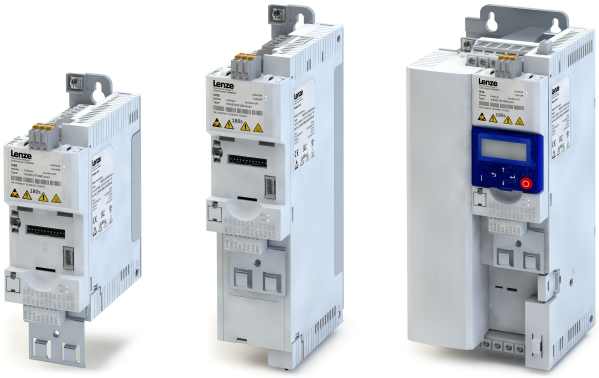

Inverter

Inverter i550 Cabinet 0.25 to 45 kW

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1 General information

1.1 Read first, then start

⚠WARNING!

Read this documentation thoroughly before carrying out the installation and commissioning.

▸ Please observe the safety instructions!

Information and tools with regard to the Lenze products can be found on the Internet:
http://www.lenze.com → Download

2 Safety instructions

2.1 Basic safety measures

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

The product

- must only be used as directed.
- must never be commissioned if they display signs of damage.
- must never be technically modified.
- must never be commissioned if they are not fully mounted.
- must never be operated without required covers.

Connect/disconnect all pluggable terminals only in deenergised condition.

Only remove the product from the installation in the deenergised state.

Insulation resistance tests between 24V control potential and PE: According to EN 61800−5−1, the maximum test voltage must not exceed 110 V DC.

Observe all specifications of the corresponding documentation supplied. This is the precondition for safe and trouble-free operation and for obtaining the product features specified.

The procedural notes and circuit details described in this document are only proposals. It is up to the user to check whether they can be adapted to the particular applications. Lenze does not take any responsibility for the suitability of the procedures and circuit proposals described.

The product must only be used by qualified personnel. IEC 60364 or CENELEC HD 384 define the skills of these persons:

- They are familiar with installing, mounting, commissioning, and operating the product.
- They have the corresponding qualifications for their work.
- They know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

Please observe the specific notes in the other chapters!
Notes used:

⚠ DANGER!

This note refers to an imminent danger which, if not avoided, may result in death or serious injury.

⚠ WARNING!

This note refers to a danger which, if not avoided, may result in death or serious injury.

⚠ CAUTION!

This note refers to a danger which, if not avoided, may result in minor or moderate injury.

i NOTICE

This note refers to a danger which, if not avoided, may result in damage to property.

2.2 Residual hazards

The user must take the residual hazards mentioned into consideration in the risk assessment for his/her machine/system.

If the above is disregarded, this can lead to severe injuries to persons and damage to material assets!

Product

Observe the warning labels on the product!

Icon	Description
	Electrostatic sensitive devices: Before working on the product, the staff must ensure to be free of electrostatic charge!
	Dangerous electrical voltage Before working on the product, check if no voltage is applied to the power terminals! After mains disconnection, the power terminals carry the hazardous electrical voltage given on the product!
	High leakage current: Carry out fixed installation and PE connection in compliance with EN 61800−5−1 or EN 60204−1!
	Hot surface: Use personal protective equipment or wait until devices have cooled down!

Motor

If there is a short circuit of two power transistors, a residual movement of up to 180°/number of pole pairs can occur at the motor! (For 4-pole motor: residual movement max. 180°/2 = 90°).

2.3 Application as directed

- The product must only be operated under the operating conditions prescribed in this documentation.
- The product meets the protection requirements of 2014/35/EU: Low-Voltage Directive.
- The product is not a machine in terms of 2006/42/EC: Machinery Directive.
- Commissioning or starting the operation as directed of a machine with the product is not permitted until it has been ensured that the machine meets the regulations of the EC Directive 2006/42/EC: Machinery Directive; observe EN 60204−1.
- Commissioning or starting the operation as directed is only allowed when there is compliance with the EMC Directive 2014/30/EU.
- The harmonised standard EN 61800−5−1 is used for the inverters.
- The product is not a household appliance, but is only designed as component for commercial or professional use in terms of EN 61000−3−2.
- The product can be used according to the technical data if drive systems have to comply with categories according to EN 61800−3.

  In residential areas, the product may cause EMC interferences. The operator is responsible for taking interference suppression measures.

3 Mounting

3.1 Important notes

⚠ DANGER!

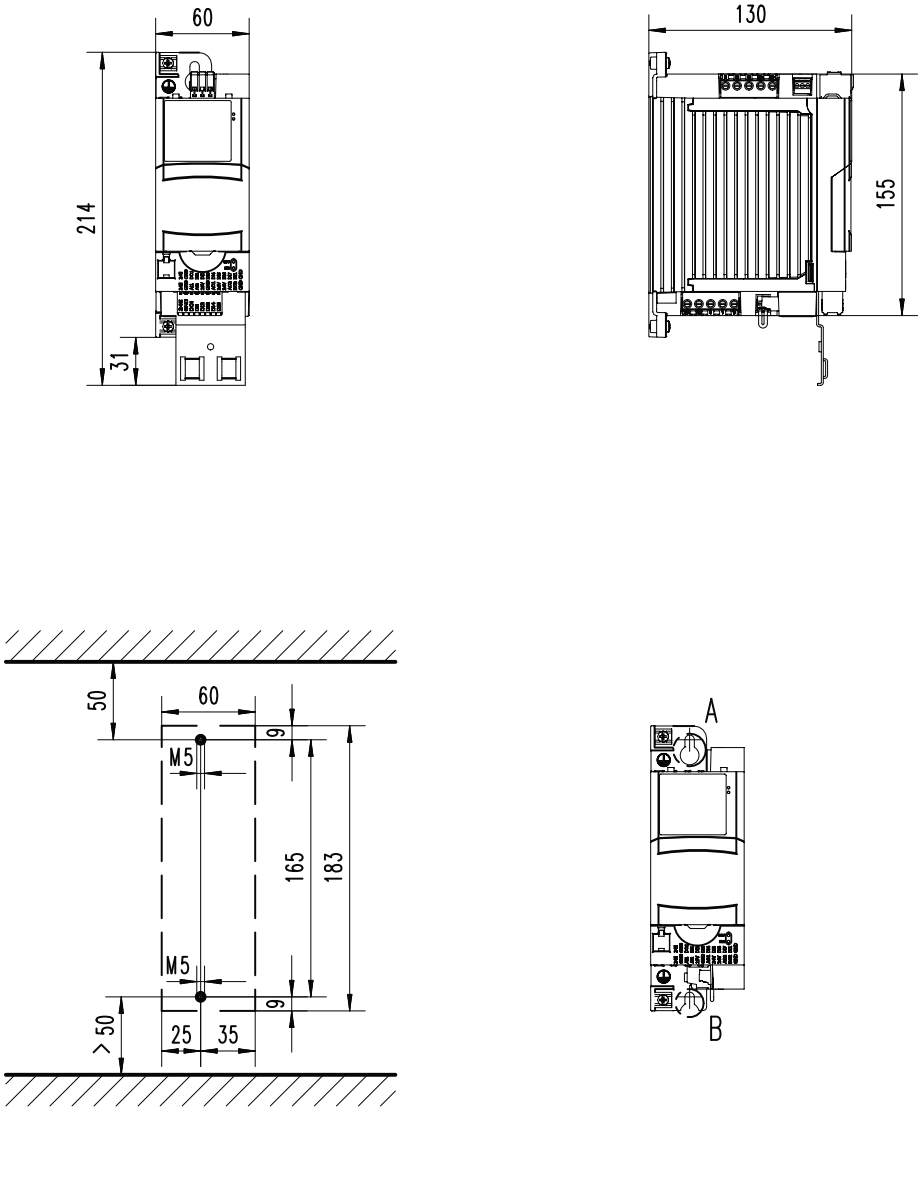
Dangerous electrical voltage

Possible consequence: death or severe injuries

- ▸ All work on the inverter must only be carried out in the deenergised state.
- ▸ After switching off the mains voltage, wait for at least 3 minutes before you start working.

3.2 Mechanical installation

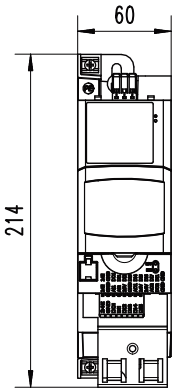
Dimensions i55AE 0,25 kW ... 0,37 kW

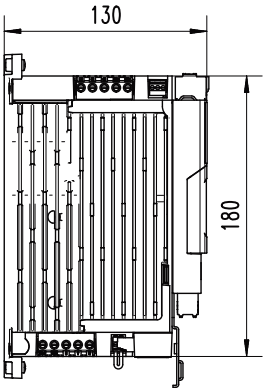


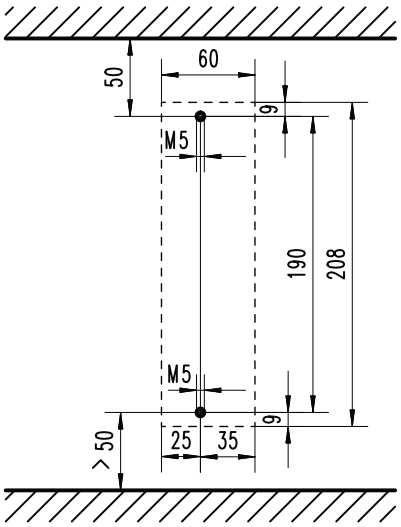
8800263

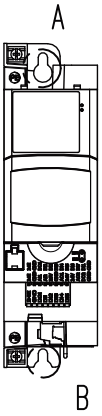
All dimensions in mm

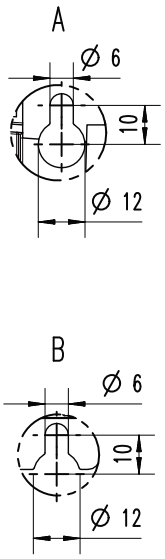
Dimensions i55AE 0,55 kW ... 0,75 kW







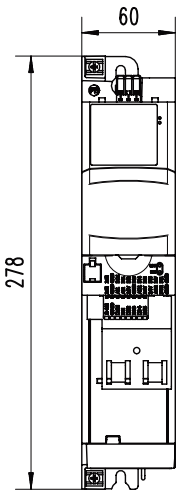


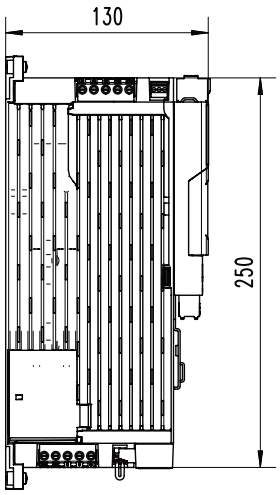


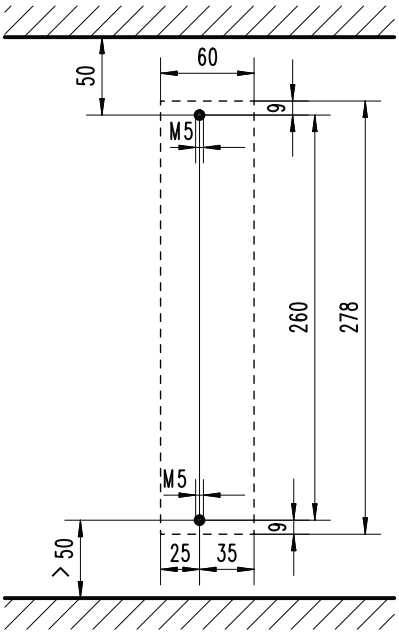
8800264

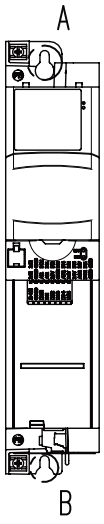
All dimensions in mm

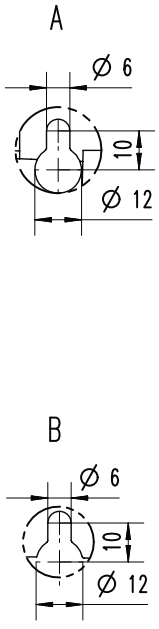
Dimensions i55AE 1,1 kW ... 2,2 kW







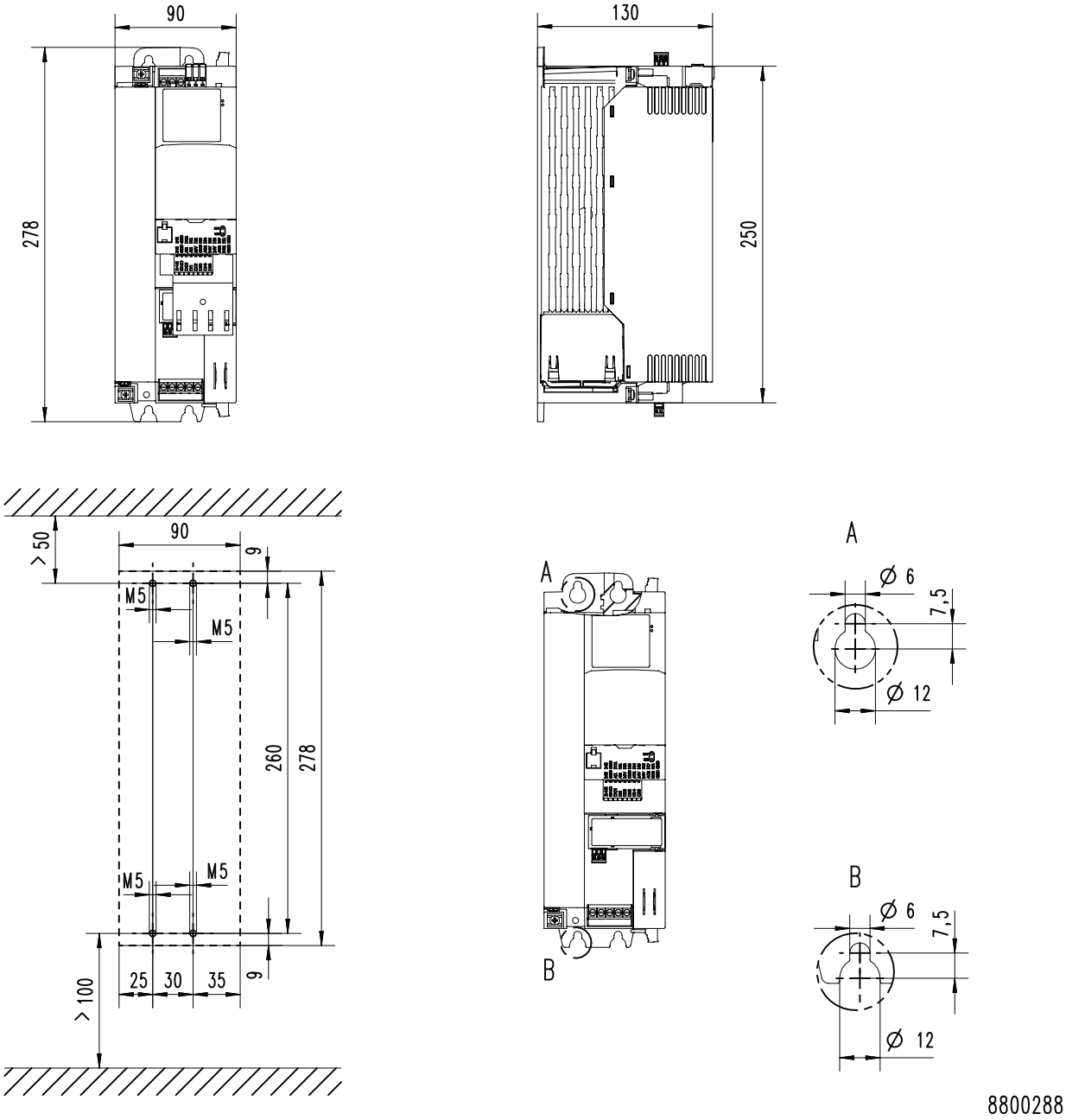




8800265

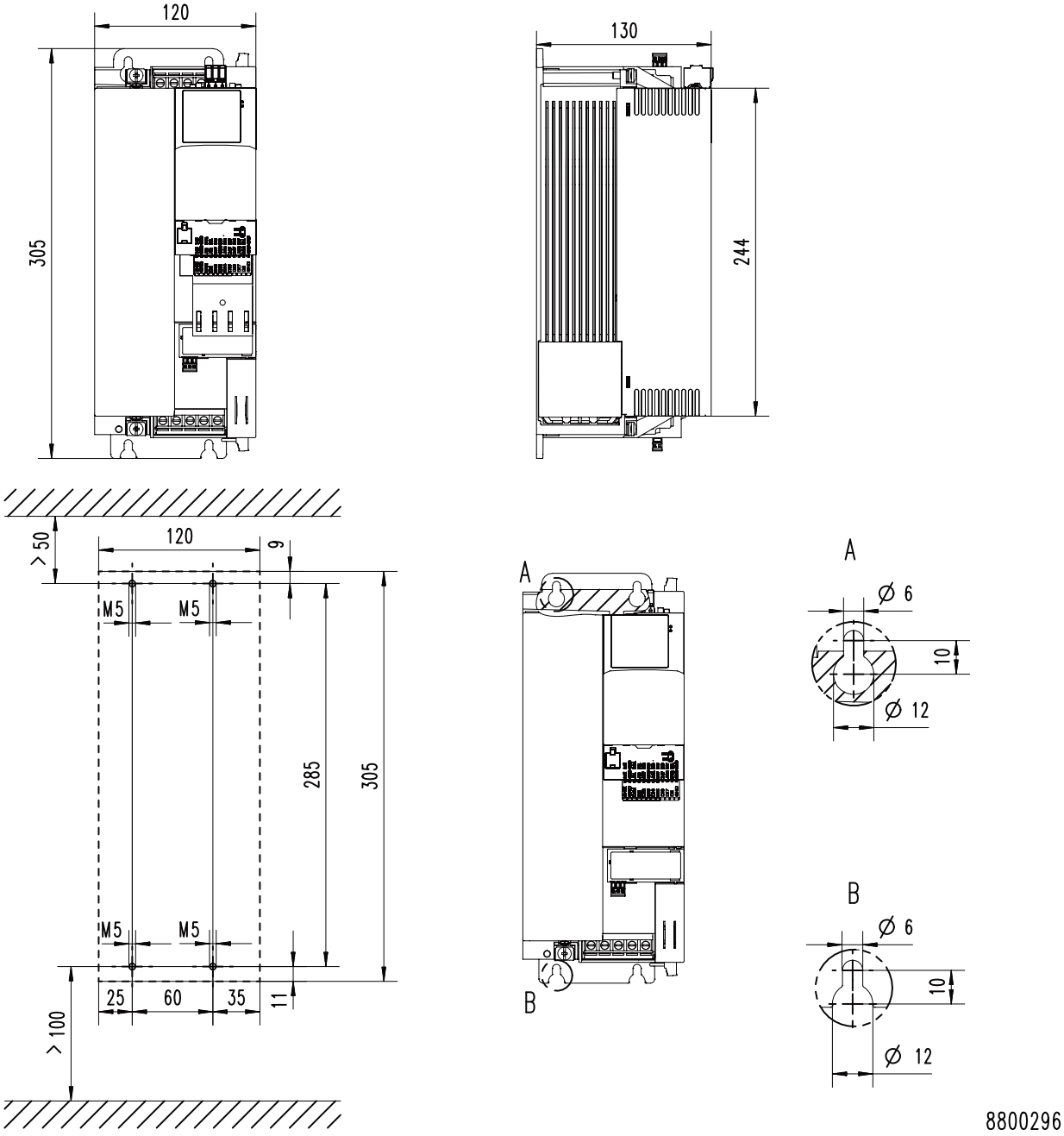
All dimensions in mm

Dimensions i55AE 3 kW ... 5,5 kW



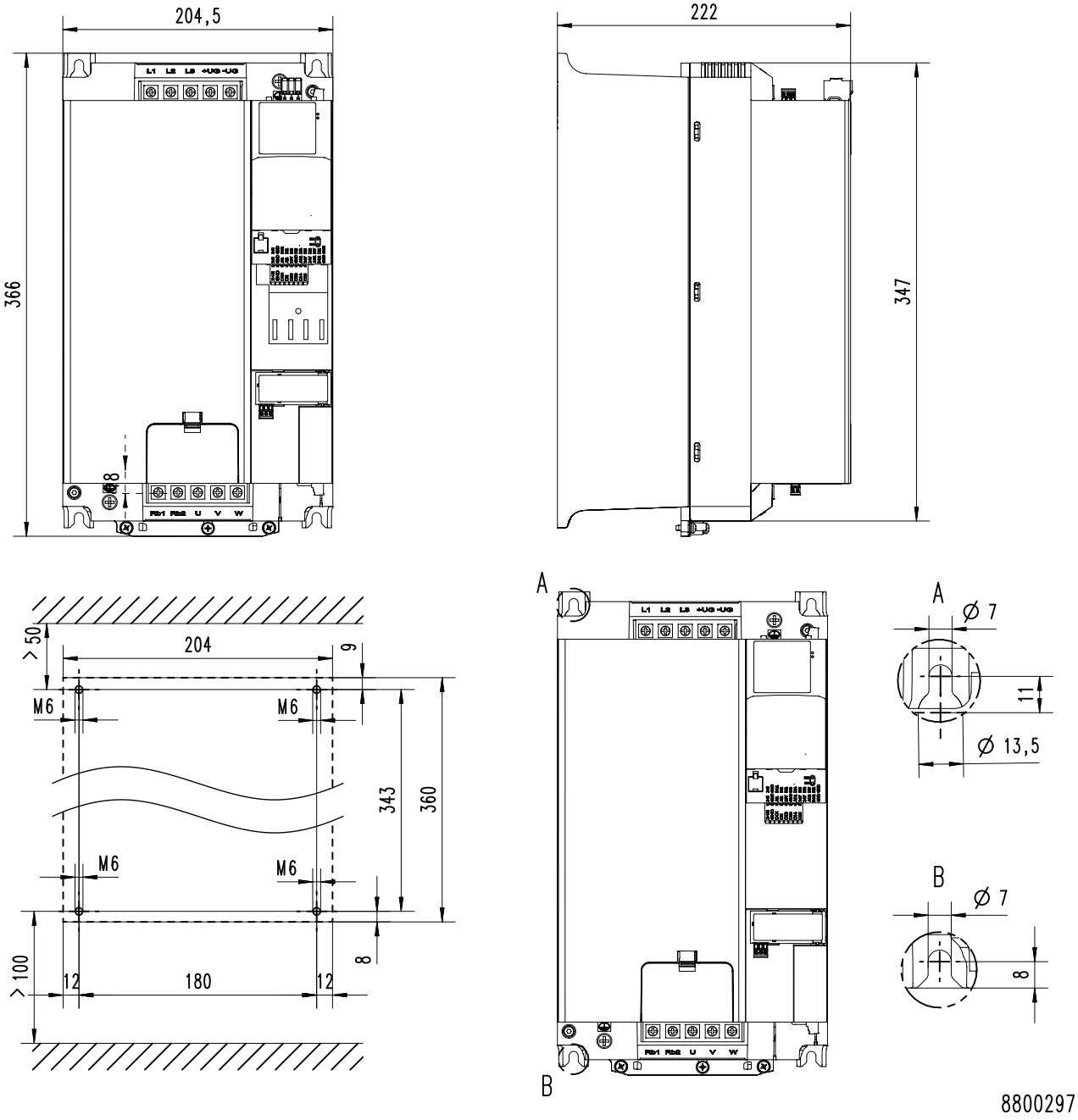
All Dimensions in mm

Dimensions i55AE 7,5 kW ... 11 kW



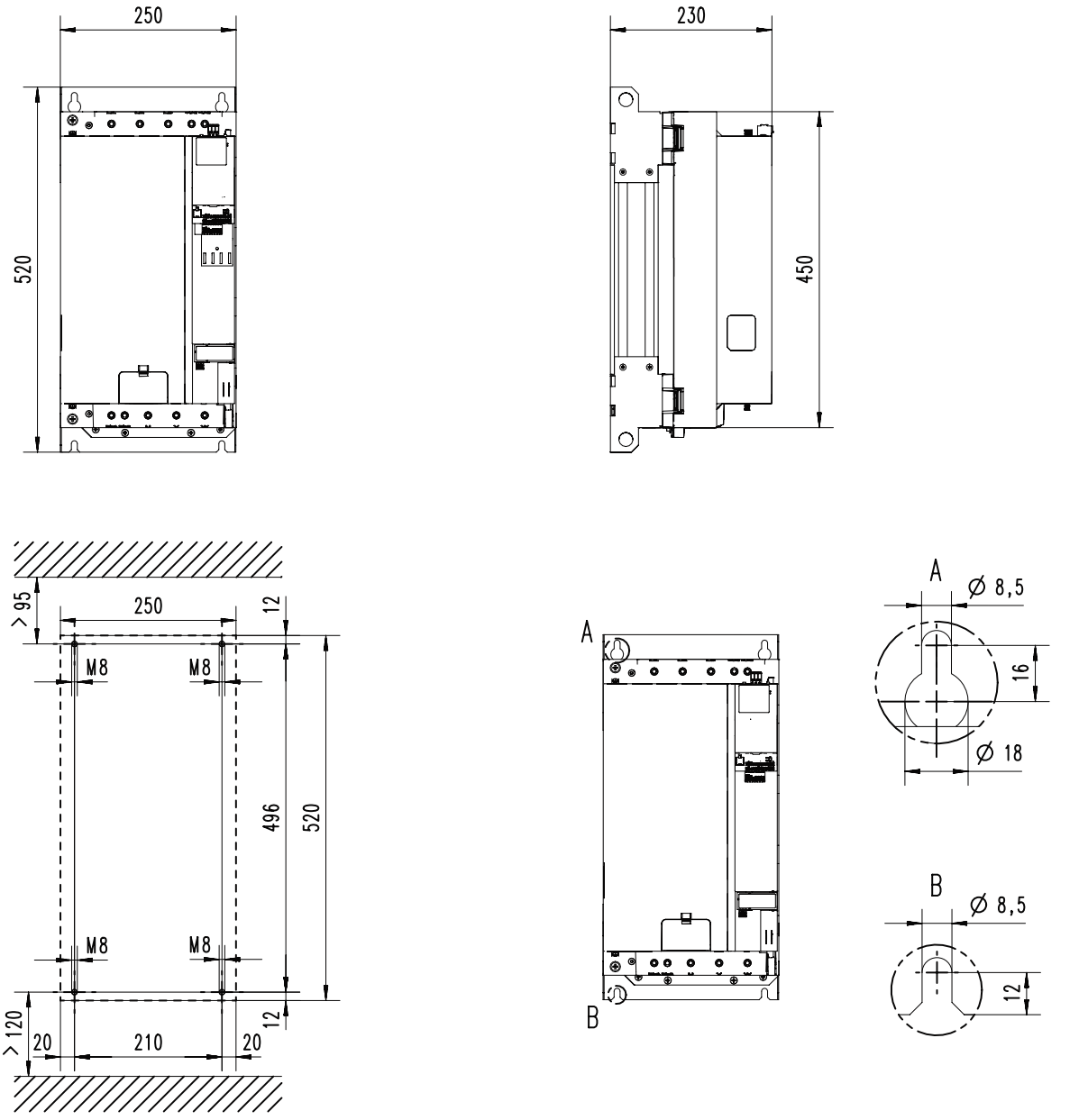
All Dimensions in mm

Dimensions i55AE 15 kW ... 22 kW



All Dimensions in mm

Dimensions i55AE 30 kW ... 45 kW



All dimensions in mm

3.3 Electrical installation

3.3.1 1-phase mains connection 230/240 V

3.3.1.1 Connection plan

The wiring diagram is valid for I5xAExxx**B** inverters.

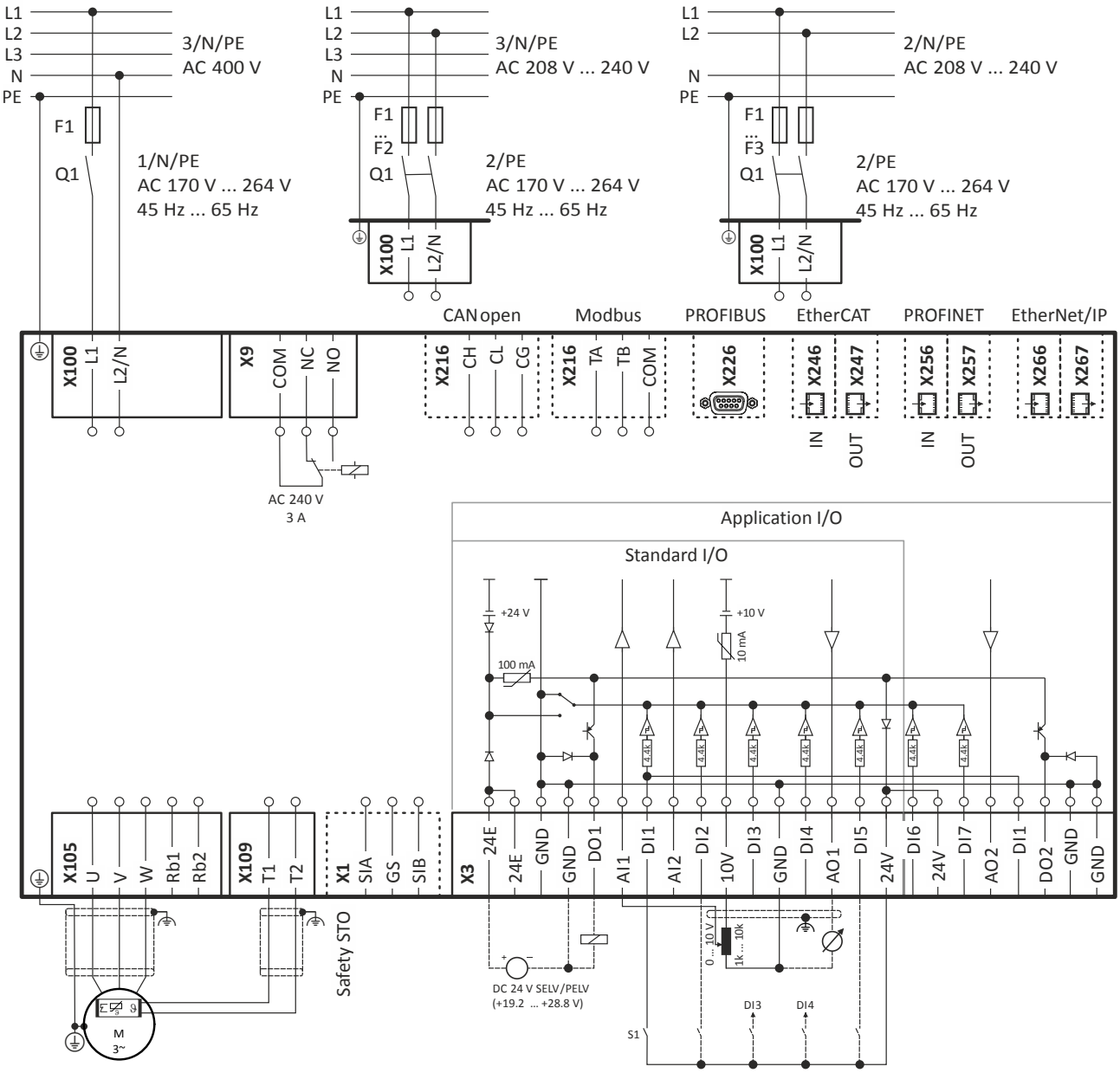


Fig. 1: Wiring example

S1	Run/Stop	Q1	Mains contactor
Fx	Fuses	---	Dashed line = options

3.3.1.2 Fusing and terminal data

Inverter		I55AE125B	I55AE137B	I55AE155B	I55AE175B	I55AE211B	I55AE215B	I55AE222B
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	16	16	25	25	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	16	16	25	25	25
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	16	16	25	25	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	16	16	25	25	25
Earth-leakage circuit breaker								
1-phase mains connection		≥ 30 mA, type A or B						
Mains connection								
Connection		X100						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1						
Max. cable cross-section	mm²	2.5				6		
Stripping length	mm	8						
Tightening torque	Nm	0.5				0.7		
Required tool		0.5 x 3.0				0.6 x 3.5		
Motor connection								
Connection		X105						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1						
Max. cable cross-section	mm²	2.5						
Stripping length	mm	8						
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						

3.3.2 1/3-phase mains connection 230/240 V

I5xAExxx**D** inverters do not have an integrated EMC filter in the AC mains supply.

In order to comply with the EMC requirements according to EN 61800−3, an external EMC filter according to IEC EN 60939 has to be used.

The user must prove that the EN 61800−3 requirements for conformity are fulfilled.

3.3.2.1 Connection plan

The wiring diagram is valid for I5xAExxx**D** inverters.

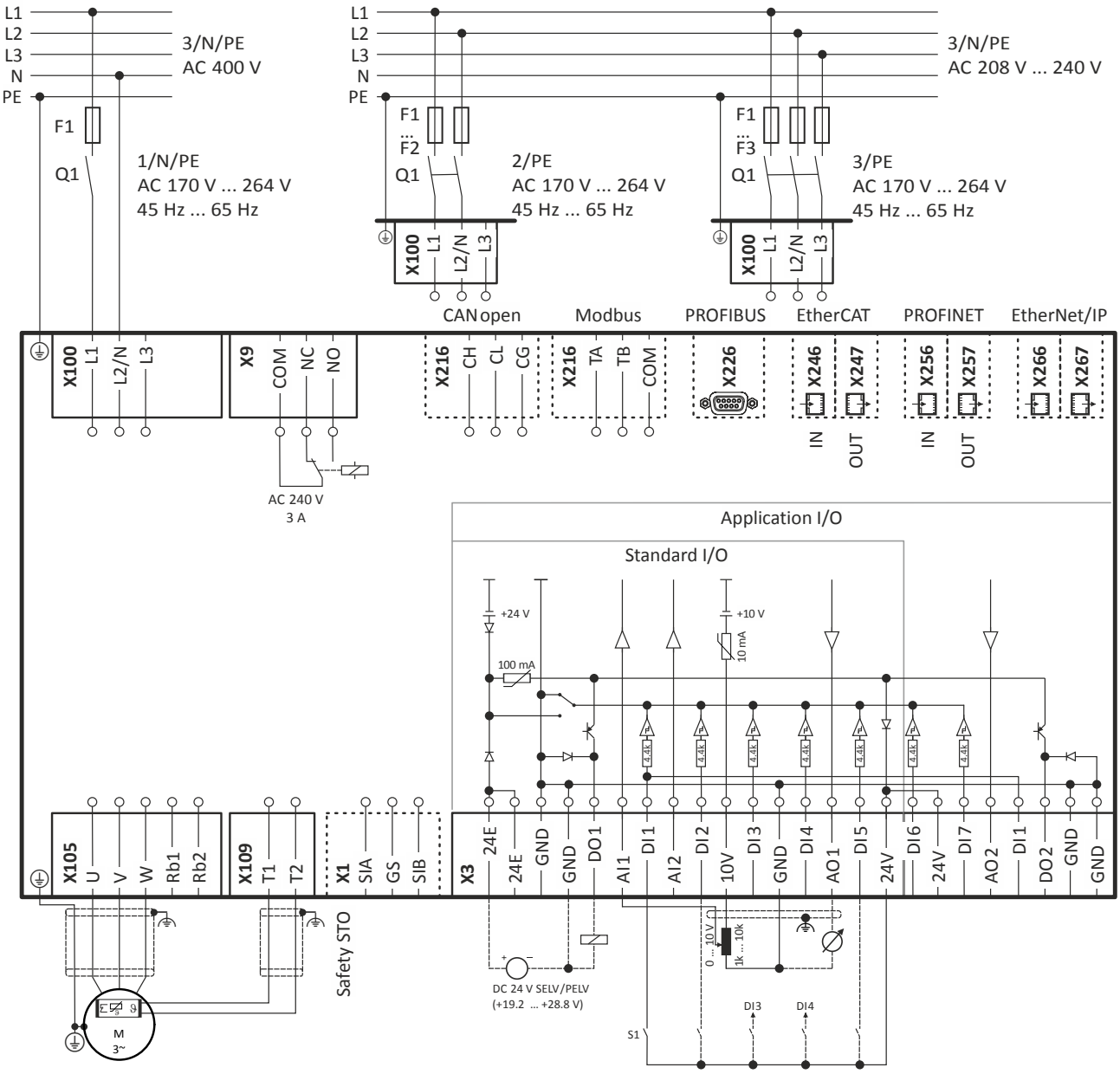


Fig. 2: Wiring example

S1	Run/Stop	Q1	Mains contactor
Fx	Fuses	---	Dashed line = options

3.3.2.2 Fusing and terminal data

Inverter		I55AE125D	I55AE137D	I55AE155D	I55AE175D	I55AE211D	I55AE215D	I55AE222D
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	16	16	25	25	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	16	16	25	25	25
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	16	16	25	25	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	16	16	25	25	25
Earth-leakage circuit breaker								
1-phase mains connection		≥ 30 mA, type A or B						
3-phase mains connection		≥ 30 mA, type B						
Mains connection								
Connection		X100						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1						
Max. cable cross-section	mm²	2.5				6		
Stripping length	mm	8						
Tightening torque	Nm	0.5				0.7		
Required tool		0.5 x 3.0				0.6 x 3.5		
Motor connection								
Connection		X105						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1						
Max. cable cross-section	mm²	2.5						
Stripping length	mm	8						
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						

3.3.3 3-phase mains connection 230/240 V

3.3.3.1 Fusing and terminal data

Inverter		I55AE240C	I55AE255C
Cable installation in compliance with		EN 60204-1	
Laying system		C	
Operation		without mains choke	
Fuse			
Characteristics		gG/gL or gRL	
Max. rated current	A	32	32
Circuit breaker			
Characteristics		B	
Max. rated current	A	32	32
Operation		with mains choke	
Fuse			
Characteristics		gG/gL or gRL	
Max. rated current	A	32	32
Circuit breaker			
Characteristics		B	
Max. rated current	A	32	32
Earth-leakage circuit breaker			
3-phase mains connection		≥ 300 mA, type B	
Mains connection			
Connection		X100	
Connection type		Screw terminal	
Min. cable cross-section	mm²	1.5	
Max. cable cross-section	mm²	6	
Stripping length	mm	9	
Tightening torque	Nm	0.5	
Required tool		0.6 x 3.5	
Motor connection			
Connection		X105	
Connection type		Screw terminal	
Min. cable cross-section	mm²	1.5	
Max. cable cross-section	mm²	6	
Stripping length	mm	9	
Tightening torque	Nm	0.5	
Required tool		0.6 x 3.5	

3.3.4 3-phase mains connection 400 V

3.3.4.1 Connection plan

The wiring diagram is valid for I5xAExxx**F** inverters.

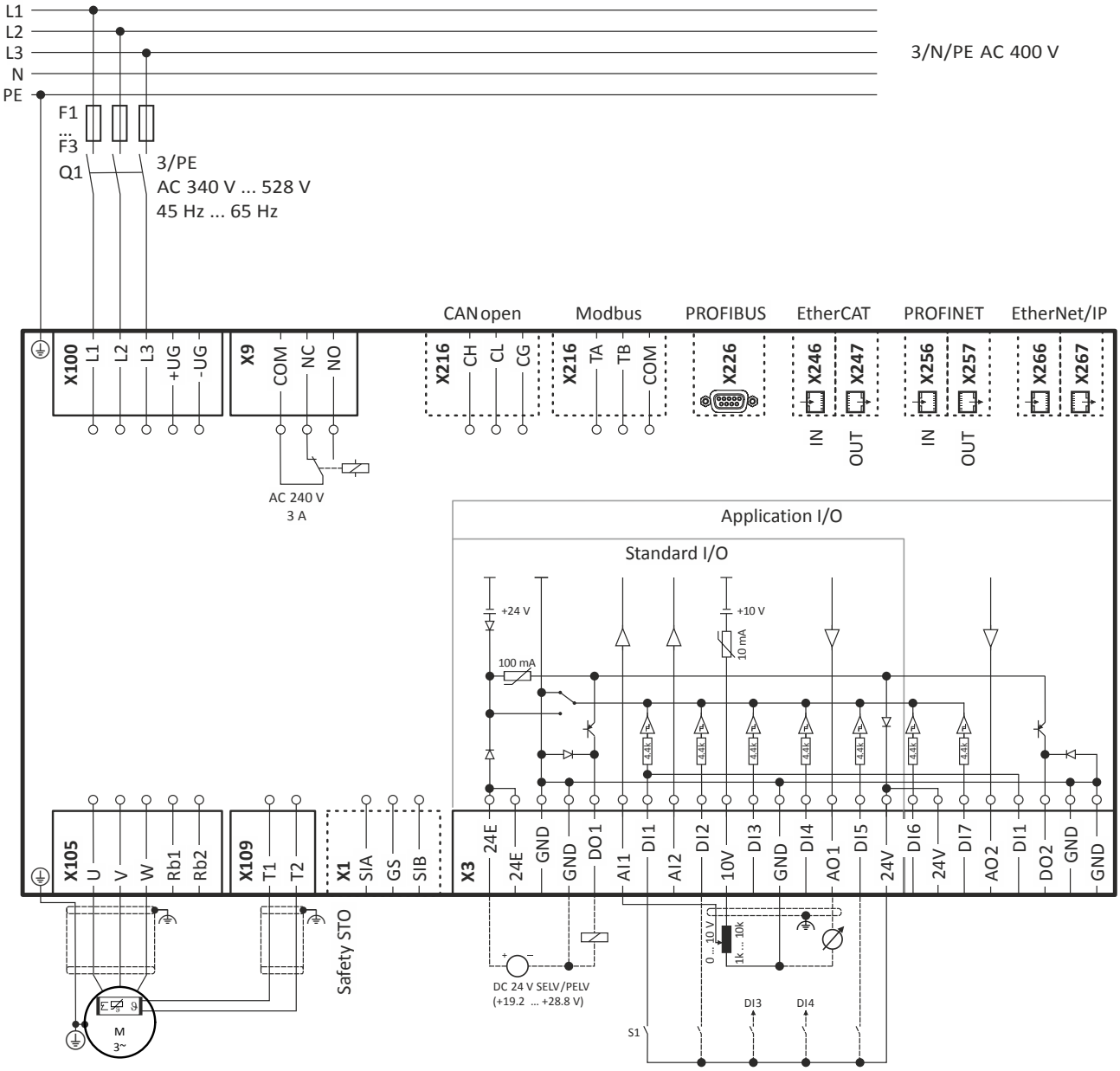


Fig. 3: Wiring example

S1	Run/Stop	Q1	Mains contactor
Fx	Fuses	---	Dashed line = options

3.3.4.2 Fusing and terminal data

Inverter		I55AE137F	I55AE155F	I55AE175F	I55AE211F	I55AE215F	I55AE222F	I55AE230F
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	10	16	16	16	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	10	16	16	16	25
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	10	16	16	16	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	10	16	16	16	25
Earth-leakage circuit breaker								
3-phase mains connection		≥ 30 mA, type B						≥ 300 mA, type B
Mains connection								
Connection		X100						
Connection type		Screw terminal						Screw terminal
Min. cable cross-section	mm²	1						1.5
Max. cable cross-section	mm²	2.5						6
Stripping length	mm	8						9
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						0.6 x 3.5
Motor connection								
Connection		X105						
Connection type		Screw terminal						Screw terminal
Min. cable cross-section	mm²	1						1.5
Max. cable cross-section	mm²	2.5						6
Stripping length	mm	8						9
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						0.6 x 3.5

Inverter		I55AE240F	I55AE255F	I55AE275F	I55AE311F	I55AE315F	I55AE318F	I55AE322F
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						-
Max. rated current	A	25	25	32	32	63	63	-
Circuit breaker								
Characteristics		B						-
Max. rated current	A	25	25	32	32	63	63	-
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	25	25	32	32	63	63	63
Circuit breaker								
Characteristics		B						
Max. rated current	A	25	25	32	32	63	63	63
Earth-leakage circuit breaker								
3-phase mains connection		≥ 300 mA, type B						
Mains connection								
Connection		X100						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1.5						
Max. cable cross-section	mm²	6		16		35		
Stripping length	mm	9		11		18		
Tightening torque	Nm	0.5		1.2		3.8		
Required tool		0.6 x 3.5		0.8 x 4.0		0.8 x 5.5		
Motor connection								
Connection		X105						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1.5						
Max. cable cross-section	mm²	6		16		35		
Stripping length	mm	9		11		18		
Tightening torque	Nm	0.5		1.2		3.8		
Required tool		0.6 x 3.5		0.8 x 4.0		0.8 x 5.5		

Inverter		I55AE330F	I55AE337F	I55AE345F
Cable installation in compliance with		EN 60204-1		
Laying system		C		
Operation				
Fuse				
Characteristics		-		
Max. rated current	A	-	-	-
Circuit breaker				
Characteristics		-		
Max. rated current	A	-	-	-
Operation		with mains choke		
Fuse				
Characteristics		gG/gL or gRL		
Max. rated current	A	80	100	125
Circuit breaker				
Characteristics		B		
Max. rated current	A	80	100	125
Earth-leakage circuit breaker				
3-phase mains connection		≥ 300 mA, type B		
Mains connection				
Connection		X100		
Connection type		Screw terminal		
Min. cable cross-section	mm²	10		
Max. cable cross-section	mm²	50		
Stripping length	mm	19		
Tightening torque	Nm	4		
Required tool		Allen key 4.0		
Motor connection				
Connection		X105		
Connection type		Screw terminal		
Min. cable cross-section	mm²	10		
Max. cable cross-section	mm²	50		
Stripping length	mm	19		
Tightening torque	Nm	4		
Required tool		Allen key 4.0		

3.3.5 3-phase mains connection 480 V

3.3.5.1 Connection plan

The wiring diagram is valid for I5xAExxx**F** inverters.

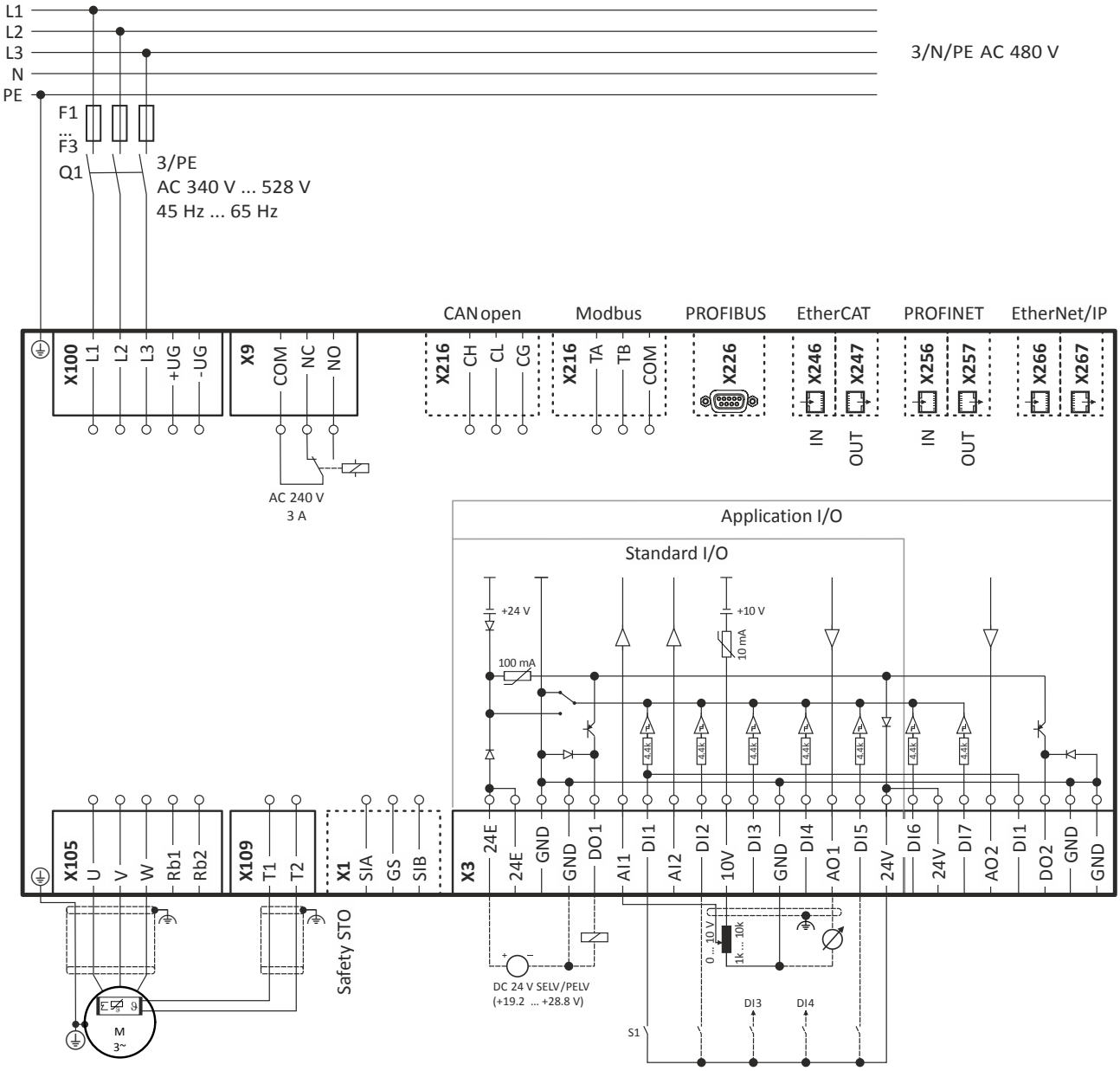


Fig. 4: Wiring example

S1	Run/Stop	Q1	Mains contactor
Fx	Fuses	---	Dashed line = options

3.3.5.2 Fusing and terminal data

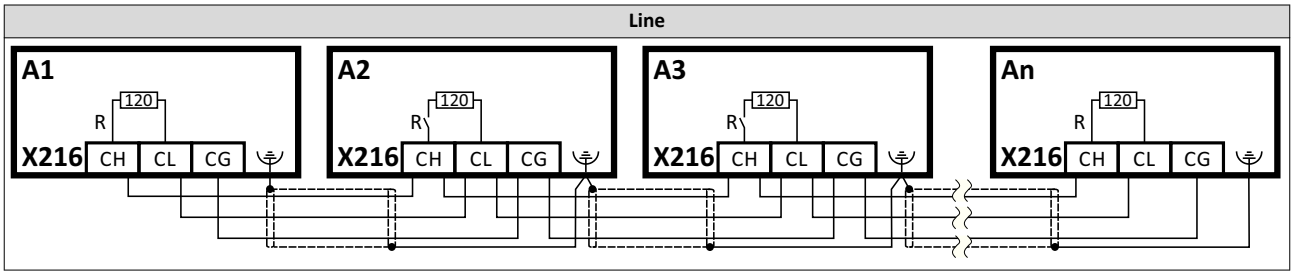
Inverter		I55AE137F	I55AE155F	I55AE175F	I55AE211F	I55AE215F	I55AE222F	I55AE230F
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	10	16	16	16	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	10	16	16	16	25
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	10	10	10	16	16	16	25
Circuit breaker								
Characteristics		B						
Max. rated current	A	10	10	10	16	16	16	25
Earth-leakage circuit breaker								
3-phase mains connection		≥ 30 mA, type B						≥ 300 mA, type B
Mains connection								
Connection		X100						
Connection type		Screw terminal						Screw terminal
Min. cable cross-section	mm²	1						1.5
Max. cable cross-section	mm²	2.5						6
Stripping length	mm	8						9
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						0.6 x 3.5
Motor connection								
Connection		X105						
Connection type		Screw terminal						Screw terminal
Min. cable cross-section	mm²	1						1.5
Max. cable cross-section	mm²	2.5						6
Stripping length	mm	8						9
Tightening torque	Nm	0.5						
Required tool		0.5 x 3.0						0.6 x 3.5

Inverter		I55AE240F	I55AE255F	I55AE275F	I55AE311F	I55AE315F	I55AE318F	I55AE322F
Cable installation in compliance with		EN 60204-1						
Laying system		B2						
Operation		without mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	25	25	32	32	63	63	63
Circuit breaker								
Characteristics		B						
Max. rated current	A	25	25	32	32	63	63	63
Operation		with mains choke						
Fuse								
Characteristics		gG/gL or gRL						
Max. rated current	A	25	25	32	32	63	63	63
Circuit breaker								
Characteristics		B						
Max. rated current	A	25	25	32	32	63	63	63
Earth-leakage circuit breaker								
3-phase mains connection		≥ 300 mA, type B						
Mains connection								
Connection		X100						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1.5						
Max. cable cross-section	mm²	6		16		35		
Stripping length	mm	9		11		18		
Tightening torque	Nm	0.5		1.2		3.8		
Required tool		0.6 x 3.5		0.8 x 4.0		0.8 x 5.5		
Motor connection								
Connection		X105						
Connection type		Screw terminal						
Min. cable cross-section	mm²	1.5						
Max. cable cross-section	mm²	6		16		35		
Stripping length	mm	9		11		18		
Tightening torque	Nm	0.5		1.2		3.8		
Required tool		0.6 x 3.5		0.8 x 4.0		0.8 x 5.5		

Inverter		I55AE330F	I55AE337F	I55AE345F
Cable installation in compliance with		EN 60204-1		
Laying system		C		
Operation				
Fuse				
Characteristics		-		
Max. rated current	A	-	-	-
Circuit breaker				
Characteristics		-		
Max. rated current	A	-	-	-
Operation		with mains choke		
Fuse				
Characteristics		gG/gL or gRL		
Max. rated current	A	80	100	125
Circuit breaker				
Characteristics		B		
Max. rated current	A	80	100	125
Earth-leakage circuit breaker				
3-phase mains connection		≥ 300 mA, type B		
Mains connection				
Connection		X100		
Connection type		Screw terminal		
Min. cable cross-section	mm²	10		
Max. cable cross-section	mm²	50		
Stripping length	mm	19		
Tightening torque	Nm	4		
Required tool		Allen key 4.0		
Motor connection				
Connection		X105		
Connection type		Screw terminal		
Min. cable cross-section	mm²	10		
Max. cable cross-section	mm²	50		
Stripping length	mm	19		
Tightening torque	Nm	4		
Required tool		Allen key 4.0		

3.3.6 CANopen

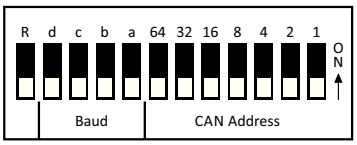
Typical topologies



Terminal description		CANopen
Connection		X216
Connection type		Spring terminal
Min. cable cross-section	mm²	0.5
Max. cable cross-section	mm²	2.5
Stripping length	mm	10
Tightening torque	Nm	-
Required tool		0.4 x 2.5

Basic network settings

Use the DIP switch to set the node address and baud rate and to activate the integrated bus terminating resistor.



Bus termination	Baud rate					CAN node address						
R	d	c	b	a		64	32	16	8	4	2	1
OFF	OFF	ON	OFF	ON	20 kbps	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
Inactive	OFF	OFF	ON	ON	50 kbps	Value from parameter						
ON	OFF	OFF	ON	OFF	125 kbps	Node address - example:						
Active	OFF	OFF	OFF	ON	250 kbps	OFF	OFF	ON	OFF	ON	ON	ON
	OFF	**OFF**	**OFF**	**OFF**	Value from parameter (**500 kbps**)	Node address = 16 + 4 + 2 + 1 = 23						
	OFF	ON	OFF	OFF	1 Mbps							
	All other combinations				Value from parameter (**500 kbps**)							

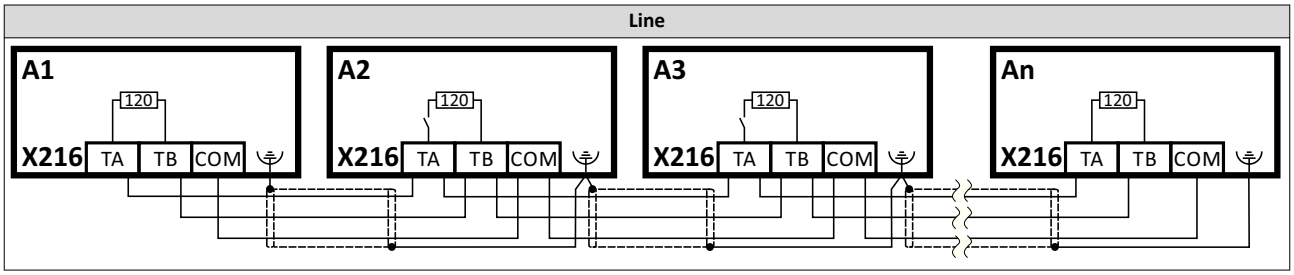
Bold print = default setting

The network must be terminated with a 120 Ω resistor at the physically first and last node.

Set the "R" switch to ON at these nodes.

3.3.7 Modbus

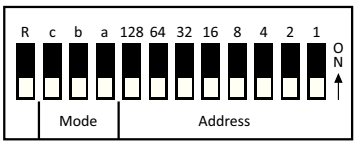
Typical topologies



Terminal description		Modbus
Connection		X216
Connection type		Spring terminal
Min. cable cross-section	mm²	0.5
Max. cable cross-section	mm²	2.5
Stripping length	mm	10
Tightening torque	Nm	-
Required tool		0.4 x 2.5

Basic network settings

Use the DIP switch to set the node address and baud rate and to activate the integrated bus terminating resistor.



Bus termination		Baud rate	Parity	Modbus node address							
R	**c**	**b**	**a**	**128**	**64**	**32**	**16**	**8**	**4**	**2**	**1**
OFF	n.c.	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
Inactive		Automatic detection	Automatic detection	Value from parameter							
ON		ON	ON	Node address - example:							
Active		Value from parameter	Value from parameter	OFF	OFF	OFF	ON	OFF	ON	ON	ON
				Node address = 16 + 4 + 2 + 1 = 23 Node address > 247: value from parameter							

Bold print = default setting

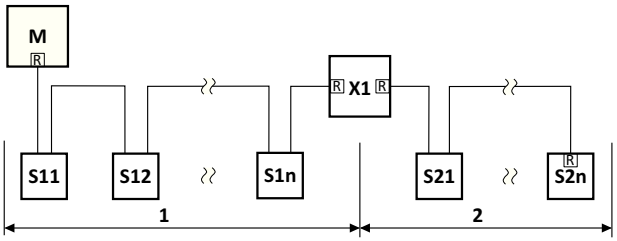
The network must be terminated with a 120 Ω resistor at the physically first and last node.

Set the "R" switch to ON at these nodes.

3.3.8 PROFIBUS

Typical topologies

Line with repeater

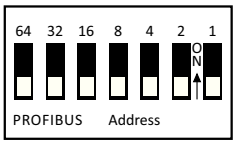


M	Master	X1	Repeater
Sxx	Slaves	R	Activated bus terminating resistor

Basic network settings

Use the DIP switch to set the station address.

The baud rate is detected automatically.



PROFIBUS station address						
64	**32**	**16**	**8**	**4**	**2**	**1**
OFF	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
Value from parameter						
Station address - example:						
OFF	OFF	ON	OFF	ON	ON	ON
Station address = 16 + 4 + 2 + 1 = 23 Do not set station address = 126 and station address = 127. These station addresses are invalid.						

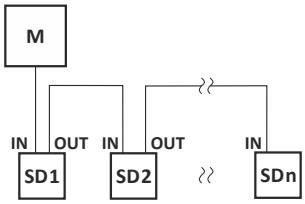
Bold print = default setting

The network must be terminated with a resistor at the physically first and last node.

Activate the bus terminating resistor at these nodes in the bus connection plug.

3.3.9 EtherCAT

Typical topologies

Line


M	Master
SD	Slave Device

Basic network settings

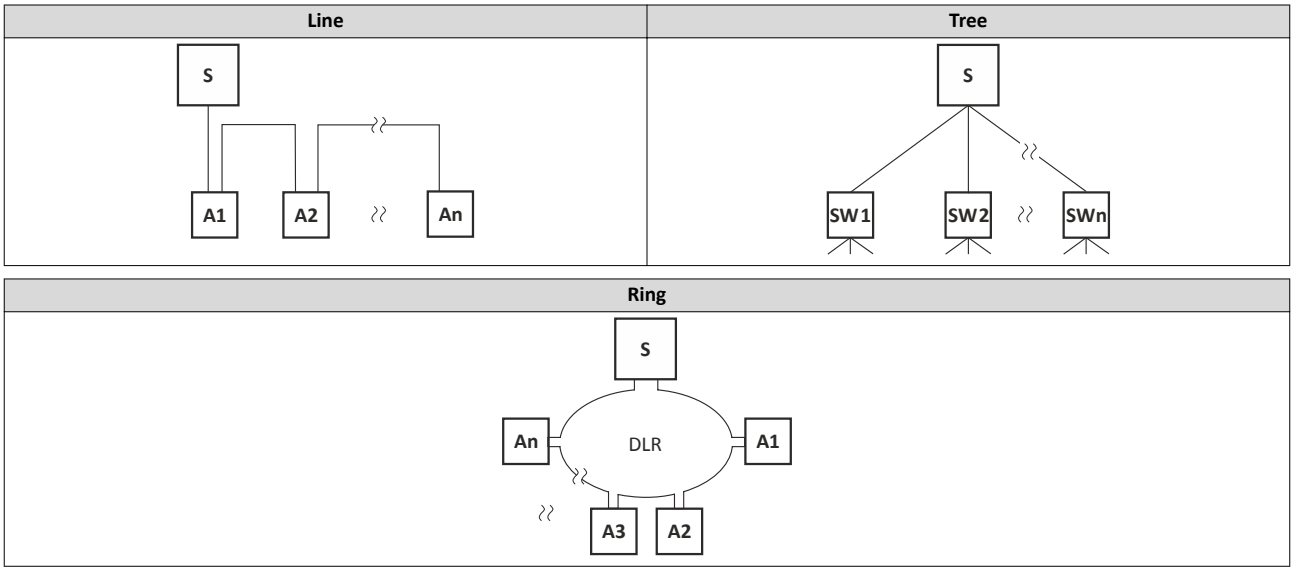
The rotary encoder switch allows you to set an EtherCAT identifier.

x 16 x 1

Setting	Identifier
0x00	Value from parameter
0x01 ... 0xFF	Switch position

3.3.10 EtherNet/IP

Typical topologies



S Scanner
A Adapter

Basic network settings

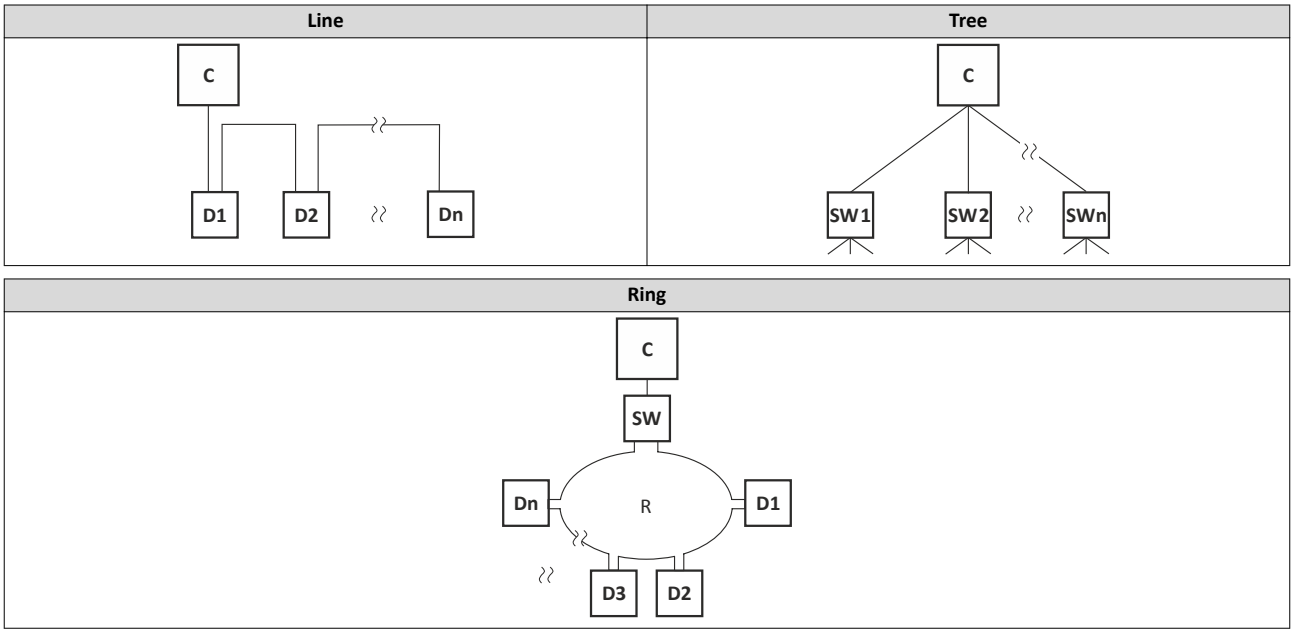
The rotary encoder switch allows you to set the last byte of the IP address.

x 16 x 1

Setting	Value of last byte
0x00	Value from parameter
0x01 ... 0xFE	Switch position
0xFF	Default setting

3.3.11 PROFINET

Typical topologies



C	I/O controller	SW	Switch SCALANCE (MRP capable)
D	I/O device	R	Redundant domain

The rotary encoder switch has no function.

3.3.12 Connection of the safety module

3.3.12.1 Terminal data

Terminal description		Safety STO
Connection		X1
Connection type		Screw terminal
Min. cable cross-section	mm²	0.5
Max. cable cross-section	mm²	1.5
Stripping length	mm	6
Tightening torque	Nm	0.2
Required tool		0.4 x 2.5

4 Commissioning

4.1 Important notes

⚠WARNING!

Incorrect wiring can cause unexpected states during the commissioning phase.

Possible consequence: death, severe injuries or damage to property

Check the following before switching on the mains voltage:

- Is the wiring complete and correct?
- Are there no short circuits and earth faults?
- Is the motor circuit configuration (star/delta) adapted to the output voltage of the inverter?
- Is the motor connected in-phase (direction of rotation)?
- Does the "emergency stop" function of the entire plant operate correctly?

⚠WARNING!

Incorrect settings during commissioning may cause unexpected and dangerous motor and system movements.

Possible consequence: death, severe injuries or damage to property

- Clear hazardous area.
- Observe safety instructions and safety clearances.

4.2 Operating interfaces

Commissioning the inverter requires an operator-process interface.

4.2.1 Keypad

The keypad is an easy means for the local operation, parameterisation, and diagnostics of the inverter.

- The keypad is simply connected to the diagnostic interface on the front of the inverter.
- The keypad can also be connected and removed during operation.

Detailed information on the keypad can be found in the appendix:

▸ Operate and parameterise the inverter with keypad 🕮 454

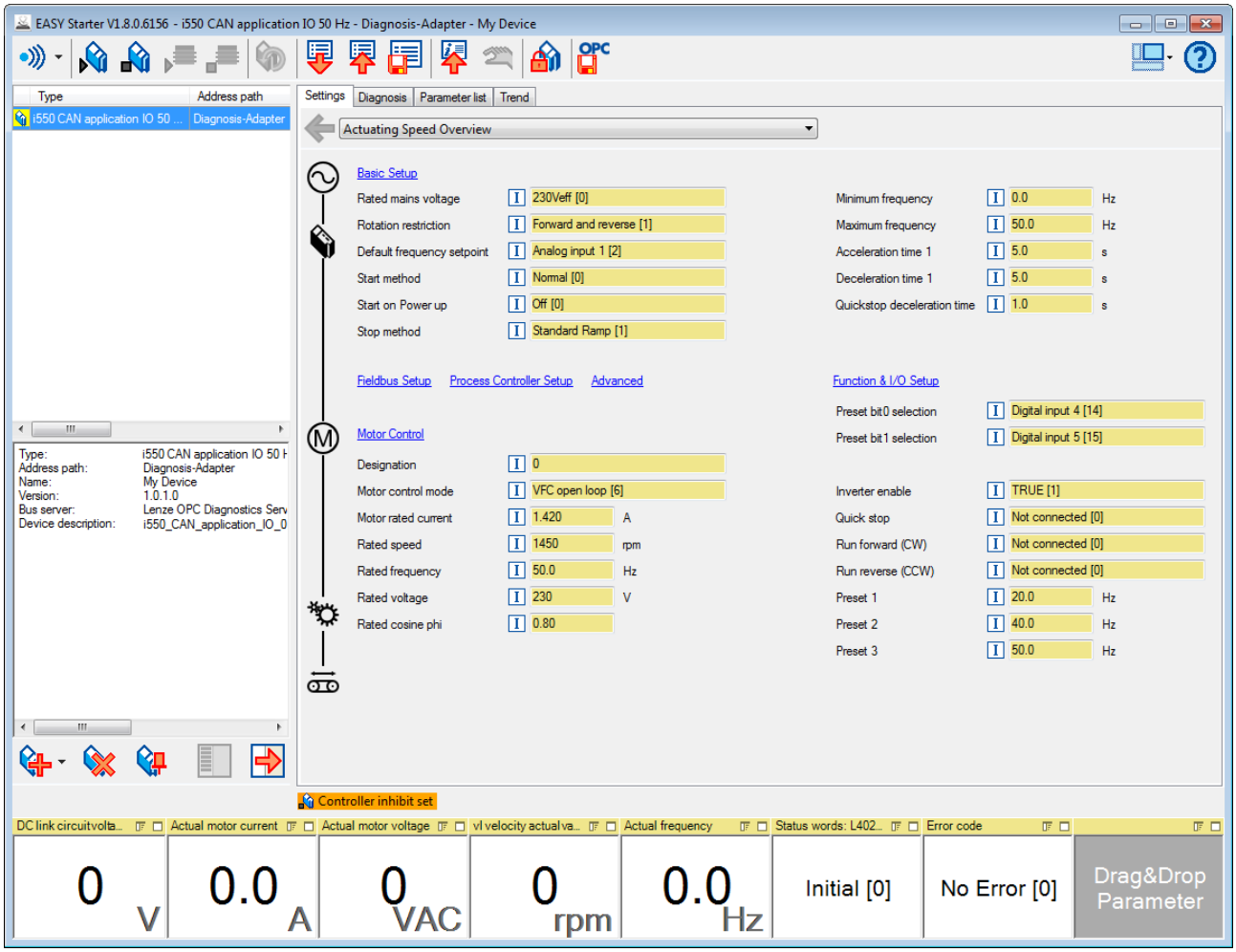
4.2.2 Engineering tool »EASY Starter«

The »EASY Starter« is a PC software that is especially designed for the commissioning and maintenance of the inverter.

The »EASY Starter« PC software can be found on the Internet:

http://www.lenze.com → Download → Software Downloads

Sample screenshot:



4.2.2.1 Generate a connection between inverter and »EASY Starter«

For commissioning the inverter with the »EASY Starter«, a communication link with the inverter is required. This can be established in a wired or wireless manner via WLAN.

Preconditions

- For the wired communication with the inverter, the USB module and a USB 2.0 cable (A plug on Micro-B plug) are required.

- For the wireless communication with the inverter, the WLAN module is required. Moreover, the PC on which the »EASY Starter« is installed must be wireless-enabled.

Details

The following instructions describe the connection establishment via the USB module.

- Parameterising without motor operation does not require a mains voltage: If you connect the inverter directly to the PC without a hub, The USB interface of the PC is sufficient for the voltage supply.
- Instructions for the connection establishment via the WLAN module can be found in the chapter "Wireless LAN (WLAN)". 📖 244

How to establish a communication to the inverter via USB:

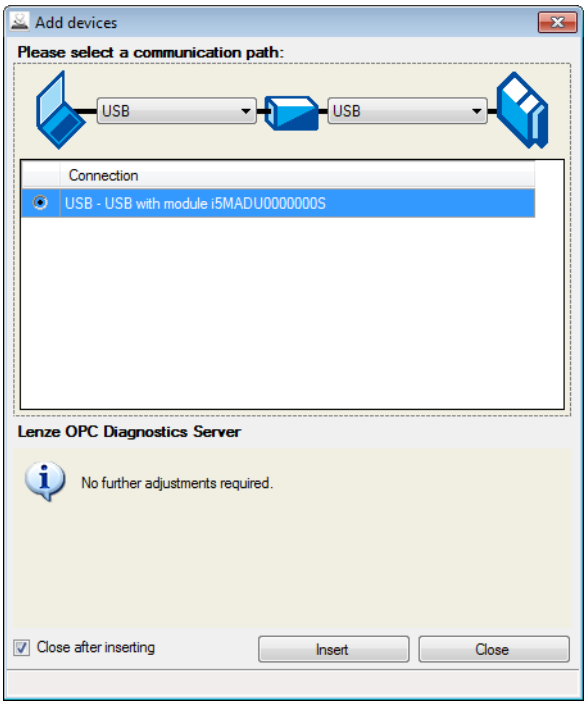
Preconditions for commissioning:

- The functional test described in the mounting and switch-on instructions has been completed successfully (without any errors or faults).
- The inverter is ready for operation (mains voltage is switched on).

Accessories required for commissioning:

- USB module
- USB 2.0 cable (A-plug on micro B-plug)
- PC with installed »EASY Starter« software

1. Plug the USB module onto the front of the inverter (interface X16).
2. Use a USB cable to connect the inverter to the PC on which »EASY Starter« is installed:
   a) Plug the micro B plug of the USB cable into the socket of the USB module.
   b) Plug the other end into a free USB type A-socket of the PC.
3. Start »EASY Starter«.
   The "Add devices" dialog is shown.
4. Select the "USB - USB via adapter i5MADU0000000S" connection:



5. Click the **Insert** button.

»EASY Starter« searches for connected devices via the communication path selected. When the connection has been established successfully, the inverter is displayed in the device list of »EASY Starter«. The inverter parameters can now be accessed via the tabs of »EASY Starter«.

4.3 Parameter setting

As a part of a machine with a speed-variable drive system, the inverter must be adapted to its drive task. The adaptation process of the inverter is carried out by changing parameters. Optionally these parameters can be accessed by means of the keypad or »EASY Starter«. If the inverter is provided with a network option, access can also be effected by a higher-level control via the corresponding network.

Certain device commands or settings which might cause a critical state of the drive behaviour can only be carried our when the inverter is inhibited.

4.3.1 General notes on parameters

Each parameter features a 16-bit index as address. Under this address, the parameter is stored in the object directory of the inverter.

- Parameters that belong together functionally are combined in a data set. These parameters are additionally provided with an 8-bit subindex.
- The colon is used as a separator between the index and subindex Example: "0x2540:001"
- There are parameters the setting of which can be changed, and (diagnostic) parameters which can only be read.

Parameterisation using the keypad

- All parameters which can be accessed by means of the keypad are provided with a "Display code", the first digit of the display code specifying the group in which the parameter can be found on the keypad.
- In the documentation, the display code — if available — is specified in brackets behind the address. Example: "0x2915 (P210.00)".

▸ Keypad parameterisation mode 📖 457

Structure of the parameter descriptions in this documentation

- The parameter descriptions in this documentation are structured in table form.
- The representation distinguishes parameters with a setting range, text, selection list, and bit-coded display.
- The default setting of parameters with a write access feature is shown in **bold**.
- The display code as well as the short keypad designation of the parameter which is limited to 16 characters, are — if available — shown in brackets.

Example: parameters with a setting range

Parameter	Name / value range / [default setting]	Info
Index:Subindex (display code)	Parameter designation (abbreviated keypad designation) Minimum value ... [**default setting**] ... maximum value • Optional information with regard to the parameter.	Explanations & notes with regard to the parameter.

Example: parameters with a selection list

Parameter	Name / value range / [default setting]		Info
Index:Subindex (display code)	Parameter designation (abbreviated keypad designation) • Optional information with regard to the parameter.		Explanations & notes with regard to the parameter. **Note:** The corresponding selection number (here 0, 1, or 2) must be set. Other values are not permissible.
	0	**Designation of selection 0**	Optionally: Explanations & notes with regard to the corresponding selection. The default selection is shown in **bold**.
	1	Designation of selection 1	
	2	Designation of selection 2	

Example: parameters with a bit-coded display

Parameter	Name / value range / [default setting]		Info
Index:Subindex (display code)	Parameter designation (abbreviated keypad designation) • Optional information with regard to the parameter.		Explanations & notes with regard to the parameter.
	Bit 0	Designation of bit 0	Optionally: Explanations & notes with regard to the corresponding bit.
	Bit 1	Designation of bit 1	
	Bit 2	Designation of bit 2	
	...	...	
	Bit 15	Designation of bit 15	

Parameter overview lists in this documentation

- Keypad parameter list: for the parameterisation using the keypad, contains a list of all parameters which can also be accessed by means of the keypad. 📖 56
- Parameter attribute list: contains a list of all inverter parameters. This list in particular includes some information that is relevant for the reading and writing of parameters via the network. 📖 472

4.3.2 Basic inverter settings

Check the following basic settings of the inverter and adapt them, if required.

Parameter	Name / value range / [default setting]		Info
0x2540:001 (P208.01)	Mains settings: Rated mains voltage (Mains settings: Mains voltage) • Setting can only be changed if the inverter is inhibited.		Selection of the mains voltage for actuating the inverter.
	0	**230 Veff**	
	1	400 Veff	
	2	480 Veff	
0x2838:001 (P203.01)	Start/stop configuration: Start method (Start/stop confg: Start method) • Setting can only be changed if the inverter is inhibited.		Behaviour after start command.
	0	**Normal**	After start command, the standard ramps are active. • Acceleration time 1 can be set in 0x2917 (P220.00). • Deceleration time 1 can be set in 0x2918 (P221.00).
	1	DC braking	After start command, the "DC braking" function is active for the time set in 0x2B84:002 (P704.02). ▸ DC braking 🕮 290
	2	Flying restart circuit	After the start command, the flying restart circuit is active. The flying restart function makes it possible to restart a coasting motor during operation without speed feedback. Synchronicity between the inverter and motor is coordinated so that the transition to the rotating motor is effected without jerk at the time of connection. ▸ Flying restart circuit 🕮 347
0x2838:002 (P203.02)	Start/stop configuration: Start at power-up (Start/stop confg: Start at powerup)		Starting performance after switching on the mains voltage.
	0	**Off**	No automatic start after switching on mains voltage. In addition to the inverter enable, a renewed start command is always required to start the motor.
	1	On	Automatic start of the motor after switching on the mains voltage if the inverter is enabled and a start command exists.
0x2838:003 (P203.03)	Start/stop configuration: Stop method (Start/stop confg: Stop method)		Behaviour after the "Stop" command.
	0	Coasting	The motor becomes torqueless (coasts down to standstill).
	1	**Standard ramp**	The motor is brought to a standstill with deceleration time 1 (or deceleration time 2, if activated). • Deceleration time 1 can be set in 0x2918 (P221.00). • Deceleration time 2 can be set in 0x291A (P223.00). ▸ Frequency limits and ramp times 🕮 118
	2	Quick stop ramp	The motor is brought to a standstill with the deceleration time set for the "Quick stop" function. • Deceleration time for quick stop can be set in 0x291C (P225.00). • The "quick stop" function can also be activated manually, for instance via a digital input. ▸ Quick stop 🕮 121
0x283A (P304.00)	Limitation of rotation (Limit. rotation)		Optional restriction of the rotating direction.
	0	Only clockwise (CW)	The motor can only be rotated clockwise (CW). The transfer of negative frequency and PID setpoints to the motor control is prevented. • This function takes effect after the "Invert rotation" function (0x2631:013 (P400.13)). • Since this function only prevents negative setpoints, counter-clockwise rotation (CCW) is possible if the motor has been wired for this rotating direction.
	1	**Both rotation directions**	Both directions of motor rotation are enabled.

Parameter	Name / value range / [default setting]		Info
0x2860:001 (P201.01)	Frequency control: Default setpoint source (Stnd. setpoints: Freq. setp. src.)		Selection of the standard setpoint source for operating mode "MS: Velocity mode". • The selected standard setpoint source is always active in the operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]" when no setpoint change-over to another setpoint source via corresponding triggers/functions is active. ▸ Setpoint change-over 📖 387
	1	Keypad	The setpoint is specified locally by the keypad. • Default setting: 0x2601:001 (P202.01) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	**Analog input 1**	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. ▸ Configuring the network 📖 164
	11	Frequency preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	Frequency preset 2	
	13	Frequency preset 3	
	14	Frequency preset 4	
	15	Frequency preset 5	
	16	Frequency preset 6	
	17	Frequency preset 7	
	18	Frequency preset 8	
	19	Frequency preset 9	
	20	Frequency preset 10	
	21	Frequency preset 11	
	22	Frequency preset 12	
	23	Frequency preset 13	
	24	Frequency preset 14	
	25	Frequency preset 15	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1 (Freq. presets: Freq. preset 1) 0.0 ... [**20.0**] ... 599.0 Hz		Parameterisable frequency setpoints (presets) for operating mode "MS: Velocity mode".
0x2911:002 (P450.02)	Frequency setpoint presets: Preset 2 (Freq. presets: Freq. preset 2) 0.0 ... [**40.0**] ... 599.0 Hz		
0x2911:003 (P450.03)	Frequency setpoint presets: Preset 3 (Freq. presets: Freq. preset 3) 0.0 ... [**50.0**] ... 599.0 Hz		
0x2915 (P210.00)	Minimum frequency (Min. frequency) 0.0 ... [**0.0**] ... 599.0 Hz		Lower limit value for all frequency setpoints.
0x2916 (P211.00)	Maximum frequency (Max. frequency) 0.0 ... [**50.0**] ... 599.0 Hz		Upper limit value for all frequency setpoints.
0x2917 (P220.00)	Acceleration time 1 (Accelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s		Acceleration time 1 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331

Parameter	Name / value range / [default setting]	Info
0x2918 (P221.00)	Deceleration time 1 (Decelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 1 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331
0x291C (P225.00)	Quick stop deceleration time (QSP dec. time) 0.0 ... [**1.0**] ... 3600.0 s	Quick stop deceleration time for the operating mode "MS: Velocity mode". • If the "Quick stop" function is activated, the motor is brought to a standstill within the deceleration time set here. • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331

All possible basic settings are described in the "Basic setting" chapter. 🕮 109

4.3.3 Basic motor settings

Check the following default settings for the motor and motor control and adapt them, if required.

Drive behaviour by default

By default, the V/f characteristic control with a linear characteristic is preset as motor control for asynchronous motors. The V/f characteristic control is a motor control for conventional frequency inverter applications. It is based on a simple and robust control mode for the operation of asynchronous motors with a linear or square-law load torque characteristic (e.g. fan). Because of the minimal parameterisation effort, such applications can be commissioned easily and quickly.

The default settings of the parameters ensure that the inverter is ready for operation immediately and the motor works adequately without further parameterisation if an inverter and a 50 Hz asynchronous machine with matching performances are assigned to each other.

Parameter	Name / value range / [default setting]		Info
0x2B01:001 (P303.01)	V/f shape data: Base voltage (V/f shape data: Base voltage) 0 ... [**230**]* ... 5000 V • Default setting depending on the size.		Base voltage and base frequency define the V/f ratio and thus the gradient of the V/f characteristic. • The V/f base voltage is usually set to the rated motor voltage 0x2C01:007 (P320.07). • The V/f base frequency is usually set to the rated motor frequency 0x2C01:005 (P320.05).
0x2B01:002 (P303.02)	V/f shape data: Base frequency (V/f shape data: Base frequency) 0 ... [**50**]* ... 599 Hz • Default setting depending on the size.		
0x2C00 (P300.00)	Motor control mode (Motor ctrl mode) • Setting can only be changed if the inverter is inhibited.		Selection of the motor control type.
	2	Servo control (SC ASM) • From version 02.00	This control mode is used for servo control of an asynchronous motor. ▸ Servo control for asynchronous motors (SC-ASM) 🕮 138
	3	Sensorless control (SL PSM) • From version 02.00	This control type is used for the sensorless control of a synchronous motor. ▸ Sensorless control for synchronous motors (SL-PSM) 🕮 139
	4	Sensorless vector control (SLVC)	This control type is used for sensorless vector control of an asynchronous motor. ▸ Sensorless vector control (SLVC) 🕮 136
	6	**V/f characteristic control (VFC open loop)**	This control mode is used for the speed control of an asynchronous motor via a V/f characteristic and is the simplest control mode. ▸ V/f characteristic control (VFC) 🕮 132
0x2C01:010	Motor parameters: Motor name		The name (e.g. " 1") can be freely selected by the user. If the motor in the engineering tool has been selected from the "motor catalog", the respective motor name is automatically entered here (example: "MDSKA080-22, 70").

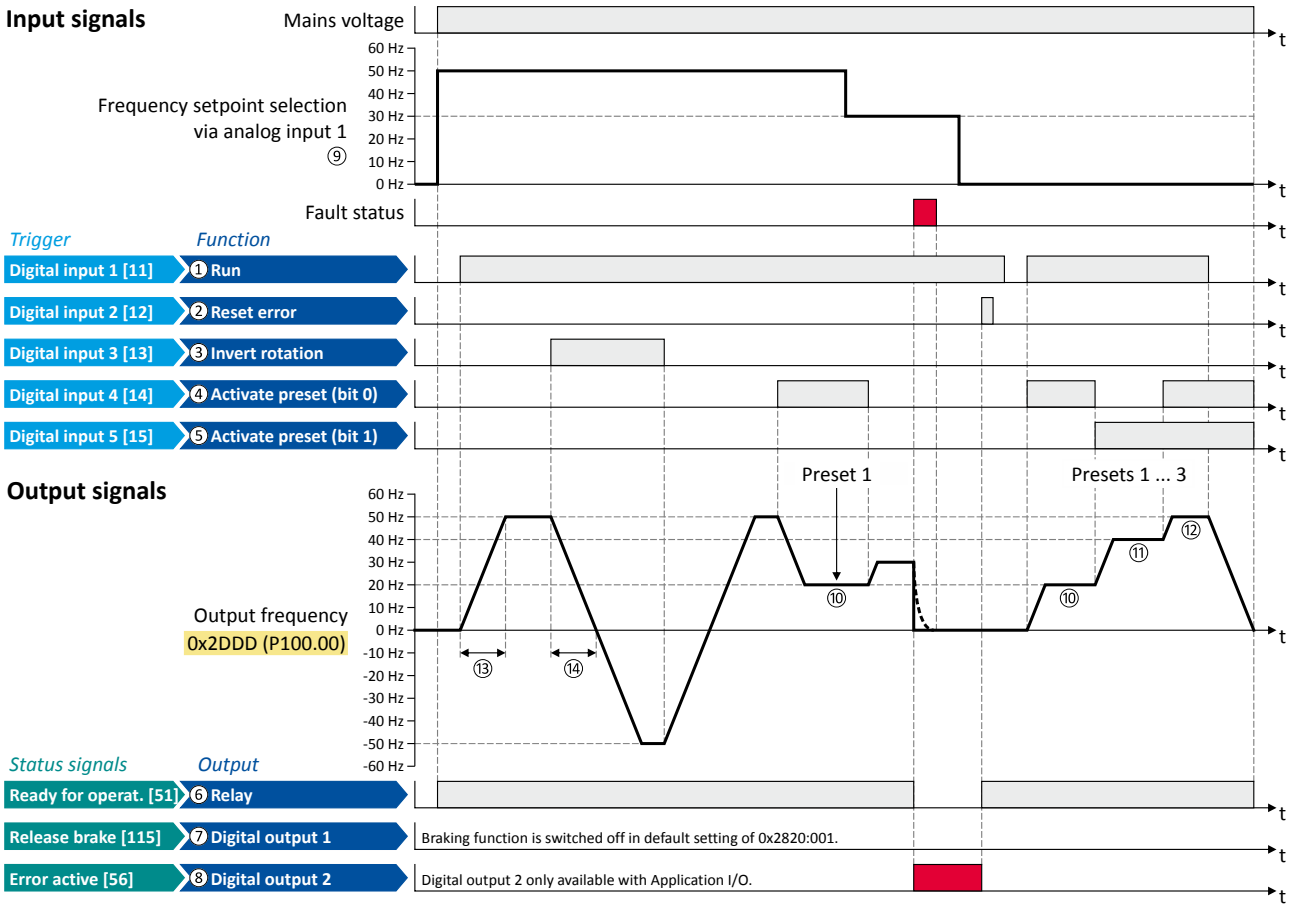
Parameter	Name / value range / [default setting]	Info
0x6075 (P323.00)	Motor rated current (Motor current) 0.001 ... [**1.700**]* ... 500.000 A • Default setting depending on the size. • Setting can only be changed if the inverter is inhibited.	The rated motor current to be set here serves as a reference value for different parameters with a setting/display in percent. Relevant parameters: • DC braking: Current 0x2B84:001 (P704.01) • Flying restart circuit: Current 0x2BA1:001 (P718.01) • Motor overload monitoring (i^2*t): Maximum utilisation [60 s] 0x2D4B:001 (P308.01) • Load loss detection: Threshold 0x4006:001 (P710.01) • Max current 0x6073 (P324.00) • Current actual value 0x6078 (P103.00)

All possible settings with regard to the motor and motor control are described in the "Motor control" chapter. 📖 125

4.3.4 Function assignment of the inputs and outputs

The inverter control can be adapted individually to the respective application. This is basically effected by assigning digital control sources ("triggers") to functions of the inverter.

By default, the inverter can be controlled via the I/O terminals as follows:



Parameter			Name	Default setting
Control functions				
①	0x2631:002	(P400.02)	Run	Digital input 1 [11]
②	0x2631:004	(P400.04)	Reset fault	Digital input 2 [12]
③	0x2631:013	(P400.13)	Invert rotation	Digital input 3 [13]
④	0x2631:018	(P400.18)	Activate preset (bit 0)	Digital input 4 [14]
⑤	0x2631:019	(P400.19)	Activate preset (bit 1)	Digital input 5 [15]
Configuration of digital outputs				
⑥	0x2634:001	(P420.01)	Relay	Ready for operation [51]
⑦	0x2634:002	(P420.02)	Digital output 1	Release holding brake [115]
⑧	0x2634:003	(P420.03)	Digital output 2 (only for application I/O)	Error active [56]
Settings for the frequency setpoint				
⑨	0x2860:001	(P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
⑩	0x2911:001	(P450.01)	Frequency setpoint presets: Preset 1	20 Hz
⑪	0x2911:002	(P450.02)	Frequency setpoint presets: Preset 2	40 Hz
⑫	0x2911:003	(P450.03)	Frequency setpoint presets: Preset 3	50 Hz
⑬	0x2917	(P220.00)	Acceleration time 1	5.0 s
⑭	0x2918	(P221.00)	Deceleration time 1	5.0 s

Parameter	Name / value range / [default setting]	Info
0x2631:002 (P400.02)	Function list: Run (Function list: Run) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Run" function. **Function 1: Start / stop motor (default setting)** Function 1 is active if no further start commands (start forward/start reverse) have been connected to triggers, no keypad control is active and no network control is active. Trigger = TRUE: Let motor rotate forward (CW). Trigger = FALSE: Stop motor. Notes to function 1: • If "Enable inverter" 0x2631:001 (P400.01) is set = "Constant TRUE [1]", the only permissible trigger for this function is a digital input in order that the motor can be stopped again any time. • The stop method can be selected in 0x2838:003 (P203.03). • The function also serves to realise an automatic start after switch-on. ▸ Starting performance 115 **Function 2: Start enable/stop motor** Function 2 is active if further start commands have been connected to triggers, keypad control is active or network control is active. Trigger = TRUE: Start commands of the active control source are enabled. Trigger = FALSE: Stop motor. Notes to function 2: • If no separate start enable is required for the application, the trigger "Constant TRUE [1]" must be set. • The stop method can be selected in 0x2838:003 (P203.03).
	11 **Digital input 1**	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
0x2631:003 (P400.03)	Function list: Activate quick stop (Function list: Quick stop) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate quick stop" function. Trigger = TRUE: Activate quick stop. Trigger = FALSE: Deactivate quick stop. Notes: • The "Quick stop" function brings the motor to a standstill within the deceleration time set in 0x291C (P225.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:004 (P400.04)	Function list: Reset fault (Function list: Reset fault) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Reset fault" function. Trigger = FALSE↗TRUE (edge): Active error is reset (acknowledged) if the error condition is not active anymore and the error is resettable. Trigger = FALSE: no action.
	12 **Digital input 2**	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
0x2631:013 (P400.13)	Function list: Invert rotation (Function list: Invert rotation) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Invert rotation" function. Trigger = TRUE: the setpoint specified is inverted (i. e. the sign is inverted). Trigger = FALSE: no action / deactivate function again.
	13 **Digital input 3**	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
0x2631:018 (P400.18)	Function list: Activate preset (bit 0) (Function list: Setp: Preset b0) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate preset (bit 0)" function. Selection bit with the valency 20 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	14 **Digital input 4**	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
0x2631:019 (P400.19)	Function list: Activate preset (bit 1) (Function list: Setp: Preset b1) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate preset (bit 1)" function. Selection bit with the valency 21 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	15 **Digital input 5**	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.

Parameter	Name / value range / [default setting]		Info
0x2634:001 (P420.01)	Digital outputs function: Relay (Dig.out.function: Relay function) • For possible settings see description for 0x2634:001 (P420.01). 📖 431		Assignment of a trigger to the relay. Trigger = FALSE: X9/NO-COM open and NC-COM closed. Trigger = TRUE: X9/NO-COM closed and NC-COM open. Notes: • An inversion set in 0x2635:001 (P421.01)is taken into consideration here.
	51	**Ready for operation**	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
0x2634:002 (P420.02)	Digital outputs function: Digital output 1 (Dig.out.function: DO1 function) • For possible settings see description for 0x2634:001 (P420.01). 📖 431		Assignment of a trigger to digital output 1. Trigger = FALSE: X3/DO1 set to LOW level. Trigger = TRUE: X3/DO1 set to HIGH level. Notes: • An inversion set in 0x2635:002 (P421.02) is taken into consideration here.
	115	**Release holding brake**	Trigger signal for releasing the holding brake (TRUE = release holding brake). ▸ Holding brake control 📖 335

All functional possible settings for controlling the inverter are described in the "Flexible I/O configuration" chapter. 📖 365

4.4 Keypad parameter list

For commissioning or diagnostics using the keypad, all parameters of the inverter that can also be accessed by means of the keypad are listed in the following "Keypad parameter list".

- The keypad parameter list is sorted in ascending order in compliance with the "display code" (Pxxx).
- In order to provide for quick access, all parameters of the inverter are divided into different groups according to their function.
- Group 0 contains the configurable "Favorites". In the default setting these are the most common parameters for the solution of typical applications. ▸ Favorites 📖 311
- Based on the hundreds digit of the display code (P**x**xx) you can quickly see in which group the parameter is to be found on the keypad:

Parameter	Group - name	Description
P**1**xx	Group 1 - Diagnostics	Diagnostic/display parameters for displaying device-internal process factors, current actual values, and status messages. ▸ Diagnostics parameter 📖 78
P**2**xx	Group 2 - Basic setting	Setting of the mains voltage, selection of the control and setpoint source, starting and stopping performance, frequency limits and ramp times. ▸ Basic setting 📖 109
P**3**xx	Group 3 - Motor control	Configuration of the motor and motor control ▸ Motor control 📖 125
P**4**xx	Group 4 - I/O setting	Function assignment and configuration of the inputs and outputs ▸ Flexible I/O configuration 📖 365
P**5**xx	Group 5 - Network setting	Configuration of the network (if available) ▸ Configuring the network 📖 164
P**6**xx	Group 6 - Process controller	Configuration of the process controller ▸ Configuring the process controller 📖 273
P**7**xx	Group 7 - Additional functions	Parameterisable additional functions ▸ Additional functions 📖 282

A complete overview of all parameter indexes can be found in the annex in the Parameter attribute list. 📖 472

Frequently used abbreviations in the short keypad designations of the parameters:

Abbreviation	Meaning
AI	Analog input
AO	Analog output
B0, B1, ...	Bit 0, bit 1, ...
CU	Control unit
DI	Digital input
DO	Digital output
LU	Undervoltage
MOP	Motor potentiometer
NET	network
OU	Overvoltage
PID	Process controller
PU	Power unit
QSP	quick stop
Setp	Setpoint
WD	Watchdog

How to read the keypad parameter list:

Column	Meaning
Display code	Parameter number on the keypad. Format: Number.Subindex
Short designation	Short keypad designation limited to 16 characters.
Default setting	Default setting of the parameter.
Setting range	Possible setting range for the parameter. Format: minimum value ... maximum value [unit]
Address	Address of the parameter in the object directory. Format: Index:Subindex
Category	Functional assignment of the parameter, for example "motor control" or "CANopen".

Keypad parameter list (short overview of all parameters with display code)

Display code	Short designation	Default setting	Setting range	Address	Category
P100.00	Output frequency	x.x Hz	- (Read only)	0x2DDD	general
P101.00	Scaled act value	x Units	- (Read only)	0x400D	general
P102.00	Freq. setpoint	x.x Hz	- (Read only)	0x2B0E	general
P103.00	Current actual	x.x %	- (Read only)	0x6078	general
P104.00	Motor current	x.x A	- (Read only)	0x2D88	general
P105.00	DC-bus voltage	x V	- (Read only)	0x2D87	general
P106.00	Motor voltage	x VAC	- (Read only)	0x2D89	general
P107.00	Torque actual	x.x %	- (Read only)	0x6077	general
P108.xx	Output power				
└ P108.01	Effective power	x.xxx kW	- (Read only)	0x2DA2:001	general
└ P108.02	Apparent power	x.xxx kVA	- (Read only)	0x2DA2:002	general
P109.xx	Output energy				
└ P109.01	Motor	x.xx kWh	- (Read only)	0x2DA3:001	general
└ P109.02	Generator	x.xx kWh	- (Read only)	0x2DA3:002	general
P110.xx	AI1 diagnostics				
└ P110.01	AI1 terminal %	x.x %	- (Read only)	0x2DA4:001	general
└ P110.02	AI1 scaled freq.	x.x Hz	- (Read only)	0x2DA4:002	general
└ P110.03	AI1 scaled PID	x.xx PID unit	- (Read only)	0x2DA4:003	general
└ P110.04	AI1 scaled torq.	x.xx %	- (Read only)	0x2DA4:004	general
└ P110.16	AI1 status	-	- (Read only)	0x2DA4:016	general
P111.xx	AI2 diagnostics				
└ P111.01	AI2 terminal %	x.x %	- (Read only)	0x2DA5:001	general
└ P111.02	AI2 scaled freq.	x.x Hz	- (Read only)	0x2DA5:002	general
└ P111.03	AI2 scaled PID	x.xx PID unit	- (Read only)	0x2DA5:003	general
└ P111.04	AI2 scaled torq.	x.xx %	- (Read only)	0x2DA5:004	general
└ P111.16	AI2 status	-	- (Read only)	0x2DA5:016	general
P112.xx	AO1 diagnostics				
└ P112.01	AO1 Voltage	x.xx V	- (Read only)	0x2DAA:001	general
└ P112.02	AO1 Current	x.xx mA	- (Read only)	0x2DAA:002	general
P113.xx	AO2 diagnostics				
└ P113.01	AO2 Current	x.xx V	- (Read only)	0x2DAB:001	Appl. I/O
└ P113.02	AO2 Voltage	x.xx mA	- (Read only)	0x2DAB:002	Appl. I/O
P117.xx	Heatsink temp.				
└ P117.01	Heatsink temp.	x.x °C	- (Read only)	0x2D84:001	general
P118.00	Digital inputs	-	- (Read only)	0x60FD	general
P119.00	Keypad status	-	- (Read only)	0x2DAC	general
P120.00	Int. HW states	-	- (Read only)	0x2DAD	general
P121.xx	PID diagnostics				
└ P121.01	PID setpoint	x.xx PID unit	- (Read only)	0x401F:001	general
└ P121.02	PID process var.	x.xx PID unit	- (Read only)	0x401F:002	general
└ P121.03	PID status	-	- (Read only)	0x401F:003	general
P123.00	Mot. i2t utilis.	x %	- (Read only)	0x2D4F	general
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
P125.xx	Inverter diag.				
└ P125.01	Active control	-	- (Read only)	0x282B:001	general
└ P125.02	Active setpoint	-	- (Read only)	0x282B:002	general
└ P125.03	Keypad LCD stat.	-	- (Read only)	0x282B:003	general
└ P125.04	Drive mode	-	- (Read only)	0x282B:004	general
└ P125.05	Netw. contr.reg.	-	- (Read only)	0x282B:005	general
└ P125.06	Netw. setp.reg.	-	- (Read only)	0x282B:006	general
P126.xx	Status words				
└ P126.01	Cause of disable	-	- (Read only)	0x282A:001	general
└ P126.02	Cause of QSP	-	- (Read only)	0x282A:002	general
└ P126.03	Cause of stop	-	- (Read only)	0x282A:003	general
└ P126.05	Device status	-	- (Read only)	0x282A:005	general
P135.xx	Device utilisat.				
└ P135.04	ixt utilisation	x %	- (Read only)	0x2D40:004	general
└ P135.05	Error response	**Fault [3]**	Selection list	0x2D40:005	general
P150.00	Error code	-	- (Read only)	0x603F	general
P151.xx	Life-diagnosis				
└ P151.01	Operating time	x s	- (Read only)	0x2D81:001	general
└ P151.02	Operating time	x s	- (Read only)	0x2D81:002	general
└ P151.03	CU oper. time	x ns	- (Read only)	0x2D81:003	general
└ P151.04	Switching cycles	-	- (Read only)	0x2D81:004	general
└ P151.05	Relay cycles	-	- (Read only)	0x2D81:005	general
└ P151.06	Short-circ.count	-	- (Read only)	0x2D81:006	general
└ P151.07	Earthfault count	-	- (Read only)	0x2D81:007	general
└ P151.08	Clamp active	-	- (Read only)	0x2D81:008	general
└ P151.09	Fan oper. time	x s	- (Read only)	0x2D81:009	general
P155.xx	Fault memory				
└ P155.00	Error memory	-	- (Read only)	0x2006:000	general
P190.xx	Device data				
└ P190.01	Product code	-	- (Read only)	0x2000:001	general
└ P190.02	Serial number	-	- (Read only)	0x2000:002	general
└ P190.04	CU firmware ver.	-	- (Read only)	0x2000:004	general
└ P190.05	CU firmware type	-	- (Read only)	0x2000:005	general
└ P190.06	CU bootlder ver.	-	- (Read only)	0x2000:006	general
└ P190.07	CU bootlder type	-	- (Read only)	0x2000:007	general
└ P190.08	OBD version	-	- (Read only)	0x2000:008	general
└ P190.10	PU firmware ver.	-	- (Read only)	0x2000:010	general
└ P190.11	PU firmware type	-	- (Read only)	0x2000:011	general
└ P190.12	PU bootlder ver.	-	- (Read only)	0x2000:012	general
└ P190.13	PU bootlder type	-	- (Read only)	0x2000:013	general
└ P190.14	Mod. firmware	-	- (Read only)	0x2000:014	general
P191.00	Device name	**My Device**	Text	0x2001	general
P192.xx	Device module				
└ P192.04	CU type code	-	- (Read only)	0x2002:004	general
└ P192.05	PU type code	-	- (Read only)	0x2002:005	general
└ P192.06	CU serial number	-	- (Read only)	0x2002:006	general
└ P192.07	PU serial number	-	- (Read only)	0x2002:007	general
P197.00	Protect. status	-	- (Read only)	0x2040	general
P198.00	Status load. par	-	- (Read only)	0x2827	general
P200.00	Control select.	**Flexible I/O [0]**	Selection list	0x2824	general
P201.xx	Stnd. setpoints				
└ P201.01	Freq. setp. src.	**Analog input 1 [2]**	Selection list	0x2860:001	general
└ P201.02	PID setp. src.	**Keypad [1]**	Selection list	0x2860:002	general
P202.xx	Keypad setpoints				
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P202.01	KP freq.setpoint	**20.0 Hz**	0.0 ... 599.0 Hz	0x2601:001	general
└ P202.02	KP PID setpoint	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x2601:002	general
P203.xx	Start/stop confg				
└ P203.01	Start method	**Normal [0]**	Selection list	0x2838:001	general
└ P203.02	Start at powerup	**Off [0]**	Selection list	0x2838:002	general
└ P203.03	Stop method	**Standard ramp [1]**	Selection list	0x2838:003	general
P208.xx	Mains settings				
└ P208.01	Mains voltage	**230 Veff [0]**	Selection list	0x2540:001	general
└ P208.02	LU warn. thresh.	**0 V** *	0 ... 800 V	0x2540:002	general
└ P208.03	LU error thresh.	x V	- (Read only)	0x2540:003	general
└ P208.04	LU reset thresh.	x V	- (Read only)	0x2540:004	general
└ P208.05	OU warn. thresh.	**0 V** *	0 ... 800 V	0x2540:005	general
└ P208.06	OU error thresh.	x V	- (Read only)	0x2540:006	general
└ P208.07	OU reset thresh.	x V	- (Read only)	0x2540:007	general
P210.00	Min. frequency	**0.0 Hz**	0.0 ... 599.0 Hz	0x2915	general
P211.00	Max. frequency	**50.0 Hz**	0.0 ... 599.0 Hz	0x2916	general
P220.00	Accelerat.time 1	**5.0 s**	0.0 ... 3600.0 s	0x2917	general
P221.00	Decelerat.time 1	**5.0 s**	0.0 ... 3600.0 s	0x2918	general
P222.00	Accelerat.time 2	**5.0 s**	0.0 ... 3600.0 s	0x2919	general
P223.00	Decelerat.time 2	**5.0 s**	0.0 ... 3600.0 s	0x291A	general
P224.00	Ramp 2 thresh.	**0.0 Hz**	0.0 ... 599.0 Hz	0x291B	general
P225.00	QSP dec. time	**1.0 s**	0.0 ... 3600.0 s	0x291C	general
P226.xx	S-ramp char.				
└ P226.01	Smoothing factor	**0.0 %**	0.0 ... 100.0 %	0x291E:001	general
P230.xx	Optical tracking				
└ P230.01	Start detection	**Stop [0]**	Selection list	0x2021:001	general
└ P230.02	Blink. duration	**5 s**	0 ... 3600 s	0x2021:002	general
P300.00	Motor ctrl mode	**VFC open loop [6]**	Selection list	0x2C00	general
P301.00	Modes of op.	**MS: Velocitymode [-2]**	Selection list	0x6060	general
P302.00	V/f charac.shape	**Linear [0]**	Selection list	0x2B00	general
P303.xx	V/f shape data				
└ P303.01	Base voltage	**230 V** *	0 ... 5000 V	0x2B01:001	MCTRL
└ P303.02	Base frequency	**50 Hz** *	0 ... 599 Hz	0x2B01:002	MCTRL
P304.00	Limit. rotation	**Both directions [1]**	Selection list	0x283A	general
P305.00	Switching freq.	**8kHz var/opt/4 [21]**	Selection list	0x2939	general
P308.xx	Motor overload				
└ P308.01	Max.load.for 60s	**150 %**	30 ... 200 %	0x2D4B:001	general
└ P308.02	Speed comp.	**On [0]**	Selection list	0x2D4B:002	general
└ P308.03	Response	**Fault [3]**	Selection list	0x2D4B:003	general
P309.xx	Mot.temp.monit.				
└ P309.02	Response	**Fault [3]**	Selection list	0x2D49:002	general
P310.xx	Mot.phase.fail.				
└ P310.01	Response	**No response [0]**	Selection list	0x2D45:001	general
└ P310.02	Current thresh.	**5.0 %**	1.0 ... 10.0 %	0x2D45:002	general
└ P310.03	Voltage thresh.	**10.0 V**	0.0 ... 100.0 V	0x2D45:003	general
P315.xx	Slip compens.				
└ P315.01	Slip: gain	**100.00 %**	-200.00 ... 200.00 %	0x2B09:001	general
└ P315.02	Filter time	**5 ms**	1 ... 6000 ms	0x2B09:002	general
P316.xx	V/f boosts				
└ P316.01	Fixed V/f boost	**2.5 %** *	0.0 ... 20.0 %	0x2B12:001	general
└ P316.02	Dynam. V/f boost	**0.0 %**	0.0 ... 20.0 %	0x2B12:002	general
P317.xx	Skip frequencies				
└ P317.01	Skip frequency 1	**0.0 Hz**	0.0 ... 599.0 Hz	0x291F:001	general
└ P317.02	Skip bandwidth 1	**0.0 Hz**	0.0 ... 10.0 Hz	0x291F:002	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P317.03	Skip frequency 2	**0.0 Hz**	0.0 ... 599.0 Hz	0x291F:003	general
└ P317.04	Skip bandwidth 2	**0.0 Hz**	0.0 ... 10.0 Hz	0x291F:004	general
└ P317.05	Skip frequency 3	**0.0 Hz**	0.0 ... 599.0 Hz	0x291F:005	general
└ P317.06	Skip bandwidth 3	**0.0 Hz**	0.0 ... 10.0 Hz	0x291F:006	general
P318.xx	Oscillat. damp.				
└ P318.01	Gain	**20 %**	-100 ... 100 %	0x2B0A:001	MCTRL
└ P318.02	Filter time	**5 ms**	1 ... 600 ms	0x2B0A:002	MCTRL
P319.00	Field weak thold	**0.0 Hz**	-599.0 ... 599.0 Hz	0x2B0C	general
P320.xx	Motor parameters				
└ P320.04	Rated speed	**1450 rpm**	50 ... 50000 rpm	0x2C01:004	MCTRL
└ P320.05	Rated frequency	**50.0 Hz**	1.0 ... 1000.0 Hz	0x2C01:005	MCTRL
└ P320.06	Rated power	**0.25 kW** *	0.00 ... 655.35 kW	0x2C01:006	MCTRL
└ P320.07	Rated voltage	**230 V** *	0 ... 65535 V	0x2C01:007	MCTRL
└ P320.08	Cosine phi	**0.80**	0.00 ... 1.00	0x2C01:008	MCTRL
P322.00	Max motor speed	**6075 rpm**	0 ... 480000 rpm	0x6080	general
P323.00	Motor current	**1.700 A** *	0.001 ... 500.000 A	0x6075	MCTRL
P324.00	Max current	**200.0 %**	0.0 ... 3000.0 %	0x6073	general
P325.00	Motor torque	**1.650 Nm** *	0.001 ... 1000.000 Nm	0x6076	MCTRL
P326.00	Max torque	**250.0 %**	0.0 ... 3000.0 %	0x6072	general
P327.xx	Axis commands				
└ P327.04	Identify mot.	**0**	0 ... 1	0x2822:004	general
└ P327.05	Calibrate mot.	**0**	0 ... 1	0x2822:005	general
P329.xx	MaxTrq.Monitor				
└ P329.01	Response	**No reaction [0]**	Selection list	0x2D67:001	MCTRL
└ P329.02	Triggering delay	**0.000 s**	0.000 ... 10.000 s	0x2D67:002	MCTRL
P330.xx					
└ P330.01	Min. voltage	**20 %**	20 ... 100 %	0x2B0D:001	MCTRL
P332.xx	Speed controller				
└ P332.01	Gain	**0.00193 Nm/rpm** *	0.00000 ... 20000.00000 Nm/rpm	0x2900:001	MCTRL
└ P332.02	Reset time	**80.0 ms** *	1.0 ... 6000.0 ms	0x2900:002	MCTRL
P333.xx	V/f Imax contr.				
└ P333.01	Gain	**0.284 Hz/A** *	0.000 ... 1000.000 Hz/A	0x2B08:001	MCTRL
└ P333.02	Reset time	**2.3 ms** *	1.0 ... 2000.0 ms	0x2B08:002	MCTRL
P334.xx	Current contr.				
└ P334.01	Gain	**42.55 V/A** *	0.00 ... 750.00 V/A	0x2942:001	MCTRL
└ P334.02	Reset time	**4.50 ms** *	0.01 ... 2000.00 ms	0x2942:002	MCTRL
P335.xx	Moment of inert.				
└ P335.01	Motor inertia	**3.70 kg cm²** *	0.00 ... 20000000.00 kg cm²	0x2910:001	MCTRL
└ P335.02	Load inertia	**3.70 kg cm²** *	0.00 ... 20000000.00 kg cm²	0x2910:002	MCTRL
P341.xx					
└ P341.01	Enc. Inc/Rev	**128**	1 ... 16384	0x2C42:001	general
P350.xx	Overspeed monit.				
└ P350.01	Threshold	**8000 rpm**	50 ... 50000 rpm	0x2D44:001	general
└ P350.02	Response	**Fault [3]**	Selection list	0x2D44:002	general
P351.xx	ASM motor par.				
└ P351.01	Rotor resistance	**8.8944 Ω** *	0.0000 ... 200.0000 Ω	0x2C02:001	MCTRL
└ P351.02	Mutual induct.	**381.9 mH** *	0.0 ... 50000.0 mH	0x2C02:002	MCTRL
└ P351.03	Magn. current	**0.96 A** *	0.00 ... 500.00 A	0x2C02:003	MCTRL
└ P351.04	Slip frequency	x.x Hz	- (Read only)	0x2C02:004	general
P352.xx					
└ P352.01	EMK constant	**41.8 V/1000rpm**	0.0 ... 100000.0 V/1000rpm	0x2C03:001	MCTRL
P353.xx	Overcurr. monit.				
└ P353.01	Threshold	**6.8 A** *	0.0 ... 1000.0 A	0x2D46:001	general
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P353.02	Response	**Fault [3]**	Selection list	0x2D46:002	general
P400.xx	Function list				
└ P400.01	Enable inverter	**TRUE [1]**	Selection list	0x2631:001	general
└ P400.02	Run	**Digital input 1 [11]**	Selection list	0x2631:002	general
└ P400.03	Quick stop	**Not connected [0]**	Selection list	0x2631:003	general
└ P400.04	Reset fault	**Digital input 2 [12]**	Selection list	0x2631:004	general
└ P400.05	DC braking	**Not connected [0]**	Selection list	0x2631:005	general
└ P400.06	Start forward	**Not connected [0]**	Selection list	0x2631:006	general
└ P400.07	Start reverse	**Not connected [0]**	Selection list	0x2631:007	general
└ P400.08	Run forward	**Not connected [0]**	Selection list	0x2631:008	general
└ P400.09	Run reverse	**Not connected [0]**	Selection list	0x2631:009	general
└ P400.10	Jog foward	**Not connected [0]**	Selection list	0x2631:010	general
└ P400.11	Jog reverse	**Not connected [0]**	Selection list	0x2631:011	general
└ P400.12	Keypad control	**Not connected [0]**	Selection list	0x2631:012	general
└ P400.13	Invert rotation	**Digital input 3 [13]**	Selection list	0x2631:013	general
└ P400.14	Setp: AI1	**Not connected [0]**	Selection list	0x2631:014	general
└ P400.15	Setp: AI2	**Not connected [0]**	Selection list	0x2631:015	general
└ P400.16	Setp: Keypad	**Not connected [0]**	Selection list	0x2631:016	general
└ P400.17	Setp: Network	**Not connected [0]**	Selection list	0x2631:017	general
└ P400.18	Setp: Preset b0	**Digital input 4 [14]**	Selection list	0x2631:018	general
└ P400.19	Setp: Preset b1	**Digital input 5 [15]**	Selection list	0x2631:019	general
└ P400.20	Setp: Preset b2	**Not connected [0]**	Selection list	0x2631:020	general
└ P400.21	Setp: Preset b3	**Not connected [0]**	Selection list	0x2631:021	general
└ P400.23	MOP up	**Not connected [0]**	Selection list	0x2631:023	general
└ P400.24	MOP down	**Not connected [0]**	Selection list	0x2631:024	general
└ P400.25	Setp: MOP	**Not connected [0]**	Selection list	0x2631:025	general
└ P400.37	Network control	**Not connected [0]**	Selection list	0x2631:037	general
└ P400.39	Activ. ramp 2	**Not connected [0]**	Selection list	0x2631:039	general
└ P400.40	Load param.set	**Not connected [0]**	Selection list	0x2631:040	general
└ P400.41	Sel. paramset b0	**Not connected [0]**	Selection list	0x2631:041	general
└ P400.42	Sel. paramset b1	**Not connected [0]**	Selection list	0x2631:042	general
└ P400.43	Fault 1	**Not connected [0]**	Selection list	0x2631:043	general
└ P400.44	Fault 2	**Not connected [0]**	Selection list	0x2631:044	general
└ P400.45	PID off	**Not connected [0]**	Selection list	0x2631:045	general
└ P400.46	PID output=0	**Not connected [0]**	Selection list	0x2631:046	general
└ P400.47	PID-I inhibited	**Not connected [0]**	Selection list	0x2631:047	general
└ P400.48	PID-Inf ramp on	**TRUE [1]**	Selection list	0x2631:048	general
└ P400.49	Release brake	**Not connected [0]**	Selection list	0x2631:049	general
P410.xx	DI settings				
└ P410.01	Assertion level	**HIGH active [1]**	Selection list	0x2630:001	general
└ P410.02	Input function	**Digital Input [0]**	Selection list	0x2630:002	general
P411.xx	DI inversion				
└ P411.01	DI1 inversion	**Not inverted [0]**	Selection list	0x2632:001	general
└ P411.02	DI2 inversion	**Not inverted [0]**	Selection list	0x2632:002	general
└ P411.03	DI3 inversion	**Not inverted [0]**	Selection list	0x2632:003	general
└ P411.04	DI4 inversion	**Not inverted [0]**	Selection list	0x2632:004	general
└ P411.05	DI5 inversion	**Not inverted [0]**	Selection list	0x2632:005	general
└ P411.06	DI6 inversion	**Not inverted [0]**	Selection list	0x2632:006	Appl. I/O
└ P411.07	DI7 inversion	**Not inverted [0]**	Selection list	0x2632:007	Appl. I/O
P412.00	Freq. threshold	**0.0 Hz**	0.0 ... 599.0 Hz	0x4005	general
P413.00	MOP startmode	**Last value [0]**	Selection list	0x4003	general
P414.xx	MOP start value				
└ P414.01	Frequency	**0.0 Hz**	0.0 ... 599.0 Hz	0x4004:001	general
└ P414.02	PID value	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4004:002	general
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P414.03	Torque	**0.0 %**	0.0 ... 1000.0 %	0x4004:003	general
P420.xx	Dig.out.function				
└ P420.01	Relay function	**Rdy for operat. [51]**	Selection list	0x2634:001	general
└ P420.02	DO1 function	**Release brake [115]**	Selection list	0x2634:002	general
└ P420.03	DO2 function	**Error [56]**	Selection list	0x2634:003	Appl. I/O
└ P420.10	NetWordOUT1.00	**Rdy for operat. [51]**	Selection list	0x2634:010	general
└ P420.11	NetWordOUT1.01	**Not connected [0]**	Selection list	0x2634:011	general
└ P420.12	NetWordOUT1.02	**Operat. enabled [52]**	Selection list	0x2634:012	general
└ P420.13	NetWordOUT1.03	**Error [56]**	Selection list	0x2634:013	general
└ P420.14	NetWordOUT1.04	**Not connected [0]**	Selection list	0x2634:014	general
└ P420.15	NetWordOUT1.05	**Quick stop [54]**	Selection list	0x2634:015	general
└ P420.16	NetWordOUT1.06	**Running [50]**	Selection list	0x2634:016	general
└ P420.17	NetWordOUT1.07	**Device warning [58]**	Selection list	0x2634:017	general
└ P420.18	NetWordOUT1.08	**Not connected [0]**	Selection list	0x2634:018	general
└ P420.19	NetWordOUT1.09	**Not connected [0]**	Selection list	0x2634:019	general
└ P420.20	NetWordOUT1.10	**Speed - setp=act [72]**	Selection list	0x2634:020	general
└ P420.21	NetWordOUT1.11	**At current limit [78]**	Selection list	0x2634:021	general
└ P420.22	NetWordOUT1.12	**Actual speed=0 [71]**	Selection list	0x2634:022	general
└ P420.23	NetWordOUT1.13	**Rot.dir.reversed [69]**	Selection list	0x2634:023	general
└ P420.24	NetWordOUT1.14	**Release brake [115]**	Selection list	0x2634:024	general
└ P420.25	NetWordOUT1.15	**Safe Torque Off [55]**	Selection list	0x2634:025	general
P421.xx	DO inversion				
└ P421.01	Relay inverted	**Not inverted [0]**	Selection list	0x2635:001	general
└ P421.02	DO1 inversion	**Not inverted [0]**	Selection list	0x2635:002	general
└ P421.03	DO2 inversion	**Not inverted [0]**	Selection list	0x2635:003	Appl. I/O
P430.xx	Analog input 1				
└ P430.01	AI1 input range	**0 ... 10 VDC [0]**	Selection list	0x2636:001	general
└ P430.02	AI1 freq @ min	**0.0 Hz**	-1000.0 ... 1000.0 Hz	0x2636:002	general
└ P430.03	AI1 freq @ max	**50.0 Hz**	-1000.0 ... 1000.0 Hz	0x2636:003	general
└ P430.04	AI1 PID @ min	**0.00 PID unit/%**	-300.00 ... 300.00 PID unit/%	0x2636:004	general
└ P430.05	AI1 PID @ max	**100.00 PID unit/%**	-300.00 ... 300.00 PID unit/%	0x2636:005	general
└ P430.06	AI1 filter time	**10 ms**	0 ... 10000 ms	0x2636:006	general
└ P430.07	AI1 dead band	**0.0 %**	0.0 ... 100.0 %	0x2636:007	general
└ P430.08	AI1 monit.level	**0.0 %**	-100.0 ... 100.0 %	0x2636:008	general
└ P430.09	AI1 monit.cond.	**IN < threshold [0]**	Selection list	0x2636:009	general
└ P430.10	AI1 error resp.	**Fault [3]**	Selection list	0x2636:010	general
P431.xx	Analog input 2				
└ P431.01	AI2 input range	**0 ... 10 VDC [0]**	Selection list	0x2637:001	general
└ P431.02	AI2 freq @ min	**0.0 Hz**	-1000.0 ... 1000.0 Hz	0x2637:002	general
└ P431.03	AI2 freq @ max	**50.0 Hz**	-1000.0 ... 1000.0 Hz	0x2637:003	general
└ P431.04	AI2 PID @ min	**0.00 PID unit/%**	-300.00 ... 300.00 PID unit/%	0x2637:004	general
└ P431.05	AI2 PID @ max	**100.00 PID unit/%**	-300.00 ... 300.00 PID unit/%	0x2637:005	general
└ P431.06	AI2 filter time	**10 ms**	0 ... 10000 ms	0x2637:006	general
└ P431.07	AI2 dead band	**0.0 %**	0.0 ... 100.0 %	0x2637:007	general
└ P431.08	AI2 monit.level	**0.0 %**	-100.0 ... 100.0 %	0x2637:008	general
└ P431.09	AI2 error resp.	**IN < threshold [0]**	Selection list	0x2637:009	general
└ P431.10	AI2 error resp.	**Fault [3]**	Selection list	0x2637:010	general
P440.xx	Analog output 1				
└ P440.01	AO1 outp. range	**0 ... 10 VDC [1]**	Selection list	0x2639:001	general
└ P440.02	AO1 function	**Outp. frequency [1]**	Selection list	0x2639:002	general
└ P440.03	AO1 min. signal	**0**	-2147483648 ... 2147483647	0x2639:003	general
└ P440.04	AO1 max. signal	**1000**	-2147483648 ... 2147483647	0x2639:004	general
P441.xx	Analog output 2				
└ P441.01	AO2 outp. range	**0 ... 10 VDC [1]**	Selection list	0x263A:001	Appl. I/O

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P441.02	AO2 function	**Motor current [5]**	Selection list	0x263A:002	Appl. I/O
└ P441.03	AO2 min. signal	**0**	-2147483648 ... 2147483647	0x263A:003	Appl. I/O
└ P441.04	AO2 max. signal	**1000**	-2147483648 ... 2147483647	0x263A:004	Appl. I/O
P450.xx	Freq. presets				
└ P450.01	Freq. preset 1	**20.0 Hz**	0.0 ... 599.0 Hz	0x2911:001	general
└ P450.02	Freq. preset 2	**40.0 Hz**	0.0 ... 599.0 Hz	0x2911:002	general
└ P450.03	Freq. preset 3	**50.0 Hz**	0.0 ... 599.0 Hz	0x2911:003	general
└ P450.04	Freq. preset 4	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:004	general
└ P450.05	Freq. preset 5	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:005	general
└ P450.06	Freq. preset 6	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:006	general
└ P450.07	Freq. preset 7	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:007	general
└ P450.08	Freq. preset 8	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:008	general
└ P450.09	Freq. preset 9	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:009	general
└ P450.10	Freq. preset 10	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:010	general
└ P450.11	Freq. preset 11	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:011	general
└ P450.12	Freq. preset 12	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:012	general
└ P450.13	Freq. preset 13	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:013	general
└ P450.14	Freq. preset 14	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:014	general
└ P450.15	Freq. preset 15	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:015	general
P451.xx	PID presets				
└ P451.01	PID preset 1	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:001	general
└ P451.02	PID preset 2	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:002	general
└ P451.03	PID preset 3	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:003	general
└ P451.04	PID preset 4	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:004	general
└ P451.05	PID preset 5	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:005	general
└ P451.06	PID preset 6	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:006	general
└ P451.07	PID preset 7	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:007	general
└ P451.08	PID preset 8	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4022:008	general
P500.xx	Module ID				
└ P500.01	Active module ID	-	- (Read only)	0x231F:001	general
└ P500.02	Module ID conn.	-	- (Read only)	0x231F:002	general
P505.xx	NetWordIN1 fct.				
└ P505.01	NetWordIN1.00	**Not active [0]**	Selection list	0x400E:001	general
└ P505.02	NetWordIN1.01	**Not active [0]**	Selection list	0x400E:002	general
└ P505.03	NetWordIN1.02	**Quick stop [3]**	Selection list	0x400E:003	general
└ P505.04	NetWordIN1.03	**Not active [0]**	Selection list	0x400E:004	general
└ P505.05	NetWordIN1.04	**Run forward [8]**	Selection list	0x400E:005	general
└ P505.06	NetWordIN1.05	**Setp: Preset b0 [18]**	Selection list	0x400E:006	general
└ P505.07	NetWordIN1.06	**Setp: Preset b1 [19]**	Selection list	0x400E:007	general
└ P505.08	NetWordIN1.07	**Reset error [4]**	Selection list	0x400E:008	general
└ P505.09	NetWordIN1.08	**Not active [0]**	Selection list	0x400E:009	general
└ P505.10	NetWordIN1.09	**DC braking [5]**	Selection list	0x400E:010	general
└ P505.11	NetWordIN1.10	**Not active [0]**	Selection list	0x400E:011	general
└ P505.12	NetWordIN1.11	**Not active [0]**	Selection list	0x400E:012	general
└ P505.13	NetWordIN1.12	**Invert rotation [13]**	Selection list	0x400E:013	general
└ P505.14	NetWordIN1.13	**Not active [0]**	Selection list	0x400E:014	general
└ P505.15	NetWordIN1.14	**Not active [0]**	Selection list	0x400E:015	general
└ P505.16	NetWordIN1.15	**Not active [0]**	Selection list	0x400E:016	general
P508.00	CANopen comm.	**No action [0]**	Selection list	0x2300	CANopen
P508.00	EtherCAT comm.	**No action [0]**	Selection list	0x2360	EtherCAT
P508.00	EtherN/IP comm.	**No action [0]**	Selection list	0x23A0	EtherNet/IP
P508.00	Modbus comm.	**0**	0 ... 1	0x2320	Modbus
P508.00	PROFINET comm.	**No action [0]**	Selection list	0x2380	PROFINET
P509.00	CANopen switch	-	- (Read only)	0x2303	CANopen

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
P509.00	EtherC. switch	-	- (Read only)	0x2363	EtherCAT
P509.00	EtherN. switch	-	- (Read only)	0x23A3	EtherNet/IP
P509.00	Modbus switch	-	- (Read only)	0x2323	Modbus
P509.00	PROFIBUS switch	-	- (Read only)	0x2343	PROFIBUS
P510.xx	CANopen sett.				
└ P510.01	Node ID	**1**	1 ... 127	0x2301:001	CANopen
└ P510.02	Baud rate	**500 kbps [5]**	Selection list	0x2301:002	CANopen
└ P510.03	Slave/Master	**Slave [0]**	Selection list	0x2301:003	CANopen
└ P510.04	Start rem. delay	**3000 ms**	0 ... 65535 ms	0x2301:004	CANopen
└ P510.05	SDO2 channel	**Not active [0]**	Selection list	0x2301:005	CANopen
P510.xx	EtherCAT sett.				
└ P510.04	Device ident.	**0**	0 ... 65535	0x2361:004	EtherCAT
P510.xx	EtherN/IP sett.				
└ P510.01	IP address	**276605120**	0 ... 4294967295	0x23A1:001	EtherNet/IP
└ P510.02	Subnet	**16777215**	0 ... 4294967295	0x23A1:002	EtherNet/IP
└ P510.03	Gateway	**0**	0 ... 4294967295	0x23A1:003	EtherNet/IP
└ P510.04	Host name		Text	0x23A1:004	EtherNet/IP
└ P510.05	IP configuration	**BOOTP [1]**	Selection list	0x23A1:005	EtherNet/IP
└ P510.06	Multicast TTL	**1**	0 ... 255	0x23A1:006	EtherNet/IP
└ P510.07	Mcast allocation	**Default alloc. [0]**	Selection list	0x23A1:007	EtherNet/IP
└ P510.08	Mcast IP addr.	**3221373167**	0 ... 4294967295	0x23A1:008	EtherNet/IP
└ P510.09	Multicast number	**1**	1 ... 8	0x23A1:009	EtherNet/IP
└ P510.10	Timeout	**10000 ms**	500 ... 65535 ms	0x23A1:010	EtherNet/IP
P510.xx	Modbus sett.				
└ P510.01	Node ID	**1**	1 ... 247	0x2321:001	Modbus
└ P510.02	Baud rate	**Automatic [0]**	Selection list	0x2321:002	Modbus
└ P510.03	Data format	**Automatic [0]**	Selection list	0x2321:003	Modbus
└ P510.04	Min. resp. time	**0 ms**	0 ... 1000 ms	0x2321:004	Modbus
P510.xx	PROFIBUS sett.				
└ P510.01	Station address	**3**	1 ... 125	0x2341:001	PROFIBUS
P510.xx	PROFINET sett.				
└ P510.01	IP address	**0**	0 ... 4294967295	0x2381:001	PROFINET
└ P510.02	Subnet	**0**	0 ... 4294967295	0x2381:002	PROFINET
└ P510.03	Gateway	**0**	0 ... 4294967295	0x2381:003	PROFINET
└ P510.04	Station name		Text	0x2381:004	PROFINET
P511.xx	CANopen diag.				
└ P511.01	Active node ID	-	- (Read only)	0x2302:001	CANopen
└ P511.02	Active baud rate	-	- (Read only)	0x2302:002	CANopen
P511.xx	EtherCAT diag.				
└ P511.04	Device ident.	-	- (Read only)	0x2362:004	EtherCAT
└ P511.06	Station address	-	- (Read only)	0x2362:006	EtherCAT
└ P511.07	Tx length	-	- (Read only)	0x2362:007	EtherCAT
└ P511.08	Rx length	-	- (Read only)	0x2362:008	EtherCAT
P511.xx	EtherN/IP diag.				
└ P511.01	IP address	-	- (Read only)	0x23A2:001	EtherNet/IP
└ P511.02	Subnet	-	- (Read only)	0x23A2:002	EtherNet/IP
└ P511.03	Gateway	-	- (Read only)	0x23A2:003	EtherNet/IP
└ P511.05	MAC address	-	- (Read only)	0x23A2:005	EtherNet/IP
└ P511.06	Mcast address	-	- (Read only)	0x23A2:006	EtherNet/IP
P511.xx	Modbus diag.				
└ P511.01	Active node ID	-	- (Read only)	0x2322:001	Modbus
└ P511.02	Active baud rate	-	- (Read only)	0x2322:002	Modbus
└ P511.03	Data format	-	- (Read only)	0x2322:003	Modbus
P511.xx	PROFIBUS diag.				
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P511.01	Act.station addr	-	- (Read only)	0x2342:001	PROFIBUS
└ P511.02	Active baud rate	-	- (Read only)	0x2342:002	PROFIBUS
└ P511.03	Watchdog time	-	- (Read only)	0x2342:003	PROFIBUS
P511.xx	PROFINET diag.				
└ P511.01	IP address	-	- (Read only)	0x2382:001	PROFINET
└ P511.02	Subnet	-	- (Read only)	0x2382:002	PROFINET
└ P511.03	Gateway	-	- (Read only)	0x2382:003	PROFINET
└ P511.04	Station name	-	- (Read only)	0x2382:004	PROFINET
└ P511.05	MAC Address	-	- (Read only)	0x2382:005	PROFINET
P512.xx	Port settings				
└ P512.01	Port 1	**Auto-Negotiation [0]**	Selection list	0x23A4:001	EtherNet/IP
└ P512.02	Port 2	**Auto-Negotiation [0]**	Selection list	0x23A4:002	EtherNet/IP
P512.xx	PROFIBUS Config.				
└ P512.01	Ext. diag. bit	**Delete [0]**	Selection list	0x2344:001	PROFIBUS
P513.00	QualityOfService	-	- (Read only)	0x23A6	EtherNet/IP
P514.00	AddrConflctDetec	**Enabled [1]**	Selection list	0x23A7	EtherNet/IP
P515.00	Time-out status	-	- (Read only)	0x2307	CANopen
P515.xx	EtherCAT monit.				
└ P515.01	WD elapsed	**Trouble [2]**	Selection list	0x2859:001	EtherCAT
└ P515.03	Invalid config	**Trouble [2]**	Selection list	0x2859:003	EtherCAT
└ P515.04	Init. error	**Trouble [2]**	Selection list	0x2859:004	EtherCAT
└ P515.05	Inval. proc.data	**Trouble [2]**	Selection list	0x2859:005	EtherCAT
P515.xx	EtherN/IP monit.				
└ P515.01	WD elapsed	**Trouble [2]**	Selection list	0x2859:001	EtherNet/IP
└ P515.03	Invalid config	**Trouble [2]**	Selection list	0x2859:003	EtherNet/IP
└ P515.04	Init. error	**Trouble [2]**	Selection list	0x2859:004	EtherNet/IP
└ P515.05	Inval. proc.data	**Trouble [2]**	Selection list	0x2859:005	EtherNet/IP
└ P515.06	Timeout ExplMsg	**Warning [1]**	Selection list	0x2859:006	EtherNet/IP
└ P515.07	Timeout Comm.	**Warning [1]**	Selection list	0x2859:007	EtherNet/IP
P515.xx	Modbus monit.				
└ P515.01	Resp. Time-out	**Fault [3]**	Selection list	0x2858:001	Modbus
└ P515.02	Time-out time	**2.0 s**	0.0 ... 300.0 s	0x2858:002	Modbus
P515.xx	PROFIBUS monit.				
└ P515.01	WD elapsed	**Fault [3]**	Selection list	0x2859:001	PROFIBUS
└ P515.02	Data exch.exited	**No response [0]**	Selection list	0x2859:002	PROFIBUS
└ P515.03	Invalid config	**Fault [3]**	Selection list	0x2859:003	PROFIBUS
└ P515.04	Init. error	**Fault [3]**	Selection list	0x2859:004	PROFIBUS
└ P515.05	Inval. proc.data	**Trouble [2]**	Selection list	0x2859:005	PROFIBUS
P515.xx	PROFINET monit.				
└ P515.01	WD elapsed	**Trouble [2]**	Selection list	0x2859:001	PROFINET
└ P515.03	Invalid config	**Trouble [2]**	Selection list	0x2859:003	PROFINET
└ P515.04	Init. error	**Trouble [2]**	Selection list	0x2859:004	PROFINET
└ P515.05	Inval. proc.data	**Trouble [2]**	Selection list	0x2859:005	PROFINET
P516.00	CANopen status	-	- (Read only)	0x2308	CANopen
P516.00	EtherCAT status	-	- (Read only)	0x2368	EtherCAT
P516.00	CIP module stat.	-	- (Read only)	0x23A8	EtherNet/IP
P516.xx	PROFIBUS Status				
└ P516.01	Bus status	-	- (Read only)	0x2348:001	PROFIBUS
└ P516.02	Watchdog status	-	- (Read only)	0x2348:002	PROFIBUS
P516.00	PROFINET status	-	- (Read only)	0x2388	PROFINET
P517.00	CAN contr.status	-	- (Read only)	0x2309	CANopen
P517.00	EtherCAT error	-	- (Read only)	0x2369	EtherCAT
P517.00	EtherN/IP status	-	- (Read only)	0x23A9	EtherNet/IP
P517.00	PROFIBUS error	-	- (Read only)	0x2349	PROFIBUS

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
P517.xx	PROFINET error				
└ P517.01	Error 1	-	- (Read only)	0x2389:001	PROFINET
└ P517.02	Error2	-	- (Read only)	0x2389:002	PROFINET
P518.00	CAN errorcounter	-	- (Read only)	0x230B	CANopen
P519.xx	Port diagnostics				
└ P519.01	Port 1	-	- (Read only)	0x23A5:001	EtherNet/IP
└ P519.02	Port 2	-	- (Read only)	0x23A5:002	EtherNet/IP
P520.xx	Cons. heartbeat				
└ P520.00	Highest subindex	-	- (Read only)	0x1016:000	CANopen
└ P520.01	Cons. heartbeat1	**0x00000000**	0x00000000 ... 0x00FFFFFF	0x1016:001	CANopen
└ P520.02	Cons. heartbeat2	**0x00000000**	0x00000000 ... 0x00FFFFFF	0x1016:002	CANopen
└ P520.03	Cons. heartbeat3	**0x00000000**	0x00000000 ... 0x00FFFFFF	0x1016:003	CANopen
└ P520.04	Cons. heartbeat4	**0x00000000**	0x00000000 ... 0x00FFFFFF	0x1016:004	CANopen
P522.00	Prod. heartbeat	**0 ms**	0 ... 65535 ms	0x1017	CANopen
P530.xx	Para. mapping				
└ P530.01	Parameter 1	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:001	Modbus
└ P530.02	Parameter 2	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:002	Modbus
└ P530.03	Parameter 3	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:003	Modbus
└ P530.04	Parameter 4	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:004	Modbus
└ P530.05	Parameter 5	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:005	Modbus
└ P530.06	Parameter 6	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:006	Modbus
└ P530.07	Parameter 7	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:007	Modbus
└ P530.08	Parameter 8	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:008	Modbus
└ P530.09	Parameter 9	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:009	Modbus
└ P530.10	Parameter 10	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:010	Modbus
└ P530.11	Parameter 11	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:011	Modbus
└ P530.12	Parameter 12	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:012	Modbus
└ P530.13	Parameter 13	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:013	Modbus
└ P530.14	Parameter 14	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:014	Modbus
└ P530.15	Parameter 15	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:015	Modbus
└ P530.16	Parameter 16	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:016	Modbus
└ P530.17	Parameter 17	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:017	Modbus
└ P530.18	Parameter 18	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:018	Modbus
└ P530.19	Parameter 19	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:019	Modbus
└ P530.20	Parameter 20	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:020	Modbus
└ P530.21	Parameter 21	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:021	Modbus
└ P530.22	Parameter 22	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:022	Modbus
└ P530.23	Parameter 23	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:023	Modbus
└ P530.24	Parameter 24	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x232B:024	Modbus
P531.xx	Reg. assigned				
└ P531.01	Register 1	-	- (Read only)	0x232C:001	Modbus
└ P531.02	Register 2	-	- (Read only)	0x232C:002	Modbus
└ P531.03	Register 3	-	- (Read only)	0x232C:003	Modbus
└ P531.04	Register 4	-	- (Read only)	0x232C:004	Modbus
└ P531.05	Register 5	-	- (Read only)	0x232C:005	Modbus
└ P531.06	Register 6	-	- (Read only)	0x232C:006	Modbus
└ P531.07	Register 7	-	- (Read only)	0x232C:007	Modbus
└ P531.08	Register 8	-	- (Read only)	0x232C:008	Modbus
└ P531.09	Register 9	-	- (Read only)	0x232C:009	Modbus
└ P531.10	Register 10	-	- (Read only)	0x232C:010	Modbus
└ P531.11	Register 11	-	- (Read only)	0x232C:011	Modbus
└ P531.12	Register 12	-	- (Read only)	0x232C:012	Modbus
└ P531.13	Register 13	-	- (Read only)	0x232C:013	Modbus
└ P531.14	Register 14	-	- (Read only)	0x232C:014	Modbus

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P531.15	Register 15	-	- (Read only)	0x232C:015	Modbus
└ P531.16	Register 16	-	- (Read only)	0x232C:016	Modbus
└ P531.17	Register 17	-	- (Read only)	0x232C:017	Modbus
└ P531.18	Register 18	-	- (Read only)	0x232C:018	Modbus
└ P531.19	Register 19	-	- (Read only)	0x232C:019	Modbus
└ P531.20	Register 20	-	- (Read only)	0x232C:020	Modbus
└ P531.21	Register 21	-	- (Read only)	0x232C:021	Modbus
└ P531.22	Register 22	-	- (Read only)	0x232C:022	Modbus
└ P531.23	Register 23	-	- (Read only)	0x232C:023	Modbus
└ P531.24	Register 24	-	- (Read only)	0x232C:024	Modbus
P532.00	Verificationcode	-	- (Read only)	0x232D	Modbus
P540.xx	RPDO1 config.				
└ P540.01	COB-ID	**0x00000200**	0x00000000 ... 0xFFFFFFFF	0x1400:001	CANopen
└ P540.02	Transm. type	**255**	0 ... 255	0x1400:002	CANopen
└ P540.05	Event timer	**100 ms**	0 ... 65535 ms	0x1400:005	CANopen
P541.xx	RPDO2 config.				
└ P541.01	COB-ID	**0x80000300**	0x00000000 ... 0xFFFFFFFF	0x1401:001	CANopen
└ P541.02	Transm. type	**255**	0 ... 255	0x1401:002	CANopen
└ P541.05	Event timer	**100 ms**	0 ... 65535 ms	0x1401:005	CANopen
P542.xx	RPDO3 config.				
└ P542.01	COB-ID	**0x80000400**	0x00000000 ... 0xFFFFFFFF	0x1402:001	CANopen
└ P542.02	Transm. type	**255**	0 ... 255	0x1402:002	CANopen
└ P542.05	Event timer	**100 ms**	0 ... 65535 ms	0x1402:005	CANopen
P550.xx	TPDO1 config.				
└ P550.01	COB-ID	**0x40000180**	0x00000001 ... 0xFFFFFFFF	0x1800:001	CANopen
└ P550.02	Transm. type	**255**	0 ... 255	0x1800:002	CANopen
└ P550.03	Inhibit time	**0.0 ms**	0.0 ... 6553.5 ms	0x1800:003	CANopen
└ P550.05	Event timer	**20 ms**	0 ... 65535 ms	0x1800:005	CANopen
P551.xx	TPDO2 config.				
└ P551.01	COB-ID	**0xC0000280**	0x00000001 ... 0xFFFFFFFF	0x1801:001	CANopen
└ P551.02	Transm. type	**255**	0 ... 255	0x1801:002	CANopen
└ P551.03	Inhibit time	**0.0 ms**	0.0 ... 6553.5 ms	0x1801:003	CANopen
└ P551.05	Event timer	**0 ms**	0 ... 65535 ms	0x1801:005	CANopen
P552.xx	TPDO3 config.				
└ P552.01	COB-ID	**0xC0000380**	0x00000001 ... 0xFFFFFFFF	0x1802:001	CANopen
└ P552.02	Transm. type	**255**	0 ... 255	0x1802:002	CANopen
└ P552.03	Inhibit time	**0.0 ms**	0.0 ... 6553.5 ms	0x1802:003	CANopen
└ P552.05	Event timer	**0 ms**	0 ... 65535 ms	0x1802:005	CANopen
P580.xx	CAN statistics				
└ P580.01	PDO1 received	-	- (Read only)	0x230A:001	CANopen
└ P580.02	PDO2 received	-	- (Read only)	0x230A:002	CANopen
└ P580.03	PDO3 received	-	- (Read only)	0x230A:003	CANopen
└ P580.05	PDO1 transmitted	-	- (Read only)	0x230A:005	CANopen
└ P580.06	PDO2 transmitted	-	- (Read only)	0x230A:006	CANopen
└ P580.07	PDO3 transmitted	-	- (Read only)	0x230A:007	CANopen
└ P580.09	SDO1 counter	-	- (Read only)	0x230A:009	CANopen
└ P580.10	SDO2 counter	-	- (Read only)	0x230A:010	CANopen
P580.xx	Modbus statistic				
└ P580.01	Mess. received	-	- (Read only)	0x232A:001	Modbus
└ P580.02	Val. mess. rec.	-	- (Read only)	0x232A:002	Modbus
└ P580.03	Mess. w. exc.	-	- (Read only)	0x232A:003	Modbus
└ P580.04	Mess. w. errors	-	- (Read only)	0x232A:004	Modbus
└ P580.05	Messages sent	-	- (Read only)	0x232A:005	Modbus
P580.xx	PROFIBUS counter				

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P580.01	Data cycles/sec.	-	- (Read only)	0x234A:001	PROFIBUS
└ P580.02	PRM events	-	- (Read only)	0x234A:002	PROFIBUS
└ P580.03	CFG events	-	- (Read only)	0x234A:003	PROFIBUS
└ P580.04	DIAG events	-	- (Read only)	0x234A:004	PROFIBUS
└ P580.05	C1 messages	-	- (Read only)	0x234A:005	PROFIBUS
└ P580.06	C2 messages	-	- (Read only)	0x234A:006	PROFIBUS
└ P580.07	WD events	-	- (Read only)	0x234A:007	PROFIBUS
└ P580.08	DataEx.event	-	- (Read only)	0x234A:008	PROFIBUS
└ P580.09	Tot. data cycles	-	- (Read only)	0x234A:009	PROFIBUS
P583.xx	Rx data diagn.				
└ P583.01	Rx data offset	**0**	0 ... 240	0x232E:001	Modbus
└ P583.02	Last RxD byte0	-	- (Read only)	0x232E:002	Modbus
└ P583.03	Last RxD byte2	-	- (Read only)	0x232E:003	Modbus
└ P583.04	Last RxD byte4	-	- (Read only)	0x232E:004	Modbus
└ P583.05	Last RxD byte6	-	- (Read only)	0x232E:005	Modbus
└ P583.06	Last RxD byte8	-	- (Read only)	0x232E:006	Modbus
└ P583.07	Last RxD byte10	-	- (Read only)	0x232E:007	Modbus
└ P583.08	Last RxD byte12	-	- (Read only)	0x232E:008	Modbus
└ P583.09	Last RxD byte14	-	- (Read only)	0x232E:009	Modbus
└ P583.10	Last RxD byte16	-	- (Read only)	0x232E:010	Modbus
└ P583.11	Last RxD byte18	-	- (Read only)	0x232E:011	Modbus
└ P583.12	Last RxD byte20	-	- (Read only)	0x232E:012	Modbus
└ P583.13	Last RxD byte22	-	- (Read only)	0x232E:013	Modbus
└ P583.14	Last RxD byte24	-	- (Read only)	0x232E:014	Modbus
└ P583.15	Last RxD byte26	-	- (Read only)	0x232E:015	Modbus
└ P583.16	Last RxD byte28	-	- (Read only)	0x232E:016	Modbus
└ P583.17	Last RxD byte30	-	- (Read only)	0x232E:017	Modbus
P585.xx	Tx data diagn.				
└ P585.01	Tx data offset	**0**	0 ... 240	0x232F:001	Modbus
└ P585.02	Last TxD byte0	-	- (Read only)	0x232F:002	Modbus
└ P585.03	Last TxD Byte1	-	- (Read only)	0x232F:003	Modbus
└ P585.04	Last TxD byte2	-	- (Read only)	0x232F:004	Modbus
└ P585.05	Last TxD byte3	-	- (Read only)	0x232F:005	Modbus
└ P585.06	Last TxD byte4	-	- (Read only)	0x232F:006	Modbus
└ P585.07	Last TxD byte5	-	- (Read only)	0x232F:007	Modbus
└ P585.08	Last TxD byte6	-	- (Read only)	0x232F:008	Modbus
└ P585.09	Last TxD byte7	-	- (Read only)	0x232F:009	Modbus
└ P585.10	Last TxD byte8	-	- (Read only)	0x232F:010	Modbus
└ P585.11	Last TxD byte9	-	- (Read only)	0x232F:011	Modbus
└ P585.12	Last TxD byte10	-	- (Read only)	0x232F:012	Modbus
└ P585.13	Last TxD byte11	-	- (Read only)	0x232F:013	Modbus
└ P585.14	Last TxD byte12	-	- (Read only)	0x232F:014	Modbus
└ P585.15	Last TxD byte13	-	- (Read only)	0x232F:015	Modbus
└ P585.16	Last TxD byte14	-	- (Read only)	0x232F:016	Modbus
└ P585.17	Last TxD byte15	-	- (Read only)	0x232F:017	Modbus
P590.xx	NetWordINx				
└ P590.01	NetWordIN1	**0x0000**	0x0000 ... 0xFFFF	0x4008:001	general
└ P590.02	NetWordIN2	**0x0000**	0x0000 ... 0xFFFF	0x4008:002	general
└ P590.03	NetWordIN3	**0.0 %**	0.0 ... 100.0 %	0x4008:003	general
└ P590.04	NetWordIN4	**0.0 %**	0.0 ... 100.0 %	0x4008:004	general
P591.xx	NetWordOUTx				
└ P591.01	NetWordOUT1	-	- (Read only)	0x400A:001	general
└ P591.02	NetWordOUT2	-	- (Read only)	0x400A:002	general
P592.xx	Process data IN				
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P592.01	AC control word	**0x0000**	0x0000 ... 0xFFFF	0x400B:001	general
└ P592.02	LECOM ctrl word	**0x0000**	0x0000 ... 0xFFFF	0x400B:002	general
└ P592.03	Net.freq. 0.1Hz	**0.0 Hz**	0.0 ... 599.0 Hz	0x400B:003	general
└ P592.04	Net.setp. speed	**0 rpm**	0 ... 50000 rpm	0x400B:004	general
└ P592.05	Net.freq.0.01Hz	**0.00 Hz**	0.00 ... 599.00 Hz	0x400B:005	general
└ P592.06	Veloc. mode setp	**0.0 Hz**	-599.0 ... 599.0 Hz	0x400B:006	general
└ P592.07	PID setpoint	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x400B:007	general
└ P592.08	Torque mode setp	**0 Nm**	-32768 ... 32767 Nm	0x400B:008	general
└ P592.09	Torque scaling	**0**	-128 ... 127	0x400B:009	general
P593.xx	Process data OUT				
└ P593.01	AC status word	-	- (Read only)	0x400C:001	general
└ P593.02	LECOM stat. word	-	- (Read only)	0x400C:002	general
└ P593.03	Frequency 0.1Hz	x.x Hz	- (Read only)	0x400C:003	general
└ P593.04	Motor speed	x rpm	- (Read only)	0x400C:004	general
└ P593.05	Drive status	-	- (Read only)	0x400C:005	general
└ P593.06	Frequency 0.01Hz	x.xx Hz	- (Read only)	0x400C:006	general
└ P593.07	Torque scaled	-	- (Read only)	0x400C:007	general
P600.xx	Process control.				
└ P600.01	Operating mode	**Inhibited [0]**	Selection list	0x4020:001	general
└ P600.02	PID process var.	**Analog input 1 [1]**	Selection list	0x4020:002	general
└ P600.03	PID speed range	**100 %**	0 ... 100 %	0x4020:003	general
└ P600.04	PID line speed	**w/o speed.add. [0]**	Selection list	0x4020:004	general
P601.00	PID P-component	**5.0 %**	0.0 ... 1000.0 %	0x4048	general
P602.00	PID I- component	**400 ms**	20 ... 6000 ms	0x4049	general
P603.00	PID D-component	**0.0 s**	0.0 ... 20.0 s	0x404A	general
P604.00	PID setp.ramp	**20.0 s**	0.0 ... 100.0 s	0x404B	general
P605.xx	PID setp. limit				
└ P605.01	Minimum setpoint	**-300.00 PID unit**	-300.00 ... 300.00 PID unit	0x404E:001	general
└ P605.02	Maximum setpoint	**300.00 PID unit**	-300.00 ... 300.00 PID unit	0x404E:002	general
P606.xx	PID speed op.				
└ P606.01	Accel. time	**1.0 s**	0.0 ... 3600.0 s	0x4021:001	general
└ P606.02	Decel. time	**1.0 s**	0.0 ... 3600.0 s	0x4021:002	general
P607.xx	PID influence				
└ P607.01	Show time	**5.0 s**	0.0 ... 999.9 s	0x404C:001	general
└ P607.02	Mask out time	**5.0 s**	0.0 ... 999.9 s	0x404C:002	general
P608.xx	PID alarms				
└ P608.01	MIN alarm thrsh.	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x404D:001	general
└ P608.02	MAX alarm thrsh.	**100.00 PID unit**	-300.00 ... 300.00 PID unit	0x404D:002	general
P610.xx	PID sleep mode				
└ P610.01	Activation	**Disabled [0]**	Selection list	0x4023:001	general
└ P610.02	Stop method	**Coasting [0]**	Selection list	0x4023:002	general
└ P610.03	Freq. thresh.	**0.0 Hz**	0.0 ... 599.0 Hz	0x4023:003	general
└ P610.04	Feedback thresh.	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4023:004	general
└ P610.05	Delay time	**0.0 s**	0.0 ... 300.0 s	0x4023:005	general
└ P610.06	Recovery	**Setp. > P610.3 [0]**	Selection list	0x4023:006	general
└ P610.07	Bandwidth	**0.00 PID unit**	0.00 ... 300.00 PID unit	0x4023:007	general
└ P610.08	Recovery thresh.	**0.00 PID unit**	-300.00 ... 300.00 PID unit	0x4023:008	general
P615.xx	Auto-rinsing				
└ P615.01	Rinsing in idle	**Inhibited [0]**	Selection list	0x4024:001	general
└ P615.02	Rinse interval	**30.0 min**	0.0 ... 6000.0 min	0x4024:002	general
└ P615.03	Rinse speed	**0.0 Hz**	-599.0 ... 599.0 Hz	0x4024:003	general
└ P615.04	Rinse period	**0.0 s**	0.0 ... 6000.0 s	0x4024:004	general
P700.xx	Device commands				
└ P700.01	Load def. sett.	**Off / ready [0]**	Selection list	0x2022:001	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P700.03	Save user data	**Off / ready [0]**	Selection list	0x2022:003	general
└ P700.04	Load user data	**Off / ready [0]**	Selection list	0x2022:004	general
└ P700.05	Load OEM data	**Off / ready [0]**	Selection list	0x2022:005	general
└ P700.06	Save OEM data	**Off / ready [0]**	Selection list	0x2022:006	general
└ P700.07	Load par. set 1	**Off / ready [0]**	Selection list	0x2022:007	general
└ P700.08	Load par. set 2	**Off / ready [0]**	Selection list	0x2022:008	general
└ P700.09	Load par. set 3	**Off / ready [0]**	Selection list	0x2022:009	general
└ P700.10	Load par. set 4	**Off / ready [0]**	Selection list	0x2022:010	general
└ P700.11	Save par. set 1	**Off / ready [0]**	Selection list	0x2022:011	general
└ P700.12	Save par. set 2	**Off / ready [0]**	Selection list	0x2022:012	general
└ P700.13	Save par. set 3	**Off / ready [0]**	Selection list	0x2022:013	general
└ P700.14	Save par. set 4	**Off / ready [0]**	Selection list	0x2022:014	general
└ P700.15	Delete logbook	**Off / ready [0]**	Selection list	0x2022:015	general
└ P700.27	Accept new HW	**Off / ready [0]**	Selection list	0x2022:027	general
P701.00	KP setp. incr.	**1**	1 ... 100	0x2862	general
P702.00	Scal.speed fact.	**0.00**	0.00 ... 650.00	0x4002	general
P703.00	KP status displ.	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x2864	general
P704.xx	DC braking				
└ P704.01	Current	**0.0 %**	0.0 ... 200.0 %	0x2B84:001	general
└ P704.02	Hold time autom.	**0.0 s**	0.0 ... 999.9 s	0x2B84:002	general
└ P704.03	Threshold autom.	**0.0 Hz**	0.0 ... 599.0 Hz	0x2B84:003	general
P705.00	KP language	**English [1]**	Selection list	0x2863	general
P706.xx	Brake management				
└ P706.01	Operating mode	**Rfg stop (RFGS) [1]**	Selection list	0x2541:001	general
└ P706.02	Active threshold	x V	- (Read only)	0x2541:002	general
└ P706.03	Red. threshold	**0 V**	0 ... 100 V	0x2541:003	general
└ P706.04	Add.frequency	**0.0 Hz**	0.0 ... 10.0 Hz	0x2541:004	general
└ P706.05	Del.overr.time	**2.0 s**	0.0 ... 60.0 s	0x2541:005	general
└ P706.06	Brk. res. behav	**Off:disabl+error [0]**	Selection list	0x2541:006	general
P707.xx	Brake resistor				
└ P707.02	Resistance value	**180.0 Ω** *	0.0 ... 500.0 Ω	0x2550:002	general
└ P707.03	Rated power	**50 W** *	0 ... 800000 W	0x2550:003	general
└ P707.04	Maximum heat	**8.0 kWs** *	0.0 ... 100000.0 kWs	0x2550:004	general
└ P707.07	Thermal load	x.x %	- (Read only)	0x2550:007	general
└ P707.08	Warning thresh.	**90.0 %**	50.0 ... 150.0 %	0x2550:008	general
└ P707.09	Error thresh.	**100.0 %**	50.0 ... 150.0 %	0x2550:009	general
└ P707.10	Warning resp.	**Warning [1]**	Selection list	0x2550:010	general
└ P707.11	Error response	**Fault [3]**	Selection list	0x2550:011	general
P710.xx	Load loss detect				
└ P710.01	Threshold	**0.0 %**	0.0 ... 200.0 %	0x4006:001	general
└ P710.02	Deceleration	**0.0 s**	0.0 ... 300.0 s	0x4006:002	general
P712.xx	Brake control				
└ P712.01	Brake mode	**Off [2]**	Selection list	0x2820:001	general
└ P712.02	Closing time	**100 ms**	0 ... 10000 ms	0x2820:002	general
└ P712.03	Opening time	**100 ms**	0 ... 10000 ms	0x2820:003	general
└ P712.07	Closing thresh.	**0.2 Hz**	0.0 ... 599.0 Hz	0x2820:007	general
└ P712.08	Holding load	**0.0 %**	-500.0 ... 500.0 %	0x2820:008	general
└ P712.15	Brake status	-	- (Read only)	0x2820:015	general
P718.xx	Flying restart				
└ P718.01	Current	**30 %**	0 ... 100 %	0x2BA1:001	MCTRL
└ P718.02	Start frequency	**20.0 Hz**	-599.0 ... 599.0 Hz	0x2BA1:002	MCTRL
└ P718.03	Restart time	**5911 ms** *	1 ... 60000 ms	0x2BA1:003	MCTRL
└ P718.08	Fl.res.frequency	x.x Hz	- (Read only)	0x2BA1:008	MCTRL
P721.xx	Mains fail. ctrl				
* Default setting depending on the size.				Firmware version 02.01.01.00	

Display code	Short designation	Default setting	Setting range	Address	Category
└ P721.01	Enable function	**Disabled [0]**	Selection list	0x2D66:001	general
└ P721.02	DC-bus act.level	**0 %** *	60 ... 90 %	0x2D66:002	general
└ P721.03	Gain V-ctrl	**0.01000 Hz/V**	0.00001 ... 0.50000 Hz/V	0x2D66:003	general
└ P721.04	Res. time V-ctrl	**20 ms**	5 ... 2000 ms	0x2D66:004	general
└ P721.05	DC voltage setp.	**100 %**	80 ... 110 %	0x2D66:005	general
└ P721.06	Setp. ramp	**20 ms**	1 ... 16000 ms	0x2D66:006	general
└ P721.07	Clear time	**20 ms**	1 ... 60000 ms	0x2D66:007	general
└ P721.08	Restart level	**0.0 Hz**	0.0 ... 599.0 Hz	0x2D66:008	general
└ P721.09	RERT:Status	-	- (Read only)	0x2D66:009	general
P730.00	PIN1 protection	**0**	-1 ... 9999	0x203D	general
P731.00	PIN2 protection	**0**	-1 ... 9999	0x203E	general
P732.00	Auto-Save EPM	**Inhibit [0]**	Selection list	0x2829	general
P740.xx	Favorites sett.				
└ P740.01	Parameter 1	**0x2DDD0000**	0x00000000 ... 0xFFFFFF00	0x261C:001	general
└ P740.02	Parameter 2	**0x60780000**	0x00000000 ... 0xFFFFFF00	0x261C:002	general
└ P740.03	Parameter 3	**0x2D890000**	0x00000000 ... 0xFFFFFF00	0x261C:003	general
└ P740.04	Parameter 4	**0x603F0000**	0x00000000 ... 0xFFFFFF00	0x261C:004	general
└ P740.05	Parameter 5	**0x28240000**	0x00000000 ... 0xFFFFFF00	0x261C:005	general
└ P740.06	Parameter 6	**0x28600100**	0x00000000 ... 0xFFFFFF00	0x261C:006	general
└ P740.07	Parameter 7	**0x28380100**	0x00000000 ... 0xFFFFFF00	0x261C:007	general
└ P740.08	Parameter 8	**0x28380300**	0x00000000 ... 0xFFFFFF00	0x261C:008	general
└ P740.09	Parameter 9	**0x25400100**	0x00000000 ... 0xFFFFFF00	0x261C:009	general
└ P740.10	Parameter 10	**0x29150000**	0x00000000 ... 0xFFFFFF00	0x261C:010	general
└ P740.11	Parameter 11	**0x29160000**	0x00000000 ... 0xFFFFFF00	0x261C:011	general
└ P740.12	Parameter 12	**0x29170000**	0x00000000 ... 0xFFFFFF00	0x261C:012	general
└ P740.13	Parameter 13	**0x29180000**	0x00000000 ... 0xFFFFFF00	0x261C:013	general
└ P740.14	Parameter 14	**0x2C000000**	0x00000000 ... 0xFFFFFF00	0x261C:014	general
└ P740.15	Parameter 15	**0x2B000000**	0x00000000 ... 0xFFFFFF00	0x261C:015	general
└ P740.16	Parameter 16	**0x2B010100**	0x00000000 ... 0xFFFFFF00	0x261C:016	general
└ P740.17	Parameter 17	**0x2B010200**	0x00000000 ... 0xFFFFFF00	0x261C:017	general
└ P740.18	Parameter 18	**0x283A0000**	0x00000000 ... 0xFFFFFF00	0x261C:018	general
└ P740.19	Parameter 19	**0x29390000**	0x00000000 ... 0xFFFFFF00	0x261C:019	general
└ P740.20	Parameter 20	**0x2D4B0100**	0x00000000 ... 0xFFFFFF00	0x261C:020	general
└ P740.21	Parameter 21	**0x2B120100**	0x00000000 ... 0xFFFFFF00	0x261C:021	general
└ P740.22	Parameter 22	**0x60730000**	0x00000000 ... 0xFFFFFF00	0x261C:022	general
└ P740.23	Parameter 23	**0x26310100**	0x00000000 ... 0xFFFFFF00	0x261C:023	general
└ P740.24	Parameter 24	**0x26310200**	0x00000000 ... 0xFFFFFF00	0x261C:024	general
└ P740.25	Parameter 25	**0x26310300**	0x00000000 ... 0xFFFFFF00	0x261C:025	general
└ P740.26	Parameter 26	**0x26310400**	0x00000000 ... 0xFFFFFF00	0x261C:026	general
└ P740.27	Parameter 27	**0x26310500**	0x00000000 ... 0xFFFFFF00	0x261C:027	general
└ P740.28	Parameter 28	**0x26310600**	0x00000000 ... 0xFFFFFF00	0x261C:028	general
└ P740.29	Parameter 29	**0x26310700**	0x00000000 ... 0xFFFFFF00	0x261C:029	general
└ P740.30	Parameter 30	**0x26310800**	0x00000000 ... 0xFFFFFF00	0x261C:030	general
└ P740.31	Parameter 31	**0x26310900**	0x00000000 ... 0xFFFFFF00	0x261C:031	general
└ P740.32	Parameter 32	**0x26310D00**	0x00000000 ... 0xFFFFFF00	0x261C:032	general
└ P740.33	Parameter 33	**0x26311200**	0x00000000 ... 0xFFFFFF00	0x261C:033	general
└ P740.34	Parameter 34	**0x26311300**	0x00000000 ... 0xFFFFFF00	0x261C:034	general
└ P740.35	Parameter 35	**0x26311400**	0x00000000 ... 0xFFFFFF00	0x261C:035	general
└ P740.36	Parameter 36	**0x26340100**	0x00000000 ... 0xFFFFFF00	0x261C:036	general
└ P740.37	Parameter 37	**0x26340200**	0x00000000 ... 0xFFFFFF00	0x261C:037	general
└ P740.38	Parameter 38	**0x26360100**	0x00000000 ... 0xFFFFFF00	0x261C:038	general
└ P740.39	Parameter 39	**0x26360200**	0x00000000 ... 0xFFFFFF00	0x261C:039	general
└ P740.40	Parameter 40	**0x26360300**	0x00000000 ... 0xFFFFFF00	0x261C:040	general
└ P740.41	Parameter 41	**0x26390100**	0x00000000 ... 0xFFFFFF00	0x261C:041	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P740.42	Parameter 42	**0x26390200**	0x00000000 ... 0xFFFFFF00	0x261C:042	general
└ P740.43	Parameter 43	**0x26390300**	0x00000000 ... 0xFFFFFF00	0x261C:043	general
└ P740.44	Parameter 44	**0x26390400**	0x00000000 ... 0xFFFFFF00	0x261C:044	general
└ P740.45	Parameter 45	**0x29110100**	0x00000000 ... 0xFFFFFF00	0x261C:045	general
└ P740.46	Parameter 46	**0x29110200**	0x00000000 ... 0xFFFFFF00	0x261C:046	general
└ P740.47	Parameter 47	**0x29110300**	0x00000000 ... 0xFFFFFF00	0x261C:047	general
└ P740.48	Parameter 48	**0x29110400**	0x00000000 ... 0xFFFFFF00	0x261C:048	general
└ P740.49	Parameter 49	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x261C:049	general
└ P740.50	Parameter 50	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x261C:050	general
P750.xx	Param.set setup				
└ P750.01	Parameter 1	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:001	general
└ P750.02	Parameter 2	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:002	general
└ P750.03	Parameter 3	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:003	general
└ P750.04	Parameter 4	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:004	general
└ P750.05	Parameter 5	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:005	general
└ P750.06	Parameter 6	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:006	general
└ P750.07	Parameter 7	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:007	general
└ P750.08	Parameter 8	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:008	general
└ P750.09	Parameter 9	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:009	general
└ P750.10	Parameter 10	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:010	general
└ P750.11	Parameter 11	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:011	general
└ P750.12	Parameter 12	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:012	general
└ P750.13	Parameter 13	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:013	general
└ P750.14	Parameter 14	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:014	general
└ P750.15	Parameter 15	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:015	general
└ P750.16	Parameter 16	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:016	general
└ P750.17	Parameter 17	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:017	general
└ P750.18	Parameter 18	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:018	general
└ P750.19	Parameter 19	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:019	general
└ P750.20	Parameter 20	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:020	general
└ P750.21	Parameter 21	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:021	general
└ P750.22	Parameter 22	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:022	general
└ P750.23	Parameter 23	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:023	general
└ P750.24	Parameter 24	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:024	general
└ P750.25	Parameter 25	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:025	general
└ P750.26	Parameter 26	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:026	general
└ P750.27	Parameter 27	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:027	general
└ P750.28	Parameter 28	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:028	general
└ P750.29	Parameter 29	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:029	general
└ P750.30	Parameter 30	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:030	general
└ P750.31	Parameter 31	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:031	general
└ P750.32	Parameter 32	**0x00000000**	0x00000000 ... 0xFFFFFF00	0x4041:032	general
P751.xx	Par. value set 1				
└ P751.01	Set 1 - Value 1	**0**	-2147483648 ... 2147483647	0x4042:001	general
└ P751.02	Set 1 - Value 2	**0**	-2147483648 ... 2147483647	0x4042:002	general
└ P751.03	Set 1 - Value 3	**0**	-2147483648 ... 2147483647	0x4042:003	general
└ P751.04	Set 1 - Value 4	**0**	-2147483648 ... 2147483647	0x4042:004	general
└ P751.05	Set 1 - Value 5	**0**	-2147483648 ... 2147483647	0x4042:005	general
└ P751.06	Set 1 - Value 6	**0**	-2147483648 ... 2147483647	0x4042:006	general
└ P751.07	Set 1 - Value 7	**0**	-2147483648 ... 2147483647	0x4042:007	general
└ P751.08	Set 1 - Value 8	**0**	-2147483648 ... 2147483647	0x4042:008	general
└ P751.09	Set 1 - Value 9	**0**	-2147483648 ... 2147483647	0x4042:009	general
└ P751.10	Set 1 - Value 10	**0**	-2147483648 ... 2147483647	0x4042:010	general
└ P751.11	Set 1 - Value 11	**0**	-2147483648 ... 2147483647	0x4042:011	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P751.12	Set 1 - Value 12	**0**	-2147483648 ... 2147483647	0x4042:012	general
└ P751.13	Set 1 - Value 13	**0**	-2147483648 ... 2147483647	0x4042:013	general
└ P751.14	Set 1 - Value 14	**0**	-2147483648 ... 2147483647	0x4042:014	general
└ P751.15	Set 1 - Value 15	**0**	-2147483648 ... 2147483647	0x4042:015	general
└ P751.16	Set 1 - Value 16	**0**	-2147483648 ... 2147483647	0x4042:016	general
└ P751.17	Set 1 - Value 17	**0**	-2147483648 ... 2147483647	0x4042:017	general
└ P751.18	Set 1 - Value 18	**0**	-2147483648 ... 2147483647	0x4042:018	general
└ P751.19	Set 1 - Value 19	**0**	-2147483648 ... 2147483647	0x4042:019	general
└ P751.20	Set 1 - Value 20	**0**	-2147483648 ... 2147483647	0x4042:020	general
└ P751.21	Set 1 - Value 21	**0**	-2147483648 ... 2147483647	0x4042:021	general
└ P751.22	Set 1 - Value 22	**0**	-2147483648 ... 2147483647	0x4042:022	general
└ P751.23	Set 1 - Value 23	**0**	-2147483648 ... 2147483647	0x4042:023	general
└ P751.24	Set 1 - Value 24	**0**	-2147483648 ... 2147483647	0x4042:024	general
└ P751.25	Set 1 - Value 25	**0**	-2147483648 ... 2147483647	0x4042:025	general
└ P751.26	Set 1 - Value 26	**0**	-2147483648 ... 2147483647	0x4042:026	general
└ P751.27	Set 1 - Value 27	**0**	-2147483648 ... 2147483647	0x4042:027	general
└ P751.28	Set 1 - Value 28	**0**	-2147483648 ... 2147483647	0x4042:028	general
└ P751.29	Set 1 - Value 29	**0**	-2147483648 ... 2147483647	0x4042:029	general
└ P751.30	Set 1 - Value 30	**0**	-2147483648 ... 2147483647	0x4042:030	general
└ P751.31	Set 1 - Value 31	**0**	-2147483648 ... 2147483647	0x4042:031	general
└ P751.32	Set 1 - Value 32	**0**	-2147483648 ... 2147483647	0x4042:032	general
P752.xx	Param. set 2				
└ P752.01	Set 2 - Value 1	**0**	-2147483648 ... 2147483647	0x4043:001	general
└ P752.02	Set 2 - Value 2	**0**	-2147483648 ... 2147483647	0x4043:002	general
└ P752.03	Set 2 - Value 3	**0**	-2147483648 ... 2147483647	0x4043:003	general
└ P752.04	Set 2 - Value 4	**0**	-2147483648 ... 2147483647	0x4043:004	general
└ P752.05	Set 2 - Value 5	**0**	-2147483648 ... 2147483647	0x4043:005	general
└ P752.06	Set 2 - Value 6	**0**	-2147483648 ... 2147483647	0x4043:006	general
└ P752.07	Set 2 - Value 7	**0**	-2147483648 ... 2147483647	0x4043:007	general
└ P752.08	Set 2 - Value 8	**0**	-2147483648 ... 2147483647	0x4043:008	general
└ P752.09	Set 2 - Value 9	**0**	-2147483648 ... 2147483647	0x4043:009	general
└ P752.10	Set 2 - Value 10	**0**	-2147483648 ... 2147483647	0x4043:010	general
└ P752.11	Set 2 - Value 11	**0**	-2147483648 ... 2147483647	0x4043:011	general
└ P752.12	Set 2 - Value 12	**0**	-2147483648 ... 2147483647	0x4043:012	general
└ P752.13	Set 2 - Value 13	**0**	-2147483648 ... 2147483647	0x4043:013	general
└ P752.14	Set 2 - Value 14	**0**	-2147483648 ... 2147483647	0x4043:014	general
└ P752.15	Set 2 - Value 15	**0**	-2147483648 ... 2147483647	0x4043:015	general
└ P752.16	Set 2 - Value 16	**0**	-2147483648 ... 2147483647	0x4043:016	general
└ P752.17	Set 2 - Value 17	**0**	-2147483648 ... 2147483647	0x4043:017	general
└ P752.18	Set 2 - Value 18	**0**	-2147483648 ... 2147483647	0x4043:018	general
└ P752.19	Set 2 - Value 19	**0**	-2147483648 ... 2147483647	0x4043:019	general
└ P752.20	Set 2 - Value 20	**0**	-2147483648 ... 2147483647	0x4043:020	general
└ P752.21	Set 2 - Value 21	**0**	-2147483648 ... 2147483647	0x4043:021	general
└ P752.22	Set 2 - Value 22	**0**	-2147483648 ... 2147483647	0x4043:022	general
└ P752.23	Set 2 - Value 23	**0**	-2147483648 ... 2147483647	0x4043:023	general
└ P752.24	Set 2 - Value 24	**0**	-2147483648 ... 2147483647	0x4043:024	general
└ P752.25	Set 2 - Value 25	**0**	-2147483648 ... 2147483647	0x4043:025	general
└ P752.26	Set 2 - Value 26	**0**	-2147483648 ... 2147483647	0x4043:026	general
└ P752.27	Set 2 - Value 27	**0**	-2147483648 ... 2147483647	0x4043:027	general
└ P752.28	Set 2 - Value 28	**0**	-2147483648 ... 2147483647	0x4043:028	general
└ P752.29	Set 2 - Value 29	**0**	-2147483648 ... 2147483647	0x4043:029	general
└ P752.30	Set 2 - Value 30	**0**	-2147483648 ... 2147483647	0x4043:030	general
└ P752.31	Set 2 - Value 31	**0**	-2147483648 ... 2147483647	0x4043:031	general
└ P752.32	Set 2 - Value 32	**0**	-2147483648 ... 2147483647	0x4043:032	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
P753.xx	Param. set 3				
└ P753.01	Set 3 - Value 1	**0**	-2147483648 ... 2147483647	0x4044:001	general
└ P753.02	Set 3 - Value 2	**0**	-2147483648 ... 2147483647	0x4044:002	general
└ P753.03	Set 3 - Value 3	**0**	-2147483648 ... 2147483647	0x4044:003	general
└ P753.04	Set 3 - Value 4	**0**	-2147483648 ... 2147483647	0x4044:004	general
└ P753.05	Set 3 - Value 5	**0**	-2147483648 ... 2147483647	0x4044:005	general
└ P753.06	Set 3 - Value 6	**0**	-2147483648 ... 2147483647	0x4044:006	general
└ P753.07	Set 3 - Value 7	**0**	-2147483648 ... 2147483647	0x4044:007	general
└ P753.08	Set 3 - Value 8	**0**	-2147483648 ... 2147483647	0x4044:008	general
└ P753.09	Set 3 - Value 9	**0**	-2147483648 ... 2147483647	0x4044:009	general
└ P753.10	Set 3 - Value 10	**0**	-2147483648 ... 2147483647	0x4044:010	general
└ P753.11	Set 3 - Value 11	**0**	-2147483648 ... 2147483647	0x4044:011	general
└ P753.12	Set 3 - Value 12	**0**	-2147483648 ... 2147483647	0x4044:012	general
└ P753.13	Set 3 - Value 13	**0**	-2147483648 ... 2147483647	0x4044:013	general
└ P753.14	Set 3 - Value 14	**0**	-2147483648 ... 2147483647	0x4044:014	general
└ P753.15	Set 3 - Value 15	**0**	-2147483648 ... 2147483647	0x4044:015	general
└ P753.16	Set 3 - Value 16	**0**	-2147483648 ... 2147483647	0x4044:016	general
└ P753.17	Set 3 - Value 17	**0**	-2147483648 ... 2147483647	0x4044:017	general
└ P753.18	Set 3 - Value 18	**0**	-2147483648 ... 2147483647	0x4044:018	general
└ P753.19	Set 3 - Value 19	**0**	-2147483648 ... 2147483647	0x4044:019	general
└ P753.20	Set 3 - Value 20	**0**	-2147483648 ... 2147483647	0x4044:020	general
└ P753.21	Set 3 - Value 21	**0**	-2147483648 ... 2147483647	0x4044:021	general
└ P753.22	Set 3 - Value 22	**0**	-2147483648 ... 2147483647	0x4044:022	general
└ P753.23	Set 3 - Value 23	**0**	-2147483648 ... 2147483647	0x4044:023	general
└ P753.24	Set 3 - Value 24	**0**	-2147483648 ... 2147483647	0x4044:024	general
└ P753.25	Set 3 - Value 25	**0**	-2147483648 ... 2147483647	0x4044:025	general
└ P753.26	Set 3 - Value 26	**0**	-2147483648 ... 2147483647	0x4044:026	general
└ P753.27	Set 3 - Value 27	**0**	-2147483648 ... 2147483647	0x4044:027	general
└ P753.28	Set 3 - Value 28	**0**	-2147483648 ... 2147483647	0x4044:028	general
└ P753.29	Set 3 - Value 29	**0**	-2147483648 ... 2147483647	0x4044:029	general
└ P753.30	Set 3 - Value 30	**0**	-2147483648 ... 2147483647	0x4044:030	general
└ P753.31	Set 3 - Value 31	**0**	-2147483648 ... 2147483647	0x4044:031	general
└ P753.32	Set 3 - Value 32	**0**	-2147483648 ... 2147483647	0x4044:032	general
P754.xx	Param. set 4				
└ P754.01	Set 4 - Value 1	**0**	-2147483648 ... 2147483647	0x4045:001	general
└ P754.02	Set 4 - Value 2	**0**	-2147483648 ... 2147483647	0x4045:002	general
└ P754.03	Set 4 - Value 3	**0**	-2147483648 ... 2147483647	0x4045:003	general
└ P754.04	Set 4 - Value 4	**0**	-2147483648 ... 2147483647	0x4045:004	general
└ P754.05	Set 4 - Value 5	**0**	-2147483648 ... 2147483647	0x4045:005	general
└ P754.06	Set 4 - Value 6	**0**	-2147483648 ... 2147483647	0x4045:006	general
└ P754.07	Set 4 - Value 7	**0**	-2147483648 ... 2147483647	0x4045:007	general
└ P754.08	Set 4 - Value 8	**0**	-2147483648 ... 2147483647	0x4045:008	general
└ P754.09	Set 4 - Value 9	**0**	-2147483648 ... 2147483647	0x4045:009	general
└ P754.10	Set 4 - Value 10	**0**	-2147483648 ... 2147483647	0x4045:010	general
└ P754.11	Set 4 - Value 11	**0**	-2147483648 ... 2147483647	0x4045:011	general
└ P754.12	Set 4 - Value 12	**0**	-2147483648 ... 2147483647	0x4045:012	general
└ P754.13	Set 4 - Value 13	**0**	-2147483648 ... 2147483647	0x4045:013	general
└ P754.14	Set 4 - Value 14	**0**	-2147483648 ... 2147483647	0x4045:014	general
└ P754.15	Set 4 - Value 15	**0**	-2147483648 ... 2147483647	0x4045:015	general
└ P754.16	Set 4 - Value 16	**0**	-2147483648 ... 2147483647	0x4045:016	general
└ P754.17	Set 4 - Value 17	**0**	-2147483648 ... 2147483647	0x4045:017	general
└ P754.18	Set 4 - Value 18	**0**	-2147483648 ... 2147483647	0x4045:018	general
└ P754.19	Set 4 - Value 19	**0**	-2147483648 ... 2147483647	0x4045:019	general
└ P754.20	Set 4 - Value 20	**0**	-2147483648 ... 2147483647	0x4045:020	general

* Default setting depending on the size. Firmware version 02.01.01.00

Display code	Short designation	Default setting	Setting range	Address	Category
└ P754.21	Set 4 - Value 21	**0**	-2147483648 ... 2147483647	0x4045:021	general
└ P754.22	Set 4 - Value 22	**0**	-2147483648 ... 2147483647	0x4045:022	general
└ P754.23	Set 4 - Value 23	**0**	-2147483648 ... 2147483647	0x4045:023	general
└ P754.24	Set 4 - Value 24	**0**	-2147483648 ... 2147483647	0x4045:024	general
└ P754.25	Set 4 - Value 25	**0**	-2147483648 ... 2147483647	0x4045:025	general
└ P754.26	Set 4 - Value 26	**0**	-2147483648 ... 2147483647	0x4045:026	general
└ P754.27	Set 4 - Value 27	**0**	-2147483648 ... 2147483647	0x4045:027	general
└ P754.28	Set 4 - Value 28	**0**	-2147483648 ... 2147483647	0x4045:028	general
└ P754.29	Set 4 - Value 29	**0**	-2147483648 ... 2147483647	0x4045:029	general
└ P754.30	Set 4 - Value 30	**0**	-2147483648 ... 2147483647	0x4045:030	general
└ P754.31	Set 4 - Value 31	**0**	-2147483648 ... 2147483647	0x4045:031	general
└ P754.32	Set 4 - Value 32	**0**	-2147483648 ... 2147483647	0x4045:032	general
P755.00	PSet activation	**On op. disabled [0]**	Selection list	0x4046	general
P756.xx	PSet error msg.				
└ P756.01	Status	-	- (Read only)	0x4047:001	general
└ P756.02	List entry	-	- (Read only)	0x4047:002	general
P760.xx	Fault config.				
└ P760.02	Restart delay	**3.0 s**	0.0 ... 1000.0 s	0x2839:002	general
└ P760.03	Restart counter	**5**	0 ... 255	0x2839:003	general
└ P760.04	Tro.count r.time	**5.0 s**	0.1 ... 3600.0 s	0x2839:004	general
└ P760.05	Trouble counter	-	- (Read only)	0x2839:005	general
P780.00	CiA: Statusword	-	- (Read only)	0x6041	general
P781.00	Target velocity	**0 rpm**	-32768 ... 32767 rpm	0x6042	general
P782.00	Velocity demand	x rpm	- (Read only)	0x6043	general
P783.00	Velocity actual	x rpm	- (Read only)	0x6044	general
P784.xx	Vel. min max				
└ P784.01	Vel. min amount	**0 rpm**	0 ... 480000 rpm	0x6046:001	general
└ P784.02	Vel. max amount	**2147483647 rpm**	0 ... 2147483647 rpm	0x6046:002	general
P785.xx	Vel.acceleration				
└ P785.01	Delta speed	**3000 rpm**	0 ... 2147483647 rpm	0x6048:001	general
└ P785.02	Delta time	**10 s**	0 ... 65535 s	0x6048:002	general
P786.xx	Vel.deceleration				
└ P786.01	Delta speed	**3000 rpm**	0 ... 2147483647 rpm	0x6049:001	general
└ P786.02	Delta time	**10 s**	0 ... 65535 s	0x6049:002	general
P788.00	Modes of op. dis	-	- (Read only)	0x6061	general
P789.00	Supported modes	-	- (Read only)	0x6502	general
P790.00	Quick stop dec.	**546000 pos. unit/s²**	0 ... 2147483647 pos. unit/s²	0x6085	general
* Default setting depending on the size.				Firmware version 02.01.01.00	

4.5 Save parameter settings in the memory module

4.5.1 Save parameter settings with keypad

If one parameter setting has been changed with the keypad but has not been saved in the memory module with mains failure protection, the SET display is blinking.

In order to save parameter settings in the user memory of the memory module, press the keypad enter key longer than 3 s.

4.5.2 Save parameter settings with »EASY Starter«

If a parameter setting has been changed with the »EASY Starter« but not yet saved in the memory module with mains failure protection, the status line of the »EASY Starter« displays the note "The parameter set was changed".

In order to save parameter settings in the user memory of the memory module,

- click the button in the toolbar of the »EASY Starter« or
- press the function key **<F6>** or
- execute the device command "Save user data": 0x2022:003 (P700.03) = "On / start [1]".

5 Diagnostics and fault elimination

5.1 LED status display

The "RDY" and "ERR" LED status displays on the front of the inverter provide some quick information about certain operating states.

"RDY" LED (blue)	"ERR" LED (red)	Status/meaning
off	off	No supply voltage.
on	on	Initialisation (inverter is started.)
blinking (1 Hz)	off	Safe torque off (STO) active. ▸ Safe torque off (STO) 🕮 364
	blinking fast (4 Hz)	Safe torque off (STO) active, warning active.
blinking (2 Hz)	off	Inverter inhibited.
	blinking fast (4 Hz)	Inverter disabled, warning active. ▸ Error handling 🕮 107
	on	Inverter disabled, error active. ▸ Error handling 🕮 107
	lit every 1.5 s for a short time	Inverter inhibited, no DC-bus voltage.
	on for a short time every 1 s	USB module is connected, 5-V supply voltage for the USB module is available.
on	off	Inverter enabled. **The motor rotates according to the specified setpoint or quick stop active.**
	blinking fast (4 Hz)	Inverter enabled, warning active. **The motor rotates according to the specified setpoint or quick stop active.**
	blinking (1 Hz)	Inverter enabled, quick stop as response to fault active. ▸ Error handling 🕮 107
Both LEDs are blinking in a rapidly alternating mode		Firmware update active. ▸ Firmware download 🕮 359
Both LEDs are blinking in a very rapidly synchronous mode		"Visual tracking" function is active. ▸ Optical device identification 🕮 124

5.2 Diagnostics parameter

The inverter provides many diagnostic parameters which are helpful for operation, maintenance, error diagnosis, error correction, etc.

- In the following overview the most common diagnostic parameters are listed. For the keypad you can find these diagnostic parameters in group 1.
- Further parameters for more specific diagnostic purposes are described in the following subchapters.
- The diagnostic parameters can only be read and cannot be written to.

Parameter	Name / value range / [default setting]	Info
0x2030	CRC parameter set • Read only	Display of the 32-bit hash sum for the integrity check of the parameter set.
0x2B0E (P102.00)	Frequency setpoint (Freq. setpoint) • Read only: x.x Hz	Display of the frequency setpoint currently assigned. • Depending on the present operating conditions, this value may differ from the current output frequency 0x2DDD (P100.00).
0x2B0F	VFC output frequency • Read only: x.x Hz	Display of the current output frequency at V/f operation.
0x2D4F (P123.00)	Motor utilisation (i²*t) (Mot. i2t utilis.) • Read only: x %	Display of the current thermal motor utilisation.
0x2D87 (P105.00)	DC-bus voltage (DC-bus voltage) • Read only: x V	Display of the current DC-bus voltage.
0x2D88 (P104.00)	Motor current (Motor current) • Read only: x.x A	Display des present current-r.m.s. value.
0x2D89 (P106.00)	Motor voltage (Motor voltage) • Read only: x VAC	Display of the current motor voltage.
0x2DA2:001 (P108.01)	Output power: Effective power (Output power: Effective power) • Read only: x.xxx kW	Display of the active output power for an energy analysis in the respective application.
0x2DA2:002 (P108.02)	Output power: Apparent power (Output power: Apparent power) • Read only: x.xxx kVA	Display of the apparent output power for an energy analysis in the respective application.
0x2DA3:001 (P109.01)	Output energy: Motor (Output energy: Motor) • Read only: x.xx kWh	Display of the output power in motor mode for an energy analysis in the respective application.
0x2DA3:002 (P109.02)	Output energy: Generator (Output energy: Generator) • Read only: x.xx kWh	Display of the output power in generator mode for an energy analysis in the respective application.
0x2DDD (P100.00)	Output frequency (Output frequency) • Read only: x.x Hz	Display of the current output frequency for diagnostics of the control.
0x400D (P101.00)	Scaled actual value (Scaled act value) • Read only: x Units	Display of the current speed in application units.
0x6077 (P107.00)	Torque actual value (Torque actual) • Read only: x.x %	Display of the current torque. • 100 % ≡ Motor rated torque 0x6076 (P325.00)
0x6078 (P103.00)	Current actual value (Current actual) • Read only: x.x %	Display of the present motor current. • 100 % ≡ Motor rated current 0x6075 (P323.00)
0x2D84:001 (P117.01)	Heatsink temperature (Heatsink temp.: Heatsink temp.) • Read only: x.x °C	Display of the current heatsink temperature.

Parameter	Name / value range / [default setting]	Info
0x2D84:002	Heatsink temperature: Warning threshold 50.0 ... [**80.0**]* ... 100.0 °C • Default setting depending on the size.	Warning threshold for temperature monitoring. • If the heatsink temperature exceeds the threshold set here, the inverter outputs a warning. • The warning is reset with a hysteresis of approx. 5 °C. • If the heatsink temperature increases further and exceeds the non-adjustable error threshold (100 °C), the inverter changes to the "Fault" device status. The inverter is disabled and thus any further operation is stopped.

5.2.1 Logbook

For diagnostic purposes, the logbook contains the last 32 error messages and warning signals of the inverter, which have occurred during operation.

Preconditions

The logbook can only be accessed

- via the user interface of »EASY Starter« ("Diagnostics" tab) or
- via network.

Details

In contrast to the error history buffer, the logbook additionally protocols the following events:

- Fault messages
- Change-over from normal to setup mode (and vice versa)
- Execution of device commands
- Avoidance of safety functions

The logbook entries are saved persistently in the inverter. If all 32 memory units are occupied, the oldest entry is deleted for a new entry. By means of the "Delete logbook" device command, all logbook entries can be deleted.

Accessing the logbook with »EASY Starter«

1. Select the inverter on the left side in the »EASY Starter« device list.
2. Change to the "Diagnostics" tab.
3. Click the icon to open the logbook.

Observe that the logbook only presents a snapshot at the time the data are read out. If a new event occurs, the logbook must be read out again so that the new event becomes visible.

Accessing the logbook via network

The logbook can also be accessed via network from a higher-level controller or a visualisation. The structure of the diagnostic messages complies with the "ETG.1020" standard of the EtherCAT Technology Group (ETG).

See chapter 13.3 of document "ETG.1020 Protocol Enhancements" provided by the EtherCAT Technology Group (ETG) for detailed information on the structure of the diagnostic messages.

Parameter	Name / value range / [default setting]		Info
0x2022:015 (P700.15)	Device commands: Delete logbook (Device commands: Delete logbook) • Setting can only be changed if the inverter is inhibited.		1 = delete all entries in the logbook.
	0	**Off / ready**	
	1	On / start	

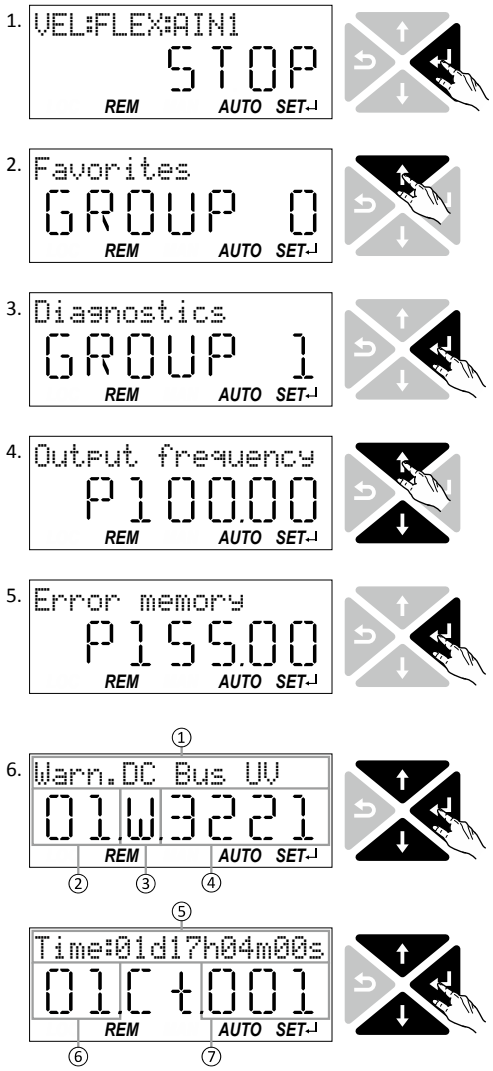
5.2.2 Error history buffer

For purposes of diagnostics, the error history buffer contains the last 32 error and warning messages of the inverter, which have occurred during operation. The error history buffer can be read out using the keypad via P155.00 and provides a limited view on the logbook.

Details

- For each event that is recorded, the error history buffer contains the message text, the error code, the time of occurrence as well as a counter for successive, identical events. If an event that has already been recorded occurs repeatedly, only the counter is incremented.
- The error history buffer can be reset by the user. In order to prevent the buffer from being reset by the user, this function can be protected by means of a password.
- Observe that the error history buffer only presents a snapshot at the time the data are read out. If a new event occurs, the error history buffer must be read out again via P155.00 so that the new event becomes visible.

Accessing the error history buffer with the keypad



1. Use the ↵ key in the operating mode to navigate to the parameterisation mode one level below.
   You are now in the group level. All parameters of the inverter are divided into different groups according to their function.
   Note: By using the ⮌ key you can navigate one level upwards again anytime.
2. Use the ↑ navigation key to select group 1 ("Diagnostics").
3. Use the ↵ key to navigate to one level below.
   You are now in the parameter level of the group selected.
4. Use the ↑ and ↓ select the P155.00 parameter.
5. Use the ↵ key to navigate to one level below.
   You are now in the error history buffer.
6. Use the ↑ and ↓ navigation keys you can now scroll through the error history buffer entries.
   Use the ↵ key, you can switch over the display.

Information displayed (page 1):
① Message text
② No. of the entry (01 = latest event)
③ Response (W = warning, T = trouble, F = fault)
④ Error code

Information displayed (page 2):
⑤ Time of occurrence
⑥ No. of the entry (01 = latest event)
⑦ Counter for successive, identical events

Note: By using the ⮌ key you can exit the error history buffer again.

Parameter	Name / value range / [default setting]	Info
0x2006:000 (P155.00)	Error history buffer: Keypad display (Fault memory: Error memory) • Read only	Display of the error history buffer on the keypad.
0x2006:001	Error history buffer: Maximum number of messages • Read only	Display of the maximum number of messages which can be stored in the history buffer (from subindex 6).

Parameter	Name / value range / [default setting]	Info
0x2006:002	Error history buffer: Latest message • Read only	Display of the subindex of the most recent message.
0x2006:003	Error history buffer: Latest acknowledgement message 0 ... [**1**] ... 1	0 = delete all entries in the error history buffer.
0x2006:004	Error history buffer: New message • Read only	Reserved for future extensions.
0x2006:005	Error history buffer: Buffer overflow • Read only	Bit 0 ... bit 4 = 0. Bit 5 = 1 ≡ overflow (after recording the 33th event in the error history buffer.
0x2006:006	Error history buffer: Message 0 • Read only	Error history buffer entry 01 (latest event)
0x2006:007	Error history buffer: Message 1 • Read only	Error history buffer entry 02
0x2006:008	Error history buffer: Message 2 • Read only	Error history buffer entry 03
0x2006:009	Error history buffer: Message 3 • Read only	Error history buffer entry 04
0x2006:010	Error history buffer: Message 4 • Read only	Error history buffer entry 05
0x2006:011	Error history buffer: Message 5 • Read only	Error history buffer entry 06
0x2006:012	Error history buffer: Message 6 • Read only	Error history buffer entry 07
0x2006:013	Error history buffer: Message 7 • Read only	Error history buffer entry 08
0x2006:014	Error history buffer: Message 8 • Read only	Error history buffer entry 09
0x2006:015	Error history buffer: Message 9 • Read only	Error history buffer entry 10
0x2006:016	Error history buffer: Message 10 • Read only	Error history buffer entry 11
0x2006:017	Error history buffer: Message 11 • Read only	Error history buffer entry 12
0x2006:018	Error history buffer: Message 12 • Read only	Error history buffer entry 13
0x2006:019	Error history buffer: Message 13 • Read only	Error history buffer entry 14
0x2006:020	Error history buffer: Message 14 • Read only	Error history buffer entry 15
0x2006:021	Error history buffer: Message 15 • Read only	Error history buffer entry 16
0x2006:022	Error history buffer: Message 16 • Read only	Error history buffer entry 17
0x2006:023	Error history buffer: Message 17 • Read only	Error history buffer entry 18
0x2006:024	Error history buffer: Message 18 • Read only	Error history buffer entry 19
0x2006:025	Error history buffer: Message 19 • Read only	Error history buffer entry 20
0x2006:026	Error history buffer: Message 20 • Read only	Error history buffer entry 21
0x2006:027	Error history buffer: Message 21 • Read only	Error history buffer entry 22
0x2006:028	Error history buffer: Message 22 • Read only	Error history buffer entry 23
0x2006:029	Error history buffer: Message 23 • Read only	Error history buffer entry 24
0x2006:030	Error history buffer: Message 24 • Read only	Error history buffer entry 25

Parameter	Name / value range / [default setting]	Info
0x2006:031	Error history buffer: Message 25 • Read only	Error history buffer entry 26
0x2006:032	Error history buffer: Message 26 • Read only	Error history buffer entry 27
0x2006:033	Error history buffer: Message 27 • Read only	Error history buffer entry 28
0x2006:034	Error history buffer: Message 28 • Read only	Error history buffer entry 29
0x2006:035	Error history buffer: Message 29 • Read only	Error history buffer entry 30
0x2006:036	Error history buffer: Message 30 • Read only	Error history buffer entry 31
0x2006:037	Error history buffer: Message 31 • Read only	Error history buffer entry 32

5.2.3 Inverter diagnostics

The following parameters supply some information about the current operating status of the inverter.

This includes the following information:

- Active access protection after log-in by means of PIN1/PIN2
- Currently loaded parameter settings
- Cause(s) for disable, quick stop and stop.
- Active control source and active setpoint source
- Active operating mode
- Keypad status
- Status of the internal motor control

Some of the following parameters contain bit-coded status words. Each single bit has a certain meaning.

▸ Display of status words on keypad 🕮 460

Parameter	Name / value range / [default setting]		Info
0x2040 (P197.00)	Access protection status (Protect. status) • Read only		Bit-coded display of the active access protection after login by PIN1/ PIN2.
	Bit 0	No write access	
	Bit 1	Only favorites changeable	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	

Parameter	Name / value range / [default setting]		Info
0x2827 (P198.00)	Currently loaded parameter settings (Status load. par) • Read only		Display of the parameter settings currently loaded. ▸ Saving/loading the parameter settings 🕮 284
	0	User settings	
	1	Reset 60 Hz setting	Delivery status (default setting) for 50 Hz
	2	Reset 50 Hz setting	Delivery status (default setting) for 60 Hz
	3	OEM default settings	
0x282A:001 (P126.01)	Status words: Cause of disable (Status words: Cause of disable) • Read only		Bit-coded display of the cause(s) for disabled inverter.
	Bit 0	Flexible I/O configuration	1 ≡ the inverter was disabled by the trigger set in 0x2631:001 (P400.01).
	Bit 1	Network	1 ≡ the inverter was disabled via network.
	Bit 2	Axis command	1 ≡ the inverter was disabled via axis command 0x2822:001.
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Fault DC-bus	1 ≡ the inverter was inhibited due to a DC-bus error.
	Bit 7	Drive not ready	1 ≡ the inverter was disabled internally since the drive was not ready for operation. Possible causes: • Under/overvoltage in the DC bus • Defect device hardware
	Bit 8	Quick stop active	1 ≡ the inverter has been disabled by the "Quick stop" function.
	Bit 9	Motor data identification	1 ≡ the inverter was disabled by the "Automatic identification of the motor data" function.
	Bit 10	Automatic holding brake control	1 ≡ the inverter was disabled by the "Holding brake control" function.
	Bit 11	Reserved	-
	Bit 12	CiA402 Inverter disabled	1 ≡ the inverter was disabled by the internal state machine. The bit is only set if • operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]" and • state machine in the "Switch on disabled" state and • the state change has not been carried out via the "Disable operation" command.
	Bit 13	CiA402 Quick stop option code 2	1 ≡ the inverter has been disabled by the "Quick stop" function.
	Bit 14	Safe torque off (STO)	1 ≡ the inverter has been disabled by the integrated safety system.
	Bit 15	CiA402 operation mode 0	1 ≡ the inverter has been disabled because the selection "No mode change/no mode assigned [0]" is set in 0x6060 (P301.00).
	Bit 16	Reserved	-
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	Reserved	

Parameter	Name / value range / [default setting]		Info
0x282A:002 (P126.02)	Status words: Cause of quick stop (Status words: Cause of QSP) • Read only		Bit coded display of the cause(s) of quick stop.
	Bit 0	Flexible I/O configuration	1 ≡ quick stop was activated by the trigger set in 0x2631:003 (P400.03).
	Bit 1	Network	1 ≡ quick stop was activated via network.
	Bit 2	Axis command	1 ≡ quick stop was activated via axis command 0x2822:001.
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Error response	1 ≡ quick stop has been activated as a response to an error.
	Bit 7	Reserved	-
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
0x282A:003 (P126.03)	Status words: Cause of stop (Status words: Cause of stop) • Read only		Bit coded display of the cause(s) of stop.
	Bit 0	Flexible I/O: Start disabled	1 ≡ stop was activated by the trigger set in 0x2631:002 (P400.02).
	Bit 1	Flexible I/O: Run forward	1 ≡ stop has been activated due to cancellation of the command "Run forward (CW)".
	Bit 2	Flexible I/O: Run reverse	1 ≡ stop has been activated due to cancellation of the command "Run reverse (CCW)".
	Bit 3	Flexible I/O: Jog forward	1 ≡ stop has been activated due to cancellation of the command "Jog foward (CW)".
	Bit 4	Flexible I/O: Jog reverse	1 ≡ stop has been activated due to cancellation of the command "Jog reverse (CCW)".
	Bit 5	Network	1 ≡ stop was activated via network.
	Bit 6	Keypad	1 ≡ stop was activated via keypad.
	Bit 7	Control mode transition	1 ≡ stop has been activated due to a change of the operating mode.
	Bit 8	End of sequence	-
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Waiting for start	1 ≡ Stop is active as a start command is not yet available (e.g. after enabling the inverter).

Parameter	Name / value range / [default setting]		Info
0x282A:004	Status words: Extended status word • Read only		Bit-coded status word.
	Bit 0	Reserved	-
	Bit 1	Reserved	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reversal	1 ≡ reversal active.
	Bit 9	Reserved	-
	Bit 10	Safe torque off (STO) active	1 ≡ "Safe torque off (STO)" function has been triggered by the integrated safety system.
	Bit 11	Reserved	-
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
0x282A:005 (P126.05)	Status words: Device status (Status words: Device status) • Read only		Display of the current inverter device state.
	0	Initialisation	
	2	Not ready to switch on	
	3	Switch on disabled	
	4	Ready to switch on	
	5	Switched on	
	6	Operation enabled	
	7	Disable operation	
	8	Shut down	
	9	Quick stop active	
	10	Fault reaction active	
	11	Fault	
0x282B:001 (P125.01)	Inverter diagnostics: Active control source (Inverter diag.: Active control) • Read only		Display of the control source that is currently active.
	0	Flexible I/O configuration	
	1	Network	
	2	Keypad	

Parameter	Name / value range / [default setting]		Info
0x282B:002 (P125.02)	Inverter diagnostics: Active setpoint source (Inverter diag.: Active setpoint) • Read only		Display of the setpoint source that is currently active.
	0	Not selected	
	1	Analog input 1	
	2	Analog input 2	
	3	Keypad Setpoint	
	4	Digital frequency via DIx	
	5	Network Setpoint	
	11	Setpoint preset 1	
	12	Setpoint preset 2	
	13	Setpoint preset 3	
	14	Setpoint preset 4	
	15	Setpoint preset 5	
	16	Setpoint preset 6	
	17	Setpoint preset 7	
	18	Setpoint preset 8	
	19	Setpoint preset 9	
	20	Setpoint preset 10	
	21	Setpoint preset 11	
	22	Setpoint preset 12	
	23	Setpoint preset 13	
	24	Setpoint preset 14	
	25	Setpoint preset 15	
	31	Segment preset 1	
	32	Segment preset 2	
	33	Segment preset 3	
	34	Segment preset 4	
	35	Segment preset 5	
	36	Segment preset 6	
	37	Segment preset 7	
	38	Segment preset 8	
	39	Last segment	
	50	Motor potentiometer	
0x282B:003 (P125.03)	Inverter diagnostics: Keypad LCD status (Inverter diag.: Keypad LCD stat.) • Read only		Bit-coded state of the keypad status displays.
	Bit 0	LOC	1 ≡ local keypad control active.
	Bit 1	REM	1 ≡ remote control via terminals, network, etc. active.
	Bit 2	MAN	1 ≡ manual setpoint selection via keypad active.
	Bit 3	Auto	1 ≡ automatic setpoint selection via terminals, network, etc. active.
	Bit 4	Set	1 ≡ a parameter setting has been changed but not been saved yet in the memory module with mains failure protection.
	Bit 5	Reserved	-
	Bit 6	Reserved	
	Bit 7	Reserved	
0x282B:004 (P125.04)	Inverter diagnostics: Active drive mode (Inverter diag.: Drive mode) • Read only		Display of the active drive mode.
	0	Velocity mode	"Velocity mode" active.
	1	PID control	PID control active.
	4	Jog operation	"Jog foward (CW)" or "Jog reverse (CCW)" function active.

Parameter	Name / value range / [default setting]		Info
0x2831	Inverter status word • Read only		Bit-coded status word of the internal motor control.
	Bit 0	Reserved	-
	Bit 1	Speed 1 limited	1 ≡ input of speed controller 1 in limitation.
	Bit 2	Speed limited	1 ≡ output of speed controller 1 in limitation.
	Bit 3	Torque limited	1 ≡ setpoint torque in limitation.
	Bit 4	Current limited	1 ≡ setpoint current in limitation.
	Bit 5	Speed 2 limited	1 ≡ input of the speed controller 2 in "torque mode" in limitation.
	Bit 6	Upper speed limit active	1 ≡ in "torque mode", the speed is limited to upper speed limit .
	Bit 7	Lower speed limit active	1 ≡ in "torque mode", the speed is limited to lower speed limit.
	Bit 8	Reserved	-
	Bit 9	Reserved	
	Bit 10	Output frequency limited	1 ≡ setpoint frequency with V/f operation in limitation.
	Bit 11	Magnetisation completed	1 ≡ during V/f operation, the factor 7 rotor time constant has passed (calculated from the time at which the inverter was enabled without restart on the fly and with a total motor current of 20 % rated motor current for the first time). Otherwise 0.
	Bit 12	Motor phase error	1 ≡ motor phase failure detection active.
	Bit 13	Reserved	-
	Bit 14	Error reset blocking time active	1 ≡ the fault can only be reset when the blocking time has elapsed.
	Bit 15	Reserved	-
0x2833	Inverter status word 2 • Read only		Bit-coded status word 2 of the inverter.
	Bit 0	Reserved	-
	Bit 1	Manual test mode active	1 ≡ manual test mode active.
	Bit 2	Manual control active	1 ≡ manual control active.
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	DC braking active	1 ≡ DC braking active.
	Bit 7	Reserved	-
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	

Parameter	Name / value range / [default setting]		Info
0x2DAC (P119.00)	Keypad status (Keypad status) • Read only		Bit-coded display of the keypad status.
	Bit 0	Start Key	1 ≡ keypad start key pressed.
	Bit 1	Stop Key	1 ≡ keypad stop key pressed.
	Bit 2	Up arrow	1 ≡ keypad up-arrow key pressed.
	Bit 3	Down arrow	1 ≡ keypad down-arrow key pressed.
	Bit 4	Enter Key	1 ≡ keypad enter key pressed.
	Bit 5	Back key	1 ≡ keypad back key pressed.
	Bit 6	Reserved	-
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
0x2DAD (P120.00)	Internal hardware states (Int. HW states) • Read only		Bit-coded display of internal hardware states.
	Bit 0	Relay	0 ≡ X9/NO-COM open and NC-COM closed. 1 ≡ X9/NO-COM closed and NC-COM open.
	Bit 1	Digital output 1	0 ≡ LOW level, 1 ≡ HIGH level.
	Bit 2	Digital output 2	
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Charge Relay	1 ≡ precharging of the DC bus via charge relay is active.
	Bit 11	Reserved	-
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
0x603F (P150.00)	Error code (Error code) • Read only		Error message

5.2.4 Network diagnostics

The following parameters show some general information with regard to the network option available and the network.

Further fieldbus-specific diagnostic parameters are described in the following subchapters.

Parameter	Name / value range / [default setting]	Info
0x282B:005 (P125.05)	Inverter diagnostics: Most recently used control register (Inverter diag.: Netw. contr.reg.) • Read only	Display of the network register for the control that was accessed last (e. g. 0x6040 or 0x400B:1). • Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex) • The lowest byte is always 0x00.

Parameter	Name / value range / [default setting]	Info
0x282B:006 (P125.06)	Inverter diagnostics: Most recently used setpoint register (Inverter diag.: Netw. setp.reg.) • Read only	Display of the network register for setpoint selection that was accessed last (e. g. 0x6042 or 0x400B:3). • Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex) • The lowest byte is always 0x00.
0x400B:006 (P592.06)	Process input data: Velocity mode setpoint (Process data IN: Veloc. mode setp) -599.0 ... [**0.0**] ... 599.0 Hz	Display of the setpoint received via network for "velocity mode".
0x400B:007 (P592.07)	Process input data: PID setpoint (Process data IN: PID setpoint) -300.00 ... [**0.00**] ... 300.00 PID unit	Display of the setpoint received via network (reference value) for PID control.
0x400B:008 (P592.08)	Process input data: Torque mode setpoint (Process data IN: Torque mode setp) -32768 ... [**0**] ... 32767 Nm	Display of the setpoint received via network for "torque mode".
0x231F:001 (P500.01)	Module ID: Active module ID (Module ID: Active module ID) • Read only • Default setting depending on the size. 48 No network 65 AS-Interface • From version 02.00 67 CANopen 71 EtherNet/IP • From version 02.00 80 PROFIBUS 82 ProfiNet • From version 02.00 84 EtherCAT • From version 02.00 87 Modbus	Display of the network options currently configured in the inverter. • When the "Load default settings" device command 0x2022:001 (P700.01)or "Accept new inverter hardware" 0x2022:027 (P700.27) is executed, the module ID is stored in the memory module. • With the help of this module ID, the keypad only shows the communication parameters relevant to the respective network. Note! When the inverter is switched on, it checks whether the parameter settings stored in the memory module match the network option available in the inverter. If not, the inverter changes to the error status. The error status can only be quit if all parameters are initialised for the new (available) network option. ▸ Initialising the network interface 🕮 287
0x231F:002 (P500.02)	Module ID: Module ID connected (Module ID: Module ID conn.) • Read only 48 No network 65 AS-Interface • From version 02.00 67 CANopen 71 EtherNet/IP • From version 02.00 80 PROFIBUS 82 ProfiNet • From version 02.00 84 EtherCAT • From version 02.00 87 Modbus	Display of the network option currently available in the inverter. Note! When the inverter is switched on, it checks whether the parameter settings stored in the memory module match the network option available in the inverter. If not, the inverter changes to the error status. The error status can only be quit if all parameters are initialised for the new (available) network option. ▸ Initialising the network interface 🕮 287
0x400B:009 (P592.09)	Process input data: Torque scaling (Process data IN: Torque scaling) -128 ... [**0**] ... 127 • From version 02.00	Scaling factor for torque setpoint and actual torque value 0x400C:007 (P593.07) via network. • With the setting 0, no scaling takes place.

Related topics

▸ Configuring the network 🕮 164

5.2.4.1 CANopen diagnostics

The following parameters serve to diagnose the CANopen interface and communication via CANopen.

Preconditions

Control unit (CU) of the inverter is provided with CANopen.

Parameter	Name / value range / [default setting]	Info
0x1000	Device type • Read only	CANopen device profile according CANopen specification CiA 301/ CiA 402. Specifies the axis type: • 0x01010192 ≡ single axis • 0x02010192 ≡ double axis • 0x01020192 ≡ servo single axis • 0x02020192 ≡ servo double axis • 0x01030192 ≡ stepper single axis • 0x02030192 ≡ stepper double axis
0x1001	Error register • Read only	Bit-coded error status. • Bit 0 is set if an error is active. The other bits signalise which group the active error belongs to: • Bit 1: Current error • Bit 2: Voltage error • Bit 3: Temperature error • Bit 4: Communication error • Bit 5: Device profile-specific error • Bit 6: Reserved (always 0) • Bit 7: Manufacturer-specific error
0x1008	Manufacturer device name • Read only	Manufacturer's device name
0x1009	Manufacturer hardware version • Read only	Manufacturer hardware version
0x100A	Manufacturer software version • Read only	Manufacturer software version
0x1018:001	Identity object: Vendor ID • Read only	Manufacturer's identification number • The identification number allocated to Lenze by the organisation "CAN in Automation e. V." is "0x0000003B".
0x1018:002	Identity object: Product code • Read only	Product code of the inverter.
0x1018:003	Identity object: Revision number • Read only	Main and subversion of firmware.
0x1018:004	Identity object: Serial number • Read only	Serial number of the inverter.
0x2302:001 (P511.01)	Active CANopen settings: Active node ID (CANopen diag.: Active node ID) • Read only	Display of the active node address.
0x2302:002 (P511.02)	Active CANopen settings: Active baud rate (CANopen diag.: Active baud rate) • Read only 1 = 20 kbps 2 = 50 kbps 3 = 125 kbps 4 = 250 kbps 5 = 500 kbps 6 = 800 kbps 7 = 1 Mbps	Display of the active baud rate.

Parameter	Name / value range / [default setting]		Info
0x2307 (P515.00)	CANopen time-out status (Time-out status) • Read only		Bit-coded status display of the CAN time monitoring functions.
	Bit 0	RPDO1-Timeout	1 ≡ RPDO1 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO1 in 0x1400:005 (P540.05).
	Bit 1	RPDO2-Timeout	1 ≡ RPDO2 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO2 in 0x1401:005 (P541.05).
	Bit 2	RPDO3-Timeout	1 ≡ RPDO3 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO3 in 0x1402:005 (P542.05).
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Heartbeat-Timeout Consumer 1	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 1 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:001 (P520.01).
	Bit 9	Heartbeat-Timeout Consumer 2	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 2 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:002 (P520.02).
	Bit 10	Heartbeat-Timeout Consumer 3	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 3 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:003 (P520.03).
	Bit 11	Heartbeat-Timeout Consumer 4	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 4 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:004 (P520.04).
	Bit 12	Reserved	-
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	Reserved	

Parameter	Name / value range / [default setting]		Info
0x2308 (P516.00)	CANopen status (CANopen status) • Read only		Display of the current CAN bus state.
	0	Initialisation	CAN bus initialisation active. • The initialisation is started automatically at mains connection. During this phase, the inverter us not involved in the data exchange process on the CAN bus. • All CAN-relevant parameters are initialised with the saved settings. • When the initialisation process has been completed, the inverter automatically adopts the "Pre-Operational" state.
	1	Reset node	"Reset Node" NMT command active. • All parameters are initialised with the saved settings (not only the CAN-relevant parameters).
	2	Reset communication	"Reset Communication" NMT command active. • Initialisation of all CAN-relevant parameters with the values stored.
	4	Stopped	Only network management telegrams can be received.
	5	Operational	Parameter data and process data can be received. If defined, process data is sent as well.
	127	Pre-Operational	Parameter data can be received, process data are ignored.
0x2309 (P517.00)	CANopen controller status (CAN contr.status) • Read only		Status display of the internal CANopen controller.
	1	Error active	The inverter is a fully-fledged communication node at the CANopen network. It is able to transmit and receive data and to report faults.
	2	Error passive	The inverter can only passively indicate faulty reception via the ACK field.
	3	Bus off	The inverter is electrically separated from the CANopen network. In order to exit this state, the CANopen interface must be reset. An automatic restart is implemented.
0x230A:001 (P580.01)	CANopen statistics: PDO1 received (CAN statistics: PDO1 received) • Read only		Display of the number of PDO1 telegrams received.
0x230A:002 (P580.02)	CANopen statistics: PDO2 received (CAN statistics: PDO2 received) • Read only		Display of the number of PDO2 telegrams received.
0x230A:003 (P580.03)	CANopen statistics: PDO3 received (CAN statistics: PDO3 received) • Read only		Display of the number of PDO3 telegrams received.
0x230A:005 (P580.05)	CANopen statistics: PDO1 transmitted (CAN statistics: PDO1 transmitted) • Read only		Display of the number of PDO1 telegrams sent.
0x230A:006 (P580.06)	CANopen statistics: PDO2 transmitted (CAN statistics: PDO2 transmitted) • Read only		Display of the number of PDO2 telegrams sent.
0x230A:007 (P580.07)	CANopen statistics: PDO3 transmitted (CAN statistics: PDO3 transmitted) • Read only		Display of the number of PDO3 telegrams sent.
0x230A:009 (P580.09)	CANopen statistics: SDO1 telegrams (CAN statistics: SDO1 counter) • Read only		Display of the number of SDO1 telegrams.
0x230A:010 (P580.10)	CANopen statistics: SDO2 telegrams (CAN statistics: SDO2 counter) • Read only		Display of the number of SDO2 telegrams.
0x230B (P518.00)	CANopen error counter (CAN errorcounter) • Read only		Display of the total number of CAN faults that have occurred.

Related topics

▸ CANopen 🕮 186

5.2.4.2 Modbus diagnostics

The following parameters serve to diagnose the Modbus interface and communication via Modbus.

Preconditions

Control unit (CU) of the inverter is provided with Modbus.

Parameter	Name / value range / [default setting]	Info
0x2322:001 (P511.01)	Active Modbus settings: Active node ID (Modbus diag.: Active node ID) • Read only	Display of the active node address.
0x2322:002 (P511.02)	Active Modbus settings: Active baud rate (Modbus diag.: Active baud rate) • Read only	Display of the active baud rate.
0x2322:003 (P511.03)	Active Modbus settings: Data format (Modbus diag.: Data format) • Read only	Display of the active data format.
0x232A:001 (P580.01)	Modbus statistics: Messages received (Modbus statistic: Mess. received) • Read only	Display of the total number of messages received. • This counter counts both valid and invalid messages. • After the maximum value has been reached, the counter starts again "0".
0x232A:002 (P580.02)	Modbus statistics: Valid messages received (Modbus statistic: Val. mess. rec.) • Read only	Display of the number of valid messages received. • After the maximum value has been reached, the counter starts again "0".
0x232A:003 (P580.03)	Modbus statistics: Messages with exceptions (Modbus statistic: Mess. w. exc.) • Read only	Display of the number of messages with exceptions that have been received. • After the maximum value has been reached, the counter starts again "0".
0x232A:004 (P580.04)	Modbus statistics: Messages with errors (Modbus statistic: Mess. w. errors) • Read only	Display of the number of messages received with a faulty data integrity (parity, CRC). • After the maximum value has been reached, the counter starts again "0".
0x232A:005 (P580.05)	Modbus statistics: Messages sent (Modbus statistic: Messages sent) • Read only	Display of the total number of messages sent. • After the maximum value has been reached, the counter starts again "0".

Related topics

▸ Modbus 🕮 212

5.2.4.3 PROFIBUS diagnostics

The following parameters serve to diagnose the PROFIBUS interface and communication via PROFIBUS.

Preconditions

Control unit (CU) of the inverter is provided with PROFIBUS.

Parameter	Name / value range / [default setting]	Info
0x2342:001 (P511.01)	Active PROFIBUS settings: Active station address (PROFIBUS diag.: Act.station addr) • Read only	Display of the active station address.

Parameter	Name / value range / [default setting]		Info
0x2342:002 (P511.02)	Active PROFIBUS settings: Active baud rate (PROFIBUS diag.: Active baud rate) • Read only		Display of the active baud rate.
	0	12 Mbps	
	1	6 Mbps	
	2	3 Mbps	
	3	1.5 Mbps	
	4	500 kbps	
	5	187.5 kbps	
	6	93.75 kbps	
	7	45.45 kbps	
	8	19.2 kbps	
	9	9.6 kbps	
	15	Search	Automatic baud rate detection active.
0x2342:003 (P511.03)	Active PROFIBUS settings: Watchdog time (PROFIBUS diag.: Watchdog time) • Read only		Display of the watchdog monitoring time specified by the master. • Monitoring starts with the arrival of the first telegram. • When a value of "0" is displayed, the monitoring function is deactivated. • A change in the watchdog monitoring time in the master is effective immediately.
0x2348:001 (P516.01)	PROFIBUS Status: Bus status (PROFIBUS Status: Bus status) • Read only		Display of the current DP state machine state (DP-STATE).
	0	WAIT_PRM	After the run-up, the inverter (slave) is waiting for parameter data (CHK_PRM) from the master. All other frame types are not processed. Exchanging user data with the master is not possible yet.
	1	WAIT_CFG	The inverter (slave) is waiting for configuration data (CHK_CFG) from the master that define the structure of the cyclic frames.
	2	DATA_EXCH	Parameter and configuration data have been received and accepted by the inverter (slave). The inverter is in the "Data Exchange" state. It is now possible to exchange user data with the master.
0x2348:002 (P516.02)	PROFIBUS Status: Watchdog status (PROFIBUS Status: Watchdog status) • Read only		Display of the current state of the watchdog state machine (WD-STATE).
	0	BAUD_SEARCH	The inverter (slave) is able to detect the baud rate automatically.
	1	BAUD_CONTROL	After detecting the correct baud rate, the inverter (slave) status changes to BAUD_CONTROL, and the baud rate is monitored.
	2	DP_CONTROL	The DP_CONTROL state serves to the response monitoring of the master.

Parameter	Name / value range / [default setting]		Info
0x2349 (P517.00)	PROFIBUS error (PROFIBUS error) • Read only		Bit-coded display of PROFIBUS errors.
	Bit 0	Watchdog elapsed	Communication with the PROFIBUS master is continuously interrupted, e. g. by cable break or failure of the PROFIBUS master. • No process data are sent to the inverter (slave) in the "Data Exchange" state. • When the watchdog monitoring time specified by the master has elapsed, the response set in 0x2859:001 (P515.01) is triggered in the inverter. Preconditions for a response by the inverter (slave): • The slave is in the "Data Exchange" state. • The watchdog monitoring time is configured correctly in the master (1 ... 65535 ms). If one of these preconditions is not met, the response to the absence of cyclic process data telegrams from the master is not executed.
	Bit 1	Data exchange completed	Data exchange via PROFIBUS has been terminated. • The inverter (slave) can be instructed by the master to exit the "Data Exchange" state. • If this state change is to be treated as an error in the inverter, the desired response can be set in 0x2859:002 (P515.02).
	Bit 2	Incorrect configuration data	The inverter (slave) has received invalid configuration data from the master. • The response set in 0x2859:003 (P515.03) is effected.
	Bit 3	Initialisation error	An error has occurred during the initialisation of the PROFIBUS interface. • The response set in 0x2859:004 (P515.04) is effected.
	Bit 4	Invalid process data	The inverter (slave) has received invalid process data from the master, e.g. no process data or deleted process data are sent by the "Stop" operating status in the master. • The response set in 0x2859:005 (P515.05) is effected.
0x234A:001 (P580.01)	PROFIBUS statistics: Data cycles per second (PROFIBUS counter: Data cycles/sec.) • Read only		Display of the data cycles per second.
0x234A:002 (P580.02)	PROFIBUS statistics: Parameterization events (PROFIBUS counter: PRM events) • Read only		Display of the number of parameterisation events.
0x234A:003 (P580.03)	PROFIBUS statistics: Configuration events (PROFIBUS counter: CFG events) • Read only		Display of the number of configuration events.
0x234A:004 (P580.04)	PROFIBUS statistics: Diagnostics events (PROFIBUS counter: DIAG events) • Read only		Display of the number of diagnostic telegrams sent.
0x234A:005 (P580.05)	PROFIBUS statistics: C1 messages (PROFIBUS counter: C1 messages) • Read only		Display of the number of requests by the class 1 DPV1 master.
0x234A:006 (P580.06)	PROFIBUS statistics: C2 messages (PROFIBUS counter: C2 messages) • Read only		Display of the number of requests by the class 2 DPV1 master.
0x234A:007 (P580.07)	PROFIBUS statistics: Watchdog events (PROFIBUS counter: WD events) • Read only		Display of the number of watchdog events.
0x234A:008 (P580.08)	PROFIBUS statistics: Data exchange aborts (PROFIBUS counter: DataEx.event) • Read only		Display of the number of "Data Exchange exited" events.
0x234A:009 (P580.09)	PROFIBUS statistics: Total data cycles (PROFIBUS counter: Tot. data cycles) • Read only		Display of the number of cyclic process data received.

Related topics

▸ PROFIBUS 224

5.2.4.4 Wireless-LAN diagnostics

The following parameters serve to diagnose the WLAN module and the WLAN communication.

Preconditions

WLAN module has been plugged onto the interface X16 on the front of the inverter.

Parameter	Name / value range / [default setting]	Info
0x2442:001	Active IP address • Read only • From version 02.00	Display of the active IP address. • If DHCP is activated, the active IP address usually derives from the configured static IP address of the device.
0x2442:002	Active netmask • Read only • From version 02.00	Display of the active netmask.
0x2442:003	Active gateway • Read only • From version 02.00	Display of the active gateway IP address.
0x2442:004	Active module mode • Read only • From version 02.00	Display of the active WLAN settings. • This parameter indicates whether the settings used come from the inverter or from the WLAN module.
	0 Inverter	The WLAN settings saved in the inverter are used.
	1 Standalone	The WLAN settings saved in the WLAN module are used.
0x2442:005	MAC address • Read only • From version 02.00	Display of the MAC address of the WLAN module.
0x2448:001	WLAN status: Connection time • Read only • From version 02.00	Display of the connection time in [s] since the current connection was established.
0x2448:002	WLAN status: Number of connections • Read only • From version 02.00	In access point mode: Display of the number of currently connected clients. In client mode: 0 ≡ not connected; 1 ≡ connected with external WLAN network.
0x2448:003	WLAN status: Rx frame counter • Read only • From version 02.00	Display of the number of request received via WLAN.
0x2448:004	WLAN status: Error statistics • Read only • From version 02.00	Display of the quality of the WLAN connection. A display value > 0 indicates communication problemsn.
0x2449	WLAN error • Read only • From version 02.00	Bit coded display of WLAN errors.
	Bit 2 ERR_WIFI_ERROR	WLAN connection problem
	Bit 3 ERR_MEM_CHK_FAILED	Memory problem
	Bit 4 WIFI_CHK_FAILED	WLAN connection problem
	Bit 7 ERR_WIFI_OFF	
	Bit 9 ERR_CLIENT_MODE_OFF	WLAN-client-mode problem
	Bit 12 ERR_TCPIP_CFG_FAIL	TCP/IP configuration error

Related topics

▸ Wireless LAN (WLAN) 🕮 244

5.2.4.5 EtherNet/IP diagnostics

The following parameters serve to diagnose the EtherNet/IP interface and the communication via EtherNet/IP.

Preconditions

Control unit (CU) of the inverter is provided with EtherNet/IP.

Parameter	Name / value range / [default setting]		Info
0x23A2:001 (P511.01)	Active EtherNet/IP settings: IP address (EtherN/IP diag.: IP address) • Read only • From version 02.00		
0x23A2:002 (P511.02)	Active EtherNet/IP settings: Subnet (EtherN/IP diag.: Subnet) • Read only • From version 02.00		
0x23A2:003 (P511.03)	Active EtherNet/IP settings: Gateway (EtherN/IP diag.: Gateway) • Read only • From version 02.00		
0x23A2:005 (P511.05)	Active EtherNet/IP settings: MAC address (EtherN/IP diag.: MAC address) • Read only • From version 02.00		
0x23A2:006 (P511.06)	Active EtherNet/IP settings: Multicast address (EtherN/IP diag.: Mcast address) • Read only • From version 02.00		
0x23A3 (P509.00)	EtherNet/IP switch position (EtherN. switch) • Read only • From version 02.00		
0x23A5:001 (P519.01)	Active port settings: Port 1 (Port diagnostics: Port 1) • Read only • From version 02.00		
	0	Not connected	
	1	10 Mbps/Half Duplex	
	2	10 Mbps/Full Duplex	
	3	100 Mbps/Half Duplex	
	4	100 Mbps/Full Duplex	
	5	Reserved	
	6	Reserved	
0x23A5:002 (P519.02)	Active port settings: Port 2 (Port diagnostics: Port 2) • Read only • From version 02.00		
	0	Not connected	
	1	10 Mbps/Half Duplex	
	2	10 Mbps/Full Duplex	
	3	100 Mbps/Half Duplex	
	4	100 Mbps/Full Duplex	
	5	Reserved	
	6	Reserved	
0x23A6 (P513.00)	Quality of service (QualityOfService) • Read only • From version 02.00		
	0	802.1Q Tag disable	
	1	802.1Q Tag enable	

Parameter	Name / value range / [default setting]	Info
0x23A8 (P516.00)	CIP module status (CIP module stat.) • Read only • From version 02.00	
0x23A9 (P517.00)	EtherNet/IP status (EtherN/IP status) • Read only • From version 02.00	

Related topics

▸ EtherNet/IP 📖 255

5.2.4.6 PROFINET diagnostics

The following parameters serve to diagnose the PROFINET interface and the communication via PROFINET.

Preconditions

Control unit (CU) of the inverter is provided with PROFINET.

Parameter	Name / value range / [default setting]		Info
0x2382:001 (P511.01)	Active PROFINET settings: IP address (PROFINET diag.: IP address) • Read only • From version 02.00		
0x2382:002 (P511.02)	Active PROFINET settings: Subnet (PROFINET diag.: Subnet) • Read only • From version 02.00		
0x2382:003 (P511.03)	Active PROFINET settings: Gateway (PROFINET diag.: Gateway) • Read only • From version 02.00		
0x2382:004 (P511.04)	Active PROFINET settings: Station name (PROFINET diag.: Station name) • Read only • From version 02.00		
0x2382:005 (P511.05)	Active PROFINET settings: MAC Address (PROFINET diag.: MAC Address) • Read only • From version 02.00		
0x2388 (P516.00)	PROFINET status (PROFINET status) • Read only • From version 02.00		
		Bit 0	Initialized
		Bit 1	Online
		Bit 2	Connected
		Bit 3	IP address error
		Bit 4	Hardware fault
		Bit 5	Reserved
		Bit 6	Watchdog elapsed
		Bit 7	Protocol error
		Bit 8	PROFINET stack ok
		Bit 9	PROFINET stack not configured
		Bit 10	Ethernet controller fault
		Bit 11	UDP stack fault

Parameter	Name / value range / [default setting]		Info
0x2389:001 (P517.01)	PROFINET error: Error 1 (PROFINET error: Error 1) • Read only • From version 02.00		
	0	No error	
	1	Reserved	
	2	Unit ID unknown	
	3	Max. units exceeded	
	4	Invalid size	
	5	Unit type unknown	
	6	Runtime plug error	
	7	Invalid argument	
	8	Service pending	
	9	Stack not ready	
	10	Command unknown	
	11	Invalid address descriptor	
0x2389:002 (P517.02)	PROFINET error: Error 2 (PROFINET error: Error2) • Read only • From version 02.00		
	Bit 0	Reserved	
	Bit 1	Reserved	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	IP address error	
	Bit 8	Station name problem	
	Bit 9	DataExch left	
	Bit 10	Stack boot error	
	Bit 11	Stack online error	
	Bit 12	Stack state error	
	Bit 13	Stack revision error	
	Bit 14	Initialization problem	
	Bit 15	Stack init error	

Related topics

▸ PROFINET 🕮 262

5.2.4.7 EtherCAT diagnostics

The following parameters serve to diagnose the EtherCAT interface and the communication via EtherCAT.

Preconditions

Control unit (CU) of the inverter is provided with EtherCAT.

Parameter	Name / value range / [default setting]	Info
0x1000	Device type • Read only • From version 02.00	
0x1008	Manufacturer device name • Read only • From version 02.00	Manufacturer's device name

Parameter	Name / value range / [default setting]	Info
0x1009	Manufacturer hardware version • Read only • From version 02.00	
0x100A	Manufacturer software version • Read only • From version 02.00	
0x1018:001	Identity object: Vendor ID • Read only • From version 02.00	
0x1018:002	Identity object: Product code • Read only • From version 02.00	
0x1018:003	Identity object: Revision number • Read only • From version 02.00	
0x1018:004	Identity object: Serial number • Read only • From version 02.00	
0x2362:004 (P511.04)	Active EtherCAT settings: Device identifier (EtherCAT diag.: Device ident.) • Read only • From version 02.00	
0x2362:006 (P511.06)	Active EtherCAT settings: Station address (EtherCAT diag.: Station address) • Read only • From version 02.00	
0x2362:007 (P511.07)	Active EtherCAT settings: Tx length (EtherCAT diag.: Tx length) • Read only • From version 02.00	
0x2362:008 (P511.08)	Active EtherCAT settings: Rx length (EtherCAT diag.: Rx length) • Read only • From version 02.00	
0x2368 (P516.00)	EtherCAT status (EtherCAT status) • Read only • From version 02.00 1 Initialisation 2 Pre-Operational 3 Bootstrap 4 Safe-Operational 8 Operational	
0x2369 (P517.00)	EtherCAT error (EtherCAT error) • Read only • From version 02.00	

Related topics

▸ EtherCAT 📖 266

5.2.5 Diagnostics of the inputs and outputs

5.2.5.1 Digital inputs and outputs

The following parameters serve to diagnose the digital inputs and outputs of the inverter.

Parameter	Name / value range / [default setting]		Info
0x60FD (P118.00)	Digital inputs (Digital inputs) • Read only		Bit coded display of the current state of the digital inputs
	Bit 0	Reserved	-
	Bit 1	Reserved	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Level of digital input 1	0 ≡ LOW level, 1 ≡ HIGH level. Digital input 6 and digital input 7 are only available with application I/O.
	Bit 17	Level of digital input 2	
	Bit 18	Level of digital input 3	
	Bit 19	Level of digital input 4	
	Bit 20	Level of digital input 5	
	Bit 21	Level of digital input 6	
	Bit 22	Level of digital input 7	
	Bit 23	Reserved	-
	Bit 24	Reserved	
	Bit 25	Internal interconnection of digital inputs	0 ≡ digital input terminals are set to HIGH level via pull-up resistors. 1 ≡ digital input terminals are set to LOW level via pull-down resistors.
	Bit 26	Reserved	-
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	Reserved	
0x4016:005	Digital output 1: Terminal state • Read only		Display of the logic state of output terminal X3/DO1.
	0	FALSE	
	1	TRUE	
0x4016:006	Digital output 1: Trigger signal state • Read only		Display of the logic state of the trigger signal for digital output 1 (without taking a ON/OFF delay set and inversion into consideration).
	0	FALSE	
	1	TRUE	
0x4017:005	Digital output 2: Terminal state • Read only • Only available for application I/O.		Display of the logic state of output terminal X3/DO2.
	0	FALSE	
	1	TRUE	

Parameter	Name / value range / [default setting]	Info
0x4017:006	Digital output 2: Trigger signal state • Read only • Only available for application I/O.	Display of the logic state of the trigger signal for digital output 2 (without taking a ON/OFF delay set and inversion into consideration).
	0 FALSE	
	1 TRUE	
0x4018:005	Relay: Relay state • Read only	Display of the logic state of the relay.
	0 FALSE	
	1 TRUE	
0x4018:006	Relay: Trigger signal state • Read only	Display of the logic state of the trigger signal for the relay (without taking a ON/OFF delay set and inversion into consideration).
	0 FALSE	
	1 TRUE	

Related topics

- Configuration of digital inputs 📖 422
- Configuration of digital outputs 📖 431

5.2.5.2 Analog inputs and outputs

The following parameters serve to diagnose the analog inputs and outputs of the inverter.

Parameter	Name / value range / [default setting]	Info
0x2DA4:001 (P110.01)	Diagnostics of analog input 1: Value in percent (AI1 diagnostics: AI1 terminal %) • Read only: x.x %	Display of the current input value at X3/AI1 scaled as value in percent. • 100 % ≡ 10 V or 20 mA or 5 V
0x2DA4:002 (P110.02)	Diagnostics of analog input 1: Frequency value (AI1 diagnostics: AI1 scaled freq.) • Read only: x.x Hz	Display of the current input value at X3/AI1 scaled as a frequency value. • The standard setpoint source for operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]" is selected in 0x2860:001 (P201.01).
0x2DA4:003 (P110.03)	Diagnostics of analog input 1: Process controller value (AI1 diagnostics: AI1 scaled PID) • Read only: x.xx PID unit	Display of the current input value at X3/AI1 scaled as a process controller value. • The standard setpoint source for the reference value of PID control is selected in 0x2860:002 (P201.02).
0x2DA4:004 (P110.04)	Diagnostics of analog input 1: Torque value (AI1 diagnostics: AI1 scaled torq.) • Read only: x.xx %	Display of the current input value at X3/AI1 scaled as a percentage torque value. • 100 % ≡ permissible maximum torque 0x6072 (P326.00)
0x2DA4:016 (P110.16)	Diagnostics of analog input 1: Status (AI1 diagnostics: AI1 status) • Read only	Bit-coded display of the status of analog input 1 (X3/AI1).
	Bit 0 Mode 0: 0 ... 10 VDC active	
	Bit 1 Mode 1: 0 ... 5 VDC active	
	Bit 2 Mode 2: 2 ... 10 VDC active	
	Bit 3 Mode 3: -10 ... 10 VDC active	
	Bit 4 Mode 4: 4 ... 20 mA active	
	Bit 5 Mode 5: 0 ... 20 mA active	
	Bit 6 24 V supply OK	
	Bit 7 Calibration successful	
	Bit 8 Monitoring threshold exceeded/not reached	
	Bit 9 Input current too low (mode 4)	
	Bit 10 Input voltage too low (mode 2)	
	Bit 11 Input voltage too high (mode 4)	
	Bit 12 Reserved	
	Bit 13 Reserved	
	Bit 14 Reserved	
	Bit 15 Reserved	
0x2DA5:001 (P111.01)	Diagnostics of analog input 2: Value in percent (AI2 diagnostics: AI2 terminal %) • Read only: x.x %	Display of the current input value at X3/AI2 scaled as a value in percent. • 100 % ≡ 10 V or 20 mA or 5 V

Parameter	Name / value range / [default setting]	Info
0x2DA5:002 (P111.02)	Diagnostics of analog input 2: Frequency value (AI2 diagnostics: AI2 scaled freq.) • Read only: x.x Hz	Display of the current input value at X3/AI2 scaled as a frequency value. • The standard setpoint source for operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]" is selected in 0x2860:001 (P201.01).
0x2DA5:003 (P111.03)	Diagnostics of analog input 2: Process controller value (AI2 diagnostics: AI2 scaled PID) • Read only: x.xx PID unit	Display of the current input value at X3/AI2 scaled as a process controller value. • The standard setpoint source for the reference value of PID control is selected in 0x2860:002 (P201.02).
0x2DA5:004 (P111.04)	Diagnostics of analog input 2: Torque value (AI2 diagnostics: AI2 scaled torq.) • Read only: x.xx %	Display of the current input value at X3/AI2 scaled as a percentage torque value. • 100 % ≡ permissible maximum torque 0x6072 (P326.00)
0x2DA5:016 (P111.16)	Diagnostics of analog input 2: Status (AI2 diagnostics: AI2 status) • Read only Bit 0: Mode 0: 0 ... 10 VDC active Bit 1: Mode 1: 0 ... 5 VDC active Bit 2: Mode 2: 2 ... 10 VDC active Bit 3: Mode 3: -10 ... 10 VDC active Bit 4: Mode 4: 4 ... 20 mA active Bit 5: Mode 5: 0 ... 20 mA active Bit 6: 24 V supply OK Bit 7: Calibration successful Bit 8: Monitoring threshold exceeded/not reached Bit 9: Input current too low Bit 10: Input voltage too low Bit 11: Input voltage too high Bit 12: Reserved Bit 13: Reserved Bit 14: Reserved Bit 15: Reserved	Bit-coded display of the status of analog input 2 (X3/AI2).
0x2DAA:001 (P112.01)	Diagnostics of analog output 1: Voltage (AO1 diagnostics: AO1 Voltage) • Read only: x.xx V	Display of the current output voltage at X3/AO1.
0x2DAA:002 (P112.02)	Diagnostics of analog output 1: Current (AO1 diagnostics: AO1 Current) • Read only: x.xx mA	Display of the present output current at X3/AO1.
0x2DAB:001 (P113.01)	Diagnostics of analog output 2: Voltage (AO2 diagnostics: AO2 Current) • Read only: x.xx V • Only available for application I/O.	Display of the current output voltage at X3/AO2.
0x2DAB:002 (P113.02)	Diagnostics of analog output 2: Current (AO2 diagnostics: AO2 Voltage) • Read only: x.xx mA • Only available for application I/O.	Display of the present output current at X3/AO2.

Related topics

▸ Configuration of analog inputs 📖 425

▸ Configuration of analog outputs 📖 439

5.2.6 Process controller status

The following parameters serve to diagnose the process controller.

Parameter	Name / value range / [default setting]	Info
0x401F:001 (P121.01)	Process controller diagnostics: Current setpoint (PID diagnostics: PID setpoint) • Read only: x.xx PID unit	Display of the current reference value (setpoint) for the process controller.
0x401F:002 (P121.02)	Process controller diagnostics: Current process variable (PID diagnostics: PID process var.) • Read only: x.xx PID unit	Display of the current controlled variable (actual value) fed back for the process controller.

Parameter	Name / value range / [default setting]	Info
0x401F:003 (P121.03)	Process controller diagnostics: Status (PID diagnostics: PID status) • Read only	Bit-coded status display of the process controller.
	Bit 0 | Process controller off	
	Bit 1 | PID output set to 0	
	Bit 2 | PID I-component set to 0	
	Bit 3 | PID influence shown	
	Bit 4 | Setpoint = actual value	
	Bit 5 | Idle state active	
	Bit 6 | Reserved	
	Bit 7 | Reserved	

Related topics

▸ Configuring the process controller 📖 273

5.2.7 Device identification

The following parameters show some general information about the inverter.

Parameter	Name / value range / [default setting]	Info
0x2000:001 (P190.01)	Device data: Product code (Device data: Product code) • Read only	Product code of the complete device. Example: "I55AE155D10V10017S" • If control unit and power unit were ordered separately, the product code "XXXXXXXXXXXXXXXXXX" is displayed.
0x2000:002 (P190.02)	Device data: Serial number (Device data: Serial number) • Read only	Serial number of the complete device. Example: "00000000000000000XYZXYZ" • If control unit and power unit were ordered separately, the serial number "XXXXXXXXXXXXXXXXXX" is displayed.
0x2000:004 (P190.04)	Device data: CU firmware version (Device data: CU firmware ver.) • Read only	Firmware version of the control unit. Example: "01.00.01.00"
0x2000:005 (P190.05)	Device data: CU firmware type (Device data: CU firmware type) • Read only	Firmware type of the control unit. Example: "IOFW51AC10"
0x2000:006 (P190.06)	Device data: CU bootloader version (Device data: CU bootlder ver.) • Read only	Bootloader version of the control unit. Example: "00.00.00.13"
0x2000:007 (P190.07)	Device data: CU bootloader type (Device data: CU bootlder type) • Read only	Bootloader type of the control unit. Example: "IOBL51AOnn"
0x2000:008 (P190.08)	Device data: Object directory version (Device data: OBD version) • Read only	Example: "108478"
0x2000:010 (P190.10)	Device data: PU firmware version (Device data: PU firmware ver.) • Read only	Firmware version of the power unit. Example: "00202"
0x2000:011 (P190.11)	Device data: PU firmware type (Device data: PU firmware type) • Read only	Firmware type of the power unit. Example: "IDFW5AA"
0x2000:012 (P190.12)	Device data: PU bootloader version (Device data: PU bootlder ver.) • Read only	Bootloader version of the power unit.
0x2000:013 (P190.13)	Device data: PU bootloader type (Device data: PU bootlder type) • Read only	Bootloader type of the power unit.
0x2000:014 (P190.14)	Device data: Module - firmware version (Device data: Mod. firmware) • Read only	Firmware version of the network option.
0x2001 (P191.00)	Device name (Device name) ["**My Device**"]	Any device name (e.g. "Wheel drive") can be set in this object for the purpose of device identification.

Parameter	Name / value range / [default setting]	Info
0x2002:004 (P192.04)	Device module: CU type code (Device module: CU type code) • Read only	Type code of the control unit.
0x2002:005 (P192.05)	Device module: PU type code (Device module: PU type code) • Read only	Type code of the power unit.
0x2002:006 (P192.06)	Device module: CU serial number (Device module: CU serial number) • Read only	Serial number of the control unit.
0x2002:007 (P192.07)	Device module: PU serial number (Device module: PU serial number) • Read only	Serial number of the power unit.

5.2.8 Device overload monitoring (i*t)

The inverter calculates the i*t utilisation in order to protect itself against thermal overload. In simple terms: a higher current or an overcurrent that continues for a longer time causes a higher i*t utilisation.

⚠ DANGER!

Uncontrolled motor movements by pulse inhibit.

When the device overload monitoring function is activated, pulse inhibit is set and the motor becomes torqueless. A load that is connected to motors without a holding brake may therefore cause uncontrolled movements! Without a load, the motor will coast.

▸ Only operate the inverter under permissible load conditions.

Details

The device overload monitoring function primarily offers protection to the power section. Indirectly, also other components such as filter chokes, circuit-board conductors, and terminals are protected against overheating. Short-time overload currents followed by recovery periods (times of smaller current utilisation) are permissible. The monitoring function during operation checks whether these conditions are met, taking into consideration that higher switching frequencies and lower stator frequencies as well as higher DC voltages cause a greater device utilisation.

- If the device utilisation exceeds the warning threshold set in 0x2D40:002 (default setting: 95 %), the inverter outputs a warning.
- If the device utilisation exceeds the permanent error threshold 100 %, the inverter is disabled immediately and any further operation is stopped.

Device overload monitoring enables operation of the inverter under the following load conditions:

- Continuous current load with up to 100 % rated current.
- 3-minute cycle: 150 % rated current for 60 s, recovery phase 120 s with 75 % rated current.
- 15-second cycle: 200 % rated current for 3 s, recovery phase 12 s with 75 % rated current.

Parameter	Name / value range / [default setting]	Info
0x2D40:002	Device utilisation (i*t): Warning threshold 0 ... [**95**] ... 101 %	If the device utilisation exceeds the threshold set, the inverter outputs a warning. • With the setting 0 % or ≥ 100 %, the warning is deactivated.
0x2D40:004 (P135.04)	Device utilisation (i*t) (Device utilisat.: ixt utilisation) • Read only: x %	Display of the current device utilisation.
0x2D40:005 (P135.05)	Device utilisation (i*t): Error response (Device utilisat.: Error response)	Selection of the response to be executed when the device overload monitoring function is triggered. Associated error code: • 9090 | 0x2382 - I*t error
	2 Trouble	▸ Error types 🕮 107
	3 Fault	

Parameter	Name / value range / [default setting]	Info
0x2DDF:001	Axis information: Rated current • Read only: x.xx A • Default setting depending on the size.	Display of the rated current of the axis.

5.2.9 Heatsink Temperature Monitoring

Parameter	Name / value range / [default setting]	Info
0x2D84:001 (P117.01)	Heatsink temperature (Heatsink temp.: Heatsink temp.) • Read only: x.x °C	Display of the current heatsink temperature.
0x2D84:002	Heatsink temperature: Warning threshold 50.0 ... [**80.0**]* ... 100.0 °C • Default setting depending on the size.	Warning threshold for temperature monitoring. • If the heatsink temperature exceeds the threshold set here, the inverter outputs a warning. • The warning is reset with a hysteresis of approx. 5 °C. • If the heatsink temperature increases further and exceeds the non-adjustable error threshold (100 °C), the inverter changes to the "Fault" device status. The inverter is disabled and thus any further operation is stopped.

5.2.10 Life-diagnosis

The following parameters provide some information about the use of the inverter.

This includes the following information:

- Operating and power-on time of the inverter/control unit
- Operating time of the internal fan
- Number of switching cycles of the mains voltage
- Number of switching cycles of the relay
- Number of short-circuits and earth faults that have occurred
- Display of the number of "Imax: Clamp responded too often" errors that have occurred.

Parameter	Name / value range / [default setting]	Info
0x2D81:001 (P151.01)	Life-diagnosis: Operating time (Life-diagnosis: Operating time) • Read only: x s	Display showing for how long the inverter has been running so far "Operation enabled" device state).
0x2D81:002 (P151.02)	Life-diagnosis: Operating time (Life-diagnosis: Operating time) • Read only: x s	Display showing for how long the inverter has been supplied with mains voltage so far.
0x2D81:003 (P151.03)	Life-diagnosis: Control unit operating time (Life-diagnosis: CU oper. time) • Read only: x ns	Display showing for how long the control unit has been supplied with voltage so far. This includes the external 24-V supply and voltage supply via USB module. • This also includes the time within which the control unit has only been supplied with an external 24 V voltage.
0x2D81:004 (P151.04)	Life-diagnosis: Main switching cycles (Life-diagnosis: Switching cycles) • Read only	Display of the number of switching cycles of the mains voltage.
0x2D81:005 (P151.05)	Life-diagnosis: Relay switching cycles (Life-diagnosis: Relay cycles) • Read only	Display of the number of switching cycles of the relay.
0x2D81:006 (P151.06)	Life-diagnosis: Short-circuit counter (Life-diagnosis: Short-circ.count) • Read only	Display of the number of short circuits that have occurred.
0x2D81:007 (P151.07)	Life-diagnosis: Earth fault counter (Life-diagnosis: Earthfault count) • Read only	Display of the number of earth faults that have occurred.
0x2D81:008 (P151.08)	Life-diagnosis: Clamp active (Life-diagnosis: Clamp active) • Read only	Display of the number of "Imax: Clamp responded too often" errors that have occurred. • "Clamp" = short-time inhibit of the inverter in V/f operation when the current limit shown in 0x2DDF:002 is reached.
0x2D81:009 (P151.09)	Life-diagnosis: Fan operating time (Life-diagnosis: Fan oper. time) • Read only: x s	Display showing for how long the internal fan has been running so far.

5.3 Error handling

Many functions integrated in the inverter can
- detect errors and thus protect inverter and motor from damages,
- detect an operating error of the user,
- output a warning or information if desired.

5.3.1 Error types

In the event of an error, the inverter response is determined by the error type defined for the error.

In the following, the different error types are described.

Error type "No response"
The error is completely ignored (does not affect the running process).

Error type "Warning"
A warning does not severely affect the process and may be also ignored in consideration of safety aspects.

Error type "Fault"
The motor is brought to a standstill with the quick stop ramp.
- The inverter will only be disabled after the quick stop is executed (motor at standstill) or after the time-out time set in 0x2826 has been elapsed. ▸ Timeout für fault reaction 🕮 349
- **Exception:** In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). For details see the table "Error codes". 🕮 461

Error type "Trouble"
Just like "Fault", but the error state will be left automatically if the error condition is not active anymore.
- **Exception:** In case of a severe trouble, the inverter is disabled immediately. The motor becomes torqueless (coasts). For details see the table "Error codes". 🕮 461
- The restart behaviour after trouble can be configured. ▸ Automatic restart 🕮 350

In the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]", the behaviour in case of "Trouble" is just like in case of "Fault"!

Comparison of the error types

The following table compares the main differences of the error types:

Error type	Logging in the Error history buffer / Logbook	Display in the CiA 402 status word 0x6041 (P780.00)	Inverter disable	Motor stop	Error reset is required	"ERR" LED (red)
No response	No	No	No	No	No	off
Warning	Yes	yes, bit 7	No	No	No	blinking fast (4 Hz)
Trouble	Yes	yes, bit 3	after quick stop or immediately.	quick stop ramp or coasting.	No	blinking (1 Hz)
Error	Yes	yes, bit 3	For details see table "Error codes". 🕮 461		Yes	on

5.3.2 Error configuration

The errors can be divided into two types:

- Errors with predefined error type
- Errors with configurable error type

Especially critical errors are permanently set to the "Fault" error type in order to protect inverter and motor from damages.

In case of errors with configurable error type, the default setting can be changed in consideration of safety aspects and the operational performance. The selection "No response [0]" is, however, only available for minor errors.

The "Error codes" table lists the error type for each error. If the error type can be configured by the user, the "adjustable in" column displays the corresponding parameter. 📖 461

5.3.3 Error reset

If the error condition is not active anymore, there are several options to reset an active error and thus leave the error state again:

- Via the keypad key . ▸ Error reset with keypad 📖 456
- Via the trigger assigned to the Reset fault" function. ▸ Reset error 📖 403
- Via the button in the »EASY Starter« ("Diagnostics" tab).
- In the default setting of 0x400E:008 (P505.08) via bit 7 in the mappable data word NET-WordIN1 0x4008:001 (P590.01).
- Via bit 7 in the mappable CiA 402 control word 0x6040.
- Via bit 2 in the mappable AC Drive control word 0x400B:001 (P592.01).
- Via bit 11 in the mappable LECOM control word 0x400B:002 (P592.02).

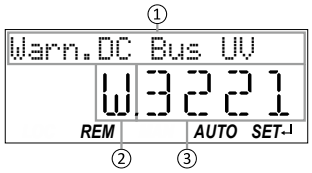
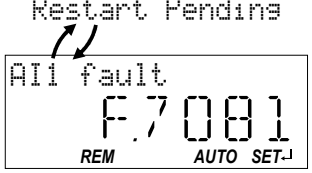
Notes:

- Certain errors can only be reset by mains switching.
- Certain errors (e. g. earth fault or short circuit of the motor phases) may cause a blocking time. In this case, the error can be reset only after the blocking time has elapsed. An active blocking time is displayed via bit 14 in the inverter status word 0x2831.

The "Error codes" table gives the blocking time (if available) for each error. This table also shows whether mains switching is required for the error reset. 📖 461

5.3.4 Keypad error messages

If an error is pending, the keypad shows the following information:

Keypad display	Meaning
 • Faults (F) and trouble (T) are displayed continuously. • Warnings (W) are only displayed every 2 seconds for a short time.	① Error text ② Error type: F Fault T Trouble W Warning ③ Error code (hexadecimal) ▸ Error codes 📖 461 ▸ Error reset with kepad 📖 456
	After a disturbance, a restart is possible if the error condition is not active anymore. The keypad shows this by the "Restart Pending" note. The note is displayed in a 1-second interval alternating with the error text. ▸ Timeout für fault reaction 📖 349

6 Basic setting

This chapter contains the most frequently used functions and settings to adapt the inverter to a simple application based on the default setting.

- Mains voltage 📖 110
- Control source selection 📖 112
- Selection of setpoint source 📖 113
- Starting/stopping performance 📖 115
- Frequency limits and ramp times 📖 118
- Quick stop 📖 121
- S-shaped ramps 📖 123
- Optical device identification 📖 124

6.1 Mains voltage

The rated mains voltage set for the inverter has an impact on the operating range of the inverter.

Details

By default, the rated mains voltage in 0x2540:001 (P208.01) is set according to the product code of the inverter.

Check the setting of the rated mains voltage in 0x2540:001 (P208.01). Ensure that it matches the actual mains voltage applied!

Region	inverter	Product code 0x2000:001 (P190.01)	Rated mains voltage	
			Default setting	Possible settings
EU	i500, 230 V, 1-phase	i5xAExxxBxxxx0xxxx	230 Veff [0]	230 Veff [0]
us	i500, 230 V, 1-phase	i5xAExxxBxxxx1xxxx	230 Veff [0]	230 Veff [0]
EU	i500, 230 V, 1/3-phase	i5xAExxxDxxxx0xxxx	230 Veff [0]	230 Veff [0]
US	i500, 230 V, 1/3-phase	i5xAExxxDxxxx1xxxx	230 Veff [0]	230 Veff [0]
EU	i500, 400 V, 3-phase	i5xAExxxFxxxx0xxxx	400 Veff [1]	400 Veff [1], 480 Veff [2]
US	i500, 480 V, 3-phase	i5xAExxxFxxxx1xxxx	480 Veff [2]	400 Veff [1], 480 Veff [2]

Notes regarding the table:

- The inverter types 400/480 V can be used with different mains voltages. For setting the internal limit values, the rated mains voltage can be set in 0x2540:001 (P208.01) by the user.
- If the inverter is reset to the delivery status, the rated mains voltage is also reset to the default setting listed in the table according to the product code.

The following results from the rated mains voltage set:

- the error threshold for monitoring the DC-bus voltage and
- the voltage threshold for braking operation ("brake chopper threshold").

Monitoring of the DC-bus voltage

- The warning thresholds for monitoring are adjustable.
- The error thresholds and reset thresholds for monitoring result from the rated mains voltage set:

Rated mains voltage	Undervoltage thresholds			Overvoltage thresholds		
	Warning threshold	Error threshold	Reset threshold	Warning threshold	Error threshold	Reset threshold
Setting in 0x2540:001 (P208.01)	Setting in 0x2540:002 (P208.02)	Display in 0x2540:003 (P208.03)	Display in 0x2540:004 (P208.04)	Setting in 0x2540:005 (P208.05)	Display in 0x2540:006 (P208.06)	Display in 0x2540:007 (P208.07)

- If the DC-bus voltage of the inverter falls below the undervoltage error threshold, the "Trouble" response is triggered.
  - Without external 24-V supply: Motor behaves according to 0x2838:002 (P203.02).
  - With external 24-V supply: At undervoltage, motor behaves according to disturbance response.
- If the DC-bus voltage of the inverter exceeds the overvoltage error threshold, the "Fault" response is triggered.

The motor does not restart automatically after the overvoltage monitoring function has been activated.

Parameter	Name / value range / [default setting]	Info
0x2540:001 (P208.01)	Mains settings: Rated mains voltage (Mains settings: Mains voltage) • Setting can only be changed if the inverter is inhibited. **0** **230 Veff** 1 400 Veff 2 480 Veff	Selection of the mains voltage for actuating the inverter.
0x2540:002 (P208.02)	Mains settings: Undervoltage warning threshold (Mains settings: LU warn. thresh.) 0 ... [**0**]* ... 800 V • Default setting depending on the size.	Setting of the warning threshold for monitoring DC bus undervoltage. • If the DC bus voltage falls below the threshold set, the inverter outputs a warning. • The warning is reset with a hysteresis of 10 V.
0x2540:003 (P208.03)	Mains settings: Undervoltage error threshold (Mains settings: LU error thresh.) • Read only: x V • Default setting depending on the size.	Display of the fixed error threshold for monitoring DC bus undervoltage. • If the DC-bus voltage falls below the threshold displayed, the "Fault" response is triggered.
0x2540:004 (P208.04)	Mains settings: Undervoltage reset threshold (Mains settings: LU reset thresh.) • Read only: x V • Default setting depending on the size.	Display of the fixed reset threshold for monitoring DC bus undervoltage.
0x2540:005 (P208.05)	Mains settings: Overvoltage warning threshold (Mains settings: OU warn. thresh.) 0 ... [**0**]* ... 800 V • Default setting depending on the size.	Setting of the warning threshold for monitoring DC bus overvoltage. • If the DC bus voltage exceeds the threshold set, the inverter outputs a warning. • The warning is reset with a hysteresis of 10 V.
0x2540:006 (P208.06)	Mains settings: Overvoltage error threshold (Mains settings: OU error thresh.) • Read only: x V • Default setting depending on the size.	Display of the fixed error threshold for monitoring the DC bus overvoltage. • If the DC-bus voltage exceeds the threshold displayed, the "Fault" response is triggered.
0x2540:007 (P208.07)	Mains settings: Overvoltage reset threshold (Mains settings: OU reset thresh.) • Read only: x V • Default setting depending on the size.	Display of the fixed reset threshold for monitoring DC bus overvoltage.

6.2 Control source selection

The selected "control source" serves to provide the inverter with its start, stop, and reversal commands.

Possible control sources are:
- Digital inputs
- Keypad
- Network

Irrespective of the control source selection, stop commands are always active from each source connected! If, for instance, the network control is active and a keypad is connected for diagnostic purposes, the motor is also stopped if the keypad key ◎ is pressed.
Exception: In the jog operation, a stop command has no impact.

Details

- The default setting "Flexible I/O configuration [0]" in 0x2824 (P200.00) enables a flexible control of the inverter via digital inputs, network and keypad. The control of the inverter via the digital inputs is preconfigured. For details see the chapter "Function assignment of the inputs and outputs". 📖 53
- If the keypad is to be used as the sole control source for the application, selection "Keypad [1]" is to be set in 0x2824 (P200.00).
- The control source that is currently active is displayed in 0x282B:001 (P125.01).

Parameter	Name / value range / [default setting]		Info
0x2824 (P200.00)	Control selection (Control select.)		Selection of the type of inverter control.
	0	**Flexible I/O configuration**	This selection enables a flexible assignment of the start, stop, and rotating direction commands with digital signal sources. • Digital signal sources can be digital inputs, network and keypad. • The I/O configuration is made via the parameters 0x2631:xx (P400.xx).
	1	Keypad	This selection enables the motor to be started exclusively via the start key of the keypad. Other signal sources for starting the motor are ignored. ⓘ Start motor ◎ Stop motor Note! • The functions "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE to start the motor. • If jog operation is active, the motor cannot be stopped via the ◎ keypad key.
0x282B:001 (P125.01)	Inverter diagnostics: Active control source (Inverter diag.: Active control) • Read only		Display of the control source that is currently active.
	0	Flexible I/O configuration	
	1	Network	
	2	Keypad	

Related topics

- The preset I/O configuration can be individually adapted to the respective application. For details see the chapter "Flexible I/O configuration". 📖 365
- For details of the network control of the inverter, see the chapter "General network settings". 📖 165

6.3 Selection of setpoint source

The selected "setpoint source" serves to provide the inverter with its setpoint. The setpoint source can be selected individually for each operating mode.

Possible setpoint sources are:

- Analog inputs
- Keypad
- Network
- Parameterisable setpoints (preset values)
- "Motor potentiometer" function

Details

- For applications only requiring one setpoint it is sufficient to define the standard setpoint source in the following parameters.
- For applications requiring a change-over of the setpoint source during operation, the functions for setpoint change-over have to be configured accordingly. ▸ Setpoint change-over 📖 387

Parameter	Name / value range / [default setting]		Info
0x2860:001 (P201.01)	Frequency control: Default setpoint source (Stnd. setpoints: Freq. setp. src.)		Selection of the standard setpoint source for operating mode "MS: Velocity mode". • The selected standard setpoint source is always active in the operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]" when no setpoint change-over to another setpoint source via corresponding triggers/functions is active. ▸ Setpoint change-over 📖 387
	1	Keypad	The setpoint is specified locally by the keypad. • Default setting: 0x2601:001 (P202.01) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	**Analog input 1**	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. ▸ Configuring the network 📖 164
	11	Frequency preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	Frequency preset 2	
	13	Frequency preset 3	
	14	Frequency preset 4	
	15	Frequency preset 5	
	16	Frequency preset 6	
	17	Frequency preset 7	
	18	Frequency preset 8	
	19	Frequency preset 9	
	20	Frequency preset 10	
	21	Frequency preset 11	
	22	Frequency preset 12	
	23	Frequency preset 13	
	24	Frequency preset 14	
	25	Frequency preset 15	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399

Parameter	Name / value range / [default setting]		Info
0x2860:002 (P201.02)	PID control: Default setpoint source (Stnd. setpoints: PID setp. src.)		Selection of the standard setpoint source for the reference value of the PID control. • The selected standard setpoint source is always active with an activated PID control when no setpoint change-over to another setpoint source via corresponding triggers/functions is active.
	1	**Keypad**	The setpoint is specified locally by the keypad. • Default setting: 0x2601:002 (P202.02) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	Analog input 1	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. Configuring the network 📖 164
	11	PID preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	PID preset 2	
	13	PID preset 3	
	14	PID preset 4	
	15	PID preset 5	
	16	PID preset 6	
	17	PID preset 7	
	18	PID preset 8	
	31	Segment preset 1 • From version 02.00	
	32	Segment preset 2 • From version 02.00	
	33	Segment preset 3 • From version 02.00	
	34	Segment preset 4 • From version 02.00	
	35	Segment preset 5 • From version 02.00	
	36	Segment preset 6 • From version 02.00	
	37	Segment preset 7 • From version 02.00	
	38	Segment preset 8 • From version 02.00	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399

6.3.1 Keypad setpoint default setting

For the manual setpoint selection via keypad the following default settings are used.

Parameter	Name / value range / [default setting]	Info
0x2601:001 (P202.01)	Keypad setpoints: Frequency setpoint (Keypad setpoints: KP freq.setpoint) 0.0 ... [**20.0**] ... 599.0 Hz	Default setting of the keypad setpoint for the operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]".
0x2601:002 (P202.02)	Keypad setpoints: Process controller setpoint (Keypad setpoints: KP PID setpoint) -300.00 ... [**0.00**] ... 300.00 PID unit	Default setting of the keypad setpoint for the reference value of the PID control.

The increment for keypad setpoints can be adapted in 0x2862 (P701.00) by pressing a keypad arrow key once.

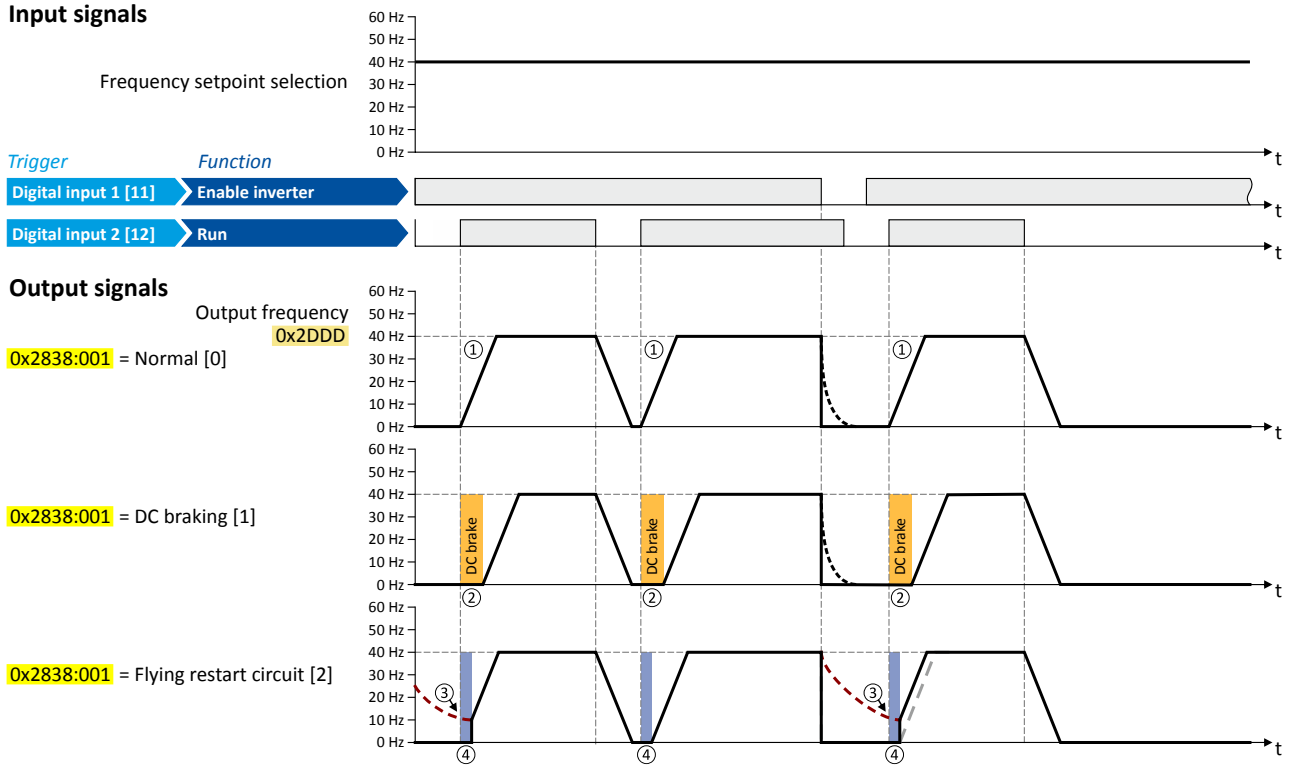
6.4 Starting/stopping performance

6.4.1 Starting performance

The start can be optionally made with DC braking or flying restart circuit. Moreover, an automatic start can be activated after switch-on.

Details

The start method can be selected in 0x2838:001 (P203.01). The following diagram demonstrates the different start methods:



① Start method = "Normal [0]": After the start command, the motor is accelerated to the setpoint with the set acceleration time.

② Start method = "DC braking [1]": After the start command, the "DC braking" function is active. Only after the hold time set in 0x2B84:002 (P704.02) has elapsed, the motor is accelerated to the setpoint with the set acceleration time.

▸ DC braking 🕮 290

③ For demonstrating the flying restart circuit: At the time of the start command, the motor is not at standstill (for instance by loads with high inertia such as fans or flywheels).

④ Start method = "Flying restart circuit [2]": After the start command, the flying restart circuit is active. The flying restart circuit serves to restart a coasting motor on the fly during operation without speed feedback. The synchronicity between inverter and motor is coordinated so that the transition to the rotating motor is effected without jerk at the time of connection.

▸ Flying restart circuit 🕮 347

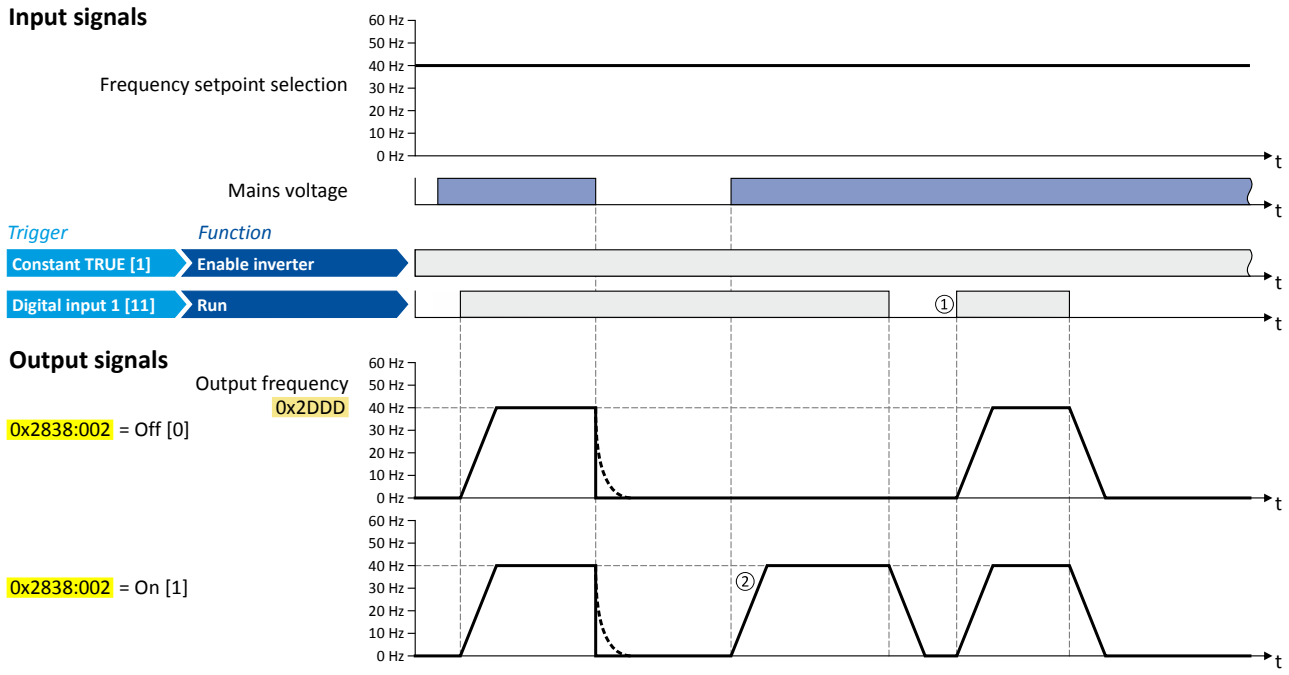
Automatic start after switching on the mains voltage

The automatic start can be activated in 0x2838:002 (P203.02).

Preconditions for the automatic start:

- Flexible I/O configuration is selected: 0x2824 (P200.00) = "Flexible I/O configuration [0]"
- For the start command, a digital input has been configured. (In case of keypad or activated network control, an automatic start is not possible.)

The following diagram demonstrates the function:



① Start at power-up = "Off [0]": After switching on the mains voltage, a renewed start command is required to start the motor.

② Start at power-up = "On [1]": After switching on the mains voltage, the motor starts automatically if a start command is active.

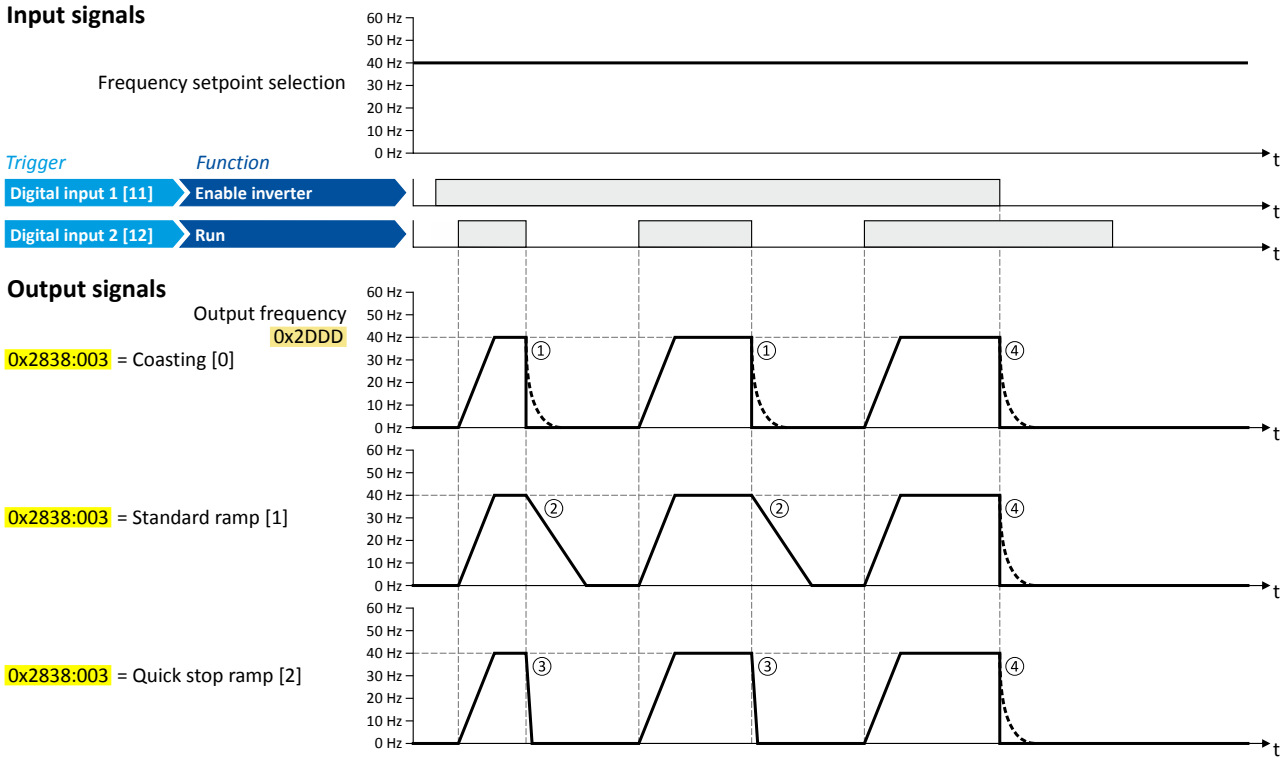
Parameter	Name / value range / [default setting]		Info
0x2838:001 (P203.01)	Start/stop configuration: Start method (Start/stop confg: Start method) • Setting can only be changed if the inverter is inhibited.		Behaviour after start command.
	0	**Normal**	After start command, the standard ramps are active. • Acceleration time 1 can be set in 0x2917 (P220.00). • Deceleration time 1 can be set in 0x2918 (P221.00).
	1	DC braking	After start command, the "DC braking" function is active for the time set in 0x2B84:002 (P704.02). ▸ DC braking 🕮 290
	2	Flying restart circuit	After the start command, the flying restart circuit is active. The flying restart function makes it possible to restart a coasting motor during operation without speed feedback. Synchronicity between the inverter and motor is coordinated so that the transition to the rotating motor is effected without jerk at the time of connection. ▸ Flying restart circuit 🕮 347
0x2838:002 (P203.02)	Start/stop configuration: Start at power-up (Start/stop confg: Start at powerup)		Starting performance after switching on the mains voltage.
	0	**Off**	No automatic start after switching on mains voltage. In addition to the inverter enable, a renewed start command is always required to start the motor.
	1	On	Automatic start of the motor after switching on the mains voltage if the inverter is enabled and a start command exists.

6.4.2 Stopping performance

In the default setting, the motor is brought to a standstill after a stop command with standard ramp. Alternatively, coasting or ramping down with quick stop ramp can be selected.

Details

The stop method can be selected in 0x2838:003 (P203.03). The following diagram demonstrates the different stop methods:



① Stop method = "Coasting [0]": The motor is coasting.

② Stop method = "Standard ramp [1]": The motor is brought to standstill with a deceleration time 1 (here: 10 s).

③ Stop method = "Quick stop ramp [2]": The motor is brought to a standstill with the deceleration time for quick stop (here: 1 s).

④ If "Enable inverter" is set to FALSE, the inverter is disabled. The motor becomes torqueless and coasts to standstill depending on the mass inertia of the machine (irrespective of the set stop method).

Parameter	Name / value range / [default setting]		Info
0x2838:003 (P203.03)	Start/stop configuration: Stop method (Start/stop confg: Stop method)		Behaviour after the "Stop" command.
	0	Coasting	The motor becomes torqueless (coasts down to standstill).
	1	**Standard ramp**	The motor is brought to a standstill with deceleration time 1 (or deceleration time 2, if activated). • Deceleration time 1 can be set in 0x2918 (P221.00). • Deceleration time 2 can be set in 0x291A (P223.00). ▸ Frequency limits and ramp times 🕮 118
	2	Quick stop ramp	The motor is brought to a standstill with the deceleration time set for the "Quick stop" function. • Deceleration time for quick stop can be set in 0x291C (P225.00). • The "quick stop" function can also be activated manually, for instance via a digital input. ▸ Quick stop 🕮 121

6.5 Frequency limits and ramp times

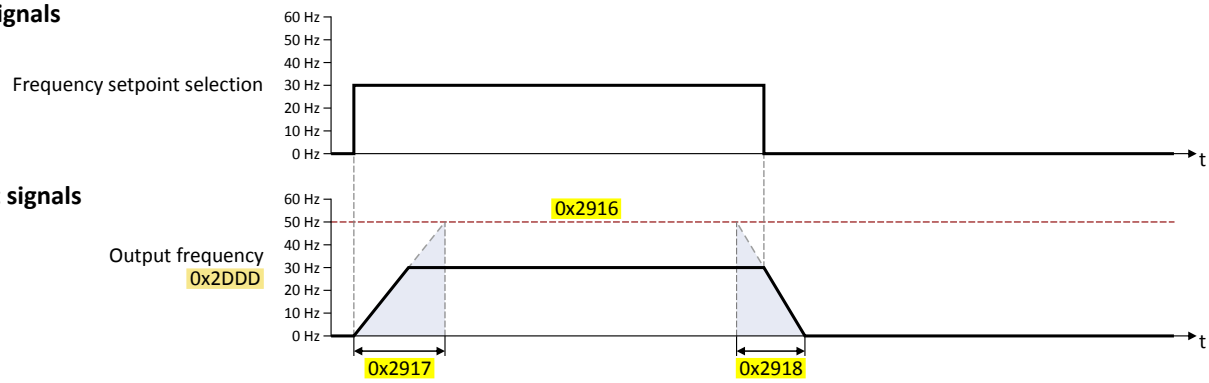
The frequency range can be limited by setting a minimum and maximum frequency. For the frequency setpoint, two different ramps can be parameterised. Change-over to ramp 2 can be carried out manually or automatically.

Details

The frequency setpoint is internally led via a ramp generator.

- The acceleration time set in 0x2917 (P220.00) refers to an acceleration from standstill to the maximum frequency set in 0x2916 (P211.00). At a low setpoint selection, the real acceleration time decreases accordingly.
- The deceleration time set in 0x2918 (P221.00) refers to the deceleration of the set maximum frequency to standstill. In case of a lower actual frequency, the actual deceleration time is reduced accordingly.

Input signals

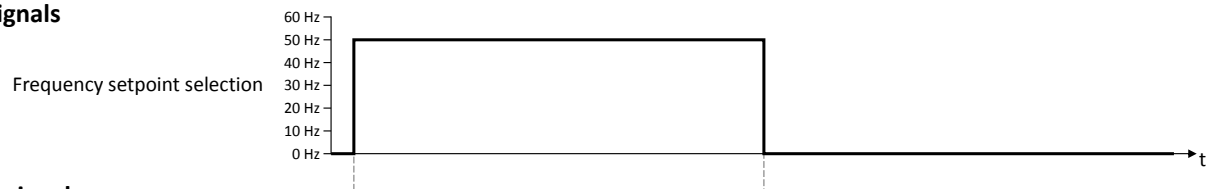


Output signals

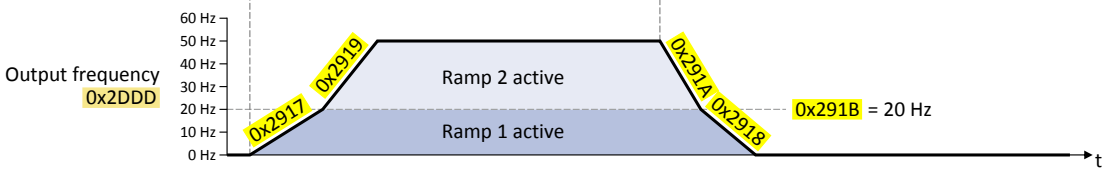
Automatic/manual change-over to ramp 2

- For ramp 2, the acceleration time 2 set in 0x2919 (P222.00) and the deceleration time 2 set in 0x291A (P223.00) apply.
- The change-over to ramp 2 is effected automatically if the frequency setpoint (absolute value) ≥ auto-changeover threshold 0x291B (P224.00).

Input signals



Output signals



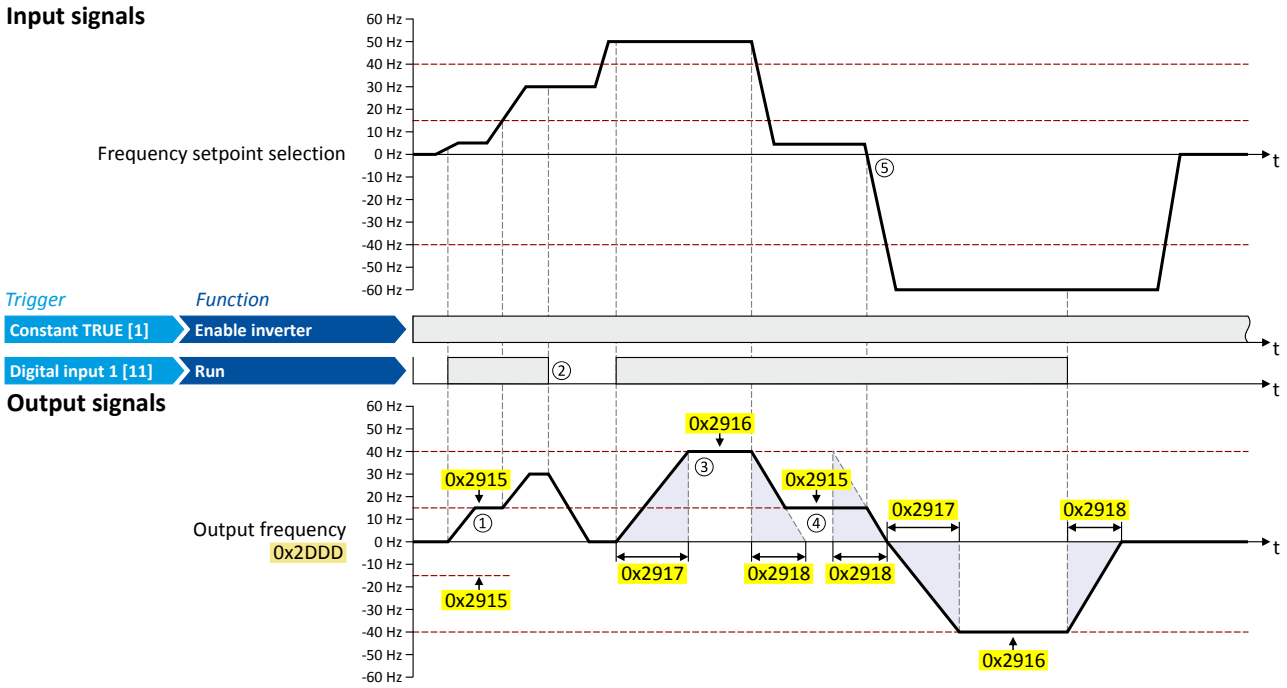
- The "Activate ramp 2" function serves to manually activate the acceleration time 2 and the deceleration time 2. ▸ Activating ramp 2 manually 🕮 409

Parameter	Name / value range / [default setting]	Info
0x2915 (P210.00)	Minimum frequency (Min. frequency) 0.0 ... [**0.0**] ... 599.0 Hz	Lower limit value for all frequency setpoints.
0x2916 (P211.00)	Maximum frequency (Max. frequency) 0.0 ... [**50.0**] ... 599.0 Hz	Upper limit value for all frequency setpoints.
0x2917 (P220.00)	Acceleration time 1 (Accelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s	Acceleration time 1 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331

Parameter	Name / value range / [default setting]	Info
0x2918 (P221.00)	Deceleration time 1 (Decelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 1 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331
0x2919 (P222.00)	Acceleration time 2 (Accelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Acceleration time 2 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • The acceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto switching threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The acceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331
0x291A (P223.00)	Deceleration time 2 (Decelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 2 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • The deceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto change-over threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The deceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331
0x291B (P224.00)	Auto-changeover threshold of ramp 2 (Ramp 2 thresh.) 0.0 ... [**0.0**] ... 599.0 Hz	Threshold for the automatic change-over to acceleration time 2 and deceleration time 2. • The change-over is effected if the frequency setpoint (absolute value) ≥ auto change-over threshold. • With the setting 0, the automatic change-over function is deactivated.

Example for operating mode

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2915 (P210.00)	Minimum frequency	15 Hz
0x2916 (P211.00)	Maximum frequency	40 Hz
0x2917 (P220.00)	Acceleration time 1	4 s
0x2918 (P221.00)	Deceleration time 1	3 s



① After a start command, the motor is accelerated to the minimum frequency. This is also the case if the setpoint selection is = 0 Hz. If the setpoint exceeds the minimum frequency, the ramp generator follows the setpoint.

② If the start command is deactivated again, the motor is stopped with the stop method set in 0x2838:003 (P203.03) (here: Standard ramp).

③ The motor is accelerated to the set maximum frequency.

④ If the setpoint falls below the minimum frequency, it is decelerated up to the minimum frequency.

⑤ In case of a sign reversal of the setpoint, a change of direction of rotation takes place, minimum and maximum frequency, however, continue to apply.

6.6 Quick stop

The "quick stop" function is an alternative stop method if the motor has to be stopped faster than normal.

Cancelling the quick stop causes a restart of the motor if the start command is still active and the inverter is enabled!

Details

- Possible triggers to be selected for the "quick stop" function are available for example in 0x2631:003 (P400.03) the digital inputs and internal status signals of the inverter.
- An activation via network is possible via the mappable NetWordIN1 data word or one of the predefined process data words. ▸ General network settings 📖 165

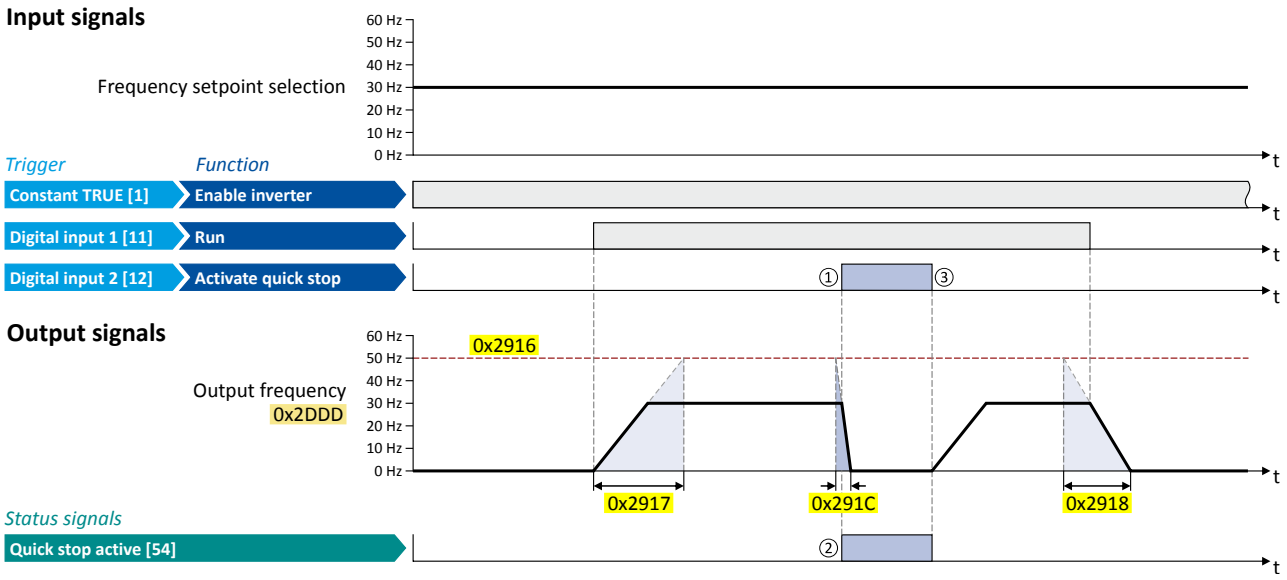
Diagnostic parameters:

- 0x282A:002 (P126.02) displays the cause of quick stop bit-coded.

Parameter	Name / value range / [default setting]	Info
0x291C (P225.00)	Quick stop deceleration time (QSP dec. time) 0.0 ... [**1.0**] ... 3600.0 s	Quick stop deceleration time for the operating mode "MS: Velocity mode". • If the "Quick stop" function is activated, the motor is brought to a standstill within the deceleration time set here. • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331
0x2631:003 (P400.03)	Function list: Activate quick stop (Function list: Quick stop) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate quick stop" function. Trigger = TRUE: Activate quick stop. Trigger = FALSE: Deactivate quick stop. Notes: • The "Quick stop" function brings the motor to a standstill within the deceleration time set in 0x291C (P225.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

Example for operating mode

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:003 (P400.03)	Activate quick stop	Digital input 2 [12]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2916 (P211.00)	Maximum frequency	50 Hz
0x2917 (P220.00)	Acceleration time 1	4 s
0x2918 (P221.00)	Deceleration time 1	3 s
0x291C (P225.00)	Quick stop deceleration time	1 s



① Quick stop is activated: The motor is brought to a standstill within the deceleration time set in 0x291C (P225.00).

② If quick stop is active, the status signal "Quick stop active [54]" is set to TRUE. This status signal can be assigned via the Flexible I/O configuration of a function or a digital output.

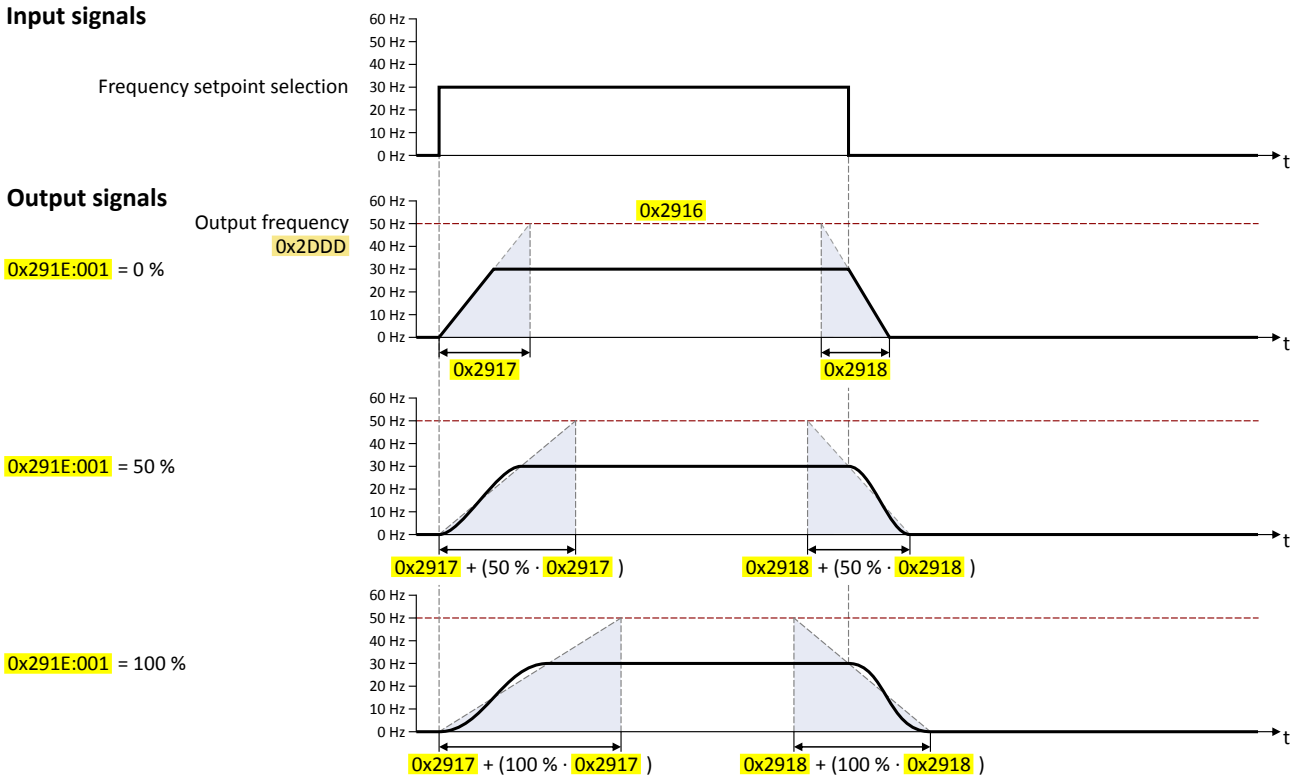
③ Quick stop is deactivated again: The motor accelerates again to the setpoint since the start command is still active.

6.7 S-shaped ramps

In order to reduce the jerk and to therefore prevent the drive components from damage, a smoothing factor can be set for the acceleration/deceleration ramps.

Details

In the default setting, the motor is accelerated and decelerated with linear ramps since this is the most used configuration. The setting of a smoothing factor causes S-shaped ramps. This leads to a smoother starting and braking behaviour which, for instance, is used for sensitive machine parts with backlash. It has to be observed here that the setting of a smoothing factor causes longer acceleration and delay times (see the following diagrams).



Parameter	Name / value range / [default setting]	Info
0x291E:001 (P226.01)	S-Ramp characteristic: Smoothing factor (S-ramp char.: Smoothing factor) 0.0 ... [**0.0**] ... 100.0 %	Factor for S-rounding of the acceleration/deceleration ramps. • With the setting "0.0", the S-rounding is deactivated and acceleration/deceleration with linear ramps is carried out.

6.8 Optical device identification

For applications including several interconnected inverters it may be difficult to locate a device that has been connected online. The "Optical device identification" function serves to locate the inverter by means of blinking LEDs.

Details

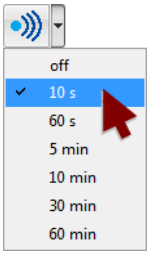
In order to start the visual tracking,

- click the button in the toolbar of the »EASY Starter« or
- set 0x2021:001 (P230.01) = "Start [1]".

After the start, both LEDs "RDY" and "ERR" on the front of the inverter synchronously blink very fast.

"RDY" LED (blue)	"ERR" LED (red)	Status/meaning
Both LEDs are blinking in a very rapidly synchronous mode		"Visual tracking" function is active.

The blinking duration can be set in 0x2021:002 (P230.02) or selected in the »EASY Starter« in the dropdown list field:



Parameter	Name / value range / [default setting]	Info
0x2021:001 (P230.01)	Optical tracking: Start detection (Optical tracking: Start detection) **0** **Stop** 1 Start	1 = start optical device identification. • After the start, the two LEDs "RDY" and "ERR" on the front of the inverter are blinking with a blinking frequency of 20 Hz for the blinking duration set in 0x2021:002 (P230.02). The setting is then automatically reset to "0" again. • If the function is reactivated within the blinking time set, the time is extended correspondingly. • A manual reset to "0" makes it possible to stop the function prematurely.
0x2021:002 (P230.02)	Optical tracking: Blinking duration (Optical tracking: Blink. duration) 0 ... [**5**] ... 3600 s	

7 Motor control

This chapter contains all functions and settings relevant for the motor control.

- Motor data 📖 126
- Motor control selection 📖 131
- Optimisation of motor control 📖 140
- Optimisation of the control loops 📖 148
- Motor rotating direction 📖 150
- Switching frequency changeover 📖 151
- Motor protection 📖 152

7.1 Motor data

The term "motor data" comprises all parameters only depending on the motor and only characterising the electrical behaviour of the machine. Motor data are independent of the application in which the inverter and the motor are used.

Preconditions

When you enter the motor nameplate data, take into account the phase connection implemented for the motor (star or delta connection). Only enter the data applying to the connection type selected.

Parameter	Name / value range / [default setting]	Info
0x2822:004 (P327.04)	Axis commands: Identify motor data (energized) (Axis commands: Identify mot.) 0 ... [**0**] ... 1	1 = start automatic identification of the motor data. • Inverter characteristics, motor equivalent circuit diagram data and controller settings are identified and set automatically. • During the procedure, the motor is energised! ▸ Automatic identification of the motor data 🕮 129
0x2822:005 (P327.05)	Axis commands: Calibrate motor data (non-energized) (Axis commands: Calibrate mot.) 0 ... [**0**] ... 1	1 = start automatic calibration of the motor data. • A default inverter characteristic is loaded. • the motor equivalent circuit diagram data and controller settings are calculated on the basis of the currently set rated motor data. • The motor is not energised.
0x2910:001 (P335.01)	Motor moment of inertia (Motor inertia) 0.00 ... [**3.70**]* ... 20000000.00 kg cm² • Default setting depending on the size.	Setting of the moment of inertia of the motor.
0x2910:002 (P335.02)	Load moment of inertia (Load inertia) 0.00 ... [**3.70**]* ... 20000000.00 kg cm² • Default setting depending on the size.	Setting of the moment of inertia of the load.
0x2910:003	Coupling 0 | Stiff 1 | Elastic **2 | With backlash**	Selection of the type of coupling between the moment of inertia of the motor and that of the load.

Parameter	Name / value range / [default setting]	Info
0x2947:001	Inverter characteristic: Value y1 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	The inverter characteristic (consisting of 17 values) is calculated and set during the automatic identification of the motor data. If only an automatic calibration of the motor data is carried out, a default inverter characteristic is loaded instead. Note! Changing these values is not recommended by the manufacturer.
0x2947:002	Inverter characteristic: Value y2 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:003	Inverter characteristic: Value y3 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:004	Inverter characteristic: Value y4 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:005	Inverter characteristic: Value y5 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:006	Inverter characteristic: Value y6 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:007	Inverter characteristic: Value y7 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:008	Inverter characteristic: Value y8 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:009	Inverter characteristic: Value y9 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:010	Inverter characteristic: Value y10 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:011	Inverter characteristic: Value y11 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:012	Inverter characteristic: Value y12 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:013	Inverter characteristic: Value y13 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:014	Inverter characteristic: Value y14 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:015	Inverter characteristic: Value y15 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:016	Inverter characteristic: Value y16 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2947:017	Inverter characteristic: Value y17 0.00 ... [**0.00**]* ... 20.00 V • Default setting depending on the size.	
0x2C01:001	Motor parameters: Number of pole pairs • Read only	Display of the number of pole pairs calculated from the rated speed and rated frequency.
0x2C01:002	Motor parameters: Stator resistance 0.0000 ... [**10.1565**]* ... 125.0000 Ω • Default setting depending on the size.	General motor data. Carry out settings as specified by manufacturer data/motor data sheet.
0x2C01:003	Motor parameters: Stator leakage inductance 0.000 ... [**23.566**]* ... 500.000 mH • Default setting depending on the size.	

Parameter	Name / value range / [default setting]	Info
0x2C01:004 (P320.04)	Motor parameters: Rated speed (Motor parameters: Rated speed) 50 ... [**1450**] ... 50000 rpm	General motor data. Carry out settings as specified by motor nameplate data.
0x2C01:005 (P320.05)	Motor parameters: Rated frequency (Motor parameters: Rated frequency) 1.0 ... [**50.0**] ... 1000.0 Hz	
0x2C01:006 (P320.06)	Motor parameters: Rated power (Motor parameters: Rated power) 0.00 ... [**0.25**]* ... 655.35 kW • Default setting depending on the size.	
0x2C01:007 (P320.07)	Motor parameters: Rated voltage (Motor parameters: Rated voltage) 0 ... [**230**]* ... 65535 V • Default setting depending on the size.	
0x2C01:008 (P320.08)	Motor parameters: Cosine phi (Motor parameters: Cosine phi) 0.00 ... [**0.80**] ... 1.00	
0x2C01:010	Motor parameters: Motor name	The name (e.g. " 1") can be freely selected by the user. If the motor in the engineering tool has been selected from the "motor catalog", the respective motor name is automatically entered here (example: "MDSKA080-22, 70").
0x2C02:001 (P351.01)	Motor parameter (ASM): Rotor resistance (ASM motor par.: Rotor resistance) 0.0000 ... [**8.8944**]* ... 200.0000 Ω • Default setting depending on the size.	Equivalent circuit data of the motor required for the motor model.
0x2C02:002 (P351.02)	Motor parameter (ASM): Mutual inductance (ASM motor par.: Mutual induct.) 0.0 ... [**381.9**]* ... 50000.0 mH • Default setting depending on the size.	
0x2C02:003 (P351.03)	Motor parameter (ASM): Magnetising current (ASM motor par.: Magn. current) 0.00 ... [**0.96**]* ... 500.00 A • Default setting depending on the size.	
0x6075 (P323.00)	Motor rated current (Motor current) 0.001 ... [**1.700**]* ... 500.000 A • Default setting depending on the size. • Setting can only be changed if the inverter is inhibited.	The rated motor current to be set here serves as a reference value for different parameters with a setting/display in percent. Relevant parameters: • DC braking: Current 0x2B84:001 (P704.01) • Flying restart circuit: Current 0x2BA1:001 (P718.01) • Motor overload monitoring (i^2*t): Maximum utilisation [60 s] 0x2D4B:001 (P308.01) • Load loss detection: Threshold 0x4006:001 (P710.01) • Max current 0x6073 (P324.00) • Current actual value 0x6078 (P103.00)
0x6076 (P325.00)	Motor rated torque (Motor torque) 0.001 ... [**1.650**]* ... 1000.000 Nm • Default setting depending on the size. • Setting can only be changed if the inverter is inhibited.	The rated motor torque to be set here serves as a reference value for different parameters with a setting/display in percent. Relevant parameters: • Target torque 0x6071 • Max torque 0x6072 (P326.00) • Torque demand value 0x6074 • Torque actual value 0x6077 (P107.00) • Positive torque limit 0x60E0 • Negative torque limit 0x60E1
0x6080 (P322.00)	Max motor speed (Max motor speed) 0 ... [**6075**] ... 480000 rpm	Limitation of the maximum motor speed.

7.1.1 Automatic identification of the motor data

For an optimal operation, the inverter characteristics, equivalent circuit data and controller settings can be automatically identified and set.

During the procedure, the motor is energised! The motor may be noisy but should not rotate.

Preconditions

Before the procedure is started, the following rated motor data has to be set correctly. Starting the calibration with wrong settings causes wrong results!

- Rated speed 0x2C01:004 (P320.04)
- Rated frequency 0x2C01:005 (P320.05)
- Rated power 0x2C01:006 (P320.06)
- Rated voltage 0x2C01:007 (P320.07)
- Cosine phi 0x2C01:008 (P320.08)
- Motor rated current 0x6075 (P323.00)
- Max current 0x6073 (P324.00)

Steps required before starting the identification

1. Disable inverter or stop motor.
2. Set minimum frequency of the motor/application in 0x2915 (P210.00) .
3. Set maximum frequency of the motor/application in 0x2916 (P211.00).
4. Set the desired motor control type in 0x2C00 (P300.00).
5. Ensure that the operating mode "MS: Velocity mode [-2]" is set in 0x6060 (P301.00).

General information on the identification

- The automatic identification can take from some seconds to minutes.
- During and after the procedure, the LED "RDY" (blue) is permanently on.
- After completing, a renewed start command is required to start the motor.

Diagnostic parameters:

- 0x2823:002 displays the status of the identification.

Execute automatic identification with »EASY Starter«

The easiest way to execute the automatic identification is to use the »EASY Starter«:

1. Go to the "Settings" tab and navigate to the parameterisation dialog "Advanced motor setting".
2. Press the "Energized" button under "Motor calibration" for an automatic identification.
   The "Identify motor parameters" dialog box is displayed. Simply follow the instructions in the dialog box to execute the identification.

Execute automatic identification with keypad

1. Request automatic identification: Set 0x2822:004 (P327.04) = "1".
   The automatic identification starts with the next start command.
2. Enable the inverter again (if disabled) and give the start command. ▸ Start / stop motor 🕮 372
   The automatic identification is started.

Parameters set by the automatic identification

After a successful identification, the following parameters are set to the identified values:

Inverter identification

- Inverter characteristic 0x2947:001 ... 0x2947:017

Motor identification

- Number of pole pairs 0x2C01:001
- Stator resistance 0x2C01:002
- Stator leakage inductance 0x2C01:003
- Rotor resistance 0x2C02:001 (P351.01)
- Mutual inductance 0x2C02:002 (P351.02)
- Magnetising current 0x2C02:003 (P351.03)

During the procedure, also the following parameters are calculated and set. A manual adaptation of these parameters is usually not recommended since wrong settings may have a negative impact on the control.

Speed controller

- Gain 0x2900:001 (P332.01)
- Reset time 0x2900:002 (P332.02)

Imax controller

- Gain 0x2B08:001 (P333.01)
- Reset time 0x2B08:002 (P333.02)

Current controller

- Gain 0x2942:001 (P334.01)
- Reset time 0x2942:002 (P334.02)

Field controller

- Gain 0x29C0:001
- Reset time 0x29C0:002

Field weakening controller

- Gain 0x29E0:001
- Reset time 0x29E0:002

SLVC Q controller

- Gain 0x2B40:001
- Reset time 0x2B40:002

Flying restart circuit

- Restart time 0x2BA1:003 (P718.03)

7.2 Motor control selection

The inverter supports different modes for closed-loop/open-loop motor control.

Parameter	Name / value range / [default setting]		Info
0x2C00 (P300.00)	Motor control mode (Motor ctrl mode) • Setting can only be changed if the inverter is inhibited.		Selection of the motor control type.
	2	Servo control (SC ASM) • From version 02.00	This control mode is used for servo control of an asynchronous motor. ▸ Servo control for asynchronous motors (SC-ASM) 🕮 138
	3	Sensorless control (SL PSM) • From version 02.00	This control type is used for the sensorless control of a synchronous motor. ▸ Sensorless control for synchronous motors (SL-PSM) 🕮 139
	4	Sensorless vector control (SLVC)	This control type is used for sensorless vector control of an asynchronous motor. ▸ Sensorless vector control (SLVC) 🕮 136
	6	**V/f characteristic control (VFC open loop)**	This control mode is used for the speed control of an asynchronous motor via a V/f characteristic and is the simplest control mode. ▸ V/f characteristic control (VFC) 🕮 132

In the following subchapters, each motor control is described in detail.

7.2.1 V/f characteristic control (VFC)

The V/f characteristic control is a motor control for conventional frequency inverter applications. It is based on a simple and robust control mode for the operation of asynchronous motors with a linear or square-law load torque characteristic (e.g. fan). Because of the minimal parameterisation effort, such applications can be commissioned easily and quickly.

Preconditions

- The V/f characteristic control is only suitable for asynchronous motors.
- If you want to actuate a drive with a square-law V/f characteristic: please always check whether the corresponding drive is suitable for operation with a square-law V/f characteristic!
- From the motor nameplate data, at least the rated speed and rated frequency must be entered, so that the inverter can calculate the correct number of pole pairs. ▸ Motor data 126
- The motor must only be actuated above the rated motor frequency/rated voltage if this is expressly approved by the motor manufacturer!

Details

This motor control type is activated by setting 0x2C00 (P300.00) = " V/f characteristic control (VFC open loop) [6]".

- 0x2B00 (P302.00) provides different characteristic shapes which are described in detail in the following subchapters.
- Limiting factors for the V/f characteristic are rated mains voltage 0x2540:001 (P208.01), minimum frequency 0x2915 (P210.00) and maximum frequency 0x2916 (P211.00).

Parameter	Name / value range / [default setting]		Info
0x2B00 (P302.00)	V/f characteristic shape (V/f charac.shape) • Setting can only be changed if the inverter is inhibited.		Selection of the V/f characteristic shape for the adaptation to different load profiles.
	0	**Linear**	Linear characteristic for drives with constant load torque over the speed. ▸ Linear V/f characteristic 133
	1	Quadratic	Square-law characteristic for drives with a linear or square-law load torque over the speed. • Square-law V/f characteristics are preferably used for centrifugal pumps and fan drives. • Please always check whether the corresponding drive is suitable for operation with a square-law V/f characteristic! • If your pump drive or fan drive is not suitable for operation with a square-law V/f characteristic, use the linear V/f characteristic instead. ▸ Square-law V/f characteristic 134
	3	Eco • From version 02.00	Linear characteristic with energy optimisation in the partial load operational range. ▸ V/f characteristic control - energy-saving (VFC Eco) 135
0x2B01:001 (P303.01)	V/f shape data: Base voltage (V/f shape data: Base voltage) 0 ... [**230**]* ... 5000 V • Default setting depending on the size.		Base voltage and base frequency define the V/f ratio and thus the gradient of the V/f characteristic. • The V/f base voltage is usually set to the rated motor voltage 0x2C01:007 (P320.07). • The V/f base frequency is usually set to the rated motor frequency 0x2C01:005 (P320.05).
0x2B01:002 (P303.02)	V/f shape data: Base frequency (V/f shape data: Base frequency) 0 ... [**50**]* ... 599 Hz • Default setting depending on the size.		

7.2.1.1 Linear V/f characteristic

The linear V/f characteristic is the most used characteristic shape for general applications since they cause a torque that is largely constant.

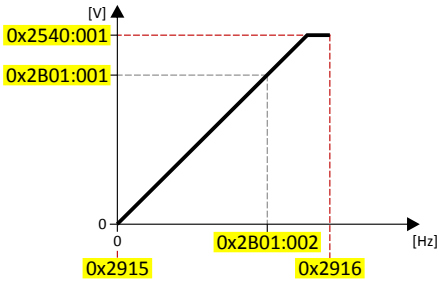
Details

Select V/f characteristic control with linear characteristic:

1. Motor control mode 0x2C00 (P300.00) = "V/f characteristic control (VFC open loop) [6]"
2. V/f characteristic shape 0x2B00 (P302.00) = "Linear [0]"

Setting of the V/f characteristic:

- Limiting factors for the V/f characteristic are rated mains voltage 0x2540:001 (P208.01), minimum frequency 0x2915 (P210.00) and maximum frequency 0x2916 (P211.00).
- The base voltage 0x2B01:001 (P303.01) is usually set to the rated motor voltage (motor nameplate data). The base voltage is preset to the rated mains voltage. This again is preset according to the product key of the inverter. ▸ Mains voltage 🕮 110
- The base frequency 0x2B01:002 (P303.02) is usually set to the rated motor frequency (motor nameplate data).

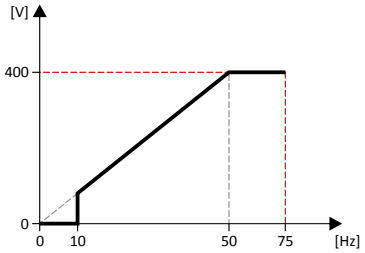


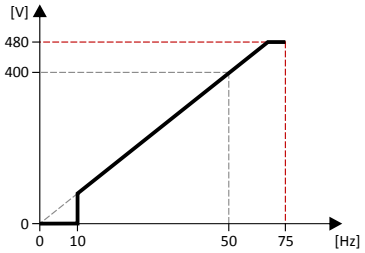
The current output frequency can exceed the set maximum frequency if the gain for the slip compensation in 0x2B09:001 (P315.01) is set to a value higher than 0.

Example

In this example, a 400 V/50 Hz motor is connected to the inverter which is to be operated with maximally 75 Hz. The minimum frequency is set to 10 Hz.

- V/f characteristic on the left: The inverter is operated with a rated mains voltage of 400 V.
- V/f characteristic on the right: The inverter is operated with a rated mains voltage of 480 V. This causes the output voltage to further increase above 50 Hz.





Parameter	Name	Setting for this example
0x2540:001 (P208.01)	Rated mains voltage	400 Veff [1] (on the left) / 480 Veff [2] (on the right)
0x2915 (P210.00)	Minimum frequency	10 Hz
0x2916 (P211.00)	Maximum frequency	75 Hz
0x2B01:001 (P303.01)	Base voltage	400 V
0x2B01:002 (P303.02)	Base frequency	50 Hz

7.2.1.2 Square-law V/f characteristic

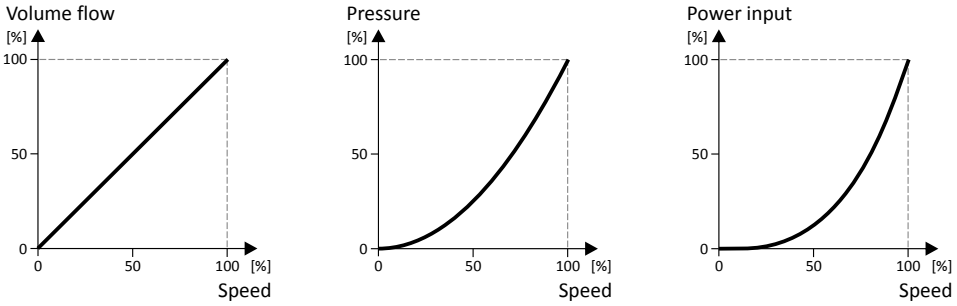
The square-law V/f characteristic is typically used in heating, ventilation and climate applications to control the speed of fans and pumps.

Details

Each application that is provided with the features according to the affinity laws may possibly benefit from a square-law V/f characteristic.

The affinity laws describe the relation between the speed and other variables:

- The volume flow increases proportionately to the speed.
- The required pressure behaves proportionately to the square of the speed.
- The power input is proportionately to the cube of the speed. This means that already a minimal reduction of the speed may lead to substantial savings in energy consumption.



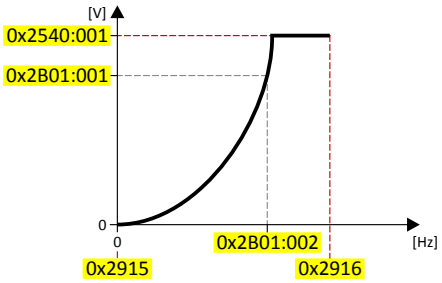
By approximation, the square-law V/f characteristic corresponds to the curve for power input shown above. At low frequencies, the voltage is reduced since due to the type of load a lower voltage is sufficient to generate the required power. All in all, this results in an energy-efficient system.

Select V/f characteristic control with square-law characteristic:

1. Motor control mode 0x2C00 (P300.00) = "V/f characteristic control (VFC open loop) [6]"
2. V/f characteristic shape 0x2B00 (P302.00) = "Quadratic [1]"

Setting of the V/f characteristic:

- Limiting factors for the V/f characteristic are rated mains voltage 0x2540:001 (P208.01), minimum frequency 0x2915 (P210.00) and maximum frequency 0x2916 (P211.00).
- The base voltage 0x2B01:001 (P303.01) is usually set to the rated motor voltage (motor nameplate data). The base voltage is preset to the rated mains voltage. This again is preset according to the product key of the inverter. ▸ Mains voltage 🕮 110
- The base frequency 0x2B01:002 (P303.02) is usually set to the rated motor frequency (motor nameplate data).



The current output frequency can exceed the set maximum frequency if the gain for the slip compensation in 0x2B09:001 (P315.01) is set to a value higher than 0.

7.2.1.3 V/f characteristic control - energy-saving (VFC Eco)

In case of the energy-saving V/f characteristic control (VFCplusEco). the motor voltage of the inverter is detected by means of a linear characteristic as a function of the rotating field frequency or motor speed to be generated. Moreover, the motor is always driven in the optimal efficiency range via a cosφ control and the resulting voltage reduction (reduced copper losses in the asynchronous motor).

Details

Select energy-saving V/f characteristic control with linear characteristic:

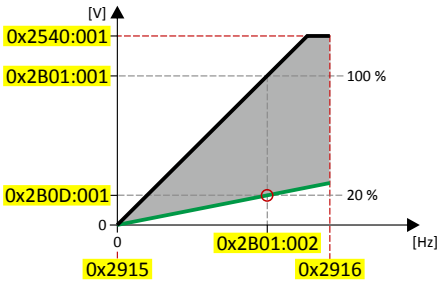
1. Motor control mode 0x2C00 (P300.00) = "V/f characteristic control (VFC open loop) [6]"
2. V/f characteristic shape 0x2B00 (P302.00) = "Eco [3]"

Setting of the V/f characteristic:

- Limiting factors for the V/f characteristic are rated mains voltage 0x2540:001 (P208.01), minimum frequency 0x2915 (P210.00) and maximum frequency 0x2916 (P211.00).
- The base voltage 0x2B01:001 (P303.01) is usually set to the rated motor voltage (motor nameplate data). The base voltage is preset to the rated mains voltage. This again is preset according to the product key of the inverter. ▸ Mains voltage 110
- The base frequency 0x2B01:002 (P303.02) is usually set to the rated motor frequency (motor nameplate data).

Eco efficiency range:

- The Eco efficiency range (grey) is between the V/f-standard characteristic (black) and the V/f Eco characteristic (green).
- The V/f Eco characteristic (green) is defined by the operating point that results from the minimum voltage 0x2B0D:001 (P330.01) and the base frequency 0x2B01:002 (P303.02).
- The minimum voltage 0x2B0D:001 (P330.01) has to be set in percent with reference to the base voltage 0x2B01:001 (P303.01).



The current output frequency can exceed the set maximum frequency if the gain for the slip compensation in 0x2B09:001 (P315.01) is set to a value higher than 0.

Optimising the control mode:

1. Select the used motor in the engineering tool from the "motor catalog". If the motor is not available in the motor catalog, the motor data have to be set according to the manufacturer information/motor data sheet. ▸ Motor data 126
2. Identify motor data (energized) or calibrate (non-energized). Details: ▸ Automatic identification of the motor data 129

Parameter	Name / value range / [default setting]	Info
0x2B0D:001 (P330.01)	Minimum voltage (Min. voltage) 20 ... [**20**] ... 100 % • From version 02.00	Defining the operating point of the V/f eco characteristic. The V/f eco characteristic defines the lower limit of the eco efficiency range. • 100 % ≡ Base voltage 0x2B01:001 (P303.01)

7.2.2 Sensorless vector control (SLVC)

Sensorless (field-oriented) vector control for asynchronous motors is based on a decoupled, separate control for the torque-producing and the field-producing current component. In addition, the actual speed is reconstructed by means of a motor model so that a speed sensor is not required.

Preconditions

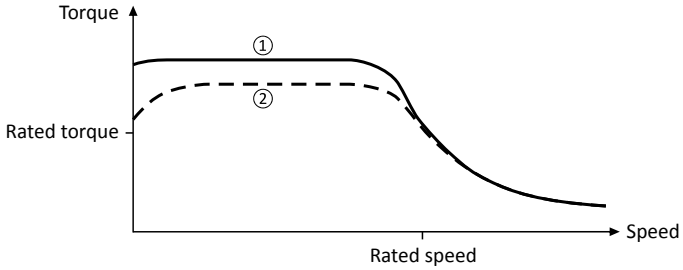
- Sensorless vector control (SLVC) is only suitable for asynchronous motors.
- Operation of the sensorless vector control (SLVC) is only permissible for one single drive!
- Operation of the sensorless vector control (SLVC) is **not** permissible for hoists!
- The default setting enables the actuation of a power-adapted motor. Optimum operation requires an automatic identification of the motor data. ▸ Automatic identification of the motor data 📖 129

Details

This motor control type is activated by setting 0x2C00 (P300.00) = " Sensorless vector control (SLVC) [4]".

Compared to the V/f characteristics, the sensorless vector control (SLVC) serves to achieve improved drive characteristics thanks to:

- higher torque throughout the entire speed range
- higher speed accuracy and higher concentricity factor
- higher efficiency



① Sensorless vector control (SLVC)
② V/f characteristic control (VFC) 📖 132

Parameter	Name / value range / [default setting]	Info
0x29C0:001	Field controller settings: Gain 0.00 ... [**59.68**]* ... 50000.00 A/Vs • Default setting depending on the size.	Gain factor Vp of the field controller.
0x29C0:002	Field controller settings: Reset time 1.0 ... [**45.5**]* ... 6000.0 ms • Default setting depending on the size.	Reset time Tn of the field controller.
0x29E0:001	Field weakening controller settings: Gain 0.000 ... [**0.000**]* ... 2000000.000 Vs/V • Default setting depending on the size.	Gain factor Vp of the field weakening controller.
0x29E0:002	Field weakening controller settings: Reset time 1.0 ... [**1478.3**]* ... 240000.0 ms • Default setting depending on the size.	Reset time Tn of the field weakening controller.
0x2B40:001	SLVC: Gain 0.0000 ... [**0.2686**]* ... 1000.0000 Hz/A • Default setting depending on the size.	Gain of the SLVC-Q controller.
0x2B40:002	SLVC: Reset time 1.0 ... [**2.3**]* ... 2000.0 ms • Default setting depending on the size.	Reset time of the SLVC-Q controller.
0x2900:001 (P332.01)	Speed controller settings: Gain (Speed controller: Gain) 0.00000 ... [**0.00193**]* ... 20000.00000 Nm/rpm • Default setting depending on the size.	Gain factor Vp of the speed controller.
0x2900:002 (P332.02)	Speed controller settings: Reset time (Speed controller: Reset time) 1.0 ... [**80.0**]* ... 6000.0 ms • Default setting depending on the size.	Reset time Ti of the speed controller.

Parameter	Name / value range / [default setting]	Info
0x2915 (P210.00)	Minimum frequency (Min. frequency) 0.0 ... [**0.0**] ... 599.0 Hz	Lower limit value for all frequency setpoints.
0x2916 (P211.00)	Maximum frequency (Max. frequency) 0.0 ... [**50.0**] ... 599.0 Hz	Upper limit value for all frequency setpoints.
0x2942:001 (P334.01)	Current controller parameters: Gain (Current contr.: Gain) 0.00 ... [**42.55**]* ... 750.00 V/A • Default setting depending on the size.	Gain factor Vp of the current controller.
0x2942:002 (P334.02)	Current controller parameters: Reset time (Current contr.: Reset time) 0.01 ... [**4.50**]* ... 2000.00 ms • Default setting depending on the size.	Reset time Ti of the current controller.
0x2BA1:003 (P718.03)	Flying restart circuit: Restart time (Flying restart: Restart time) 1 ... [**5911**]* ... 60000 ms • Default setting depending on the size.	Integration time for controlling the flying restart circuit. • The parameter is calculated and set in the course of the automatic identification of the motor data. The same applies if an automatic calibration of the motor data is carried out. ▸ Automatic identification of the motor data 🕮 129
0x6073 (P324.00)	Max current (Max current) 0.0 ... [**200.0**] ... 3000.0 %	Maximum overload current of the inverter. • 100 % ≡ Motor rated current 0x6075 (P323.00) • If the current consumption of the motor exceeds this current limit, the inverter changes its dynamic behaviour, in order to counteract this exceedance. • If the change in the dynamic behaviour carried out by the inverter does not result in exiting the overcurrent state, the inverter outputs an error. Note! This parameter is not identical to the so-called ultimate motor current I_{ULT} ! • The ultimate motor current set in 0x2D46:001 (P353.01) is a limit value for synchronous motors that serves to protect their magnets. • The value to be set here should always be considerably below the ultimate motor current!

7.2.3 Servo control for asynchronous motors (SC-ASM)

The field-oriented servo control is based on a decoupled, separated control of the torque-producing and field-producing current share. The motor control is based on a feedback, field-oriented and cascaded controller structure and enables a dynamic and stable operation in all four quadrants.

Preconditions

- The servo control (SC ASM) is only suitable for asynchronous motors.
- The servo control requires a feedback of the speed. A motor encoder must be connected to the inverter and set as feedback system for the motor control. ▸ Encoder settings 📖 356
- The default setting enables the operation of a power-adapted motor.
- An optimal operation is only possible if:
  a) The motor in the engineering tool has been selected from the "motor catalog".
  b) The nameplate data of the motor have been entered manually and subsequently an automatic identification of the motor data has been executed. ▸ Automatic identification of the motor data 📖 129
  c) The nameplate data and equivalent circuit data of the motor have been entered manually. ▸ Motor data 📖 126

Details

This motor control type is activated by setting 0x2C00 (P300.00) = " Servo control (SC ASM) [2]".

Basically, the servo control has the same advantages as the sensorless vector control (SLVC). Compared to the V/f characteristic control without feedback, the following can be achieved by means of the servo control:

- A higher maximum torque throughout the entire speed range
- A higher speed accuracy
- A higher concentricity factor
- A higher level of efficiency
- The implementation of torque-actuated operation with speed limitation
- The limitation of the maximum torque in motor and generator mode for speed-actuated operation

Relevant functions

▸ Automatic identification of the motor data 📖 129

▸ Switching frequency changeover 📖 151

▸ Skip frequencies 📖 141

7.2.4 Sensorless control for synchronous motors (SL-PSM)

In preparation!

Parameter	Name / value range / [default setting]	Info
0x2C03:001 (P352.01)	EMK constant (EMK constant) 0.0 ... [**41.8**] ... 100000.0 V/1000rpm • From version 02.00	
0x2C11:001	Lower limit 10 ... [**30**] ... 100 % • From version 02.00	
0x2C11:002	Tracking controller gain 0 ... [**250**] ... 65535 % • From version 02.00	
0x2C11:003	Tracking controller reset time 0.00 ... [**3.30**] ... 655.35 ms • From version 02.00	
0x2C11:004	Tracking controller decouple time 0.00 ... [**0.50**] ... 655.35 ms • From version 02.00	
0x2C12:001	Acceleration current 5 ... [**100**] ... 400 % • From version 02.00	
0x2C12:002	Standstill current 5 ... [**40**] ... 400 % • From version 02.00	

7.3 Optimisation of motor control

The inverter provides different functions by means of which the drive behaviour can be further optimised.

- V/f voltage boost 140
- Skip frequencies 141
- Optimising the stalling behaviour 143
- Slip compensation 145
- Oscillation damping 146

7.3.1 V/f voltage boost

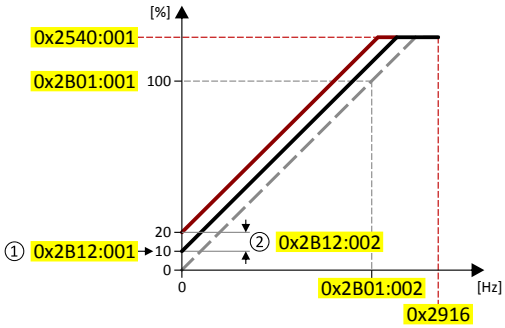
The parameterisable voltage boost makes it possible to improve the starting performance for applications requiring a high starting torque.

Preconditions

"V/f characteristic control (VFC open loop)" motor control has been selected in 0x2C00 (P300.00). Otherwise the voltage boost is not effective.

Details

- In 0x2B12:001 (P316.01), a permanent voltage boost can be set. ①
- In 0x2B12:002 (P316.02), an additional voltage boost can be set for acceleration processes only. ②
- Reference for the percentage setting of the voltage boost is the base voltage 0x2B01:001 (P303.01).



Parameter	Name / value range / [default setting]	Info
0x2B12:001 (P316.01)	V/f voltage boost: Fixed boost (V/f boosts: Fixed V/f boost) 0.0 ... [**2.5**]* ... 20.0 % • Default setting depending on the size.	Fixed (constant) voltage boost for V/f characteristic control without feedback. • 100 % ≡ V/f base voltage 0x2B01:001 (P303.01) • For the purpose of optimising the starting performance for applications requiring a high starting torque.
0x2B12:002 (P316.02)	V/f voltage boost: Boost at acceleration (V/f boosts: Dynam. V/f boost) 0.0 ... [**0.0**] ... 20.0 %	Additional voltage boost for V/f characteristic control without feedback. • 100 % ≡ V/f base voltage 0x2B01:001 (P303.01) • This voltage boost is only active while the motor is accelerated. It then acts in addition to the fixed voltage boost set in 0x2B12:001 (P316.01).
0x2B01:001 (P303.01)	V/f shape data: Base voltage (V/f shape data: Base voltage) 0 ... [**230**]* ... 5000 V • Default setting depending on the size.	Base voltage and base frequency define the V/f ratio and thus the gradient of the V/f characteristic. • The V/f base voltage is usually set to the rated motor voltage 0x2C01:007 (P320.07). • The V/f base frequency is usually set to the rated motor frequency 0x2C01:005 (P320.05).

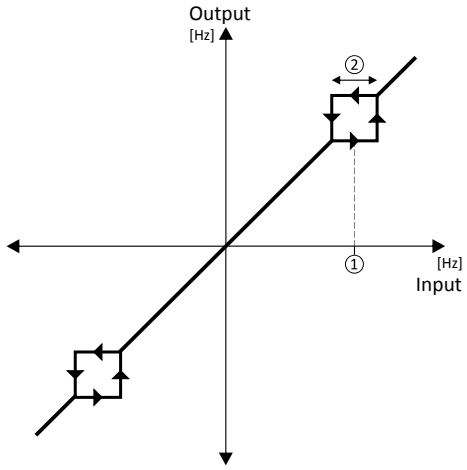
7.3.2 Skip frequencies

By means of the three parameterisable skip frequencies, critical frequencies can be suppressed which lead to mechanical resonances in the system.

Details

A blocking zone is active as soon as the frequency for this blocking zone is set to value unequal to "0 Hz".

- The set frequency defines the centre of the range to be masked out. ①
- The set bandwidth defines its total size. ②



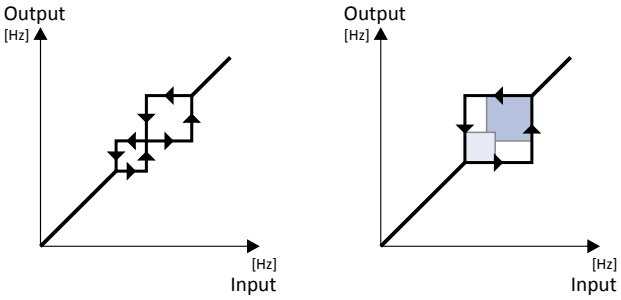
Example: For a blocking zone, the frequency is set to 20 Hz and the bandwidth to 10 Hz. These settings mask out the range from 15 Hz to 25 Hz.

Notes:

- Skip frequencies are absolute values. With the setting "20 Hz", at the same time also the skip frequency "-20 Hz" is defined.
- The inverter accelerates/decelerates the motor by the range to be masked out. A continuous operation within this range is not possible.
- A blocking zone is not active if its bandwidth is set to "0 Hz".

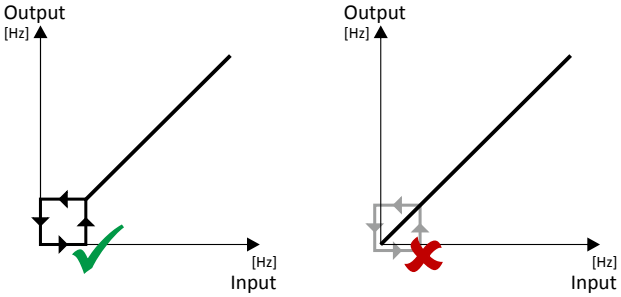
Adjacent and overlapping ranges:

- Example on the left: If the ranges are closely spaced, the ranges are passed through as shown.
- Example on the right: If the ranges overlap, the lowest and highest value form a new range. In the status display 0x291F:016, both ranges are shown as active.



Valid and invalid ranges:

- Example on the left: Skip frequency = 5 Hz, bandwidth = 10 Hz
  → Valid range (starts at ≥ 0)
- Example on the right: Skip frequency = 4 Hz, bandwidth = 10 Hz
  → Invalid range (starts at < 0); is thus ignored.



Parameter	Name / value range / [default setting]	Info
0x291F:001 (P317.01)	Skip frequencies: Skip frequency 1 (Skip frequencies: Skip frequency 1) 0.0 ... [**0.0**] ... 599.0 Hz	Centre of frequency range 1 which is to be skipped.
0x291F:002 (P317.02)	Skip frequencies: Skip bandwidth 1 (Skip frequencies: Skip bandwidth 1) 0.0 ... [**0.0**] ... 10.0 Hz	Size of frequency range 1 which is to be skipped.
0x291F:003 (P317.03)	Skip frequencies: Skip frequency 2 (Skip frequencies: Skip frequency 2) 0.0 ... [**0.0**] ... 599.0 Hz	Centre of frequency range 2 which is to be skipped.
0x291F:004 (P317.04)	Skip frequencies: Skip bandwidth 2 (Skip frequencies: Skip bandwidth 2) 0.0 ... [**0.0**] ... 10.0 Hz	Size of frequency range 2 which is to be skipped.
0x291F:005 (P317.05)	Skip frequencies: Skip frequency 3 (Skip frequencies: Skip frequency 3) 0.0 ... [**0.0**] ... 599.0 Hz	Centre of frequency range 3 which is to be skipped.
0x291F:006 (P317.06)	Skip frequencies: Skip bandwidth 3 (Skip frequencies: Skip bandwidth 3) 0.0 ... [**0.0**] ... 10.0 Hz	Size of frequency range 3 which is to be skipped.
0x291F:016	Skip frequencies: Status • Read only Bit 0: Blocking zone 1 active Bit 1: Blocking zone 2 active Bit 2: Blocking zone 3 active Bit 3: Reserved Bit 4: Frequency above blocking zone 1 Bit 5: Frequency above blocking zone 2 Bit 6: Frequency above blocking zone 3 Bit 7: Reserved Bit 8: Blocking zone 1 invalid Bit 9: Blocking zone 2 invalid Bit 10: Blocking zone 3 invalid Bit 11: Reserved Bit 12: Reserved Bit 13: Reserved Bit 14: Reserved Bit 15: Reserved	Bit-coded status display of the skip frequencies.
0x291F:032	Skip frequencies: Input frequency • Read only: x.xx Hz	Display of the skip filter input frequency.
0x291F:033	Skip frequencies: Output frequency • Read only: x.xx Hz	Display of the skip filter output frequency.

7.3.3 Optimising the stalling behaviour

If the motor is driven with frequencies above the rated motor frequency, the operating point is shifted to the "field weakening range". In this range, the motor voltage does not increase proportionately to the output frequency anymore. As a consequence, the inverter automatically reduces the maximum current since the full torque is not available anymore at these frequencies.

For special motors which enable an operation in the field weakening range, the behaviour in the field weakening range can be adapted to the motor with 0x2B0C (P319.00).

⚠ DANGER!

Danger by incorrect parameterisation.

Possible consequences: damage to material assets and injury to persons

- ▸ Only change the default setting (0 Hz) in 0x2B0C (P319.00) after consulting the motor manufacturer!
- ▸ Recommendation: Maintain default setting (0 Hz).

Preconditions

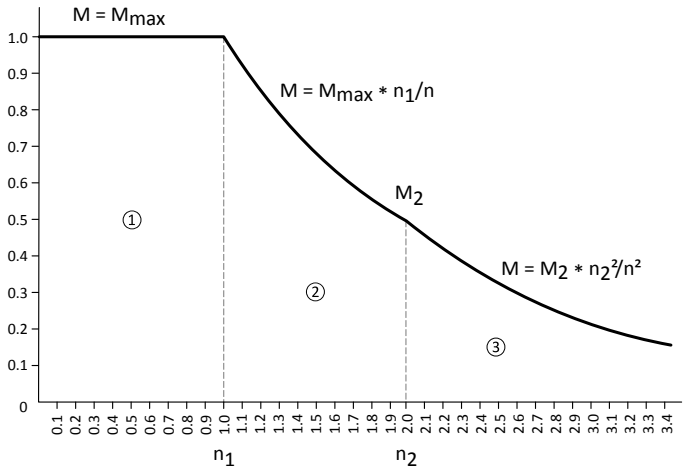
The function is only effective if the a V/f motor control mode is selected in 0x2C00 (P300.00).

Details

The operating range of an asynchronous motor consists of the voltage range ① and the field weakening range. The field weakening range again is divided into two ranges:

- In the first range ②, the power can be kept constant without the motor stalling.
- The second field weakening range ③ is characterised by the fact that the maximum permissible stator current is decreased to prevent the motor from stalling .

Speed/torque curve of the asynchronous motor with two field weakening ranges



The override point (n_2, M_2) can be influenced with 0x2B0C (P319.00).

0x2B0C (P319.00) > 0 Hz:

- The maximum current characteristic is shifted to higher field frequencies by the frequency entered.
- The maximum permissible current and the maximum torque increase in the field weakening range.
- The risk of motor stalling increases.

0x2B0C (P319.00) < 0 Hz:

- The maximum current characteristic is shifted to lower field frequencies by the frequency entered.
- The maximum permissible current and the maximum torque are reduced in the field weakening range.
- The risk of motor stalling is reduced.

Parameter	Name / value range / [default setting]	Info
0x2B0C (P319.00)	Override field weakening (Field weak thold) -599.0 ... [**0.0**] ... 599.0 Hz	Offset of the override point for field weakening.
0x2B01:002 (P303.02)	V/f shape data: Base frequency (V/f shape data: Base frequency) 0 ... [**50**]* ... 599 Hz • Default setting depending on the size.	Base voltage and base frequency define the V/f ratio and thus the gradient of the V/f characteristic. • The V/f base voltage is usually set to the rated motor voltage 0x2C01:007 (P320.07). • The V/f base frequency is usually set to the rated motor frequency 0x2C01:005 (P320.05).

7.3.4 Slip compensation

In case of a load, the speed of an asynchronous motor decreases. This load-dependent speed drop is called slip. The slip compensation serves to counteract the load-dependent speed loss.

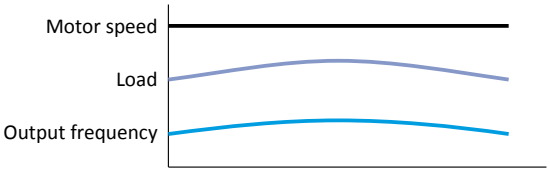
Preconditions

In order that the slip compensation can determine the rated slip correctly, the following parameters must be set correctly:

- Rated speed
- Rated frequency
- Number of pole pairs (automatically calculated from Rated speed and Rated frequency)

Details

The slip compensation increases or decreases the output frequency as a response to a load change. Thus, the slip is counteracted and the speed is kept precisely.



The rated slip required for the slip compensation is calculated by the inverter according to the following formula:

Rated slip [%] = (1 - (rated motor speed [rpm] / (120 * rated motor frequency [Hz] / number of poles))) * 100

Calculation example:

- Rated motor speed = 1750 rpm
- Rated motor frequency = 60 Hz
- Number of poles = 2 * Number of pole pairs = 2 * 2 = 4
- Rated slip = (1 - (1750 / (120 * 60 / 4))) * 100 = 2.77 %

The rated slip represents the reduction of the motor speed due to the motor load. At full speed and full load, the motor given in the example would rotate with 1750 rpm, which means 2.77 % below its synchronous speed of 1800 rpm. In order to compensate this speed loss, the inverter increases the output frequency by the rated slip multiplied by the rated motor frequency. In the example 2.77 % * 60 Hz = 1.66 Hz increase at full load.

In order to consider load changes, the influence of the rated slip on output frequency can be adapted in 0x2B09:001 (P315.01). A setting of 100 % corresponds to the rated slip of the machine in the nominal operating point.

With reference to the example above and a setpoint frequency of 60 Hz:

- If 0x2B09:001 (P315.01) = 100 %, the output frequency is = 61.66 Hz (60 Hz + 100 % * 1.66 Hz).
- If 0x2B09:001 (P315.01) = 50 %, the output frequency is = 60.83 Hz (60 Hz + 50 % * 1.66 Hz).

Additionally, the filter time for the slip compensation can be adapted in 0x2B09:002 (P315.02) if required. The preset filter time is adapted to typical motors. If full load or nearly full load oscillations or instabilities occur, we recommend an increase of the filter time.

Parameter	Name / value range / [default setting]	Info
0x2B09:001 (P315.01)	Slip compensation: Gain (Slip compens.: Slip: gain) -200.00 ... [**100.00**] ... 200.00 %	Adjustment in percent of the slip calculated. • For instance required for deviations of the real motor data from the nameplate data. • A setting of 100 % corresponds to the rated slip of the machine in the nominal operating point.
0x2B09:002 (P315.02)	Slip compensation: Filter time (Slip compens.: Filter time) 1 ... [**5**] ... 6000 ms	Filter time for the slip compensation. • The preset filter time is adapted to typical motors.
0x2C02:004 (P351.04)	Slip frequency (Slip frequency) • Read only: x.x Hz	Display of the rated slip determined.

Parameter	Name / value range / [default setting]	Info
0x2C01:001	Motor parameters: Number of pole pairs • Read only	Display of the number of pole pairs calculated from the rated speed and rated frequency.
0x2C01:004 (P320.04)	Motor parameters: Rated speed (Motor parameters: Rated speed) 50 ... [**1450**] ... 50000 rpm	General motor data. Carry out settings as specified by motor nameplate data.
0x2C01:005 (P320.05)	Motor parameters: Rated frequency (Motor parameters: Rated frequency) 1.0 ... [**50.0**] ... 1000.0 Hz	

7.3.5 Oscillation damping

The oscillation damping serves to reduce the oscillations during no-load operation which are caused by energy oscillating between the mechanical system (mass inertia) and the electrical system (DC bus). Furthermore, the oscillation damping can also be used to compensate for resonances.

Preconditions

"V/f characteristic control (VFC open loop)" motor control has been selected in 0x2C00 (P300.00). Otherwise the oscillation damping is not effective.

Restrictions

Observe the following restrictions:

- Damping is possible only for constant oscillations at a steady-state operating point.
- Oscillations occurring sporadically cannot be damped.
- Oscillation damping is not suitable for oscillations occurring during dynamic processes (e.g. accelerations or load changes).
- Oscillation damping is only active if the setpoint speed is greater than 10 rpm and the DC-bus voltage exceeds a value of 100 V.

Details

The determination of the oscillation is based on the active current. In order to obtain the alternating component of the active current, this current is differentiated. This signal is then passed through a PT1 filter.

Identification of the oscillation

Before the oscillation damping function can be parameterised, the oscillation has to be identified. One way to do this is to examine the motor current while oscillation damping is switched off (gain = 0 %). At steady-state operation, a constant current flows. If the drive oscillates, these oscillations are also visible on the motor current. It is therefore possible to determine the frequency and the amplitude of the oscillation from the alternating component of the motor current. In the following, this alternating component is referred to as "current oscillation".

Parameter setting

The gain of the oscillation signal is to be set according to the following equation:

0x2B0A:001 (P318.01) = current amplitude * 100 % / (√2 * maximum device current)

The default time constant of the PT1 filter should be sufficient for most applications. If required, it is only possible to adapt the time constant via »EASY Starter«. Generally, the time constant must be set so that the oscillation can be dampened, but that higher-frequency components are filtered from the signal. The time constant is determined from the reciprocal value of the double current oscillation frequency:

0x2B0A:002 (P318.02) = 1 / (2 * oscillation frequency)

Parameter	Name / value range / [default setting]	Info
0x2B0A:001 (P318.01)	Gain (Gain) -100 ... [**20**] ... 100 %	Gain of the oscillation signal. • With the setting 0, oscillation damping is deactivated.
0x2B0A:002 (P318.02)	Filter time (Filter time) 1 ... [**5**] ... 600 ms	Time constant of the PT1 filter.

Parameter	Name / value range / [default setting]	Info
0x2DDF:002	Axis information: Maximum current • Read only: x.xx A • Default setting depending on the size.	Display of the maximum current of the axis.
0x2D88 (P104.00)	Motor current (Motor current) • Read only: x.x A	Display des present current-r.m.s. value.

7.4 Optimisation of the control loops

The following speed controller, Imax controller and current controller parameters are calculated and set automatically in the course of automatic identification of the motor data.

Details

- For details see chapter "Automatic identification of the motor data". 📖 129
- The automatic identification considers all controllers at once, they cannot be controlled individually.
- Without carrying out the automatic identification, standard values are preset according to the voltage and power of the inverter.
- When the automatic identification has been carried out, further adaptation is neither required nor recommended for typical applications.

If these parameters have to be adapted, this has to be done very carefully. An incorrect setting may have a negative impact on the control system.

7.4.1 Speed controller

Parameter	Name / value range / [default setting]	Info
0x2900:001 (P332.01)	Speed controller settings: Gain (Speed controller: Gain) 0.00000 ... [**0.00193**]* ... 20000.00000 Nm/rpm • Default setting depending on the size.	Gain factor Vp of the speed controller.
0x2900:002 (P332.02)	Speed controller settings: Reset time (Speed controller: Reset time) 1.0 ... [**80.0**]* ... 6000.0 ms • Default setting depending on the size.	Reset time Ti of the speed controller.
0x2904	Actual speed filter time 0.0 ... [**2.0**] ... 50.0 ms	Filter time for the actual speed value.

7.4.2 Imax controller

The Imax controller becomes active if the actual motor current exceeds the maximum overload current "Max current". The Imax controller changes the output frequency to counteract the exceedance.

Preconditions

The Imax controller is only effective if a V/f motor control mode is selected in 0x2C00 (P300.00).

Details

The maximum overload current "Max current" is defined in 0x6073 (P324.00) in percent with regard to the rated motor current "Motor rated current" 0x6075 (P323.00).

If the maximum overload current is exceeded:

- During operation in motor mode, the Imax controller reduces the output frequency.
- During operation in generator mode, the Imax controller increases the output frequency.

Optimising the Imax controller

For typical applications, a manual adaptation of the parameters of the Imax controller is not recommended. A wrong setting may have a negative effect on the control. For special applications, contact the manufacturer before adapting the parameters.

If oscillations occur at the current limit during operation:

- Reduce gain of the Imax controller in 0x2B08:001 (P333.01).
- Increase reset time of the Imax controller in 0x2B08:002 (P333.02).
- Carry out the changes in small steps only (by 2 ... 3 % of the set value) until the oscillations do not exist anymore.

If the Imax controller does not respond fast enough after the maximum current has been exceeded:

- Increase gain of the Imax controller in 0x2B08:001 (P333.01).
- Reduce reset time of the Imax controller in 0x2B08:002 (P333.02).
- Carry out the changes in small steps only (by 2 ... 3 % of the set value) until the response time is acceptable.

Parameter	Name / value range / [default setting]	Info
0x2822:019	Axis commands: Calculate Imax controller parameter 0 ... [**0**] ... 1	1 = start automatic calculation of the Imax controller parameters.
0x2B08:001 (P333.01)	V/f Imax controller: Gain (V/f Imax contr.: Gain) 0.000 ... [**0.284**]* ... 1000.000 Hz/A • Default setting depending on the size.	Gain factor Vp of the Imax controller. • The parameter is calculated and set in the course of the automatic identification of the motor data. • The parameter can also be set and thus overwritten by selecting a motor in the engineering tool from the "motor catalog" or calibrating the motor data. ▸ Automatic identification of the motor data 129
0x2B08:002 (P333.02)	V/f Imax controller: Reset time (V/f Imax contr.: Reset time) 1.0 ... [**2.3**]* ... 2000.0 ms • Default setting depending on the size.	Reset time Ti of the Imax controller. • The parameter is calculated and set in the course of the automatic identification of the motor data. • The parameter can also be set and thus overwritten by selecting a motor in the engineering tool from the "motor catalog" or calibrating the motor data. ▸ Automatic identification of the motor data 129

7.4.3 Current controller

Parameter	Name / value range / [default setting]	Info
0x2942:001 (P334.01)	Current controller parameters: Gain (Current contr.: Gain) 0.00 ... [**42.55**]* ... 750.00 V/A • Default setting depending on the size.	Gain factor Vp of the current controller.

Parameter	Name / value range / [default setting]	Info
0x2942:002 (P334.02)	Current controller parameters: Reset time (Current contr.: Reset time) 0.01 ... [**4.50**]* ... 2000.00 ms • Default setting depending on the size.	Reset time Ti of the current controller.

7.5 Motor rotating direction

In the default setting, both directions of motor rotation are enabled. Optionally, the direction of rotation can be restricted so that only a clockwise rotation (CW) of the motor is possible.

Preconditions

Wiring of the motor phases must be carried out correctly with regard to the direction of motor rotation.

In the documentation and the parameter selection texts, the following terms are used for the direction of rotation:

- Forward = clockwise direction of rotation (CW)
- Reverse = counter-clockwise direction of rotation (CCW)

Details

The direction of rotation of the motor can be controlled in various ways:

- Via the function "Invert rotation". Possible triggers to be selected for the function "Invert rotation" are available for example in 0x2631:013 (P400.13) the digital inputs and internal status signals of the inverter.
- Via network. The definition of the direction of rotation is possible via the mappable NetWordIN1 data word or one of the predefined process data words.
- By specifying a bipolar setpoint value via analog input. Either via bipolar input range (-10 ... +10 V) or configuration of a bipolar setting range.

If a reversal is not required, the direction of rotation can be restricted in 0x283A (P304.00) to "Only clockwise (CW) [0]".

Parameter	Name / value range / [default setting]		Info
0x283A (P304.00)	Limitation of rotation (Limit. rotation)		Optional restriction of the rotating direction.
	0	Only clockwise (CW)	The motor can only be rotated clockwise (CW). The transfer of negative frequency and PID setpoints to the motor control is prevented. • This function takes effect after the "Invert rotation" function (0x2631:013 (P400.13)). • Since this function only prevents negative setpoints, counter-clockwise rotation (CCW) is possible if the motor has been wired for this rotating direction.
	1	**Both rotation directions**	Both directions of motor rotation are enabled.
0x2631:013 (P400.13)	Function list: Invert rotation (Function list: Invert rotation) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373		Assignment of a trigger for the "Invert rotation" function. Trigger = TRUE: the setpoint specified is inverted (i. e. the sign is inverted). Trigger = FALSE: no action / deactivate function again.
	13	**Digital input 3**	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.

7.6 Switching frequency changeover

The output voltage of the inverter is a DC voltage with sine-coded pulse width modulation (PWM). This corresponds by approximation to a AC voltage with variable frequency. The frequency of the PWM pulses is adjustable and is called "switching frequency".

Details

The switching frequency has an impact on the smooth running performance and the noise generation in the motor connected as well as on the power loss in the inverter. The lower the switching frequency, the better the concentricity factor, the smaller the power loss and the higher the noise generation.

Parameter	Name / value range / [default setting]		Info
0x2939 (P305.00)	Switching frequency (Switching freq.)		Selection of the inverter switching frequency. Abbreviations used: • "Variable": adaptation of the switching frequency as a function of the current • "Drive-opt.": drive-optimised modulation ("sine/delta modulation") • "Fixed": fixed switching frequency • "Min. Pv": additional reduction of power loss
	1	4 kHz variable / drive-optimised	
	2	8 kHz variable / drive-optimised	
	3	16 kHz variable / drive-optimised	
	5	2 kHz fixed / drive-optimised	
	6	4 kHz fixed / drive-optimised	
	7	8 kHz fixed / drive-optimised	
	8	16 kHz fixed / drive-optimised	
	11	4 kHz variable / min. Pv	
	12	8 kHz variable / min. Pv	
	13	16 kHz variable / min. Pv	
	15	2 kHz constant/min. Pv	
	16	4 kHz constant/min. Pv	
	17	8 kHz constant/min. Pv	
	18	16 kHz constant/min. Pv	
	21	**8 kHz variable / drive-optimised / 4 kHz min.**	
	22	16 kHz variable / drive-optimised / 4 kHz min.	
	23	16 kHz variable / drive-optimised / 8 kHz min.	
	31	8 kHz variable /min. Pv / 4 kHz min.	
	32	16 kHz variable /min. Pv / 4 kHz min.	
	33	16 kHz variable /min. Pv / 8 kHz min.	

7.7 Motor protection

Many monitoring functions integrated in the inverter can detect errors and thus protect the device or motor from being destroyed or overloaded.

- Motor overload monitoring (i^2*t) 📖 153
- Motor temperature monitoring 📖 157
- Current limits 📖 158
- Overcurrent monitoring 📖 160
- Motor phase failure detection 📖 161
- Motor speed monitoring 📖 162
- Motor torque monitoring 📖 162

7.7.1 Motor overload monitoring (i²*t)

This function monitors the thermal utilisation of the motor, taking the motor currents recorded and a mathematical model as a basis.

⚠ DANGER!

Fire hazard by overheating of the motor.

Possible consequences: Death or severe injuries

- ▸ To achieve full motor protection, an additional temperature monitoring function with a separate evaluation must be installed.
- ▸ When actuating motors that are equipped with PTC thermistors or thermal contacts, always activate the PTC input.

Details

This function only serves to functionally protect the motor. It is not suitable for the safety-relevant protection against energy-induced hazards, since the implementation is not fail-safe.

- When the thermal motor utilisation calculated reaches the threshold set in 0x2D4B:001 (P308.01), the response set in 0x2D4B:003 (P308.03) is triggered.
- With the setting 0x2D4B:003 (P308.03) = "No response [0]", the monitoring function is deactivated.

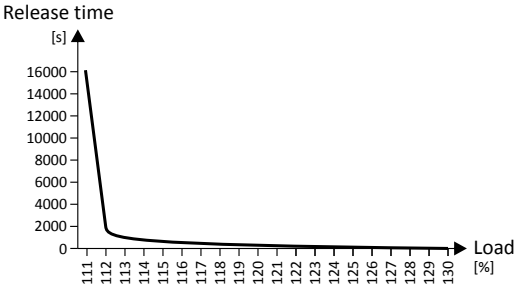
For a UL-compliant operation, leave 0x2D4B:002 (P308.02) and 0x2D4B:003 (P308.03) to the default setting!
(speed compensation = "on [0]" and error response = "Fault [3]")
In order to meet the UL requirements, the calculated motor load is internally saved when the inverter is switched off and loaded again when the inverter is switched on.

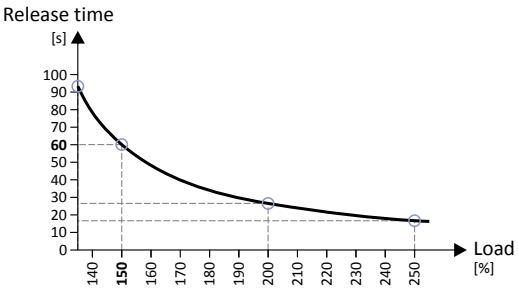
If a suitable motor temperature sensor is connected to the terminals X109/T1 and X109/T2 and the response to the triggering of the motor temperature monitoring in 0x2D49:002 (P309.02) is set to "Fault [3]", the response of the motor overload monitoring may be set other than "Fault [3]" " in 0x2D4B:003 (P308.03).

▸ Motor temperature monitoring 📖 157

The following two diagrams show the relation between the motor load and release time of the monitoring under the following conditions:

- Maximum utilisation 0x2D4B:001 (P308.01) = 150 %
- Speed compensation 0x2D4B:002 (P308.02) = "Off [1]" or output frequency ≥ 40 Hz





Load * Load ratio	Release time
110 %	Indefinite
135 %	93 s
150 %	**60 s**
200 %	26 s
250 %	17 s

Depending on the setting in 0x2D4B:001 (P308.01), the release time from the diagrams can be derived as follows:

- Calculation of the load ratio:
  Load ratio = 150 % / maximum utilisation 0x2D4B:001 (P308.01)
  (example: 0x2D4B:001 (P308.01) = 75 % → load ratio = 150 % / 75 % = 2)
- Calculation of the release time of the monitoring:
  Release time = actual load * load ratio
  (example: actual load = 75 % → release time = 75 % * 2 = 150 %)
- Looking up the release time from the above table based on load * load ratio.
  (example: Load * load ratio = 150 % → release time = 60 s)

Speed compensation for protecting motors at low speed

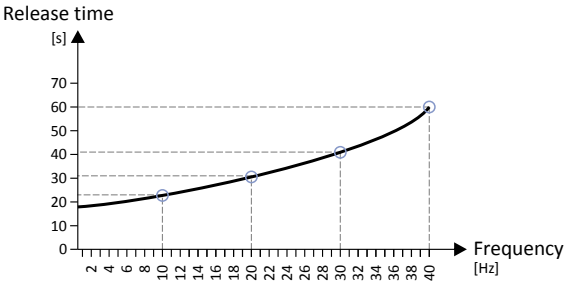
The inverter comes with an implemented compensation for low speed. If the motor is driven with frequencies lower than 40 Hz, the speed compensation in 0x2D4B:002 (P308.02)should be set to "On [0]" (default setting). This setting serves to reduce the release time of the monitoring at low speed to consider the reduced natural ventilation at AC motors. The speed compensation for UL-compliant operation in 0x2D4B:002 (P308.02) must be set to "On [0]" as well.

If the speed compensation is activated, the release time is reduced as follows:

- With an output frequency < 40 Hz: Reduced release time to 62.5 % + 37.5 % * output frequency [Hz] / 40 [Hz]
- With an output frequency ≥ 40 Hz: No reduced release time

The following diagram shows the reduced release time with activated speed compensation.

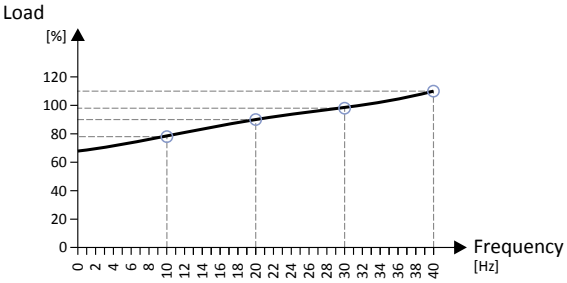
- Maximum utilisation 0x2D4B:001 (P308.01) = 150 %
- Speed compensation 0x2D4B:002 (P308.02) = "On [0]"



Output frequency	Release time
40 Hz	60 s
30 Hz	≈ 41 s
20 Hz	≈ 31 s
10 Hz	≈ 23 s

The following diagram shows the possible permanent load with activated speed compensation without the monitoring being triggered.

- Maximum utilisation 0x2D4B:001 (P308.01) = 150 %
- Speed compensation 0x2D4B:002 (P308.02) = "On [0]"



Output frequency	Possible permanent load
40 Hz	110 %
30 Hz	99 %
20 Hz	90 %
10 Hz	79 %

In case of 0 Hz, only a load of 62.7 % (≈ 62.5 %) with regard to the load at 40 Hz or above is possible (69 / 110 * 100 % = 62.7 %). In case of a deviating setting in 0x2D4B:001 (P308.01), the maximum possible motor load changes proportionately.

Parameter	Name / value range / [default setting]	Info
0x2D4B:001 (P308.01)	Motor overload monitoring (i²*t): Maximum utilisation [60 s] (Motor overload: Max.load.for 60s) 30 ... [**150**] ... 200 %	Maximum permissible thermal motor utilisation (max. permissible motor current for 60 seconds). • 100 % ≡ rated motor current 0x6075 (P323.00) • If the motor is actuated with the current set here for 60 seconds, the maximum permissible thermal motor utilisation is reached and the response set in 0x2D4B:003 (P308.03) is executed. • If the motor is actuated with a different current, the time period until the motor overload monitoring function is activated is different. Generally the following applies: the lower the current, the lower the thermal utilisation and the later the monitoring function is triggered.

Parameter	Name / value range / [default setting]	Info
0x2D4B:002 (P308.02)	Motor overload monitoring (i²*t): Speed compensation (Motor overload: Speed comp.)	Use this function to protect motors that are actuated at a speed below 40 Hz. • UL-compliant operation requires the setting "On [0]"!
	0 **On**	Release time for motor overload monitoring is reduced in order to compensate for the reduced cooling of naturally ventilated AC induction motors during operation at low speed.
	1 Off	Function deactivated, no reduction of the motor overload monitoring release time.
0x2D4B:003 (P308.03)	Motor overload monitoring (i²*t): Response (Motor overload: Response) • For possible settings see description for 0x2D45:001 (P310.01). 📖 161	Selection of the response to the triggering of motor overload monitoring. • UL-compliant operation requires the setting "Error [3]"! Associated error code: • 9040 | 0x2350 - CiA: i²*t overload (thermal state)
	3 **Fault**	▸ Error types 📖 107
0x2D4B:005	Motor overload monitoring (i²*t): Thermal load • Read only	Display of the value of the internal i²*t integrator. • 37500 ≡ 100 % thermal load • When power is switched off, this value is saved in the internal EEPROM. • When power is switched on, the saved value is reloaded into the i²*t integrator.

7.7.2 Motor temperature monitoring

In order to record and monitor the motor temperature, a PTC thermistor (single sensor according to DIN 44081 or triple sensor according to DIN 44082) or thermal contact (normally-closed contact) can be connected to the terminals T1 and T2. This measure helps to prevent the motor from being destroyed by overheating.

Preconditions

- The inverter can only evaluate one PTC thermistor! Do not connect several PTC thermistors in series or parallel.
- If several motors are actuated on one inverter, thermal contacts (NC contacts) connected in series are to be used.
- To achieve full motor protection, an additional temperature monitoring function with a separate evaluation must be installed.
- By default, a wire jumper is installed between terminals X109/T1 and X109/T2, which must be removed when the PTC thermistor or thermal contact is connected.

Details

If 1.6 kΩ < R < 4 kΩ at terminals X109/T1 and X109/T2, the monitoring function will be activated; see functional test below.

- If the monitoring function is activated, the response set in 0x2D49:002 (P309.02) will be effected.
- The setting 0x2D49:002 (P309.02) = 0 deactivates the monitoring function.

If a suitable motor temperature sensor is connected to the terminals X109/T1 and X109/T2 and the response in 0x2D49:002 (P309.02) is set to "Fault [3]", the response of the motor overload monitoring may be set other than "Fault [3]" in 0x2D4B:003 (P308.03).

▸ Motor overload monitoring (i^2*t) 🕮 153

Functional test

Connect a fixed resistor to the PTC input:

- R > 4 kΩ : the monitoring function must be activated.
- R < 1 kΩ : the monitoring function must not be activated.

Parameter	Name / value range / [default setting]	Info
0x2D49:002 (P309.02)	Motor temperature monitoring: Response (Mot.temp.monit.: Response) • For possible settings see description for 0x2D45:001 (P310.01). 🕮 161	Selection of the response to the triggering of the motor temperature monitoring. Associated error code: • 17168 | 0x4310 - Motor temperature error
	3 **Fault**	▸ Error types 🕮 107

7.7.3 Current limits

For the purpose of current limitation, a maximum overload current can be set for the inverter. If the current consumption of the motor exceeds this current limit, the inverter changes its dynamic behaviour, in order to counteract this exceedance.

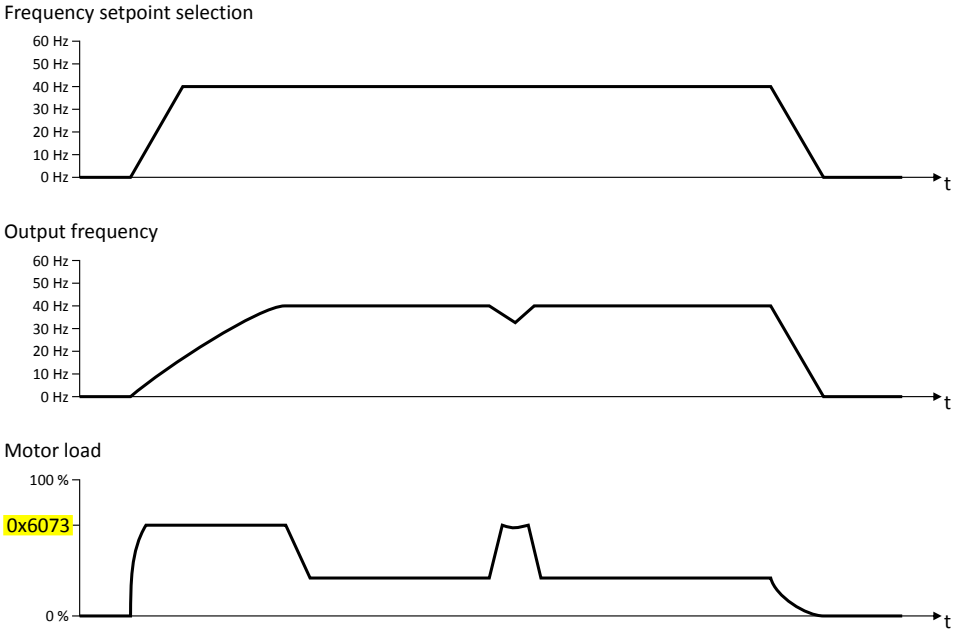
Details

- The maximum overload current of the inverter can be set in 0x6073 (P324.00).
- Reference for the percentage setting of the maximum overload current is the rated motor current set in 0x6075 (P323.00).
- The actual motor current is displayed in 0x2D88 (P104.00).

If the change in the dynamic behaviour carried out by the inverter does not result in exiting the overcurrent state, the inverter outputs an error.

Load behaviour	Impact
Overload during acceleration in motor mode	A longer time than is required for reaching the frequency setpoint is set.
Overload during deceleration in generator mode	A longer time than is required for reaching standstill is set.
Increasing load at constant frequency	If the motor current limit value is reached: • The inverter reduces the effective speed setpoint until a stable working is set or an effective speed setpoint of 0 rpm is reached. • If the load is reduced, the inverter increases the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
	When the generator current limit value is reached: • The inverter increases the effective speed setpoint until a stable working point is reached or up to the maximum permissible output frequency 0x2916 (P211.00). • If the load is reduced, the inverter reduces the effective speed setpoint until the setpoint speed is reached or the load reaches the current limit value again.
	If an abrupt load is building at the motor shaft (e.g. drive is blocked), the overcurrent switch-off function may respond.

Example: Overcurrent switch-off in case of a sudden load at the motor shaft



Parameter	Name / value range / [default setting]	Info
0x6073 (P324.00)	Max current (Max current) 0.0 ... [**200.0**] ... 3000.0 %	Maximum overload current of the inverter. • 100 % ≡ Motor rated current 0x6075 (P323.00) • If the current consumption of the motor exceeds this current limit, the inverter changes its dynamic behaviour, in order to counteract this exceedance. • If the change in the dynamic behaviour carried out by the inverter does not result in exiting the overcurrent state, the inverter outputs an error. Note! This parameter is not identical to the so-called ultimate motor current I_{ULT} ! • The ultimate motor current set in 0x2D46:001 (P353.01) is a limit value for synchronous motors that serves to protect their magnets. • The value to be set here should always be considerably below the ultimate motor current!
0x2D88 (P104.00)	Motor current (Motor current) • Read only: x.x A	Display des present current-r.m.s. value.
0x6078 (P103.00)	Current actual value (Current actual) • Read only: x.x %	Display of the present motor current. • 100 % ≡ Motor rated current 0x6075 (P323.00)

7.7.4 Overcurrent monitoring

This function monitors the instantaneous value of the motor current and serves as motor protection.

NOTICE

With an incorrect parameterisation, the maximum permissible motor current may be exceeded in the process.

Possible consequence: irreversible damage of the motor.

- ▸ The setting of the threshold for the overcurrent monitoring in 0x2D46:001 (P353.01) must be adapted to the connected motor.
- ▸ Set the maximum output current of the inverter in 0x6073 (P324.00) much lower than the threshold for overcurrent monitoring.

Details

The inverter monitors its output current. This monitoring takes place irrespective of the settings for the current limiting function. ▸ Current limits 📖 158

- If the instantaneous value of the motor current exceeds the threshold set in 0x2D46:001 (P353.01), the response set in 0x2D46:002 (P353.02) takes place.
- With the setting 0x2D46:002 (P353.02) = "No response [0]", the monitoring function is deactivated.

The threshold for the overcurrent monitoring is preset to four times the rated motor current. This presetting is overwritten in case a motor in the engineering tool is selected from the "motor catalog" or the automatic identification or calibration of the motor data is carried out. For a suitable protection, the automatically adapted setting should be used. If disturbances occur during operation, the value can be increased.

Parameter	Name / value range / [default setting]	Info
0x2D46:001 (P353.01)	Overcurrent monitoring: Threshold (Overcurr. monit.: Threshold) 0.0 ... [**6.8**]* ... 1000.0 A • Default setting depending on the size. • From version 02.00	Warning/error threshold for motor current monitoring. • If the instantaneous value of the motor current exceeds the threshold set, the response set in 0x2D46:002 (P353.02) is effected for the purpose of motor protection. • The parameter is calculated and set in the course of the automatic identification of the motor data. • The parameter can also be set and thus overwritten by selecting a motor in the engineering tool from the "motor catalog" or calibrating the motor data. ▸ Automatic identification of the motor data 📖 129
0x2D46:002 (P353.02)	Overcurrent monitoring: Response (Overcurr. monit.: Response) • For possible settings see description for 0x2D45:001 (P310.01). 📖 161	Selection of the response to the triggering of motor current monitoring. Associated error code: • 29056 | 0x7180 - Motor overcurrent
	3 | **Fault**	▸ Error types 📖 107

7.7.5 Motor phase failure detection

The motor phase failure detection function can be activated for both synchronous and asynchronous motors.

Preconditions

Phase failure detection during operation is basically only suitable for applications which are operated with a constant load and speed. In all other cases, transient processes or unfavourable operating points can cause maloperation.

Details

If a current-carrying motor phase (U, V, W) fails during operation, the response selected in 0x2D45:001 (P310.01) is tripped if the following two conditions are met:

- Condition 1: detection is activated. See 0x2D45:002 (P310.02)
- Condition 2: a specific commutation angle (approx. 150° electrically) has been covered without the detection of a current flow.

Parameter	Name / value range / [default setting]	Info
0x2D45:001 (P310.01)	Motor phase failure detection: Response (Mot.phase.fail.: Response)	Selection of the response following the detection of a motor phase failure. Associated error codes: • 65289 | 0xFF09 - Motor phase failure • 65290 | 0xFF0A - Motor phase failure phase U • 65291 | 0xFF0B - Motor phase failure phase V • 65292 | 0xFF0C - Motor phase failure phase W
	0 No response	▸ Error types 📖 107
	1 Warning	
	2 Trouble	
	3 Fault	
0x2D45:002 (P310.02)	Motor phase failure detection: Current threshold (Mot.phase.fail.: Current thresh.) 1.0 ... [**5.0**] ... 10.0 %	Current threshold for the activation of the motor phase failure detection function. • 100 % ≡ Maximum current 0x2DDF:002 • Background: in order to be able to reliably detect the failure of a motor phase, first a certain must flow for the current sensor system. The detection function is therefore only activated if the actual value of the motor current has exceeded the current threshold set here. • Display of the present motor current in 0x2D88 (P104.00).
0x2D45:003 (P310.03)	Motor phase failure detection: Voltage threshold (Mot.phase.fail.: Voltage thresh.) 0.0 ... [**10.0**] ... 100.0 V	Voltage threshold for the monitoring of several motor phases. • The V/f characteristic control enables the detection of several failed motor phases during operation. • Monitoring with regard to the failure of several motor phases is active if a response that is not "0: No response" is set in 0x2D45:001 (P310.01) and if the motor voltage exceeds the voltage threshold set here. • The monitoring function is triggered if the level of the motor current is lower than the device-dependent threshold for longer than 20 ms. • The monitoring function for the failure of several motor phases can be deactivated if the value "100.0 V" is set here.

7.7.6 Motor speed monitoring

This function monitors the motor speed during operation.

Preconditions

- In order to detect the current motor speed, the inverter must be enabled and the motor must rotate.
- For an exact monitoring, rated motor speed 0x2C01:004 (P320.04) and rated motor frequency 0x2C01:005 (P320.05) must be set correctly.

Details

- If the motor speed reaches the threshold set in 0x2D44:001 (P350.01), the response set in 0x2D44:002 (P350.02) takes place.
- With the setting 0x2D44:002 (P350.02) = "No response [0]", the monitoring function is deactivated.

Parameter	Name / value range / [default setting]	Info
0x2D44:001 (P350.01)	Overspeed monitoring: Threshold (Overspeed monit.: Threshold) 50 ... [**8000**] ... 50000 rpm	Warning/error threshold for motor speed monitoring. • If the motor speed reaches the threshold set, the response selected in 0x2D44:002 (P350.02) is effected. • The parameter is calculated and set in the course of the automatic identification of the motor data. • The parameter can also be set and thus overwritten by selecting a motor in the engineering tool from the "motor catalog" or calibrating the motor data. ▸ Automatic identification of the motor data 🕮 129
0x2D44:002 (P350.02)	Overspeed monitoring: Response (Overspeed monit.: Response) • For possible settings see description for 0x2D45:001 (P310.01). 🕮 161	Selection of the response to the triggering of motor speed monitoring. Associated error code: • 65286 | 0xFF06 - Motor overspeed
	3 **Fault**	▸ Error types 🕮 107

7.7.7 Motor torque monitoring

This function monitors the motor torque during operation.

Preconditions

The motor torque monitoring can only be used for control modes with speed controller. Thus, the selection "V/f characteristic control (VFC open loop) [6]" must not be set in .

Details

This function sets the internal status signal "Torque limit reached [79]" = TRUE if the maximum possible torque has been reached.

- The status signal is set irrespective of the response 0x2D67:001 (P329.01) and delay time 0x2D67:002 (P329.02) set for this monitoring.
- The user can use the status signal to activate certain functions. ▸ Flexible I/O configuration 🕮 365
- The status signal also serves to set a digital output or a bit of the NetWordOUT1 status word. ▸ Configuration of digital outputs 🕮 431

Parameter	Name / value range / [default setting]	Info
0x2D67:001 (P329.01)	Maximum torque monitoring: Response (MaxTrq.Monitor: Response) • From version 02.00	Selection of response to reaching the maximum possible torque. • The selected response takes place if the status signal "Torque limit reached [79]" = TRUE and the deceleration time set in 0x2D67:002 (P329.02) has elapsed. Associated error code: • 33553 | 0x8311 - Torque limit reached
	0 **No reaction**	▸ Error types 🕮 107
	1 Warning	
	2 Trouble	
	3 Fault	

Parameter	Name / value range / [default setting]	Info
0x2D67:002 (P329.02)	Maximum torque monitoring: Triggering delay (MaxTrq.Monitor: Triggering delay) 0.000 ... [**0.000**] ... 10.000 s • From version 02.00	Optional setting of a deceleration for triggering the response selected in 0x2D67:001 (P329.01). Typical application: • The motor should be driven at the torque limit for a short time without triggering the selected response. • Only after a longer operation (> set deceleration) at the torque limit, the selected response is to take place.
0x6072 (P326.00)	Max torque (Max torque) 0.0 ... [**250.0**] ... 3000.0 % • From version 02.00	Symmetrical selection of the maximum permissible torque. • 100 % ≡ Motor rated torque 0x6076 (P325.00) • This parameter serves to implement a statically and bipolarly acting torque limitation. This can be used, for instance, as overload protection of the mechanical transmission path/elements starting at the motor shaft. • This limitation acts irrespective of the torque limitations acting in unipolar mode that are set in 0x60E0 and 0x60E1.
0x60E0	Positive torque limit 0.0 ... [**250.0**] ... 3276.7 % • From version 02.00	Positive torque limit source for speed control with torque limitation. • 100 % ≡ Motor rated torque 0x6076 (P325.00)
0x60E1	Negative torque limit 0.0 ... [**250.0**] ... 3276.7 % • From version 02.00	Negative torque limit source for speed control with torque limitation. • 100 % ≡ Motor rated torque 0x6076 (P325.00)

8 Configuring the network

The inverter is available as variants with different network options.

- General network settings 📖 165
- Predefined process data words 📖 177
- Acyclic data exchange 📖 185
- CANopen 📖 186
- Modbus 📖 212
- PROFIBUS 📖 224
- Wireless LAN (WLAN) 📖 244
- EtherNet/IP 📖 255
- PROFINET 📖 262
- EtherCAT 📖 266

8.1 General network settings

Activate network control

In order to be able to control the inverter via network, a trigger must be first assigned in 0x2631:037 (P400.37) to the "Activate network control" function.

- This trigger can for instance be the constant value "TRUE" or a digital input.
- If the assigned trigger is = TRUE, the motor can only be started via the network control word (exception: Jog operation; see chapter "Start / stop motor" 372).

In case of an activated network control, the following functions are still active:

- 0x2631:001 (P400.01): Enable inverter
- 0x2631:002 (P400.02): Run
- 0x2631:003 (P400.03): Activate quick stop
- 0x2631:004 (P400.04): Reset fault
- 0x2631:005 (P400.05): Activate DC braking
- 0x2631:010 (P400.10): Jog foward (CW)
- 0x2631:011 (P400.11): Jog reverse (CCW)
- 0x2631:012 (P400.12): Activate keypad control
- 0x2631:037 (P400.37): Activate network control

All other functions configurable via 0x2631:xx (P400.xx) are deactivated in case of network control. ▸ Flexible I/O configuration 365

Network control word and status word

For establishing a simple network connection, the inverter provides predefined control and status words for device profile CiA 402, AC drive profile as well as in LECOM format. For implementing your own formats, the data words NetWordIN1 and NetWordOUT1 are available. By means of data mapping to a network register, each of these words can be transferred as process date via network.

Name	Parameter	Associated mapping entry *	Further information
CiA: Controlword	0x6040	0x60400010	▸ Device profile CiA 402 178
CiA: Statusword	0x6041 (P780.00)	0x60410010	
AC Drive control word	0x400B:001 (P592.01)	0x400B0110	▸ AC Drive Profile 179
AC Drive status word	0x400C:001 (P593.01)	0x400C0110	
LECOM control word	0x400B:002 (P592.02)	0x400B0210	▸ Lenze LECOM profile 180
LECOM status word	0x400C:002 (P593.02)	0x400C0210	
NetWordIN1	0x4008:001 (P590.01)	0x40080110	For implementing an individual control word format. The functions that are to be triggered via bits 0 ... 15 of the NetWordIN1 data word are defined in 0x400E:001 (P505.01) ... 0x400E:016 (P505.16).
NetWordOUT1	0x400A:001 (P591.01)	0x400A0110	For implementing an individual status word format. The triggers for bits 0 ... 15 of the NetWordOUT1 data word are defined in 0x2634:010 (P420.10) ... 0x2634:025 (P420.25).
* A mapping entry consists of index, subindex and data length in bits of the parameter to be mapped.			

General information about the process of data mapping can be found in the chapter of the same name for the corresponding network.

Network setpoint

In order to generally set the network as standard setpoint source, go to 0x2860:001 (P201.01) and select "Network [5]".

- If the network control is not active (0x2631:037 (P400.37) = "FALSE"), the "Activate network setpoint" 0x2631:017 (P400.17) function serves to change over to the network setpoint. The setpoint change-over only takes place if no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 388
- If the network control is activated (0x2631:037 (P400.37) = "TRUE"), a change-over to the network setpoint is possible via the used network control word:

Network control word	Change-over to network setpoint		
NetWordIN1 data word 0x4008:001 (P590.01)	Assign the functionActivate network setpoint [17]" to the bit that is to be used for activating the network setpoint. • The functions that are to be triggered via bits 0 ... 15 of the NetWordIN1 data word are defined in 0x400E:001 (P505.01) ... 0x400E:016 (P505.16).		
	Bit x		Selection:
	0		Standard setpoint source selected in 0x2860:001 (P201.01).
	1		Network setpoint
AC drive control word 0x400B:001 (P592.01)	The network setpoint is activated via bit 6 of the AC Drive control word:		
	Bit 6		Selection:
	0		Standard setpoint source selected in 0x2860:001 (P201.01).
	1		Network setpoint
LECOM control word 0x400B:002 (P592.02)	The setpoint is selected via bit 0 and bit 1 of the LECOM control word:		
	Bit 1	Bit 0	Selection:
	0	0	Standard setpoint source selected in 0x2860:001 (P201.01).
	0	1	Frequency setpoint preset 1 0x2911:001 (P450.01)
	1	0	Frequency setpoint preset 2 0x2911:002 (P450.02)
	1	1	Frequency setpoint preset 3 0x2911:003 (P450.03)
CiA 402 Controlword 0x6040	In case of control via device profile CiA 402: • In the operating mode "CiA: Velocity mode [2]", the setpoint speed defined via the "Target velocity" 0x6042 (P781.00) parameter is used. ▸ Device profile CiA 402 331 • A change-over to an alternative setpoint source via the CiA 402 Controlword is not possible.		

Parameter	Name / value range / [default setting]		Info
0x231F:001 (P500.01)	Module ID: Active module ID (Module ID: Active module ID) • Read only • Default setting depending on the size.		Display of the network options currently configured in the inverter. • When the "Load default settings" device command 0x2022:001 (P700.01)or "Accept new inverter hardware" 0x2022:027 (P700.27) is executed, the module ID is stored in the memory module. • With the help of this module ID, the keypad only shows the communication parameters relevant to the respective network. Note! When the inverter is switched on, it checks whether the parameter settings stored in the memory module match the network option available in the inverter. If not, the inverter changes to the error status. The error status can only be quit if all parameters are initialised for the new (available) network option. ▸ Initialising the network interface 287
	48	No network	
	65	AS-Interface • From version 02.00	
	67	CANopen	
	71	EtherNet/IP • From version 02.00	
	80	PROFIBUS	
	82	ProfiNet • From version 02.00	
	84	EtherCAT • From version 02.00	
	87	Modbus	

Parameter	Name / value range / [default setting]		Info
0x231F:002 (P500.02)	Module ID: Module ID connected (Module ID: Module ID conn.) • Read only		Display of the network option currently available in the inverter. Note! When the inverter is switched on, it checks whether the parameter settings stored in the memory module match the network option available in the inverter. If not, the inverter changes to the error status. The error status can only be quit if all parameters are initialised for the new (available) network option. ▸ Initialising the network interface 🕮 287
	48	No network	
	65	AS-Interface • From version 02.00	
	67	CANopen	
	71	EtherNet/IP • From version 02.00	
	80	PROFIBUS	
	82	ProfiNet • From version 02.00	
	84	EtherCAT • From version 02.00	
	87	Modbus	

Parameter	Name / value range / [default setting]		Info
0x400E:001 (P505.01)	NetWordIN1 function: Bit 0 (NetWordIN1 fct.: NetWordIN1.00) • Setting can only be changed if the inverter is inhibited.		Definition of the function that is to be triggered via bit 0 of the mappable NetWordIN1 data word.
	0	**Not active**	Trigger bit without any function.
	1	Disable inverter	Trigger bit = 0-1 edge: The inverter is disabled. Trigger bit = 0: The inverter is enabled (unless there is another cause for inverter disable). Notes: • In all device states, a 0-1 edge causes an immediate change to the inhibited state with one exception: If the inverter is in the error status and the error condition still exists, the inverter remains in the error status. • Changing to the disabled state causes an immediate stop of the motor, regardless of the stop method set in 0x2838:003 (P203.03). The motor coasts down as a function of the mass inertia of the machine. • In the disabled state, the motor cannot be started. • After the inverter disable is deactivated, a renewed start command is required to restart the motor. • The cause(s) that are active for the disabled state are shown in 0x282A:001 (P126.01).
	2	Stopping	Trigger bit = 1: Motor is stopped. Trigger bit = 0: No action / Deactivate stop again. Notes: • The stop method can be selected in 0x2838:003 (P203.03).
	3	Activate quick stop	Trigger bit = 1: "Quick stop" function activated. Trigger bit = 0: no action / deactivate function again. Notes: • The "Quick stop" function brings the motor to a standstill within the deceleration time set in 0x291C (P225.00). • The "Quick stop" function has a higher priority than the "Run" function.
	4	Reset error	Trigger bit = 0-1 edge: Active error is reset (acknowledged) if the error condition is not active anymore and the error is resettable. Trigger bit = 0: No action. Notes: • After resetting the error, a new enable/start command is required to restart the motor.
	5	Activate DC braking	Trigger bit = 1: "DC braking" function activated. Trigger bit = 0: no action / deactivate function again.
	8	Run forward (CW)	Trigger bit = 0-1 edge: Motor is started in forward rotating direction (CW). Trigger bit = 1-0 edge: Motor is stopped again. Notes: • The stop method can be selected in 0x2838:003 (P203.03). • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint. • The function also serves to realise an automatic start after switch-on. ▸ Starting performance 📖 115 • The "Invert rotation [13]" function can be used in connection with this function.

Parameter	Name / value range / [default setting]		Info
	9	Run reverse (CCW)	Trigger bit = 0-1 edge: Motor is started in backward rotating direction (CCW). Trigger bit = 1-0 edge: Motor is stopped again. Notes: • The stop method can be selected in 0x2838:003 (P203.03). • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint. • The function also serves to realise an automatic start after switch-on. ▸ Starting performance 📖 115 • The "Invert rotation [13]" function can be used in connection with this function.
	13	Invert rotation	Trigger bit = 1: the setpoint specified is inverted (i. e. the sign is inverted). Trigger bit = 0: no action / deactivate function again.
	14	Activate AI1 setpoint	Trigger bit = 1: analog input 1 is used as setpoint source (if the trigger bit assigned has the highest setpoint priority). Trigger bit = 0: no action / deactivate function again.
	15	Activate AI2 setpoint	Trigger bit = 1: analog input 2 is used as setpoint source (if the trigger bit assigned has the highest setpoint priority). Trigger bit = 0: no action / deactivate function again.
	17	Activate network setpoint	Trigger bit = 1: the network is used as setpoint source (if the trigger bit assigned has the highest setpoint priority). Trigger bit = 0: no action / deactivate function again.
	18	Activate preset (bit 0)	Selection bit with the valency 2^0 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
	19	Activate preset (bit 1)	Selection bit with the valency 2^1 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
	20	Activate preset (bit 2)	Selection bit with the valency 2^2 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
	21	Activate preset (bit 3)	Selection bit with the valency 2^3 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
	39	Activate ramp 2	Trigger bit = 1: activate acceleration time 2 and deceleration time 2 manually. Trigger bit = 0: no action / deactivate function again.
	40	Load parameter set	Trigger bit = 0-1 edge: parameter change-over to the value set selected via "Select parameter set (bit 0)" and "Select parameter set (bit 1)". Trigger bit = 0: no action. Notes: • The activation method for the "Parameter change-over" function can be selected in 0x4046 (P755.00).
	41	Select parameter set (bit 0)	Selection bit with the valency 2^0 for "Parameter change-over" function.
	42	Select parameter set (bit 1)	Selection bit with the valency 2^1 for "Parameter change-over" function.
	43	Activate fault 1	Trigger bit = 1: Trigger user-defined error 1. Trigger bit = 0: no action. Notes: • After the error is triggered, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Associated error code: • 25249 | 0x62A1 - Network: user fault 1
	44	Activate fault 2	Trigger bit = 1: Trigger user-defined error 2. Trigger bit = 0: no action. Notes: • After the error is triggered, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Associated error code: • 25250 | 0x62A2 - Network: user fault 2

Parameter	Name / value range / [default setting]		Info
	45	Deactivate PID controlling	Trigger bit = 1: If PID control is activated, ignore PID control and drive the motor in speed-controlled manner. Trigger bit = 0: If PID control is activated, drive the motor with PID control. Notes: • The PID control can be activated in 0x4020:001 (P600.01).
	46	Set PID output to 0	Trigger bit = 1: If PID control is activated, I component and the output of the PID controller are set to 0 and the internal control algorithm is stopped. The PID control remains active. Trigger bit = 0: No action / deactivate function again.
	47	Inhibit PID I-component	Trigger bit = 1: If the PID control is activated, the I component of the PID controller is set to 0 and the integration process is stopped. Trigger bit = 0: No action / deactivate function again. Notes: • The reset time can be set in 0x4049 (P602.00).
	48	Activate PID influence ramp	Trigger bit = 1: the influence of the process controller is shown by means of a ramp. Trigger bit = 0 or not connected: the influence of the process controller is shown by means of a ramp. Notes: • The influence of the process controller is always active (not only when PID control is activated). • Acceleration time for showing the influence of the process controller can be set in 0x404C:001 (P607.01). • Deceleration time for hiding the influence of the process controller can be set in 0x404C:002 (P607.02).
0x400E:002 (P505.02)	NetWordIN1 function: Bit 1 (NetWordIN1 fct.: NetWordIN1.01) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E:001 (P505.01). 168		Definition of the function that is to be triggered via bit 1 of the mappable NetWordIN1 data word.
	00	**Not active**	Trigger bit without any function.
0x400E:003 (P505.03)	NetWordIN1 function: Bit 2 (NetWordIN1 fct.: NetWordIN1.02) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E:001 (P505.01). 168		Definition of the function that is to be triggered via bit 2 of the mappable NetWordIN1 data word.
	03	**Activate quick stop**	Trigger bit = 1: "Quick stop" function activated. Trigger bit = 0: no action / deactivate function again. Notes: • The "Quick stop" function brings the motor to a standstill within the deceleration time set in 0x291C (P225.00). • The "Quick stop" function has a higher priority than the "Run" function.
0x400E:004 (P505.04)	NetWordIN1 function: Bit 3 (NetWordIN1 fct.: NetWordIN1.03) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E:001 (P505.01). 168		Definition of the function that is to be triggered via bit 3 of the mappable NetWordIN1 data word.
	00	**Not active**	Trigger bit without any function.

Parameter	Name / value range / [default setting]	Info
0x400E:005 (P505.05)	NetWordIN1 function: Bit 4 (NetWordIN1 fct.: NetWordIN1.04) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 4 of the mappable NetWordIN1 data word.
	8 Run forward (CW)	Trigger bit = 0-1 edge: Motor is started in forward rotating direction (CW). Trigger bit = 1-0 edge: Motor is stopped again. Notes: • The stop method can be selected in 0x2838:003 (P203.03). • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint. • The function also serves to realise an automatic start after switch-on. ▸ Starting performance 115 • The "Invert rotation [13]" function can be used in connection with this function.
0x400E:006 (P505.06)	NetWordIN1 function: Bit 5 (NetWordIN1 fct.: NetWordIN1.05) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 5 of the mappable NetWordIN1 data word.
	18 Activate preset (bit 0)	Selection bit with the valency 2^0 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
0x400E:007 (P505.07)	NetWordIN1 function: Bit 6 (NetWordIN1 fct.: NetWordIN1.06) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 6 of the mappable NetWordIN1 data word.
	19 Activate preset (bit 1)	Selection bit with the valency 2^1 for the bit-coded selection and activation of a parameterisable setpoint (preset value).
0x400E:008 (P505.08)	NetWordIN1 function: Bit 7 (NetWordIN1 fct.: NetWordIN1.07) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 7 of the mappable NetWordIN1 data word.
	04 Reset error	Trigger bit = 0-1 edge: Active error is reset (acknowledged) if the error condition is not active anymore and the error is resettable. Trigger bit = 0: No action. Notes: • After resetting the error, a new enable/start command is required to restart the motor.
0x400E:009 (P505.09)	NetWordIN1 function: Bit 8 (NetWordIN1 fct.: NetWordIN1.08) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 8 of the mappable NetWordIN1 data word.
	00 Not active	Trigger bit without any function.
0x400E:010 (P505.10)	NetWordIN1 function: Bit 9 (NetWordIN1 fct.: NetWordIN1.09) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 9 of the mappable NetWordIN1 data word.
	05 Activate DC braking	Trigger bit = 1: "DC braking" function activated. Trigger bit = 0: no action / deactivate function again.

Parameter	Name / value range / [default setting]	Info
0x400E:011 (P505.11)	NetWordIN1 function: Bit 10 (NetWordIN1 fct.: NetWordIN1.10) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 10 of the mappable NetWordIN1 data word.
	00 **Not active**	Trigger bit without any function.
0x400E:012 (P505.12)	NetWordIN1 function: Bit 11 (NetWordIN1 fct.: NetWordIN1.11) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 11 of the mappable NetWordIN1 data word.
	00 **Not active**	Trigger bit without any function.
0x400E:013 (P505.13)	NetWordIN1 function: Bit 12 (NetWordIN1 fct.: NetWordIN1.12) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 12 of the mappable NetWordIN1 data word.
	13 **Invert rotation**	Trigger bit = 1: the setpoint specified is inverted (i. e. the sign is inverted). Trigger bit = 0: no action / deactivate function again.
0x400E:014 (P505.14)	NetWordIN1 function: Bit 13 (NetWordIN1 fct.: NetWordIN1.13) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 13 of the mappable NetWordIN1 data word.
	00 **Not active**	Trigger bit without any function.
0x400E:015 (P505.15)	NetWordIN1 function: Bit 14 (NetWordIN1 fct.: NetWordIN1.14) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 14 of the mappable NetWordIN1 data word.
	00 **Not active**	Trigger bit without any function.
0x400E:016 (P505.16)	NetWordIN1 function: Bit 15 (NetWordIN1 fct.: NetWordIN1.15) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x400E: 001 (P505.01). 168	Definition of the function that is to be triggered via bit 15 of the mappable NetWordIN1 data word.
	00 **Not active**	Trigger bit without any function.
0x2022:027 (P700.27)	Device commands: Accept new inverter hardware (Device commands: Accept new HW) • Setting can only be changed if the inverter is inhibited.	1 = initialise parameters for a new network option.
	0 **Off / ready**	
	1 On / start	

Parameter	Name / value range / [default setting]		Info
0x2631:037 (P400.37)	Function list: Activate network control (Function list: Network control)		Assignment of a trigger for the "Activate network control" function. Trigger = TRUE: Activate network control. Trigger = FALSE: No action / deactivate network control again.
	0	**Not connected**	No trigger assigned (trigger is constantly FALSE).
	1	Constant TRUE	Trigger is constantly TRUE.
	11	Digital input 1	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
	12	Digital input 2	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
	13	Digital input 3	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
	14	Digital input 4	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
	15	Digital input 5	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.
	16	Digital input 6	State of X3/DI6, taking an inversion set in 0x2632:006 (P411.06) into consideration. Digital input 6 is only available in the Control Unit (CU) with application I/O.
	17	Digital input 7	State of X3/DI7, taking an inversion set in 0x2632:007 (P411.07) into consideration. Digital input 7 is only available in the Control Unit (CU) with application I/O.
	50	Running	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
	51	Ready for operation	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
	53	Stop active	TRUE if inverter is enabled and motor is not started and output frequency = 0.
	54	Quick stop active	TRUE if quick stop is active. Otherwise FALSE.
	58	Device warning active	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
	59	Device fault active	TRUE if a fault is active. Otherwise FALSE. • In the event of a fault, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • Exception: In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). • The error state will be left automatically if the error condition is not active anymore. • The restart behaviour after trouble can be configured. ▸ Automatic restart 📖 350
	60	Heatsink temperature warning active	TRUE if current heatsink temperature > warning threshold for temperature monitoring. Otherwise FALSE. • Display of the current heatsink temperature in 0x2D84:001 (P117.01). • Setting of the warning threshold in 0x2D84:002.
	69	Rotational direction reversed	TRUE if output frequency is negative. Otherwise FALSE.
	70	Frequency threshold exceeded	TRUE if current output frequency > frequency threshold. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00). • Setting Frequency thresholdin 0x4005 (P412.00). ▸ Frequency threshold for "Frequency threshold exceeded" trigger 📖 421
	71	Actual speed = 0	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).
	78	Current limit reached	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).
	79	Torque limit reached • From version 02.00	TRUE if torque limit has been reached or exceeded. Otherwise FALSE. • Setting "Positive torque limit" in 0x60E0. • Setting "Negative torque limit" in 0x60E1.
	80	Follower signal (4 ... 20 mA) lost	Reserve (do not use trigger)

Parameter	Name / value range / [default setting]		Info
	81	Error of analog input 1 active	TRUE if the monitoring of the input signal at the analog input 1 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2636:008 (P430.08) • Monitoring condition 0x2636:009 (P430.09) The setting of the Error response in 0x2636:010 (P430.10) has no effect on this trigger. ▸ Analog input 1 📖 425
	82	Error of analog input 2 active	TRUE if the monitoring of the input signal at the analog input 2 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2637:008 (P431.08) • Monitoring condition 0x2637:009 (P431.09) The setting of the Error response in 0x2637:010 (P431.10) has no effect on this trigger. ▸ Analog input 2 📖 429
	83	Load loss detected	TRUE if actual motor current < threshold for load loss detection after delay time of the load loss detection has elapsed. Otherwise FALSE. • Display of the present motor current in 0x6078 (P103.00). • Setting Threshold in 0x4006:001 (P710.01). • Setting Decelerationin 0x4006:002 (P710.02). ▸ Load loss detection 📖 301
	104	Local control active	TRUE if local keypad control ("LOC") active. Otherwise FALSE.
	105	Remote control active	TRUE if remote control ("REM") via terminals, network, etc. active. Otherwise FALSE.
	106	Manual setpoint selection active	TRUE if manual setpoint selection ("MAN") via keypad active. Otherwise FALSE. • Selection of the trigger for the "Activate keypad setpoint" function in 0x2631:016 (P400.16).
	107	Automatic setpoint selection active	TRUE if automatic setpoint selection ("AUTO") via terminals, network, etc. active. Otherwise FALSE.
	114	Network control active • From version 02.00	TRUE if network control activated. Otherwise FALSE.

Parameter	Name / value range / [default setting]		Info
0x2860:001 (P201.01)	Frequency control: Default setpoint source (Stnd. setpoints: Freq. setp. src.)		Selection of the standard setpoint source for operating mode "MS: Velocity mode". • The selected standard setpoint source is always active in the operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]" when no setpoint change-over to another setpoint source via corresponding triggers/functions is active. ▸ Setpoint change-over 📖 387
	1	Keypad	The setpoint is specified locally by the keypad. • Default setting: 0x2601:001 (P202.01) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	**Analog input 1**	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. ▸ Configuring the network 📖 164
	11	Frequency preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	Frequency preset 2	
	13	Frequency preset 3	
	14	Frequency preset 4	
	15	Frequency preset 5	
	16	Frequency preset 6	
	17	Frequency preset 7	
	18	Frequency preset 8	
	19	Frequency preset 9	
	20	Frequency preset 10	
	21	Frequency preset 11	
	22	Frequency preset 12	
	23	Frequency preset 13	
	24	Frequency preset 14	
	25	Frequency preset 15	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399

Parameter	Name / value range / [default setting]		Info
0x2860:002 (P201.02)	PID control: Default setpoint source (Stnd. setpoints: PID setp. src.)		Selection of the standard setpoint source for the reference value of the PID control. • The selected standard setpoint source is always active with an activated PID control when no setpoint change-over to another setpoint source via corresponding triggers/functions is active.
	1	**Keypad**	The setpoint is specified locally by the keypad. • Default setting: 0x2601:002 (P202.02) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	Analog input 1	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. Configuring the network 📖 164
	11	PID preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	PID preset 2	
	13	PID preset 3	
	14	PID preset 4	
	15	PID preset 5	
	16	PID preset 6	
	17	PID preset 7	
	18	PID preset 8	
	31	Segment preset 1 • From version 02.00	
	32	Segment preset 2 • From version 02.00	
	33	Segment preset 3 • From version 02.00	
	34	Segment preset 4 • From version 02.00	
	35	Segment preset 5 • From version 02.00	
	36	Segment preset 6 • From version 02.00	
	37	Segment preset 7 • From version 02.00	
	38	Segment preset 8 • From version 02.00	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399

8.2 Predefined process data words

Process data are exchanged via cyclic data exchange between the network master and the inverter.

Details

For the cyclic data exchange, the inverter is provided with 24 network registers.

- 12 network registers are provided as input registers for data words from the network master to the inverter.
- 12 network registers are provided as output registers for data words from the inverter to the network master.
- Each network register is provided with a corresponding code that defines which parameters (or other data codes) are mapped to the network register.
- The input and output registers are divided into three blocks (A, B, C) in each case, featuring 4 successive data words, respectively:

Network register	
Input register	**Output register**
Network IN A0 Network IN A1 Network IN A2 Network IN A3	Network OUT A0 Network OUT A1 Network OUT A2 Network OUT A3
Network IN B0 Network IN B1 Network IN B2 Network IN B3	Network OUT B0 Network OUT B1 Network OUT B2 Network OUT B3
Network IN C0 Network IN C1 Network IN C2 Network IN C3	Network OUT C0 Network OUT C1 Network OUT C2 Network OUT C3

The terms "input" and "output" refer to the point of view of the inverter:

- Input data are transmitted by the network master and received by the inverter.
- Output data are transmitted by the inverter and received by the network master.

The exact assignment of the network registers and the number of data words that can be transmitted cyclically varies according to the network/communication protocol. You can find some detailed information in the documentation for the respective communication protocol.

Data mapping

For establishing a simple network connection, the inverter provides predefined control and status words for device profile CiA 402, AC drive profile as well as in LECOM format. By means of data mapping to a network register, each of these words can be transferred as process date via network. Additionally, further mappable data words are provided to individually control the inverter. The mappable data words are described in detail in the following subchapters.

Data mapping cannot be applied to all parameters. The mappable parameters are marked correspondingly in the parameter attribute list.

8.2.1 Device profile CiA 402

For control via device profile CiA 402, the parameters listed in the following can be mapped to network register.

Details

- The mapping entry for the CiA 402 control word is 0x60400010.
- The mapping entry for the CiA 402 status word is 0x60410010.
- General information about the process of data mapping can be found in the chapter of the same name for the corresponding network.
- For further CiA 402 parameters, see chapter "Device profile CiA 402". 📖 331

Parameter	Name / value range / [default setting]		Info
0x6040	CiA: Controlword 0 ... [**0**] ... 65535		Mappable CiA 402 control word with bit assignment according to device profile CiA 402.
	Bit 0	Switch on	1 = switch-on
	Bit 1	Enable voltage	1 = DC bus: Establish readiness for operation
	Bit 2	Quick stop	0 = activate quick stop
	Bit 3	Enable operation	1 = enable operation
	Bit 4	Operation mode specific	Bits are not supported.
	Bit 5	Operation mode specific	
	Bit 6	Operation mode specific	
	Bit 7	Fault reset	0-1 edge = reset error
	Bit 8	Reserved	Bit is not supported.
	Bit 9	Operation mode specific	Operating mode dependent
	Bit 10	Reserved	
	Bit 11	Override coast	
	Bit 12	AutoInit	
	Bit 13	Reserved	
	Bit 14	Release holding brake	1 = releasing holding brake manually Notes: • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command. ▸ Holding brake control 📖 335
	Bit 15	Reserved	
0x6041 (P780.00)	CiA: Statusword (CiA: Statusword) • Read only		Mappable CiA 402 status word with bit assignment according to device profile CiA 402.
	Bit 0	Ready to switch on	1 ≡ drive ready to start
	Bit 1	Switched on	1 ≡ drive switched-on
	Bit 2	Operation enabled	1 ≡ operation enabled
	Bit 3	Fault	1 ≡ fault or trouble active
	Bit 4	Voltage enabled	1 ≡ DC bus ready for operation
	Bit 5	Quick stop	0 ≡ quick stop active
	Bit 6	Switch on disabled	1 ≡ operation inhibited
	Bit 7	Warning	1 ≡ warning active
	Bit 8	RPDOs deactivated	1 ≡ cyclic PDOs have been deactivated.
	Bit 9	Remote	1 ≡ inverter can receive commands via network.
	Bit 10	Target reached	1 ≡ the actual position is in the window.
	Bit 11	Internal limit active	1 ≡ internal limitation of a setpoint active.
	Bit 12	Operation mode active	1 ≡ operation enabled and no test mode activated. (no internal setpoint generation active.)
	Bit 13	Following error	1 ≡ following error active
	Bit 14	Holding brake released	1 ≡ holding brake released
	Bit 15	Safe torque off (STO) not active	0 ≡ STO active 1 ≡ STO not active

8.2.2 AC Drive Profile

For control via AC drive profile, the parameters listed in the following can be mapped to network registers.

Details

- The mapping entry for the AC Drive control word is 0x400B0110.
- The mapping entry for the AC Drive status word is 0x400C0110.
- General information about the process of data mapping can be found in the chapter of the same name for the corresponding network.

Parameter	Name / value range / [default setting]		Info
0x400B:001 (P592.01)	Process input data: AC Drive control word (Process data IN: AC control word) 0x0000 ... [**0x0000**] ... 0xFFFF		Mappable control word with bit assignment in compliance with EtherNet/IP™ AC drive profile.
	Bit 0	Run forward (CW)	
	Bit 1	Run reverse (CCW)	
	Bit 2	Reset error (0-1 edge)	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Activate network control	
	Bit 6	Activate network setpoint	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Disable inverter	
	Bit 13	Activate quick stop	
	Bit 14	Deactivate PID controlling	
	Bit 15	Activate DC braking	
0x400C:001 (P593.01)	Process output data: AC Drive status word (Process data OUT: AC status word) • Read only		Mappable status word with bit assignment in compliance with EtherNet/IP™ AC drive profile.
	Bit 0	Fault/Trip active	
	Bit 1	Reserved	
	Bit 2	Running forward	
	Bit 3	Running reverse	
	Bit 4	Ready	
	Bit 5	Network control active	
	Bit 6	Network setpoint active	
	Bit 7	At Reference	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Process controller active	
	Bit 13	Torque mode active	
	Bit 14	Current limit reached	
	Bit 15	DC braking active	
0x6402	Motor type • From version 02.00		AC motor type • Motor Data Object (0x28) - instance attribute 3
	3	PM synchronous	
	6	Wound rotor induction	
	7	**Squirrel cage induction**	

8.2.3 Lenze LECOM profile

For connection to Lenze inverters with a LECOM control word (C135) and LECOM status word (C150), the parameters listed in the following can be mapped to network registers.

Details

- The mapping entry for the LECOM control word is 0x400B0210.
- The mapping entry for the LECOM status word is 0x400C0210.
- General information about the process of data mapping can be found in the chapter of the same name for the corresponding network.

Parameter	Name / value range / [default setting]		Info
0x400B:002 (P592.02)	Process input data: LECOM control word (Process data IN: LECOM ctrl word) 0x0000 ... [**0x0000**] ... 0xFFFF		Mappable control word with bit assignment in compliance with code C135 of the 8200 Lenze inverter.
	Bit 0	Activate preset (bit 0)	
	Bit 1	Activate preset (bit 1)	
	Bit 2	Reversal rotation direction	
	Bit 3	Activate quick stop	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Disable inverter	
	Bit 10	Activate fault	
	Bit 11	Reset error (0-1 edge)	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Activate DC braking	
	Bit 15	Reserved	
0x400C:002 (P593.02)	Process output data: LECOM status word (Process data OUT: LECOM stat. word) • Read only		Mappable status word with bit assignment in compliance with code C150 of the 8200 Lenze inverter.
	Bit 0	Active parameter set (0 = set 1 or 3; 1 = set 2 or 4)	
	Bit 1	Power section inhibited	
	Bit 2	Current or Torque limit reached	
	Bit 3	Frequency setpoint reached	
	Bit 4	Ramp generator (input = output)	
	Bit 5	Frequency < frequency threshold	
	Bit 6	Actual frequency = 0	
	Bit 7	Inverter disabled	
	Bit 8	Coded status bit 0	
	Bit 9	Coded status bit 1	
	Bit 10	Coded status bit 2	
	Bit 11	Coded status bit 3	
	Bit 12	Overtemperature warning	
	Bit 13	DC-bus overvoltage	
	Bit 14	Rotational direction reversed	
	Bit 15	Ready for Operation	

8.2.4 Further process data

The parameters listed in the following can also be mapped to network registers, in order to transmit control and status information as well as setpoints and actual values as process data.

Details

- The following parameters are always available irrespective of the network option.
- The use of these parameters for the transmission of process data is optional. It is also possible to only use part of the parameters. For the transmission of the frequency setpoint and actual value, for instance several parameters with a different resolution can be selected.
- Via the parameters, at the same time the general network activity can be diagnosed.

NetWordIN1 ... NetWordIN4

These four mappable data words are provided to individually control the inverter:

- NetWordIN1: for the implementation of an individual control word format. ▸ General network settings 📖 165
- NetWordIN2: for control of the digital outputs via network. ▸ Configuration of digital outputs 📖 431
- NetWordIN3 and NetWordIN4: for control of the analog outputs via network. ▸ Configuration of analog outputs 📖 439

NetWordOUT1 and NetWordOUT2

These two mappable data words are provided to output status messages to the network master:

- NetWordOUT1: for the implementation of an individual status word format. ▸ NetWordOUT1 status word 📖 436
- NetWordOUT2: for the output of messages of the "Sequencer" function (in preparation).

Parameter	Name / value range / [default setting]		Info
0x4008:001 (P590.01)	Process input words: NetWordIN1 (NetWordINx: NetWordIN1) 0x0000 ... [**0x0000**] ... 0xFFFF		Mappable data word for flexible control of the inverter via network.
	Bit 0	Mapping bit 0	Assignment of the function: 0x400E:001 (P505.01)
	Bit 1	Mapping bit 1	Assignment of the function: 0x400E:002 (P505.02)
	Bit 2	Mapping bit 2	Assignment of the function: 0x400E:003 (P505.03)
	Bit 3	Mapping bit 3	Assignment of the function: 0x400E:004 (P505.04)
	Bit 4	Mapping bit 4	Assignment of the function: 0x400E:005 (P505.05)
	Bit 5	Mapping bit 5	Assignment of the function: 0x400E:006 (P505.06)
	Bit 6	Mapping bit 6	Assignment of the function: 0x400E:007 (P505.07)
	Bit 7	Mapping bit 7	Assignment of the function: 0x400E:008 (P505.08)
	Bit 8	Mapping bit 8	Assignment of the function: 0x400E:009 (P505.09)
	Bit 9	Mapping bit 9	Assignment of the function: 0x400E:010 (P505.10)
	Bit 10	Mapping bit 10	Assignment of the function: 0x400E:011 (P505.11)
	Bit 11	Mapping bit 11	Assignment of the function: 0x400E:012 (P505.12)
	Bit 12	Mapping bit 12	Assignment of the function: 0x400E:013 (P505.13)
	Bit 13	Mapping bit 13	Assignment of the function: 0x400E:014 (P505.14)
	Bit 14	Mapping bit 14	Assignment of the function: 0x400E:015 (P505.15)
	Bit 15	Mapping bit 15	Assignment of the function: 0x400E:016 (P505.16)

Parameter	Name / value range / [default setting]		Info
0x4008:002 (P590.02)	Process input words: NetWordIN2 (NetWordINx: NetWordIN2) 0x0000 ... [**0x0000**] ... 0xFFFF		Mappable data word for optional control of the digital outputs via network. Assignment of the digital outputs: • Relay: 0x2634:001 (P420.01) / selection [34] ... [49] • Digital output 1: 0x2634:002 (P420.02) / selection [34] ... [49] • Digital output 2: 0x2634:003 (P420.03) / selection [34] ... [49]
	Bit 0	Mapping bit 0	
	Bit 1	Mapping bit 1	
	Bit 2	Mapping bit 2	
	Bit 3	Mapping bit 3	
	Bit 4	Mapping bit 4	
	Bit 5	Mapping bit 5	
	Bit 6	Mapping bit 6	
	Bit 7	Mapping bit 7	
	Bit 8	Mapping bit 8	
	Bit 9	Mapping bit 9	
	Bit 10	Mapping bit 10	
	Bit 11	Mapping bit 11	
	Bit 12	Mapping bit 12	
	Bit 13	Mapping bit 13	
	Bit 14	Mapping bit 14	
	Bit 15	Mapping bit 15	
0x4008:003 (P590.03)	Process input words: NetWordIN3 (NetWordINx: NetWordIN3) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN3 [20]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN3 [20]"
0x4008:004 (P590.04)	Process input words: NetWordIN4 (NetWordINx: NetWordIN4) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN4 [21]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN4 [21]"

Parameter	Name / value range / [default setting]		Info
0x400A:001 (P591.01)	Process output words: NetWordOUT1 (NetWordOUTx: NetWordOUT1) • Read only		Mappable data word for the output of status messages of the inverter via network.
	Bit 0	Mapping bit 0	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:010 (P420.10)
	Bit 1	Mapping bit 1	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:011 (P420.11)
	Bit 2	Mapping bit 2	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:012 (P420.12)
	Bit 3	Mapping bit 3	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:013 (P420.13)
	Bit 4	Mapping bit 4	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:014 (P420.14)
	Bit 5	Mapping bit 5	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:015 (P420.15)
	Bit 6	Mapping bit 6	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:016 (P420.16)
	Bit 7	Mapping bit 7	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:017 (P420.17)
	Bit 8	Mapping bit 8	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:018 (P420.18)
	Bit 9	Mapping bit 9	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:019 (P420.19)
	Bit 10	Mapping bit 10	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:020 (P420.20)
	Bit 11	Mapping bit 11	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:021 (P420.21)
	Bit 12	Mapping bit 12	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:022 (P420.22)
	Bit 13	Mapping bit 13	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:023 (P420.23)
	Bit 14	Mapping bit 14	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:024 (P420.24)
	Bit 15	Mapping bit 15	Mappable data word for the output of status messages of the inverter via network. Assignment of the status message: 0x2634:025 (P420.25)

Parameter	Name / value range / [default setting]	Info
0x400A:002 (P591.02)	Process output words: NetWordOUT2 (NetWordOUTx: NetWordOUT2) • Read only Bit 0: Mapping bit 0 Bit 1: Mapping bit 1 Bit 2: Mapping bit 2 Bit 3: Mapping bit 3 Bit 4: Mapping bit 4 Bit 5: Mapping bit 5 Bit 6: Mapping bit 6 Bit 7: Mapping bit 7 Bit 8: Mapping bit 8 Bit 9: Mapping bit 9 Bit 10: Mapping bit 10 Bit 11: Mapping bit 11 Bit 12: Mapping bit 12 Bit 13: Mapping bit 13 Bit 14: Mapping bit 14 Bit 15: Mapping bit 15	Mappable data word for the output of messages of the "Sequencer" function via network.
0x400B:003 (P592.03)	Process input data: Network setpoint frequency (Process data IN: Net.freq. 0.1Hz) 0.0 ... [**0.0**] ... 599.0 Hz	Mappable parameter for specifying the frequency setpoint in [0.1 Hz] via network. • The specification is made without sign (irrespective of the rotating direction). • The rotating direction is specified via the control word. • Example: 456 ≡ 45.6 Hz
0x400B:004 (P592.04)	Process input data: Network setpoint speed (Process data IN: Net.setp. speed) 0 ... [**0**] ... 50000 rpm	Mappable parameter for specifying the setpoint as speed in [rpm] via network. • The specification is made without sign (irrespective of the rotating direction). • The rotating direction is specified via the control word. • Example: 456 ≡ 456 rpm
0x400B:005 (P592.05)	Process input data: Network setpoint frequency (Process data IN: Net.freq.0.01Hz) 0.00 ... [**0.00**] ... 599.00 Hz	Mappable parameter for specifying the frequency setpoint in [0.01 Hz] via network. • The specification is made without sign (irrespective of the rotating direction). • The rotating direction is specified via the control word. • Example: 456 ≡ 4.56 Hz
0x400B:009 (P592.09)	Process input data: Torque scaling (Process data IN: Torque scaling) -128 ... [**0**] ... 127 • From version 02.00	Scaling factor for torque setpoint and actual torque value 0x400C:007 (P593.07) via network. • With the setting 0, no scaling takes place.
0x400C:003 (P593.03)	Process output data: Frequency [0.1 Hz] (Process data OUT: Frequency 0.1Hz) • Read only: x.x Hz	Mappable parameter for the output of the actual frequency value in [0.1 Hz] via network. • The output is effected without sign (irrespective of the rotating direction). • The rotating direction is specified via the status word. • Example: 456 ≡ 45.6 Hz
0x400C:004 (P593.04)	Process output data: Motor speed (Process data OUT: Motor speed) • Read only: x rpm	Mappable parameter for the output of the actual value as speed in [rpm] via network. • The output is effected without sign (irrespective of the rotating direction). • The rotating direction is specified via the status word. • Example: 456 ≡ 456 rpm

Parameter	Name / value range / [default setting]	Info
0x400C:005 (P593.05)	Process output data: Drive status (Process data OUT: Drive status) • Read only	Mappable status word (Modbus Legacy Register 2003).
	0 Error (non-resettable) active	
	1 Error active	
	2 Waiting for start	
	3 Identification not executed	
	4 Inverter disabled	
	5 Stop active	
	7 Identification active	
	8 Running	
	9 Acceleration active	
	10 Deceleration active	
	11 Deceleration override active	
	12 DC braking active	
	13 Flying start active	
	14 Current limit reached	
	16 Process controller idle state	
0x400C:006 (P593.06)	Process output data: Frequency [0.01 Hz] (Process data OUT: Frequency 0.01Hz) • Read only: x.xx Hz	Mappable parameter for the output of the actual frequency value in [0.01 Hz] via network. • The output is effected without sign (irrespective of the rotating direction). • The rotating direction is specified via the status word. • Example: 456 ≡ 4.56 Hz
0x400C:007 (P593.07)	Process output data: Torque scaled (Process data OUT: Torque scaled) • Read only • From version 02.00	Mappable parameter for the output of the actual torque value in [Nm / $2^{\text{scaling factor}}$] via network. • The scaling factor can be set in 0x400B:009 (P592.09). • Actual torque value = scaled actual torque value (0x400C:007) / $2^{\text{scaling factor}}$ Example: • Scaled actual torque value (0x400C:007) = 345 [Nm] • Scaling factor (0x400B:009) = 3 • Actual torque value = 345 [Nm] / 2^3 = 43.125 [Nm]

8.3 Acyclic data exchange

The acyclic data exchange is normally used for transmitting parameter data the transmission of which is not time-critical. Such parameter data are for example operating parameters, motor data, and diagnostic information.

Details

- The acyclic data exchange enables access to all parameters of the inverter.
- For all communication protocols except Modbus, the parameter is addressed directly via the index and subindex.
- The parameter attribute list contains a list of all inverter parameters. This list in particular includes some information that is relevant to the reading and writing of parameters via the network.

8.4 CANopen

CANopen® is an internationally approved communication protocol which is designed for commercial and industrial automation applications. High data transfer rates in connection with efficient data formatting provide for the coordination of motion control devices in multi-axis applications.

- Detailed information on CANopen can be found on the web page of the CAN in Automation (CiA) user organisation: http://www.can-cia.org
- Information about the dimensioning of a CANopen network can be found in the configuration document for the inverter.
- CANopen® is a registered community trademark of the CAN in Automation e. V user organisation.

Preconditions

- Control unit (CU) of the inverter is provided with CANopen.
- The EDS device description files for CANopen can be found here: http://www.lenze.com/application-knowledge-base/artikel/200413930/0/

8.4.1 CANopen introduction

- The implementation of the CANopen communication profile (CiA DS301, version 4.02) enables baud rates of 20 kbps to 1 Mbps.
- For establishing a simple network connection, the inverter provides predefined control and status words for device profile CiA 402, AC-drive profile and in LECOMformat. Additionally, further mappable data words are provided to individually control the inverter.
- The inverter control is preconfigured via a CiA 402-compliant control word.

8.4.2 CANopen node address

Each network node must be provided with a unique node address.

Details

- The node address of the inverter can be optionally set in 0x2301:001 (P510.01) or using the DIP switches on the device labelled with "1" ... "64".
- The setting that is active when the inverter is switched on is the effective setting.
- The labelling of the DIP switches corresponds to the values of the individual DIP switches for determining the node address (see the following example).
- The active node address is displayed in 0x2302:001 (P511.01).

Example of how the node address is set via the DIP switches

DIP switch	64	32	16	8	4	2	1
Setting	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	**16**	0	**4**	**2**	**1**
Node address	= sum of all values = 16 + 4 + 2 + 1 = **23**						

Parameter	Name / value range / [default setting]	Info
0x2301:001 (P510.01)	CANopen settings: Node ID (CANopen sett.: Node ID) 1 ... [**1**] ... 127	Optionally setting of the node address (instead of setting via DIP switches 1 ... 64). • The node address set here only becomes effective if DIP switches 1 ... 64 have been set to OFF before mains switching. • A change in the node address will not be effective until a CAN Reset Node is performed.
0x2302:001 (P511.01)	Active CANopen settings: Active node ID (CANopen diag.: Active node ID) • Read only	Display of the active node address.
0x2303 (P509.00)	CANopen switch position (CANopen switch) • Read only	Display of the DIP switch setting at the last mains power-on.

8.4.3 CANopen baud rate

All network nodes must be set to the same baud rate.

Details

- The baud rate can be optionally set in 0x2301:002 (P510.02) or using the DIP switches on the device labelled with "a" ... "d" (see the following table).
- The setting that is active when the inverter is switched on is the effective setting.
- The active baud rate is displayed in 0x2302:002 (P511.02).

d	c	b	a	Baud rate
OFF	ON	OFF	ON	20 kbps
OFF	OFF	ON	ON	50 kbps
OFF	OFF	ON	OFF	125 kbps
OFF	OFF	OFF	ON	250 kbps
OFF	**OFF**	**OFF**	**OFF**	**500 kbps**
OFF	ON	OFF	OFF	1 Mbps
When a combination is set that is not in the list, the baud rate is set to 500 kbps.				

Parameter	Name / value range / [default setting]		Info
0x2301:002 (P510.02)	CANopen settings: Baud rate (CANopen sett.: Baud rate)		Optionally, setting of the baud rate (instead of setting via DIP switches a ... d). • The parameterised baud rate is only effective if DIP switches a ... d and 1 ... 64 were set to before mains switching. • A change in the baud rate will not be effective until a CAN reset node is performed.
	1	20 kbps	
	2	50 kbps	
	3	125 kbps	
	4	250 kbps	
	5	**500 kbps**	
	6	800 kbps	
	7	1 Mbps	
0x2302:002 (P511.02)	Active CANopen settings: Active baud rate (CANopen diag.: Active baud rate) • Read only		Display of the active baud rate.
	1	20 kbps	
	2	50 kbps	
	3	125 kbps	
	4	250 kbps	
	5	500 kbps	
	6	800 kbps	
	7	1 Mbps	

8.4.4 CANopen initialisation

If the initialisation of the CANopen network and the associated status change from "Pre-Operational" to "Operational" is not effected by a higher-level host system, the inverter can instead be defined as a "mini" master to execute this task.

Details

The inverter is configured as mini master in 0x2301:003 (P510.03).

- In the default setting, the inverter is configured as slave and waits for the NMT telegram "Start Remote Node" from the master/host system after being switched on.
- Configured as mini master, the inverter changes to the "Operational" state after being switched on and sets all nodes connected to the CAN bus (broadcast telegram) to the "Operational" communication state using the "Start Remote Node" NMT telegram after the deceleration time set in 0x2301:004 (P510.04) has elapsed. Only this communication status enables data exchange via the process data objects.

The change of the master/slave operation only becomes effective by renewed mains switching of the inverter or by sending the NMT telegram "Reset Node" or "Reset Communication" to the inverter. Alternatively, the CAN communication can be restarted via 0x2300 (P508.00). ▸ Resetting the CANopen interface 📖 208

Parameter	Name / value range / [default setting]	Info
0x2301:003 (P510.03)	CANopen settings: Slave/Master (CANopen sett.: Slave/Master)	1 = after mains switching, inverter starts as mini-master.
	0 **Slave**	
	1 Mini-master	
0x2301:004 (P510.04)	CANopen settings: Start remote delay (CANopen sett.: Start rem. delay) 0 ... [**3000**] ... 65535 ms	If the inverter has been defined as mini-master, a delay time can be set here, which has to elapse after mains switching before the inverter deposits the "Start Remote Node" NMT telegram on the CAN bus.

8.4.5 CANopen diagnostics

For the purpose of diagnostics, the inverter provides several status words via which the CAN bus status, the CAN bus controller status, and the status of different time monitoring functions can be queried.

Parameter	Name / value range / [default setting]		Info
0x2307 (P515.00)	CANopen time-out status (Time-out status) • Read only		Bit-coded status display of the CAN time monitoring functions.
	Bit 0	RPDO1-Timeout	1 ≡ RPDO1 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO1 in 0x1400:005 (P540.05).
	Bit 1	RPDO2-Timeout	1 ≡ RPDO2 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO2 in 0x1401:005 (P541.05).
	Bit 2	RPDO3-Timeout	1 ≡ RPDO3 was not received within the monitoring time or not with the sync configured. • Status is reset automatically after the RPDO has been received again. • Setting of monitoring time for RPDO3 in 0x1402:005 (P542.05).
	Bit 3	Reserved	-
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Heartbeat-Timeout Consumer 1	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 1 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:001 (P520.01).
	Bit 9	Heartbeat-Timeout Consumer 2	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 2 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:002 (P520.02).
	Bit 10	Heartbeat-Timeout Consumer 3	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 3 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:003 (P520.03).
	Bit 11	Heartbeat-Timeout Consumer 4	1 ≡ within the "Heartbeat Consumer Time", no heartbeat telegram was received from node 4 to be monitored. • Status can only be reset by mains switching or error reset. • "Heartbeat Consumer Time" setting in 0x1016:004 (P520.04).
	Bit 12	Reserved	-
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	Reserved	

Parameter	Name / value range / [default setting]		Info
0x2308 (P516.00)	CANopen status (CANopen status) • Read only		Display of the current CAN bus state.
	0	Initialisation	CAN bus initialisation active. • The initialisation is started automatically at mains connection. During this phase, the inverter us not involved in the data exchange process on the CAN bus. • All CAN-relevant parameters are initialised with the saved settings. • When the initialisation process has been completed, the inverter automatically adopts the "Pre-Operational" state.
	1	Reset node	"Reset Node" NMT command active. • All parameters are initialised with the saved settings (not only the CAN-relevant parameters).
	2	Reset communication	"Reset Communication" NMT command active. • Initialisation of all CAN-relevant parameters with the values stored.
	4	Stopped	Only network management telegrams can be received.
	5	Operational	Parameter data and process data can be received. If defined, process data is sent as well.
	127	Pre-Operational	Parameter data can be received, process data are ignored.
0x2309 (P517.00)	CANopen controller status (CAN contr.status) • Read only		Status display of the internal CANopen controller.
	1	Error active	The inverter is a fully-fledged communication node at the CANopen network. It is able to transmit and receive data and to report faults.
	2	Error passive	The inverter can only passively indicate faulty reception via the ACK field.
	3	Bus off	The inverter is electrically separated from the CANopen network. In order to exit this state, the CANopen interface must be reset. An automatic restart is implemented.

8.4.6 CANopen emergency telegram

If the error status changes when an internal device error occurs or is remedied, an emergency telegram is sent to the NMT master once.

Details

- The identifier for the emergency telegram is fixedly defined and is shown in 0x1014.
- In 0x1015, a blocking time can be set, in order to limit the bus load in the case of emergency telegrams following quickly in succession.

Parameter	Name / value range / [default setting]	Info
0x1014	COB-ID EMCY • Read only	Display of the identifier for emergency telegrams.
0x1015	Inhibit time EMCY 0.0 ... [**0.0**] ... 6553.5 ms	Blocking time which can be set in order to limit the bus load in the case of emergency telegrams following quickly in succession.

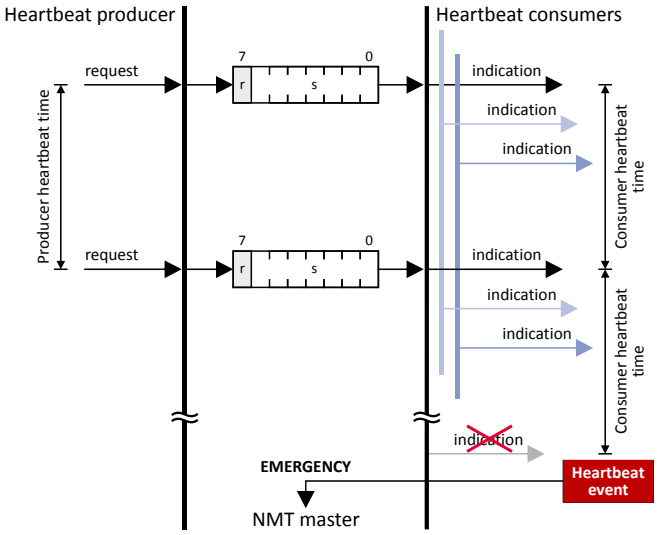
8.4.7 CANopen heartbeat protocol

The heartbeat protocol can be used for node monitoring purposes within a CAN network.

Details

Basic procedure:

1. A heartbeat producer cyclically sends a heartbeat telegram to one or several receivers (consumers).
2. The consumer(s) monitor(s) the heartbeat telegram for arrival on a regular basis.



The inverter can be configured as producer or as consumer to monitor up to four other nodes.

Parameter	Name / value range / [default setting]	Info
0x1016:000 (P520.00)	Consumer heartbeat time: Highest sub-index supported (Cons. heartbeat: Highest subindex) • Read only	Highest subindex, permanently set to 4. Corresponds at the same time to the maximum possible number of nodes to be monitored.
0x1016:001 (P520.01)	Consumer heartbeat time: Consumer heartbeat time 1 (Cons. heartbeat: Cons. heartbeat1) 0x00000000 ... [**0x00000000**] ... 0x00FFFFFF	Node ID and heartbeat time of node 1 which is to be monitored. • Format: 0x00nnhhhh (nn = node ID, hhhh = heartbeat time in [ms])
0x1016:002 (P520.02)	Consumer heartbeat time: Consumer heartbeat time 2 (Cons. heartbeat: Cons. heartbeat2) 0x00000000 ... [**0x00000000**] ... 0x00FFFFFF	Node ID and heartbeat time of node 2 which is to be monitored. • Format: 0x00nnhhhh (nn = node ID, hhhh = heartbeat time in [ms])
0x1016:003 (P520.03)	Consumer heartbeat time: Consumer heartbeat time 3 (Cons. heartbeat: Cons. heartbeat3) 0x00000000 ... [**0x00000000**] ... 0x00FFFFFF	Node ID and heartbeat time of node 3 which is to be monitored. • Format: 0x00nnhhhh (nn = node ID, hhhh = heartbeat time in [ms])
0x1016:004 (P520.04)	Consumer heartbeat time: Consumer heartbeat time 4 (Cons. heartbeat: Cons. heartbeat4) 0x00000000 ... [**0x00000000**] ... 0x00FFFFFF	Node ID and heartbeat time of node 4 which is to be monitored. • Format: 0x00nnhhhh (nn = node ID, hhhh = heartbeat time in [ms])
0x1017 (P522.00)	Producer heartbeat time (Prod. heartbeat) 0 ... [**0**] ... 65535 ms	Time interval for the transmission of the heartbeat telegram to the consumer(s). • The heartbeat telegram is sent automatically as soon as a time > 0 ms is set. • The set time is internally rounded up to the next multiple of 10 ms.

8.4.8 CANopen process data objects

Process data objects (PDOs) are used for the cyclic transmission of (process) data via CANopen. PDOs only contain data and an identifier. They do not contain any information about the sender or receiver and are therefore very efficient.

Details

- Process data objects which the inverter receives via the network are referred to as "Receive PDOs" (RPDOs).
- Process data objects which the inverter sends via the network are referred to as "Transmit PDOs" (TPDOs).
- The maximum length of a PDO is 8 bytes (4 data words).
- Each PDO requires a unique identifier ("COB-ID") for the purpose of identification within the network.
- Communication parameters such as the transmission type and cycle time for each PDO can be set freely and independently of the settings of other PDOs

Transmission type

Process data objects can be transmitted in an event-controlled or time-controlled manner. The below table shows that it is possible to combine the different methods by means of logic operations (AND, OR):

- Event-controlled: The PDO is sent if a special device-internal event has occurred, for instance, if the data contents of the TPDO have changed or if a transmission cycle time has elapsed.
- Synchronous transmission: Transmission of a TPDOs or reception of an RPDO is effected after the inverter has received a sync telegram (COB-ID 0x80).
- Cyclic transmission: The cyclic transmission of PDOs is effected when the transmission cycle time has elapsed.
- Polled via RTR: Transmission of a TPDO is carried out on request by another device via data request frame (RTR remote transmit request). For this, the data requester (e.g. master) sends the data request frame with the COB-ID of the TPDO that is to be requested to transmit. The receiver recognises the RTR and carries out the transmission.

Transmission type	PDO transmission			Logic combination of different transmission types
	cyclic	synchronous	event-controlled	
0		●	●	AND
1 ... 240		●		-
254, 255	●		●	OR

Transmission type	Description
0	Synchronous and acyclic • The PDO is transmitted on an event-controlled basis with every sync (e.g. when a bit change occurs in the PDO).
1 ... 240	Synchronous and cyclic (sync-controlled with a response) • Selection n = 1: The PDO is transmitted with every sync. • Selection 1 < n ≤ 240: The PDO is transmitted with every n-th sync.
241 ... 251	Reserved
252	Synchronous - RTR only
253	Asynchronous - RTR only
254, 255	Asynchronous - manufacturer-specific / device profile-specific • If one of these values is entered, the PDO is transferred in an event-controlled or cyclic manner. (The values "254" and "255" are equivalent). • For a cyclic transmission, a cycle time must be entered for the respective PDO. In this case, cyclic transmission takes place in addition to event-controlled transmission.

Synchronisation of PDOs via sync telegram

During cyclic transmission, one or more PDOs are transmitted/received in fixed time intervals. An additional specific telegram, the so-called sync telegram, is used for synchronising cyclic process data.

- The sync telegram is the trigger point for the transmission of process data from the slaves to the master and for the acceptance of process data from the master in the slaves.
- For sync-controlled process data processing, the sync telegram must be generated accordingly.
- The response to a sync telegram is determined by the transmission type selected.

Generating the sync telegram:

- 0x1005 can be used to activate the generation of sync telegrams and to write the identifier value.
- Sync telegrams are created when bit 30 (see below) is set to "1".
- The interval between sync telegrams is to be set in 0x1006.

Writing identifiers:

- To receive sync telegrams, the value 0x80 must be entered in the 11-bit identifier in the default setting (and in compliance with the CANopen specification). This means that all inverters are set to the same sync telegram by default.
- If sync telegrams are only to be received by specific nodes, their identifiers can be entered with a value of up to and including 0x07FF.
- The identifier can only be changed if the inverter does not send any sync telegrams (0x1005, Bit 30 = "0").

Data telegram assignment

8th byte (data 4)		7th byte (data 3)	6th byte (data 2)	5th byte (data 1)
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
x	0/1	Extended identifier*		11-bit identifier
* The extended identifier is not supported. Bit 11 ... bit 29 must be set to "0".				

Parameter	Name / value range / [default setting]	Info
0x1005	COB-ID SYNC 0x00000000 ... [**0x00000080**] ... 0xFFFFFFFF	Identifier for sync telegram. How to change the identifier: 1. Deactivate Sync: Set bit 30 to "0". 2. Change identifier. 3. Activate Sync: Set bit 30 to "1".
0x1006	Communication cyclic period 0 ... [**0**] ... 65535000 us	Cycle time for sync telegrams. • With the setting "0", no sync telegrams are generated. • The set time is internally rounded up to the next multiple of 10 ms. The shortest possible cycle time thus is 10 ms.
0x1400:000	RPDO1 communication parameter: Highest sub-index supported • Read only	

Parameter	Name / value range / [default setting]		Info
0x1400:001 (P540.01)	RPDO1 communication parameter: COB-ID (RPDO1 config.: COB-ID) 0x00000000 ... [**0x00000200**] ... 0xFFFFFFFF		RPDO1: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	PDO invalid	
0x1400:002 (P540.02)	RPDO1 communication parameter: Transmission type (RPDO1 config.: Transm. type) 0 ... [**255**] ... 255		RPDO1: transmission type in compliance with DS301 V4.02
0x1400:005 (P540.05)	RPDO1 communication parameter: Event timer (RPDO1 config.: Event timer) 0 ... [**100**] ... 65535 ms		RPDO1: time-out for the monitoring of data reception.

Parameter	Name / value range / [default setting]		Info
0x1401:001 (P541.01)	RPDO2 communication parameter: COB-ID (RPDO2 config.: COB-ID) 0x00000000 ... [**0x80000300**] ... 0xFFFFFFFF		RPDO2: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	PDO invalid	
0x1401:002 (P541.02)	RPDO2 communication parameter: Transmission type (RPDO2 config.: Transm. type) 0 ... [**255**] ... 255		RPDO2: transmission type in compliance with DS301 V4.02
0x1401:005 (P541.05)	RPDO2 communication parameter: Event timer (RPDO2 config.: Event timer) 0 ... [**100**] ... 65535 ms		RPDO2: time-out for the monitoring of data reception.

Parameter	Name / value range / [default setting]		Info
0x1402:001 (P542.01)	RPDO3 communication parameter: COB-ID (RPDO3 config.: COB-ID) 0x00000000 ... [**0x80000400**] ... 0xFFFFFFFF		RPDO3: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	PDO invalid	
0x1402:002 (P542.02)	RPDO3 communication parameter: Transmission type (RPDO3 config.: Transm. type) 0 ... [**255**] ... 255		RPDO3: transmission type in compliance with DS301 V4.02
0x1402:005 (P542.05)	RPDO3 communication parameter: Event timer (RPDO3 config.: Event timer) 0 ... [**100**] ... 65535 ms		RPDO3: time-out for the monitoring of data reception.
0x1800:000	TPDO1 communication parameter: Highest sub-index supported • Read only		The value "5" is permanently set.

Parameter	Name / value range / [default setting]		Info
0x1800:001 (P550.01)	TPDO1 communication parameter: COB-ID (TPDO1 config.: COB-ID) 0x00000001 ... [**0x40000180**] ... 0xFFFFFFFF		TPDO1: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	RTR not allowed	
	Bit 31	PDO invalid	
0x1800:002 (P550.02)	TPDO1 communication parameter: Transmission type (TPDO1 config.: Transm. type) 0 ... [**255**] ... 255		TPDO1: transmission type in compliance with DS301 V4.02
0x1800:003 (P550.03)	TPDO1 communication parameter: Inhibit time (TPDO1 config.: Inhibit time) 0.0 ... [**0.0**] ... 6553.5 ms		TPDO1: minimum time between the transmission of two identical PDOs (see DS301 V4.02).
0x1800:005 (P550.05)	TPDO1 communication parameter: Event timer (TPDO1 config.: Event timer) 0 ... [**20**] ... 65535 ms		TPDO1: Cycle time for PDO transmission with transmission type "254" or "255". • The set time is internally rounded up to the next multiple of 10 ms.
0x1801:000	TPDO2 communication parameter: Highest sub-index supported • Read only		The value "5" is permanently set.

Parameter	Name / value range / [default setting]		Info
0x1801:001 (P551.01)	TPDO2 communication parameter: COB-ID (TPDO2 config.: COB-ID) 0x00000001 ... [**0xC0000280**] ... 0xFFFFFFFF		TPDO2: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	RTR not allowed	
	Bit 31	PDO invalid	
0x1801:002 (P551.02)	TPDO2 communication parameter: Transmission type (TPDO2 config.: Transm. type) 0 ... [**255**] ... 255		TPDO2: transmission type in compliance with DS301 V4.02
0x1801:003 (P551.03)	TPDO2 communication parameter: Inhibit time (TPDO2 config.: Inhibit time) 0.0 ... [**0.0**] ... 6553.5 ms		TPDO2: minimum time between the transmission of two identical PDOs (see DS301 V4.02).
0x1801:005 (P551.05)	TPDO2 communication parameter: Event timer (TPDO2 config.: Event timer) 0 ... [**0**] ... 65535 ms		TPDO2: Cycle time for PDO transmission with transmission type "254" or "255". • The set time is internally rounded up to the next multiple of 10 ms.
0x1802:000	TPDO3 communication parameter: Highest sub-index supported • Read only		The value "5" is permanently set.

Parameter	Name / value range / [default setting]		Info
0x1802:001 (P552.01)	TPDO3 communication parameter: COB-ID (TPDO3 config.: COB-ID) 0x00000001 ... [**0xC0000380**] ... 0xFFFFFFFF		TPDO3: identifier How to change the identifier: 1. Set PDO to "invalid": Set bit 31 to "1". 2. Change identifier and reset PDO to "valid" (bit 31 = "0").
	Bit 0	COB-ID bit 0	
	Bit 1	COB-ID bit 1	
	Bit 2	COB-ID bit 2	
	Bit 3	COB-ID bit 3	
	Bit 4	COB-ID bit 4	
	Bit 5	COB-ID bit 5	
	Bit 6	COB-ID bit 6	
	Bit 7	COB-ID bit 7	
	Bit 8	COB-ID bit 8	
	Bit 9	COB-ID bit 9	
	Bit 10	COB-ID bit 10	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	Reserved	
	Bit 18	Reserved	
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	RTR not allowed	
	Bit 31	PDO invalid	
0x1802:002 (P552.02)	TPDO3 communication parameter: Transmission type (TPDO3 config.: Transm. type) 0 ... [**255**] ... 255		TPDO3: transmission type in compliance with DS301 V4.02
0x1802:003 (P552.03)	TPDO3 communication parameter: Inhibit time (TPDO3 config.: Inhibit time) 0.0 ... [**0.0**] ... 6553.5 ms		TPDO3: minimum time between the transmission of two identical PDOs (see DS301 V4.02).
0x1802:005 (P552.05)	TPDO3 communication parameter: Event timer (TPDO3 config.: Event timer) 0 ... [**0**] ... 65535 ms		TPDO3: Cycle time for PDO transmission with transmission type "254" or "255". • The set time is internally rounded up to the next multiple of 10 ms.

8.4.9 CANopen data mapping

Data mapping serves to define which process data are transmitted cyclically via the process data channels.

Details

Data mapping (in the case of CANopen also referred to as "PDO mapping") is preconfigured for control of the inverter via the device profile CiA 402:

- RPDO1 = CiA 402 control word 0x6040 and Target velocity 0x6042 (P781.00).
- TPDO1 = CiA 402 status word 0x6041 (P780.00) and Velocity actual value 0x6044 (P783.00).

Variable PDO mapping

For individual drive solutions, the inverter supports "variable PDO mapping", providing 8 mapping entries in each case to assign 8-bit, 16-bit, and 32-bit parameters to a PDO in an optional order. The total length of the parameters mapped, however, must not exceed 8 bytes.

The process of PDO mapping cannot be applied to all parameters. The mappable parameters are marked correspondingly in the parameter attribute list.

The process of variable PDO mapping only allows the following procedure:

1. Set PDO to "invalid": set bit 31 in the corresponding identifier (0x1400:1 ... 0x1402:1 or 0x1800:1 ... 0x1802:1) to "1".
2. Set PDO mapping to "invalid": Set subindex 0 in the mapping parameter (0x1600 ... 0x1602 or 0x1A00 ... 0x1A02) to "0".
3. Set desired PDO mapping via the corresponding mapping entries.
   format: 0xiiiissll (iiii = hexadecimal index, ss = hexadecimal subindex, ll = hexadecimal data length)
4. Set subindex 0 in the mapping parameter (0x1600 ... 0x1602 or 0x1A00 ... 0x1A02) to a valid value (number of parameters mapped).
5. Reset PDO to "valid": set bit 31 in the corresponding identifier (0x1400:1 ... 0x1402:1 or 0x1800:1 ... 0x1802:1) to "0".

Parameter	Name / value range / [default setting]	Info
0x1600:000	RPDO1 mapping parameter: Number of mapped application objects in PDO 0 ... [**2**] ... 8	Number of objects mapped in RPDO1.
0x1600:001	RPDO1 mapping parameter: Application object 1 0x00000000 ... [**0x60400010**] ... 0xFFFFFFFF	Mapping entry 1 for RPDO1.
0x1600:002	RPDO1 mapping parameter: Application object 2 0x00000000 ... [**0x60420010**] ... 0xFFFFFFFF	Mapping entry 2 for RPDO1.
0x1600:003	RPDO1 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for RPDO1.
0x1600:004	RPDO1 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for RPDO1.
0x1600:005	RPDO1 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for RPDO1.
0x1600:006	RPDO1 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for RPDO1.
0x1600:007	RPDO1 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for RPDO1.
0x1600:008	RPDO1 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for RPDO1.
0x1601:000	RPDO2 mapping parameter: Number of mapped application objects in PDO 0 ... [**0**] ... 8	Number of objects mapped in RPDO2.
0x1601:001	RPDO2 mapping parameter: Application object 1 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 1 for RPDO2.
0x1601:002	RPDO2 mapping parameter: Application object 2 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 2 for RPDO2.

Parameter	Name / value range / [default setting]	Info
0x1601:003	RPDO2 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for RPDO2.
0x1601:004	RPDO2 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for RPDO2.
0x1601:005	RPDO2 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for RPDO2.
0x1601:006	RPDO2 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for RPDO2.
0x1601:007	RPDO2 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for RPDO2.
0x1601:008	RPDO2 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for RPDO2.
0x1602:000	RPDO3 mapping parameter: Number of mapped application objects in PDO 0 ... [**0**] ... 8	Number of objects mapped in RPDO3.
0x1602:001	RPDO3 mapping parameter: Application object 1 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 1 for RPDO3.
0x1602:002	RPDO3 mapping parameter: Application object 2 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 2 for RPDO3.
0x1602:003	RPDO3 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for RPDO3.
0x1602:004	RPDO3 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for RPDO3.
0x1602:005	RPDO3 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for RPDO3.
0x1602:006	RPDO3 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for RPDO3.
0x1602:007	RPDO3 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for RPDO3.
0x1602:008	RPDO3 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for RPDO3.
0x1A00:000	TPDO1 mapping parameter: Number of mapped application objects in TPDO 0 ... [**2**] ... 8	Number of objects mapped in TPDO1.
0x1A00:001	TPDO1 mapping parameter: Application object 1 0x00000000 ... [**0x60410010**] ... 0xFFFFFFFF	Mapping entry 1 for TPDO1.
0x1A00:002	TPDO1 mapping parameter: Application object 2 0x00000000 ... [**0x60440010**] ... 0xFFFFFFFF	Mapping entry 2 for TPDO1.
0x1A00:003	TPDO1 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for TPDO1.
0x1A00:004	TPDO1 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for TPDO1.
0x1A00:005	TPDO1 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for TPDO1.
0x1A00:006	TPDO1 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for TPDO1.
0x1A00:007	TPDO1 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for TPDO1.
0x1A00:008	TPDO1 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for TPDO1.
0x1A01:000	TPDO2 mapping parameter: Number of mapped application objects in TPDO 0 ... [**0**] ... 8	Number of objects mapped in TPDO2.
0x1A01:001	TPDO2 mapping parameter: Application object 1 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 1 for TPDO2.
0x1A01:002	TPDO2 mapping parameter: Application object 2 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 2 for TPDO2.
0x1A01:003	TPDO2 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for TPDO2.
0x1A01:004	TPDO2 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for TPDO2.

Parameter	Name / value range / [default setting]	Info
0x1A01:005	TPDO2 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for TPDO2.
0x1A01:006	TPDO2 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for TPDO2.
0x1A01:007	TPDO2 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for TPDO2.
0x1A01:008	TPDO2 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for TPDO2.
0x1A02:000	TPDO3 mapping parameter: Number of mapped application objects in TPDO 0 ... [**0**] ... 8	Number of objects mapped in TPDO3.
0x1A02:001	TPDO3 mapping parameter: Application object 1 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 1 for TPDO3.
0x1A02:002	TPDO3 mapping parameter: Application object 2 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 2 for TPDO3.
0x1A02:003	TPDO3 mapping parameter: Application object 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 3 for TPDO3.
0x1A02:004	TPDO3 mapping parameter: Application object 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 4 for TPDO3.
0x1A02:005	TPDO3 mapping parameter: Application object 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 5 for TPDO3.
0x1A02:006	TPDO3 mapping parameter: Application object 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 6 for TPDO3.
0x1A02:007	TPDO3 mapping parameter: Application object 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 7 for TPDO3.
0x1A02:008	TPDO3 mapping parameter: Application object 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF	Mapping entry 8 for TPDO3.

8.4.10 CANopen service data objects

Service data objects (SDOs) make it possible to read and write all parameters of the inverter via CANopen.

Details

- Two independent SDO channels are provided at the same time. SDO channel 1 is always active. SDO channel 2 can be activated via 0x2301:005 (P510.05).
- The identifiers for SDO1 and SDO2 are generated from the basic identifier (in compliance with the "Predefined Connection Set") and the node address set.
- An SDO is always transmitted with confirmation, i. e. the reception of an SDO frame is acknowledged by the receiver.

Structure of the SDO frame user data

The user data are shown in Motorola format:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	**Index**		**Subindex**	**Data 1**	**Data 2**	**Data 3**	**Data 4**
See table below.	LOW byte	HIGH byte		LOW word		HIGH word	
	Address of the parameter to be read or written.			LOW byte	HIGH byte	LOW byte	HIGH byte

The following commands can be transmitted or received for writing and reading the parameters:

Command	1st byte		Data length	Info
	hex	dec		
Write request	0x23	35	4 bytes	Writing of a parameter to the inverter.
	0x2B	43	2 bytes	
	0x2F	47	1 byte	
	0x21	33	Block	
Write response	0x60	96	4 bytes	Inverter acknowledges a write request.
Read request	0x40	64	4 bytes	Reading of a parameter from the inverter.
Read response	0x43	67	4 bytes	Inverter response to a read request with the current parameter value.
	0x4B	75	2 bytes	
	0x4F	79	1 byte	
	0x41	65	Block	
Error response	0x80	128	4 bytes	Inverter response to the incorrect execution of the read/write request.

More precisely, the command byte comprises the following information:

Command	1st byte							
	Command specifier (cs)			Toggle (t)	Length*		e	s
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Write request	0	0	1	0	0/1	0/1	1	1
Write response	0	1	1	0	0	0	0	0
Read request	0	1	0	0	0	0	0	0
Read response	0	1	0	0	0/1	0/1	1	1
Error response	1	0	0	0	0	0	0	0
*Bit coding of the length: 00 = 4 bytes, 01 = 3 bytes, 10 = 2 bytes, 11 = 1 byte e: expedited (shortened block service) s: segmented (normal block service)								

More commands are defined in the DS301 V4.02 CANopen specification (e.g. segmented transfer).

Maximally 4 bytes are available for parameter value entries. Depending on the data format, they are assigned as follows:

5th byte	6th byte	7th byte	8th byte
Parameter value (1 byte)	0x00	0x00	0x00
Parameter value (2 bytes)		0x00	0x00
LOW byte	HIGH byte		
Parameter value (4 bytes)			
LOW word		HIGH word	
LOW byte	HIGH byte	LOW byte	HIGH byte

The parameter attribute list in the annex also specifies a scaling factor. The scaling factor is relevant to the transmission of parameter values which are represented with one or several decimal positions in the parameter list. If the scaling factor is > 1, before the transmission, the value must be multiplied with the scaling factor specified, so that the value can be transferred completely (as an integer value). On the SDO-client side, the integer value must then be divided by the scaling factor again, in order to receive the original value with decimal positions.

Parameter	Name / value range / [default setting]	Info
0x1200:000	SDO1 server parameter: Highest sub-index supported • Read only	
0x1200:001	SDO1 server parameter: COB-ID client -> server (rx) • Read only	Display of the receive identifier for SDO server channel 1 (basic SDO channel). • According to DS301 V4.02, the basic SDO channel can neither be changed nor deactivated.
0x1200:002	SDO1 server parameter: COB-ID server -> client (tx) • Read only	Display of the transmit identifier for SDO server channel 1 (basic SDO channel). • According to DS301 V4.02, the basic SDO channel can neither be changed nor deactivated.
0x1201:000	SDO2 server parameter: Highest sub-index supported • Read only	
0x1201:001	SDO2 server parameter: COB-ID client -> server (rx) 0x00000000 ... [**0x80000640**] ... 0xFFFFFFFF	Specification of the receive identifier for SDO server channel 2. • If SDO server channel 2 is activated via 0x2301:005 (P510.05), this parameter is set to the value "node address + 0x640". This default setting can be changed.
0x1201:002	SDO2 server parameter: COB-ID server -> client (tx) 0x00000000 ... [**0x800005C0**] ... 0xFFFFFFFF	Specification of the transmit identifier for SDO server channel 2. • If SDO server channel 2 is activated via 0x2301:005 (P510.05), this parameter is set to the value "node address + 0x5C0". This default setting can be changed.
0x1201:003	SDO2 server parameter: Node-ID of the SDO client 1 ... [**0**] ... 127	Specification of the node address for the SDO client.
0x2301:005 (P510.05)	CANopen settings: Activate SDO2 channel (CANopen sett.: SDO2 channel) **0** **Not active** 1 Active	1 = activate SDO server channel 2.

8.4.11 CANopen error responses

The response to CANopen errors such as missing PDOs or heartbeat frames can be configured via the following parameters.

Parameter	Name / value range / [default setting]	Info
0x1029:000	Error behavior: Highest sub-index supported • Read only	

Parameter	Name / value range / [default setting]	Info
0x1029:001	Error behavior: Communication error	Selection of the NMT state to which the inverter is to change automatically if a failure of a CANopen node or an internal error is detected in the "Operational" state. These also include the following communication errors: • Change-over of the CAN interface to the "Bus-off" state. • Occurrence of a "Heartbeat Event".
	0 Status -> Pre-operational	In the "Pre-operational" state, network management, sync, and emergency telegrams as well as parameter data can be received; process data, however, are ignored.
	1 No status change	
	2 Status -> Stopped	In the "Stopped" state, only network management telegrams can be received.
0x2857:001	CANopen monitoring: RPDO1-Timeout • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to triggering the RPDO1 time monitoring. Associated error code: • 33425 | 0x8291 - CAN: RPDO1 time-out
	3 Fault	▸ Error types 107
0x2857:002	CANopen monitoring: RPDO2-Timeout • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to triggering the RPDO2 time monitoring. Associated error code: • 33426 | 0x8292 - CAN: RPDO2 time-out
	3 Fault	▸ Error types 107
0x2857:003	CANopen monitoring: RPDO3-Timeout • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to triggering the RPDO3 time monitoring. Associated error code: • 33427 | 0x8293 - CAN: RPDO3 time-out
	3 Fault	▸ Error types 107
0x2857:005	CANopen monitoring: Heartbeat-Timeout Consumer 1 • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response with "Heartbeat Event" in consumer 1. Associated error code: • 33156 | 0x8184 - CAN: heartbeat time-out consumer 1
	3 Fault	▸ Error types 107
0x2857:006	CANopen monitoring: Heartbeat-Timeout Consumer 2 • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response with "Heartbeat Event" in consumer 2. Associated error code: • 33157 | 0x8185 - CAN: heartbeat time-out consumer 2
	3 Fault	▸ Error types 107
0x2857:007	CANopen monitoring: Heartbeat-Timeout Consumer 3 • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response with "Heartbeat Event" in consumer 3. Associated error code: • 33158 | 0x8186 - CAN: heartbeat time-out consumer 3
	3 Fault	▸ Error types 107
0x2857:008	CANopen monitoring: Heartbeat-Timeout Consumer 4 • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response with "Heartbeat Event" in consumer 4. Associated error code: • 33159 | 0x8187 - CAN: heartbeat time-out consumer 4
	3 Fault	▸ Error types 107
0x2857:010	CANopen monitoring: "Bus-off" state change • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to changing to the "Bus off" state. Associated error code: • 33154 | 0x8182 - CAN: bus off
	2 Trouble	▸ Error types 107
0x2857:011	CANopen monitoring: Warning	Selection of the response that is executed in the case of too many incorrectly sent or received CAN telegrams (> 96). Associated error code: • 33155 | 0x8183 - CAN: warning
	0 No response	▸ Error types 107
	1 Warning	
	2 Trouble	
	3 Fault	

8.4.12 CANopen diagnostic counter

The following parameters serve to diagnose the communication activities between the inverter and the CANopen network. The counters are free-running, i. e. when the maximum value has been reached, the respective counter starts at 0 again.

Parameter	Name / value range / [default setting]	Info
0x230A:000	CANopen statistics: Highest subindex • Read only	Number of frame and error counters.
0x230A:001 (P580.01)	CANopen statistics: PDO1 received (CAN statistics: PDO1 received) • Read only	Display of the number of PDO1 telegrams received.
0x230A:002 (P580.02)	CANopen statistics: PDO2 received (CAN statistics: PDO2 received) • Read only	Display of the number of PDO2 telegrams received.
0x230A:003 (P580.03)	CANopen statistics: PDO3 received (CAN statistics: PDO3 received) • Read only	Display of the number of PDO3 telegrams received.
0x230A:005 (P580.05)	CANopen statistics: PDO1 transmitted (CAN statistics: PDO1 transmitted) • Read only	Display of the number of PDO1 telegrams sent.
0x230A:006 (P580.06)	CANopen statistics: PDO2 transmitted (CAN statistics: PDO2 transmitted) • Read only	Display of the number of PDO2 telegrams sent.
0x230A:007 (P580.07)	CANopen statistics: PDO3 transmitted (CAN statistics: PDO3 transmitted) • Read only	Display of the number of PDO3 telegrams sent.
0x230A:009 (P580.09)	CANopen statistics: SDO1 telegrams (CAN statistics: SDO1 counter) • Read only	Display of the number of SDO1 telegrams.
0x230A:010 (P580.10)	CANopen statistics: SDO2 telegrams (CAN statistics: SDO2 counter) • Read only	Display of the number of SDO2 telegrams.
0x230B (P518.00)	CANopen error counter (CAN errorcounter) • Read only	Display of the total number of CAN faults that have occurred.

8.4.13 CANopen LED status displays

Information about the CAN bus status can be obtained quickly via the "CAN-RUN" and "CAN-ERR" LED displays on the front of the inverter.

The meaning can be seen from the tables below.

Inverter not active on the CAN bus (yet)

LED "CAN-RUN"	LED "CAN-ERR"	Meaning
off	off	Inverter is not active on the CAN bus.
	on	"Bus Off" state.
Both LEDs are flickering alternately		Automatic baud rate detection active.

Inverter active on the CAN bus

The green "CAN-RUN" LED indicates the CANopen state:

LED "CAN-RUN"	CANopen state
blinking fast (5 Hz)	Pre-Operational
on	Operational
blinking 1x, then goes off for 1 s	Stopped

The red "CAN-ERR" LED indicates a CANopen error:

LED "CAN-ERR"	CANopen error
blinking 1x, then goes off for 1 s	Warning Limit reached
blinking 2x, then goes off for 1 s	Heartbeat Event
blinking 3x, then goes off for 1 s	Sync message error (only possible in the "Operational" state)

8.4.14 Resetting the CANopen interface

The following parameter can be used to restart or stop CAN communication. Optionally it is also possible to reset all CAN parameters to the default state.

Parameter	Name / value range / [default setting]		Info
0x2300 (P508.00)	CANopen communication (CANopen comm.) • Setting can only be changed if the inverter is inhibited.		Restart / stop CAN communication. • After successful execution, the value 0 is shown.
	0	**No action/no error**	Only status feedback.
	1	Restart with current values	Restart CAN communication with the current values.
	2	Restart with default values	Restart CAN communication with the standard values of the CAN parameters (0x1000 ... 0x1FFF und 0x2301).
	5	Stop network communication	Stop CAN communication. • The "Stop Remote Node" NMT command is executed. After successful execution of this command, only the reception of network management frames is possible.
	10	In progress	Only status feedback.
	11	Action cancelled	
	12	Error	

8.4.15 CANopen - short setup

In the following, the steps required for controlling the inverter via CANopen are described.

Parameterisation required

1. Set the CANopen node address.
   - Each network node must be provided with a unique node address.
   - Details: ▸ CANopen node address 📖 186
2. Set the CANopen baud rate.
   - Default setting: 500 kbps
   - Details: ▸ CANopen baud rate 📖 187
3. Optional: Configure inverter as "mini master".
   - Required if the initialisation of the CANopen network and the associated status change from "Pre-Operational" to "Operational" is not effected by a higher-level host system.
   - Details: ▸ CANopen initialisation 📖 188
4. Optional: Change the response of the inverter to the triggering of the RPDO time monitoring.
   - Default setting: In case of missing RPDOs, an error is triggered.
   - Details: ▸ CANopen error responses 📖 205
5. Save parameter settings: 0x2022:003 (P700.03) = "On / start [1]".
6. Switch the inverter off and then on again in order that the changed communication settings can get effective.
7. Program the master so that the following SDO messages are sent to the inverter:
   1. 0x2631:037 (P400.37) = 1 (activate network control)
   2. 0x2860:001 (P201.01) = 5 (set network as standard setpoint source)
   3. PDO mapping and configuration of the process data objects RPDO1 and TPDO1 (see the sections "RPDO1 mapping" and "TPDO1 mapping").
8. Control inverter via RPDO1 (and evaluate the current status via TPDO1).
   - For assignment of the control word and setpoint selection, see section "RPDO1 mapping".
   - For assignment of the status word and actual value output, see section "TPDO1 mapping".
   - Acceleration 0x2917 (P220.00) and deceleration 0x2918 (P221.00) can be set/changed via SDO messages.

In the default setting, the digital input DI1 is assigned with the "Run" function. If the network control is activated, this function serves as "start enable" for start commands via network. Hence, the digital input DI1 must be set to HIGH level in order that the motor can be started via network. ▸ Start / stop motor 📖 372

RPDO1 mapping

The RPDO1 is used to control the inverter.

Changing the identifier (COB-ID) and the PDO mapping only allows the following procedure:

1. Set RPDO1 to "invalid": Set bit 31 in the identifier 0x1400:001 (P540.01) to "1".
2. Set RPDO1 mapping to "invalid": 0x1600:000 = set 0.
3. Map NetWordIN1 data word0x4008:001 (P590.01) to RPDO1:
   0x1600:001 = set 0x40080110.
4. MapNetwork setpoint frequency 0x400B:003 (P592.03) to RPDO1:
   0x1600:002 = set 0x400B0310.
5. Set RPDO1 mapping to "valid" again: 0x1600:000 = set 2 (number of mapped parameters).
6. Optional: Set time-out time for monitoring the data reception in 0x1400:005 (P540.05) in [ms].
   - Default setting: 100 ms
7. Change identifier for RPDO1 (optional) and set RPDO1 to "valid" again: Write the new identifier into 0x1400:001 (P540.01) and simultaneously set bit 31 to "0".
   - Default setting: 0x200 + node address (hex)
   - Example: Node address = 10 (0xA) and basic identifier = default setting:

     Identifier to be written into 0x1400:001 (P540.01) = 0x200 + 0xA = 0x20A (0b0011 0000 1010)

Function assignment of the NetWordIN1 data word (byte 1+2 of the RPDO1)

Bit	Default setting	For details and configuration, see
0	Not active (reserve)	0x400E:001 (P505.01)
1	Not active (reserve)	0x400E:002 (P505.02)
2	Activate quick stop	0x400E:003 (P505.03)
3	Not active (reserve)	0x400E:004 (P505.04)
4	Run forward (CW)	0x400E:005 (P505.05)
5	Activate preset (bit 0)	0x400E:006 (P505.06)
6	Activate preset (bit 1)	0x400E:007 (P505.07)
7	Reset error	0x400E:008 (P505.08)
8	Not active (reserve)	0x400E:009 (P505.09)
9	Activate DC braking	0x400E:010 (P505.10)
10	Not active (reserve)	0x400E:011 (P505.11)
11	Not active (reserve)	0x400E:012 (P505.12)
12	Invert rotation	0x400E:013 (P505.13)
13	Not active (reserve)	0x400E:014 (P505.14)
14	Not active (reserve)	0x400E:015 (P505.15)
15	Not active (reserve)	0x400E:016 (P505.16)

Specifying the frequency setpoint (byte 3+4 of the RPDO1)

- The specification is made unsigned (independent of the direction of rotation) as integer in the resolution [0.1 Hz].
- The direction of rotation is defined in the default setting via bit 12 of the NetWordIN1 data word.
- Example: 456 ≡ 45.6 Hz

TPDO1 mapping

The TPDO1 is used for the output of status information and the actual frequency value.

Changing the identifier (COB-ID) and the PDO mapping only allows the following procedure:

1. Set TPDO1 to "invalid": Set bit 31 in the identifier 0x1800:001 (P550.01) to "1".
2. Set TPDO1 mapping to "invalid": 0x1A00:000 = set 0.
3. Map NetWordOUT1 data word 0x400A:001 (P591.01)to TPDO1:
   0x1A00:001 = set 0x400A0110.
4. MapFrequency [0.1 Hz] 0x400B:003 (P592.03) to TPDO1:
   0x1A00:002 = set 0x400C0310.
5. Set TPDO1 mapping to "valid" again: 0x1A00:000 = set 2 (number of mapped parameters).
6. Optional: Set Transmission type in 0x1800:002 (P550.02) and Event timer in 0x1800:005 (P550.05).
   - Default setting: Cyclic transmission every 20 ms.
7. Change identifier for TPDO1 (optional) and set TPDO1 to "valid" again: Write the new identifier into 0x1800:001 (P550.01) and simultaneously set bit 31 to "0".
   - Default setting: 0x40000180 + node address (hex)
   - Example: Node address = 10 (0xA) and TPDO1 basic identifier = default setting:

     Identifier to be written into 0x1800:001 (P550.01) = 0x40000180 + 0xA = 0x4000018A
     (0b0100 0000 0000 0000 0000 0001 1000 1010)

Status assignment of the NetWordOUT1 data word (byte 1+2 of the TPDO1)

Bit	Default setting	For details and configuration, see
0	Ready for operation	0x2634:010 (P420.10)
1	Not connected	0x2634:011 (P420.11)
2	Operation enabled	0x2634:012 (P420.12)
3	Error active	0x2634:013 (P420.13)
4	Not connected	0x2634:014 (P420.14)
5	Quick stop active	0x2634:015 (P420.15)
6	Running	0x2634:016 (P420.16)
7	Device warning active	0x2634:017 (P420.17)
8	Not connected	0x2634:018 (P420.18)
9	Not connected	0x2634:019 (P420.19)
10	Setpoint speed reached	0x2634:020 (P420.20)
11	Current limit reached	0x2634:021 (P420.21)
12	Actual speed = 0	0x2634:022 (P420.22)
13	Rotational direction reversed	0x2634:023 (P420.23)
14	Release holding brake	0x2634:024 (P420.24)
15	Safe torque off (STO) active	0x2634:025 (P420.25)

Output of the actual frequency value (byte 3+4 of the TPDO1)

- The output is made unsigned (independent of the direction of rotation) as integer in the resolution [0.1 Hz].
- An active reversal is displayed via bit 13 of the NetWordOUT1 data word.
- Example: 456 ≡ 45.6 Hz

8.5 Modbus

Modbus is an internationally approved, asynchronous, serial communication protocol, designed for commercial and industrial automation applications.

- Detailed information on the Modbus can be found on the web page of the international Modbus Organization, USA, who also further develop the Modbus protocol: http://www.modbus.org
- Information about the dimensioning of a Modbus network can be found in the configuration document for the inverter.

Preconditions

Control unit (CU) of the inverter is provided with Modbus.

8.5.1 Modbus introduction

- The process of data transmission distinguishes between three different operating modes: Modbus ASCII, Modbus RTU, and Modbus TCP. The inverter supports the Modbus RTU operating mode ("Remote Terminal Unit").
- The Modbus protocol is based on a master/slave architecture where the inverter always works as slave.
- The Modbus network only permits one master (at a time) sending commands and requests. The master is also the sole instance to be allowed to initiate Modbus communication. No direct communication takes place between the slaves.
- The physical interface corresponds to TIA/EIA-485-A which is very common and suitable for the industrial environment. This interface enables baud rates from 2400 to 115200 kbps.
- The inverter supports Modbus function codes 3, 6, 16 (0x10) and 23 (0x17).

8.5.2 Modbus node address

Each network node must be provided with a unique node address.

Details

- The node address of the inverter can be optionally set in 0x2321:001 (P510.01) or using the DIP switches on the device labelled with "1" ... "128".
- The setting that is active when the inverter is switched on is the effective setting.
- The labelling of the DIP switches corresponds to the values of the individual DIP switches for determining the node address (see the following example).
- The node address 0 is reserved for messages to all nodes ("Broadcast") .
- The active node address is shown in 0x2322:001 (P511.01).

Example of how the node address is set via the DIP switches

DIP switch	128	64	32	16	8	4	2	1
Setting	OFF	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	0	**16**	0	**4**	**2**	**1**
Node address	= sum of all values = 16 + 4 + 2 + 1 = **23**							

Parameter	Name / value range / [default setting]	Info
0x2321:001 (P510.01)	Modbus settings: Node ID (Modbus sett.: Node ID) 1 ... [**1**] ... 247	Optionally setting of the node address (instead of setting via DIP switches 1 ... 128). • The node address set here only becomes effective if DIP switches 1 ... 128 have been set to OFF before mains switching. • A change in the node address only becomes effective after a restart of Modbus communication.
0x2323 (P509.00)	Modbus switch position (Modbus switch) • Read only	Display of the DIP switch setting at the last mains power-on. • The value displayed corresponds to the sum of all DIP switch values (except for DIP switches for terminating resistor).

8.5.3 Modbus baud rate

All network nodes must be set to the same baud rate.

Details

- If the DIP switch labelled with "b" is in the OFF position at switch-on, the automatic baud rate detection function is active. If it is in the ON position, the setting in 0x2321:002 (P510.02)applies instead.
- If the automatic baud rate detection function is activated, the first 5 ... 10 messages are lost after switch-on.
- The active baud rate is displayed in 0x2322:002 (P511.02).

Parameter	Name / value range / [default setting]	Info
0x2321:002 (P510.02)	Modbus settings: Baud rate (Modbus sett.: Baud rate)	Optionally setting of the baud rate (instead of setting via DIP switch b). • The baud rate set here is only effective if DIP switch b was set to ON before mains switching. Otherwise automatic baud rate detection is active. • A change in the baud rate only becomes effective after a restart of Modbus communication. • If the automatic baud rate detection function is activated, the first 5 ... 10 messages are lost after switch-on.
	0 **Automatic**	
	1 2400 kbps	
	2 4800 kbps	
	3 9600 kbps	
	4 19200 kbps	
	5 38400 kbps	
	6 57600 kbps	
	7 115200 kbps	
0x2323 (P509.00)	Modbus switch position (Modbus switch) • Read only	Display of the DIP switch setting at the last mains power-on. • The value displayed corresponds to the sum of all DIP switch values (except for DIP switches for terminating resistor).

8.5.4 Modbus data format

All network nodes must be set to the same data format.

Details

- If the DIP switch labelled with "a" is in the OFF position at switch-on, the automatic data format detection function is active. If it is in the ON position, the setting in 0x2321:003 (P510.03)applies instead.
- If the automatic data format detection function is activated, the first 5 ... 10 messages are lost after switch-on.
- The active data format is displayed in 0x2322:003 (P511.03).

Parameter	Name / value range / [default setting]	Info
0x2321:003 (P510.03)	Modbus settings: Data format (Modbus sett.: Data format)	Definition of the parity and stop bits.
	0 **Automatic**	Automatic data format detection. • With this setting, the first 5 ... 10 messages are lost after switch-on.
	1 8, E, 1	8 data bits, even parity, 1 stop bit
	2 8, O, 1	8 data bits, odd parity, 1 stop bit
	3 8, N, 2	8 data bits, no parity bit, 2 stop bits
0x2323 (P509.00)	Modbus switch position (Modbus switch) • Read only	Display of the DIP switch setting at the last mains power-on. • The value displayed corresponds to the sum of all DIP switch values (except for DIP switches for terminating resistor).

8.5.5 Modbus time-out monitoring

The response to the missing Modbus messages can be configured via the following parameters.

Parameter	Name / value range / [default setting]	Info
0x2858:001 (P515.01)	Modbus monitoring: Response to time-out (Modbus monit.: Resp. Time-out) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response executed if no valid messages have been received via the Modbus for a longer time than the time-out period set in 0x2858:002 (P515.02). Associated error code: • 33185 | 0x81A1 - Modbus: network time-out
	3 **Fault**	▸ Error types 107

Parameter	Name / value range / [default setting]	Info
0x2858:002 (P515.02)	Modbus monitoring: Time-out time (Modbus monit.: Time-out time) 0.0 ... [**2.0**] ... 300.0 s	Time-out period for monitoring the message reception via Modbus.

8.5.6 Modbus diagnostics

The following parameters serve to diagnose the communication activities between the inverter and the Modbus network.

Parameter	Name / value range / [default setting]	Info
0x2322:001 (P511.01)	Active Modbus settings: Active node ID (Modbus diag.: Active node ID) • Read only	Display of the active node address.
0x2322:002 (P511.02)	Active Modbus settings: Active baud rate (Modbus diag.: Active baud rate) • Read only	Display of the active baud rate.
0x2322:003 (P511.03)	Active Modbus settings: Data format (Modbus diag.: Data format) • Read only	Display of the active data format.
0x232A:001 (P580.01)	Modbus statistics: Messages received (Modbus statistic: Mess. received) • Read only	Display of the total number of messages received. • This counter counts both valid and invalid messages. • After the maximum value has been reached, the counter starts again "0".
0x232A:002 (P580.02)	Modbus statistics: Valid messages received (Modbus statistic: Val. mess. rec.) • Read only	Display of the number of valid messages received. • After the maximum value has been reached, the counter starts again "0".
0x232A:003 (P580.03)	Modbus statistics: Messages with exceptions (Modbus statistic: Mess. w. exc.) • Read only	Display of the number of messages with exceptions that have been received. • After the maximum value has been reached, the counter starts again "0".
0x232A:004 (P580.04)	Modbus statistics: Messages with errors (Modbus statistic: Mess. w. errors) • Read only	Display of the number of messages received with a faulty data integrity (parity, CRC). • After the maximum value has been reached, the counter starts again "0".
0x232A:005 (P580.05)	Modbus statistics: Messages sent (Modbus statistic: Messages sent) • Read only	Display of the total number of messages sent. • After the maximum value has been reached, the counter starts again "0".
0x232E:001 (P583.01)	Modbus diagnostics of last Rx data: Offset (Rx data diagn.: Rx data offset) 0 ... [**0**] ... 240	For purposes of diagnostics, the last message received (max. 16 bytes) is shown in 0x232E:002 (P583.02)...0x232E:017 (P583.17). For longer messages, an offset can be specified here, indicating from which byte of the message the display of the 16 bytes is to start.

Parameter	Name / value range / [default setting]	Info
0x232E:002 (P583.02)	Modbus diagnostics of last Rx data: Data byte 0 (Rx data diagn.: Last RxD byte0) • Read only	Display of the message received last.
0x232E:003 (P583.03)	Modbus diagnostics of last Rx data: Data byte 1 (Rx data diagn.: Last RxD byte2) • Read only	
0x232E:004 (P583.04)	Modbus diagnostics of last Rx data: Data byte 2 (Rx data diagn.: Last RxD byte4) • Read only	
0x232E:005 (P583.05)	Modbus diagnostics of last Rx data: Data byte 3 (Rx data diagn.: Last RxD byte6) • Read only	
0x232E:006 (P583.06)	Modbus diagnostics of last Rx data: Data byte 4 (Rx data diagn.: Last RxD byte8) • Read only	
0x232E:007 (P583.07)	Modbus diagnostics of last Rx data: Data byte 5 (Rx data diagn.: Last RxD byte10) • Read only	
0x232E:008 (P583.08)	Modbus diagnostics of last Rx data: Data byte 6 (Rx data diagn.: Last RxD byte12) • Read only	
0x232E:009 (P583.09)	Modbus diagnostics of last Rx data: Data byte 7 (Rx data diagn.: Last RxD byte14) • Read only	
0x232E:010 (P583.10)	Modbus diagnostics of last Rx data: Data byte 8 (Rx data diagn.: Last RxD byte16) • Read only	
0x232E:011 (P583.11)	Modbus diagnostics of last Rx data: Data byte 9 (Rx data diagn.: Last RxD byte18) • Read only	
0x232E:012 (P583.12)	Modbus diagnostics of last Rx data: Data byte 10 (Rx data diagn.: Last RxD byte20) • Read only	
0x232E:013 (P583.13)	Modbus diagnostics of last Rx data: Data byte 11 (Rx data diagn.: Last RxD byte22) • Read only	
0x232E:014 (P583.14)	Modbus diagnostics of last Rx data: Data byte 12 (Rx data diagn.: Last RxD byte24) • Read only	
0x232E:015 (P583.15)	Modbus diagnostics of last Rx data: Data byte 13 (Rx data diagn.: Last RxD byte26) • Read only	
0x232E:016 (P583.16)	Modbus diagnostics of last Rx data: Data byte 14 (Rx data diagn.: Last RxD byte28) • Read only	
0x232E:017 (P583.17)	Modbus diagnostics of last Rx data: Data byte 15 (Rx data diagn.: Last RxD byte30) • Read only	
0x232F:001 (P585.01)	Modbus diagnostics of last Tx data: Offset (Tx data diagn.: Tx data offset) 0 ... [**0**] ... 240	For purposes of diagnostics, the last message sent (max. 16 bytes) is shown in 0x232F:002 (P585.02)...0x232F:017 (P585.17). For longer messages, an offset can be specified here, indicating from which byte of the message the display of the 16 bytes is to start.

Parameter	Name / value range / [default setting]	Info
0x232F:002 (P585.02)	Modbus diagnostics of last Tx data: Data byte 0 (Tx data diagn.: Last TxD byte0) • Read only	Display of the message sent last.
0x232F:003 (P585.03)	Modbus diagnostics of last Tx data: Data byte 1 (Tx data diagn.: Last TxD Byte1) • Read only	
0x232F:004 (P585.04)	Modbus diagnostics of last Tx data: Data byte 2 (Tx data diagn.: Last TxD byte2) • Read only	
0x232F:005 (P585.05)	Modbus diagnostics of last Tx data: Data byte 3 (Tx data diagn.: Last TxD byte3) • Read only	
0x232F:006 (P585.06)	Modbus diagnostics of last Tx data: Data byte 4 (Tx data diagn.: Last TxD byte4) • Read only	
0x232F:007 (P585.07)	Modbus diagnostics of last Tx data: Data byte 5 (Tx data diagn.: Last TxD byte5) • Read only	
0x232F:008 (P585.08)	Modbus diagnostics of last Tx data: Data byte 6 (Tx data diagn.: Last TxD byte6) • Read only	
0x232F:009 (P585.09)	Modbus diagnostics of last Tx data: Data byte 7 (Tx data diagn.: Last TxD byte7) • Read only	
0x232F:010 (P585.10)	Modbus diagnostics of last Tx data: Data byte 8 (Tx data diagn.: Last TxD byte8) • Read only	
0x232F:011 (P585.11)	Modbus diagnostics of last Tx data: Data byte 9 (Tx data diagn.: Last TxD byte9) • Read only	
0x232F:012 (P585.12)	Modbus diagnostics of last Tx data: Data byte 10 (Tx data diagn.: Last TxD byte10) • Read only	
0x232F:013 (P585.13)	Modbus diagnostics of last Tx data: Data byte 11 (Tx data diagn.: Last TxD byte11) • Read only	
0x232F:014 (P585.14)	Modbus diagnostics of last Tx data: Data byte 12 (Tx data diagn.: Last TxD byte12) • Read only	
0x232F:015 (P585.15)	Modbus diagnostics of last Tx data: Data byte 13 (Tx data diagn.: Last TxD byte13) • Read only	
0x232F:016 (P585.16)	Modbus diagnostics of last Tx data: Data byte 14 (Tx data diagn.: Last TxD byte14) • Read only	
0x232F:017 (P585.17)	Modbus diagnostics of last Tx data: Data byte 15 (Tx data diagn.: Last TxD byte15) • Read only	

8.5.7 Modbus function codes

The mode of access to inverter data (parameters) is controlled via function codes.

Details

The inverter supports the following function codes:

Function code		Function name	Description
3	0x03	Read Holding Registers	Read one or more 16-bit data words.
6	0x06	Preset Single Register	Write a 16-bit data word.
16	0x10	Preset Multiple Registers	Write one or more 16-bit data words.
23	0x17	Read/Write 4X Registers	Write one or more 16-bit data words and read them back.

Addressing

- The function codes listed above exclusively refer to 4X registers in Modbus addressing.
- All data in the inverter can only be accessed via 4X registers, i.e. via register addresses from 40001.
- The 4xxxx reference is implicit, i. e. given by the function code used. In the frame therefore the leading 4 is omitted in the addressing process.
- The numbering of the registers starts with 1; addressing, however, starts with 0. Therefore, for instance, the address 0 is used in the frame when register 40001 is read.

Telegram structure

Communication is established on the basis of the central medium access method. Communication is always started by a master request. The inverter (slave) then either gives a valid response or outputs an error code (provided that the request has been received and evaluated as a valid Modbus frame). Error causes can be invalid CRC checksums, function codes that are not supported, or impermissible data access.

All Modbus frames have the following basic structure:

- A "frame" consists of a PDU (Protocol Data Unit) and an ADU (Application Data Unit).
- The PDU contains the function code and the data belonging to the function code.
- The ADU serves the purposes of addressing and error detection.
- The data are represented in Big Endian format (most significant byte first).

ADU (Application Data Unit)			
Slave address	Function code	Data	Checksum (CRC)
	PDU (Protocol Data Unit)		

Error codes

Error code	Name	Cause(s)
0x01	Invalid function code	The function code is not supported by the inverter, or the inverter is in a state in which the request is not permissible or in which it cannot be processed.
0x02	Invalid data address	The combination of a start address and the length of the data to be transmitted is invalid. Example: If you have a slave with 100 registers, the first register has the address 0 and the last register has the address 99. If there is a request of four registers now, from the start address 96, the request can be processed successfully (for registers 96, 97, 98, and 99). If, however, five registers from the start address 96 are queried, this error code is returned, since the slave has no register with the address 100.
0x03	Invalid data value	The cause, however, is not that a (parameter) value is written outside the valid setting range. As a matter of principle, the Modbus protocol has no information on valid setting ranges of individual registers or their meaning.
0x04	Slave device failure	A non-correctable error has occurred while the request was processed in the inverter.

8.5.8 Modbus data mapping

The process of data mapping is used for defining which Modbus registers read or write to which inverter parameters.

Details

- There are fixedly defined Modbus registers for common control and status words, which are located in coherent blocks, in order to facilitate communication with OPC servers and other Modbus masters. In order to access all relevant data of the inverter, only a minimum number of commands is required.
- In addition, 24 registers are provided for variable mapping, i. e. free assignment to inverter parameters.

Predefined Modbus control registers

- These registers are provided with write and read access.
- The cross-reference in column 2 leads to the detailed parameter description.

Modbus registers	Permanently assigned parameter	
	Address	Name
42101	0x400B:001 (P592.01)	AC Drive control word
42102	0x400B:005 (P592.05)	Network setpoint frequency
42103	0x4008:002 (P590.02)	NetWordIN2
42104	0x4008:003 (P590.03)	NetWordIN3
42105	0x400B:007 (P592.07)	PID setpoint
42106	0x6071	Target torque
42107	0x4008:001 (P590.01)	NetWordIN1
42108	0x4008:004 (P590.04)	NetWordIN4
42109 ... 42121	-	Reserved

Predefined Modbus status registers

- These registers are only provided with read access.
- The cross-reference in column 2 leads to the detailed parameter description.

Modbus registers	Permanently assigned parameter	
	Address	Name
42001	0x400C:001 (P593.01)	AC Drive status word
42002	0x400C:006 (P593.06)	Frequency [0.01 Hz]
42003	0x603F (P150.00)	Error code
42004	0x400C:005 (P593.05)	Drive status
42005	0x2D89 (P106.00)	Motor voltage
42006	0x2D88 (P104.00)	Motor current
42007	0x6078 (P103.00)	Current actual value
42008	0x2DA2:002 (P108.02)	Apparent power (42008 = High Word, 42009 = Low Word)
42009		
42010	0x2D84:001 (P117.01)	Heatsink temperature
42011	0x2D87 (P105.00)	DC-bus voltage
42012	0x60FD (P118.00)	Digital inputs (only bit 16 ... bit 31)
42013	0x6077 (P107.00)	Torque actual value
42014 ... 42021	-	Reserved

Variable mapping

- Via 0x232B:1 ... 24, 24 registers can be mapped variably to parameters of the inverter. Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex)
- The display of the internal Modbus register numbers in 0x232C:1 ... 24 is generated automatically. Since 32-bit parameters require two registers, there is no 1:1 assignment.
- For the mappable registers, a CRC (Cyclic Redundancy Check) is executed. The checksum determined is displayed in 0x232D (P532.00). The user can read this "validation code" and use it for comparison in the Modbus master. In this way it can be checked whether the inverter currently queried is configured correctly for the respective application.

Parameter	Name / value range / [default setting]	Info
0x232B:001 (P530.01)	Modbus parameter mapping: Parameter 1 (Para. mapping: Parameter 1) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40103.
0x232B:002 (P530.02)	Modbus parameter mapping: Parameter 2 (Para. mapping: Parameter 2) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40105.
0x232B:003 (P530.03)	Modbus parameter mapping: Parameter 3 (Para. mapping: Parameter 3) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40107.
0x232B:004 (P530.04)	Modbus parameter mapping: Parameter 4 (Para. mapping: Parameter 4) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40109.
0x232B:005 (P530.05)	Modbus parameter mapping: Parameter 5 (Para. mapping: Parameter 5) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40111.
0x232B:006 (P530.06)	Modbus parameter mapping: Parameter 6 (Para. mapping: Parameter 6) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40113.
0x232B:007 (P530.07)	Modbus parameter mapping: Parameter 7 (Para. mapping: Parameter 7) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40115.
0x232B:008 (P530.08)	Modbus parameter mapping: Parameter 8 (Para. mapping: Parameter 8) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40117.
0x232B:009 (P530.09)	Modbus parameter mapping: Parameter 9 (Para. mapping: Parameter 9) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40119.
0x232B:010 (P530.10)	Modbus parameter mapping: Parameter 10 (Para. mapping: Parameter 10) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40121.
0x232B:011 (P530.11)	Modbus parameter mapping: Parameter 11 (Para. mapping: Parameter 11) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40123.
0x232B:012 (P530.12)	Modbus parameter mapping: Parameter 12 (Para. mapping: Parameter 12) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40125.
0x232B:013 (P530.13)	Modbus parameter mapping: Parameter 13 (Para. mapping: Parameter 13) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40127.
0x232B:014 (P530.14)	Modbus parameter mapping: Parameter 14 (Para. mapping: Parameter 14) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40129.
0x232B:015 (P530.15)	Modbus parameter mapping: Parameter 15 (Para. mapping: Parameter 15) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40131.
0x232B:016 (P530.16)	Modbus parameter mapping: Parameter 16 (Para. mapping: Parameter 16) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40133.
0x232B:017 (P530.17)	Modbus parameter mapping: Parameter 17 (Para. mapping: Parameter 17) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40135.
0x232B:018 (P530.18)	Modbus parameter mapping: Parameter 18 (Para. mapping: Parameter 18) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40137.
0x232B:019 (P530.19)	Modbus parameter mapping: Parameter 19 (Para. mapping: Parameter 19) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40139.
0x232B:020 (P530.20)	Modbus parameter mapping: Parameter 20 (Para. mapping: Parameter 20) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40141.
0x232B:021 (P530.21)	Modbus parameter mapping: Parameter 21 (Para. mapping: Parameter 21) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40143.

Parameter	Name / value range / [default setting]	Info
0x232B:022 (P530.22)	Modbus parameter mapping: Parameter 22 (Para. mapping: Parameter 22) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40145.
0x232B:023 (P530.23)	Modbus parameter mapping: Parameter 23 (Para. mapping: Parameter 23) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40147.
0x232B:024 (P530.24)	Modbus parameter mapping: Parameter 24 (Para. mapping: Parameter 24) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Mapping entry for Modbus register 40149.
0x232C:001 (P531.01)	Modbus register assignment: Register 1 (Reg. assigned: Register 1) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:1 is stored. • For the first parameter mapped, always 2500.
0x232C:002 (P531.02)	Modbus register assignment: Register 2 (Reg. assigned: Register 2) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:2 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:003 (P531.03)	Modbus register assignment: Register 3 (Reg. assigned: Register 3) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:3 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:004 (P531.04)	Modbus register assignment: Register 4 (Reg. assigned: Register 4) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:4 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:005 (P531.05)	Modbus register assignment: Register 5 (Reg. assigned: Register 5) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:5 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:006 (P531.06)	Modbus register assignment: Register 6 (Reg. assigned: Register 6) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:6 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:007 (P531.07)	Modbus register assignment: Register 7 (Reg. assigned: Register 7) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:7 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:008 (P531.08)	Modbus register assignment: Register 8 (Reg. assigned: Register 8) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:8 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:009 (P531.09)	Modbus register assignment: Register 9 (Reg. assigned: Register 9) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:9 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:010 (P531.10)	Modbus register assignment: Register 10 (Reg. assigned: Register 10) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:10 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:011 (P531.11)	Modbus register assignment: Register 11 (Reg. assigned: Register 11) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:11 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:012 (P531.12)	Modbus register assignment: Register 12 (Reg. assigned: Register 12) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:12 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:013 (P531.13)	Modbus register assignment: Register 13 (Reg. assigned: Register 13) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:13 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.

Parameter	Name / value range / [default setting]	Info
0x232C:014 (P531.14)	Modbus register assignment: Register 14 (Reg. assigned: Register 14) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:14 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:015 (P531.15)	Modbus register assignment: Register 15 (Reg. assigned: Register 15) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:15 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:016 (P531.16)	Modbus register assignment: Register 16 (Reg. assigned: Register 16) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:16 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:017 (P531.17)	Modbus register assignment: Register 17 (Reg. assigned: Register 17) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:17 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:018 (P531.18)	Modbus register assignment: Register 18 (Reg. assigned: Register 18) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:18 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:019 (P531.19)	Modbus register assignment: Register 19 (Reg. assigned: Register 19) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:19 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:020 (P531.20)	Modbus register assignment: Register 20 (Reg. assigned: Register 20) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:20 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:021 (P531.21)	Modbus register assignment: Register 21 (Reg. assigned: Register 21) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:21 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:022 (P531.22)	Modbus register assignment: Register 22 (Reg. assigned: Register 22) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:22 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:023 (P531.23)	Modbus register assignment: Register 23 (Reg. assigned: Register 23) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:23 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232C:024 (P531.24)	Modbus register assignment: Register 24 (Reg. assigned: Register 24) • Read only	Display of the internal Modbus register number starting from which the parameter mapped in 0x232B:24 is stored. • 2500 + offset. The offset results from the data types of the previously mapped parameters.
0x232D (P532.00)	Modbus verification code (Verificationcode) • Read only	
0x6071	Target torque -3276.8 ... [**0.0**] ... 3276.7 %	Setpoint torque for the "MS: Torque mode" operating mode. • 100 % ≡ Motor rated torque 0x6076 (P325.00)

8.5.9 Modbus LED status displays

Information about the Modbus status can be obtained quickly via the "MOD-RUN" and "MOD-ERR" LED displays on the front of the inverter.

The meaning can be seen from the tables below.

Inverter not active on the Modbus bus (yet)

LED "MOD-RUN"	LED "MOD-ERR"	Meaning
off	on	Internal error
Both LEDs are flickering alternately		Automatic detection of baud rate and data format active.

Inverter active on the Modbus

The green "MOD-RUN" LED indicates the communication status:

LED "MOD-RUN"	Communication status
off	No reception / no transmission
on	Reception / transmission active

The red "MOD-ERR" LED indicates an error:

LED "MOD-ERR"	Error
off	No fault
Blinking	Communication error

8.5.10 Reset Modbus interface

Parameter	Name / value range / [default setting]	Info
0x2320 (P508.00)	Modbus communication (Modbus comm.) 0 ... [**0**] ... 1	1 = activate network options.

8.5.11 Modbus response time

Parameter	Name / value range / [default setting]	Info
0x2321:004 (P510.04)	Modbus settings: Minimum response time (Modbus sett.: Min. resp. time) 0 ... [**0**] ... 1000 ms	Minimum time delay between the reception of a valid message and the response of the drive.

8.5.12 Short setup of Modbus

In the following, the steps required for controlling the inverter via Modbus are described.

Parameterisation required

1. Activate network control: 0x2631:037 (P400.37) = "TRUE [1]"
2. Set network as standard setpoint source: 0x2860:001 (P201.01) = "Network [5]"
3. Set Modbus node address.
   - Each network node must be provided with a unique node address.
   - Details: ▸ Modbus node address 📖 212
4. Set Modbus baud rate.
   - Default setting: Automatic detection.
   - If the automatic baud rate detection function is activated, the first 5 ... 10 messages are lost after switch-on.
   - Details: ▸ Modbus baud rate 📖 213
5. Set Modbus data format.
   - Default setting: Automatic detection.
   - If the automatic data format detection function is activated, the first 5 ... 10 messages are lost after switch-on.
   - Details: ▸ Modbus data format 📖 213

In the default setting, the digital input DI1 is assigned with the "Run" function. If the network control is activated, this function serves as "start enable" for start commands via network. Hence, the digital input DI1 must be set to HIGH level in order that the motor can be started via network. ▸ Start / stop motor 📖 372

Starting/stopping the drive via Modbus

For starting/stopping the drive, Modbus register 42101 can be used.

- Modbus register 42101 is permanently assigned to the AC Drive control word 0x400B:001 (P592.01).
- In the frame, the leading 4 is omitted in the addressing process. The numbering of the registers starts with 1; addressing, however starts with 0. Therefore the address 2100 (0x0834) is used in the frame when register 42101 is written.

Bits set in the AC drive control word:

- Bit 0 ≡ Run forward (CW)
- Bit 5 ≡ Activate network control
- Bit 6 ≡ Activate network setpoint

Example of an inverter with the node address 1:

Request frame by the master							
Slave address	Function code	Data				Checksum (CRC)	
		Register address		AC Drive control word			
0x01	0x06	0x08	0x34	0x00	0x61	0x0B	0x8C

If digital input DI1 ("Start enable") is set to HIGH level, the drive should start and the inverter should respond with the same frame as confirmation:

Response message from the inverter							
Slave address	Function code	Data				Checksum (CRC)	
		Register address		AC Drive control word			
0x01	0x06	0x08	0x34	0x00	0x61	0x0B	0x8C

8.6 PROFIBUS

PROFIBUS® (Process Field Bus) is a widely-used fieldbus system for the automation of machines and production plants.

- Detailed information on PROFIBUS can be found on the web page of the PROFIBUS & PROFINET International (PI) user organisation: http://www.profibus.com
- Information about the dimensioning of a PROFIBUS network can be found in the configuration document for the inverter.
- PROFIBUS® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organisation.

Preconditions

- Control unit (CU) of the inverter is provided with PROFIBUS.
- The GSE device description files for PROFIBUS can be found here: http://www.lenze.com/application-knowledge-base/artikel/200412329/0/

8.6.1 PROFIBUS introduction

The inverter is integrated into a PROFIBUS-DP network as slave. Therefore it is only allowed to receive and acknowledge messages and to respond to requests by a master. The master is also referred to as an active node. Two different types are distinguished:

- Class 1 DP master: central control (PLC or PC) which cyclically exchanges process data with the slave. Acyclic data exchange via a separate transmission channel is also possible.
- Class 2 DP master: engineering, configuration, or operator device (HMI) which only exchanges data with the slave acyclically, e.g. for the purposes of configuration, maintenance, or diagnostics.

8.6.2 PROFIBUS communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times in the PROFIBUS network depend on the ...

- processing time in the inverter
- Telegram runtime (baud rate/telegram length),
- nesting depth of the network.

In the case of the inverter, the processing time for process data is approx. 2 ... 3 ms, and for parameter data (DPV1) it is approx. 10 ms. There are no interdependencies between parameter data and process data.

8.6.3 PROFIBUS station address

Each network node must be provided with a unique station address.

Details

- The station address of the inverter can be optionally set via the DIP switches on the device labelled with "1" ... "64" or in 0x2341:001 (P510.01). (The DIP switches have priority.)
- The setting that is active when the inverter is switched on is the effective setting.
- The labelling of the DIP switches corresponds to the values of the individual DIP switches for determining the station address (see the following example).
- The active station address is shown in 0x2342:001 (P511.01).

Example of how the station address is set via the DIP switches

DIP switch	64	32	16	8	4	2	1
Setting	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	**16**	0	**4**	**2**	**1**
Station address	= sum of all values = 16 + 4 + 2 + 1 = **23**						

Parameter	Name / value range / [default setting]	Info
0x2341:001 (P510.01)	PROFIBUS settings: Station address (PROFIBUS sett.: Station address) 1 ... [**3**] ... 125	Optional setting of the station address (instead of setting via DIP switches 1 ... 64). • The station address set here only becomes effective if DIP switches 1 ... 64 have been set to OFF before mains switching. • A change in the station address only becomes effective after a restart of PROFIBUS communication.
0x2342:001 (P511.01)	Active PROFIBUS settings: Active station address (PROFIBUS diag.: Act.station addr) • Read only	Display of the active station address.
0x2343 (P509.00)	PROFIBUS switch position (PROFIBUS switch) • Read only	Display of the DIP switch setting at the last mains power-on. • The displayed value corresponds to the sum of the individual DIP switch values 1 ... 64.

8.6.4 PROFIBUS baud rate

At the class 1 DP master, the desired baud rate is set. All masters at the bus must be set to the same baud rate.

Details

- The inverter detects the baud rate automatically.
- The active baud rate is displayed in 0x2342:002 (P511.02).
- The status of automatic detection is displayed in 0x2348:002 (P516.02).

Parameter	Name / value range / [default setting]		Info
0x2342:002 (P511.02)	Active PROFIBUS settings: Active baud rate (PROFIBUS diag.: Active baud rate) • Read only		Display of the active baud rate.
	0	12 Mbps	
	1	6 Mbps	
	2	3 Mbps	
	3	1.5 Mbps	
	4	500 kbps	
	5	187.5 kbps	
	6	93.75 kbps	
	7	45.45 kbps	
	8	19.2 kbps	
	9	9.6 kbps	
	15	Search	Automatic baud rate detection active.

Parameter	Name / value range / [default setting]		Info
0x2348:002 (P516.02)	PROFIBUS Status: Watchdog status (PROFIBUS Status: Watchdog status) • Read only		Display of the current state of the watchdog state machine (WD-STATE).
	0	BAUD_SEARCH	The inverter (slave) is able to detect the baud rate automatically.
	1	BAUD_CONTROL	After detecting the correct baud rate, the inverter (slave) status changes to BAUD_CONTROL, and the baud rate is monitored.
	2	DP_CONTROL	The DP_CONTROL state serves to the response monitoring of the master.

8.6.5 PROFIBUS monitoring

The inverter can give a parameterisable response to various PROFIBUS errors.

Details

The following table lists the PROFIBUS errors that can be set for a response.

Event	Display in	Response can be set in	Default setting
Communication to the PROFIBUS master is continuously interrupted.	0x2349 (P517.00), Bit 0	0x2859:001 (P515.01)	Error
Data exchange via PROFIBUS has been terminated.	0x2349 (P517.00), Bit 1	0x2859:002 (P515.02)	No response
The inverter has received invalid configuration data from the master.	0x2349 (P517.00), Bit 2	0x2859:003 (P515.03)	Error
An error has occurred during the initialisation of the PROFIBUS interface.	0x2349 (P517.00), Bit 3	0x2859:004 (P515.04)	Error
The process data received are invalid.	0x2349 (P517.00), Bit 4	0x2859:005 (P515.05)	Trouble

Parameter	Name / value range / [default setting]		Info
0x2342:003 (P511.03)	Active PROFIBUS settings: Watchdog time (PROFIBUS diag.: Watchdog time) • Read only		Display of the watchdog monitoring time specified by the master. • Monitoring starts with the arrival of the first telegram. • When a value of "0" is displayed, the monitoring function is deactivated. • A change in the watchdog monitoring time in the master is effective immediately.
0x2348:002 (P516.02)	PROFIBUS Status: Watchdog status (PROFIBUS Status: Watchdog status) • Read only		Display of the current state of the watchdog state machine (WD-STATE).
	0	BAUD_SEARCH	The inverter (slave) is able to detect the baud rate automatically.
	1	BAUD_CONTROL	After detecting the correct baud rate, the inverter (slave) status changes to BAUD_CONTROL, and the baud rate is monitored.
	2	DP_CONTROL	The DP_CONTROL state serves to the response monitoring of the master.

Parameter	Name / value range / [default setting]	Info
0x2349 (P517.00)	PROFIBUS error (PROFIBUS error) • Read only	Bit-coded display of PROFIBUS errors.
	Bit 0 Watchdog elapsed	Communication with the PROFIBUS master is continuously interrupted, e. g. by cable break or failure of the PROFIBUS master. • No process data are sent to the inverter (slave) in the "Data Exchange" state. • When the watchdog monitoring time specified by the master has elapsed, the response set in 0x2859:001 (P515.01) is triggered in the inverter. Preconditions for a response by the inverter (slave): • The slave is in the "Data Exchange" state. • The watchdog monitoring time is configured correctly in the master (1 ... 65535 ms). If one of these preconditions is not met, the response to the absence of cyclic process data telegrams from the master is not executed.
	Bit 1 Data exchange completed	Data exchange via PROFIBUS has been terminated. • The inverter (slave) can be instructed by the master to exit the "Data Exchange" state. • If this state change is to be treated as an error in the inverter, the desired response can be set in 0x2859:002 (P515.02).
	Bit 2 Incorrect configuration data	The inverter (slave) has received invalid configuration data from the master. • The response set in 0x2859:003 (P515.03) is effected.
	Bit 3 Initialisation error	An error has occurred during the initialisation of the PROFIBUS interface. • The response set in 0x2859:004 (P515.04) is effected.
	Bit 4 Invalid process data	The inverter (slave) has received invalid process data from the master, e.g. no process data or deleted process data are sent by the "Stop" operating status in the master. • The response set in 0x2859:005 (P515.05) is effected.
0x2859:001 (P515.01)	PROFIBUS monitoring: Watchdog elapsed (PROFIBUS monit.: WD elapsed) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to the continuous interruption of communication to the PROFIBUS master, e. g. by cable break or failure of the PROFIBUS master. Associated error code: • 33168 | 0x8190 - Network: watchdog timeout
	3 Fault	▸ Error types 107
0x2859:002 (P515.02)	PROFIBUS monitoring: Data exchange completed (PROFIBUS monit.: Data exch.exited) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to exiting the "Data Exchange" state. Associated error code: • 33169 | 0x8191 - Network: disruption of cyclic data exchange
	0 No response	▸ Error types 107
0x2859:003 (P515.03)	PROFIBUS monitoring: Invalid configuration (PROFIBUS monit.: Invalid config) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response triggered by the reception of invalid configuration data. Associated error code: • 33414 | 0x8286 - Network: PDO mapping error
	3 Fault	▸ Error types 107
0x2859:004 (P515.04)	PROFIBUS monitoring: Initialisation error (PROFIBUS monit.: Init. error) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response triggered by the occurrence of an error during the initialisation of the PROFIBUS module. Associated error code: • 33170 | 0x8192 - Network: initialisation error
	3 Fault	▸ Error types 107
0x2859:005 (P515.05)	PROFIBUS monitoring: Invalid process data (PROFIBUS monit.: Inval. proc.data) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response triggered by the reception of invalid process data. • If the master changes to the "Stop" state, no cyclic process data are sent to the inverter (slave) anymore; the length of the process data then is 0. Associated error code: • 33171 | 0x8193 - Network: invalid cyclic process data
	2 Trouble	▸ Error types 107

8.6.6 PROFIBUS LED status displays

Information about the PROFIBUS status can be obtained quickly via the "NS" and "NE" LED displays on the front of the inverter.

The meaning can be seen from the table below.

LED "NS" (green)	LED "NE" (red)	Status/meaning
off	off	No supply voltage available, network deactivated, not initialised, or firmware download active.
on		Connected with master, control running, "Data Exchange" state active.
Blinking		Not connected, control stopped, or no data exchange.
Blinking	Blinking	Watchdog monitoring time elapsed.
Any	Flashing	PROFIBUS parameterisation error.
	Flashing 2 x	PROFIBUS configuration error.
off	on	Invalid station address set or non-correctable error.

8.6.7 PROFIBUS diagnostics

The following parameters serve to diagnose the communication activities between the inverter and the PROFIBUS network.

Parameter	Name / value range / [default setting]	Info
0x2344:001 (P512.01)	PROFIBUS Configuration: Extended diagnostic bit (PROFIBUS Config.: Ext. diag. bit)	1 = set external diagnostic bit ("Diag Bit"). • The diagnostic bit is sent to the master where it is evaluated separately.
	0 Delete	
	1 Set	
0x2348:001 (P516.01)	PROFIBUS Status: Bus status (PROFIBUS Status: Bus status) • Read only	Display of the current DP state machine state (DP-STATE).
	0 WAIT_PRM	After the run-up, the inverter (slave) is waiting for parameter data (CHK_PRM) from the master. All other frame types are not processed. Exchanging user data with the master is not possible yet.
	1 WAIT_CFG	The inverter (slave) is waiting for configuration data (CHK_CFG) from the master that define the structure of the cyclic frames.
	2 DATA_EXCH	Parameter and configuration data have been received and accepted by the inverter (slave). The inverter is in the "Data Exchange" state. It is now possible to exchange user data with the master.
0x234A:001 (P580.01)	PROFIBUS statistics: Data cycles per second (PROFIBUS counter: Data cycles/sec.) • Read only	Display of the data cycles per second.
0x234A:002 (P580.02)	PROFIBUS statistics: Parameterization events (PROFIBUS counter: PRM events) • Read only	Display of the number of parameterisation events.
0x234A:003 (P580.03)	PROFIBUS statistics: Configuration events (PROFIBUS counter: CFG events) • Read only	Display of the number of configuration events.
0x234A:004 (P580.04)	PROFIBUS statistics: Diagnostics events (PROFIBUS counter: DIAG events) • Read only	Display of the number of diagnostic telegrams sent.
0x234A:005 (P580.05)	PROFIBUS statistics: C1 messages (PROFIBUS counter: C1 messages) • Read only	Display of the number of requests by the class 1 DPV1 master.
0x234A:006 (P580.06)	PROFIBUS statistics: C2 messages (PROFIBUS counter: C2 messages) • Read only	Display of the number of requests by the class 2 DPV1 master.
0x234A:007 (P580.07)	PROFIBUS statistics: Watchdog events (PROFIBUS counter: WD events) • Read only	Display of the number of watchdog events.

Parameter	Name / value range / [default setting]	Info
0x234A:008 (P580.08)	PROFIBUS statistics: Data exchange aborts (PROFIBUS counter: DataEx.event) • Read only	Display of the number of "Data Exchange exited" events.
0x234A:009 (P580.09)	PROFIBUS statistics: Total data cycles (PROFIBUS counter: Tot. data cycles) • Read only	Display of the number of cyclic process data received.

8.6.8 PROFIBUS functions

The inverter supports PROFIBUS DP-V0 (DRIVECOM profile) and PROFIBUS DP-V1 (PROFIdrive profile). PROFIBUS DP-V2 is not supported.

Details

The PROFIBUS DP communication protocol is provided with the following functions:

- DP-V0: cyclic data exchange, diagnostics (all devices).
- DP-V1: acyclic data exchange, process alarm processing (process automation). Note: The inverter does not support any alarm diagnostics.
- DP-V2: cycle synchronisation and time stamp, slave-to-slave communication.

A class 1 DP master connection (DPV1 C1) between a cyclic master and slave is established automatically when the "Data Exchange" state has been established. In byte 7 of the parameterisation frame, the "DPV1_Enable" bit must be set. Furthermore, a class 2 DP master connection (DPV1 C2) with the slave can be defined by another master connected. This connection must be established via the "MSAC2_Initiate" service.

The inverter supports the following acyclic DPV1 services:

- MSAC1_Read/Write: C1 read/write request for a data block.
- MSAC2_Initiate/Abort: connection or disconnection for acyclic data exchange between a class 2 DP master and the slave.
- MSAC2_Read/Write: C2 read/write request for a data block.

8.6.9 PROFIBUS data mapping

Data mapping is used to define which process data are exchanged cyclically between the master and slave. Data mapping is defined in the hardware configurator. The configuration of the process data is automatically sent to the inverter. The same applies to the bit configuration of the data words NetWordIN1 and NetWordOUT1.

Details

- First the user imports the GSD file into the hardware configurator of the control. By adding the node to the PROFIBUS network configuration, the user can then select the data required for the application.
- After the start-up, the master communicates the structure of the cyclic frames to the inverter (slave) via the configuration frame (CHK_CFG).
- The inverter checks the configuration. If the configuration is accepted, the inverter changes from the "Wait Configuration" state to the "Data Exchange" state. It is now possible to exchange user data with the master.
- Internal mapping of the cyclic data is set in 0x24E0:xxx (master → inverter direction) and 0x24E1:xxx (inverter → master direction).

Parameter	Name / value range / [default setting]	Info
0x24E0:000	Generic RPDO mapping: Highest subindex 0 ... [**2**] ... 16 • From version 02.00	Number of mapping entries for RPDO.
0x24E0:001	Generic RPDO mapping: Entry 1 0x00000000 ... [**0x60400010**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 1 for RPDO.
0x24E0:002	Generic RPDO mapping: Entry 2 0x00000000 ... [**0x60420010**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 2 for RPDO.

Parameter	Name / value range / [default setting]	Info
0x24E0:003	Generic RPDO mapping: Entry 3 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 3 for RPDO.
0x24E0:004	Generic RPDO mapping: Entry 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 4 for RPDO.
0x24E0:005	Generic RPDO mapping: Entry 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 5 for RPDO.
0x24E0:006	Generic RPDO mapping: Entry 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 6 for RPDO.
0x24E0:007	Generic RPDO mapping: Entry 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 7 for RPDO.
0x24E0:008	Generic RPDO mapping: Entry 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 8 for RPDO.
0x24E0:009	Generic RPDO mapping: Entry 9 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 9 for RPDO.
0x24E0:010	Generic RPDO mapping: Entry 10 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 10 for RPDO.
0x24E0:011	Generic RPDO mapping: Entry 11 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 11 for RPDO.
0x24E0:012	Generic RPDO mapping: Entry 12 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 12 for RPDO.
0x24E0:013	Generic RPDO mapping: Entry 13 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 13 for RPDO.
0x24E0:014	Generic RPDO mapping: Entry 14 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 14 for RPDO.
0x24E0:015	Generic RPDO mapping: Entry 15 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 15 for RPDO.
0x24E0:016	Generic RPDO mapping: Entry 16 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 16 for RPDO.
0x24E1:000	Generic TPDO mapping: Highest subindex 0 ... [**3**] ... 16 • From version 02.00	Number of mapping entries for TPDO.
0x24E1:001	Generic TPDO mapping: Entry 1 0x00000000 ... [**0x60410010**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 1 for TPDO.
0x24E1:002	Generic TPDO mapping: Entry 2 0x00000000 ... [**0x60440010**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 2 for TPDO.
0x24E1:003	Generic TPDO mapping: Entry 3 0x00000000 ... [**0x603F0010**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 3 for TPDO.
0x24E1:004	Generic TPDO mapping: Entry 4 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 4 for TPDO.
0x24E1:005	Generic TPDO mapping: Entry 5 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 5 for TPDO.
0x24E1:006	Generic TPDO mapping: Entry 6 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 6 for TPDO.

Parameter	Name / value range / [default setting]	Info
0x24E1:007	Generic TPDO mapping: Entry 7 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 7 for TPDO.
0x24E1:008	Generic TPDO mapping: Entry 8 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 8 for TPDO.
0x24E1:009	Generic TPDO mapping: Entry 9 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 9 for TPDO.
0x24E1:010	Generic TPDO mapping: Entry 10 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 10 for TPDO.
0x24E1:011	Generic TPDO mapping: Entry 11 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 11 for TPDO.
0x24E1:012	Generic TPDO mapping: Entry 12 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 12 for TPDO.
0x24E1:013	Generic TPDO mapping: Entry 13 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 13 for TPDO.
0x24E1:014	Generic TPDO mapping: Entry 14 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 14 for TPDO.
0x24E1:015	Generic TPDO mapping: Entry 15 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 15 for TPDO.
0x24E1:016	Generic TPDO mapping: Entry 16 0x00000000 ... [**0x00000000**] ... 0xFFFFFFFF • From version 02.00	Mapping entry 16 for TPDO.

8.6.10 PROFIBUS - acyclic data transfer

Data communication with PROFIBUS DP-V0 is characterised by cyclic diagnostics and cyclic process data transfer. An optional service expansion is the acyclic parameter data transfer of PROFIBUS DP-V1. This service does not impair the functionality of the standard services under PROFIBUS DP-V0.

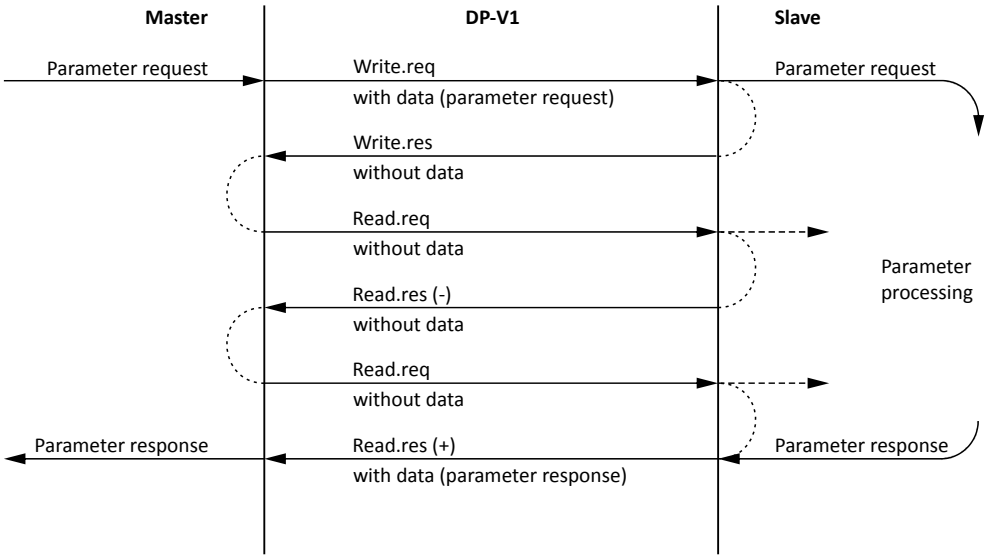
Details

- PROFIBUS DP-V0 and PROFIBUS DP-V1 can be operated simultaneously in the same network. This enables the step-by-step expansion or modification of a system.
- The services of PROFIBUS DP-V1 can be used by the class 1 master (PLC) and the class 2 DP master (diagnostics master, etc.).
- Integration of the acyclic service into the fixed bus cycle depends on the corresponding configuration of the class 1 master:
  - With configuration, a time slot is reserved.
  - Without configuration, the acyclic service is appended when a class 2 DP master acyclically accesses a DP-V1 slave.

Product features

- 16 bits each for addressing the parameter index and subindex.
- Several parameter requests can be combined to one request (multi-parameter requests).
- Only one request is processed at a time (no pipelining).
- A request or response must fit into one data block (max. 240 bytes). Requests or responses cannot be split into several data blocks.
- No spontaneous messages are transferred.
- There are only acyclic parameter requests.
- Profile-specific parameters can be read independently of the slave state.
- A class 1 DP master can always request parameters from a slave if the slave is in the "Data Exchange" state.
- In addition to a class 1 DP master, a class 2 DP master can establish communication with a slave:

Transmission directions for acyclic data transfer



Procedure:

1. A "Write.req" is used to pass the data set (DB47) to the slave in the form of a parameter request.
2. With "Write.res" the master receives the confirmation for the receipt of the message.
3. The master requests the response of the slave with "Read.req".
4. The slave responds with "Read.res (-)" if processing has not been completed yet.
5. After parameter processing, the parameter request is completed by transmitting the parameter response to the master with "Read.res (+)".

Telegram structure

SD	LE	LEr	SD	DA	SA	FC	DSAP	SSAP	**Data Unit (DU)**	FCS	ED

The Data Unit (DU) contains the DP-V1 header and the parameter request or the parameter response. The DP V1 header consists of the function detection, slot number, data set, and the length of the user data. More information about the DP-V1 header can be found in the corresponding PROFIBUS specification. A detailed description of the parameter request and parameter response can be found in the following subchapters.

Assignment of the user data depending on the data type

Depending on the data type used, the user data are assigned as follows:

Data type	**Length**	**User data assignment**				
		Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte ...**
String	x bytes	*Data* (x bytes)				
U8	1 byte	*Data*	0x00			
U16	2 bytes	HIGH byte	LOW byte			
		Data	*Data*			
U32	4 bytes	HIGH word		LOW word		
		HIGH byte	LOW byte	HIGH byte	LOW byte	
		Data	*Data*	*Data*	*Data*	

8.6.11 PROFIBUS - reading parameter data acyclically

This section describes the request and response for the acyclic reading of a parameter.

Details

- When a read request is processed, no parameter value is written to the slave.
- When a read request is transmitted by multi-parameters, the parameter attribute, index and subindex are repeated.
- A read request must not exceed the maximum data length of 240 bytes.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is defined by the master.
Request identification	U8	0x01: Request parameters for reading.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter attribute

Byte 5	Byte 6	
Attribute	Number of subindices	

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
HIGH byte	LOW byte	HIGH byte	LOW byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0000 ... 0x00FF (0 ... 255)

Response to a correctly executed read request

Responses to a read request do not contain parameter attributes, indices and subindices.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request.
Response identification	U8	0x01: Parameter has been read.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6	
Format	Number of values	

Field	Data type	Values
Format	U8	0x02: integer8 (1 byte with sign) 0x03: Integer16 (2 bytes with sign) 0x04: Integer32 (4 bytes with sign) 0x05: Unsigned8 (1 byte without sign) 0x06: Unsigned16 (2 bytes without sign) 0x07: Unsigned32 (4 bytes without sign) 0x09: Visible String (with n characters) 0x0A: Octet String (with n characters) 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	0x01 or number of characters (n) for string parameters.

Parameter value

Byte 7	Byte 8	Byte 9	Byte 10
Value (Integer8 / Unsigned8 / byte)			
Value (Integer16 / Unsigned16 / word)			
Value (Integer32 / Unsigned32 / double word)			

Byte 7	Byte 8	Byte 9	Byte ...
String (Visible String / octet string with an optional length)			

Field	Data type	Values
Value	U8/U16/U32	Value range/length depends on the parameter format (see table above).
String	U8	Visible string / octet string with an optional length (n characters = n bytes)

Response to a read error

In the case of a multi-parameter request, correct and possible faulty messages are summarised in one telegram. They have the following data contents:

Correct message

- Format: data type of the value requested
- Number of values: as described above.
- Parameter value: value requested

Faulty message

- Format: 0x44
- Number of values: 0x01 or 0x02
- Error code without additional information (for number of values = 0x01) or error code with additional information (for number of values = 0x02)

A faulty access to a parameter "n" is indicated at the nth position in the response telegram of a multi-parameter request.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request.
Response identification	U8	0x81: Parameter has not been read. The data in bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters requested)

Parameter format

Byte 5	Byte 6	
Format	Number of values	

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information. 0x02: Error code with additional information.

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
HIGH byte	LOW byte	HIGH byte	LOW byte

Field	Data type	Values
Error code	U16	0x0000 ... 0xFFFF PROFIBUS error codes for acyclic data transfer 240
Additional information (if available)	U16	

8.6.12 PROFIBUS - writing parameter data acyclically

This section describes the request and response for the acyclic writing of a parameter.

Details

- When a multi-parameter write request is transmitted, the parameter attribute, index and subindex and then the parameter format and parameter value are repeated "n" times, "n" being the number of parameters addressed.
- A write request must not exceed the maximum data length of 240 bytes.

Request header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference	Request identification	Axis	Number of indices

Field	Data type	Values
Request reference	U8	This value is defined by the master.
Request identification	U8	0x02: Write parameters.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters addressed)

Parameter attribute

Byte 5	Byte 6	
Attribute	Number of subindices	

Field	Data type	Values
Attribute	U8	0x10: Value
Number of subindices	U8	0x00

Index and subindex

Byte 7	Byte 8	Byte 9	Byte 10
Index		Subindex	
HIGH byte	LOW byte	HIGH byte	LOW byte

Field	Data type	Values
Index	U16	0x0001 ... 0xFFFF (1 ... 65535)
Subindex	U16	0x0000 ... 0x00FF (0 ... 255)

Parameter format

Byte 11	Byte 12	
Format	Number of values	

Field	Data type	Values
Format	U8	0x02: integer8 (1 byte with sign) 0x03: Integer16 (2 bytes with sign) 0x04: Integer32 (4 bytes with sign) 0x05: Unsigned8 (1 byte without sign) 0x06: Unsigned16 (2 bytes without sign) 0x07: Unsigned32 (4 bytes without sign) 0x09: Visible String (with n characters) 0x0A: Octet String (with n characters) 0x40: Zero 0x41: Byte 0x42: Word 0x43: Double word
Number of values	U8	0x01 or number of characters (n) for string parameters.

Parameter value

Byte 13	Byte 14	Byte 15	Byte 16
Value (Integer8 / Unsigned8 / byte)			
Value (Integer16 / Unsigned16 / word)			
Value (Integer32 / Unsigned32 / double word)			

Byte 13	Byte 14	Byte 15	Byte ...
String (Visible string / octet string with an optional length)			

Field	Data type	Values
Value	U8/U16/U32	Value range/length depends on the parameter format (see table above).
String	U8	Visible string / octet string with an optional length (n characters = n bytes)

Response to a correctly executed write request

With an error-free multi-parameter request, only the response header is transmitted, and the complete data area is omitted.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request.
Response identification	U8	0x02: Parameter has been written.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters addressed)

Response to a write error

In the case of a multi-parameter request, correct and possible faulty messages are summarised in one telegram. They have the following data contents:

Correct message

- Format: 0x40
- Number of values: 0x00

Faulty message

- Format: 0x44
- Number of values: 0x01 or 0x02
- Error code without additional information (for number of values = 0x01) or error code with additional information (for number of values = 0x02)

A faulty access to a parameter "n" is indicated at the nth position in the response telegram of a multi-parameter request.

Response header

Byte 1	Byte 2	Byte 3	Byte 4
Request reference (mirrored)	Response identification	Axis (mirrored)	Number of indices

Field	Data type	Values
Request reference	U8	Mirrored value of the parameter request.
Response identification	U8	0x82: Parameter has not been written. The data in bytes 7 + 8 must be interpreted as an error code.
Axis	U8	0x00 or 0x01
Number of indices	U8	0x"n" (n = number of parameters addressed)

Parameter format

Byte 5	Byte 6	
Format	Number of values	

Field	Data type	Values
Format	U8	0x44: Error
Number of values	U8	0x01: Error code without additional information. 0x02: Error code with additional information.

Error code

Byte 7	Byte 8	Byte 9	Byte 10
Error code		Additional information (if available)	
HIGH byte	LOW byte	HIGH byte	LOW byte

Field	Data type	Values
Error code	U16	0x0000 ... 0xFFFF PROFIBUS error codes for acyclic data transfer 240
Additional information (if available)	U16	

8.6.13 PROFIBUS error codes for acyclic data transfer

The following table lists all possible error codes for the acyclic data exchange:

Error code	Description	Explanation	Additional information
0x0000	Parameter number impermissible	Access to non-available parameter.	-
0x0001	Parameter value cannot be changed	Change access to a parameter value that cannot be changed.	Subindex
0x0002	Lower or upper value limit exceeded	Change access with value beyond the value limits.	Subindex
0x0003	Subindex impermissible	Access to non-available subindex.	Subindex
0x0004	No array	Access with subindex to non-indicated parameter.	-
0x0005	Incorrect data type	Change access with value that does not match the data type of the parameter.	-
0x0006	No setting permitted (only resettable)	Change access with a non-zero value where it is not permitted.	Subindex
0x0007	Description element cannot be changed	Change access to a description element that cannot be changed.	Subindex
0x0008	Reserved	(PROFIdrive profile V2: PPO-Write requested in IR is not available.)	-
0x0009	Description data not available	Access to non-available description (parameter value is available).	-
0x000A	Reserved	(PROFIdrive profile V2: Wrong access group.)	-
0x000B	No parameter change rights	Change access with missing parameter change rights.	-
0x000C	Reserved	(PROFIdrive profile V2: Wrong password.)	-
0x000D	Reserved	(PROFIdrive profile V2: Text cannot be read in cyclic data transfer.)	-
0x000E	Reserved	(PROFIdrive profile V2: Name cannot be read in cyclic data transfer.)	-
0x000F	No text array available	Access to non-available text array (parameter value is available).	-
0x0010	Reserved	(PROFIdrive profile V2: No PPO-Write.)	-
0x0011	Request cannot be executed due to the operating state	Access is not possible for temporary reasons that are not specified in detail.	-
0x0012	Reserved	(PROFIdrive profile V2: Other error.)	-
0x0013	Reserved	(PROFIdrive profile V2: Date cannot be read in cyclic data transfer.)	-
0x0014	Value impermissible	Change access with the value that is within the value limits but that is impermissible for other permanent reasons (parameters with defined individual values).	Subindex
0x0015	Response too long	The length of the current response exceeds the maximum length transferrable.	-
0x0016	Parameter address impermissible	Impermissible value or value which is not supported for the attribute, number of subindexes, parameter number, or subindex, or a combination.	-
0x0017	Format impermissible	Write request: Impermissible or non-supported format of parameter data.	-
0x0018	Number of values not consistent	Write request: Number of parameter data values does not match the number of subindexes in the parameter address.	-
0x0019	Axis impermissible	Access to non-available axis. For double axis, only 0x00 or 0x01 permitted.	-
0x001A	Reserved	-	-
...			
0x00FF			

8.6.14 PROFIBUS - short setup

In the following, the steps required for controlling the inverter via PROFIBUS are described.

Parameterisation required

1. Activate network control: 0x2631:037 (P400.37) = "TRUE [1]"
2. Set network as standard setpoint source: 0x2860:001 (P201.01) = "Network [5]"
3. Set PROFIBUS station address.
   - Each network node must be provided with a unique station address.
   - Details: ▸ PROFIBUS station address 📖 225
4. Optional: Change the response of the inverter if the communication to the PROFIBUS master is interrupted.
   - Default setting: If communication is interrupted, an error is triggered.
   - Details: ▸ PROFIBUS monitoring 📖 226
5. Save parameter settings: 0x2022:003 (P700.03) = "On / start [1]".
6. Switch the inverter off and then on again in order that the changed communication settings can get effective.
7. Configure the host system (master) in order to enable communication with the inverter. See section "Configuring the host system (master)".
8. Control inverter via RPDO (and evaluate in the current status via TPDO).
   - For assignment of the control word and setpoint selection, see section "RPDO mapping".
   - For assignment of the status word and actual value output, see section "TPDO mapping".
   - Acceleration 0x2917 (P220.00) and deceleration 0x2918 (P221.00) can be set/changed via the acyclic parameter data transfer.

In the default setting, the digital input DI1 is assigned with the "Run" function. If the network control is activated, this function serves as "start enable" for start commands via network. Hence, the digital input DI1 must be set to HIGH level in order that the motor can be started via network. ▸ Start / stop motor 📖 372

Configuring the host system (master)

Configure the host system (master) as follows in order to enable communication with the inverter.

1. Import the device description file of the inverter into the master.

   The device description file for the inverter can be found in the Internet:
   http://www.lenze.com → Download

   The following language versions of the device description file can be used:
   - LENZE[product type].GSE (source file, English), e.g. LENZE550.GSE for i550
   - LENZE[product type].GSG (German), e.g. LENZE550.GSG for i550
   - LENZE[product type].GSE (English), e.g. LENZE550.GSE for i550
2. Define the user data length.
   - The user data length is defined during the initialisation phase of the master.
   - The inverter supports the configuration of maximally 16 process data words (maximally 32 bytes).
   - The user data length for process input data and process output data is the same.
3. Execute data mapping in the hardware configurator.
   - For preconfigured PDO mapping, see the sections "RPDO mapping" and "TPDO mapping".
   - Details: ▸ PROFIBUS data mapping 📖 229

RPDO mapping

For the process data from the master to the inverter, the following data mapping is preset in the device description file:

1. NetWordIN1 data word0x4008:001 (P590.01)
2. Network setpoint frequency 0x400B:005 (P592.05)
3. 16 bit selectable output data, mapped to Keypad setpoints: Process controller setpoint 0x2601:002 (P202.02)

Function assignment of the NetWordIN1 data word

Bit	Default setting	For details and configuration, see
0	Not active (reserve)	0x400E:001 (P505.01)
1	Not active (reserve)	0x400E:002 (P505.02)
2	Activate quick stop	0x400E:003 (P505.03)
3	Not active (reserve)	0x400E:004 (P505.04)
4	Run forward (CW)	0x400E:005 (P505.05)
5	Activate preset (bit 0)	0x400E:006 (P505.06)
6	Activate preset (bit 1)	0x400E:007 (P505.07)
7	Reset error	0x400E:008 (P505.08)
8	Not active (reserve)	0x400E:009 (P505.09)
9	Activate DC braking	0x400E:010 (P505.10)
10	Not active (reserve)	0x400E:011 (P505.11)
11	Not active (reserve)	0x400E:012 (P505.12)
12	Invert rotation	0x400E:013 (P505.13)
13	Not active (reserve)	0x400E:014 (P505.14)
14	Not active (reserve)	0x400E:015 (P505.15)
15	Not active (reserve)	0x400E:016 (P505.16)

Specifying the frequency setpoint

- The specification is made unsigned (independent of the direction of rotation) as integer in the resolution [0.01 Hz].
- The direction of rotation is defined in the default setting via bit 12 of the NetWordIN1 data word.
- Example: 4560 ≡ 45.60 Hz

TPDO mapping

For the process data from the inverter to the master, the following data mapping is preset in the device description file:

1. NetWordOUT1 data word 0x400A:001 (P591.01)
2. Network setpoint frequency 0x400B:005 (P592.05)
3. Motor current 0x2D88 (P104.00)

Status assignment of the NetWordOUT1 data word

Bit	Default setting	For details and configuration, see
0	Ready for operation	0x2634:010 (P420.10)
1	Not connected	0x2634:011 (P420.11)
2	Operation enabled	0x2634:012 (P420.12)
3	Error active	0x2634:013 (P420.13)
4	Not connected	0x2634:014 (P420.14)
5	Quick stop active	0x2634:015 (P420.15)
6	Running	0x2634:016 (P420.16)
7	Device warning active	0x2634:017 (P420.17)
8	Not connected	0x2634:018 (P420.18)
9	Not connected	0x2634:019 (P420.19)
10	Setpoint speed reached	0x2634:020 (P420.20)
11	Current limit reached	0x2634:021 (P420.21)
12	Actual speed = 0	0x2634:022 (P420.22)
13	Rotational direction reversed	0x2634:023 (P420.23)
14	Release holding brake	0x2634:024 (P420.24)
15	Safe torque off (STO) active	0x2634:025 (P420.25)

Output of the actual frequency value

- The output is made unsigned (independent of the direction of rotation) as integer in the resolution [0.01 Hz].
- An active reversal is displayed via bit 13 of the NetWordOUT1 data word.
- Example: 4560 ≡ 45.60 Hz

8.7 Wireless LAN (WLAN)

The pluggable WLAN module enables

- an easy access to inverters that are installed in difficult access areas,
- an easy parameter setting without cable and instead of the keypad,
- a comfortable monitoring and adaptation of the machine.

The inverter can be accessed via WLAN with the following devices:

- Engineering PC (with WLAN functionality) and the »EASY Starter« engineering tool.
- Android smartphone with Lenze Smart Keypad App.

The Lenze Smart Keypad App is recommended for the adaptation of simple applications. The Lenze Smart Keypad App can be found in the Google Play Store.

8.7.1 LED status displays

Information on the WLAN module status can be obtained quickly via the LED displays "Power", "TX/RX" and "WLAN" on the front of the WLAN module.

The meaning can be seen from the table below.

LED "Power" (green)	LED "TX/RX" (yellow)	LED "WLAN" (green)	Status/meaning
off	off	off	No supply voltage.
on	on	on	Self-test (duration approx. 1 s)
	off	off	Ready for operation — no active WLAN connection.
	Flashing	on	Communication active.
	off	Blinking	Client mode — waiting for connection.
Blinking	off	off	Trouble

After being plugged in, the WLAN module needs approx. 20 seconds until it is ready for operation.

8.7.2 WLAN basic settings

The WLAN functionality can be configured via the following parameters.

Preconditions

WLAN module has been plugged onto the interface X16 on the front of the inverter.

Details

- The WLAN module can be connected and removed during operation.
- The WLAN module can either create an own WLAN network (access point mode, default setting) or implement itself as a WLAN client in an already existing WLAN network. For details see the following subchapters.
- The WLAN connection is encrypted. The WLAN encryption can be selected in 0x2441:009.
- 0x2441:012 can be used to set that the name of the WLAN network, called SSID, is not visible for other WLAN devices. As a result, the number of WLAN networks displayed on smartphone or PC can be reduced.

Parameter	Name / value range / [default setting]		Info
0x2440	Initiate WLAN • From version 02.00		Restart WLAN network with default setting or current settings.
	0	**No action/no error**	Only status display.
	2	Restart with default values	Restart WLAN network with default setting of the WLAN parameters.
	11	Restart with current values	Restart WLAN network with current settings of the WLAN parameters. At the same time, the current settings are saved in the WLAN module.
0x2441:004	DHCP • From version 02.00		1 = Dynamic Host Configuration Protocol (DHCP) is enabled. • In the access point mode, the DHCP server of the WLAN module is activated. • In the client mode, the DHCP-client function is activated.
	0	Disabled	
	1	**Enabled**	
0x2441:005	DHCP start address 0 ... [**0**] ... 4294967295 • From version 02.00		Definition of the start address when the Dynamic Host Configuration Protocol (DHCP) is used. • Only relevant for access point mode. • When 0 is set, the active IP address + 1 is used as start address.
0x2441:006	WLAN operation mode • From version 02.00		Definition of the operating mode of the WLAN module.
	0	**Access point mode**	For a direct connection to another WLAN device, the WLAN module creates an own WLAN network. ▸ WLAN access point mode 248
	1	Client mode	The WLAN module can be integrated as WLAN client into an already existing WLAN network. ▸ WLAN client mode 253
0x2441:007	WLAN SSID ["**i5**"] • From version 02.00		Name (Service Set Identifier, SSID) of the WLAN network. • The preset name consists of the device name (iXXX) and the first 10 digits of the serial number. • Example: "i550_0123456789" • The serial number is displayed in 0x2000:002 (P190.02).
0x2441:008	WLAN password ["**password**"] • From version 02.00		Password (WLAN network key) of the WLAN network. • This password serves to secure the WLAN connections. • The password must have a minimum length of 8 digits. Note! If the WLAN module is to be plugged onto the inverter for a longer period of time, it is important to select a safe password. Otherwise, a potential attacker might connect to the WLAN access point and attack the device and other connected devices or networks. Currently (status: 2016), a WLAN is considered as safe if the password • consists of more than 20 characters, • contains capital and small letters, numbers and special characters and • cannot be found in any dictionary.
0x2441:009	WLAN security • From version 02.00		Selection of the WLAN encryption.
	0	WPA	
	1	**WPA2**	

Parameter	Name / value range / [default setting]		Info
0x2441:010	WLAN access • From version 02.00		Switch on/off WLAN.
	0	Disabled (WLAN off)	
	1	**Enabled (WLAN on)**	
0x2441:011	WLAN channel • From version 02.00		Selection of the WLAN channel.
	1	**Channel 1**	
	2	Channel 2	
	3	Channel 3	
	4	Channel 4	
	5	Channel 5	
	6	Channel 6	
	7	Channel 7	
	8	Channel 8	
	9	Channel 9	
	10	Channel 10	
	11	Channel 11	
0x2441:012	WLAN SSID broadcast • From version 02.00		1 = the name of the WLAN network, called SSID, is not visible for other WLAN devices.
	0	**Activated**	
	1	Deactivated	
0x2442:004	Active module mode • Read only • From version 02.00		Display of the active WLAN settings. • This parameter indicates whether the settings used come from the inverter or from the WLAN module.
	0	Inverter	The WLAN settings saved in the inverter are used.
	1	Standalone	The WLAN settings saved in the WLAN module are used.
0x2442:005	MAC address • Read only • From version 02.00		Display of the MAC address of the WLAN module.
0x2449	WLAN error • Read only • From version 02.00		Bit coded display of WLAN errors.
	Bit 2	ERR_WIFI_ERROR	WLAN connection problem
	Bit 3	ERR_MEM_CHK_FAILED	Memory problem
	Bit 4	WIFI_CHK_FAILED	WLAN connection problem
	Bit 7	ERR_WIFI_OFF	
	Bit 9	ERR_CLIENT_MODE_OFF	WLAN-client-mode problem
	Bit 12	ERR_TCPIP_CFG_FAIL	TCP/IP configuration error

8.7.2.1 Resetting WLAN settings to default setting

Possible reasons:

- Password is not known anymore.
- WLAN SSID is not visible and not known anymore.
- WLAN module mode "stand-alone" shall be deactivated.

0x2440 serves to reset all WLAN settings to the default setting. For this purpose, the inverter must be connected to the »EASY Starter« via the USB module or an existing network.

Option 1: Reset via USB module

How to reset the WLAN settings to default setting by means of the USB module:

Requirements:

- The inverter is ready for operation (supplied with voltage).

Required accessories:

- USB module
- USB 2.0 cable (A-plug on micro B-plug)
- PC with installed »EASY Starter« software

1. Remove the WLAN module from the inverter and plug on the USB module instead.
2. Establish a connection between inverter and »EASY Starter« via the USB module.
3. Set the parameter 0x2440 to "Restart with default values [2]".
4. Remove the USB module from the inverter and plug on the WLAN module instead again.

The default setting is loaded.

Option 2: Reset via network

How to reset the WLAN settings to default setting via network:

Requirements:

- The inverter is ready for operation (supplied with voltage).
- The inverter is connected to a functioning network.

Required accessories:

- PC with installed »EASY Starter«. Moreover, the PC must be connected to the network which also implements the inverter.

1. Establish a connection between the inverter and »EASY Starter« via the used network.
2. Set the parameter 0x2440 to "Restart with default values [2]".

The default setting is loaded.

8.7.3 WLAN access point mode

In the presetting, the WLAN module is configured as WLAN access point because this is the most frequent application. In this operating mode, the WLAN module creates its own WLAN network for a direct connection to other WLAN devices.

The supported WLAN devices are:

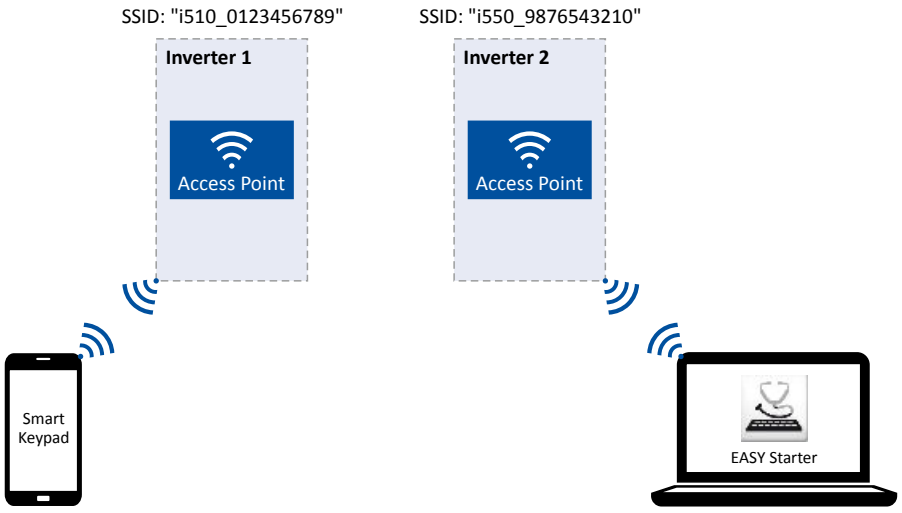
- Android smartphone with Lenze Smart Keypad App.
- Engineering PC (with WLAN functionality) and the »EASY Starter« engineering tool.

Details

- In default setting, every inverter with WLAN functionality comes with an individual network name, called SSID.
- The preset network name consists of the device name (iXXX) and the first 10 digits of the serial number (example: "i550_0123456789").
- In the default setting, the password for the WLAN network is called "password" and can be changed in 0x2441:008.

If the WLAN module is to be plugged onto the inverter for a longer period of time, it is important to select a safe password. Otherwise, a potential attacker might connect to the WLAN access point and attack the device and other connected devices or networks. Currently (status: 2016), a WLAN is considered as safe if the password consists of more than 20 characters, contains capital and small letters, numbers and special characters and cannot be found in any dictionary.

The following illustration displays the SSIDs as examples only:



For establishing a WLAN connection, only a few settings are required. The respective setting is described in the following subchapters:

- Establishing a direct WLAN connection between smartphone and inverter 📖 249
- Using the smartphone as "Smart Keypad" 📖 250
- Establishing a direct WLAN connection between Engineering PC and inverter 📖 251

8.7.3.1 Establishing a direct WLAN connection between smartphone and inverter

How to establish a direct WLAN connection to the inverter on the smartphone:

Requirements:

- The functional test described in the mounting and switch-on instructions has been completed successfully (without any errors or faults).
- The inverter is ready for operation (supplied with voltage).

Required accessories:

- WLAN module
- Android smartphone
- Lenze Smart Keypad App (available free of charge in the Google Play Store)

1. Plug the WLAN module onto the front of the inverter (interface X16).
2. Unless already activated, activate the WLAN function on the smartphone under "Settings" → "WLAN".
   The WLAN networks available in your range are now displayed.
3. Select the WLAN network established by the inverter.
4. Enter the password for the WLAN network (default setting "password") and click "Connect".
   The connection to the WLAN network of the inverter is now established.
5. Start the Lenze Smart Keypad App on the Android smartphone.

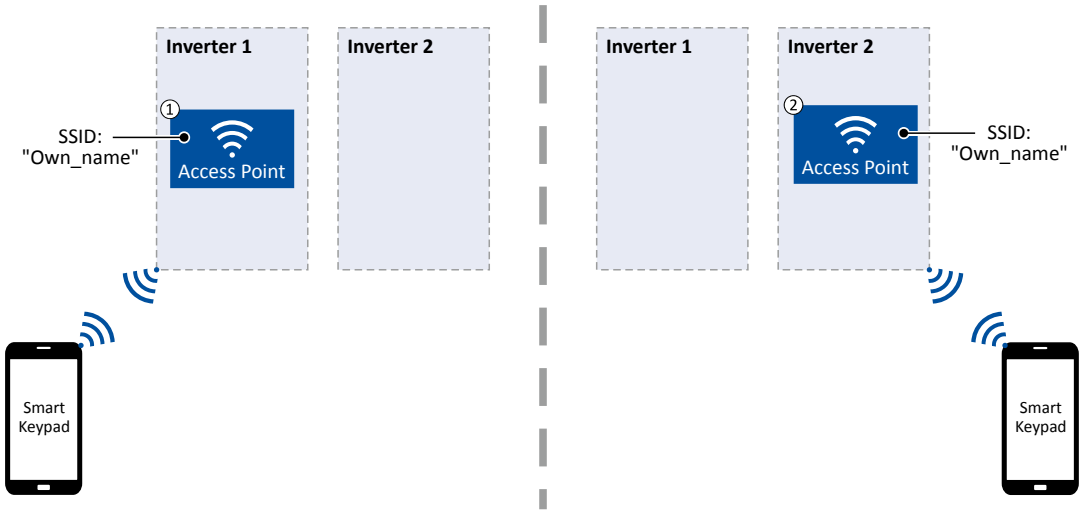
If a WLAN connection to the inverter has been established, the Lenze Smart Keypad App serves to

- read out diagnostics parameters of the inverter,
- change parameter settings of the inverter and
- transmit parameter sets.

8.7.3.2 Using the smartphone as "Smart Keypad"

In the default setting, the WLAN settings of the inverters are used. If the WLAN module is plugged onto another inverter, the WLAN connection must be set up again because the replugging causes a change of the network name.

For using the smartphone as "Smart Keypad", the WLAN module can be configured such that the WLAN settings are saved locally in the WLAN module and only these settings are used. In this "standalone" mode, the WLAN module remains permanently coupled to the smartphone because after replugging onto another inverter, the login data for the WLAN network (SSID and password) is the same:



① WLAN module is plugged onto the inverter 1. After the connection to the smartphone has been established, the inverter 1 can be diagnosed or parameterised with the Lenze Smart Keypad App.

② WLAN module is plugged onto the inverter 2. After the WLAN network is restarted, a connection is established again to the smartphone because the WLAN settings are identical. Now, the inverter 2 can be diagnosed or parameterised with the Lenze Smart Keypad App.

How to configure the WLAN module for a "Smart Keypad" use:

Requirements:

- The WLAN settings of the inverter can be accessed via the Lenze Smart Keypad App or »EASY Starter«.

1. Define your own network name (SSID) in 0x2441:007.
2. Define your own password in 0x2441:008.
3. Set the selection "Restart with current values [11]" in 0x2440.

The defined network name and the password are saved locally in the WLAN module. The WLAN network is restarted with the current settings.

If the WLAN module is then plugged onto another inverter, the settings that are locally saved in the WLAN module are used (irrespective of the WLAN settings of the inverter).

- The active mode ("Inverter" or "Standalone") is displayed in 0x2442:004.
- In order to return to the standard mode "Inverter", the selection "Restart with default values [2]" must be set in 0x2440.

8.7.3.3 Establishing a direct WLAN connection between Engineering PC and inverter

How to establish a direct WLAN connection to the inverter on the Engineering PC:

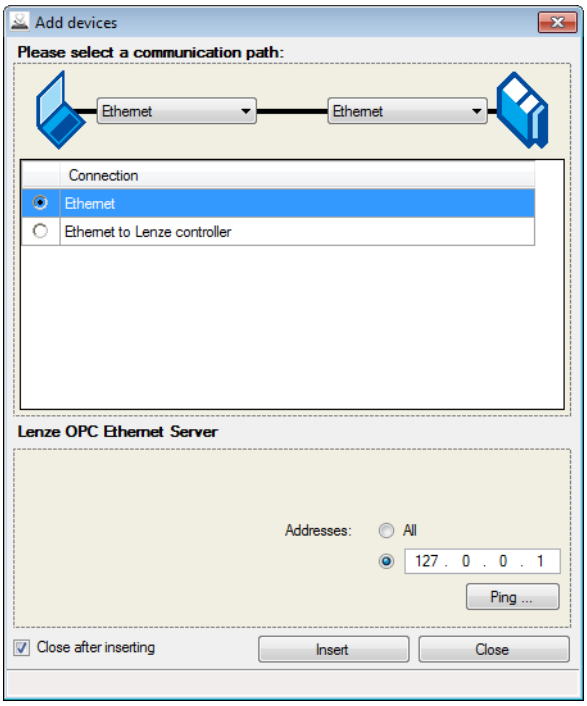
Requirements:

- The functional test described in the mounting and switch-on instructions has been completed successfully (without any errors or faults).
- The inverter is ready for operation (supplied with voltage).

Required accessories:

- WLAN module
- PC (with WLAN functionality) and installed »EASY Starter«

1. Plug the WLAN module onto the front of the inverter (interface X16).
2. Open the network settings on the Engineering PC: "Control panel" → "Network and sharing center".
3. Select the "Set up a new connection or network" option under "Change your network settings".
   The "Set Up a Connection or Network" dialog box is displayed.
4. Select the "Manually connect to a wireless network" connection option and click the "Next" button.
   The "Manually connect to a wireless network" dialog box is displayed.
5. Enter the SSID of the inverter as network name.
6. Select "WPA2-Personal" as safety type.
7. Select "AES" as encryption type.
8. Enter the password as safety key for the WLAN network (default setting "password").
9. Tick "Start this connection automatically".
10. Click "Next".
    A note indicates that the connection has been added successfully.
11. Click "Close".
12. Start »EASY Starter«.
    The "Add devices" dialog is shown.
13. Select the "Ethernet" connection:

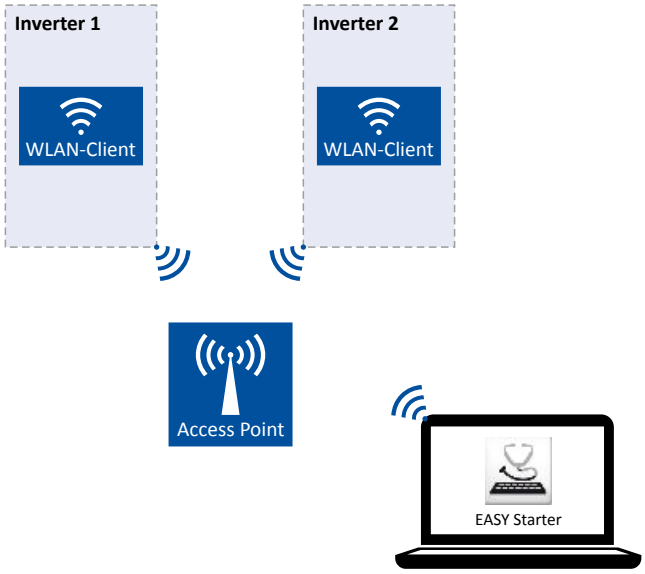


14. Click the **Insert** button.
    »EASY Starter« searches for connected devices via the communication path selected. When the connection has been established successfully, the inverter is displayed in the device list of »EASY Starter«. The inverter parameters can now be accessed via the tabs of »EASY Starter«.

Recommendation: Click the button in the toolbar of the »EASY Starter« to start visual tracking. This function serves to quickly check whether the connection to the correct device has been established. ▸ Optical device identification 124

8.7.4 WLAN client mode

The WLAN module can be optionally configured as a WLAN client. In this operating mode, the WLAN module can be implemented into an already existing WLAN network.



How to configure the WLAN module as WLAN client:

Requirements:

- The WLAN settings of the inverter can be accessed via »EASY Starter«.
- Name (SSID) and password of the external WLAN network are known.

1. Set the selection "Client mode [1]" in 0x2441:006.
2. Set the name (SSID) of the external WLAN network in 0x2441:007.
3. Set the password of the external WLAN network in 0x2441:008.
4. .

Before activating the changed WLAN settings in the next step: Make sure that the name (SSID) and the password of the external WLAN network are set correctly. The restart of the WLAN module in the client mode causes a termination of an existing WLAN connection in the access point mode!

5. Restart the inverter or remove and replug the WLAN module to activate the changed WLAN settings.

The WLAN module now tries as a client to establish a connection to the set external WLAN network.

Notes:

- In the default setting, the WLAN client is configured as DHCP client in 0x2441:004.
  - Settings as IP address, subnetwork mask and gateway are automatically made by the DHCP server of the external WLAN network.
  - The active settings are displayed in 0x2442:001, 0x2442:002 and 0x2442:003.
- A static IP configuration can be made via the parameters 0x2441:001, 0x2441:002 and 0x2441:003.

Parameter	Name / value range / [default setting]	Info
0x2441:001	IP address 0 ... [**28485824**] ... 4294967295 • From version 02.00	Definition of the IP address for the WLAN access point. • In the client mode, a static IP address can be set here for the WLAN client. In order that the static configuration becomes effective, DHCP must be disabled in 0x2441:004. • Byte order is "Big-Endian": 192.168.178.01 ≡ 0x01B2A8C0 (= 28485824)

Parameter	Name / value range / [default setting]	Info
0x2441:002	Netmask 0 ... [**16777215**] ... 4294967295 • From version 02.00	Definition of the network mask for the WLAN access point. • In the client mode, a static network mask can be set here for the WLAN client. In order that the static configuration becomes effective, DHCP must be disabled in 0x2441:004. • Byte order is "Big-Endian": 255.255.255.0 ≡ 0x00FFFFFF (= 16777215)
0x2441:003	Gateway 0 ... [**28485824**] ... 4294967295 • From version 02.00	Definition of the gateway for the WLAN access point. • In the client mode, a static gateway can be set here for the WLAN client. In order that the static configuration becomes effective, DHCP must be disabled in 0x2441:004. • Byte order is "Big-Endian": 192.168.178.1 ≡ 0x01B2A8C0 (= 28485824)
0x2442:001	Active IP address • Read only • From version 02.00	Display of the active IP address. • If DHCP is activated, the active IP address usually derives from the configured static IP address of the device.
0x2442:002	Active netmask • Read only • From version 02.00	Display of the active netmask.
0x2442:003	Active gateway • Read only • From version 02.00	Display of the active gateway IP address.
0x2448:001	WLAN status: Connection time • Read only • From version 02.00	Display of the connection time in [s] since the current connection was established.
0x2448:002	WLAN status: Number of connections • Read only • From version 02.00	In access point mode: Display of the number of currently connected clients. In client mode: 0 ≡ not connected; 1 ≡ connected with external WLAN network.
0x2448:003	WLAN status: Rx frame counter • Read only • From version 02.00	Display of the number of request received via WLAN.
0x2448:004	WLAN status: Error statistics • Read only • From version 02.00	Display of the quality of the WLAN connection. A display value > 0 indicates communication problemsn.

8.8 EtherNet/IP

EtherNet/IP™ (EtherNet Industrial Protocol) is a fieldbus system based on Ethernet which uses the Common Industrial Protocol™ (CIP™) for data exchange.

- Detailed information on EtherNet/IP can be found on the web page of the ODVA (Open DeviceNet Vendor Association) user organisation: http://www.odva.org
- Information about the dimensioning of a EtherNet/IP network can be found in the configuration document for the inverter.
- EtherNet/IP™ and Common Industrial Protocol™ (CIP™) are trademarks and patented technologies, licensed by the user organisation ODVA (Open DeviceNet Vendor Association), USA.

Preconditions

- Control unit (CU) of the inverter is provided with EtherNet/IP.
- The EDS device description files for EtherNet/IP can be found here: http://www.lenze.com/application-knowledge-base/artikel/201207514/0/

Details

Just like DeviceNet and ControlNet, EtherNet/IP uses the Common Industrial Protocol (CIP) to exchange data between devices via an Ethernet network.

The CIP implementation in the inverter follows the standard that is supported by the ODVA (Open DeviceNet Vendor Assoziation) user organisation. The two main types of the EtherNet/IP communication are supported: Explicit Messaging and I/O Messaging.

This chapter describes the special features of the CIP implementation in the inverter. Moreover, it contains information and examples required for users and network programmers. The descriptions assume that the reader is familiar with the general concept of the Common Industrial Protocol and has a basic knowledge of the Ethernet-TCP/IP communication principles.

8.8.1 EtherNet/IP configuration

Parameter	Name / value range / [default setting]	Info
0x23A1:001 (P510.01)	EtherNet/IP settings: IP address (EtherN/IP sett.: IP address) 0 ... [**276605120**] ... 4294967295 • From version 02.00	
0x23A1:002 (P510.02)	EtherNet/IP settings: Subnet (EtherN/IP sett.: Subnet) 0 ... [**16777215**] ... 4294967295 • From version 02.00	
0x23A1:003 (P510.03)	EtherNet/IP settings: Gateway (EtherN/IP sett.: Gateway) 0 ... [**0**] ... 4294967295 • From version 02.00	
0x23A1:004 (P510.04)	EtherNet/IP settings: Host name (EtherN/IP sett.: Host name) • From version 02.00	
0x23A1:005 (P510.05)	EtherNet/IP settings: IP configuration (EtherN/IP sett.: IP configuration) • From version 02.00	
	0 Stored IP	
	1 BOOTP	
	2 DHCP	
0x23A1:006 (P510.06)	EtherNet/IP settings: Multicast TTL (EtherN/IP sett.: Multicast TTL) 0 ... [**1**] ... 255 • From version 02.00	

Parameter	Name / value range / [default setting]		Info
0x23A1:007 (P510.07)	EtherNet/IP settings: Multicast allocation (EtherN/IP sett.: Mcast allocation) • From version 02.00		
	0	**Default allocation**	
	1	Multicast number/start address	
0x23A1:008 (P510.08)	EtherNet/IP settings: Multicast IP address (EtherN/IP sett.: Mcast IP addr.) 0 ... [**3221373167**] ... 4294967295 • From version 02.00		
0x23A1:009 (P510.09)	EtherNet/IP settings: Multicast number (EtherN/IP sett.: Multicast number) 1 ... [**1**] ... 8 • From version 02.00		
0x23A4:001 (P512.01)	Port settings: Port 1 (Port settings: Port 1) • From version 02.00		
	0	**Auto-Negotiation**	
	1	10 Mbps	
	2	100 Mbps	
	3	Reserved	
	4	Reserved	
	5	10 Mbps/Half Duplex	
	6	10 Mbps/Full Duplex	
	7	100 Mbps/Half Duplex	
	8	100 Mbps/Full Duplex	
	9	Reserved	
	10	Reserved	
	11	Reserved	
	12	Reserved	
0x23A4:002 (P512.02)	Port settings: Port 2 (Port settings: Port 2) • From version 02.00		
	0	**Auto-Negotiation**	
	1	10 Mbps	
	2	100 Mbps	
	3	Reserved	
	4	Reserved	
	5	10 Mbps/Half Duplex	
	6	10 Mbps/Full Duplex	
	7	100 Mbps/Half Duplex	
	8	100 Mbps/Full Duplex	
	9	Reserved	
	10	Reserved	
	11	Reserved	
	12	Reserved	
0x23A7 (P514.00)	Address conflict detection (AddrConflctDetec) • From version 02.00		
	0	Disabled	
	1	**Enabled**	
0x23A3 (P509.00)	EtherNet/IP switch position (EtherN. switch) • Read only • From version 02.00		

Parameter	Name / value range / [default setting]	Info
0x23A6 (P513.00)	Quality of service (QualityOfService) • Read only • From version 02.00	
	0 | 802.1Q Tag disable	
	1 | 802.1Q Tag enable	

8.8.2 EtherNet/IP monitoring

Parameter	Name / value range / [default setting]	Info
0x23A1:010 (P510.10)	EtherNet/IP settings: Timeout (EtherN/IP sett.: Timeout) 500 ... [**10000**] ... 65535 ms • From version 02.00	
0x2859:001 (P515.01)	EtherNet/IP monitoring: Watchdog elapsed (EtherN/IP monit.: WD elapsed) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33168 | 0x8190 - Network: watchdog timeout
	2 | **Trouble**	▸ Error types 107
0x2859:003 (P515.03)	EtherNet/IP monitoring: Invalid configuration (EtherN/IP monit.: Invalid config) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33414 | 0x8286 - Network: PDO mapping error
	2 | **Trouble**	▸ Error types 107
0x2859:004 (P515.04)	EtherNet/IP monitoring: Initialisation error (EtherN/IP monit.: Init. error) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33170 | 0x8192 - Network: initialisation error
	2 | **Trouble**	▸ Error types 107
0x2859:005 (P515.05)	EtherNet/IP monitoring: Invalid process data (EtherN/IP monit.: Inval. proc.data) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33171 | 0x8193 - Network: invalid cyclic process data
	2 | **Trouble**	▸ Error types 107
0x2859:006 (P515.06)	EtherNet/IP monitoring: Timeout explicit message (EtherN/IP monit.: Timeout ExplMsg) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33042 | 0x8112 - Network: timeout explicit message
	1 | **Warning**	▸ Error types 107
0x2859:007 (P515.07)	EtherNet/IP monitoring: Timeout communication (EtherN/IP monit.: Timeout Comm.) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33044 | 0x8114 - Network: overall communication timeout
	1 | **Warning**	▸ Error types 107

8.8.3 EtherNet/IP LED status displays

Information on the CIP status can be obtained quickly via the "MS" and "NS" LED displays on the front of the inverter. In addition, the LEDs at the RJ45 sockets indicate the Ethernet connection status.

The meaning of the "MS" and "NS" LEDs can be obtained from the following two tables.

LED "MS" (green/red)	CIP module status	Status/meaning
off	Nonexistent	The network option is not supplied with voltage.
On (green)	Operational	The network option works correctly.
Blinking green	Standby	The network option is not configured completely or the configuration is incorrect.
Blinking red	Major recoverable fault	The network option contains a correctable error.
On (red)	Major unrecoverable fault	The network option contains a non-correctable error.
Blinking green/red	Device self testing	The network option executes a self-test.

LED "NS" (green/red)	CIP network status	Status/meaning
off	No IP address	The network option is not supplied with voltage or has not received an IP address yet.
On (green)	Connected	The network option works correctly an has established a connection to the scanner.
Blinking green	No connections	The network option • works correctly, • has been assigned to an IP address, • has not been implemented into the network yet by the scanner.
Blinking red	Connection timeout	A time-out has occurred.
On (red)	Duplicate IP	The network option cannot access the network (IP address conflict).
Blinking green/red	Device self testing	The network option executes a self-test.

Status displays at the RJ45 sockets

The LEDs at the RJ45 sockets indicate the Ethernet connection status:

LED "Link" (green)	Status/meaning
off	No Ethernet connection.
on	A physical Ethernet connection is available.

LED "Activity" (yellow)	Status/meaning
off	No Ethernet data transfer.
on or flickers	Data is exchanged via Ethernet.

8.8.4 EtherNet/IP diagnostics

Parameter	Name / value range / [default setting]		Info
0x23A2:001 (P511.01)	Active EtherNet/IP settings: IP address (EtherN/IP diag.: IP address) • Read only • From version 02.00		
0x23A2:002 (P511.02)	Active EtherNet/IP settings: Subnet (EtherN/IP diag.: Subnet) • Read only • From version 02.00		
0x23A2:003 (P511.03)	Active EtherNet/IP settings: Gateway (EtherN/IP diag.: Gateway) • Read only • From version 02.00		
0x23A2:005 (P511.05)	Active EtherNet/IP settings: MAC address (EtherN/IP diag.: MAC address) • Read only • From version 02.00		
0x23A2:006 (P511.06)	Active EtherNet/IP settings: Multicast address (EtherN/IP diag.: Mcast address) • Read only • From version 02.00		
0x23A5:001 (P519.01)	Active port settings: Port 1 (Port diagnostics: Port 1) • Read only • From version 02.00		
	0	Not connected	
	1	10 Mbps/Half Duplex	
	2	10 Mbps/Full Duplex	
	3	100 Mbps/Half Duplex	
	4	100 Mbps/Full Duplex	
	5	Reserved	
	6	Reserved	
0x23A5:002 (P519.02)	Active port settings: Port 2 (Port diagnostics: Port 2) • Read only • From version 02.00		
	0	Not connected	
	1	10 Mbps/Half Duplex	
	2	10 Mbps/Full Duplex	
	3	100 Mbps/Half Duplex	
	4	100 Mbps/Full Duplex	
	5	Reserved	
	6	Reserved	
0x23A8 (P516.00)	CIP module status (CIP module stat.) • Read only • From version 02.00		
0x23A9 (P517.00)	EtherNet/IP status (EtherN/IP status) • Read only • From version 02.00		

8.8.5 EtherNet/IP objects

Parameter	Name / value range / [default setting]		Info
0x2631:017 (P400.17)	Function list: Activate network setpoint (Function list: Setp: Network)		Assignment of a trigger for the "Activate network setpoint" function. Trigger = TRUE: the network is used as setpoint source (if the trigger assigned has the highest setpoint priority). Trigger = FALSE: no action / deactivate function again.
	0	**Not connected**	No trigger assigned (trigger is constantly FALSE).
	1	Constant TRUE	Trigger is constantly TRUE.
	11	Digital input 1	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
	12	Digital input 2	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
	13	Digital input 3	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
	14	Digital input 4	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
	15	Digital input 5	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.
	16	Digital input 6	State of X3/DI6, taking an inversion set in 0x2632:006 (P411.06) into consideration. Digital input 6 is only available in the Control Unit (CU) with application I/O.
	17	Digital input 7	State of X3/DI7, taking an inversion set in 0x2632:007 (P411.07) into consideration. Digital input 7 is only available in the Control Unit (CU) with application I/O.
	50	Running	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
	51	Ready for operation	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
	53	Stop active	TRUE if inverter is enabled and motor is not started and output frequency = 0.
	54	Quick stop active	TRUE if quick stop is active. Otherwise FALSE.
	58	Device warning active	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
	59	Device fault active	TRUE if a fault is active. Otherwise FALSE. • In the event of a fault, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • Exception: In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). • The error state will be left automatically if the error condition is not active anymore. • The restart behaviour after trouble can be configured. ▸ Automatic restart 📖 350
	60	Heatsink temperature warning active	TRUE if current heatsink temperature > warning threshold for temperature monitoring. Otherwise FALSE. • Display of the current heatsink temperature in 0x2D84:001 (P117.01). • Setting of the warning threshold in 0x2D84:002.
	69	Rotational direction reversed	TRUE if output frequency is negative. Otherwise FALSE.
	70	Frequency threshold exceeded	TRUE if current output frequency > frequency threshold. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00). • Setting Frequency thresholdin 0x4005 (P412.00). ▸ Frequency threshold for "Frequency threshold exceeded" trigger 📖 421
	71	Actual speed = 0	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).
	78	Current limit reached	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).

Parameter	Name / value range / [default setting]		Info
	79	Torque limit reached • From version 02.00	TRUE if torque limit has been reached or exceeded. Otherwise FALSE. • Setting "Positive torque limit" in 0x60E0. • Setting "Negative torque limit" in 0x60E1.
	80	Follower signal (4 ... 20 mA) lost	Reserve (do not use trigger)
	81	Error of analog input 1 active	TRUE if the monitoring of the input signal at the analog input 1 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2636:008 (P430.08) • Monitoring condition 0x2636:009 (P430.09) The setting of the Error response in 0x2636:010 (P430.10) has no effect on this trigger. ▸ Analog input 1 📖 425
	82	Error of analog input 2 active	TRUE if the monitoring of the input signal at the analog input 2 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2637:008 (P431.08) • Monitoring condition 0x2637:009 (P431.09) The setting of the Error response in 0x2637:010 (P431.10) has no effect on this trigger. ▸ Analog input 2 📖 429
	83	Load loss detected	TRUE if actual motor current < threshold for load loss detection after delay time of the load loss detection has elapsed. Otherwise FALSE. • Display of the present motor current in 0x6078 (P103.00). • Setting Threshold in 0x4006:001 (P710.01). • Setting Decelerationin 0x4006:002 (P710.02). ▸ Load loss detection 📖 301
	104	Local control active	TRUE if local keypad control ("LOC") active. Otherwise FALSE.
	105	Remote control active	TRUE if remote control ("REM") via terminals, network, etc. active. Otherwise FALSE.
	106	Manual setpoint selection active	TRUE if manual setpoint selection ("MAN") via keypad active. Otherwise FALSE. • Selection of the trigger for the "Activate keypad setpoint" function in 0x2631:016 (P400.16).
	107	Automatic setpoint selection active	TRUE if automatic setpoint selection ("AUTO") via terminals, network, etc. active. Otherwise FALSE.
	116	Network setpoint active • From version 02.00	TRUE if network setpoint activated. Otherwise FALSE.
0x400B:010	AC Drive mode		
	0	Vendor specific	
	1	**Speed control (open loop)**	
	2	Speed control (closed loop)	
0x6402	Motor type • From version 02.00		AC motor type • Motor Data Object (0x28) - instance attribute 3
	3	PM synchronous	
	6	Wound rotor induction	
	7	**Squirrel cage induction**	

8.8.6 EtherNet/IP commissioning

Parameter	Name / value range / [default setting]		Info
0x23A0 (P508.00)	EtherNet/IP communication (EtherN/IP comm.) • From version 02.00		
	0	**No action/no error**	
	1	Restart with current values	
	2	Restart with default values	
	5	Stop network communication	
	10	In process	
	11	Action cancelled	
	12	Fault	

8.9 PROFINET

PROFINET® (Process Field Network) is a real-time capable fieldbus system based on Ethernet.

- Detailed information on PROFINET can be found on the web page of the PROFIBUS & PROFINET International (PI) user organisation: http://www.profibus.com
- Information about the dimensioning of a PROFINET network can be found in the configuration document for the inverter.
- PROFINET® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organisation.

Preconditions

- Control unit (CU) of the inverter is provided with PROFINET.
- The GSDML device description files for PROFINET can be found here: http://www.lenze.com/application-knowledge-base/artikel/200804173/0/

8.9.1 PROFINET configuration

Parameter	Name / value range / [default setting]		Info
0x2380 (P508.00)	PROFINET communication (PROFINET comm.) • From version 02.00		
	0	**No action/no error**	
	1	Restart with current values	
	2	Restart with default values	
	5	Stop network communication	
	10	In process	
	11	Action cancelled	
	12	Fault	
0x2381:001 (P510.01)	PROFINET settings: IP address (PROFINET sett.: IP address) 0 ... [**0**] ... 4294967295 • From version 02.00		
0x2381:002 (P510.02)	PROFINET settings: Subnet (PROFINET sett.: Subnet) 0 ... [**0**] ... 4294967295 • From version 02.00		
0x2381:003 (P510.03)	PROFINET settings: Gateway (PROFINET sett.: Gateway) 0 ... [**0**] ... 4294967295 • From version 02.00		
0x2381:004 (P510.04)	PROFINET settings: Station name (PROFINET sett.: Station name) • From version 02.00		
0x2381:005	PROFINET settings: I&M1 System designation • From version 02.00		
0x2381:006	PROFINET settings: I&M1 Installation site • From version 02.00		
0x2381:007	PROFINET settings: I&M2 Installation date • From version 02.00		
0x2381:008	PROFINET settings: I&M3 additional information • From version 02.00		
0x2381:009	PROFINET settings: I&M4 signature code • From version 02.00		

8.9.2 PROFINET LED status displays

Information on the network status can be obtained quickly via the "BUS RDY" and "BUS ERR" LED displays on the front of the inverter. In addition, the LEDs at the RJ45 sockets indicate the PROFINET connection status.

The meaning of the "BUS RDY" and "BUS ERR" LEDs can be obtained from the following two tables.

LED "BUS RDY" (green)	Status/meaning
off	No connection to the master
Blinking	PLC in STOP
on	PLC in RUN (DATA_EXCHANGE)

LED "BUS ERR" (red)	Status/meaning
off	No fault
flickers	The PROFINET function "Node flashing test" is triggered by the IO controller. The flickering LED serves to identify (locate) accessible IO devices
blinking	Impermissible settings: Stack, station name or IP parameters are invalid.
on (red)	Communication error (e.g. Ethernet cable removed)

Status displays at the RJ45 sockets

The LEDs at the RJ45 sockets indicate the PROFINET connection status:

LED "Link" (green)	Status/meaning
off	No PROFINET connection.
on	A physical PROFINET connection is available.

LED "Activity" (yellow)	Status/meaning
off	No PROFINET data transfer.
on or flickers	Data is exchanged via PROFINET.

8.9.3 PROFINET diagnostics

Parameter	Name / value range / [default setting]	Info
0x2382:001 (P511.01)	Active PROFINET settings: IP address (PROFINET diag.: IP address) • Read only • From version 02.00	
0x2382:002 (P511.02)	Active PROFINET settings: Subnet (PROFINET diag.: Subnet) • Read only • From version 02.00	
0x2382:003 (P511.03)	Active PROFINET settings: Gateway (PROFINET diag.: Gateway) • Read only • From version 02.00	
0x2382:004 (P511.04)	Active PROFINET settings: Station name (PROFINET diag.: Station name) • Read only • From version 02.00	
0x2382:005 (P511.05)	Active PROFINET settings: MAC Address (PROFINET diag.: MAC Address) • Read only • From version 02.00	

Parameter	Name / value range / [default setting]		Info
0x2388 (P516.00)	PROFINET status (PROFINET status) • Read only • From version 02.00		
	Bit 0	Initialized	
	Bit 1	Online	
	Bit 2	Connected	
	Bit 3	IP address error	
	Bit 4	Hardware fault	
	Bit 5	Reserved	
	Bit 6	Watchdog elapsed	
	Bit 7	Protocol error	
	Bit 8	PROFINET stack ok	
	Bit 9	PROFINET stack not configured	
	Bit 10	Ethernet controller fault	
	Bit 11	UDP stack fault	
0x2389:001 (P517.01)	PROFINET error: Error 1 (PROFINET error: Error 1) • Read only • From version 02.00		
	0	No error	
	1	Reserved	
	2	Unit ID unknown	
	3	Max. units exceeded	
	4	Invalid size	
	5	Unit type unknown	
	6	Runtime plug error	
	7	Invalid argument	
	8	Service pending	
	9	Stack not ready	
	10	Command unknown	
	11	Invalid address descriptor	
0x2389:002 (P517.02)	PROFINET error: Error 2 (PROFINET error: Error2) • Read only • From version 02.00		
	Bit 0	Reserved	
	Bit 1	Reserved	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	IP address error	
	Bit 8	Station name problem	
	Bit 9	DataExch left	
	Bit 10	Stack boot error	
	Bit 11	Stack online error	
	Bit 12	Stack state error	
	Bit 13	Stack revision error	
	Bit 14	Initialization problem	
	Bit 15	Stack init error	

8.9.4 PROFINET monitoring

Parameter	Name / value range / [default setting]	Info
0x2859:001 (P515.01)	PROFINET monitoring: Watchdog elapsed (PROFINET monit.: WD elapsed) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33168 | 0x8190 - Network: watchdog timeout
	2 Trouble	▸ Error types 107
0x2859:003 (P515.03)	PROFINET monitoring: Invalid configuration (PROFINET monit.: Invalid config) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33414 | 0x8286 - Network: PDO mapping error
	2 Trouble	▸ Error types 107
0x2859:004 (P515.04)	PROFINET monitoring: Initialisation error (PROFINET monit.: Init. error) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33170 | 0x8192 - Network: initialisation error
	2 Trouble	▸ Error types 107
0x2859:005 (P515.05)	PROFINET monitoring: Invalid process data (PROFINET monit.: Inval. proc.data) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33171 | 0x8193 - Network: invalid cyclic process data
	2 Trouble	▸ Error types 107

8.10 EtherCAT

EtherCAT® (Ethernet for Controller and Automation Technology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial realtime systems

- Detailed information on EtherCAT can be found on the web page of the EtherCAT Technology Group (ETG): http://www.ethercat.org
- Information about the dimensioning of an EtherCAT network can be found in the configuration document for the inverter.
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Preconditions

- Control unit (CU) of the inverter is provided with EtherCAT.
- The XML device description files for EtherCAT can be found here: http://www.lenze.com/application-knowledge-base/artikel/200800381/0/

Parameter	Name / value range / [default setting]		Info
0x2360 (P508.00)	EtherCAT communication (EtherCAT comm.) • From version 02.00		
	0	**No action/no error**	
	1	Restart with current values	
	10	In process	
	11	Action cancelled	
	12	Fault	

8.10.1 EtherCAT

Parameter	Name / value range / [default setting]	Info
0x1000	Device type • Read only • From version 02.00	
0x1008	Manufacturer device name • Read only • From version 02.00	Manufacturer's device name
0x1009	Manufacturer hardware version • Read only • From version 02.00	
0x100A	Manufacturer software version • Read only • From version 02.00	
0x1018:001	Identity object: Vendor ID • Read only • From version 02.00	
0x1018:002	Identity object: Product code • Read only • From version 02.00	
0x1018:003	Identity object: Revision number • Read only • From version 02.00	
0x1018:004	Identity object: Serial number • Read only • From version 02.00	

8.10.2 EtherCAT configuration

Parameter	Name / value range / [default setting]	Info
0x2361:004 (P510.04)	EtherCAT settings: Device identifier (EtherCAT sett.: Device ident.) 0 ... [**0**] ... 65535 • From version 02.00	
0x2363 (P509.00)	EtherCAT switch position (EtherC. switch) • Read only • From version 02.00	

8.10.3 EtherCAT LED status displays

Information on the network status can be obtained quickly via the "BUS RDY" and "BUS ERR" LED displays on the front of the inverter. In addition, the LEDs at the RJ45 sockets indicate the EtherCAT connection status.

The meaning of the "BUS RDY" and "BUS ERR" LEDs can be obtained from the following two tables.

LED "BUS RDY" (green)	EtherCAT status	Status/meaning
off	off / Init	The network option is not active at the network or is in the "Init" status.
blinking	Pre-Operational	Access to parameters and objects possible. No process data exchange.
	Safe-Operational	The data is not active yet in the standard device.
on	Operational	The network option works correctly.
flickers	Bootstrap	Firmware update of the network option active.

LED "BUS ERR" (red)	Status/meaning
off	No fault
flickers	Local error. The network option changes automatically to the "Safe-Operational" status.
on (red)	A "Sync Manager Watchdog Timeout" has occurred.
blinking	The configuration is invalid/incorrect.

Status display at the RJ45 sockets

The LED "L/A" at the RJ45 sockets shows the EtherCAT connection status:

LED "L/A" (green)	Status/meaning
off	No EtherCAT connection.
flickers	Data is exchanged via EtherCAT.
on	A physical EtherCAT connection is available.

8.10.4 EtherCAT diagnostics

Parameter	Name / value range / [default setting]	Info
0x2362:004 (P511.04)	Active EtherCAT settings: Device identifier (EtherCAT diag.: Device ident.) • Read only • From version 02.00	
0x2362:006 (P511.06)	Active EtherCAT settings: Station address (EtherCAT diag.: Station address) • Read only • From version 02.00	
0x2362:007 (P511.07)	Active EtherCAT settings: Tx length (EtherCAT diag.: Tx length) • Read only • From version 02.00	
0x2362:008 (P511.08)	Active EtherCAT settings: Rx length (EtherCAT diag.: Rx length) • Read only • From version 02.00	
0x2368 (P516.00)	EtherCAT status (EtherCAT status) • Read only • From version 02.00	
	1 Initialisation	
	2 Pre-Operational	
	3 Bootstrap	
	4 Safe-Operational	
	8 Operational	
0x2369 (P517.00)	EtherCAT error (EtherCAT error) • Read only • From version 02.00	

8.10.5 EtherCAT monitoring

Parameter	Name / value range / [default setting]	Info
0x2859:001 (P515.01)	EtherCAT monitoring: Watchdog elapsed (EtherCAT monit.: WD elapsed) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33168 | 0x8190 - Network: watchdog timeout
	2 Trouble	▸ Error types 107
0x2859:003 (P515.03)	EtherCAT monitoring: Invalid configuration (EtherCAT monit.: Invalid config) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33414 | 0x8286 - Network: PDO mapping error
	2 Trouble	▸ Error types 107
0x2859:004 (P515.04)	EtherCAT monitoring: Initialisation error (EtherCAT monit.: Init. error) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33170 | 0x8192 - Network: initialisation error
	2 Trouble	▸ Error types 107
0x2859:005 (P515.05)	EtherCAT monitoring: Invalid process data (EtherCAT monit.: Inval. proc.data) • From version 02.00 • For possible settings see description for 0x2D45:001 (P310.01). 161	Associated error code: • 33171 | 0x8193 - Network: invalid cyclic process data
	2 Trouble	▸ Error types 107

8.10.6 EtherCAT objects

Parameter	Name / value range / [default setting]	Info
0x2360 (P508.00)	EtherCAT communication (EtherCAT comm.) • From version 02.00	
	0 No action/no error	
	1 Restart with current values	
	10 In process	
	11 Action cancelled	
	12 Fault	
0x2361:004 (P510.04)	EtherCAT settings: Device identifier (EtherCAT sett.: Device ident.) 0 ... [**0**] ... 65535 • From version 02.00	
0x2362:004 (P511.04)	Active EtherCAT settings: Device identifier (EtherCAT diag.: Device ident.) • Read only • From version 02.00	
0x2362:006 (P511.06)	Active EtherCAT settings: Station address (EtherCAT diag.: Station address) • Read only • From version 02.00	
0x2362:007 (P511.07)	Active EtherCAT settings: Tx length (EtherCAT diag.: Tx length) • Read only • From version 02.00	
0x2362:008 (P511.08)	Active EtherCAT settings: Rx length (EtherCAT diag.: Rx length) • Read only • From version 02.00	
0x2363 (P509.00)	EtherCAT switch position (EtherC. switch) • Read only • From version 02.00	
0x2368 (P516.00)	EtherCAT status (EtherCAT status) • Read only • From version 02.00	
	1 Initialisation	
	2 Pre-Operational	
	3 Bootstrap	
	4 Safe-Operational	
	8 Operational	
0x2369 (P517.00)	EtherCAT error (EtherCAT error) • Read only • From version 02.00	

8.10.7 EtherCAT - cyclic data transfer

Parameter	Name / value range / [default setting]	Info
0x1603:001	RPDO4 mapping parameter: Application object 1 • Read only • From version 02.00	
0x1603:002	RPDO4 mapping parameter: Application object 2 • Read only • From version 02.00	
0x1605:001	RPDO6 mapping parameter: Application object 1 • Read only • From version 02.00	
0x1605:002	RPDO6 mapping parameter: Application object 2 • Read only • From version 02.00	

Parameter	Name / value range / [default setting]	Info
0x1605:003	RPDO6 mapping parameter: Application object 3 • Read only • From version 02.00	
0x1605:004	RPDO6 mapping parameter: Application object 4 • Read only • From version 02.00	
0x1605:005	RPDO6 mapping parameter: Application object 5 • Read only • From version 02.00	
0x1605:006	RPDO6 mapping parameter: Application object 6 • Read only • From version 02.00	
0x1605:007	RPDO6 mapping parameter: Application object 7 • Read only • From version 02.00	
0x1605:008	RPDO6 mapping parameter: Application object 8 • Read only • From version 02.00	
0x1605:009	RPDO6 mapping parameter: Application object 9 • Read only • From version 02.00	
0x1605:010	RPDO6 mapping parameter: Application object 10 • Read only • From version 02.00	
0x1605:011	RPDO6 mapping parameter: Application object 11 • Read only • From version 02.00	
0x1605:012	RPDO6 mapping parameter: Application object 12 • Read only • From version 02.00	
0x1605:013	RPDO6 mapping parameter: Application object 13 • Read only • From version 02.00	
0x1605:014	RPDO6 mapping parameter: Application object 14 • Read only • From version 02.00	
0x1605:015	RPDO6 mapping parameter: Application object 15 • Read only • From version 02.00	
0x1605:016	RPDO6 mapping parameter: Application object 16 • Read only • From version 02.00	
0x1A03:001	TPDO4 mapping parameter: Application object 1 • Read only • From version 02.00	
0x1A03:002	TPDO4 mapping parameter: Application object 2 • Read only • From version 02.00	
0x1A03:003	TPDO4 mapping parameter: Application object 3 • Read only • From version 02.00	
0x1A05:001	TPDO6 mapping parameter: Application object 1 • Read only • From version 02.00	
0x1A05:002	TPDO6 mapping parameter: Application object 2 • Read only • From version 02.00	
0x1A05:003	TPDO6 mapping parameter: Application object 3 • Read only • From version 02.00	
0x1A05:004	TPDO6 mapping parameter: Application object 4 • Read only • From version 02.00	

Parameter	Name / value range / [default setting]	Info
0x1A05:005	TPDO6 mapping parameter: Application object 5 • Read only • From version 02.00	
0x1A05:006	TPDO6 mapping parameter: Application object 6 • Read only • From version 02.00	
0x1A05:007	TPDO6 mapping parameter: Application object 7 • Read only • From version 02.00	
0x1A05:008	TPDO6 mapping parameter: Application object 8 • Read only • From version 02.00	
0x1A05:009	TPDO6 mapping parameter: Application object 9 • Read only • From version 02.00	
0x1A05:010	TPDO6 mapping parameter: Application object 10 • Read only • From version 02.00	
0x1A05:011	TPDO6 mapping parameter: Application object 11 • Read only • From version 02.00	
0x1A05:012	TPDO6 mapping parameter: Application object 12 • Read only • From version 02.00	
0x1A05:013	TPDO6 mapping parameter: Application object 13 • Read only • From version 02.00	
0x1A05:014	TPDO6 mapping parameter: Application object 14 • Read only • From version 02.00	
0x1A05:015	TPDO6 mapping parameter: Application object 15 • Read only • From version 02.00	
0x1A05:016	TPDO6 mapping parameter: Application object 16 • Read only • From version 02.00	
0x1C00:001	Sync Manager communication type: SM1 communication type • Read only • From version 02.00 0 Reserved 1 Receive mailbox 2 Transmit mailbox 3 Transmit process data 4 Receive process data	
0x1C00:002	Sync Manager communication type: SM2 communication type • Read only • From version 02.00 • For meaning of the display see description for .	
0x1C00:003	Sync Manager communication type: SM3 communication type • Read only • From version 02.00 • For meaning of the display see description for .	
0x1C00:004	Sync Manager communication type: SM4 communication type • Read only • From version 02.00 • For meaning of the display see description for .	

Parameter	Name / value range / [default setting]	Info
0x1C12:000	Number of assigned PDOs • Read only • From version 02.00	
0x1C12:001	PDO mapping object index of assigned RxPDO 1 • Read only • From version 02.00	
0x1C12:002	PDO mapping object index of assigned RxPDO 2 • Read only • From version 02.00	
0x1C13:000	Number of assigned PDOs • Read only • From version 02.00	
0x1C13:001	PDO mapping object index of assigned RxPDO 1 • Read only • From version 02.00	
0x1C13:002	PDO mapping object index of assigned RxPDO 2 • Read only • From version 02.00	
0x1C32:001	Sync Manager 2: Synchronization type • From version 02.00	
	0 **Free run**	
0x1C32:002	Sync Manager 2: Cycle time • Read only: x ns • From version 02.00	
0x1C32:003	Sync Manager 2: Shift time • Read only: x ns • From version 02.00	
0x1C32:004	Sync Manager 2: Synchronization types supported • Read only • From version 02.00	
0x1C32:005	Sync Manager 2: Minimum cycle time • Read only: x ns • From version 02.00	
0x1C33:001	Sync Manager 3: Synchronization type • From version 02.00 • For possible settings see description for 0x1C32:001. 272	
	0 **Free run**	
0x1C33:002	Sync Manager 3: Cycle time • Read only: x ns • From version 02.00	
0x1C33:003	Sync Manager 3: Shift time • Read only: x ns • From version 02.00	
0x1C33:004	Sync Manager 3: Synchronization types supported • Read only • From version 02.00	
0x1C33:005	Sync Manager 3: Minimum cycle time • Read only: x ns • From version 02.00	

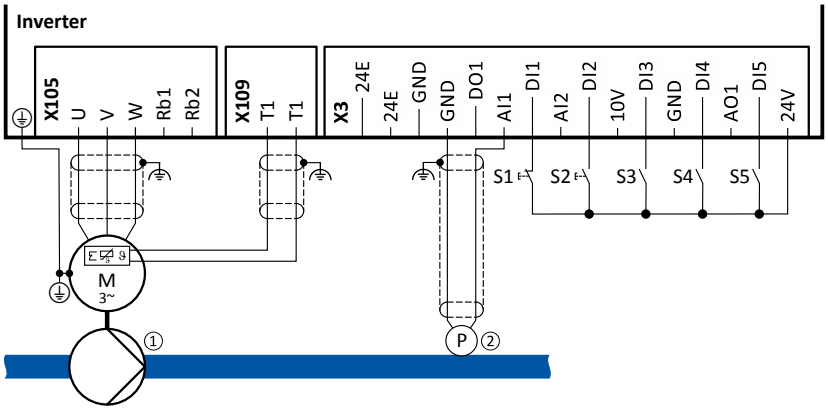
9 Configuring the process controller

By means of the process controller, a process variable can be regulated, for instance the pressure of a pump. The process controller is also referred to as "PID controller" (PID controller = proportional, integral and differential controller).

The process controller is part of a closed control loop. The variable to be influenced (controlled variable) is measured continuously by means of a sensor and supplied to the inverter as an analog signal (actual value) which, in the inverter, is then compared to the reference value (setpoint). The system deviation resulting therefrom is supplied to the process controller which, on this basis, decelerates or accelerates the motor speed according to the desired dynamic performance of the control loop, so that, for instance, a pump always generates the desired pressure.

Connection plan (example)

The following sample connection plan shows the control of a pump ①. The feedback of the variable (here: pressure) takes place via a pressure transducer ② connected to the analog input 1.



The digital inputs can be used to activate functions of the process controller. The specific assignment of the digital inputs and type of the contacts (switches or buttons, normally-closed contacts or normally-open contacts) depends on the application.

General information on the setting

- The basic setting of the process controller is described in the following subchapter.
  ▸ Basic process controller settings 🕮 274
- Optionally, the motor can be put into an energy-saving idle state if no power is required.
  ▸ Process controller idle state 🕮 280
- The rinsing function which can be activated in addition accelerates the motor in idle state to a defined speed at regular intervals. The rinsing of a pipe system with a pump that has been in an inactive state for a longer period is a typical application. ▸ Process controller rinse function 🕮 281

9.1 Basic process controller settings

The process controller is set in two steps:
1. Basic settings
2. Fine adjustment of the PID controller for an optimum control mode

Basic settings

Based on the default setting, we recommend the following proceeding:

1. Activate PID control: Set the desired operating mode (normal or reverse operation) in 0x4020:001 (P600.01).
2. If the feedback of the variable is to take place via analog input 2 instead of analog input 1: Set 0x4020:002 (P600.02) = "analog input 2 [2]".
3. Configure used analog input:
   - Configure input range.
   - Configure setting range for the PID control.
   - Adapt filter time to minimise impacts of the noise on the variable.
   - Set monitoring response to "No response [0]".
   ▸ Configuration of analog inputs 📖 425
4. If a (temporary) change-over to a speed-controlled operation is to be possible via a digital input:
   - Assign a free digital input to the control function "Deactivate PID controller" in 0x2631:045 (P400.45). As long as the digital input provides a TRUE signal, the PID control is ignored and the motor is driven in a speed-controlled way.
   - Set acceleration time 0x4021:001 (P606.01) and deceleration time 0x4021:002 (P606.02) for speed-controlled drive control.
5. Select the standard setpoint source for the reference value in 0x2860:002 (P201.02).
   - Functions for setpoint change-over can be used as well. ▸ Setpoint change-over 📖 387
   - The keypad setpoint can be preset in 0x2601:002 (P202.02).
   - If process controller presets are used, they have to be set in 0x4022:001 (P451.01) ... 0x4022:008 (P451.08).
   - If the analog input is used as setpoint source, it must be configured accordingly. ▸ Configuration of analog inputs 📖 425
   - If the motor potentiometer is used as setpoint source, this function must be configured accordingly. ▸ Motor potentiometer setpoint source (MOP) 📖 399
6. Set the speed range to be controlled in 0x4020:003 (P600.03).
7. Try out the following parameters with the default setting and only adapt them if required:
   - 0x404B (P604.00): Setpoint ramp
   - 0x404C:001 (P607.01): Acceleration time for showing the process controller influence
   - 0x404C:002 (P607.02): Deceleration for hiding the process controller influence
8. Diagnostics: Check current reference value and feedback of the variable:
   - The current reference value (setpoint) is displayed in 0x401F:001 (P121.01).
   - The current variable (actual value) is displayed in 0x401F:002 (P121.02).

After the basic setting of the process controller has been carried out, a fine adjustment of the PID controller must be executed for an optimum control mode (see the following section).

Fine adjustment of the PID controller

The dynamics of the PID controller is parameterised based on the gain of the P component 0x4048 (P601.00), the reset time for the I component 0x4049 (P602.00) and the gain of the D component 0x404A (P603.00). In the default setting, the process controller operates as PI controller, the D component is deactivated.

Basics

- If only the P component is used and the system operates in a steady-state status (reference value is constant and process variable is controlled to a fixed value), a certain system deviation always continues to exist. This remaining system deviation is also called "stationary deviation".
- The I component ensures that no permanent system deviation remains. Here, the reset time 0x4049 (P602.00)determines how much the duration of the control deviation influences the control. A high reset time means a lower influence of the I component and vice versa.
- The D component does not respond to the height of the system deviation but to their rate of change only. The D component acts as a "damper" for overshoots. Overshoots may occur if the control tries to respond quickly to changes in the system deviation or the reference value. Thus, the D component reduces the risk of instabilities due to overshoots.

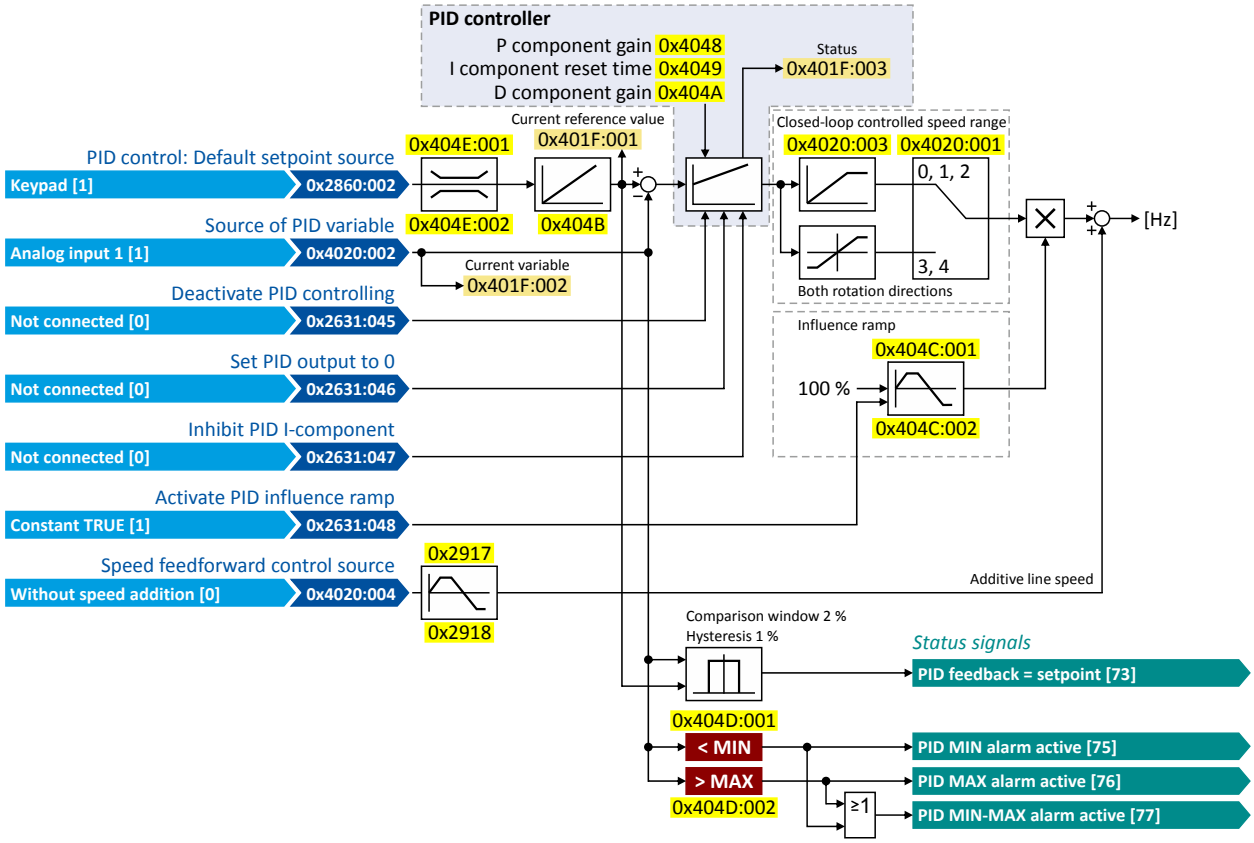
For most applications, the setting of the gain of the P component and the reset time for the I component is sufficient for the fine adjustment. The setting of the gain of the D component may by required for a further stabilisation of the system especially if a quick response to system deviations is to take place.

Execute fine adjustment:

1. Set the reset time for the I component to 6000 ms in 0x4049 (P602.00) to deactivate the I component.
   - With this setting and the default setting of 0x404A (P603.00), the process controller operates as P controller.
2. Increase gain of the P component step by step in 0x4048 (P601.00) unit the system gets instable.
3. Reduce gain again until the system is stable again.
4. Reduce gain by another 15 %.
5. Set reset time for the I component in 0x4049 (P602.00).
   - With this setting it should be noted that a too low reset time may cause overshoots, especially in case of high steps of the system deviation.
6. Set optional gain of D component in 0x404A (P603.00).
   - With this setting it should be noted that the D component responds very sensitively to electrical disturbance on the feedback as well as digitisation errors.

Internal signal flow

The following illustration shows the internal signal flow of the process controller (without the additional functions "idle state" and "rinsing function"):



Control functions

The flexible I/O configuration serves to configure different control functions for the process controller:

- 0x2631:045 (P400.45): Deactivate PID controller
- 0x2631:046 (P400.46): Set process controller output to 0
- 0x2631:047 (P400.47): Inhibit process controller I-component
- 0x2631:048 (P400.48): Activate process controller influence ramp

For details see chapter "Process controller function selection". 🕮 418

Status signals for configurable outputs

The process controller provides different internal status signals. These status signals can be assigned to the relay, the digital outputs or the NetWordOUT1 status word.

For details see chapter "Configuration of digital outputs". 🕮 431

Parameter	Name / value range / [default setting]		Info
0x4020:001 (P600.01)	Process controller: Operating mode (Process control.: Operating mode)		Selection of the process controller operating mode.
	0	**Inhibited**	Process controller deactivated.
	1	Normal operation	The setpoint is higher than the fed back variable (actual value). If the system deviation increases, the motor speed is increased. Example: pressure-controlled booster pumps (increase in the motor speed produces an increase in pressure.)
	2	Reverse operation	The setpoint is lower than the fed back variable (actual value). If the system deviation increases, the motor speed is increased. Example: temperature-controlled cooling water pump (increase in motor speed produces decrease in temperature.)
	3	Normal bi-drectional	The direction of rotation corresponds to the sign of the system deviation. If the system deviation increases, the motor speed is increased.
	4	Reverse bi-directional	A negative system deviation causes a positive direction of rotation. If the system deviation increases, the motor speed is increased.
0x4020:002 (P600.02)	Process controller: PID process variable (Process control.: PID process var.)		Selection of the source via which the feedback of the controlled variable (actual value) for the process controller is effected.
	1	**Analog input 1**	
	2	Analog input 2	
	3	DC-bus voltage • From version 02.00	
	4	Motor Current • From version 02.00	
	5	Network • From version 02.00	
0x4020:003 (P600.03)	Process controller: Closed-loop controlled speed range (Process control.: PID speed range) 0 ... [**100**] ... 100 %		Setting of the maximum output frequency up to which the process controller carries out regulation. • 100 % ≡ upper frequency limit value 0x2916 (P211.00).
0x4020:004 (P600.04)	Process controller: Speed feedforward control source (Process control.: PID line speed)		Optional selection of a speed feedforward control source for the process controller. • Is advisable, for instance, for dancer position controls if the motor speed must not fall below line speed (process controller output value = line speed + controlled motor speed). • Standard applications usually do not require a speed feedforward control; therefore it is deactivated in the default setting.
	0	**Without speed addition**	
	1	Keypad frequency setpoint	
	2	Analog input 1	
	3	Analog input 2	
	4	Frequency preset 1	
	5	Frequency preset 2	
	6	Frequency preset 3	
	7	Frequency preset 4	
	8	Network	
0x4021:001 (P606.01)	PID speed operation: Acceleration time (PID speed op.: Accel. time) 0.0 ... [**1.0**] ... 3600.0 s		Acceleration time for (temporary) speed-controlled drive control in process controller mode. • The acceleration time takes effect at the output of the process controller.
0x4021:002 (P606.02)	PID speed operation: Deceleration time (PID speed op.: Decel. time) 0.0 ... [**1.0**] ... 3600.0 s		Deceleration time for (temporary) speed-controlled drive control in process controller mode. • The deceleration time takes effect at the output of the process controller.
0x4048 (P601.00)	PID P-component (PID P-component) 0.0 ... [**5.0**] ... 1000.0 %		Output frequency of the process controller per 1 % system deviation. • 100 % ≡ maximum frequency 0x2916 (P211.00).
0x4049 (P602.00)	PID I- component (PID I- component) 20 ... [**400**] ... 6000 ms		Reset time for system deviation. • With the setting "6000 ms", the I component is deactivated. • The I component can also be deactivated via the "Inhibit process controller I-component" 0x2631:047 (P400.47) function.
0x404A (P603.00)	PID D-component (PID D-component) 0.0 ... [**0.0**] ... 20.0 s		D component, does not respond to the rate of the system deviation, but only to its rate of change.
0x404B (P604.00)	PID setpoint ramp (PID setp.ramp) 0.0 ... [**20.0**] ... 100.0 s		Acceleration time and deceleration time for the process controller setpoint, relating to the entire setting range of the process controller.

Parameter	Name / value range / [default setting]	Info
0x404C:001 (P607.01)	PID influence: Acceleration time for showing (PID influence: Show time) 0.0 ... [**5.0**] ... 999.9 s	If the trigger assigned in 0x2631:048 (P400.48) of the "Activate process controller influence ramp" function is TRUE, the influence of the process controller is shown by means of a ramp with the acceleration time set here.
0x404C:002 (P607.02)	PID influence: Deceleration time for masking out (PID influence: Mask out time) 0.0 ... [**5.0**] ... 999.9 s	If the trigger assigned in 0x2631:048 (P400.48) of the "Activate process controller influence ramp" function is FALSE, the influence of the process controller is hidden via a ramp with the deceleration time set here.
0x404D:001 (P608.01)	PID alarms: MIN alarm threshold (PID alarms: MIN alarm thrsh.) -300.00 ... [**0.00**] ... 300.00 PID unit	Trigger threshold for the status signal "PID MIN alarm active [75]". • The "PID MIN alarm active [75]" status signal is TRUE if the fed back variable (with activated PID control) is lower than the threshold set here. • The status signal can be assigned to the relay, a digital output of the NetWordOUT1 status word. ▸ Configuration of digital outputs 🕮 431
0x404D:002 (P608.02)	PID alarms: MAX alarm threshold (PID alarms: MAX alarm thrsh.) -300.00 ... [**100.00**] ... 300.00 PID unit	Trigger threshold for the status signal "PID MAX alarm active [76]". • The "PID MAX alarm active [76]" status signal is TRUE if the fed back variable (with activated PID control) is higher than the threshold set here. • The status signal can be assigned to the relay, a digital output of the NetWordOUT1 status word. ▸ Configuration of digital outputs 🕮 431
0x404E:001 (P605.01)	PID setpoint limits: Minimum setpoint (PID setp. limit: Minimum setpoint) -300.00 ... [**-300.00**] ... 300.00 PID unit	Minimum value of the process controller setpoint.
0x404E:002 (P605.02)	PID setpoint limits: Maximum setpoint (PID setp. limit: Maximum setpoint) -300.00 ... [**300.00**] ... 300.00 PID unit	Maximum value of the process controller setpoint.

Parameter	Name / value range / [default setting]		Info
0x2860:002 (P201.02)	PID control: Default setpoint source (Stnd. setpoints: PID setp. src.)		Selection of the standard setpoint source for the reference value of the PID control. • The selected standard setpoint source is always active with an activated PID control when no setpoint change-over to another setpoint source via corresponding triggers/functions is active.
	1	**Keypad**	The setpoint is specified locally by the keypad. • Default setting: 0x2601:002 (P202.02) • Use the ↑ and ↓ navigation keys to change the keypad setpoint (also during running operation).
	2	Analog input 1	The setpoint is specified analogously via X3/AI1. ▸ Analog input 1 📖 425
	3	Analog input 2	The setpoint is specified analogously via X3/AI2. ▸ Analog input 2 📖 429
	5	Network	The setpoint is specified via network. Configuring the network 📖 164
	11	PID preset 1	For the setpoint selection, preset values can be parameterised and selected. ▸ Setpoint source of preset setpoints 📖 394
	12	PID preset 2	
	13	PID preset 3	
	14	PID preset 4	
	15	PID preset 5	
	16	PID preset 6	
	17	PID preset 7	
	18	PID preset 8	
	31	Segment preset 1 • From version 02.00	
	32	Segment preset 2 • From version 02.00	
	33	Segment preset 3 • From version 02.00	
	34	Segment preset 4 • From version 02.00	
	35	Segment preset 5 • From version 02.00	
	36	Segment preset 6 • From version 02.00	
	37	Segment preset 7 • From version 02.00	
	38	Segment preset 8 • From version 02.00	
	50	Motor potentiometer	The setpoint is generated by the "Motor potentiometer" function. ▸ Motor potentiometer setpoint source (MOP) 📖 399
0x401F:003 (P121.03)	Process controller diagnostics: Status (PID diagnostics: PID status) • Read only		Bit-coded status display of the process controller.
	Bit 0	Process controller off	
	Bit 1	PID output set to 0	
	Bit 2	PID I-component set to 0	
	Bit 3	PID influence shown	
	Bit 4	Setpoint = actual value	
	Bit 5	Idle state active	
	Bit 6	Reserved	
	Bit 7	Reserved	

9.2 Process controller - idle state and rinse function

9.2.1 Process controller idle state

If the PID control is activated, this function sets the drive in process controller mode to an energy-saving idle state when no power is required.

Details

A typical application for this function is a booster pump for water in a high-rise building. If no tenant opens the water tap or uses the shower for a longer period of time, the pump changes to the energy-saving idle state. This usually happens at night. The idle state automatically ends as soon as a tenant opens the tap again. The pumps operates normally again until the condition for the idle state is pending again.

The conditions for activating and terminating the idle state can be set independently of one another:

- 0x4023:001 (P610.01): Condition for activating the idle state
- 0x4023:006 (P610.06): Condition for terminating the idle state

Parameter	Name / value range / [default setting]		Info
0x4023:001 (P610.01)	PID sleep mode: Activation (PID sleep mode: Activation)		Selection of the condition for activating the idle state.
	0	**Disabled**	Idle state deactivated.
	1	Setpoint < threshold	Activation of idle state if process controller correcting variable < frequency threshold 0x4023:003 (P610.03) longer than the deceleration time 0x4023:005 (P610.05).
	2	Setpoint < threshold OR process variable > feedback threshold	Activation of idle state if • Process controller correcting variable < frequency threshold 0x4023:003 (P610.03) longer than the deceleration time 0x4023:005 (P610.05) OR • fed back variable > feedback threshold 0x4023:004 (P610.04) longer than the deceleration time 0x4023:005 (P610.05).
	3	Setpoint < threshold OR process variable < feedback threshold	Activation of idle state if • Process controller correcting variable < frequency threshold 0x4023:003 (P610.03) longer than the deceleration time 0x4023:005 (P610.05) OR • fed back variable < feedback threshold 0x4023:004 (P610.04) longer than the deceleration time 0x4023:005 (P610.05).
0x4023:002 (P610.02)	PID sleep mode: Stop method (PID sleep mode: Stop method)		Selection of the stop method after activation of the idle state.
	0	**Coasting**	The motor becomes torqueless (coasts down to standstill).
	1	Deceleration to standstill	The motor is brought to a standstill with deceleration time 1 (or deceleration time 2, if activated). • Deceleration time 1 can be set in 0x2918 (P221.00). • Deceleration time 2 can be set in 0x291A (P223.00). ▸ Frequency limits and ramp times 🕮 118
	2	Stop method set	The stop method set in 0x2838:003 (P203.03) is used.
0x4023:003 (P610.03)	PID sleep mode: Frequency threshold (PID sleep mode: Freq. thresh.) 0.0 ... [**0.0**] ... 599.0 Hz		Frequency threshold for the activation of the idle state. • For comparing "process controller correcting variable < frequency threshold 0x4023:003 (P610.03)" in case of selection 1 ... 3 in 0x4023:001 (P610.01).
0x4023:004 (P610.04)	PID sleep mode: Feedback threshold (PID sleep mode: Feedback thresh.) -300.00 ... [**0.00**] ... 300.00 PID unit		Feedback threshold for the activation of the idle state. • For comparing "fed back variable > feedback threshold 0x4023:004 (P610.04)" in case of selection 2 in 0x4023:001 (P610.01). • For comparing "fed back variable < feedback threshold 0x4023:004 (P610.04)" in case of selection 3 in 0x4023:001 (P610.01).
0x4023:005 (P610.05)	PID sleep mode: Delay time (PID sleep mode: Delay time) 0.0 ... [**0.0**] ... 300.0 s		Minimum time for which the respective threshold must be underrun or exceeded before the idle state is activated.

Parameter	Name / value range / [default setting]		Info
0x4023:006 (P610.06)	PID sleep mode: Recovery (PID sleep mode: Recovery)		Selection of the condition for terminating the idle state.
	0	**Setpoint > threshold OR system deviation > bandwidth**	Completion of idle state if • frequency setpoint > (frequency threshold 0x4023:003 (P610.03) + 2 Hz hysteresis) OR • in case of active PID control system deviation > bandwidth 0x4023:007 (P610.07) and bandwidth 0x4023:007 (P610.07) <> 0.
	1	Process variable < recovery threshold	Completion of idle state if the controlled variable fed back < completion threshold 0x4023:008 (P610.08).
	2	Process variable > recovery threshold	Completion of idle state if the controlled variable fed back > completion threshold 0x4023:008 (P610.08).
0x4023:007 (P610.07)	PID sleep mode: Bandwidth (PID sleep mode: Bandwidth) 0.00 ... [**0.00**] ... 300.00 PID unit		Range around the process controller setpoint for terminating the idle state.
0x4023:008 (P610.08)	PID sleep mode: Recovery threshold (PID sleep mode: Recovery thresh.) -300.00 ... [**0.00**] ... 300.00 PID unit		Termination threshold for idle state.

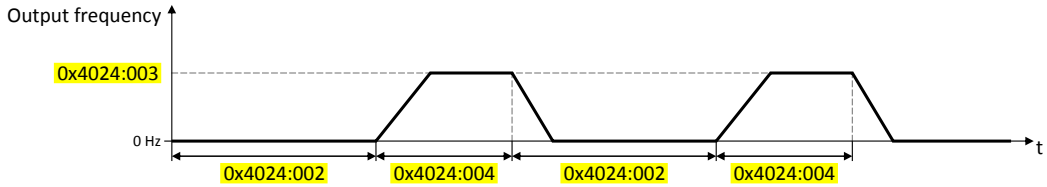
9.2.2 Process controller rinse function

This function accelerates the motor in idle state of the process controller at regular intervals to a defined speed.

Details

A typical application for this function is the rinsing of a pipe system with a pump that has been in an inactive state for a longer period to prevent deposits.

- In order to activate the rinsing function, set the selection "Enabled [1]" in 0x4024:001 (P615.01).
- The following diagram demonstrates the function:



- The rinsing function uses the ramp times set for the "MS: Velocity mode". ▸ Frequency limits and ramp times 🕮 118

Parameter	Name / value range / [default setting]		Info
0x4024:001 (P615.01)	Automatic rinsing: Rinsing in idle state (Auto-rinsing: Rinsing in idle)		1 = activate automatic rinsing in idle state.
	0	**Inhibited**	
	1	Enabled	
0x4024:002 (P615.02)	Automatic rinsing: Rinse interval (Auto-rinsing: Rinse interval) 0.0 ... [**30.0**] ... 6000.0 min		Time interval between two rinsing processes.
0x4024:003 (P615.03)	Automatic rinsing: Rinse speed (Auto-rinsing: Rinse speed) -599.0 ... [**0.0**] ... 599.0 Hz		Speed setpoint for rinse function.
0x4024:004 (P615.04)	Automatic rinsing: Rinse period (Auto-rinsing: Rinse period) 0.0 ... [**0.0**] ... 6000.0 s		Duration of a rinsing process.

10 Additional functions

- Device Commands 📖 283
- Keypad 📖 289
- DC braking 📖 290
- Brake energy management 📖 295
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- Favorites 📖 311
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- Additive voltage impression 📖 360
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10.1 Device Commands

Device commands are commands for calling organisational functions of the inverter, e.g. saving and loading of parameter settings, or restoring the default setting.

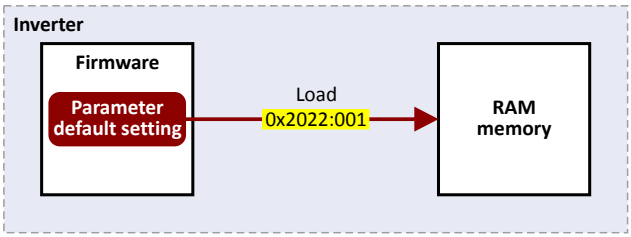
10.1.1 Reset parameters to default

With the "Load default settings" device command, all parameters can be reset to the default setting.

By executing this device command, all parameter settings made by the user are lost!

Details

- All parameters in the RAM memory of the inverter are set to the default setting stored in the firmware of the inverter. (The persistent parameters in the memory module remain unaffected by this measure.)



- Afterwards the inverter can be parameterised again on the basis of this initial state.
- Typical application: incorrect or unknown parameter settings.
- The device command only has an effect on the RAM. For a permanent acceptance of the changes made, the data must be saved in the memory module. ▸ Saving/loading the parameter settings 🕮 284

Parameter	Name / value range / [default setting]		Info
0x2022:001 (P700.01)	Device commands: Load default settings (Device commands: Load def. sett.) • Setting can only be changed if the inverter is inhibited.		1 ≡ reset all parameters in the RAM memory of the inverter to the default setting that is stored in the inverter firmware. • All parameter changes made by the user are lost during this process! • It may take some seconds to execute the task. When the task has been executed successfully, the value 0 is shown. • Loading parameters has a direct effect on the cyclic communication: The data exchange for control is interrupted and a communication error is generated.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

10.1.2 Saving/loading the parameter settings

If parameter settings of the inverter are changed, these changes at first are only made in the RAM memory of the inverter. In order to save the parameter settings with mains failure protection, the inverter is provided with a pluggable memory module and corresponding device commands.

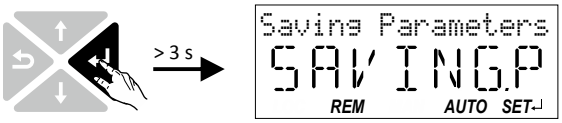
Details

The memory module is provided with two memories, the user memory and the OEM memory.

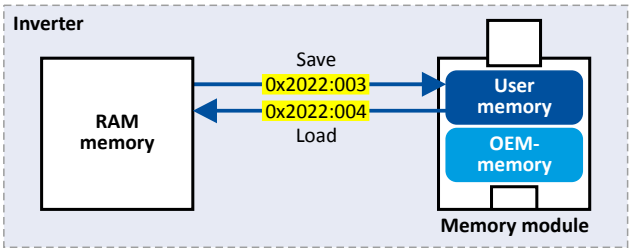
User memory

The user memory is used as power-failure-proof storage of parameter settings made by the user during commissioning/operation.

- The SET display is blinking on the keypad if a parameter setting has been changed but has not been saved in the memory module with mains failure protection. In order to save parameter settings in the user memory of the memory module, press the keypad "Enter" key > 3 s.



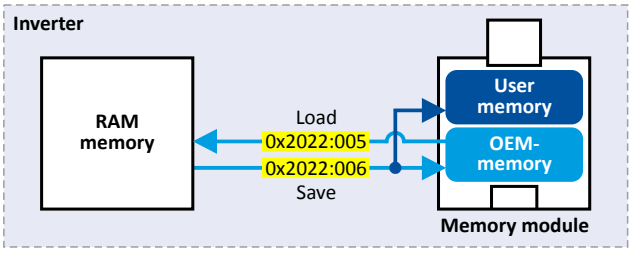
- Parameter settings carried out with »EASY Starter« or via network must be explicitly saved in the user memory by means of the "Save user data" device command, so that the changes carried out are not lost when the mains of the inverter are switched.
- Saving can also be made in the »EASY Starter« via the button or the **<F6>** function key.
- The device command "Load user data" serves to reload the data from the user memory into the RAM.



OEM memory

The OEM memory is provided for the storage of customised parameter settings by the OEM/mechanical engineer. If the user carries out parameter settings with the keypad, they are always saved in the user memory if the keypad Enter key is clicked longer than 3 s. The OEM memory remains unaffected by these changes.

- With the "Load OEM data" device command, the parameter settings preconfigured by the OEM/mechanical engineer can be reloaded to the RAM memory of the inverter anytime, if required.
- Parameter settings can only be stored in the OEM memory with »EASY Starter« or via network. This explicitly requires execution of the "Save OEM data" device command. At the same time, the parameter settings are stored in the user memory.



Response after initial switch-on of the inverter

After switch-on, the inverter first tries to load the parameter settings stored in the user memory. If the user memory is empty or damaged, an error message is output and the user must intervene:

- Option 1 = user memory empty: → default setting is loaded automatically from the firmware → data are saved automatically in the user memory of the memory module.
- Option 2 = user- memory damaged: → Error message → default setting is loaded automatically → data are saved automatically in the user memory of the memory module.
- Option 3 = OEM memory empty/damaged: → error message → data are loaded automatically from the user memory of the memory module.

Parameter	Name / value range / [default setting]		Info
0x2022:003 (P700.03)	Device commands: Save user data (Device commands: Save user data)		1 = save current parameter settings in the main memory of the memory module with mains failure protection. • It may take some seconds to execute the task. When the task has been executed successfully, the value 0 is shown. • Do not switch off the supply voltage during the saving process and do not unplug the memory module from the inverter! • When the inverter is switched on, all parameters are automatically loaded from the main memory of the memory module to the RAM memory of the inverter.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:004 (P700.04)	Device commands: Load user data (Device commands: Load user data) • Setting can only be changed if the inverter is inhibited.		1 = load data from the main memory of the memory module to the RAM memory of the inverter. • When the device command has been executed successfully, the value 0 is shown. • Loading parameters has a direct effect on the cyclic communication: The data exchange for control is interrupted and a communication error is generated.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:005 (P700.05)	Device commands: Load OEM data (Device commands: Load OEM data) • Setting can only be changed if the inverter is inhibited.		1 = load data from the OEM memory of the memory module to the RAM memory of the inverter. • When the device command has been executed successfully, the value 0 is shown. • Loading parameters has a direct effect on the cyclic communication: The data exchange for control is interrupted and a communication error is generated.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

Parameter	Name / value range / [default setting]		Info
0x2022:006 (P700.06)	Device commands: Save OEM data (Device commands: Save OEM data)		1 = save current parameter settings in the OEM memory of the memory module with mains failure protection. • At the same time, the parameter settings are saved in the main memory of the memory module. • After successful execution, the value 0 is shown.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2829 (P732.00)	Automatic storage in the memory module (Auto-Save EPM)		1 = activate automatic saving of parameters in the memory module. • With the setting 0, the "Save user data" 0x2022:003 (P700.03) device command must be explicitly executed, or the "Enter" keypad key must be pressed for longer than 3 s to save the current parameter settings in the memory module of the inverter with mains failure protection.
	0	**Inhibit**	
	1	Enable	

10.1.3 Device commands for parameter change-over

The inverter supports several parameter sets. The parameter set can be selected by means of the device commands "Load parameter set 1" ... "Load parameter set 4".

⚠ DANGER!

Changed parameter settings can become effective immediately depending on the activating method set in 0x4046 (P755.00).

The possible consequence is an unexpected response of the motor shaft while the inverter is enabled.

- ▸ If possible, only carry out parameter changes while the inverter is disabled.
- ▸ Certain device commands or settings which might cause a critical state of the drive behaviour can generally only be carried our when the inverter is inhibited.

Details

The "parameter change-over" function provides a change-over between four sets with different parameter values for up to 32 freely selectable parameters. For details on the compilation of the parameters and setting of the value sets, see the chapter "Parameter change-over".
📖 316

The change-over via the device commands depends on the activation method set in 0x4046 (P755.00):

- Activation method = 1 or 3: Change-over takes place immediately.
- Activation method = 0 or 2: The respective device command is only executed if the inverter is disabled.

Parameter	Name / value range / [default setting]		Info
0x2022:007 (P700.07)	Device commands: Load parameter set 1 (Device commands: Load par. set 1)		1 = load value set 1 of the "Parameter change-over" function. • The parameters specified in 0x4041/1...32 are set to the values set in 0x4042/1...32. • After successful execution, the value 0 is shown. ▸ Parameter change-over 📖 316
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

Parameter	Name / value range / [default setting]		Info
0x2022:008 (P700.08)	Device commands: Load parameter set 2 (Device commands: Load par. set 2)		1 = load value set 2 of the "Parameter change-over" function. • The parameters specified in 0x4041/1...32 are set to the values set in 0x4043/1...32. • After successful execution, the value 0 is shown. ▸ Parameter change-over 316
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:009 (P700.09)	Device commands: Load parameter set 3 (Device commands: Load par. set 3)		1 = load value set 3 of the "Parameter change-over" function. • The parameters specified in 0x4041/1...32 are set to the values set in 0x4044/1...32. • After successful execution, the value 0 is shown. ▸ Parameter change-over 316
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:010 (P700.10)	Device commands: Load parameter set 4 (Device commands: Load par. set 4)		1 = load value set 4 of the "Parameter change-over" function. • The parameters specified in 0x4041/1...32 are set to the values set in 0x4045/1...32. • After successful execution, the value 0 is shown. ▸ Parameter change-over 316
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

10.1.4 Initialising the network interface

When the inverter is switched on, it checks whether the parameter settings stored in the memory module match the network option available in the inverter. If not, the inverter changes to the error status. The error status can only be quit if the currently available network option is accepted as new hardware.

Details

In order to accept the currently available network option as new hardware, 0x2022:027 (P700.27) must be set to "1". When this device command is executed, all parameters are initialised for the new network option.

Diagnostic parameters:

- The network option currently configured in the inverter is displayed in 0x231F:001 (P500.01).
- The network option currently available in the inverter is displayed in 0x231F:002 (P500.02).

Parameter	Name / value range / [default setting]		Info
0x2022:027 (P700.27)	Device commands: Accept new inverter hardware (Device commands: Accept new HW) • Setting can only be changed if the inverter is inhibited.		1 = initialise parameters for a new network option.
	0	**Off / ready**	
	1	On / start	

10.1.5 Delete logbook

By means of the "Delete logbook" device command, all logbook entries can be deleted.

Parameter	Name / value range / [default setting]		Info
0x2022:015 (P700.15)	Device commands: Delete logbook (Device commands: Delete logbook) • Setting can only be changed if the inverter is inhibited.		1 = delete all entries in the logbook.
	0	**Off / ready**	
	1	On / start	

10.2 Keypad

For the keypad various settings can be made, which are described in detail in the following subchapters.

10.2.1 Keypad language selection

Parameter	Name / value range / [default setting]	Info
0x2863 (P705.00)	Keypad language selection (KP language)	Language selection for the keypad display.
	0 No language selected	
	1 English	
	2 German	

10.2.2 Keypad setpoint increment

Parameter	Name / value range / [default setting]	Info
0x2862 (P701.00)	Keypad setpoint increment (KP setp. incr.) 1 ... [**1**] ... 100	Adaptation of the increment for keypad setpoints when a keypad arrow key is pressed once. The value set serves as a multiplier for the preset increments. Preset increments: • 0.1 Hz for frequency setpoint 0x2601:001 (P202.01). • 0.01 PUnit for process controller setpoint 0x2601:002 (P202.02). • 1 % for torque setpoint . Notes: • With a setting > 1, the option of repeatedly changing the setpoint by pressing the key for a longer time is deactivated. • The setting only has an impact on the keypad setpoints. Example: with the setting "5", the keypad frequency setpoint is increased/decreased by 0.5 Hz every time the key is pressed.

10.2.3 Keypad scaling of speed display

Parameter	Name / value range / [default setting]	Info
0x4002 (P702.00)	Speed display scaling (Scal.speed fact.) 0.00 ... [**0.00**] ... 650.00	Factor for the scaling of the speed display in 0x400D (P101.00). • With the setting "0.00", no scaling takes place. • Example: with the "16.50" and the actual frequency = 50 Hz, 0x400D (P101.00) shows the speed "825 rpm".
0x400D (P101.00)	Scaled actual value (Scaled act value) • Read only: x Units	Display of the current speed in application units.

10.2.4 Keypad status display

During operation, the keypad displays the output frequency of the inverter, or with an active PID control it shows the process controller setpoint. Alternatively, an optional diagnostic parameter can be displayed during operation.

Parameter	Name / value range / [default setting]	Info
0x2864 (P703.00)	Keypad status display (KP status displ.) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	0 = normal display depending on the operating mode • In case of an active frequency control, the keypad displays the output frequency of the inverter. • In case of active PID control, the keypad displays the current Process controller setpoint in [P-Unit]. As an alternative, an optional diagnostic parameter can be set here, which is to be shown on the keypad during operation. • Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex) • The lowest byte is always 0x00. • The keypad can be used to select the desired diagnostics parameter from a list.

10.3 DC braking

The "DC braking" function generates a braking torque by injecting a DC current into the motor. The function can be used to shorten the braking of a load with high mass inertia. Another application is holding the motor shaft either before starting or while stopping.

NOTICE

Avoid long-time activation of the "DC braking" function with a high braking current or a high braking voltage!

Possible consequence: thermal motor overload.

- Only use the "DC braking" function in applications in which the load is only exceptionally stopped.
- Do not activate the "DC braking" function longer than necessary.

Preconditions

The "DC braking" function is only possible if the inverter is enabled.

Details

The function can be used as follows:

1. Automatically when the motor is started.
2. Automatically when the motor is stopped.
3. Manually (via the flexible I/O configuration).

The three options can also be combined, for instance automatic DC braking when starting and stopping the motor.

For further details and configuration examples, see the following chapter:

- Example 1: Automatic DC braking when the motor is started 📖 292
- Example 2: Automatic DC braking when the motor is stopped 📖 293
- Activating DC braking manually 📖 405

Parameter	Name / value range / [default setting]	Info
0x2B84:001 (P704.01)	DC braking: Current (DC braking: Current) 0.0 ... [**0.0**] ... 200.0 %	Braking current for DC braking. • 100 % ≡ rated motor current 0x6075 (P323.00)
0x2B84:002 (P704.02)	DC braking: Automatic hold time (DC braking: Hold time autom.) 0.0 ... [**0.0**] ... 999.9 s	Hold time for automatic DC braking. • The "Automatic DC braking" function is active for the time set here.
0x2B84:003 (P704.03)	DC braking: Automatic operating threshold (DC braking: Threshold autom.) 0.0 ... [**0.0**] ... 599.0 Hz	Operating threshold for automatic DC braking. • With the setting 0, the "Automatic DC braking" function is deactivated.
0x2631:005 (P400.05)	Function list: Activate DC braking (Function list: DC braking) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate DC braking" function. Trigger = TRUE: Activate DC braking. Trigger = FALSE: Deactivate DC braking. ⚠ CAUTION! DC braking remains active as long as the trigger is set to TRUE. ▸ DC braking 📖 290
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

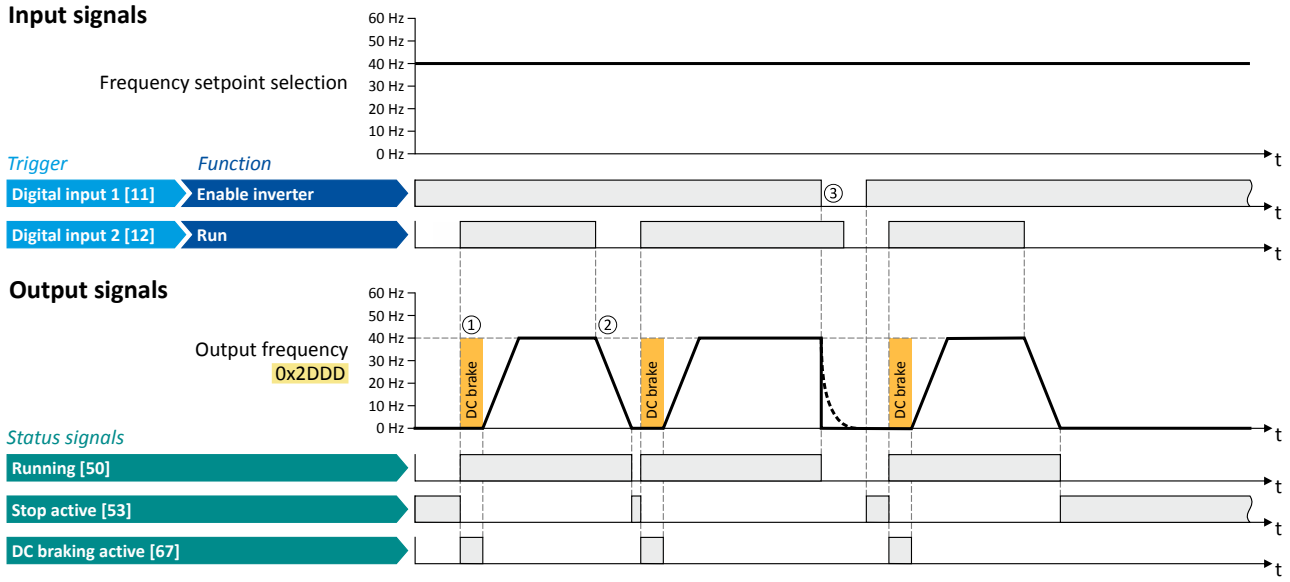
Parameter	Name / value range / [default setting]		Info
0x2838:001 (P203.01)	Start/stop configuration: Start method (Start/stop confg: Start method) • Setting can only be changed if the inverter is inhibited.		Behaviour after start command.
	0	**Normal**	After start command, the standard ramps are active. • Acceleration time 1 can be set in 0x2917 (P220.00). • Deceleration time 1 can be set in 0x2918 (P221.00).
	1	DC braking	After start command, the "DC braking" function is active for the time set in 0x2B84:002 (P704.02). ▸ DC braking 📖 290
	2	Flying restart circuit	After the start command, the flying restart circuit is active. The flying restart function makes it possible to restart a coasting motor during operation without speed feedback. Synchronicity between the inverter and motor is coordinated so that the transition to the rotating motor is effected without jerk at the time of connection. ▸ Flying restart circuit 📖 347
0x2838:003 (P203.03)	Start/stop configuration: Stop method (Start/stop confg: Stop method)		Behaviour after the "Stop" command.
	0	Coasting	The motor becomes torqueless (coasts down to standstill).
	1	**Standard ramp**	The motor is brought to a standstill with deceleration time 1 (or deceleration time 2, if activated). • Deceleration time 1 can be set in 0x2918 (P221.00). • Deceleration time 2 can be set in 0x291A (P223.00). ▸ Frequency limits and ramp times 📖 118
	2	Quick stop ramp	The motor is brought to a standstill with the deceleration time set for the "Quick stop" function. • Deceleration time for quick stop can be set in 0x291C (P225.00). • The "quick stop" function can also be activated manually, for instance via a digital input. ▸ Quick stop 📖 121

10.3.1 Example 1: Automatic DC braking when the motor is started

In order that the DC braking is automatically active when the motor is started, the start method "DC braking [1]" must be set in 0x2838:001 (P203.01).

- The DC braking is carried out with the braking current set in 0x2B84:001 (P704.01).
- Only after the hold time 0x2B84:002 (P704.02) has elapsed, the motor is accelerated to the setpoint.

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Digital input 1 [11]
0x2631:002 (P400.02)	Run	Digital input 2 [12]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2838:001 (P203.01)	Start method	DC braking [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Frequency preset 1 [11]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	40 Hz
0x2B84:001 (P704.01)	Current	50 %
0x2B84:002 (P704.02)	Automatic hold time	10 s



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① After the start command, the DC braking is active. Only after the hold time 0x2B84:002 (P704.02) has elapsed, the motor is accelerated to the setpoint.

② The motor is stopped with the stop method set in 0x2838:003 (P203.03). In the example: Stop with standard ramp.

③ If the inverter is disabled, the motor coasts.

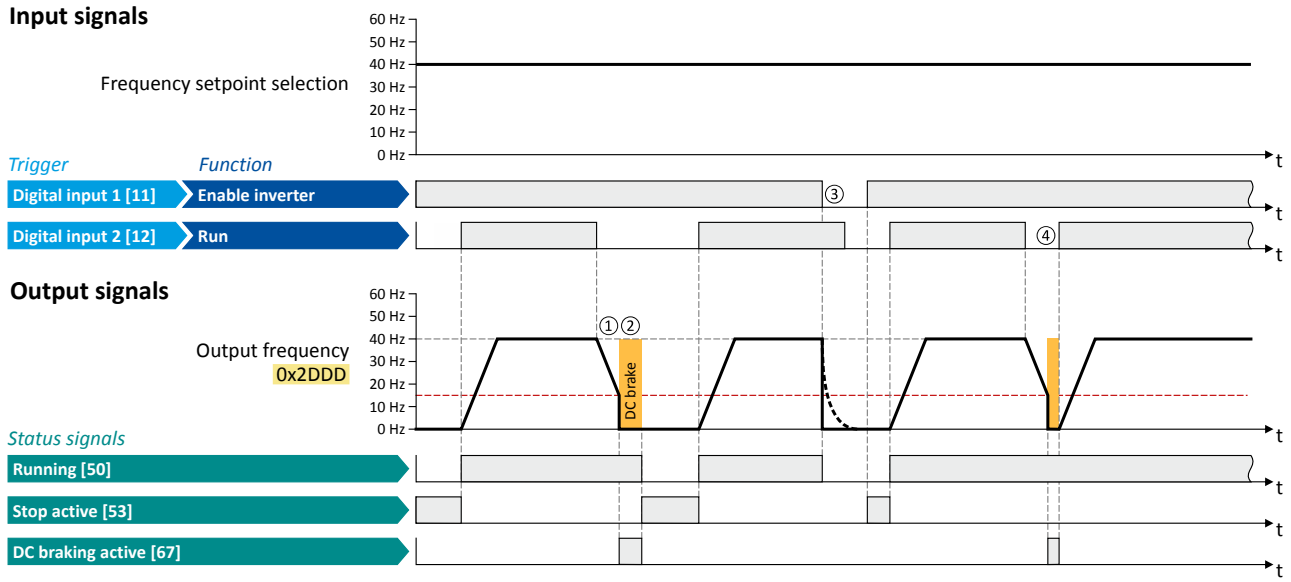
10.3.2 Example 2: Automatic DC braking when the motor is stopped

In order that the DC braking is automatically active when the motor is stopped, the corresponding operating threshold must be set in 0x2B84:003 (P704.03).

- After a stop command, the motor is first decelerated as set. Only if the output frequency falls below the set operating threshold, the inverter stops the deceleration and activates DC braking.
- DC braking is carried out with the braking current set in 0x2B84:001 (P704.01) for the hold time set in 0x2B84:002 (P704.02).
- The exact behaviour depends on the stop method set in 0x2838:003 (P203.03).

Stop method = "Standard ramp [1]"

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Digital input 1 [11]
0x2631:002 (P400.02)	Run	Digital input 2 [12]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Frequency preset 1 [11]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	40 Hz
0x2B84:001 (P704.01)	Current	50 %
0x2B84:002 (P704.02)	Automatic hold time	10 s
0x2B84:003 (P704.03)	Automatic operating threshold	15 Hz



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① With the stop method "Standard ramp [1]", the motor is first decelerated normally until the value falls below the operating threshold set in 0x2B84:003 (P704.03).

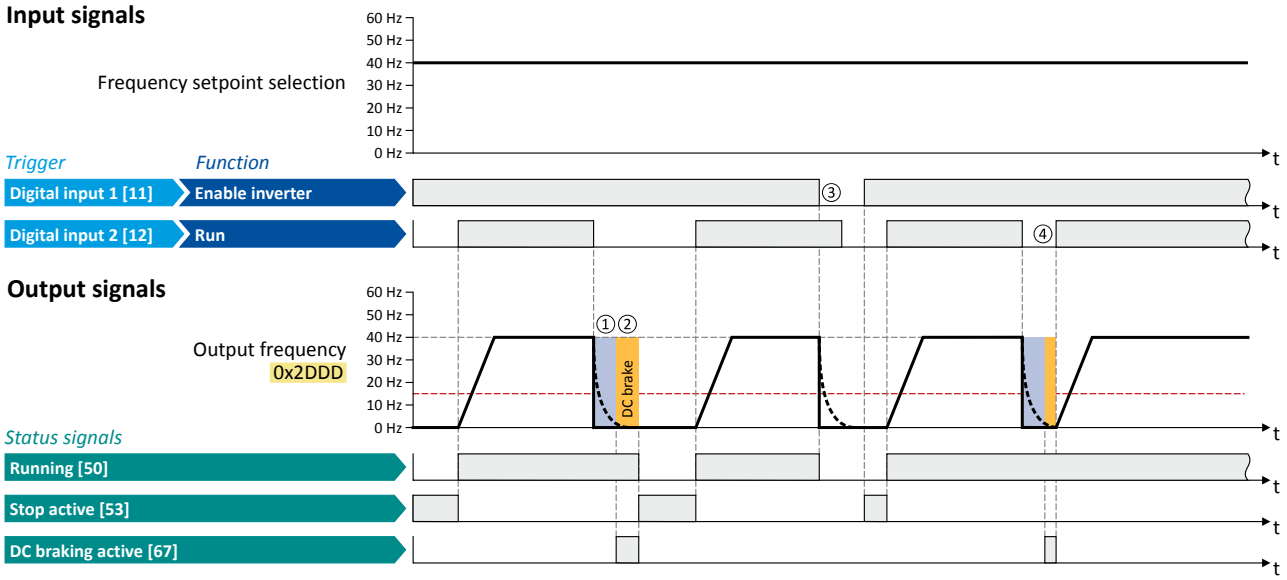
② The DC braking becomes active for the hold time set in 0x2B84:002 (P704.02).

③ If the inverter is disabled, the motor coasts. (DC braking is only possible if the inverter is enabled.)

④ If there is a new start command within the hold time, the DC braking is cancelled. The motor is accelerated to the setpoint again.

Stop method = "Coasting [0]"

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Digital input 1 [11]
0x2631:002 (P400.02)	Run	Digital input 2 [12]
0x2838:003 (P203.03)	Stop method	Coasting [0]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Frequency preset 1 [11]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	40 Hz
0x2B84:001 (P704.01)	Current	50 %
0x2B84:002 (P704.02)	Automatic hold time	10 s
0x2B84:003 (P704.03)	Automatic operating threshold	15 Hz



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① With the stop method "Coasting [0]", the motor first coasts for a specified time. This "demagnetising time" serves to reduce the induced voltage.

② The DC braking becomes active for the hold time set in 0x2B84:002 (P704.02).

③ If the inverter is disabled, the motor coasts. (DC braking is only possible if the inverter is enabled.)

④ If there is a new start command within the hold time, the DC braking is cancelled. The motor is accelerated to the setpoint again.

10.4 Brake energy management

When braking electrical motors, the kinetic energy of the drive train is fed back regeneratively to the DC bus. This energy causes a DC-bus voltage boost. If the energy fed back is too high, the inverter reports an error.

Several different strategies can serve to avoid DC-bus overvoltage:

- Use of a brake resistor
- Stopping the deceleration ramp function generator when the active voltage threshold for the brake operation is exceeded
- Use of the "Inverter motor brake" function
- Combination of the above named options
- DC-bus connection

Details

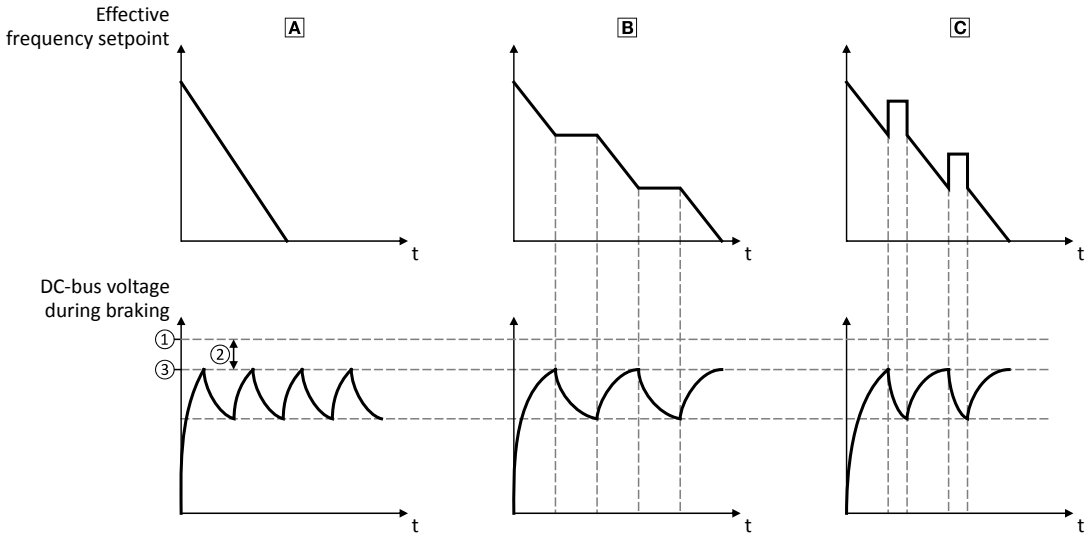
The voltage threshold for braking operation results on the basis of the rated mains voltage set:

Rated mains voltage	Voltage threshold for braking operation
230 V	DC 380 V
400 V	DC 725 V
480 V	DC 775 V

The voltage threshold for braking operation can be reduced by 0 ... 100 V. The reduction required must be set in 0x2541:003 (P706.03). However, the reduction must be made to such an extent that the reduced voltage threshold is still above the normal stationary DC-bus voltage.

If the DC-bus voltage exceeds the voltage threshold for braking operation, the braking method selected in 0x2541:001 (P706.01) is applied.

- Optimum following of the actual frequency value to the frequency setpoint (e.g. quick stop of the motor) can always be achieved by the use of a brake resistor.
- Stopping the deceleration ramp function generator enables smoother deceleration with lower torque oscillation..
- The "Inverter motor brake" function allows for quick braking without using a brake resistor. For process-related reasons, torque oscillations may occur.



① Voltage threshold for braking operation
② Reduced threshold 0x2541:003 (P706.03)
③ Active threshold 0x2541:002 (P706.02)

A Use of a brake resistor 297
B Stopping the deceleration ramp function generator 299
C Inverter motor brake 300

Parameter	Name / value range / [default setting]		Info
0x2541:001 (P706.01)	Brake energy management: Operating mode (Brake management: Operating mode)		Selection of the braking method. • The braking method(s) selected is/are activated if the DC-bus voltage exceeds the voltage threshold for the braking operation shown in 0x2541:002 (P706.02).
	0	Brake resistor	The integrated brake chopper (brake transistor) is used. ▸ Use of a brake resistor 297
	1	**Ramp function generator stop (RFGS)**	The deceleration ramp function generator is stopped. ▸ Stopping the deceleration ramp function generator 299
	2	Brake resistor + RFGS	The brake resistor is supplied with current and the deceleration ramp function generator is stopped.
	3	Inverter motor brake (IMB) + RFGS	Braking with the "Inverter motor brake" braking method in connection with "Deceleration ramp function generator stop" is executed. ▸ Inverter motor brake 300
	4	Brake resistor + IMB + RFGS	Braking is performed by combining all three braking procedures.
0x2541:002 (P706.02)	Brake energy management: Active threshold (Brake management: Active threshold) • Read only: x V		Display of the active voltage threshold for the braking operation. • The voltage threshold shown depends on the mains voltage selected in 0x2540:001 (P208.01) and the voltage value set in 0x2541:003 (P706.03). • The voltage threshold must be higher than the stationary DC voltage in the DC bus.
0x2541:003 (P706.03)	Brake energy management: Reduced threshold (Brake management: Red. threshold) 0 ... [**0**] ... 100 V		The voltage threshold for the braking operation is reduced by the voltage value set here.
0x2541:005 (P706.05)	Brake energy management: Deceleration override time (Brake management: Del.overr.time) 0.0 ... [**2.0**] ... 60.0 s		Maximum permissible time for the deceleration override by means of the braking method selected in 0x2541:001 (P706.01). • If the DC-bus voltage does not fall below the voltage threshold for braking operation shown in 0x2541:002 (P706.02) within this time, the motor is decelerated further. • The time is only reset if the voltage threshold shown in 0x2541:002 (P706.02) is not reached.
0x2540:001 (P208.01)	Mains settings: Rated mains voltage (Mains settings: Mains voltage) • Setting can only be changed if the inverter is inhibited.		Selection of the mains voltage for actuating the inverter.
	0	**230 Veff**	
	1	400 Veff	
	2	480 Veff	

10.4.1 Use of a brake resistor

For braking operation, optionally the brake chopper integrated in the inverter (brake transistor) can be used.

NOTICE

Incorrect dimensioning of the brake resistor may result in the destruction of the integrated brake chopper (brake transistor).

- ▸ Only connect a brake resistor complying in terms of performance to terminals R_{B1} and R_{B2} of the inverter.
- ▸ Avoiding thermal overload of the brake resistor.

Preconditions

In order that the integrated brake chopper is activated in the braking operation, one of the following braking methods must be set in 0x2541:001 (P706.01):

- "Brake resistor [0]"
- "Brake resistor + RFGS [2]"
- "Brake resistor + IMB + RFGS [4]"

In the default setting of 0x2541:001 (P706.01), the integrated brake chopper is not activated in the brake operation!

Details

- The brake resistor required is to be connected to terminals R_{B1} and R_{B2} of the inverter.
- In 0x2541:001 (P706.01), additionally the stopping function for the deceleration ramp function generator can be set when the brake resistor is controlled, in order to avoid overvoltage disconnection in the case of lower deceleration times.
- In the default setting and with a disabled inverter and an error status ("Error active"), the brake chopper is switched off. This behaviour can be changed in 0x2541:006 (P706.06). Example: In a DC-bus connection with several inverters, only one brake resistor is used. It is connected to the most powerful inverter in the DC-bus connection. This inverter then serves to change the behaviour so that inverter disable and/or an error does not cause a switch-off of the brake chopper.

Internal protective function

The following protective function prevents the brake chopper from being switched on permanently, e.g. due to too high voltages or wrong settings:

- The brake chopper is switched off if it was switched on over a period of 4 s.
- If the DC-bus voltage again falls below the voltage threshold for braking operation, the brake chopper can again be switched on for maximally 4 s without interruption.

Brake resistor monitoring

The inverter calculates and monitors the thermal load of the brake resistor to ensure that the brake resistor will not be overloaded.

A correct calculation required the following settings according to the data on the nameplate of the brake resistor:

- 0x2550:002 (P707.02): Resistance value
- 0x2550:003 (P707.03): Rated power
- 0x2550:004 (P707.04): Maximum thermal load

The calculated thermal load is not displayed in 0x2550:007 (P707.07).

The brake resistor monitoring is designed with two stages:

- If the calculated thermal load exceeds the warning threshold set in 0x2550:008 (P707.08) (default setting: 90 %), the response set in 0x2550:010 (P707.10) takes place (default setting: "Warning"). The warning status will be reset if the thermal load falls below the warning threshold - 20 %.
- If the calculated thermal load exceeds the warning threshold set in 0x2550:009 (P707.09) (default setting: 100 %), the response set in 0x2550:011 (P707.11) takes place (default setting: "Fault"). The error status will be reset if the thermal load falls below the error threshold - 20 %.

Parameter	Name / value range / [default setting]		Info
0x2541:006 (P706.06)	Brake energy management: Brake resistor response (Brake management: Brk. res. behav) • Setting can only be changed if the inverter is inhibited.		Behaviour of the integrated brake chopper if the inverter is disabled and if the error status is active.
	0	**Off: disable and error**	If the inverter is disabled and the error status is active, the brake chopper is switched off.
	1	On: disable / off: error	Brake chopper is switched off if the error status is active, but not if the inverter is disabled.
	2	Off: disable / on: error	Brake chopper is switched off if the inverter is disabled but not if the error status is active.
	3	On: disable and error	Brake chopper is not switched off if the inverter disabled and the error status is active.
0x2550:002 (P707.02)	Brake resistor: Resistance value (Brake resistor: Resistance value) 0.0 ... [**180.0**]* ... 500.0 Ω • Default setting depending on the size.		Resistance value of the brake resistor connected. • The value to be entered can be obtained from the brake resistor nameplate.
0x2550:003 (P707.03)	Brake resistor: Rated power (Brake resistor: Rated power) 0 ... [**50**]* ... 800000 W • Default setting depending on the size.		Rated power of the brake resistor connected. • The value to be entered can be obtained from the brake resistor nameplate.
0x2550:004 (P707.04)	Brake resistor: Maximum thermal load (Brake resistor: Maximum heat) 0.0 ... [**8.0**]* ... 100000.0 kWs • Default setting depending on the size.		Thermal capacity of the brake resistor connected. • The value to be entered can be obtained from the brake resistor nameplate.
0x2550:007 (P707.07)	Brake resistor: Thermal load (Brake resistor: Thermal load) • Read only: x.x %		Display of the utilisation of the brake resistor connected.
0x2550:008 (P707.08)	Brake resistor: Warning threshold (Brake resistor: Warning thresh.) 50.0 ... [**90.0**] ... 150.0 %		Warning threshold for brake resistor monitoring. • If the utilisation shown in 0x2541:004 (P706.04) reaches the threshold set, the response selected in 0x2550:010 (P707.10) is effected. • The warning is reset with a hysteresis of 20 %.
0x2550:009 (P707.09)	Brake resistor: Error threshold (Brake resistor: Error thresh.) 50.0 ... [**100.0**] ... 150.0 %		Error threshold for brake resistor monitoring. • If the utilisation shown in 0x2541:004 (P706.04) reaches the threshold set, the response selected in 0x2550:011 (P707.11) is effected. • Resetting the error is only possible if the hysteresis is lower than 20 %.
0x2550:010 (P707.10)	Brake resistor: Response to warning (Brake resistor: Warning resp.) • For possible settings see description for 0x2D45:001 (P310.01). 161		Selection of the response that is executed when the warning threshold for brake resistor monitoring is reached. Associated error code: • 65334 | 0xFF36 - Brake resistor: overload warning
	1	**Warning**	▸ Error types 107

Parameter	Name / value range / [default setting]	Info
0x2550:011 (P707.11)	Brake resistor: Response to error (Brake resistor: Error response) • For possible settings see description for 0x2D45:001 (P310.01). 161	Selection of the response to be executed when the error threshold for brake resistor monitoring is reached. Associated error code: • 65282 | 0xFF02 - Brake resistor: overload fault
	3 **Fault**	▸ Error types 107

10.4.2 Stopping the deceleration ramp function generator

The deceleration ramp function generator is stopped for a short time if the voltage threshold for braking operation is exceeded.

Details

When this braking method is selected, the maximum permissible time for the deceleration override has to be set in 0x2541:005 (P706.05).

- If the DC-bus voltage does not fall below the voltage threshold for braking operation shown in 0x2541:002 (P706.02) within this time, the motor is decelerated further.
- The time is only reset if the voltage threshold shown in 0x2541:002 (P706.02) is not reached.

10.4.3 Inverter motor brake

With this braking method, which can be selected in 0x2541:001 (P706.01), the regenerative energy in the motor is converted as a result of dynamic acceleration/deceleration with down-ramping of the ramp function generator.

NOTICE

Too frequent braking may cause thermal overload of the motor.

- Avoid activating the "Inverter motor brake" function over a longer time!
- In applications with a high mass inertia and long braking times (> 2 s), use the "DC braking" function.

Preconditions

- The "Inverter motor brake" braking method must not be used with vertical conveyors (hoists) or with active loads!
- The "inverter motor brake" braking method only works in operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]".
- When this braking method is used, the motor overload monitoring is not adapted. A too frequent use of the inverter motor brake may cause an incorrect operation of the motor overload monitoring. ▸ Motor overload monitoring (i²*t) 153

Details

During the deceleration process, the ramp function generator is stopped. The frequency set in 0x2541:004 (P706.04) is added to the frequency setpoint, taking the sign of the current actual frequency into consideration. Furthermore the ramp function generator is stopped in a state of overvoltage. If the DC-bus voltage falls below a defined DC-bus voltage potential, the additional frequency connected is reduced again and the ramp function generator is re-activated. By the alternating acceleration and deceleration resulting from this circuit, the energy is converted thermally in the motor. For process-related reasons, torque oscillations may occur.

Setting instructions

Generally, the smallest value possible required by the application for being able to still traverse the load to be moved in a controlled fashion should be set as additional frequency. Greater mass inertia values require an increase in the rated motor frequency set. Increasing the rated motor frequency, however, causes greater torque oscillations. A possible consequence is the reduced service life of mechanical components. Furthermore an increase in the rated motor frequency also increases the energy converted into heat in the motor. A possible consequence is the reduced service life of the motor.

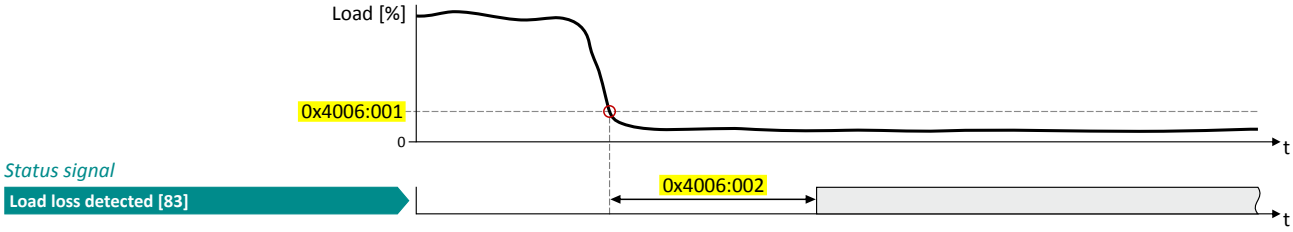
Parameter	Name / value range / [default setting]		Info
0x2541:004 (P706.04)	Brake energy management: Additional frequency (Brake management: Add.frequency) 0.0 ... [**0.0**] ... 10.0 Hz		Frequency deviation which is connected to the deceleration ramp in a pulsative fashion when the "Inverter motor brake" braking method is used.
0x2C01:005 (P320.05)	Motor parameters: Rated frequency (Motor parameters: Rated frequency) 1.0 ... [**50.0**] ... 1000.0 Hz		General motor data. Carry out settings as specified by motor nameplate data.
0x6060 (P301.00)	Modes of operation (Modes of op.) • Setting can only be changed if the inverter is inhibited.		Selection of the operating mode.
	-2	**MS: Velocity mode**	Vendor specific velocity mode
	0	No mode change/no mode assigned	No operating mode (standstill)
	2	CiA: Velocity mode	CiA 402 velocity mode

10.5 Load loss detection

This function serves to detect a load loss during operation and to then activate a specific function, for instance the switching of the relay.

Details

If, during operation, the current motor current falls below the threshold set in 0x4006:001 (P710.01) for at least the time set in 0x4006:002 (P710.02), the internal status signal "Load loss detected [83]" is set to TRUE:



- The threshold is set in percent with reference to the rated motor current "Motor rated current" 0x6075 (P323.00).
- The status signal "Load loss detected [83]" can be assigned, for instance, to a digital output or the relay via the flexible I/O configuration. ▸ Configuration of digital outputs 🕮 431
- The load loss detection is not active with active DC braking.

Parameter	Name / value range / [default setting]	Info
0x4006:001 (P710.01)	Load loss detection: Threshold (Load loss detect: Threshold) 0.0 ... [**0.0**] ... 200.0 %	Threshold for load loss detection. • 100 % ≡ rated motor current 0x6075 (P323.00)
0x4006:002 (P710.02)	Load loss detection: Deceleration (Load loss detect: Deceleration) 0.0 ... [**0.0**] ... 300.0 s	Tripping delay for load loss detection.
0x6075 (P323.00)	Motor rated current (Motor current) 0.001 ... [**1.700**]* ... 500.000 A • Default setting depending on the size. • Setting can only be changed if the inverter is inhibited.	The rated motor current to be set here serves as a reference value for different parameters with a setting/display in percent. Relevant parameters: • DC braking: Current 0x2B84:001 (P704.01) • Flying restart circuit: Current 0x2BA1:001 (P718.01) • Motor overload monitoring (i²*t): Maximum utilisation [60 s] 0x2D4B:001 (P308.01) • Load loss detection: Threshold 0x4006:001 (P710.01) • Max current 0x6073 (P324.00) • Current actual value 0x6078 (P103.00)
0x6078 (P103.00)	Current actual value (Current actual) • Read only: x.x %	Display of the present motor current. • 100 % ≡ Motor rated current 0x6075 (P323.00)

10.6 Access protection

10.6.1 Write access protection

Optionally a write access protection can be installed for the inverter parameters.

Write access protection only restricts parameterisation via keypad and »EASY Starter«. Write access protection via network is not restricted. Irrespective of the write access protection that is currently set, a higher-level controller, OPC-UA server, or any other communication partner connected to the inverter is always provided with full read/write access to all parameters of the inverter.

After activating the write access protection, you have to enter a valid PIN to remove the write access protection. Note down the defined PIN(s) and keep this information in a safe place! If you lose the PIN(s), the inverter can only be disabled by resetting it to the delivery status. This means, all parameter settings made by the user get lost! ▸ Reset parameters to default 📖 283

Details

Usually the write access protection function is implemented by the mechanical engineer/ OEM , for example to protect the inverter against incorrect parameterisation by non-authorised persons. For diagnostic purposes, a read access to all parameters is always possible.

The write access protection allows for the following configurations:

- Full write access
- Write access only to favorites or (when knowing PIN1) to all parameters
- No write access or (when knowing PIN2) full write access
- No write access or (when knowing PIN1) write access only to favorites or (when knowing PIN2) to all parameters

The following table compares the four possible configurations:

PIN1 setting	PIN2 setting	Log-in	Status display after log-in	Active write access protection (via keypad/»EASY Starter«)
0x203D (P730.00)	0x203E (P731.00)	0x203F	0x2040 (P197.00)	
0	0	-	0	No access protection configured.
		Access → Diagnostics (read access) | Favorites | All parameters		
> 0	0	0 or wrong PIN	2	Write access only possible to favorites.
		Correct PIN1	0	Write access to all parameters possible.
		Access → Diagnostics (read access) | Favorites | PIN1 | All parameters		
0	> 0	0 or wrong PIN	1	No write access.
		Correct PIN2	0	Write access to all parameters possible.
		Access → Diagnostics (read access) | PIN2 | Favorites | All parameters		
> 0	> 0	0 or wrong PIN	1	No write access.
		Correct PIN1	2	Write access only possible to favorites.
		Correct PIN2	0	Write access to all parameters possible.
		Access → Diagnostics (read access) | PIN1 | Favorites | PIN2 | All parameters		
		If PIN1 and PIN2 are set identically, a write access to all parameters is possible after the PIN has been entered correctly.		

Notes:

- The firmware of the inverter does only support the protection status.
- The access protection is realised by the keypad and engineering tools as "clients" themselves based on the current protection status 0x2040 (P197.00).

More details on how to configure the write access protection with the respective client can be found in the following subchapters:

▸ Write access protection in the »EASY Starter« 📖 304

▸ Write access protection in the keypad 📖 307

Parameter	Name / value range / [default setting]		Info
0x203D (P730.00)	PIN1 access protection (PIN1 protection) -1 ... [**0**] ... 9999		PIN definition for write access protection. • 1 … 9999 = set/change PIN. • 0 = delete PIN (deactivate access protection). • When the PIN has been set successfully, the value -1 is shown; otherwise 0. • Setting/changing the PIN via keypad/»EASY Starter« only possible if no write access protection is active. • Settings/changes via »EASY Starter« become effective immediately; via keypad they only become effective when the parameter group has been exited.
0x203E (P731.00)	PIN2 access protection (PIN2 protection) -1 ... [**0**] ... 9999		
0x203F	PIN1/PIN2 log-in -32768 ... [**0**] ... 32767		Parameter for PIN entry for the purpose of deactivating an active access protection temporarily. • 1 … 9999 = log-in (deactivate access protection temporarily). • 0 = log-out (reactivate access protection). • After having logged in successfully, the value 0 is shown; otherwise -1. • After 10 invalid entries, the log-in function is inhibited. In order to remove the log-in inhibit, the inverter must be switched off and on again.
0x2040 (P197.00)	Access protection status (Protect. status) • Read only		Bit-coded display of the active access protection after login by PIN1/PIN2.
	Bit 0	No write access	
	Bit 1	Only favorites changeable	
	Bit 2	Reserved	
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Reserved	
	Bit 8	Reserved	
	Bit 9	Reserved	
	Bit 10	Reserved	
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	

10.6.1.1 Write access protection in the »EASY Starter«

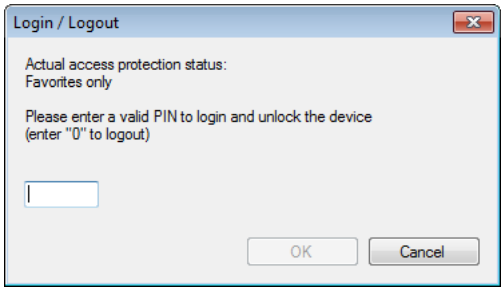
If a write access protection is active for the online connected inverter, it is displayed in the status bar of the »EASY Starter«:

Display	Representation of the parameters in the »EASY Starter«
No write access	All parameters in all dialogs are displayed as read-only parameters.
Only favorites	Except for the favorites, all parameters in all dialogs are displayed as read-only parameters.

An active write access protection can be removed when the PIN is known.

How to remove an active write access protection temporarily:

1. Click the symbol in the toolbar.
   The "Log in / Log off" dialog box is displayed:



2. Enter the valid PIN and confirm with **OK**.

After 10 invalid entries, the log-in function is inhibited. In order to remove the log-in inhibit, the inverter must be switched off and on again.

The write access protection gets active again:

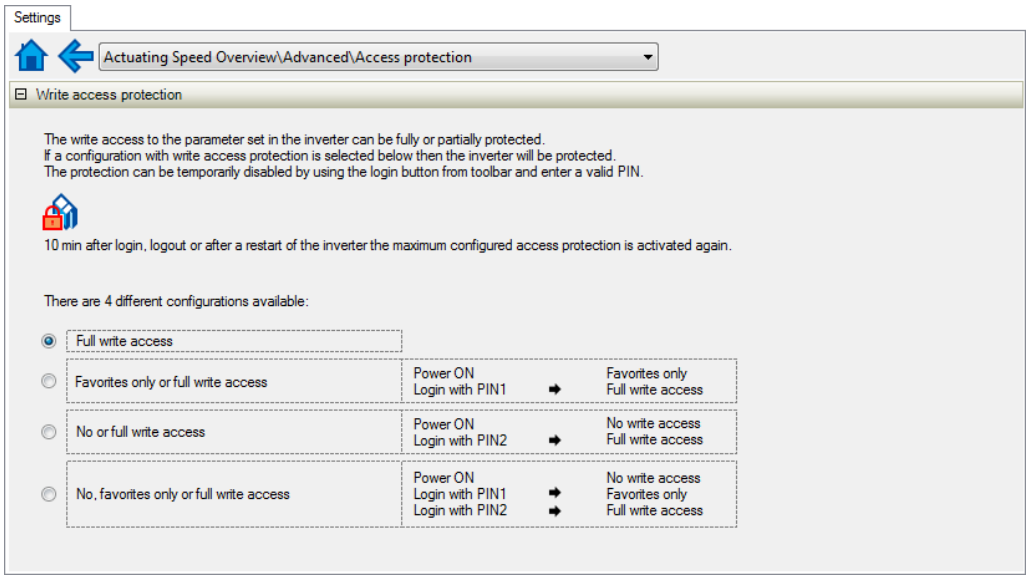
- Automatically 10 minutes after the last log-in.
- Automatically after the mains voltage is switched on again.
- Manually by entering a "0" in the dialog box "Log in / Log off" (see above).

Configuring the write access protection with »EASY Starter«

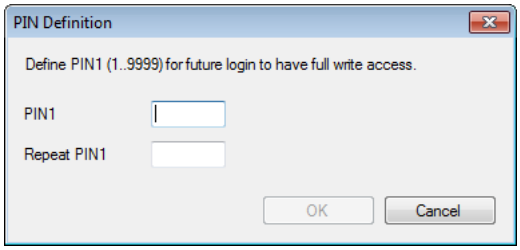
The write access protection is activated by specifying PIN1 and/or PIN2 (depending on the desired configuration of the write access protection).

How to activate the write access protection:

1. Go to the "Settings" tab and navigate to the "Access protection" parameterisation dialog:



2. Select the desired configuration of the write access protection.
   The "PIN definition" dialog box is displayed. The possible entries depend on the selected configuration.



3. Enter the desired PIN(s) and confirm with **OK**.
   After successful execution, the write access protection is immediately effective and is displayed in the »EASY Starter« status bar.
4. For a permanent acceptance of the configuration: Save parameter settings in the device.

How to change already defined PIN(s):

1. Remove the active write access protection temporarily (see above).
2. Select the "Full write access" configuration in the "Access protection" parameterisation dialog.
3. Select again the desired configuration of the write access protection.
4. Enter new PIN(s) and confirm with **OK**.
5. Save parameter settings in the device.

How to remove a configured write access protection permanently:

1. Remove the active write access protection temporarily (see above).
2. Select the "Full write access" configuration in the "Access protection" parameterisation dialog.
3. Save parameter settings in the device.

Impact of the write access protection on EASY Starter« functions

The following »EASY Starter« functions are not supported when write access protection is active:

- Parameter set download
- Definition of the "Favorites" parameters.
- Definition of the parameters for the "Parameter change-over" function

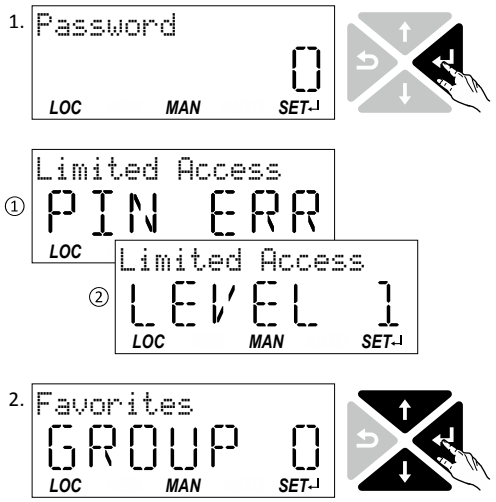
The following »EASY Starter« functions are supported irrespective of whether write access protection is active:

- Optical device identification 0x2021:001 (P230.01)
- Enable/inhibit inverter 0x2822:001
- Reset parameters to default 0x2022:001 (P700.01)
- Save parameter set 0x2022:003 (P700.03)
- Load user parameter 0x2022:004 (P700.04)
- Load OEM parameter 0x2022:005 (P700.05)
- Reset error 0x2631:004 (P400.04)

10.6.1.2 Write access protection in the keypad

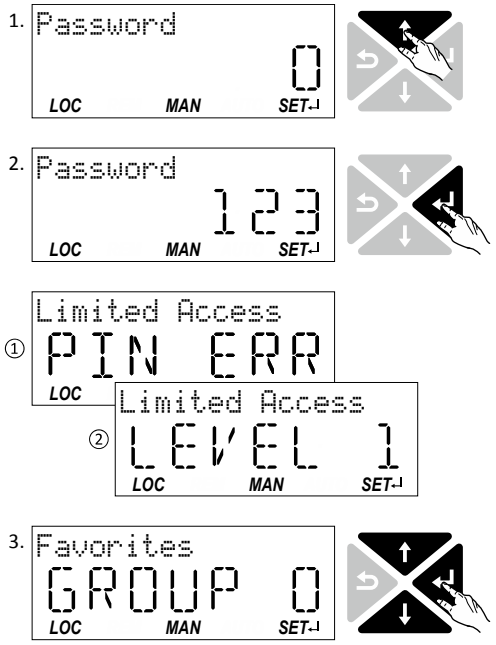
If a write access protection is active for the inverter, the keypad automatically displays a log-in when changing to the parameterisation mode. You can either skip the log-in and thus keep the access protection active or remove it temporarily by entering a valid PIN.

Option 1 - skip log-in and keep access protection active



1. Use the ↵ key to skip the log-in.
   The configured access protection remains active and is briefly displayed:
   ① PIN ERR: No write access
   ② LEVEL 1: Write access only to favorites
   You are now in the group level.
2. You can now use the navigation keys ↑ and ↓ to select the desired group and with key ↵ navigate one level lower to the parameter level.
   Note: By using the ⮌ key you can navigate one level upwards again anytime.

Option 2 - remove access protection temporarily by entering a valid PIN



1. Use the ↑ key to enter the defined PIN.
2. Use the ↵ key to accept the changed setting.
   If the access remains restricted, it is briefly displayed:
   ① PIN ERR: No write access
   ② LEVEL 1: Write access only to favorites
   You are now in the group level.
3. You can now use the navigation keys ↑ and ↓ to select the desired group and with key ↵ navigate one level lower to the parameter level.
   Note: By using the ⮌ key you can navigate one level upwards again anytime.

After 10 invalid entries, the log-in function is inhibited. In order to remove the log-in inhibit, the inverter must be switched off and on again.

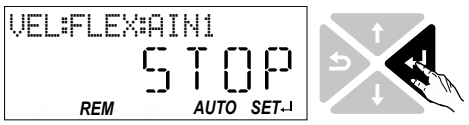
The write access protection gets active again:

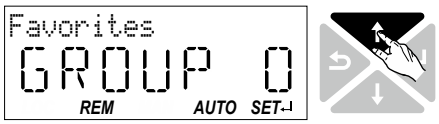
- Automatically 10 minutes after the last log-in or the last keypad entry.
- Automatically after the mains voltage is switched on again.

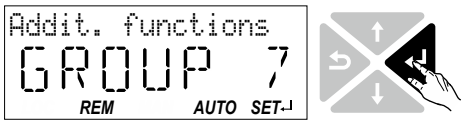
Configuring the write access protection with the keypad

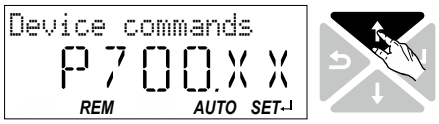
The write access protection is activated by defining PIN1 in P730.00 and/or PIN2 in P731.00 (depending on the desired configuration of the write access protection).

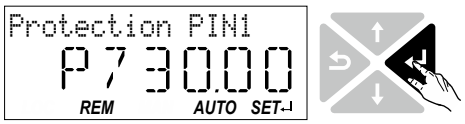
In the following example, the write access protection is configured in such a way that a write access to the favorites only is possible or (when knowing PIN) to all parameters. This configuration only requires the definition of PIN1 (here: "123").

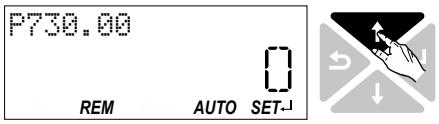
1. 

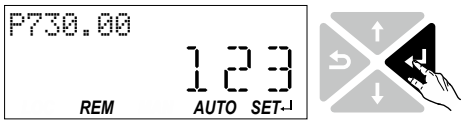
2. 

3. 

4. 

5. 

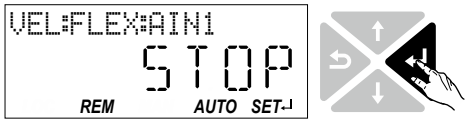
6. 

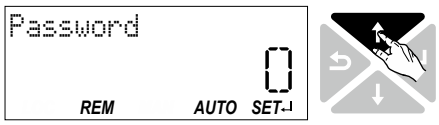
7. 

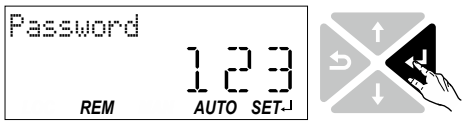
Defining PIN1:

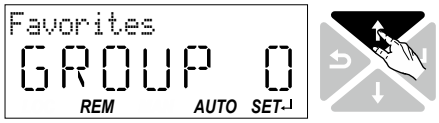
1. Use the ↵ key in the operating mode to navigate to the parameterisation mode one level below.
   You are now in the group level.
   Note: By using the ⮌ key you can navigate one level upwards again anytime.
2. Use the ↑ navigation key to select group 7.
3. Use the ↵ key to navigate to one level below.
   You are now in the parameter level of the group selected.
4. Use the ↑ navigation key to select the P730.00 parameter.
5. Use the ↵ key to navigate to one level below.
   You are now in the editing mode.
6. Use the ↑ navigation key to set PIN1 to the value "123".
7. Use the ↵ key to accept the changed setting.
   The editing mode is exited.
   Note: The configured access protection only gets effective after the parameter group is quit.

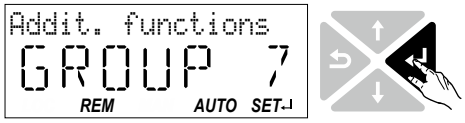
In the following example, PIN1 is changed from "123" to "456". For this purpose, the defined PIN must first be deleted by the setting "0".

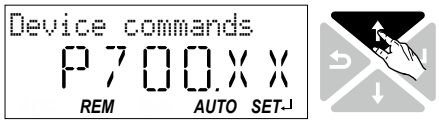
1. 

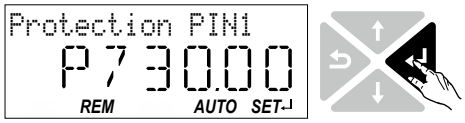
2. 

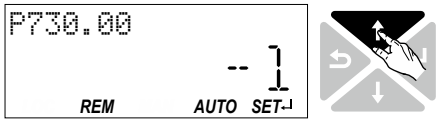
3. 

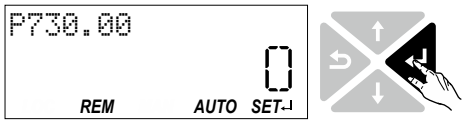
4. 

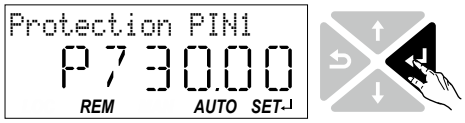
5. 

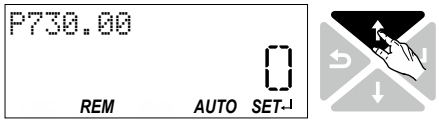
6. 

7. 

8. 

9. 

10. 

11. 

12.

Change defined PIN1:

1. Use the ↵ key in the operating mode to navigate to the parameterisation mode one level below.
   Since the access protection is active, the input dialog for the PIN is displayed.
2. Use the ↑ navigation key to set PIN "123" to remove the access protection temporarily.
3. Use the ↵ key to accept the entered PIN.
   You are now in the group level.
4. Use the ↑ to select group 7.
5. Use the ↵ key to navigate to one level below.
   You are now in the parameter level of the group selected.
6. Use the ↑ to select the P730.00 parameter.
7. Use the ↵ key to navigate to one level below.
   You are now in the editing mode.
8. Use the ↑ key to set PIN1 to the value "0". This setting first deletes PIN1.
9. Use the ↵ key to accept the changed setting.
   The editing mode is exited.
10. Use the ↵ key to navigate again one level below to the editing mode.
11. Use the ↑ navigation key t set the previously deleted PIN1 to the new value "456".
12. Use the ↵ key to accept the changed setting.
    The editing mode is exited.
    Note: The configured access protection only gets effective after the parameter group is quit.

How to remove a configured write access protection permanently:

1. Remove the active write access protection temporarily (see above).
2. Set PIN1 (P730.00) and PIN2 (P731.00) to the value "0" (see instructions for changing the PIN).

Impact of the write access protection to the keypad functions

The following keypad functions are supported irrespective of the active write access protection:

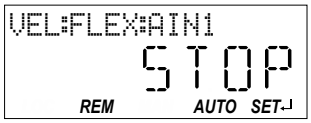
- Optical device identification 0x2021:001 (P230.01)
- Reset parameters to default 0x2022:001 (P700.01)
- Load user parameter 0x2022:004 (P700.04)
- Load OEM parameter 0x2022:005 (P700.05)

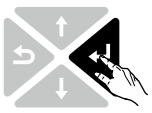
10.7 Favorites

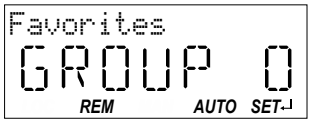
In order to gain quick access using »EASY Starter« or the keypad, frequently used parameters of the inverter can be defined as "Favorites".

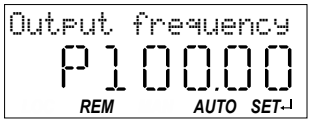
- »EASY Starter« provides quick access to the "Favorites" via the *Favorites* tab.
- On the keypad, the "Favorites" can be found in group 0.

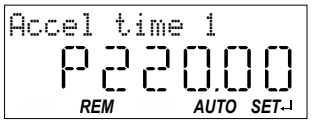
10.7.1 Accessing the "Favorites" with the keypad

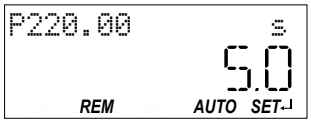
1. 

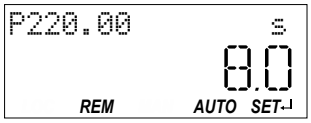


2. 

3. 

4. 

5. 

6. 

1. Use the ↵ key in the operating mode to navigate to the parameterisation mode one level below.
   You are now in the group level. All parameters of the inverter are divided into different groups according to their function.
   Group 0 contains the "Favorites".
   Note: By using the ⮌ key you can navigate one level upwards again anytime.
2. Use the ↵ key to navigate to one level below.
   You are now in the parameter level of the group selected.
3. Use the ↑ and ↓ navigation keys to select the desired parameter.
4. Use the ↵ key to navigate to one level below.
   You are now in the editing mode.
5. Set the desired value using the ↑ and ↓ navigation keys.
6. Use the ↵ key to accept the changed setting.
   The editing mode is exited.
   Note: By using the ⮌ key you can exit the editing mode without accepting the new setting (abort).

10.7.2 Favorites parameter list (default setting)

In the default setting, the most common parameters for the solution of typical applications are defined as "Favorites":

No.	Display code	Name	Default setting	Setting range	Info
1	P100.00	Output frequency	x.x Hz	- (Read only)	0x2DDD (P100.00)
2	P103.00	Current actual	x.x %	- (Read only)	0x6078 (P103.00)
3	P106.00	Motor voltage	x VAC	- (Read only)	0x2D89 (P106.00)
4	P150.00	Error code	-	- (Read only)	0x603F (P150.00)
5	P200.00	Control select.	**Flexible I/O [0]**	Selection list	0x2824 (P200.00)
6	P201.01	Freq. setp. src.	**Analog input 1 [2]**	Selection list	0x2860:001 (P201.01)
7	P203.01	Start method	**Normal [0]**	Selection list	0x2838:001 (P203.01)
8	P203.03	Stop method	**Standard ramp [1]**	Selection list	0x2838:003 (P203.03)
9	P208.01	Mains voltage	**230 Veff [0]**	Selection list	0x2540:001 (P208.01)
10	P210.00	Min. frequency	**0.0 Hz**	0.0 ... 599.0 Hz	0x2915 (P210.00)
11	P211.00	Max. frequency	**50.0 Hz**	0.0 ... 599.0 Hz	0x2916 (P211.00)
12	P220.00	Accelerat.time 1	**5.0 s**	0.0 ... 3600.0 s	0x2917 (P220.00)
13	P221.00	Decelerat.time 1	**5.0 s**	0.0 ... 3600.0 s	0x2918 (P221.00)
14	P300.00	Motor ctrl mode	**VFC open loop [6]**	Selection list	0x2C00 (P300.00)
15	P302.00	V/f charac.shape	**Linear [0]**	Selection list	0x2B00 (P302.00)
16	P303.01	Base voltage	**230 V**	0 ... 5000 V	0x2B01:001 (P303.01)
17	P303.02	Base frequency	**50 Hz**	0 ... 599 Hz	0x2B01:002 (P303.02)
18	P304.00	Limit. rotation	**Both directions [1]**	Selection list	0x283A (P304.00)
19	P305.00	Switching freq.	**8kHz var/opt/4 [21]**	Selection list	0x2939 (P305.00)
20	P308.01	Max.load.for 60s	**150 %**	30 ... 200 %	0x2D4B:001 (P308.01)
21	P316.01	Fixed V/f boost	**2.5 %**	0.0 ... 20.0 %	0x2B12:001 (P316.01)
22	P324.00	Max current	**200.0 %**	0.0 ... 3000.0 %	0x6073 (P324.00)
23	P400.01	Enable inverter	**TRUE [1]**	Selection list	0x2631:001 (P400.01)
24	P400.02	Run	**Digital input 1 [11]**	Selection list	0x2631:002 (P400.02)
25	P400.03	Quick stop	**Not connected [0]**	Selection list	0x2631:003 (P400.03)
26	P400.04	Reset fault	**Digital input 2 [12]**	Selection list	0x2631:004 (P400.04)
27	P400.05	DC braking	**Not connected [0]**	Selection list	0x2631:005 (P400.05)
28	P400.06	Start forward	**Not connected [0]**	Selection list	0x2631:006 (P400.06)
29	P400.07	Start reverse	**Not connected [0]**	Selection list	0x2631:007 (P400.07)
30	P400.08	Run forward	**Not connected [0]**	Selection list	0x2631:008 (P400.08)
31	P400.09	Run reverse	**Not connected [0]**	Selection list	0x2631:009 (P400.09)
32	P400.13	Invert rotation	**Digital input 3 [13]**	Selection list	0x2631:013 (P400.13)
33	P400.18	Setp: Preset b0	**Digital input 4 [14]**	Selection list	0x2631:018 (P400.18)
34	P400.19	Setp: Preset b1	**Digital input 5 [15]**	Selection list	0x2631:019 (P400.19)
35	P400.20	Setp: Preset b2	**Not connected [0]**	Selection list	0x2631:020 (P400.20)
36	P420.01	Relay function	**Rdy for operat. [51]**	Selection list	0x2634:001 (P420.01)
37	P420.02	DO1 function	**Release brake [115]**	Selection list	0x2634:002 (P420.02)
38	P430.01	AI1 input range	**0 ... 10 VDC [0]**	Selection list	0x2636:001 (P430.01)
39	P430.02	AI1 freq @ min	**0.0 Hz**	-1000.0 ... 1000.0 Hz	0x2636:002 (P430.02)
40	P430.03	AI1 freq @ max	**50.0 Hz**	-1000.0 ... 1000.0 Hz	0x2636:003 (P430.03)
41	P440.01	AO1 outp. range	**0 ... 10 VDC [1]**	Selection list	0x2639:001 (P440.01)
42	P440.02	AO1 function	**Outp. frequency [1]**	Selection list	0x2639:002 (P440.02)
43	P440.03	AO1 min. signal	**0**	-2147483648 ... 2147483647	0x2639:003 (P440.03)
44	P440.04	AO1 max. signal	**1000**	-2147483648 ... 2147483647	0x2639:004 (P440.04)
45	P450.01	Freq. preset 1	**20.0 Hz**	0.0 ... 599.0 Hz	0x2911:001 (P450.01)
46	P450.02	Freq. preset 2	**40.0 Hz**	0.0 ... 599.0 Hz	0x2911:002 (P450.02)
47	P450.03	Freq. preset 3	**50.0 Hz**	0.0 ... 599.0 Hz	0x2911:003 (P450.03)
48	P450.04	Freq. preset 4	**0.0 Hz**	0.0 ... 599.0 Hz	0x2911:004 (P450.04)
49	-	-	-	-	not assigned
50	-	-	-	-	not assigned

10.7.3 Configuring the "Favorites"

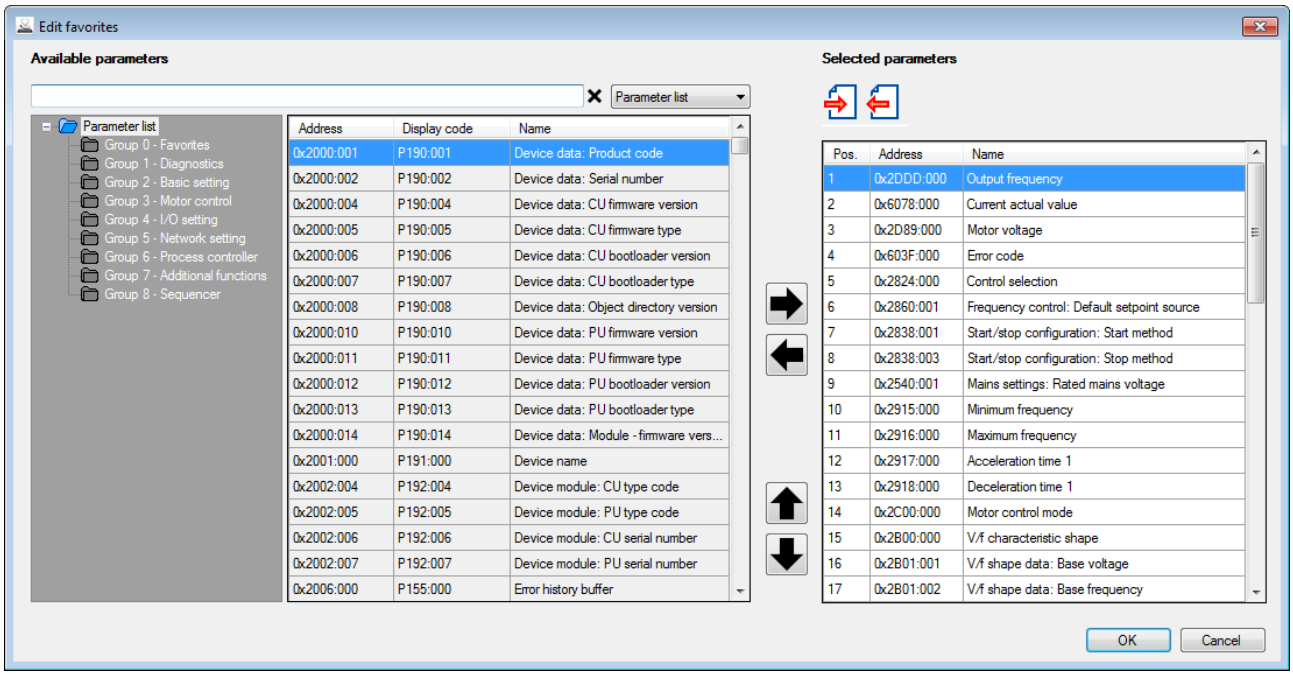
The "Favorites" can be configured by the user.

Details

A maximum number of 50 parameters can be defined as "Favorites".

The easiest way to process the selection of the favorites is via the parameterisation dialog in the »EASY Starter«:

1. Change to the "Parameter list" tab.
2. Select group 0 - Favorites.
3. Click the button.
4. Process favorites:



Default favorites can be changed with the keypad or via network via the following parameters:

Parameter	Name / value range / [default setting]	Info
0x261C:001 (P740.01)	Favorites settings: Parameter 1 (Favorites sett.: Parameter 1) 0x00000000 ... [**0x2DDD0000**] ... 0xFFFFFF00	Definition of the "Favorites" parameters. • Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex) • The lowest byte is always 0x00. • The keypad can be used to select the desired parameter from a list.
0x261C:002 (P740.02)	Favorites settings: Parameter 2 (Favorites sett.: Parameter 2) 0x00000000 ... [**0x60780000**] ... 0xFFFFFF00	
0x261C:003 (P740.03)	Favorites settings: Parameter 3 (Favorites sett.: Parameter 3) 0x00000000 ... [**0x2D890000**] ... 0xFFFFFF00	
0x261C:004 (P740.04)	Favorites settings: Parameter 4 (Favorites sett.: Parameter 4) 0x00000000 ... [**0x603F0000**] ... 0xFFFFFF00	
0x261C:005 (P740.05)	Favorites settings: Parameter 5 (Favorites sett.: Parameter 5) 0x00000000 ... [**0x28240000**] ... 0xFFFFFF00	
0x261C:006 (P740.06)	Favorites settings: Parameter 6 (Favorites sett.: Parameter 6) 0x00000000 ... [**0x28600100**] ... 0xFFFFFF00	
0x261C:007 (P740.07)	Favorites settings: Parameter 7 (Favorites sett.: Parameter 7) 0x00000000 ... [**0x28380100**] ... 0xFFFFFF00	
0x261C:008 (P740.08)	Favorites settings: Parameter 8 (Favorites sett.: Parameter 8) 0x00000000 ... [**0x28380300**] ... 0xFFFFFF00	

Parameter	Name / value range / [default setting]	Info
0x261C:009 (P740.09)	Favorites settings: Parameter 9 (Favorites sett.: Parameter 9) 0x00000000 ... [**0x25400100**] ... 0xFFFFFF00	
0x261C:010 (P740.10)	Favorites settings: Parameter 10 (Favorites sett.: Parameter 10) 0x00000000 ... [**0x29150000**] ... 0xFFFFFF00	
0x261C:011 (P740.11)	Favorites settings: Parameter 11 (Favorites sett.: Parameter 11) 0x00000000 ... [**0x29160000**] ... 0xFFFFFF00	
0x261C:012 (P740.12)	Favorites settings: Parameter 12 (Favorites sett.: Parameter 12) 0x00000000 ... [**0x29170000**] ... 0xFFFFFF00	
0x261C:013 (P740.13)	Favorites settings: Parameter 13 (Favorites sett.: Parameter 13) 0x00000000 ... [**0x29180000**] ... 0xFFFFFF00	
0x261C:014 (P740.14)	Favorites settings: Parameter 14 (Favorites sett.: Parameter 14) 0x00000000 ... [**0x2C000000**] ... 0xFFFFFF00	
0x261C:015 (P740.15)	Favorites settings: Parameter 15 (Favorites sett.: Parameter 15) 0x00000000 ... [**0x2B000000**] ... 0xFFFFFF00	
0x261C:016 (P740.16)	Favorites settings: Parameter 16 (Favorites sett.: Parameter 16) 0x00000000 ... [**0x2B010100**] ... 0xFFFFFF00	
0x261C:017 (P740.17)	Favorites settings: Parameter 17 (Favorites sett.: Parameter 17) 0x00000000 ... [**0x2B010200**] ... 0xFFFFFF00	
0x261C:018 (P740.18)	Favorites settings: Parameter 18 (Favorites sett.: Parameter 18) 0x00000000 ... [**0x283A0000**] ... 0xFFFFFF00	
0x261C:019 (P740.19)	Favorites settings: Parameter 19 (Favorites sett.: Parameter 19) 0x00000000 ... [**0x29390000**] ... 0xFFFFFF00	
0x261C:020 (P740.20)	Favorites settings: Parameter 20 (Favorites sett.: Parameter 20) 0x00000000 ... [**0x2D4B0100**] ... 0xFFFFFF00	
0x261C:021 (P740.21)	Favorites settings: Parameter 21 (Favorites sett.: Parameter 21) 0x00000000 ... [**0x2B120100**] ... 0xFFFFFF00	
0x261C:022 (P740.22)	Favorites settings: Parameter 22 (Favorites sett.: Parameter 22) 0x00000000 ... [**0x60730000**] ... 0xFFFFFF00	
0x261C:023 (P740.23)	Favorites settings: Parameter 23 (Favorites sett.: Parameter 23) 0x00000000 ... [**0x26310100**] ... 0xFFFFFF00	
0x261C:024 (P740.24)	Favorites settings: Parameter 24 (Favorites sett.: Parameter 24) 0x00000000 ... [**0x26310200**] ... 0xFFFFFF00	
0x261C:025 (P740.25)	Favorites settings: Parameter 25 (Favorites sett.: Parameter 25) 0x00000000 ... [**0x26310300**] ... 0xFFFFFF00	
0x261C:026 (P740.26)	Favorites settings: Parameter 26 (Favorites sett.: Parameter 26) 0x00000000 ... [**0x26310400**] ... 0xFFFFFF00	
0x261C:027 (P740.27)	Favorites settings: Parameter 27 (Favorites sett.: Parameter 27) 0x00000000 ... [**0x26310500**] ... 0xFFFFFF00	
0x261C:028 (P740.28)	Favorites settings: Parameter 28 (Favorites sett.: Parameter 28) 0x00000000 ... [**0x26310600**] ... 0xFFFFFF00	
0x261C:029 (P740.29)	Favorites settings: Parameter 29 (Favorites sett.: Parameter 29) 0x00000000 ... [**0x26310700**] ... 0xFFFFFF00	

Parameter	Name / value range / [default setting]	Info
0x261C:030 (P740.30)	Favorites settings: Parameter 30 (Favorites sett.: Parameter 30) 0x00000000 ... [**0x26310800**] ... 0xFFFFFF00	
0x261C:031 (P740.31)	Favorites settings: Parameter 31 (Favorites sett.: Parameter 31) 0x00000000 ... [**0x26310900**] ... 0xFFFFFF00	
0x261C:032 (P740.32)	Favorites settings: Parameter 32 (Favorites sett.: Parameter 32) 0x00000000 ... [**0x26310D00**] ... 0xFFFFFF00	
0x261C:033 (P740.33)	Favorites settings: Parameter 33 (Favorites sett.: Parameter 33) 0x00000000 ... [**0x26311200**] ... 0xFFFFFF00	
0x261C:034 (P740.34)	Favorites settings: Parameter 34 (Favorites sett.: Parameter 34) 0x00000000 ... [**0x26311300**] ... 0xFFFFFF00	
0x261C:035 (P740.35)	Favorites settings: Parameter 35 (Favorites sett.: Parameter 35) 0x00000000 ... [**0x26311400**] ... 0xFFFFFF00	
0x261C:036 (P740.36)	Favorites settings: Parameter 36 (Favorites sett.: Parameter 36) 0x00000000 ... [**0x26340100**] ... 0xFFFFFF00	
0x261C:037 (P740.37)	Favorites settings: Parameter 37 (Favorites sett.: Parameter 37) 0x00000000 ... [**0x26340200**] ... 0xFFFFFF00	
0x261C:038 (P740.38)	Favorites settings: Parameter 38 (Favorites sett.: Parameter 38) 0x00000000 ... [**0x26360100**] ... 0xFFFFFF00	
0x261C:039 (P740.39)	Favorites settings: Parameter 39 (Favorites sett.: Parameter 39) 0x00000000 ... [**0x26360200**] ... 0xFFFFFF00	
0x261C:040 (P740.40)	Favorites settings: Parameter 40 (Favorites sett.: Parameter 40) 0x00000000 ... [**0x26360300**] ... 0xFFFFFF00	
0x261C:041 (P740.41)	Favorites settings: Parameter 41 (Favorites sett.: Parameter 41) 0x00000000 ... [**0x26390100**] ... 0xFFFFFF00	
0x261C:042 (P740.42)	Favorites settings: Parameter 42 (Favorites sett.: Parameter 42) 0x00000000 ... [**0x26390200**] ... 0xFFFFFF00	
0x261C:043 (P740.43)	Favorites settings: Parameter 43 (Favorites sett.: Parameter 43) 0x00000000 ... [**0x26390300**] ... 0xFFFFFF00	
0x261C:044 (P740.44)	Favorites settings: Parameter 44 (Favorites sett.: Parameter 44) 0x00000000 ... [**0x26390400**] ... 0xFFFFFF00	
0x261C:045 (P740.45)	Favorites settings: Parameter 45 (Favorites sett.: Parameter 45) 0x00000000 ... [**0x29110100**] ... 0xFFFFFF00	
0x261C:046 (P740.46)	Favorites settings: Parameter 46 (Favorites sett.: Parameter 46) 0x00000000 ... [**0x29110200**] ... 0xFFFFFF00	
0x261C:047 (P740.47)	Favorites settings: Parameter 47 (Favorites sett.: Parameter 47) 0x00000000 ... [**0x29110300**] ... 0xFFFFFF00	
0x261C:048 (P740.48)	Favorites settings: Parameter 48 (Favorites sett.: Parameter 48) 0x00000000 ... [**0x29110400**] ... 0xFFFFFF00	
0x261C:049 (P740.49)	Favorites settings: Parameter 49 (Favorites sett.: Parameter 49) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x261C:050 (P740.50)	Favorites settings: Parameter 50 (Favorites sett.: Parameter 50) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	

10.8 Parameter change-over

For up to 32 freely selectable parameters, this function provides a change-over between four sets with different parameter values.

⚠ DANGER!

Changed parameter settings are effective immediately.

The possible consequence is an unexpected response of the motor shaft while the inverter is enabled.

- If possible, only carry out parameter changes while the inverter is disabled.
- Certain device commands or settings which might cause a critical state of the drive behaviour can generally only be carried our when the inverter is inhibited.

Details

The parameter list is compiled in the same way as that of the "Favorites" via configuration. »EASY Starter« provides a user-friendly parameterisation dialog for this purpose.

Change-over to another value set can optionally be effected via corresponding device commands and/or special functions/triggers:

▸ Device commands for parameter change-over 📖 286

▸ Functions for parameter change-over 📖 412

Parameter	Name / value range / [default setting]		Info
0x2022:011 (P700.11)	Device commands: Save parameter set 1 (Device commands: Save par. set 1)		1 = save value set 1 of the "Parameter change-over" function. • When the device command has been executed successfully, the value 0 is shown.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:012 (P700.12)	Device commands: Save parameter set 2 (Device commands: Save par. set 2)		1 = save value set 2 of the "Parameter change-over" function. • When the device command has been executed successfully, the value 0 is shown.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:013 (P700.13)	Device commands: Save parameter set 3 (Device commands: Save par. set 3)		1 = save value set 3 of the "Parameter change-over" function. • When the device command has been executed successfully, the value 0 is shown.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

Parameter	Name / value range / [default setting]		Info
0x2022:014 (P700.14)	Device commands: Save parameter set 4 (Device commands: Save par. set 4)		1 = save value set 3 of the "Parameter change-over" function. • When the device command has been executed successfully, the value 0 is shown.
	0	**Off / ready**	Only status feedback.
	1	On / start	Execute device command.
	2	In progress	Only status feedback.
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	

Parameter	Name / value range / [default setting]	Info
0x4041:001 (P750.01)	Parameter change-over: Parameter 1 (Param.set setup: Parameter 1) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	Definition of the parameter list for the "Parameter change-over" function. • Format: 0xiiiiss00 (iiii = hexadecimal index, ss = hexadecimal subindex) • The lowest byte is always 0x00.
0x4041:002 (P750.02)	Parameter change-over: Parameter 2 (Param.set setup: Parameter 2) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:003 (P750.03)	Parameter change-over: Parameter 3 (Param.set setup: Parameter 3) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:004 (P750.04)	Parameter change-over: Parameter 4 (Param.set setup: Parameter 4) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:005 (P750.05)	Parameter change-over: Parameter 5 (Param.set setup: Parameter 5) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:006 (P750.06)	Parameter change-over: Parameter 6 (Param.set setup: Parameter 6) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:007 (P750.07)	Parameter change-over: Parameter 7 (Param.set setup: Parameter 7) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:008 (P750.08)	Parameter change-over: Parameter 8 (Param.set setup: Parameter 8) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:009 (P750.09)	Parameter change-over: Parameter 9 (Param.set setup: Parameter 9) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:010 (P750.10)	Parameter change-over: Parameter 10 (Param.set setup: Parameter 10) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:011 (P750.11)	Parameter change-over: Parameter 11 (Param.set setup: Parameter 11) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:012 (P750.12)	Parameter change-over: Parameter 12 (Param.set setup: Parameter 12) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:013 (P750.13)	Parameter change-over: Parameter 13 (Param.set setup: Parameter 13) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:014 (P750.14)	Parameter change-over: Parameter 14 (Param.set setup: Parameter 14) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:015 (P750.15)	Parameter change-over: Parameter 15 (Param.set setup: Parameter 15) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:016 (P750.16)	Parameter change-over: Parameter 16 (Param.set setup: Parameter 16) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:017 (P750.17)	Parameter change-over: Parameter 17 (Param.set setup: Parameter 17) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:018 (P750.18)	Parameter change-over: Parameter 18 (Param.set setup: Parameter 18) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:019 (P750.19)	Parameter change-over: Parameter 19 (Param.set setup: Parameter 19) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:020 (P750.20)	Parameter change-over: Parameter 20 (Param.set setup: Parameter 20) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:021 (P750.21)	Parameter change-over: Parameter 21 (Param.set setup: Parameter 21) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	

Parameter	Name / value range / [default setting]	Info
0x4041:022 (P750.22)	Parameter change-over: Parameter 22 (Param.set setup: Parameter 22) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:023 (P750.23)	Parameter change-over: Parameter 23 (Param.set setup: Parameter 23) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:024 (P750.24)	Parameter change-over: Parameter 24 (Param.set setup: Parameter 24) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:025 (P750.25)	Parameter change-over: Parameter 25 (Param.set setup: Parameter 25) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:026 (P750.26)	Parameter change-over: Parameter 26 (Param.set setup: Parameter 26) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:027 (P750.27)	Parameter change-over: Parameter 27 (Param.set setup: Parameter 27) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:028 (P750.28)	Parameter change-over: Parameter 28 (Param.set setup: Parameter 28) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:029 (P750.29)	Parameter change-over: Parameter 29 (Param.set setup: Parameter 29) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:030 (P750.30)	Parameter change-over: Parameter 30 (Param.set setup: Parameter 30) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:031 (P750.31)	Parameter change-over: Parameter 31 (Param.set setup: Parameter 31) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	
0x4041:032 (P750.32)	Parameter change-over: Parameter 32 (Param.set setup: Parameter 32) 0x00000000 ... [**0x00000000**] ... 0xFFFFFF00	

Parameter	Name / value range / [default setting]	Info
0x4042:001 (P751.01)	Parameter value set 1: Value of parameter 1 (Par. value set 1: Set 1 - Value 1) -2147483648 ... [**0**] ... 2147483647	Value set 1 for the parameter list defined in 0x4041:001 (P750.01).
0x4042:002 (P751.02)	Parameter value set 1: Value of parameter 2 (Par. value set 1: Set 1 - Value 2) -2147483648 ... [**0**] ... 2147483647	
0x4042:003 (P751.03)	Parameter value set 1: Value of parameter 3 (Par. value set 1: Set 1 - Value 3) -2147483648 ... [**0**] ... 2147483647	
0x4042:004 (P751.04)	Parameter value set 1: Value of parameter 4 (Par. value set 1: Set 1 - Value 4) -2147483648 ... [**0**] ... 2147483647	
0x4042:005 (P751.05)	Parameter value set 1: Value of parameter 5 (Par. value set 1: Set 1 - Value 5) -2147483648 ... [**0**] ... 2147483647	
0x4042:006 (P751.06)	Parameter value set 1: Value of parameter 6 (Par. value set 1: Set 1 - Value 6) -2147483648 ... [**0**] ... 2147483647	
0x4042:007 (P751.07)	Parameter value set 1: Value of parameter 7 (Par. value set 1: Set 1 - Value 7) -2147483648 ... [**0**] ... 2147483647	
0x4042:008 (P751.08)	Parameter value set 1: Value of parameter 8 (Par. value set 1: Set 1 - Value 8) -2147483648 ... [**0**] ... 2147483647	
0x4042:009 (P751.09)	Parameter value set 1: Value of parameter 9 (Par. value set 1: Set 1 - Value 9) -2147483648 ... [**0**] ... 2147483647	
0x4042:010 (P751.10)	Parameter value set 1: Value of parameter 10 (Par. value set 1: Set 1 - Value 10) -2147483648 ... [**0**] ... 2147483647	
0x4042:011 (P751.11)	Parameter value set 1: Value of parameter 11 (Par. value set 1: Set 1 - Value 11) -2147483648 ... [**0**] ... 2147483647	
0x4042:012 (P751.12)	Parameter value set 1: Value of parameter 12 (Par. value set 1: Set 1 - Value 12) -2147483648 ... [**0**] ... 2147483647	
0x4042:013 (P751.13)	Parameter value set 1: Value of parameter 13 (Par. value set 1: Set 1 - Value 13) -2147483648 ... [**0**] ... 2147483647	
0x4042:014 (P751.14)	Parameter value set 1: Value of parameter 14 (Par. value set 1: Set 1 - Value 14) -2147483648 ... [**0**] ... 2147483647	
0x4042:015 (P751.15)	Parameter value set 1: Value of parameter 15 (Par. value set 1: Set 1 - Value 15) -2147483648 ... [**0**] ... 2147483647	
0x4042:016 (P751.16)	Parameter value set 1: Value of parameter 16 (Par. value set 1: Set 1 - Value 16) -2147483648 ... [**0**] ... 2147483647	
0x4042:017 (P751.17)	Parameter value set 1: Value of parameter 17 (Par. value set 1: Set 1 - Value 17) -2147483648 ... [**0**] ... 2147483647	
0x4042:018 (P751.18)	Parameter value set 1: Value of parameter 18 (Par. value set 1: Set 1 - Value 18) -2147483648 ... [**0**] ... 2147483647	
0x4042:019 (P751.19)	Parameter value set 1: Value of parameter 19 (Par. value set 1: Set 1 - Value 19) -2147483648 ... [**0**] ... 2147483647	
0x4042:020 (P751.20)	Parameter value set 1: Value of parameter 20 (Par. value set 1: Set 1 - Value 20) -2147483648 ... [**0**] ... 2147483647	
0x4042:021 (P751.21)	Parameter value set 1: Value of parameter 21 (Par. value set 1: Set 1 - Value 21) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4042:022 (P751.22)	Parameter value set 1: Value of parameter 22 (Par. value set 1: Set 1 - Value 22) -2147483648 ... [**0**] ... 2147483647	
0x4042:023 (P751.23)	Parameter value set 1: Value of parameter 23 (Par. value set 1: Set 1 - Value 23) -2147483648 ... [**0**] ... 2147483647	
0x4042:024 (P751.24)	Parameter value set 1: Value of parameter 24 (Par. value set 1: Set 1 - Value 24) -2147483648 ... [**0**] ... 2147483647	
0x4042:025 (P751.25)	Parameter value set 1: Value of parameter 25 (Par. value set 1: Set 1 - Value 25) -2147483648 ... [**0**] ... 2147483647	
0x4042:026 (P751.26)	Parameter value set 1: Value of parameter 26 (Par. value set 1: Set 1 - Value 26) -2147483648 ... [**0**] ... 2147483647	
0x4042:027 (P751.27)	Parameter value set 1: Value of parameter 27 (Par. value set 1: Set 1 - Value 27) -2147483648 ... [**0**] ... 2147483647	
0x4042:028 (P751.28)	Parameter value set 1: Value of parameter 28 (Par. value set 1: Set 1 - Value 28) -2147483648 ... [**0**] ... 2147483647	
0x4042:029 (P751.29)	Parameter value set 1: Value of parameter 29 (Par. value set 1: Set 1 - Value 29) -2147483648 ... [**0**] ... 2147483647	
0x4042:030 (P751.30)	Parameter value set 1: Value of parameter 30 (Par. value set 1: Set 1 - Value 30) -2147483648 ... [**0**] ... 2147483647	
0x4042:031 (P751.31)	Parameter value set 1: Value of parameter 31 (Par. value set 1: Set 1 - Value 31) -2147483648 ... [**0**] ... 2147483647	
0x4042:032 (P751.32)	Parameter value set 1: Value of parameter 32 (Par. value set 1: Set 1 - Value 32) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4043:001 (P752.01)	Parameter value set 2: Value of parameter 1 (Param. set 2: Set 2 - Value 1) -2147483648 ... [**0**] ... 2147483647	Value set 2 for the parameter list defined in 0x4041:001 (P750.01).
0x4043:002 (P752.02)	Parameter value set 2: Value of parameter 2 (Param. set 2: Set 2 - Value 2) -2147483648 ... [**0**] ... 2147483647	
0x4043:003 (P752.03)	Parameter value set 2: Value of parameter 3 (Param. set 2: Set 2 - Value 3) -2147483648 ... [**0**] ... 2147483647	
0x4043:004 (P752.04)	Parameter value set 2: Value of parameter 4 (Param. set 2: Set 2 - Value 4) -2147483648 ... [**0**] ... 2147483647	
0x4043:005 (P752.05)	Parameter value set 2: Value of parameter 5 (Param. set 2: Set 2 - Value 5) -2147483648 ... [**0**] ... 2147483647	
0x4043:006 (P752.06)	Parameter value set 2: Value of parameter 6 (Param. set 2: Set 2 - Value 6) -2147483648 ... [**0**] ... 2147483647	
0x4043:007 (P752.07)	Parameter value set 2: Value of parameter 7 (Param. set 2: Set 2 - Value 7) -2147483648 ... [**0**] ... 2147483647	
0x4043:008 (P752.08)	Parameter value set 2: Value of parameter 8 (Param. set 2: Set 2 - Value 8) -2147483648 ... [**0**] ... 2147483647	
0x4043:009 (P752.09)	Parameter value set 2: Value of parameter 9 (Param. set 2: Set 2 - Value 9) -2147483648 ... [**0**] ... 2147483647	
0x4043:010 (P752.10)	Parameter value set 2: Value of parameter 10 (Param. set 2: Set 2 - Value 10) -2147483648 ... [**0**] ... 2147483647	
0x4043:011 (P752.11)	Parameter value set 2: Value of parameter 11 (Param. set 2: Set 2 - Value 11) -2147483648 ... [**0**] ... 2147483647	
0x4043:012 (P752.12)	Parameter value set 2: Value of parameter 12 (Param. set 2: Set 2 - Value 12) -2147483648 ... [**0**] ... 2147483647	
0x4043:013 (P752.13)	Parameter value set 2: Value of parameter 13 (Param. set 2: Set 2 - Value 13) -2147483648 ... [**0**] ... 2147483647	
0x4043:014 (P752.14)	Parameter value set 2: Value of parameter 14 (Param. set 2: Set 2 - Value 14) -2147483648 ... [**0**] ... 2147483647	
0x4043:015 (P752.15)	Parameter value set 2: Value of parameter 15 (Param. set 2: Set 2 - Value 15) -2147483648 ... [**0**] ... 2147483647	
0x4043:016 (P752.16)	Parameter value set 2: Value of parameter 16 (Param. set 2: Set 2 - Value 16) -2147483648 ... [**0**] ... 2147483647	
0x4043:017 (P752.17)	Parameter value set 2: Value of parameter 17 (Param. set 2: Set 2 - Value 17) -2147483648 ... [**0**] ... 2147483647	
0x4043:018 (P752.18)	Parameter value set 2: Value of parameter 18 (Param. set 2: Set 2 - Value 18) -2147483648 ... [**0**] ... 2147483647	
0x4043:019 (P752.19)	Parameter value set 2: Value of parameter 19 (Param. set 2: Set 2 - Value 19) -2147483648 ... [**0**] ... 2147483647	
0x4043:020 (P752.20)	Parameter value set 2: Value of parameter 20 (Param. set 2: Set 2 - Value 20) -2147483648 ... [**0**] ... 2147483647	
0x4043:021 (P752.21)	Parameter value set 2: Value of parameter 21 (Param. set 2: Set 2 - Value 21) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4043:022 (P752.22)	Parameter value set 2: Value of parameter 22 (Param. set 2: Set 2 - Value 22) -2147483648 ... [**0**] ... 2147483647	
0x4043:023 (P752.23)	Parameter value set 2: Value of parameter 23 (Param. set 2: Set 2 - Value 23) -2147483648 ... [**0**] ... 2147483647	
0x4043:024 (P752.24)	Parameter value set 2: Value of parameter 24 (Param. set 2: Set 2 - Value 24) -2147483648 ... [**0**] ... 2147483647	
0x4043:025 (P752.25)	Parameter value set 2: Value of parameter 25 (Param. set 2: Set 2 - Value 25) -2147483648 ... [**0**] ... 2147483647	
0x4043:026 (P752.26)	Parameter value set 2: Value of parameter 26 (Param. set 2: Set 2 - Value 26) -2147483648 ... [**0**] ... 2147483647	
0x4043:027 (P752.27)	Parameter value set 2: Value of parameter 27 (Param. set 2: Set 2 - Value 27) -2147483648 ... [**0**] ... 2147483647	
0x4043:028 (P752.28)	Parameter value set 2: Value of parameter 28 (Param. set 2: Set 2 - Value 28) -2147483648 ... [**0**] ... 2147483647	
0x4043:029 (P752.29)	Parameter value set 2: Value of parameter 29 (Param. set 2: Set 2 - Value 29) -2147483648 ... [**0**] ... 2147483647	
0x4043:030 (P752.30)	Parameter value set 2: Value of parameter 30 (Param. set 2: Set 2 - Value 30) -2147483648 ... [**0**] ... 2147483647	
0x4043:031 (P752.31)	Parameter value set 2: Value of parameter 31 (Param. set 2: Set 2 - Value 31) -2147483648 ... [**0**] ... 2147483647	
0x4043:032 (P752.32)	Parameter value set 2: Value of parameter 32 (Param. set 2: Set 2 - Value 32) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4044:001 (P753.01)	Parameter value set 3: Value of parameter 1 (Param. set 3: Set 3 - Value 1) -2147483648 ... [**0**] ... 2147483647	Value set 3 for the parameter list defined in 0x4041:001 (P750.01).
0x4044:002 (P753.02)	Parameter value set 3: Value of parameter 2 (Param. set 3: Set 3 - Value 2) -2147483648 ... [**0**] ... 2147483647	
0x4044:003 (P753.03)	Parameter value set 3: Value of parameter 3 (Param. set 3: Set 3 - Value 3) -2147483648 ... [**0**] ... 2147483647	
0x4044:004 (P753.04)	Parameter value set 3: Value of parameter 4 (Param. set 3: Set 3 - Value 4) -2147483648 ... [**0**] ... 2147483647	
0x4044:005 (P753.05)	Parameter value set 3: Value of parameter 5 (Param. set 3: Set 3 - Value 5) -2147483648 ... [**0**] ... 2147483647	
0x4044:006 (P753.06)	Parameter value set 3: Value of parameter 6 (Param. set 3: Set 3 - Value 6) -2147483648 ... [**0**] ... 2147483647	
0x4044:007 (P753.07)	Parameter value set 3: Value of parameter 7 (Param. set 3: Set 3 - Value 7) -2147483648 ... [**0**] ... 2147483647	
0x4044:008 (P753.08)	Parameter value set 3: Value of parameter 8 (Param. set 3: Set 3 - Value 8) -2147483648 ... [**0**] ... 2147483647	
0x4044:009 (P753.09)	Parameter value set 3: Value of parameter 9 (Param. set 3: Set 3 - Value 9) -2147483648 ... [**0**] ... 2147483647	
0x4044:010 (P753.10)	Parameter value set 3: Value of parameter 10 (Param. set 3: Set 3 - Value 10) -2147483648 ... [**0**] ... 2147483647	
0x4044:011 (P753.11)	Parameter value set 3: Value of parameter 11 (Param. set 3: Set 3 - Value 11) -2147483648 ... [**0**] ... 2147483647	
0x4044:012 (P753.12)	Parameter value set 3: Value of parameter 12 (Param. set 3: Set 3 - Value 12) -2147483648 ... [**0**] ... 2147483647	
0x4044:013 (P753.13)	Parameter value set 3: Value of parameter 13 (Param. set 3: Set 3 - Value 13) -2147483648 ... [**0**] ... 2147483647	
0x4044:014 (P753.14)	Parameter value set 3: Value of parameter 14 (Param. set 3: Set 3 - Value 14) -2147483648 ... [**0**] ... 2147483647	
0x4044:015 (P753.15)	Parameter value set 3: Value of parameter 15 (Param. set 3: Set 3 - Value 15) -2147483648 ... [**0**] ... 2147483647	
0x4044:016 (P753.16)	Parameter value set 3: Value of parameter 16 (Param. set 3: Set 3 - Value 16) -2147483648 ... [**0**] ... 2147483647	
0x4044:017 (P753.17)	Parameter value set 3: Value of parameter 17 (Param. set 3: Set 3 - Value 17) -2147483648 ... [**0**] ... 2147483647	
0x4044:018 (P753.18)	Parameter value set 3: Value of parameter 18 (Param. set 3: Set 3 - Value 18) -2147483648 ... [**0**] ... 2147483647	
0x4044:019 (P753.19)	Parameter value set 3: Value of parameter 19 (Param. set 3: Set 3 - Value 19) -2147483648 ... [**0**] ... 2147483647	
0x4044:020 (P753.20)	Parameter value set 3: Value of parameter 20 (Param. set 3: Set 3 - Value 20) -2147483648 ... [**0**] ... 2147483647	
0x4044:021 (P753.21)	Parameter value set 3: Value of parameter 21 (Param. set 3: Set 3 - Value 21) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4044:022 (P753.22)	Parameter value set 3: Value of parameter 22 (Param. set 3: Set 3 - Value 22) -2147483648 ... [**0**] ... 2147483647	
0x4044:023 (P753.23)	Parameter value set 3: Value of parameter 23 (Param. set 3: Set 3 - Value 23) -2147483648 ... [**0**] ... 2147483647	
0x4044:024 (P753.24)	Parameter value set 3: Value of parameter 24 (Param. set 3: Set 3 - Value 24) -2147483648 ... [**0**] ... 2147483647	
0x4044:025 (P753.25)	Parameter value set 3: Value of parameter 25 (Param. set 3: Set 3 - Value 25) -2147483648 ... [**0**] ... 2147483647	
0x4044:026 (P753.26)	Parameter value set 3: Value of parameter 26 (Param. set 3: Set 3 - Value 26) -2147483648 ... [**0**] ... 2147483647	
0x4044:027 (P753.27)	Parameter value set 3: Value of parameter 27 (Param. set 3: Set 3 - Value 27) -2147483648 ... [**0**] ... 2147483647	
0x4044:028 (P753.28)	Parameter value set 3: Value of parameter 28 (Param. set 3: Set 3 - Value 28) -2147483648 ... [**0**] ... 2147483647	
0x4044:029 (P753.29)	Parameter value set 3: Value of parameter 29 (Param. set 3: Set 3 - Value 29) -2147483648 ... [**0**] ... 2147483647	
0x4044:030 (P753.30)	Parameter value set 3: Value of parameter 30 (Param. set 3: Set 3 - Value 30) -2147483648 ... [**0**] ... 2147483647	
0x4044:031 (P753.31)	Parameter value set 3: Value of parameter 31 (Param. set 3: Set 3 - Value 31) -2147483648 ... [**0**] ... 2147483647	
0x4044:032 (P753.32)	Parameter value set 3: Value of parameter 32 (Param. set 3: Set 3 - Value 32) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4045:001 (P754.01)	Parameter value set 4: Value of parameter 1 (Param. set 4: Set 4 - Value 1) -2147483648 ... [**0**] ... 2147483647	Value set 4 for the parameter list defined in 0x4041:001 (P750.01).
0x4045:002 (P754.02)	Parameter value set 4: Value of parameter 2 (Param. set 4: Set 4 - Value 2) -2147483648 ... [**0**] ... 2147483647	
0x4045:003 (P754.03)	Parameter value set 4: Value of parameter 3 (Param. set 4: Set 4 - Value 3) -2147483648 ... [**0**] ... 2147483647	
0x4045:004 (P754.04)	Parameter value set 4: Value of parameter 4 (Param. set 4: Set 4 - Value 4) -2147483648 ... [**0**] ... 2147483647	
0x4045:005 (P754.05)	Parameter value set 4: Value of parameter 5 (Param. set 4: Set 4 - Value 5) -2147483648 ... [**0**] ... 2147483647	
0x4045:006 (P754.06)	Parameter value set 4: Value of parameter 6 (Param. set 4: Set 4 - Value 6) -2147483648 ... [**0**] ... 2147483647	
0x4045:007 (P754.07)	Parameter value set 4: Value of parameter 7 (Param. set 4: Set 4 - Value 7) -2147483648 ... [**0**] ... 2147483647	
0x4045:008 (P754.08)	Parameter value set 4: Value of parameter 8 (Param. set 4: Set 4 - Value 8) -2147483648 ... [**0**] ... 2147483647	
0x4045:009 (P754.09)	Parameter value set 4: Value of parameter 9 (Param. set 4: Set 4 - Value 9) -2147483648 ... [**0**] ... 2147483647	
0x4045:010 (P754.10)	Parameter value set 4: Value of parameter 10 (Param. set 4: Set 4 - Value 10) -2147483648 ... [**0**] ... 2147483647	
0x4045:011 (P754.11)	Parameter value set 4: Value of parameter 11 (Param. set 4: Set 4 - Value 11) -2147483648 ... [**0**] ... 2147483647	
0x4045:012 (P754.12)	Parameter value set 4: Value of parameter 12 (Param. set 4: Set 4 - Value 12) -2147483648 ... [**0**] ... 2147483647	
0x4045:013 (P754.13)	Parameter value set 4: Value of parameter 13 (Param. set 4: Set 4 - Value 13) -2147483648 ... [**0**] ... 2147483647	
0x4045:014 (P754.14)	Parameter value set 4: Value of parameter 14 (Param. set 4: Set 4 - Value 14) -2147483648 ... [**0**] ... 2147483647	
0x4045:015 (P754.15)	Parameter value set 4: Value of parameter 15 (Param. set 4: Set 4 - Value 15) -2147483648 ... [**0**] ... 2147483647	
0x4045:016 (P754.16)	Parameter value set 4: Value of parameter 16 (Param. set 4: Set 4 - Value 16) -2147483648 ... [**0**] ... 2147483647	
0x4045:017 (P754.17)	Parameter value set 4: Value of parameter 17 (Param. set 4: Set 4 - Value 17) -2147483648 ... [**0**] ... 2147483647	
0x4045:018 (P754.18)	Parameter value set 4: Value of parameter 18 (Param. set 4: Set 4 - Value 18) -2147483648 ... [**0**] ... 2147483647	
0x4045:019 (P754.19)	Parameter value set 4: Value of parameter 19 (Param. set 4: Set 4 - Value 19) -2147483648 ... [**0**] ... 2147483647	
0x4045:020 (P754.20)	Parameter value set 4: Value of parameter 20 (Param. set 4: Set 4 - Value 20) -2147483648 ... [**0**] ... 2147483647	
0x4045:021 (P754.21)	Parameter value set 4: Value of parameter 21 (Param. set 4: Set 4 - Value 21) -2147483648 ... [**0**] ... 2147483647	

Parameter	Name / value range / [default setting]	Info
0x4045:022 (P754.22)	Parameter value set 4: Value of parameter 22 (Param. set 4: Set 4 - Value 22) -2147483648 ... [**0**] ... 2147483647	
0x4045:023 (P754.23)	Parameter value set 4: Value of parameter 23 (Param. set 4: Set 4 - Value 23) -2147483648 ... [**0**] ... 2147483647	
0x4045:024 (P754.24)	Parameter value set 4: Value of parameter 24 (Param. set 4: Set 4 - Value 24) -2147483648 ... [**0**] ... 2147483647	
0x4045:025 (P754.25)	Parameter value set 4: Value of parameter 25 (Param. set 4: Set 4 - Value 25) -2147483648 ... [**0**] ... 2147483647	
0x4045:026 (P754.26)	Parameter value set 4: Value of parameter 26 (Param. set 4: Set 4 - Value 26) -2147483648 ... [**0**] ... 2147483647	
0x4045:027 (P754.27)	Parameter value set 4: Value of parameter 27 (Param. set 4: Set 4 - Value 27) -2147483648 ... [**0**] ... 2147483647	
0x4045:028 (P754.28)	Parameter value set 4: Value of parameter 28 (Param. set 4: Set 4 - Value 28) -2147483648 ... [**0**] ... 2147483647	
0x4045:029 (P754.29)	Parameter value set 4: Value of parameter 29 (Param. set 4: Set 4 - Value 29) -2147483648 ... [**0**] ... 2147483647	
0x4045:030 (P754.30)	Parameter value set 4: Value of parameter 30 (Param. set 4: Set 4 - Value 30) -2147483648 ... [**0**] ... 2147483647	
0x4045:031 (P754.31)	Parameter value set 4: Value of parameter 31 (Param. set 4: Set 4 - Value 31) -2147483648 ... [**0**] ... 2147483647	
0x4045:032 (P754.32)	Parameter value set 4: Value of parameter 32 (Param. set 4: Set 4 - Value 32) -2147483648 ... [**0**] ... 2147483647	
0x4046 (P755.00)	Activation of parameter set (PSet activation)	Selection of the activation method for the parameter change-over. • If the selection is changed from "Via command... [0]/[1]" to "If the selection is changed...[2]/[3]" after switch-on, the parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated immediately. In case of selection [2], however, this only takes place if the inverter is disabled, the motor is stopped or an error is active.
	0 **Via command (disable required)**	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated if the trigger assigned to the "Load parameter set" function in 0x2631:040 (P400.40) provides a FALSE-TRUE edge AND the inverter is inhibited, the motor is stopped or an error is active.
	1 Via command (immediately)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is immediately activated if the trigger assigned to the "Load parameter set" function in 0x2631:040 (P400.40) provides a FALSE-TRUE edge.
	2 If the selection is changed (disable required)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated if the state of these selection bits changes AND the inverter is inhibited, the motor is stopped or an error is active.
	3 If the selection is changed (immediately)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated immediately if the state of these selection bits is changed.

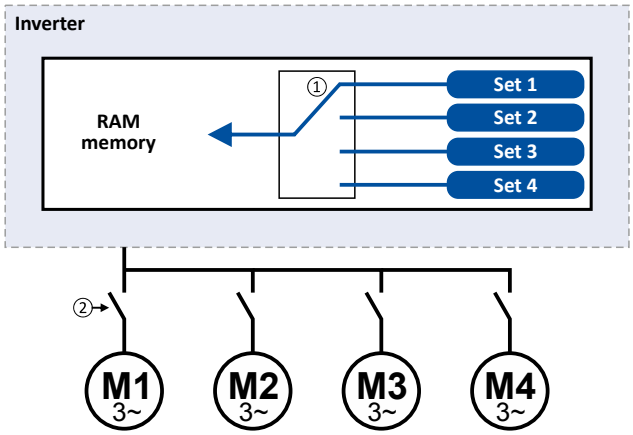
Parameter	Name / value range / [default setting]		Info
0x4047:001 (P756.01)	Parameter change-over error message: Status (PSet error msg.: Status) • Read only		Error message for the "parameter change-over" function. • In the event of an error, an error status is shown here, and in 0x4047:002 (P756.02) the number of the list entry in which the error has occurred is displayed (in connection with the value set selected). • If several errors occur at the same time, only the first incorrect list entry will be displayed. Hence, after elimination of the displayed error and repeated activation, more errors may be displayed. • The parameter list will always be processed from beginning to end, even if errors occur in the meantime.
	0	No fault	
	33803	Invalid data type	
	33804	Range violation	
	33806	Invalid index	
	33813	No element selected	
	33815	Writing impermissible	
	33816	Device not inhibited	
	33829	Invalid subindex	
	33837	Access impermissible	
	33860	Parameter not mappable	
	33865	No subindexes	
	33876	Parameter not changeable	
0x4047:002 (P756.02)	Parameter change-over error message: List entry (PSet error msg.: List entry) • Read only		Error message for the "Parameter set changeover" function. • In the event of an error, the number of the list entry for which the error displayed in 0x4047:001 (P756.01) has occurred is shown here.
0x2631:040 (P400.40)	Function list: Load parameter set (Function list: Load param.set) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373		Assignment of a trigger for the "Load parameter set" function. Trigger = FALSE-TRUE edge: parameter change-over to the value set selected via "Select parameter set (bit 0)" and "Select parameter set (bit 1)". Trigger = FALSE: no action. Notes: • The activation method for the "Parameter change-over" function can be selected in 0x4046 (P755.00).
	00	**Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:041 (P400.41)	Function list: Select parameter set (bit 0) (Function list: Sel. paramset b0) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373		Assignment of a trigger for the "Select parameter set (bit 0)" function. Selection bit with the valency 2^0 for "Parameter change-over" function. Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00	**Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:042 (P400.42)	Function list: Select parameter set (bit 1) (Function list: Sel. paramset b1) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373		Assignment of a trigger for the "Select parameter set (bit 1)" function. Selection bit with the valency 2^1 for "Parameter change-over" function. Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00	**Not connected**	No trigger assigned (trigger is constantly FALSE).

10.8.1 Example: Selective control of several motors with one inverter

A typical application for the parameter change-over is an application/machine in which several axes must be triggered successively but a simultaneous operation of several motors is not required. In this case, one and the same inverter can trigger the motors in succession. Advantages of this solution are the reduced amount of components (inverters) and thus a reduced energy consumption.

Principle:

- The motor to be currently controlled is connected to the inverter via motor contactors. (The contactor system can, for instance, be controlled via the digital outputs of the inverter.)
- At the same time, the motor and control settings suitable for motor are activated in the inverter by means of parameter change-over. ▸ Functions for parameter change-over 412



① Motor data change-over (via the "parameter change-over" function)
② Motor change-over (e.g. via motor contactors)

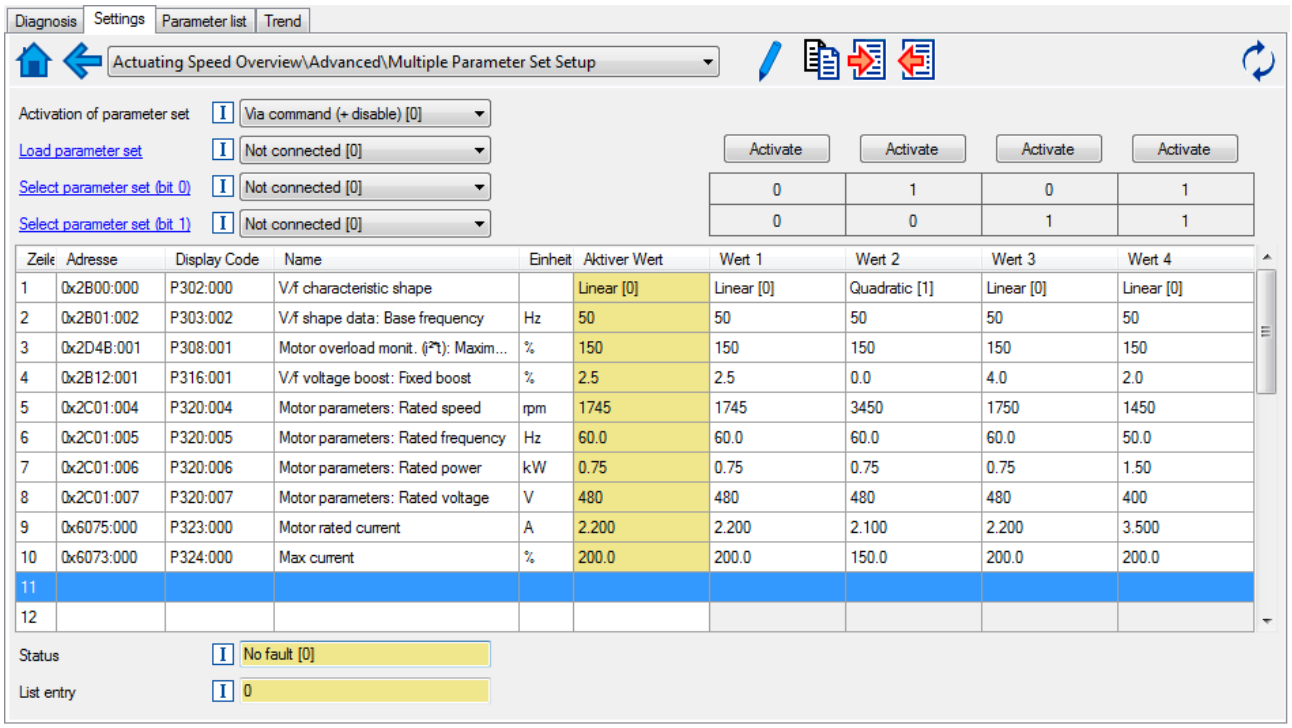
The following table lists all parameters that require different settings for the four motors:

#	Parameter	Name	Setting			
			M1	M2	M3	M4
1	0x2B00 (P302.00)	V/f characteristic shape	Linear [0]	Square-law [1]	Linear [0]	Linear [0]
2	0x2B01:002 (P303.02)	Base frequency	60 Hz	60 Hz	60 Hz	50 Hz
3	0x2D4B:001 (P308.01)	Maximum utilisation [60 s]	150 %	120 %	150 %	150 %
4	0x2B12:001 (P316.01)	Fixed boost	2.5 %	0.0 %	4.0 %	2.0 %
5	0x2C01:004 (P320.04)	Rated speed	1745	3450	1750	1450
6	0x2C01:005 (P320.05)	Rated frequency	60.0 Hz	60.0 Hz	60.0 Hz	50.0 Hz
7	0x2C01:006 (P320.06)	Rated power	0.75 kW	0.75 kW	0.75 kW	1.50 kW
8	0x2C01:007 (P320.07)	Rated voltage	480 V	480 V	480 V	400 V
9	0x6075 (P323.00)	Motor rated current	2,200 A	2,100 A	2,200 A	3,500 A
10	0x6073 (P324.00)	Max current	200.0 %	150.0 %	200.0 %	200.0 %

Settings required for the "parameter change-over" function

The easiest way to make the required settings is via the parameterisation dialog in the »EASY Starter«:

1. Click the button to first select the 10 relevant parameters.
2. Set values for motor M1 ... M4 in the corresponding fields:



Zeile	Adresse	Display Code	Name	Einheit	Aktiver Wert	Wert 1	Wert 2	Wert 3	Wert 4
1	0x2B00:000	P302:000	V/f characteristic shape		Linear [0]	Linear [0]	Quadratic [1]	Linear [0]	Linear [0]
2	0x2B01:002	P303:002	V/f shape data: Base frequency	Hz	50	50	50	50	50
3	0x2D4B:001	P308:001	Motor overload monit. (i²t): Maxim...	%	150	150	150	150	150
4	0x2B12:001	P316:001	V/f voltage boost: Fixed boost	%	2.5	2.5	0.0	4.0	2.0
5	0x2C01:004	P320:004	Motor parameters: Rated speed	rpm	1745	1745	3450	1750	1450
6	0x2C01:005	P320:005	Motor parameters: Rated frequency	Hz	60.0	60.0	60.0	60.0	50.0
7	0x2C01:006	P320:006	Motor parameters: Rated power	kW	0.75	0.75	0.75	0.75	1.50
8	0x2C01:007	P320:007	Motor parameters: Rated voltage	V	480	480	480	480	400
9	0x6075:000	P323:000	Motor rated current	A	2.200	2.200	2.100	2.200	3.500
10	0x6073:000	P324:000	Max current	%	200.0	200.0	150.0	200.0	200.0
11									
12									

In case of a direct setting in the parameters of the "parameter change-over" function:

- The addresses must be set with the following format: 0xiiiiss00 (iiii = index hexadecimal, ss = subindex hexadecimal). The keypad serves to select the desired parameter from a list.
- The values for the motors must be set as integer values. The integer value results from the multiplication of the actual setting value by the factor of the respective parameter. In the , the factor for each parameter must be given.

The following table shows the required settings:

#	Address 0x4041:x (PAR 750/x)		Name	Value 1 0x4042:x (PAR 752/x)	Value 2 0x4043:x (PAR 753/x)	Value 3 0x4044:x (PAR 754/x)	Value 4 0x4045:x (PAR 755/x)
	hex	decimal					
1	0x2B000000	721420288	V/f characteristic shape	0	1	0	0
2	0x2B010200	721486336	Base frequency	60	60	60	50
3	0x2D4B0100	759890176	Maximum utilisation [60 s]	150	120	150	150
4	0x2B120100	722600192	Fixed boost	25	0	40	20
5	0x2C010400	738264064	Rated speed	1745	3450	1750	1450
6	0x2C010500	738264320	Rated frequency	600	600	600	500
7	0x2C010600	738264576	Rated power	75	75	75	150
8	0x2C010700	738264832	Rated voltage	480	480	480	400
9	0x60750000	1618280448	Motor rated current	2200	2100	2200	3500
10	0x60730000	1618149376	Max current	2000	1500	2000	2000

10.9 Device profile CiA 402

The CiA® 402 device profile defines the functional behaviour of stepping motors, servo drives, and frequency inverters. In order to be able to describe the different drive types, various operating modes and device parameters are specified in the device profile. Each operating mode provides objects (e.g. for the setpoint speed, acceleration and deceleration) to generate the desired drive behaviour.

Details

The CiA 402 operating mode "CiA: Velocity mode" is activated by the setting 0x6060 (P301.00) = "CiA: Velocity mode [2]".

More details can be found in the CiA 402 specification (CANopen device profile for drives and Motion Control) of the CAN in Automation (CiA) user organisation.
http://www.can-cia.org

CiA® is a registered community trademark of the CAN in Automation e. V user organisation.

Parameter	Name / value range / [default setting]		Info
0x6042 (P781.00)	Target velocity (Target velocity) -32768 ... [**0**] ... 32767 rpm		Setpoint speed (velocity mode).
0x6043 (P782.00)	Velocity demand (Velocity demand) • Read only: x rpm		Display of the setpoint velocity (velocity mode).
0x6044 (P783.00)	Velocity actual value (Velocity actual) • Read only: x rpm		Display of the actual speed (velocity mode).
0x6046:001 (P784.01)	Velocity min max amount: Velocity min amount (Vel. min max: Vel. min amount) 0 ... [**0**] ... 480000 rpm		Minimum speed (velocity mode).
0x6046:002 (P784.02)	Velocity min max amount: Velocity max amount (Vel. min max: Vel. max amount) 0 ... [**2147483647**] ... 2147483647 rpm		Maximum speed (velocity mode).
0x6048:001 (P785.01)	Velocity acceleration: Delta speed (Vel.acceleration: Delta speed) 0 ... [**3000**] ... 2147483647 rpm		Acceleration: speed interval
0x6048:002 (P785.02)	Velocity acceleration: Delta time (Vel.acceleration: Delta time) 0 ... [**10**] ... 65535 s		Acceleration: time interval
0x6049:001 (P786.01)	Velocity deceleration: Delta speed (Vel.deceleration: Delta speed) 0 ... [**3000**] ... 2147483647 rpm		Deceleration: speed interval
0x6049:002 (P786.02)	Velocity deceleration: Delta time (Vel.deceleration: Delta time) 0 ... [**10**] ... 65535 s		Deceleration: time interval
0x605A	Quick stop option code		Device status after exiting the quick stop ramp. • Setting is only effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]".
	2	**Quick stop ramp -> switch-on inhibited**	Automatic change to the "Switch-on inhibited" device state. • The "Quick stop active [54]" status is reset to FALSE after ramp-down to standstill.
	6	Quick stop ramp -> quick stop active	The inverter remains in the "Quick stop active" device state. • The "Quick stop active [54]" status remains TRUE until the "Quick stop" function is activated.
0x6060 (P301.00)	Modes of operation (Modes of op.) • Setting can only be changed if the inverter is inhibited.		Selection of the operating mode.
	-2	**MS: Velocity mode**	Vendor specific velocity mode
	0	No mode change/no mode assigned	No operating mode (standstill)
	2	CiA: Velocity mode	CiA 402 velocity mode

Parameter	Name / value range / [default setting]		Info
0x6061 (P788.00)	Modes of operation display (Modes of op. dis) • Read only		Display of the current operating mode.
	-2	MS: Velocity mode	Vendor specific velocity mode
	0	No mode change/no mode assigned	No operating mode (standstill)
	2	CiA: Velocity mode	CiA 402 velocity mode
	8	Cyclic sync position mode • From version 02.00	- (not supported)
	9	Cyclic sync velocity mode • From version 02.00	
	10	Cyclic sync torque mode • From version 02.00	
0x6071	Target torque -3276.8 ... [**0.0**] ... 3276.7 %		Setpoint torque for the "MS: Torque mode" operating mode. • 100 % ≡ Motor rated torque 0x6076 (P325.00)
0x6074	Torque demand value • Read only: x.x % • From version 02.00		Display of the setpoint torque in the "MS: Torque mode" operating mode. • 100 % ≡ Motor rated torque 0x6076 (P325.00)
0x6079	DC link circuit voltage • Read only: x.xxx V • From version 02.00		Display of the current DC-bus voltage.
0x6085 (P790.00)	Quick stop deceleration (Quick stop dec.) 0 ... [**546000**] ... 2147483647 pos. unit/s²		Change in velocity used for deceleration to a standstill if quick stop is activated. • Setting is only effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". • In operating mode 0x6060 (P301.00) = "MS: Velocity mode [-2]", the deceleration time set in 0x291C (P225.00) is effective. 0x6085 = ((initial speed of the motor [rpm]) / (duration of the ramp until standstill [s])) * 1092

Parameter	Name / value range / [default setting]		Info
0x6502 (P789.00)	Supported drive modes (Supported modes) • Read only		Bit-coded display of the operating modes supported.
	Bit 0	Reserved	-
	Bit 1	CiA: Velocity mode	1 ≡ CiA 402 velocity mode is supported.
	Bit 2	Reserved	-
	Bit 3	Reserved	
	Bit 4	Reserved	
	Bit 5	Reserved	
	Bit 6	Reserved	
	Bit 7	Cyclic sync position mode	Always 0 (not supported).
	Bit 8	Cyclic sync velocity mode	
	Bit 9	Cyclic sync torque mode	
	Bit 10	Reserved	-
	Bit 11	Reserved	
	Bit 12	Reserved	
	Bit 13	Reserved	
	Bit 14	Reserved	
	Bit 15	Reserved	
	Bit 16	Reserved	
	Bit 17	MS: Velocity mode	1 ≡ vendor specific velocity mode is supported.
	Bit 18	Reserved	-
	Bit 19	Reserved	
	Bit 20	Reserved	
	Bit 21	Reserved	
	Bit 22	Reserved	
	Bit 23	Reserved	
	Bit 24	Reserved	
	Bit 25	Reserved	
	Bit 26	Reserved	
	Bit 27	Reserved	
	Bit 28	Reserved	
	Bit 29	Reserved	
	Bit 30	Reserved	
	Bit 31	Reserved	

Parameter	Name / value range / [default setting]		Info
0x6040	CiA: Controlword 0 ... [**0**] ... 65535		Mappable CiA 402 control word with bit assignment according to device profile CiA 402.
	Bit 0	Switch on	1 = switch-on
	Bit 1	Enable voltage	1 = DC bus: Establish readiness for operation
	Bit 2	Quick stop	0 = activate quick stop
	Bit 3	Enable operation	1 = enable operation
	Bit 4	Operation mode specific	Bits are not supported.
	Bit 5	Operation mode specific	
	Bit 6	Operation mode specific	
	Bit 7	Fault reset	0-1 edge = reset error
	Bit 8	Reserved	Bit is not supported.
	Bit 9	Operation mode specific	Operating mode dependent
	Bit 10	Reserved	
	Bit 11	Override coast	
	Bit 12	AutoInit	
	Bit 13	Reserved	
	Bit 14	Release holding brake	1 = releasing holding brake manually Notes: • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command. ▸ Holding brake control 📖 335
	Bit 15	Reserved	
0x6041 (P780.00)	CiA: Statusword (CiA: Statusword) • Read only		Mappable CiA 402 status word with bit assignment according to device profile CiA 402.
	Bit 0	Ready to switch on	1 ≡ drive ready to start
	Bit 1	Switched on	1 ≡ drive switched-on
	Bit 2	Operation enabled	1 ≡ operation enabled
	Bit 3	Fault	1 ≡ fault or trouble active
	Bit 4	Voltage enabled	1 ≡ DC bus ready for operation
	Bit 5	Quick stop	0 ≡ quick stop active
	Bit 6	Switch on disabled	1 ≡ operation inhibited
	Bit 7	Warning	1 ≡ warning active
	Bit 8	RPDOs deactivated	1 ≡ cyclic PDOs have been deactivated.
	Bit 9	Remote	1 ≡ inverter can receive commands via network.
	Bit 10	Target reached	1 ≡ the actual position is in the window.
	Bit 11	Internal limit active	1 ≡ internal limitation of a setpoint active.
	Bit 12	Operation mode active	1 ≡ operation enabled and no test mode activated. (no internal setpoint generation active.)
	Bit 13	Following error	1 ≡ following error active
	Bit 14	Holding brake released	1 ≡ holding brake released
	Bit 15	Safe torque off (STO) not active	0 ≡ STO active 1 ≡ STO not active

10.10 Holding brake control

This function is used for low-wear control of a holding brake.

Preconditions

- Observe that the holding brake is an important element of the machine's safety concept as a whole. Therefore be sure to carry out commissioning of this system part with particular care!
- Holding brakes are not intended for braking during operation. The increased wear caused by braking during operation may destroy the holding brake prematurely!
- Ensure that the inverter builds up a sufficient torque in the motor when releasing and applying the holding brake, in order to hold the load. For this purpose, a voltage boost can for instance be set for the V/f characteristic control. ▸ V/f voltage boost 📖 140
- If the holding brake is to be controlled via a digital output, the use of an additional relay or power contactor is required. The digital output is not suited for direct control of a holding brake.
- When a power contactor is used, the response time and release time of the contactor is added to the application and release time of the holding brake. Both times must also be taken into consideration for parameterising the application and release time of the holding brake.
- If, instead of an electrically releasing (self-holding) holding brake, an electrically holding (self-releasing) holding brake is to be controlled, a signal inversion for the digital output used or for the relay is to be set! ▸ Configuration of digital outputs 📖 431

Details

Holding brakes are used for locking axes if the inverter is disabled or if the system is in the "mains off" state. This is not only important for vertical axes but, for instance, also for horizontal axes which may cause various problems with uncontrolled movements.

Examples:

- Loss of the reference information after mains OFF and further spinning of the drive.
- Collision with other moving machine parts.

The holding brake can be triggered automatically depending on the device state and manually via an external control signal. For more details see the following subchapters:

- "Automatic" brake mode (automatic operation) 📖 338
- Manual release of the holding brake 📖 346

In the default setting 0x2820:001 (P712.01) = "Off [2]", the holding brake control is deactivated.

The holding brake control itself only outputs a digital trigger for releasing the holding brake. This trigger can be assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply.

Configuration examples:

- Assignment of the trigger to the relay: 0x2634:001 (P420.01) = "Release holding brake [115]".
- Assignment of the trigger to the digital output 1: 0x2634:002 (P420.02) = "Release holding brake [115]".

▸ Configuration of digital outputs 📖 431

Parameter	Name / value range / [default setting]		Info
0x2820:001 (P712.01)	Holding brake control: Brake mode (Brake control: Brake mode)		Selecting how the "Release holding brake" command is to be triggered.
	0	Automatically (via device state)	"Automatic operation": The "Release holding brake" command is automatically carried out as a function of the device state and further conditions. Additionally, the "Release holding brake" command can be manually initiated by the following external triggers: • Via the trigger assigned to the "Release holding brake" function in 0x2631:049 (P400.49) if the network control is not active. • Via bit 14 in the CiA 402 control word 0x6040 if the network control is active. Notes: • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command.
	1	Manually	The "Release holding brake" command can also be initiated by the following external triggers: • Via the trigger assigned to the "Release holding brake" function in 0x2631:049 (P400.49) if the network control is not active. • Via bit 14 in the CiA 402 control word 0x6040 if the network control is active. Notes: • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command.
	2	**Off**	The holding brake is deactivated.
0x2820:002 (P712.02)	Holding brake control: Brake closing time (Brake control: Closing time) 0 ... [**100**] ... 10000 ms		Application time (engagement time) of the holding brake. • Only effective in automatic operation.
0x2820:003 (P712.03)	Holding brake control: Brake opening time (Brake control: Opening time) 0 ... [**100**] ... 10000 ms		Release time (disengagement time) of the holding brake. • Only effective in automatic operation.
0x2820:007 (P712.07)	Holding brake control: Brake closing threshold (Brake control: Closing thresh.) 0.0 ... [**0.2**] ... 599.0 Hz		Threshold for applying the holding brake for automatic operation without feedforward control (typically for horizontal applications). • Only effective if the holding load in 0x2820:008 (P712.08) is set to 0 %. • By setting a threshold, the holding brake can be triggered to close before the output frequency has reached the value 0 Hz. • In order that the brake can work correctly, the threshold for closing the brake must be set to a value that is greater than or that equals the minimum frequency 0x2915 (P210.00).
0x2820:008 (P712.08)	Holding brake control: Brake holding load (Brake control: Holding load) -500.0 ... [**0.0**] ... 500.0 %		Holding load for automatic operation (typically for vertical applications). • 100 % ≡ slip frequency 0x2C02:004 (P351.04) • For vertical applications we recommend starting with the setting 100 % and then reducing the setting value, if required.
0x2820:015 (P712.15)	Holding brake control: Brake status (Brake control: Brake status) • Read only		Display of the holding brake status. • The status is also displayed via bit 14 in the CiA: Statusword 0x6041 (P780.00).
	0	Active	Holding brake is applied.
	1	Brake released	Holding brake is released.

Parameter	Name / value range / [default setting]	Info
0x2631:049 (P400.49)	Function list: Release holding brake (Function list: Release brake) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Release holding brake" function. Trigger = TRUE: Release holding brake (immediately). Trigger = FALSE: no action. Notes: • Function is only executed if the brake mode 0x2820:001 (P712.01) is set to "Automatic [0]" or "Manual [1]". • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command!
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

10.10.1 "Automatic" brake mode (automatic operation)

In automatic operation, the "Release holding brake [115]" trigger is set as a function of certain conditions as for instance:

- frequency setpoint
- Current output frequency
- Device status

In automatic operation, the holding brake is always closed if the power section is switched off (exception: The holding brake is released manually). In addition, the holding brake control can disable the switch-on of the power section.

⚠ DANGER!

Manual release of the holding brake

Also in automatic operation, a manual release of the holding brake is possible. The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off.

▶ The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command!

Preconditions

Automatic operation is only available if the operating mode "MS: Velocity mode [-2]" is set in 0x6060 (P301.00).

General operating mode of the automatic mode

- The threshold for releasing the holding brake either results from the holding load set in 0x2820:008 (P712.08) or from the threshold for closing the holding brake set in 0x2820:007 (P712.07) if the holding load is set to 0 %.
- The threshold has a permanent hysteresis of 1 Hz to prevent a constant change-over (exception: If the threshold = 0 Hz, the hysteresis is also = 0 Hz).
- The power section remains disabled as long as the conditions for releasing the holding brake are not fulfilled.
- The holding brake is released if the frequency setpoint exceeds the threshold for release (plus hysteresis).
- The holding brake is closed if both frequency setpoint and output frequency are lower than or equal to the threshold.
- The expiration of the release time 0x2820:003 (P712.03) only starts after the power section has been switched on and the motor has been magnetised.
- The acceleration to the frequency setpoint starts after the release time has expired.
- If a holding load is set in 0x2820:008 (P712.08), the resulting frequency value is used for feedforward control during the release time and application time. The sign of the holding load determines the direction of the feedforward control.
- After the application time 0x2820:002 (P712.02) has expired, the output frequency is set to zero (holding brake closed).

Automatic operation without feedforward control

Typical applications for automatic operation without feedforward control are horizontal applications.

- If the holding load is set to 0 % in 0x2820:008 (P712.08), there will be no feedforward control during the release time (disengagement time) and application time (engagement time).
- If the holding brake is to be closed before the output frequency reaches 0 Hz, the corresponding threshold must be set in [Hz] in 0x2820:007 (P712.07).

Process - Release holding brake:

1. If the frequency setpoint exceeds the threshold for release, the power section is enabled and the motor is magnetised.
2. After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE.
3. After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Process - close holding brake:

1. If the frequency setpoint and the output frequency reach the threshold for release, the trigger "Release holding brake [115]" is reset to FALSE.
2. After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

Also see the following examples:

▸ Example 1: Forward motion without feedforward control 📖 341

▸ Example 2: Forward motion without feedforward control with reversal 📖 342

Automatic operation with feedforward control

Typical applications for the automatic operation with feedforward control are vertical applications.

- The required holding load must be set in 0x2820:008 (P712.08) in percent with reference to the slip frequency 0x2C02:004 (P351.04).
- The slip frequency depends on the motor power.
- Typical slip frequencies of AC motors:
  - 0.25 kW ... 3.0 kW: 3.0 Hz (6.0 %)
  - 4.0 kW ... 7.5 kW: 1.8 Hz (3.5 %)
  - 11 kW ... 22 kW: 1.4 Hz (2.7 %)
  - 30 kW ... 45 kW: 1.0 Hz (2.0 %)
  - 55 kW ... 90 kW: 0.6 Hz (1.2 %)

For vertical applications we recommend starting with the setting 0x2820:008 (P712.08) = 100 % and then reducing the setting value, if required.

Process - Release holding brake:

1. If the frequency setpoint exceeds the holding load, the power section is enabled and the motor is magnetised.
2. After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE. At the same time, the output frequency is set to the holding load for the purpose of the feedforward control.
3. After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Process - close holding brake:

1. If the frequency setpoint and the output frequency reach the holding load , the trigger "Release holding brake [115]" is reset to FALSE. The output frequency remains set to the holding load for the purpose of the feedforward control.
2. After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

Also see the following examples:

▸ Example 3: Upward motion with feedforward control 🕮 343

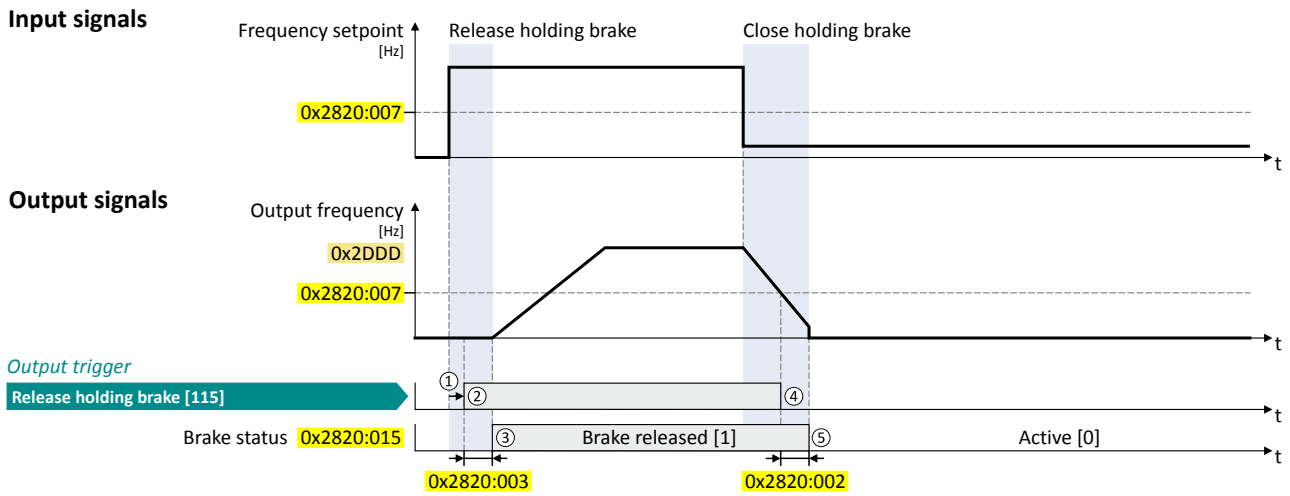
▸ Example 4: Upward motion with feedforward control and inverted rotation 🕮 344

▸ Example 5: Downward motion with feedforward control 🕮 345

10.10.2 Example 1: Forward motion without feedforward control

Requirements:

- In 0x6060 (P301.00), the operating mode "MS: Velocity mode [-2]" is set.
- In 0x2820:001 (P712.01), the brake mode "Automatically (via device state) [0]" is set.
- In 0x2820:008 (P712.08), the holding load is set to 0 %.
- The trigger "Release holding brake [115]" is assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply. ▸ Configuration of digital outputs 431



Release holding brake:

① If the frequency setpoint exceeds the threshold 0x2820:007 (P712.07), the power section is enabled and the motor is magnetised.

② After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE.

③ After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Close holding brake:

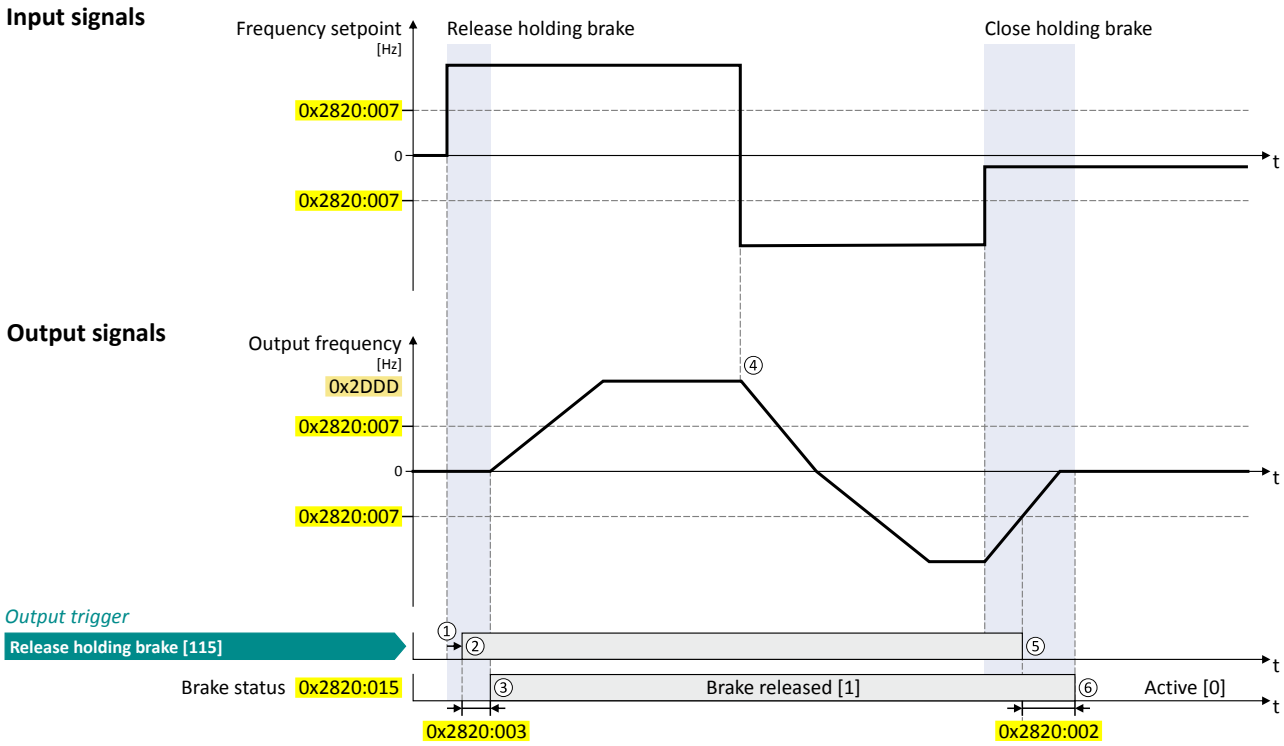
④ If the frequency setpoint and the output frequency reach the threshold 0x2820:007 (P712.07), the trigger "Release holding brake [115]" is reset to FALSE.

⑤ After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

10.10.3 Example 2: Forward motion without feedforward control with reversal

Requirements:

- In 0x6060 (P301.00), the operating mode "MS: Velocity mode [-2]" is set.
- In 0x2820:001 (P712.01), the brake mode "Automatically (via device state) [0]" is set.
- In 0x2820:008 (P712.08), the holding load is set to 0 %.
- The trigger "Release holding brake [115]" is assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply. ▸ Configuration of digital outputs 431



Release holding brake:

① If the frequency setpoint exceeds the threshold 0x2820:007 (P712.07), the power section is enabled and the motor is magnetised.

② After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE.

③ After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Invert rotation:

④ Activating the "Invert rotation" function does not close the holding brake because the frequency setpoint is still above the threshold 0x2820:007 (P712.07).

Close holding brake:

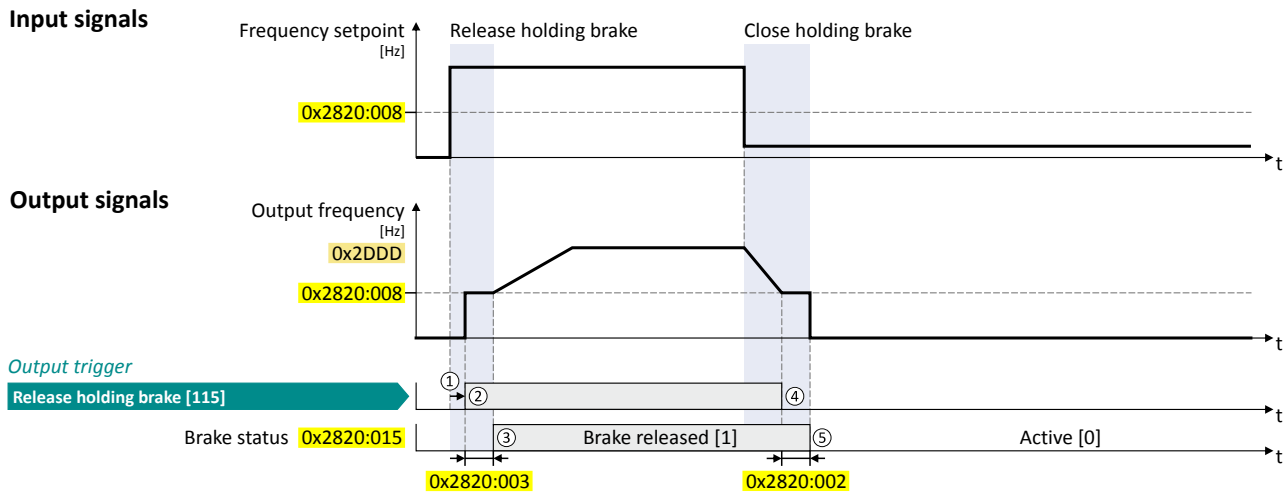
⑤ If the frequency setpoint and the output frequency reach the threshold 0x2820:007 (P712.07), the trigger "Release holding brake [115]" is reset to FALSE.

⑥ After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

10.10.4 Example 3: Upward motion with feedforward control

Requirements:

- In 0x6060 (P301.00), the operating mode "MS: Velocity mode [-2]" is set.
- In 0x2820:001 (P712.01), the brake mode "Automatically (via device state) [0]" is set.
- In 0x2820:008 (P712.08), the holding load required for the application is set.
- The trigger "Release holding brake [115]" is assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply. ▸ Configuration of digital outputs 431



Release holding brake:

① If the frequency setpoint exceeds the holding load 0x2820:008 (P712.08), the power section is enabled and the motor is magnetised.

② After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE. At the same time, the output frequency is set to the holding load for the purpose of the feedforward control.

③ After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Close holding brake:

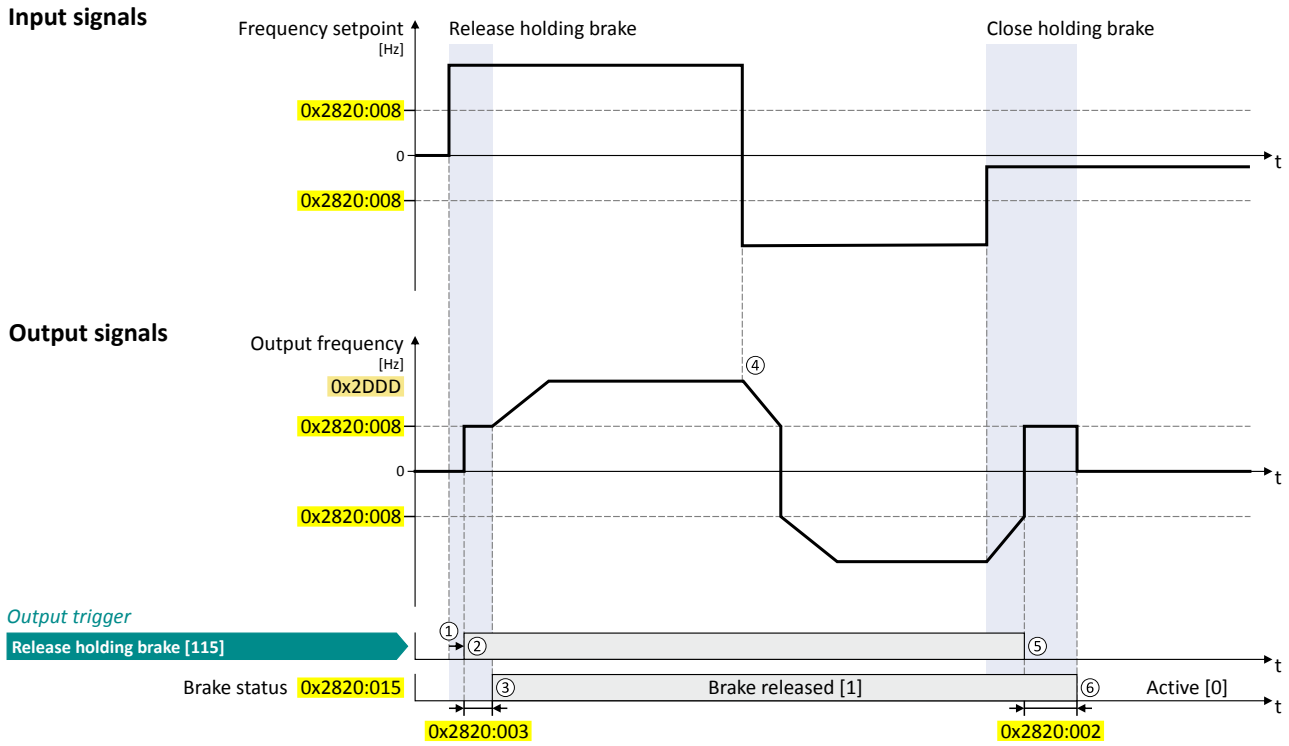
④ If the frequency setpoint and the output frequency reach the holding load 0x2820:008 (P712.08), the trigger "Release holding brake [115]" is reset to FALSE. The output frequency remains set to the holding load for the purpose of the feedforward control.

⑤ After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

10.10.5 Example 4: Upward motion with feedforward control and inverted rotation

Requirements:

- In 0x6060 (P301.00), the operating mode "MS: Velocity mode [-2]" is set.
- In 0x2820:001 (P712.01), the brake mode "Automatically (via device state) [0]" is set.
- In 0x2820:008 (P712.08), the holding load required for the application is set.
- The trigger "Release holding brake [115]" is assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply. ▸ Configuration of digital outputs 431



Release holding brake:

① If the frequency setpoint exceeds the holding load 0x2820:008 (P712.08), the power section is enabled and the motor is magnetised.

② After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE. At the same time, the output frequency is set to the holding load for the purpose of the feedforward control.

③ After the release time 0x2820:003 (P712.03) has elapsed, the output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Invert rotation:

④ Activating the "Invert rotation" function does not close the holding brake because the frequency setpoint is still above the holding load 0x2820:008 (P712.08).

Close holding brake:

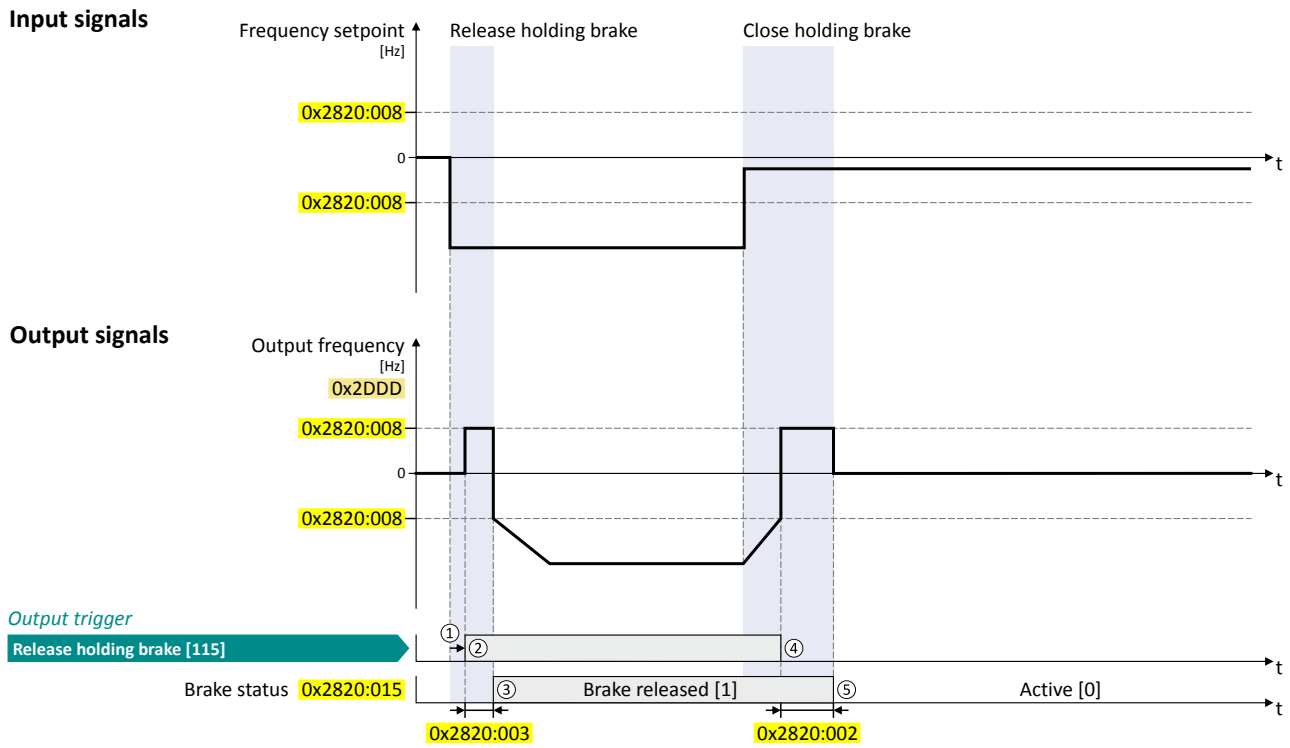
⑤ If the frequency setpoint and the output frequency reach the holding load 0x2820:008 (P712.08), the trigger "Release holding brake [115]" is reset to FALSE. The output frequency remains set to the holding load for the purpose of the feedforward control.

⑥ After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

10.10.6 Example 5: Downward motion with feedforward control

Requirements:

- In 0x6060 (P301.00), the operating mode "MS: Velocity mode [-2]" is set.
- In 0x2820:001 (P712.01), the brake mode "Automatically (via device state) [0]" is set.
- In 0x2820:008 (P712.08), the holding load required for the application is set.
- The trigger "Release holding brake [115]" is assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply. ▸ Configuration of digital outputs 431



Release holding brake:

① If the frequency setpoint exceeds the holding load 0x2820:008 (P712.08), the power section is enabled and the motor is magnetised.

② After the fixed delay for magnetising the motor, the trigger "Release holding brake [115]" is set to TRUE. At the same time, the output frequency is set to the positive holding load for the purpose of the feedforward control.

③ After the release time 0x2820:003 (P712.03) has elapsed, the negative output frequency is accelerated to the frequency setpoint. The brake status is set to "Brake released [1]" in 0x2820:015 (P712.15).

Close holding brake:

④ If the frequency setpoint and the output frequency fall below the holding load 0x2820:008 (P712.08), the trigger "Release holding brake [115]" is reset to FALSE. The output frequency remains set to the positive holding load for the purpose of the feedforward control.

⑤ After the application time 0x2820:002 (P712.02) has elapsed, the brake status is set to "Active [0]" in 0x2820:015 (P712.15). With a short delay, the holding brake control disables the power section again.

10.10.7 Manual release of the holding brake

A manual release of the holding brake is possible in the modes "Automatic [0]" and "Manual [1]" via the following external triggers:

- Via bit 14 in the CiA 402 Controlword 0x6040.
- Via the trigger assigned in 0x2631:049 (P400.49) of the "Release holding brake" function.
  ▸ Example for operating mode 📖 407

⚠ DANGER!

Manual release of the holding brake

The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off.

▸ The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command!

10.11 Flying restart circuit

The flying restart function makes it possible to restart a coasting motor on the fly during operation without speed feedback. Synchronicity between the inverter and the motor is coordinated so that the transition to the rotating drive is effected without jerk at the time of connection.

Preconditions

- The flying restart circuit is only suitable for asynchronous motors.
- Drive systems with speed feedback do not need a flying restart circuit because there is always a jerk-free synchronisation to the feedback speed.
- The flying restart circuit operates safely and reliably in case of drives with high centrifugal masses. If several motors with different centrifugal masses are connected to the inverter, the flying restart circuit must not be used.
- The flying restart circuit serves to identify rotating field frequencies of up to maximally ±200 Hz.
- Especially at high power, very high mass inertias and mains voltages higher than 440 V, a temporary overvoltage in the DC bus may occur. The use of a brake resistor can prevent this behaviour. ▸ Use of a brake resistor 🕮 297

Required settings before the flying restart circuit is used:

1. The motor data must be set correctly. ▸ Motor data 🕮 126
2. The settings for the current controller and the flying restart controller must be adapted to the motor. For this purpose, you have to carry out an automatic identification of the motor data. ▸ Automatic identification of the motor data 🕮 129

Details

The inverter determines synchronicity by identifying the synchronous rotating field frequency. The "search" starts in positive direction.

Duration:

- The flying restart process is determined within approx. 0.5 ... 1.5 seconds.
- The duration is influenced by the start frequency 0x2BA1:001 (P718.01).
- If the rotating field frequency is unknown, a fixed start frequency of 20 Hz (or -20 Hz for systems rotating in the negative direction) is recommended.

Setting the function:

1. As starting performance, set the selection "Flying restart circuit [2]" in 0x2838:001 (P203.01).
   - Thus, every inverter enable causes a synchronisation to the rotating or standing drive.
   - After the inverter has been enabled, the motor can temporarily start or reverse if drives with low friction and low mass inertia are used.
   - If the inverter is operated with the default settings, no further settings are required for most applications.
2. If required, adapt the current 0x2BA1:001 (P718.01) and the start frequency 0x2BA1:002 (P718.02) for the flying restart circuit.
   - Setting notes can be found in the "Info" column for the respective parameter.

For diagnostic purposes, the frequency detected when the motor has been restarted on the fly is displayed in 0x2BA1:008 (P718.08).

Parameter	Name / value range / [default setting]	Info
0x2BA1:001 (P718.01)	Flying restart circuit: Current (Flying restart: Current) 0 ... [**30**] ... 100 %	The current set here is injected into the motor during the flying restart process for the identification of the rotating field frequency. • 100 % ≡ Motor rated current 0x6075 (P323.00) • Reducing the current causes a reduction of the motor torque during the flying restart process. A short-time starting action or reversing of the motor is prevented with low flying restart currents. • If the current is set too low, the rotating field frequency cannot be identified correctly. • If the current is increased, this improves the robustness of the flying restart circuit. • In case of high mass inertias and high speeds, the flying restart circuit may cause an overvoltage in the DC bus if no brake resistor is connected. In this case, the current must be reduced.
0x2BA1:002 (P718.02)	Flying restart circuit: Start frequency (Flying restart: Start frequency) -599.0 ... [**20.0**] ... 599.0 Hz	The frequency set here defines the starting point for the flying restart process. • The search starts in positive direction. • The default setting is adjusted to standard asynchronous motors. • In case of systems with a known search speed (e.g. torque-controlled drive systems that are to synchronise to a defined speed), the start frequency can be adapted for reducing the flying restart time.
0x2BA1:003 (P718.03)	Flying restart circuit: Restart time (Flying restart: Restart time) 1 ... [**5911**]* ... 60000 ms • Default setting depending on the size.	Integration time for controlling the flying restart circuit. • The parameter is calculated and set in the course of the automatic identification of the motor data. The same applies if an automatic calibration of the motor data is carried out. ▸ Automatic identification of the motor data 📖 129
0x2BA1:008 (P718.08)	Flying restart circuit: Flying restart frequency (Flying restart: Fl.res.frequency) • Read only: x.x Hz	Display of the found frequency at which the motor has been successfully restarted on the fly.

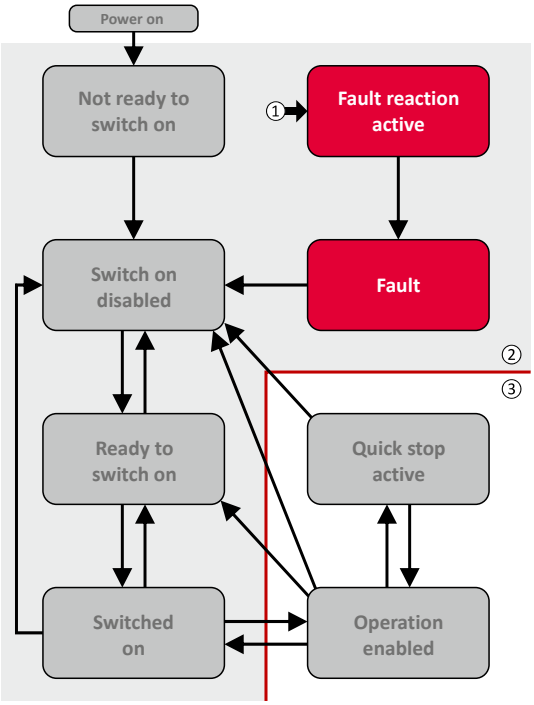
10.12 Timeout für fault reaction

If an error occurs that does not immediately cause a switch-off, the "Fault reaction active" device status becomes initially active. The motor is brought to a standstill with quick stop ramp. The change to the device status "Fault" is only made after the quick stop (motor at standstill) has been executed or after an adjustable timeout time has expired.

Details

In the device status "Fault reaction active"

- only the parameters of the inverter can be changed that do not require an inverter disable.
- a holding brake in brake mode 0x2820:001 (P712.01) = "Automatically (via device state) [0]" is triggered for closing.
- the motor control continues to be operable.



① From all states
② Power section inhibited (pulse inhibit)
③ Power section enabled

Diagnostic parameters:

- 0x282A:005 (P126.05) displays the current device status of the inverter

Parameter	Name / value range / [default setting]	Info
0x2826	Time-out for error response 0.0 ... [**6.0**] ... 100.0 s	This timer is started when a change-over to the "Fault reaction active" device status takes place. If the motor is still rotating after the time-out time has elapsed, a change-over to the "Fault" device status takes place. • In case of a serious error, an immediate change-over to the "Fault" device status takes place. ⚠ CAUTION! Changing this parameter may cause a longer ramptime in the event of an error. This must be considered when changing this parameter.

Related topics

- Error handling 📖 107
- Automatic restart 📖 350

10.13 Automatic restart

Configuration of the restart behaviour after a fault.

The settings have no impact on errors and warnings of the inverter.

Parameter	Name / value range / [default setting]	Info
0x2839:002 (P760.02)	Fault configuration: Restart delay (Fault config.: Restart delay) 0.0 ... [**3.0**] ... 1000.0 s	If a fault occurs, a restart is possible at the earliest after the time set here has elapsed.
0x2839:003 (P760.03)	Fault configuration: Number of restart attempts (Fault config.: Restart counter) 0 ... [**5**] ... 255	Number of restart attempts after a fault. • 255 = unlimited number of restart attempts.
0x2839:004 (P760.04)	Fault configuration: Trouble counter reset time (Fault config.: Tro.count r.time) 0.1 ... [**5.0**] ... 3600.0 s	Time of trouble-free operation after the expiry of which the fault counter is decreased by 1.
0x2839:005 (P760.05)	Fault configuration: Trouble counter (Fault config.: Trouble counter) • Read only	Display of the current fault counter content. • The counter content is increased by 1 after each restart attempt.

Related topics

▸ Error handling 📖 107

▸ Timeout für fault reaction 📖 349

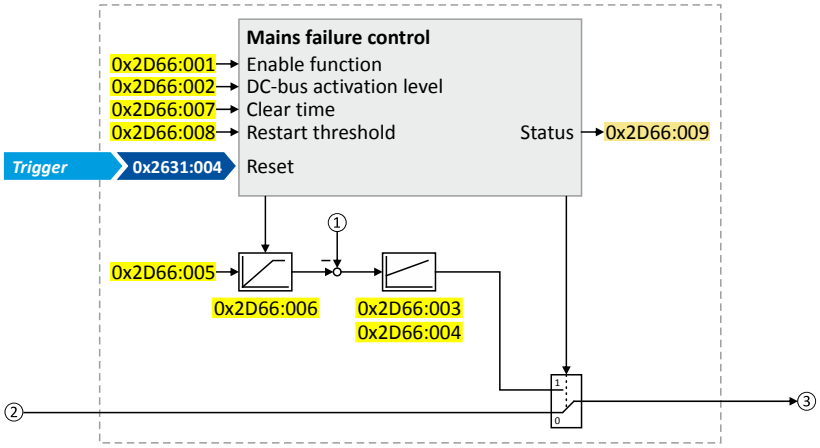
10.14 Mains failure control

In case of power failure, this function can decelerate the motor and use its rotational energy to maintain the DC-bus voltage for a certain period of time. This makes it possible to continue to let the motor run during a short-term failure of the mains voltage. After mains recovery, the operating status that was active before the failure is adopted again.

Details

A failure of the mains voltage causes a continuous DC-bus voltage drop. If the mains failure control is enabled in 0x2D66:001 (P721.01), it will get active if the DC-bus voltage falls below the activation threshold set in 0x2D66:002 (P721.02).

As soon as the mains failure control is active, the motor is decelerated. Now the rotational energy of the motor is used to maintain the DC-bus voltage above the error threshold for undervoltage until the motor is decelerated to standstill in a controlled way. This process is controlled by the DC-bus voltage controller.



① Current DC-bus voltage
② Frequency setpoint (internal input signal)
③ Frequency setpoint (internal output signal for motor control)

The activation and commissioning of the mains failure control are described in detail in the following subchapters.

Parameter	Name / value range / [default setting]	Info
0x2D66:001 (P721.01)	Mains failure control: Enable function (Mains fail. ctrl: Enable function) • From version 02.00 **0** **Disabled** 1 Enabled	1 = enable mains failure control.
0x2D66:002 (P721.02)	Mains failure control: DC-bus activation level (Mains fail. ctrl: DC-bus act.level) 60 ... [**0**]* ... 90 % • Default setting depending on the size. • From version 02.00	Threshold below which the mains failure control is activated if it is enabled (0x2D66:001 (P721.01) = 1). • 100 % ≡ nominal DC-bus voltage Recommended setting: • In general: 5 ... 10 % above the error threshold for undervoltage (display in 0x2540:003 (P208.03)). • 230-V devices: 72 % • 400/480-V devices: 82 %
0x2D66:003 (P721.03)	Mains failure control: Gain V-controller (Mains fail. ctrl: Gain V-ctrl) 0.00001 ... [**0.01000**] ... 0.50000 Hz/V • From version 02.00	Proportional gain of the DC-bus voltage controller.
0x2D66:004 (P721.04)	Mains failure control: Reset time V-controller (Mains fail. ctrl: Res. time V-ctrl) 5 ... [**20**] ... 2000 ms • From version 02.00	Reset time of the DC-bus voltage controller.

Parameter	Name / value range / [default setting]	Info
0x2D66:005 (P721.05)	Mains failure control: DC voltage setpoint (Mains fail. ctrl: DC voltage setp.) 80 ... [**100**] ... 110 % • From version 02.00	Voltage setpoint onto which the DC-bus voltage is to maintained. • 100 % ≡ nominal DC-bus voltage
0x2D66:006 (P721.06)	Mains failure control: Setpoint ramp (Mains fail. ctrl: Setp. ramp) 1 ... [**20**] ... 16000 ms • From version 02.00	Acceleration time for the voltage setpoint set in 0x2D66:005 (P721.05). • The set acceleration time refers to the acceleration from 0 to 100 % of the nominal DC-bus voltage.
0x2D66:007 (P721.07)	Mains failure control: Clear time (Mains fail. ctrl: Clear time) 1 ... [**20**] ... 60000 ms • From version 02.00	After the DC-bus voltage has exceeded the activation threshold 0x2D66:002 (P721.02) (+hysteresis) again, the time set here must be elapsed before the mains failure control is deactivated again if the restart protection is not activated (default setting).
0x2D66:008 (P721.08)	Mains failure control: Restart threshold (Mains fail. ctrl: Restart level) 0.0 ... [**0.0**] ... 599.0 Hz • From version 02.00	Threshold for restart protection. Below the threshold set here no restart takes place after mains recovery.
0x2D66:009 (P721.09)	Mains failure control: Status mains failure control (Mains fail. ctrl: RERT:Status) • Read only • From version 02.00	Bit coded display of the mains failure control status.
	Bit 0 Control active	1 ≡ mains failure control active. • The DC-bus voltage has fallen below the activation threshold 0x2D66:002 (P721.02). • The bit is reset to 0 after the DC-bus voltage has exceeded the activation threshold (+hysteresis) again and the clear time set in 0x2D66:007 (P721.07) has elapsed.
	Bit 1 I-Reset active	1 ≡ I component of the speed controller of the motor control is reset. • Bit is set to 1 if bit 0 is set to 1 (mains failure control active). • Bit is reset to 0 if the frequency setpoint falls below 0.1 Hz.
	Bit 2 Reserved	-
	Bit 3 Reserved	
	Bit 4 Reserved	
	Bit 5 Reserved	
	Bit 6 Reserved	
	Bit 7 Reserved	
0x2B01:002 (P303.02)	V/f shape data: Base frequency (V/f shape data: Base frequency) 0 ... [**50**]* ... 599 Hz • Default setting depending on the size.	Base voltage and base frequency define the V/f ratio and thus the gradient of the V/f characteristic. • The V/f base voltage is usually set to the rated motor voltage 0x2C01:007 (P320.07). • The V/f base frequency is usually set to the rated motor frequency 0x2C01:005 (P320.05).

10.14.1 Activating the mains failure control

1. Set the selection "Enabled [1]" in 0x2D66:001 (P721.01).
2. Set the activation threshold in [%] with reference to the nominal DC-bus voltage in 0x2D66:002 (P721.02).
   - Recommended setting: 5 ... 10 % above the error threshold for undervoltage (display in 0x2540:003 (P208.03)).
3. Set the voltage setpoint onto which the DC-bus voltage is to be maintained in 0x2D66:005 (P721.05).
   - Recommended setting: 95 ... 100 % (of the nominal DC-bus voltage).

The mains failure control gets active with these settings if the DC-bus voltage falls below the activation threshold. The DC-bus voltage controller now generates the required operational energy from the rotational energy of the motor. The motor is decelerated by the mains failure control. Thus, the deceleration ramp is shorter than the one of a non-guided system (coasting drive).

After the mains failure control has been activated:

1. The DC-bus voltage is controlled with the acceleration time set in 0x2D66:006 (P721.06) to the setpoint set in 0x2D66:005 (P721.05).
2. An internally generated frequency setpoint is transferred to the motor control which enables the motor (via the frequency setpoint) to be decelerated to a frequency close to "0 Hz".
   - Starting value for the guided deceleration is the current output frequency.
   - The deceleration ramp (and hence the braking torque) results from the moment of inertia of the load machine(s), the power loss of the drive (system) and the set parameterisation.

Behaviour after mains recovery

If, after mains recovery, the DC-bus voltage has exceeded the activation threshold (+hysteresis) again, an internal timing element is started. After the time period set in 0x2D66:007 (P721.07) has elapsed, the mains failure control is stopped if the restart protection is not activated (default setting).

▸ Restart protection 🕮 354

▸ Fast mains recovery 🕮 354

10.14.2 Restart protection

The integrated restart protection is to prevent a restart in the lower frequency range if the mains voltage was only interrupted briefly (mains recovery before the motor stands still).

- In the default setting 0x2D66:008 (P721.08) = 0 Hz, the restart protection is deactivated.
- In order to activate the restart protection, set the restart threshold in [Hz] in 0x2D66:008 (P721.08) below which no automatic start shall take place after mains recovery.
- If, in case of mains recovery, the output frequency is below the restart threshold, the restart protection gets active:
  - If the current DC-bus voltage is lower than the voltage setpoint 0x2D66:005 (P721.05), the motor is continued to be decelerated (until frequency 0 Hz).
  - If the current DC-bus voltage is higher than the voltage setpoint 0x2D66:005 (P721.05), the motor is accelerated in a controlled way until the output frequency exceeds the restart threshold.
- If, in case of mains recovery, the output frequency is above the restart threshold, the motor is accelerated again to the frequency setpoint. ▸ Fast mains recovery 🕮 354

Diagnostic parameters:

- An active restart protection is displayed via the status bit 0 in 0x2D66:009 (P721.09) if the mains failure control is not active.

Terminating the active restart protection

If, after mains recovery, the restart protection is active, it can be terminated by the following actions:

- Error reset via the trigger set in 0x2631:004 (P400.04).
- Short-time inverter disable via the trigger set in 0x2631:001 (P400.01).
- Restart via the trigger set in 0x2631:002 (P400.02).

10.14.3 Fast mains recovery

A fast mains recovery is caused by a short interruption at the energy supply company (for instance due to a thunderstorm) and by faulty components in the supply cables (for instance slip rings).

The fast mains recovery causes a restart of the motor

- if the restart protection is deactivated (0x2D66:008 (P721.08) = 0 Hz, default setting)
  or
- the restart protection does not get active (output frequency > 0x2D66:008 (P721.08)).

If this behaviour is not desired, you can decelerate the restart by setting a switch-off time in 0x2D66:007 (P721.07) or prevent it in connection with the restart protection. ▸ Restart protection 🕮 354

10.14.4 Commissioning the mains failure control

Commissioning should be executed with motors without load:

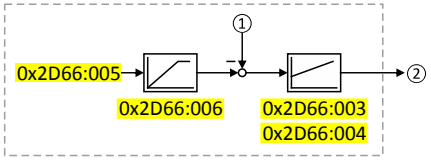
1. Let the motor rotate with a rated frequency of 100 %.
2. Disable the inverter and measure the time until the motor has reached standstill.
   - The time can be measured with a stop watch or similar.
   - If a motor encoder is connected to the inverter and set as feedback system for the motor control, this signal can be output at the analog output and measured with an oscilloscope.
3. Set the acceleration time for the voltage setpoint in 0x2D66:006 (P721.06) to approx. 1/10 of the time measured before.
4. Set the switch-off time n 0x2D66:007 (P721.07) to the time measured before.

Fine adjustment of the mains failure control

For the fine adjustment, you must repeat the following points several times:

1. An end frequency as low as possible should be reached before the inverter reaches the error threshold for undervoltage:
   - Increase the proportional gain of the DC-bus voltage controller in 0x2D66:003 (P721.03).
   - Reduce the reset time of the DC-bus voltage controller in 0x2D66:004 (P721.04).
2. If, during the mains failure control, monitoring for overvoltage in the DC bus is triggered:
   - Increase the reset time again in 0x2D66:004 (P721.04) until monitoring is not triggered anymore.
   - If required, additionally reduce the voltage setpoint in 0x2D66:005 (P721.05) onto which the DC-bus voltage is to be controlled.
3. Increasing the delay time or reducing the braking torque is only possible to a limited extent:
   - Increasing the acceleration time in 0x2D66:006 (P721.06) reduces the initial braking torque and simultaneously increases the deceleration time.
   - Increasing the reset time of the DC-bus voltage controller in 0x2D66:004 (P721.04) reduces the braking torque and simultaneously increases the deceleration time. If the reset time is too high, the inverter reaches the error threshold for undervoltage before standstill is reached. From this point on, the motor is not guided anymore.

Signal flow - DC-bus voltage controller



① Current DC-bus voltage
② Internally generated frequency setpoint that is transferred to the motor control in case of an active mains failure control.

10.15 Encoder settings

In general, an encoder is a measuring system which serves to detect the velocity/speed and possibly the position of a kinematics or motor.

- The Inverter i550 exclusively supports HTL encoders.
- For details see the following subchapter.

10.15.1 HTL encoder

The digital inputs serve to evaluate the signals of a cost-effective HTL encoder.

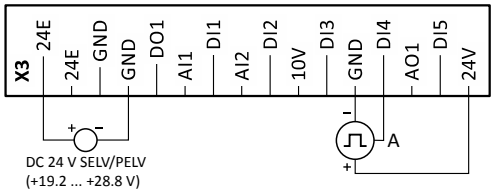
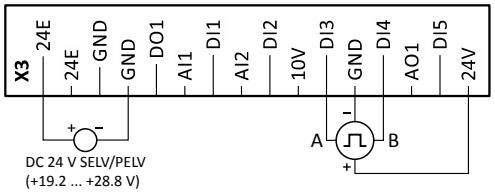
An HTL encoder can be used at the Inverter i550 for the following tasks:

- As motor encoder for a motor speed feedback for speed control as precise as possible.
- As setpoint encoder for defining a frequency setpoint (in preparation).
- As setpoint encoder for defining a setpoint for the process controller (in preparation).

Preconditions

- Single-track or two-track HTL encoder.
  - A single-track HTL encoder (track A) cannot be used for motor speed feedback.
  - A two-track HTL encoder (track A and B) must have a phase offset of exactly 90° between track A and B (error ≤ ±10°). Inverted tracks are not required.
- Encoder supply voltage: 19.2 ... 28.8 V
- Encoder increments: ≤ 32767 increments per revolution
- The inverter requires an external 24-V voltage supply.
- Track A and B are detected via the digital inputs DI3 and DI4. These two digital inputs are then not available anymore for other functions.
- The maximum input frequency of the digital inputs is 100 kHz. If this frequency is exceeded, an error is triggered.

Details

Connection of single-track HTL encoder	Connection of two-track HTL encoder
	

Encoder dimensioning: Calculate maximum number of increments per revolution of the encoder	
Max. encoder increments = f_{max} [Hz] * 60 s / n_{max} [rpm]	
Max. encoder increment = 100000 [Hz] * 60 s / 1500 [rpm] = 4000 Increments/revolution	
f_{max}	Maximum input frequency of the digital inputs = 100 kHz = 100000 Hz
n_{max}	Maximum encoder speed (in this example: 1500 rpm)
Max. encoder increments	Maximum number of increments per encoder revolution

Select an encoder with a maximum number of increments per revolution which is lower than or equal to the calculated number. The higher the number of increments per revolution, the more stable the system is.

Basic steps for configuring the encoder in the »EASY Starter«:

1. Set the selection "Encoder (AB) [1]" in 0x2630:002 (P410.02) to configure the digital inputs DI3 and DI4 as encoder inputs.
2. Set the encoder increment in 0x2C42:001 (P341.01) according to the manufacturer data/ encoder data sheet.

Parameter	Name / value range / [default setting]	Info
0x2C42:001 (P341.01)	Increments/revolution (Enc. Inc/Rev) 1 ... [**128**] ... 16384 • Setting can only be changed if the inverter is inhibited. • From version 02.00	Encoder increment. Carry out setting according to manufacturer data/encoder data sheet.
0x2C42:006	Actual velocity • Read only: x rpm • From version 02.00	Display of the speed currently detected by the encoder.

Parameter	Name / value range / [default setting]		Info
0x2630:002 (P410.02)	Settings for digital inputs: Input function (DI settings: Input function)		Input function of the digital terminals DI3 and DI4.
	0	**Digital input**	DI3 = digital input DI4 = digital input
	1	Encoder (AB) • From version 02.00	DI3 = encoder input B DI4 = encoder input A

10.16 Firmware download

The device firmware is continuously improved by the manufacturer. New firmware versions contain error corrections, function extensions and simplify the handling.

A new firmware is always compatible with the older version:

- A device with updated firmware and unchanged parameter settings shows the same behaviour as before.
- Parameter settings must only be adapted if new functions are used.

10.16.1 Firmware download with »EASY Starter (Firmware loader)«

The »EASY Starter (firmware loader)« is a PC software which serves to update the firmware of the inverter.

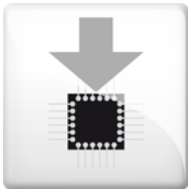
Preconditions

- For the firmware download, we recommend a direct USB connection to the device. For this purpose, the USB module and a USB 2.0 cable (A plug on Micro-B plug) are required. The voltage supply of the control electronics also takes place via the USB connection.
- The control electronics of the inverter must be supplied with voltage. Either via the USB connection or via the external 24-V voltage supply.
- Voltage supply and communication must not be interrupted during the firmware download.

Details

Together with the »EASY Starter« engineering tool, the following tools are installed as well:

Tool	Brief description
»EASY Navigator«	Helps you to find the right tool for your application.
»EASY Package Manager«	Enables the automatic download and the installation of files for the engineering tools. • For this purpose, the »EASY Package Manager« is provided with current files by the manufacturer and enables the user to install them. • The files also include new firmware versions for inverters.
»EASY Starter (firmware loader)«	Enables the update of the firmware for inverters. • The update can be made by the mechanical engineer or the end user depending on the access protection set for the device.



Carry out the firmware download with the »EASY Starter (firmware loader)«:

1. Start »EASY Navigator« (All programs → Lenze → EASY Navigator).
2. In the »EASY Navigator«, change to the "Ensuring productivity" engineering phase.
3. Click the »EASY Starter (firmware loader)« icon (see on the left).
4. Follow the instructions of the »EASY Starter (firmware loader)«.

Notes:

- The firmware download will not take more than 20 seconds. The progress is shown in the »EASY Starter (firmware loader)«.
- After the firmware download, the connection to the device gets lost for some second and is then restored again automatically.
- Device settings are not changed by the firmware download.
- The brand protection does not get lost by the firmware download.
- The firmware can neither be exported from the device nor be deleted from the device.

If the connection is aborted during the firmware download, this may have the following consequences:

- The device starts with the old firmware. The firmware download can be restarted.
- The firmware in the device is damaged. Contact the Lenze Service.

10.17 Additive voltage impression

This function serves to boost (or lower) the motor voltage from the process via an additive voltage setpoint in order to realise a load adjustment (for instance in case of winder applications).

NOTICE

A too high boost of the motor voltage may cause the motor to heat up strongly due to the resulting current.

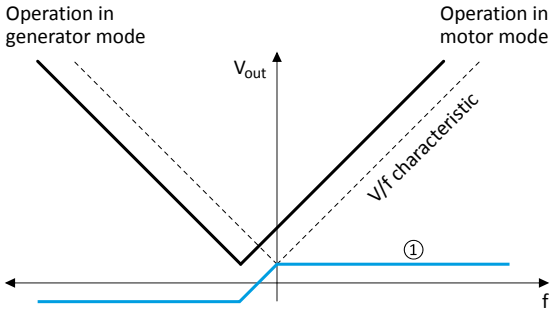
▶ Avoid a too high boost of the motor voltage!

Details

At a constant field frequency, the output voltage of the inverter can be changed within a wide range.

Example: Adaptation of the voltage characteristic in case of V/f characteristic control as a function of the load:

- Clockwise rotation (CW) is operation in motor mode: Boost voltage.
- Counter-clockwise rotation (CCW) is operation in generator mode: Lower voltage.



① Selecting an additive voltage setpoint

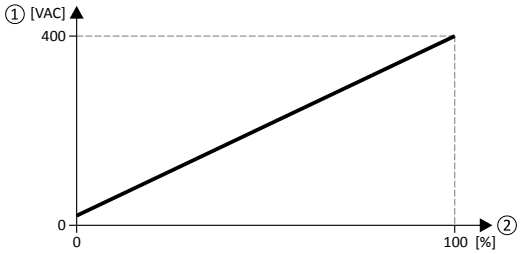
A detailed configuration example for this function can be found in the following subchapter.

Parameter	Name / value range / [default setting]	Info
0x2B13:001	Additive voltage impression: Enable Function • From version 02.00	1 = enable function.
	0 Disable	
	1 Enable	
0x2B13:002	Additive voltage impression: Setpoint source • From version 02.00	Selection of the source for specifying the additive voltage setpoint. • 100 % ≡ Rated voltage 0x2C01:007 (P320.07)
	1 Analog input 1	
	2 Analog input 2	
0x2B13:003	Additive voltage impression: Actual voltage • Read only: x V • From version 02.00	Display of the current (boosted or lowered) voltage.

10.17.1 Example: Using the function with a 400-V inverter

With the settings indicated below, the motor is accelerated after the start to 50 Hz. As the base frequency, however, is set very high (here: 599 Hz), the motor voltage at 50 Hz only amounts to 20 VAC.

Now, the analog input 1 serves to change the motor voltage at constant frequency within a wide range:



① Motor voltage

② Selection of an additive voltage setpoint in percent via analog input 1

Parameter	Name	Setting for this example
0x2636:004 (P430.04)	Min PID value	0 %
0x2636:005 (P430.05)	Max PID value	100 %
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Frequency preset 1 [11]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	50 Hz
0x2B01:002 (P303.02)	Base frequency	599 Hz
0x2B13:001	Enable Function	Enable [1]
0x2B13:002	Setpoint source	Analog input 1 [1]

10.18 Parameter for engineering tools

The following parameters are required for an interaction of the engineering tools with the inverter connected online. They are not relevant for the user and only reported here for the sake of completeness.

Parameter	Name / value range / [default setting]		Info
0x2022:032	Device commands: Deactivate PDO Communication		Parameters for interaction with engineering tools.
	0	**Off / ready**	
	1	On / start	
	2	In progress	
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2022:033	Device commands: Activate PDO Communication		
	0	**Off / ready**	
	1	On / start	
	2	In progress	
	3	Action cancelled	
	4	No access	
	5	No access (Inverter disabled)	
0x2822:001	Axis commands: Enable inverter		
	0	**Inverter inhibited**	
	1	Inverter enabled	
0x2822:002	Axis commands: Activate quick stop 0 ... [**0**] ... 1		
0x2822:003	Axis commands: Reset error 0 ... [**0**] ... 1		
0x2822:028	Axis commands: Initialize device controller 0 ... [**0**] ... 1		
0x2823:001	Last subindex • Read only		
0x2823:002	Status of last axis command • Read only		
	0	Successful	
	1	Unknown command	
	2	No access	
	3	Time-out	
	4	Error	
	5	Command server assigned	
	6	Disable inverter required	
	7	Enable inverter required	
	8	Command is executed	
	10	Memory module link invalid	
	11	Password too short	
	12	Wrong password	
	13	Password set	
	14	Password assigned	
	15	Command aborted	

Parameter	Name / value range / [default setting]	Info
0x2832	Motor identification status • Read only • From version 02.00	
	Bit 0: Identification enabled	
	Bit 1: Identification active	
	Bit 2: Identification completed	
	Bit 3: Identification failed	
	Bit 4: Reserved	
	Bit 5: Reserved	
	Bit 6: Reserved	
	Bit 7: Reserved	
	Bit 8: Reserved	
	Bit 9: Reserved	
	Bit 10: Reserved	
	Bit 11: Reserved	
	Bit 12: Reserved	
	Bit 13: Reserved	
	Bit 14: Reserved	
	Bit 15: Reserved	
0x2EFF:001	Bootloader activation key 1 0 ... [**0**] ... 4294967295 • Setting can only be changed if the inverter is inhibited.	
0x2EFF:002	Bootloader activation key 2 0 ... [**0**] ... 4294967295 • Setting can only be changed if the inverter is inhibited.	
0x2EFF:003	Bootloader activation key 3 0 ... [**0**] ... 4294967295 • Setting can only be changed if the inverter is inhibited.	

11 Safety functions

11.1 Safe torque off (STO)

With this safety function, the drive can be switch off safely immediately.

⚠ DANGER!

Automatic restart if the request of the safety function is deactivated.

Possible consequences: Death or severe injuries

- ▸ You must provide external measures according to EN ISO 13849−1 which ensure that the drive only restarts after a confirmation.

Preconditions

Inverter with I5MASA000 safety module

Details

Safe disconnection of the drive

1. A safety sensor requests the safety function.
2. The transmission of the pulse width modulation is safely switched off by the safety unit.
3. The power drivers do not generate a rotating field anymore.
4. The "STO is not active" status in the status word changes from 1: HIGH to 0: LOW (object 0x6041, bit 15).

The motor is safely switched to torqueless operation (STO).

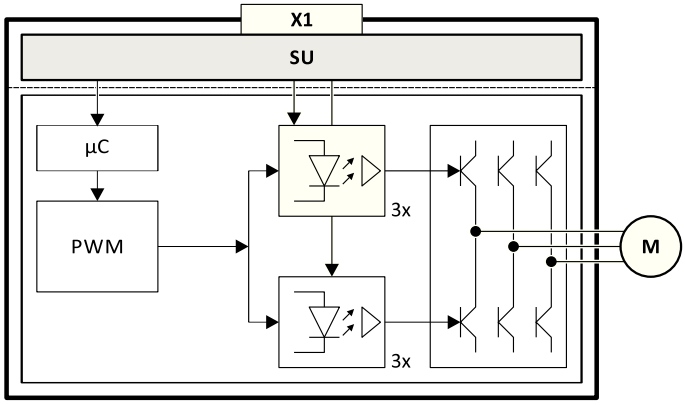


Fig. 5: Operating principle of safety unit

X1	Control terminals of the safety unit	M	Motor
PWM	Pulse width modulation	µC	Microcontroller

Truth table

Safe input / channel		Inverter	
SIA	SIB	Device status	Approval
0	0	STO active	0
0	1		0
1	0		0
1	1	Drive enabled	1

If SIA = LOW and SIB = LOW, the internal "Safe torque off (STO) active [55]" status signal in the inverter is set to TRUE. You can use this status signal to control a "non-safe output" (e.g. the relay).

12 Flexible I/O configuration

Use parameter 0x2631 (P400xx) to individually adapt the inverter control to the respective application. This is basically effected by assigning digital signal sources ("triggers") to functions of the inverter.

NOTICE

A digital signal source can be assigned to several functions.

Possible consequence: unforeseeable behaviour of the drive in case of incorrect assignment

▶ Carry out assignment of a digital signal source to several functions with greater care.

Details

- Each subcode of 0x2631 (P400) is permanently assigned to a specific function. Functions are for example "Enable inverter", "Activate quick stop" or "Start forward (CW)".
- For a function, exactly one (digital) trigger can be set:

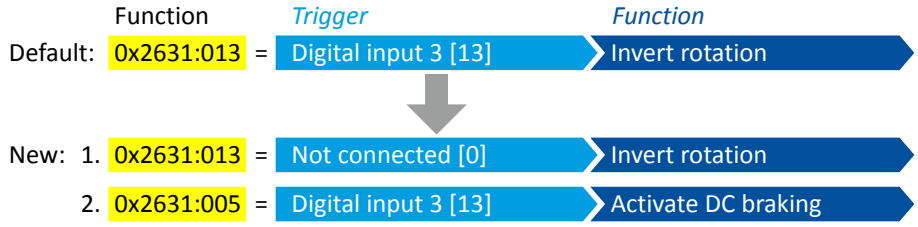
- Possible triggers to be selected are for example the digital input and internal status signals of the inverter.
- A list of all triggers available can be found in the description for the parameter 0x2631:001 (P400.01).
- If the trigger condition is met, the corresponding function is executed. More details with regard to the respective trigger conditions can be gathered from the functional descriptions in the following subchapters.

Example: changing the function assignment of a digital input

Task for this example:

1. The preset assignment of the digital input 3 for "Invert rotation" function is to be cancelled.
2. Instead, the digital input 3 is to be assigned to the "Activate DC braking" function.

   For this purpose, the following two settings are required:



12.1 Control source change-over

The term "control sources" in this connection refers to the digital signal sources from which the inverter receives its start, stop, and reversal commands.

Possible control sources are:

- Digital inputs
- Keypad
- Network

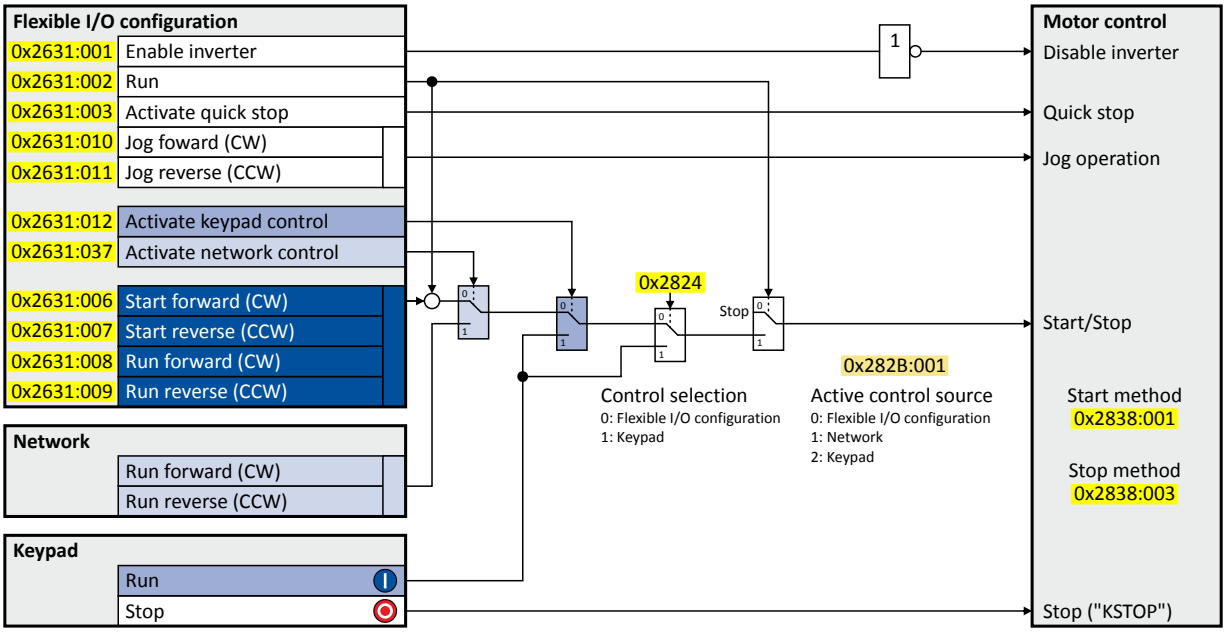
Details

First, select in 0x2824 (P200.00) whether the start of the motor is to be configured flexibly (default setting) or exclusively via the keypad. ▸ Control source selection 📖 112

If "Flexible I/O configuration" is set, a change-over from one control source to another can be effected during operation via the functions listed in the following table. The inverter not only supports such a change-over via its digital inputs, but also as a function of internal inverter states.

Activate keypad control 0x2631:012 (P400.12)	Activate network control 0x2631:037 (P400.37)	Active control source
FALSE / Not connected	FALSE / Not connected	Flexible I/O configuration (default setting) • The motor is controlled via the digital inputs. • For preconfigured assignment of the digital inputs, see chapter "Function assignment of the inputs and outputs". 📖 53 • For description of the basic functions for controlling the motor, see chapter "Start / stop motor". 📖 372
TRUE	Any	Keypad • Starting the motor is only possible via the ⏻ keypad key. • Exception: Jog operation; see chapter "Start / stop motor". 📖 372 ▸ Example 1: Change-over from terminal control to keypad control 📖 370
FALSE / Not connected	TRUE	Network • Starting the motor is only possible via the network control word. • Exception: Jog operation; see chapter "Start / stop motor". 📖 372 ▸ Example 2: Change-over from terminal control to network control 📖 371

The following signal flow shows the internal control logics:



The "Enable inverter" 0x2631:001 (P400.01) function must be set to TRUE to start the motor. Either via digital input or by default setting "Constant TRUE [1]". If the function is set to FALSE, the inverter is disabled. The motor becomes torqueless (coasts).

In case of an activated keypad or network control, the "Run" 0x2631:002 (P400.02) function must be additionally set to TRUE to start the motor. Either via digital input or by the "Constant TRUE [1]" setting.

Notes:

- In case of an activated keypad or network control, the following functions are still active:
  - 0x2631:001 (P400.01): Enable inverter
  - 0x2631:002 (P400.02): Run
  - 0x2631:003 (P400.03): Activate quick stop
  - 0x2631:004 (P400.04): Reset fault
  - 0x2631:005 (P400.05): Activate DC braking
  - 0x2631:010 (P400.10): Jog foward (CW)
  - 0x2631:011 (P400.11): Jog reverse (CCW)
  - 0x2631:012 (P400.12): Activate keypad control
  - 0x2631:037 (P400.37): Activate network control
- In case of an activated network control, the following additional functions are still active:
  - 0x2631:013 (P400.13): Invert rotation
  - The functions for setpoint change-over. ▸ Setpoint change-over 📖 387

  All other functions configurable via 0x2631:xx (P400.xx) are deactivated in case of keypad or network control.

Diagnostic parameters:

- 0x282A:001 (P126.01): Cause of disable
- 0x282A:002 (P126.02): Cause of quick stop
- 0x282A:003 (P126.03): Cause of stop
- 0x282B:001 (P125.01): Active control source

For description of the basic functions for controlling the motor, see chapter "Start / stop motor". 📖 372

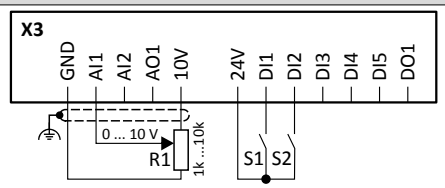
Parameter	Name / value range / [default setting]	Info
0x2631:012 (P400.12)	Function list: Activate keypad control (Function list: Keypad control) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate keypad control" function. Trigger = TRUE: activate keypad as control source. Trigger = FALSE: no action / deactivate keypad as control source again.
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

Parameter	Name / value range / [default setting]		Info
0x2631:037 (P400.37)	Function list: Activate network control (Function list: Network control)		Assignment of a trigger for the "Activate network control" function. Trigger = TRUE: Activate network control. Trigger = FALSE: No action / deactivate network control again.
	0	**Not connected**	No trigger assigned (trigger is constantly FALSE).
	1	Constant TRUE	Trigger is constantly TRUE.
	11	Digital input 1	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
	12	Digital input 2	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
	13	Digital input 3	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
	14	Digital input 4	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
	15	Digital input 5	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.
	16	Digital input 6	State of X3/DI6, taking an inversion set in 0x2632:006 (P411.06) into consideration. Digital input 6 is only available in the Control Unit (CU) with application I/O.
	17	Digital input 7	State of X3/DI7, taking an inversion set in 0x2632:007 (P411.07) into consideration. Digital input 7 is only available in the Control Unit (CU) with application I/O.
	50	Running	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
	51	Ready for operation	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
	53	Stop active	TRUE if inverter is enabled and motor is not started and output frequency = 0.
	54	Quick stop active	TRUE if quick stop is active. Otherwise FALSE.
	58	Device warning active	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
	59	Device fault active	TRUE if a fault is active. Otherwise FALSE. • In the event of a fault, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • Exception: In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). • The error state will be left automatically if the error condition is not active anymore. • The restart behaviour after trouble can be configured. ▸ Automatic restart 📖 350
	60	Heatsink temperature warning active	TRUE if current heatsink temperature > warning threshold for temperature monitoring. Otherwise FALSE. • Display of the current heatsink temperature in 0x2D84:001 (P117.01). • Setting of the warning threshold in 0x2D84:002.
	69	Rotational direction reversed	TRUE if output frequency is negative. Otherwise FALSE.
	70	Frequency threshold exceeded	TRUE if current output frequency > frequency threshold. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00). • Setting Frequency thresholdin 0x4005 (P412.00). ▸ Frequency threshold for "Frequency threshold exceeded" trigger 📖 421
	71	Actual speed = 0	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).
	78	Current limit reached	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).
	79	Torque limit reached • From version 02.00	TRUE if torque limit has been reached or exceeded. Otherwise FALSE. • Setting "Positive torque limit" in 0x60E0. • Setting "Negative torque limit" in 0x60E1.
	80	Follower signal (4 ... 20 mA) lost	Reserve (do not use trigger)

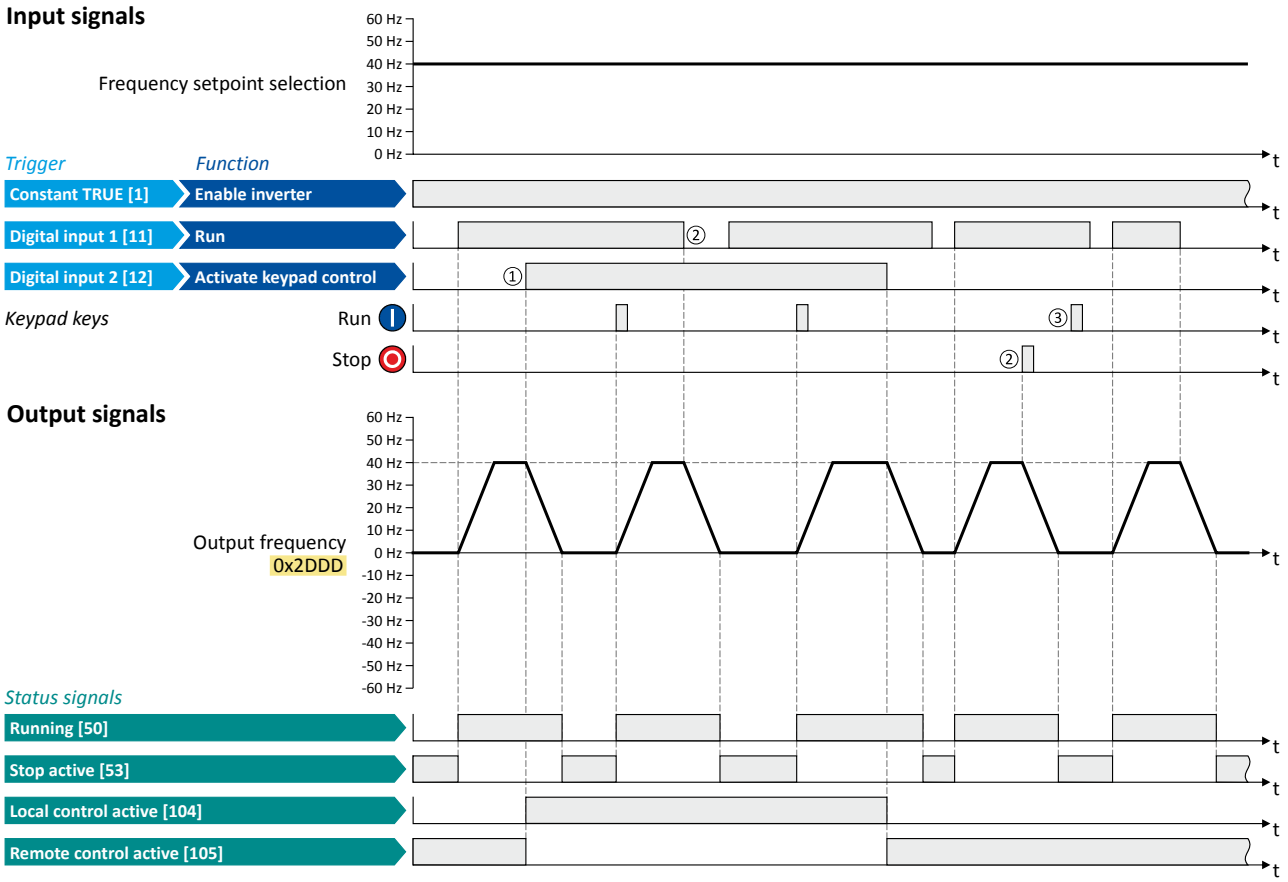
Parameter	Name / value range / [default setting]		Info
	81	Error of analog input 1 active	TRUE if the monitoring of the input signal at the analog input 1 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2636:008 (P430.08) • Monitoring condition 0x2636:009 (P430.09) The setting of the Error response in 0x2636:010 (P430.10) has no effect on this trigger. ▸ Analog input 1 📖 425
	82	Error of analog input 2 active	TRUE if the monitoring of the input signal at the analog input 2 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2637:008 (P431.08) • Monitoring condition 0x2637:009 (P431.09) The setting of the Error response in 0x2637:010 (P431.10) has no effect on this trigger. ▸ Analog input 2 📖 429
	83	Load loss detected	TRUE if actual motor current < threshold for load loss detection after delay time of the load loss detection has elapsed. Otherwise FALSE. • Display of the present motor current in 0x6078 (P103.00). • Setting Threshold in 0x4006:001 (P710.01). • Setting Decelerationin 0x4006:002 (P710.02). ▸ Load loss detection 📖 301
	104	Local control active	TRUE if local keypad control ("LOC") active. Otherwise FALSE.
	105	Remote control active	TRUE if remote control ("REM") via terminals, network, etc. active. Otherwise FALSE.
	106	Manual setpoint selection active	TRUE if manual setpoint selection ("MAN") via keypad active. Otherwise FALSE. • Selection of the trigger for the "Activate keypad setpoint" function in 0x2631:016 (P400.16).
	107	Automatic setpoint selection active	TRUE if automatic setpoint selection ("AUTO") via terminals, network, etc. active. Otherwise FALSE.
	114	Network control active • From version 02.00	TRUE if network control activated. Otherwise FALSE.
0x2824 (P200.00)	Control selection (Control select.)		Selection of the type of inverter control.
	0	**Flexible I/O configuration**	This selection enables a flexible assignment of the start, stop, and rotating direction commands with digital signal sources. • Digital signal sources can be digital inputs, network and keypad. • The I/O configuration is made via the parameters 0x2631:xx (P400.xx).
	1	Keypad	This selection enables the motor to be started exclusively via the start key of the keypad. Other signal sources for starting the motor are ignored. Start motor Stop motor Note! • The functions "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE to start the motor. • If jog operation is active, the motor cannot be stopped via the keypad key.

12.1.1 Example 1: Change-over from terminal control to keypad control

- The control is executed primarily via the I/O terminals: Switch S1 serves to start and stop the motor.
- Switch S2 serves to optionally change over to local keypad control. In case of activated keypad control, the motor can only be started via the ⏽ keypad key. However, the condition is that switch S1 is closed.
- If switch S1 is opened again or the ⏺ keypad key is pressed, the motor is stopped (irrespective of the active control source).

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate keypad control

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:012 (P400.12)	Activate keypad control	Digital input 2 [12]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

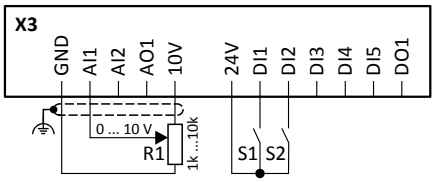
① When changing over to another control source, the motor is first stopped with the stop method set in 0x2838:003 (P203.03).

② The motor will also be stopped if the "Run" function is deactivated or the ⏺ keypad key is pressed (irrespective of the active control source).

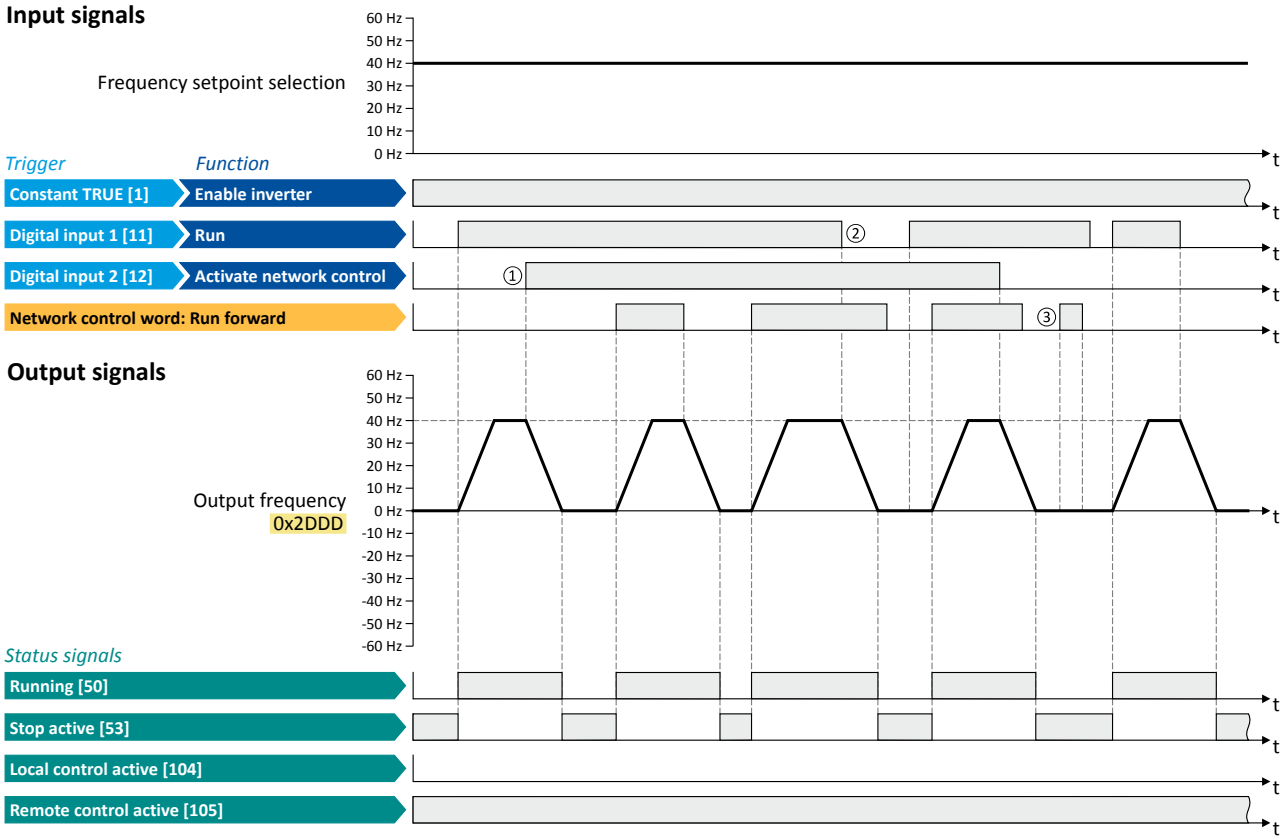
③ After stopping with the ⏺ keypad key and before a renewed start command from another control source, the ⏽ key on the keypad must be pressed to cancel the keypad stop again ("KSTOP").

12.1.2 Example 2: Change-over from terminal control to network control

- The control is executed primarily via the I/O terminals: Switch S1 serves to start and stop the motor.
- Switch S2 serves to activate the network control. In case of activated keypad control, the motor can only be started via the network control word. However, the condition is that switch S1 is closed.
- If switch S1 is opened again, the motor is stopped (irrespective of the active control source).

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate network control

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:037 (P400.37)	Activate network control	Digital input 2 [12]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 431

① When changing over to another control source, the motor is first stopped with the stop method set in 0x2838:003 (P203.03).
② The motor will also be stopped if the "Run" function is deactivated (irrespective of the active control source).
③ Commands via network are ignored if the network control is not active.

12.2 Start / stop motor

Configuration of the triggers for the basic functions for controlling the motor.

Details

The following table contains a short overview of the basic functions. For more details see the following parameter descriptions.

function	Info
Enable inverter 0x2631:001 (P400.01)	Enable/disable operation. • The function must be set to TRUE to start the motor. Either via digital input or by default setting "Constant TRUE [1]". • If the function is set to FALSE, the inverter is disabled. The motor becomes torqueless (coasts). ▸ Example 6: Enable inverter 📖 386
Run 0x2631:002 (P400.02)	Function 1: Start / stop motor (default setting) • Function 1 is active if no further start commands (start forward/start reverse) have been connected to triggers, no keypad control is active and no network control is active. TRUE: Let motor rotate forward (CW). FALSE: Stop motor. ▸ Example 1: Start/stop (1 signal) and reversal 📖 378
	Function 2: Start enable/stop motor • Function 2 is active if further start commands have been connected to triggers, keypad control is active or network control is active. TRUE: Start commands of the active control source are enabled. FALSE: Stop motor. ▸ Example 2: Start forward/start reverse/stop (edge-controlled) 📖 379 ▸ Example 3: Run forward/Run reverse/stop (status-controlled) 📖 381
Activate quick stop 0x2631:003 (P400.03)	Bring motor to a standstill in best time. ▸ Example 4: Quick stop 📖 383
Start forward (CW) 0x2631:006 (P400.06)	Start motor edge-controlled. • In order to be able to start the motor, the "Run" function must be set to TRUE. • The motor is stopped by resetting the "Run" function to FALSE. • Functions are deactivated in case of keypad or network control. ▸ Example 2: Start forward/start reverse/stop (edge-controlled) 📖 379
Start reverse (CCW) 0x2631:007 (P400.07)	
Run forward (CW) 0x2631:008 (P400.08)	Let the motor rotate in a status-controlled way. • In order to be able to start the motor, the "Run" function must be set to TRUE. • Functions are deactivated in case of keypad or network control. ▸ Example 3: Run forward/Run reverse/stop (status-controlled) 📖 381
Run reverse (CCW) 0x2631:009 (P400.09)	
Jog foward (CW) 0x2631:010 (P400.10)	Jog operation: Let the motor rotate in a status-controlled way with setpoint preset. ⚠ CAUTION! The jog operation has a higher priority than the "Run" function, all other start commands and the keypad key ⭕. • If jog operation is active, the motor cannot be stopped with the previously mentioned functions! • However, jog operation can be interrupted by the "Quick stop" function. • Jog operation can always be activated, even in case of keypad or network control. ▸ Example 5: Jog forward/Jog reverse 📖 384
Jog reverse (CCW) 0x2631:011 (P400.11)	
Invert rotation 0x2631:013 (P400.13)	Invert frequency setpoint. • Function can be used in combination with all start commands. • Function is deactivated in case of network control. ▸ Example 1: Start/stop (1 signal) and reversal 📖 378

Assignment guidelines

The error message "Trigger/functions connected incorrectly" (error code 25216 | 0x6280) is output if one of the following assignment guidelines is not observed:

- If the "flexible I/O configuration" is active as control source, the "Enable inverter" function or the "Run" function must be connected to a digital input in order that the motor can be stopped again any time!
- In case of keypad or network control, the two functions "Enable inverter" and "Run" can also be set to "Constant TRUE [1]" to start the motor.
- The use of the "Start forward (CW)" and "Start reverse (CCW)" functions excludes the use of the "Run forward (CW)" and "Run reverse (CCW)" and vice versa.

Parameter	Name / value range / [default setting]		Info
0x2631:001 (P400.01)	Function list: Enable inverter (Function list: Enable inverter) • Setting can only be changed if the inverter is inhibited.		Assignment of a trigger for the "Enable inverter" function. Trigger = TRUE: The inverter is enabled (unless there is another cause for inverter disable). Trigger = FALSE: The inverter is disabled. Notes: • This function must be set to TRUE to start the motor. Either via an assigned digital input or by default setting "Constant TRUE [1]". • Changing to the inhibited state causes an immediate stop of the motor, regardless of the stop method set in 0x2838:003 (P203.03). The motor becomes torqueless and coasts down as a function of the mass inertia of the machine. • The cause(s) that are active for the disabled state are shown in 0x282A:001 (P126.01).
	0	Not connected	No trigger assigned (trigger is constantly FALSE).
	1	**Constant TRUE**	Trigger is constantly TRUE.
	11	Digital input 1	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
	12	Digital input 2	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
	13	Digital input 3	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
	14	Digital input 4	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
	15	Digital input 5	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.
	16	Digital input 6	State of X3/DI6, taking an inversion set in 0x2632:006 (P411.06) into consideration. Digital input 6 is only available in the Control Unit (CU) with application I/O.
	17	Digital input 7	State of X3/DI7, taking an inversion set in 0x2632:007 (P411.07) into consideration. Digital input 7 is only available in the Control Unit (CU) with application I/O.
	50	Running	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
	51	Ready for operation	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
	53	Stop active	TRUE if inverter is enabled and motor is not started and output frequency = 0.
	54	Quick stop active	TRUE if quick stop is active. Otherwise FALSE.
	58	Device warning active	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
	59	Device fault active	TRUE if a fault is active. Otherwise FALSE. • In the event of a fault, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • Exception: In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). • The error state will be left automatically if the error condition is not active anymore. • The restart behaviour after trouble can be configured. ▸ Automatic restart 350
	60	Heatsink temperature warning active	TRUE if current heatsink temperature > warning threshold for temperature monitoring. Otherwise FALSE. • Display of the current heatsink temperature in 0x2D84:001 (P117.01). • Setting of the warning threshold in 0x2D84:002.
	69	Rotational direction reversed	TRUE if output frequency is negative. Otherwise FALSE.
	70	Frequency threshold exceeded	TRUE if current output frequency > frequency threshold. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00). • Setting Frequency thresholdin 0x4005 (P412.00). ▸ Frequency threshold for "Frequency threshold exceeded" trigger 421

Parameter	Name / value range / [default setting]		Info
	71	Actual speed = 0	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).
	78	Current limit reached	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).
	79	Torque limit reached • From version 02.00	TRUE if torque limit has been reached or exceeded. Otherwise FALSE. • Setting "Positive torque limit" in 0x60E0. • Setting "Negative torque limit" in 0x60E1.
	80	Follower signal (4 ... 20 mA) lost	Reserve (do not use trigger)
	81	Error of analog input 1 active	TRUE if the monitoring of the input signal at the analog input 1 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2636:008 (P430.08) • Monitoring condition 0x2636:009 (P430.09) The setting of the Error response in 0x2636:010 (P430.10) has no effect on this trigger. ▸ Analog input 1 📖 425
	82	Error of analog input 2 active	TRUE if the monitoring of the input signal at the analog input 2 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2637:008 (P431.08) • Monitoring condition 0x2637:009 (P431.09) The setting of the Error response in 0x2637:010 (P431.10) has no effect on this trigger. ▸ Analog input 2 📖 429
	83	Load loss detected	TRUE if actual motor current < threshold for load loss detection after delay time of the load loss detection has elapsed. Otherwise FALSE. • Display of the present motor current in 0x6078 (P103.00). • Setting Threshold in 0x4006:001 (P710.01). • Setting Decelerationin 0x4006:002 (P710.02). ▸ Load loss detection 📖 301
	104	Local control active	TRUE if local keypad control ("LOC") active. Otherwise FALSE.
	105	Remote control active	TRUE if remote control ("REM") via terminals, network, etc. active. Otherwise FALSE.
	106	Manual setpoint selection active	TRUE if manual setpoint selection ("MAN") via keypad active. Otherwise FALSE. • Selection of the trigger for the "Activate keypad setpoint" function in 0x2631:016 (P400.16).
	107	Automatic setpoint selection active	TRUE if automatic setpoint selection ("AUTO") via terminals, network, etc. active. Otherwise FALSE.

Parameter	Name / value range / [default setting]	Info
0x2631:002 (P400.02)	Function list: Run (Function list: Run) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Run" function. **Function 1: Start / stop motor (default setting)** Function 1 is active if no further start commands (start forward/start reverse) have been connected to triggers, no keypad control is active and no network control is active. Trigger = TRUE: Let motor rotate forward (CW). Trigger = FALSE: Stop motor. Notes to function 1: • If "Enable inverter" 0x2631:001 (P400.01) is set = "Constant TRUE [1]", the only permissible trigger for this function is a digital input in order that the motor can be stopped again any time. • The stop method can be selected in 0x2838:003 (P203.03). • The function also serves to realise an automatic start after switch-on. ▸ Starting performance 📖 115 **Function 2: Start enable/stop motor** Function 2 is active if further start commands have been connected to triggers, keypad control is active or network control is active. Trigger = TRUE: Start commands of the active control source are enabled. Trigger = FALSE: Stop motor. Notes to function 2: • If no separate start enable is required for the application, the trigger "Constant TRUE [1]" must be set. • The stop method can be selected in 0x2838:003 (P203.03).
	11 **Digital input 1**	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
0x2631:003 (P400.03)	Function list: Activate quick stop (Function list: Quick stop) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate quick stop" function. Trigger = TRUE: Activate quick stop. Trigger = FALSE: Deactivate quick stop. Notes: • The "Quick stop" function brings the motor to a standstill within the deceleration time set in 0x291C (P225.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:006 (P400.06)	Function list: Start forward (CW) (Function list: Start forward) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Start forward (CW)" function. Trigger = FALSE↗TRUE (edge): Let motor rotate forward. Trigger = TRUE↘FALSE (edge): No action. Notes: • In order to start the motor, "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE. • After the start, the motor runs until "Run" is set to FALSE, another stop command is given or the inverter is disabled. • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:007 (P400.07)	Function list: Start reverse (CCW) (Function list: Start reverse) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Start reverse (CCW)" function Trigger = FALSE↗TRUE (edge): Let motor rotate backward. Trigger = TRUE↘FALSE (edge): No action. Notes: • In order to start the motor, "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE. • After the start, the motor runs until "Run" is set to FALSE, another stop command is given or the inverter is disabled. • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

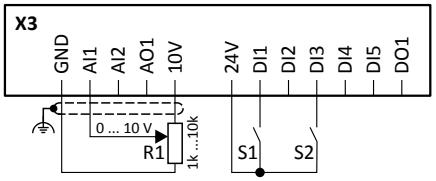
Parameter	Name / value range / [default setting]	Info
0x2631:008 (P400.08)	Function list: Run forward (CW) (Function list: Run forward) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Run forward (CW)" function. Trigger = TRUE: Let motor rotate forward. Trigger = FALSE: Stop motor. Notes: • In order to start the motor, "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE. • The inverter always responds to the run command detected last (if start enable is available). • The stop method can be selected in 0x2838:003 (P203.03). • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint. • The "Run forward (CW)" function also serves to realise an automatic start after switch-on. ▸ Starting performance 115
	00 Not connected	No trigger assigned (trigger is constantly FALSE).
0x2631:009 (P400.09)	Function list: Run reverse (CCW) (Function list: Run reverse) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Run reverse (CCW)" function. Trigger = TRUE: Let motor rotate backward. Trigger = FALSE: Stop motor. Notes: • In order to start the motor, "Enable inverter" 0x2631:001 (P400.01) and "Run" 0x2631:002 (P400.02) must be set to TRUE. • The inverter always responds to the run command detected last (if start enable is available). • The stop method can be selected in 0x2838:003 (P203.03). • In the case of a bipolar setpoint selection (e.g ±10 V), the function is executed irrespective of the rotating direction. The rotating direction is determined by the sign of the setpoint. • The "Run reverse (CCW)" function also serves to realise an automatic start after switch-on. ▸ Starting performance 115
	00 Not connected	No trigger assigned (trigger is constantly FALSE).
0x2631:010 (P400.10)	Function list: Jog foward (CW) (Function list: Jog foward) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Jog foward (CW)" function. Trigger = TRUE: Let motor rotate forward with preset 5. Trigger = FALSE: Stop motor. ⚠ CAUTION! The jog operation has a higher priority than the "Run" function, all other start commands and the keypad key. • If jog operation is active, the motor cannot be stopped with the previously mentioned functions! • However, jog operation can be interrupted by the "Quick stop" function. Notes: • The preset value 5 can be set in 0x2911:005 (P450.05). • The stop method can be selected in 0x2838:003 (P203.03). • If "Jog foward (CW)" and "Jog reverse (CCW)" are activated at the same time, the motor is stopped using the stop method and jog operation must be triggered again. • Jog operation cannot be started automatically. The "Start at power-up" option in 0x2838:002 (P203.02) does not apply to jog operation.
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

Parameter	Name / value range / [default setting]	Info
0x2631:011 (P400.11)	Function list: Jog reverse (CCW) (Function list: Jog reverse) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Jog reverse (CCW)" function. Trigger = TRUE: Let motor rotate backward with preset 6. Trigger = FALSE: Stop motor. ⚠ CAUTION! The jog operation has a higher priority than the "Run" function, all other start commands and the keypad key. • If jog operation is active, the motor cannot be stopped with the previously mentioned functions! • However, jog operation can be interrupted by the "Quick stop" function. Notes: • The preset value 6 can be set in 0x2911:006 (P450.06). • The stop method can be selected in 0x2838:003 (P203.03). • If "Jog foward (CW)" and "Jog reverse (CCW)" are activated at the same time, the motor is stopped using the stop method and jog operation must be triggered again. • Jog operation cannot be started automatically. The "Start at power-up" option in 0x2838:002 (P203.02) does not apply to jog operation.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:013 (P400.13)	Function list: Invert rotation (Function list: Invert rotation) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Invert rotation" function. Trigger = TRUE: the setpoint specified is inverted (i. e. the sign is inverted). Trigger = FALSE: no action / deactivate function again.
	13 **Digital input 3**	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.

12.2.1 Example 1: Start/stop (1 signal) and reversal

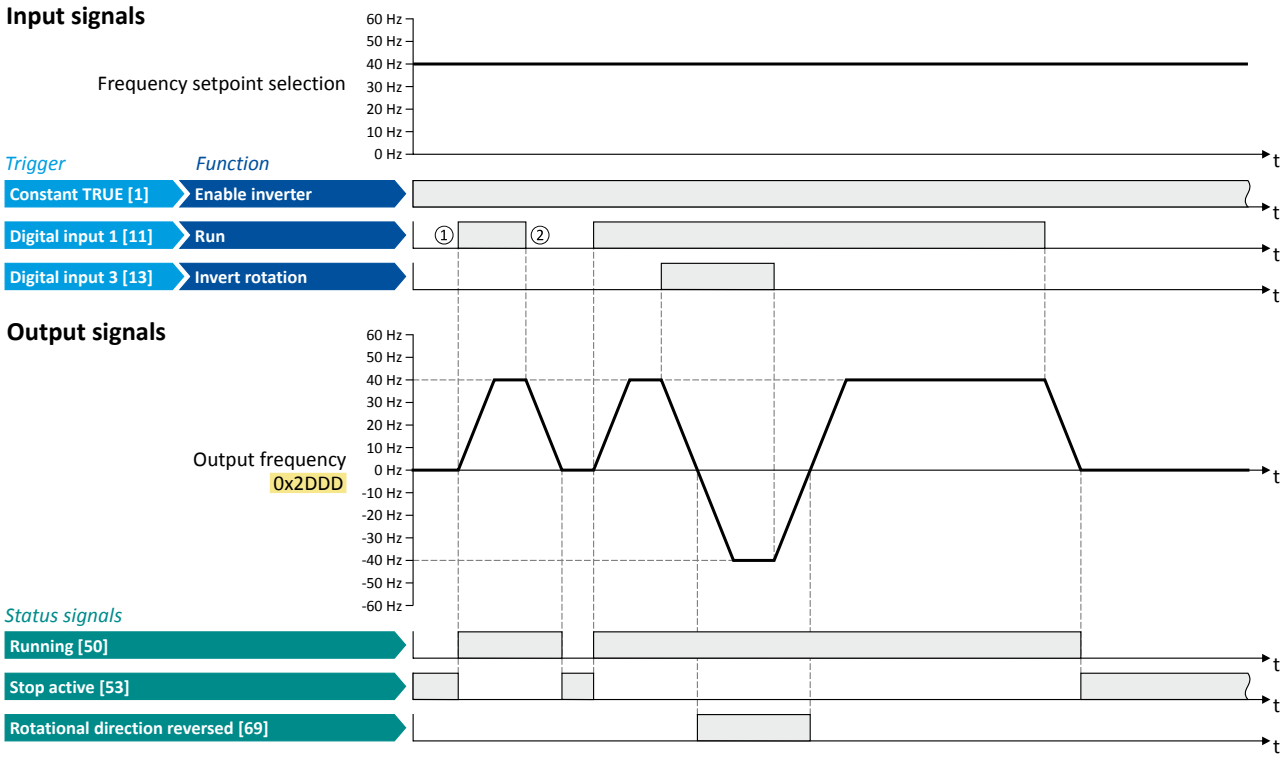
This example shows a simple control option via two switches which should be sufficient for many applications:

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 switches the direction of rotation.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Invert rotation

The example uses the preset I/O configuration of the inverter:

Parameter	Name	Setting for this example (corresponds to default setting)
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:013 (P400.13)	Invert rotation	Digital input 3 [13]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 📖 431

① If the inverter is enabled and no error is active, the motor can be started with the "Run" function in forward rotating direction.

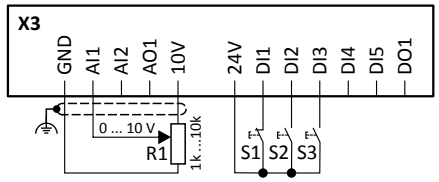
② If "Run" is set to FALSE, the motor is stopped with the stop method set in 0x2838:003 (P203.03). In the example: Stop with standard ramp.

12.2.2 Example 2: Start forward/start reverse/stop (edge-controlled)

The "Run" function automatically becomes a "start enable" if the functions "Start forward (CW)"/ "Start reverse (CCW)" are connected to triggers.

This example shows an edge-controlled start/stop via three buttons:

- In the non-operating state of button S1 (normally-closed contact), there is already a start enable.
- Button S2 starts the motor in forward rotating direction.
- Button S3 starts the motor in backward rotating direction.
- Button S1 (normally-closed contact) stops the motor by (short-time) cancellation of the start command.The inverter then waits for the next start command via button S2/S3.

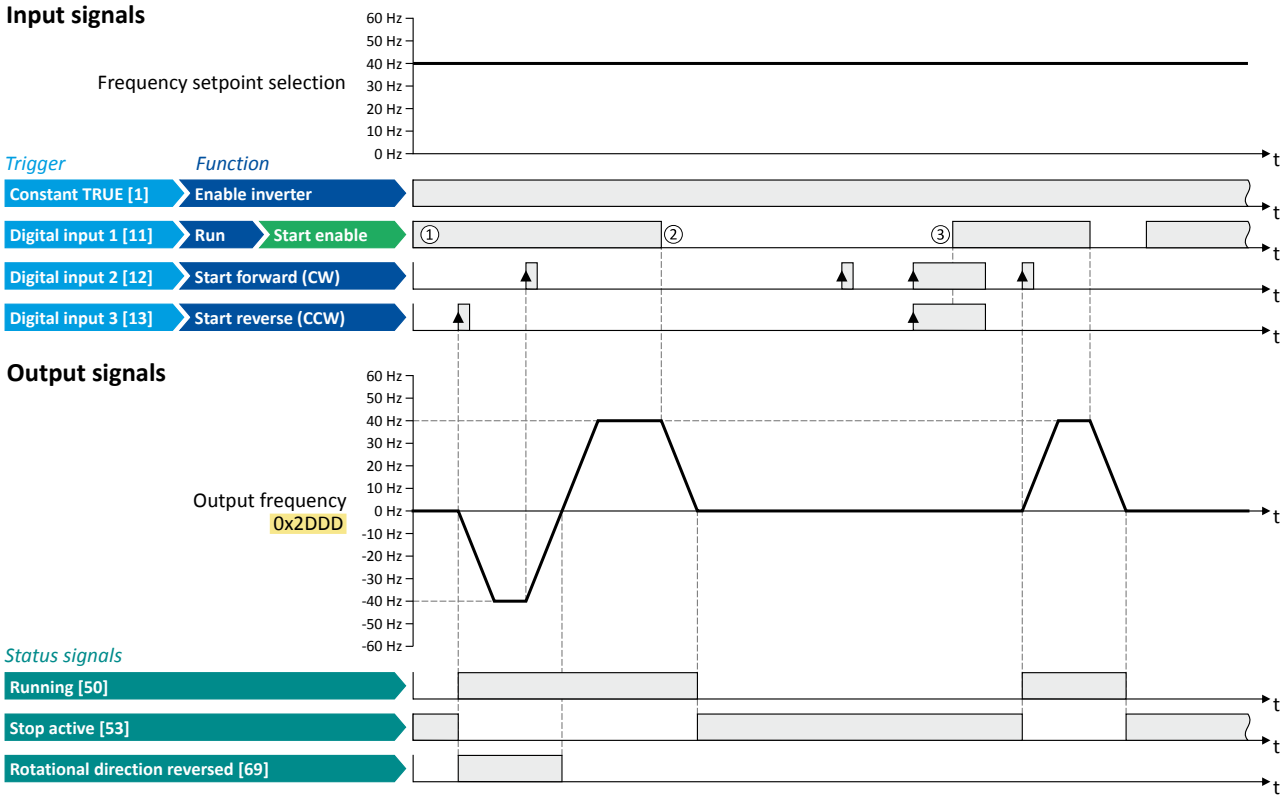
Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Button S1	Stopping
	Button S2	Start forward (CW)
	Button S3	Start reverse (CCW)

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:006 (P400.06)	Start forward (CW)	Digital input 2 [12]
0x2631:007 (P400.07)	Start reverse (CCW)	Digital input 3 [13]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]

Flexible I/O configuration

Start / stop motor

Example 2: Start forward/start reverse/stop (edge-controlled)



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① The "Run" functions serves as start enable for the functions "Start forward (CW)" and "Start reverse (CCW)". Without start enable, the motor cannot be started.

② If the start command is cancelled, the motor is stopped with the stop method set in 0x2838:003 (P203.03). In the example: Stop with standard ramp.

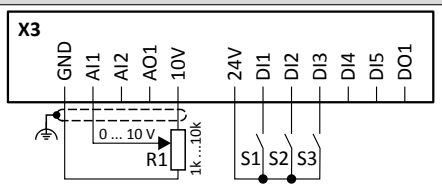
③ If, at start enable, "Start forward (CW)" and "Start reverse (CCW)" are already set to TRUE, the motor remains stopped and the inverter waits for the next valid start edge.

12.2.3 Example 3: Run forward/Run reverse/stop (status-controlled)

The "Run" function automatically becomes a "start enable" if the functions "Run forward (CW)"/"Run reverse (CCW)" are connected to triggers.

This example shows a status-controlled start/stop via three switches:

- Switch S1 enables the start. Without start enable, the motor cannot be started.
- Switch S2 starts the motor in forward direction of rotation.
- Switch S3 starts the motor in backward direction of rotation.
- The motor is stopped by cancelling the run commands (switches S2 and S3 open) or by cancelling the start enable (switch S1 open).

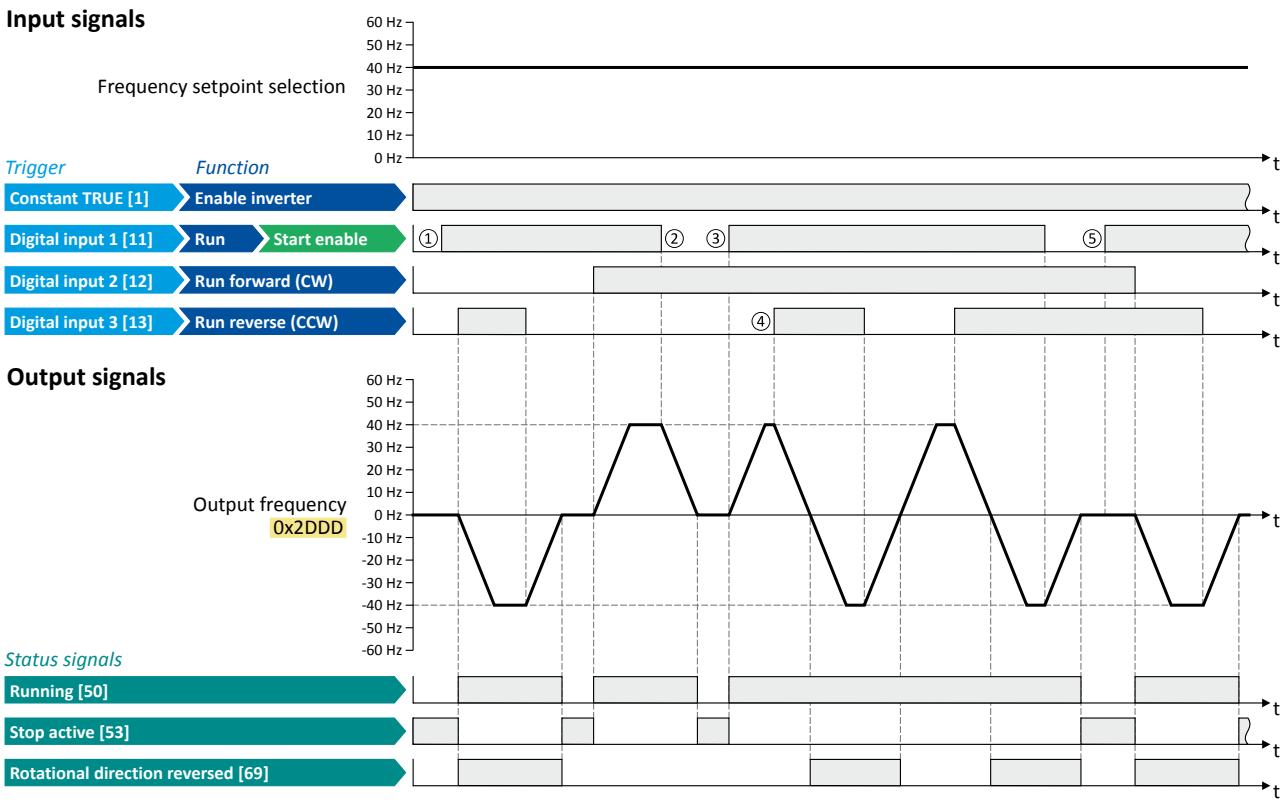
Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Start enable
	Switch S2	Run forward (CW)
	Switch S3	Run reverse (CCW)

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:008 (P400.08)	Run forward (CW)	Digital input 2 [12]
0x2631:009 (P400.09)	Run reverse (CCW)	Digital input 3 [13]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]

Flexible I/O configuration

Start / stop motor

Example 3: Run forward/Run reverse/stop (status-controlled)



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① The "Run" functions serves as start enable for the functions "Run forward (CW)" and "Run reverse (CCW)".
Without start enable, the motor cannot be started.

② If the start command is cancelled, the motor is stopped with the stop method set in 0x2838:003 (P203.03). In the example: Stop with standard ramp.
After a renewed start enable, the inverter waits for the next run command.

③ If, at start enable, either "Run forward (CW)" or "Run reverse (CCW)" is set to TRUE, the motor starts into the triggered direction.

④ The inverter always responds to the run command detected last (if start enable is available).
In the example, the "Run reverse (CCW)" command replaces the still active "Run forward (CW)" command.

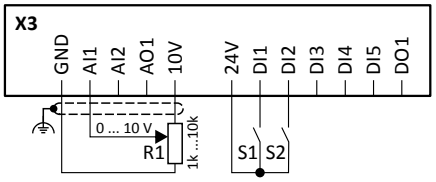
⑤ If, at start enable, both run commands are set to TRUE, the motor remains stopped until only one valid run command is available.

12.2.4 Example 4: Quick stop

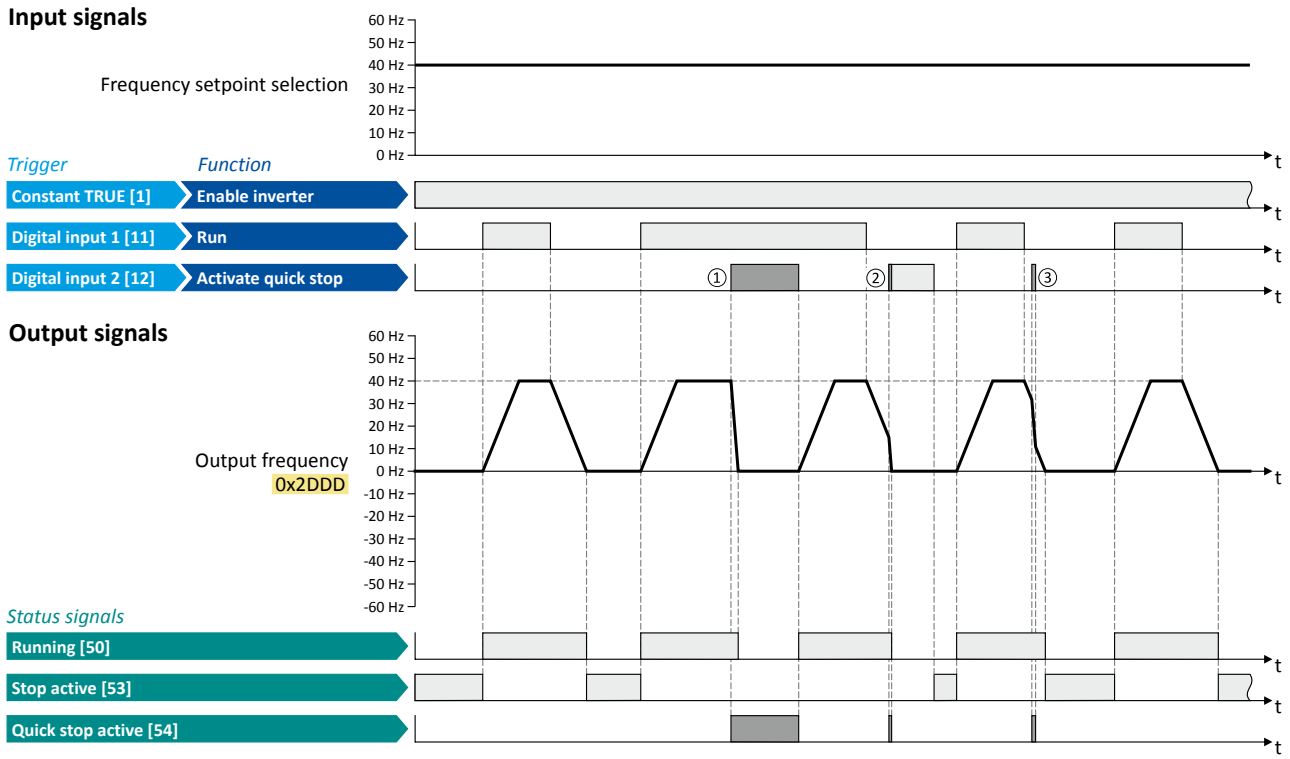
This example illustrates the "quick stop" function. If quick stop is activated, the motor is brought to a standstill within the deceleration time set in 0x291C (P225.00).

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 activates the "quick stop" function.

Cancelling the quick stop causes a restart of the motor if "Run" is still active (switch S1 closed)!

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate quick stop

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:003 (P400.03)	Activate quick stop	Digital input 2 [12]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2917 (P220.00)	Acceleration time 1	3.0 s
0x2918 (P221.00)	Deceleration time 1	3.0 s
0x291C (P225.00)	Quick stop deceleration time	1.0 s



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 431

① If quick stop is activated, the motor is decelerated to the frequency setpoint 0 Hz within a short period of time. The "Quick stop active [54]" status is set as long as quick stop is activated. The "Stop active [53]" status is not set.

② An active stop command is interrupted by a quick stop.

③ If quick stop is cancelled again before standstill is reached, stopping is continued with the stop method set in 0x2838:003 (P203.03). In the example: Stop with standard ramp.

12.2.5 Example 5: Jog forward/Jog reverse

This example illustrates the functions "Jog forward (CW)" and "Jog reverse (CCW)" for Jog operation.

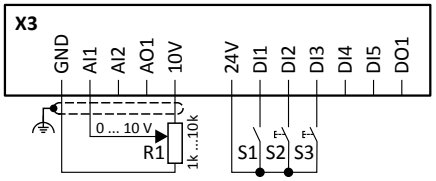
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Button S2 starts the motor in forward direction of rotation with frequency preset 5.
- Button S3 starts the motor in backward direction of rotation with frequency preset 6.
- The motor rotates in jog operation as long as the respective button is pressed. If both buttons are pressed at the same time, the motor is stopped.

NOTICE

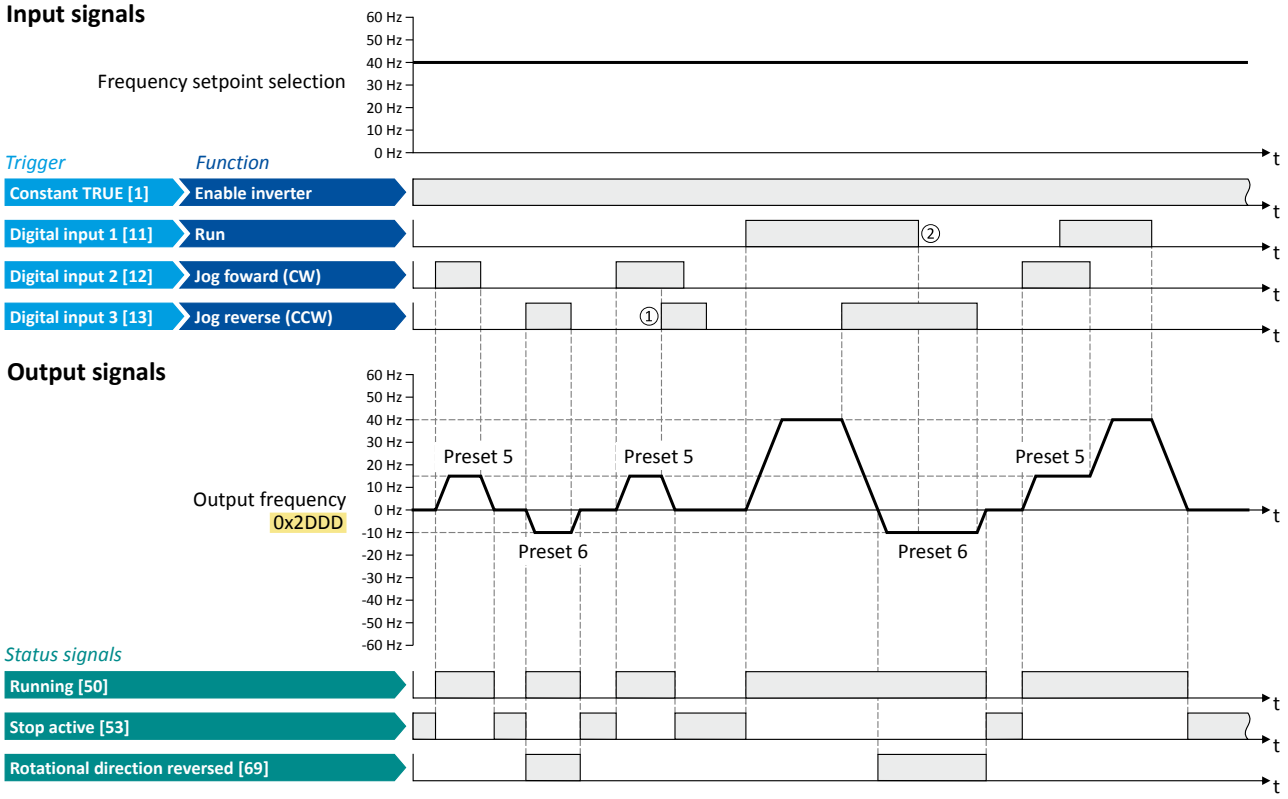
The jog operation has a higher priority than the "Run" function, all other start commands and the keypad key .

If jog operation is active, the motor cannot be stopped with the previously mentioned functions!

- ▸ The jog operation is stopped by cancelling the functions "Jog foward (CW)"/"Jog reverse (CCW)".
- ▸ The jog operation can be interrupted with the "Activate quick stop" 0x2631:003 (P400.03)function.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Button S2	Jog foward (CW)
	Button S3	Jog reverse (CCW)

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:010 (P400.10)	Jog foward (CW)	Digital input 2 [12]
0x2631:011 (P400.11)	Jog reverse (CCW)	Digital input 3 [13]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2911:005 (P450.05)	Frequency setpoint presets: Preset 5	15 Hz (is used for jog forward)
0x2911:006 (P450.06)	Frequency setpoint presets: Preset 6	10 Hz (is used for jog reverse)



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 431

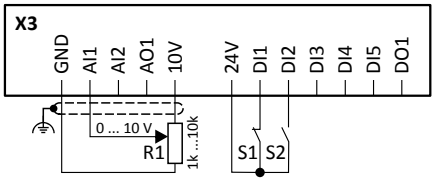
① If "Jog foward (CW)" and "Jog reverse (CCW)" are activated at the same time, the motor is stopped with the stop method set in 0x2838:003 (P203.03) and the jog operation must be triggered again.

② The jog operation cannot be terminated with the "Run" function but only by cancelling the jog command.

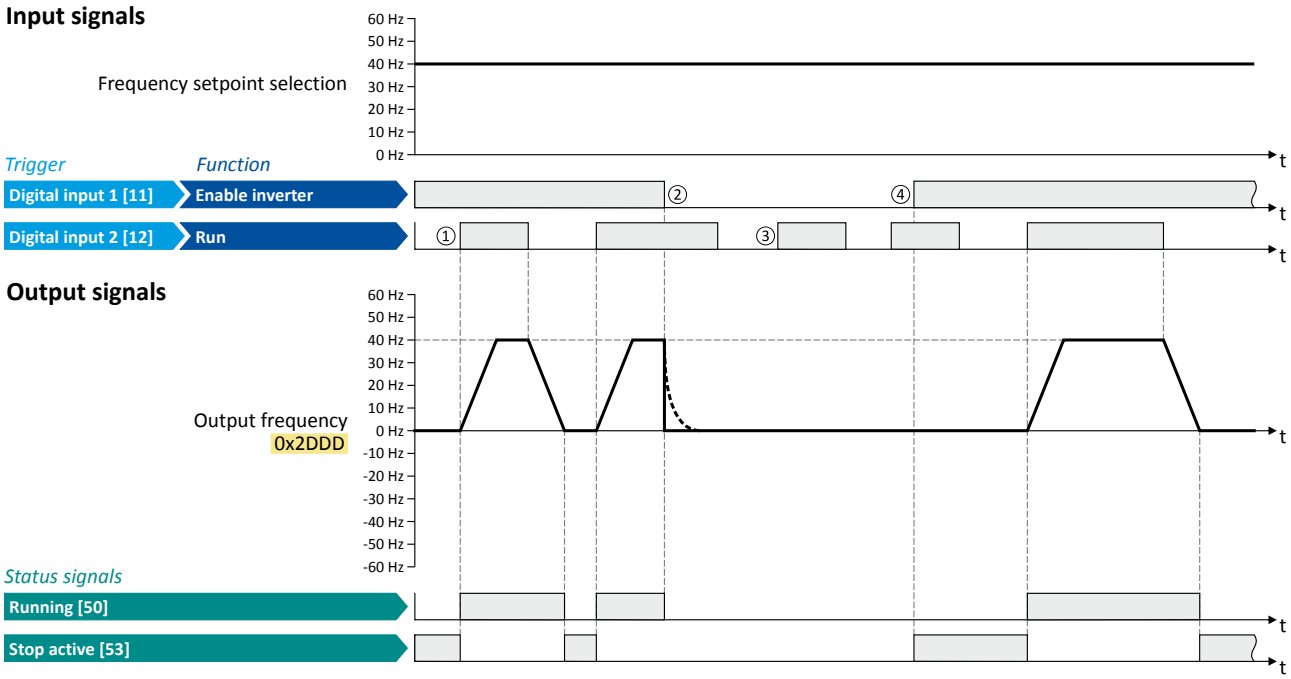
12.2.6 Example 6: Enable inverter

This example shows how to use the "Enable inverter" function for a separate enable input.

- In idle state of switch S1 (normally-closed contact), "Enable inverter" is already available.
- Switch S2 starts the motor in forward rotating direction (if switch S1 is closed). Switch S2 in initial position stops the motor again.
- Switch S1 disables the inverter. The motor becomes torqueless (coasts).

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Disable inverter
	Switch S2	Run

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Digital input 1 [11])
0x2631:002 (P400.02)	Run	Digital input 2 [12]
0x2631:004 (P400.04)	Reset fault	Not connected [0]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① If the inverter is enabled and no error is active, the motor can be started with the "Run" function in forward rotating direction.

② If "Enable inverter" is set to FALSE, the inverter is disabled. The motor becomes torqueless and coasts to standstill as a function of the mass inertia of the machine.

③ Without "Enable inverter", the motor cannot be started.

④ In the default setting, the motor does not start if the "Run" function is set to TRUE during "Enable inverter" . After "Enable inverter", must be retriggered to start the motor.
▸ Starting performance 🕮 115

12.3 Setpoint change-over

The inverter receives its setpoint from the selected standard setpoint source. Corresponding functions make it possible to change over to other setpoint sources during operation.

Possible setpoint sources are:

- Analog inputs
- Keypad
- Network
- Parameterisable setpoints (preset values)
- "Motor potentiometer" function

Details

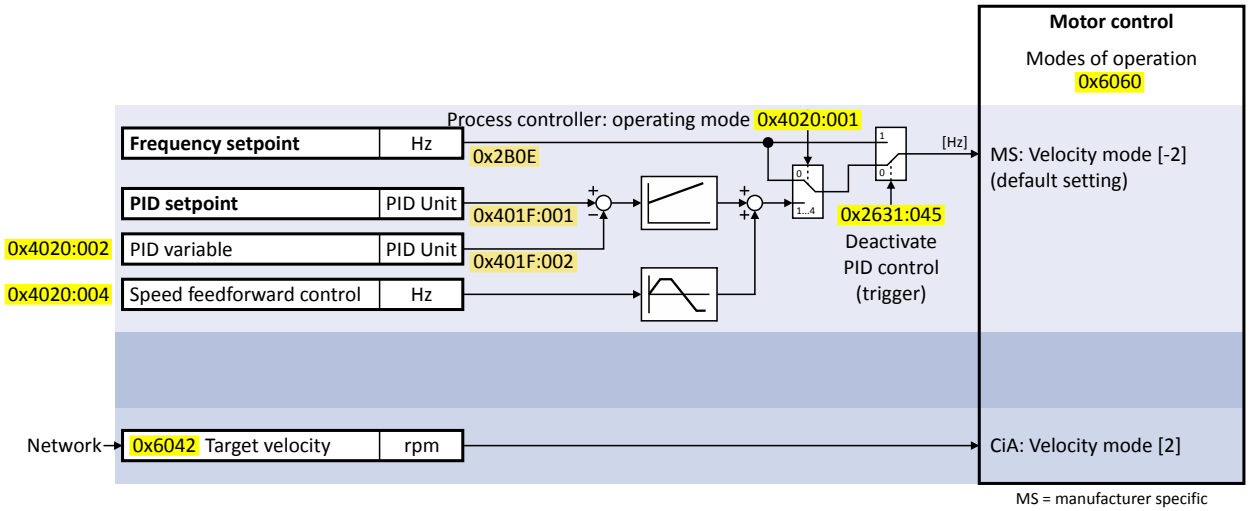
For applications only requiring one setpoint it is sufficient to define the standard setpoint source in the following parameters:

- 0x2860:001 (P201.01): Frequency control: Default setpoint source
- 0x2860:002 (P201.02): PID control: Default setpoint source

For a setpoint change-over during operation, the following functions must be configured. For details and examples see the following subchapters.

function	Info
Activate AI1 setpoint 0x2631:014 (P400.14)	Activate analog input 1 / analog input 2 as setpoint source. ▸ Analog input setpoint source 🕮 389
Activate AI2 setpoint 0x2631:002 (P400.02)	
Activate keypad setpoint 0x2631:016 (P400.16)	Activate keypad as setpoint source. • The keypad setpoint can be changed in the operating mode via the navigation keys ↑ and ↓ keypad keys. ▸ Keypad setpoint source 🕮 391
Activate network setpoint 0x2631:017 (P400.17)	Activate network as setpoint source. ▸ Network setpoint source 🕮 393
Activate preset (bit 0) 0x2631:018 (P400.18)	Activate parameterisable setpoints (presets) as setpoint source. • 15 frequency setpoints and 8 PID setpoints can be set as presets. • A preset value can be selected binary-coded via the four functions "Activate preset (bit 0)" ... "Activate preset (bit 3)". ▸ Setpoint source of preset setpoints 🕮 394
Activate preset (bit 1) 0x2631:019 (P400.19)	
Activate preset (bit 2) 0x2631:020 (P400.20)	
Activate preset (bit 3) 0x2631:021 (P400.21)	
Activate MOP setpoint 0x2631:025 (P400.25)	The "Motor potentiometer" function can be used as an alternative setpoint control that is controlled via two functions: "MOP setpoint up" and "MOP setpoint down". ▸ Motor potentiometer setpoint source (MOP) 🕮 399

The following signal flow shows the internal setpoint logics:



Notes:

- In case of an activated network control, the functions for setpoint change-over are not active! If in case of network control no setpoint is defined via the network control word, the standard setpoint source is active.
- The setpoint used by the motor control depends on the operating mode selected in 0x6060 (P301.00):
  - "MS: Velocity mode [-2]": The active frequency setpoint is used. In addition, the PID control can be activated in 0x4020:001 (P600.01). ▸ Configuring the process controller 273
  - "CiA: Velocity mode [2]": The setpoint speed defined via the "Target velocity" 0x6042 (P781.00) parameter is used. ▸ Device profile CiA 402 331
- As only one setpoint source can be active at a time, priorities are assigned to the frequency and PID setpoint sources. For details see the following subchapter "Priority of the setpoint sources". 388.

Diagnostic parameters:

- 0x282B:002 (P125.02): Active setpoint source

12.3.1 Priority of the setpoint sources

Since only one setpoint source can be active at a time, the following priorities apply:

Flexible I/O configuration or keypad control active 0x2631:037 (P400.37) = **FALSE**	**Network control active** 0x2631:017 (P400.17) = **FALSE** 0x2631:037 (P400.37) = **TRUE**
Prio 1: Functions for setpoint change-over The priority of the functions results from the assigned triggers (in the order of the selection list): 1. Constant TRUE [1] 2. Digital input 1 [11] 3. Digital input 2 [12] 4. Digital input 3 [13] 5. ...	Prio 1: Setpoint source selected via network control word ▸ General network settings 165
Prio 2: Set standard setpoint source • 0x2860:001 (P201.01): Frequency control: Default setpoint source • 0x2860:002 (P201.02): PID control: Default setpoint source ▸ Selection of setpoint source 113	Prio 2: Set standard setpoint source • 0x2860:001 (P201.01): Frequency control: Default setpoint source • 0x2860:002 (P201.02): PID control: Default setpoint source ▸ Selection of setpoint source 113

Example of allocating priority

Parameter	Name	Setting for this example
0x2631:014 (P400.14)	Activate AI1 setpoint	Digital input 5 [15]
0x2631:016 (P400.16)	Activate keypad setpoint	Digital input 4 [14]

Digital input 4	Digital input 5	Active setpoint source
FALSE	FALSE	Standard setpoint source set in 0x2860:001 (P201.01)
FALSE	TRUE	Analog input 1
TRUE	FALSE	keypad
TRUE	TRUE	Keypad (since "Digital input 4" trigger is higher in the selection list than "Digital input 5" trigger)

12.3.2 Analog input setpoint source

The following functions are used to select analog input 1 or analog input 2 as setpoint source.

Preconditions

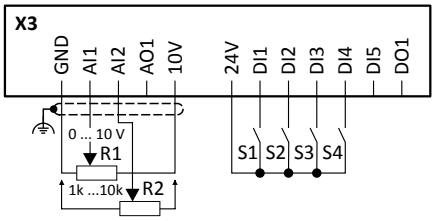
A setpoint change-over to the respective analog input is only effected if no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 🕮 388

Parameter	Name / value range / [default setting]	Info
0x2631:014 (P400.14)	Function list: Activate AI1 setpoint (Function list: Setp: AI1) • For possible settings see description for 0x2631:001 (P400.01). 🕮 373	Assignment of a trigger for the "Activate AI1 setpoint" function. Trigger = TRUE: analog input 1 is used as setpoint source (if the trigger assigned has the highest setpoint priority). Trigger = FALSE: no action / deactivate function again. ▸ Analog input 1 🕮 425
	00 Not connected	No trigger assigned (trigger is constantly FALSE).
0x2631:015 (P400.15)	Function list: Activate AI2 setpoint (Function list: Setp: AI2) • For possible settings see description for 0x2631:001 (P400.01). 🕮 373	Assignment of a trigger for the "Activate AI2 setpoint" function. Trigger = TRUE: analog input 2 is used as setpoint source (if the trigger assigned has the highest setpoint priority). Trigger = FALSE: no action / deactivate function again. ▸ Analog input 2 🕮 429
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

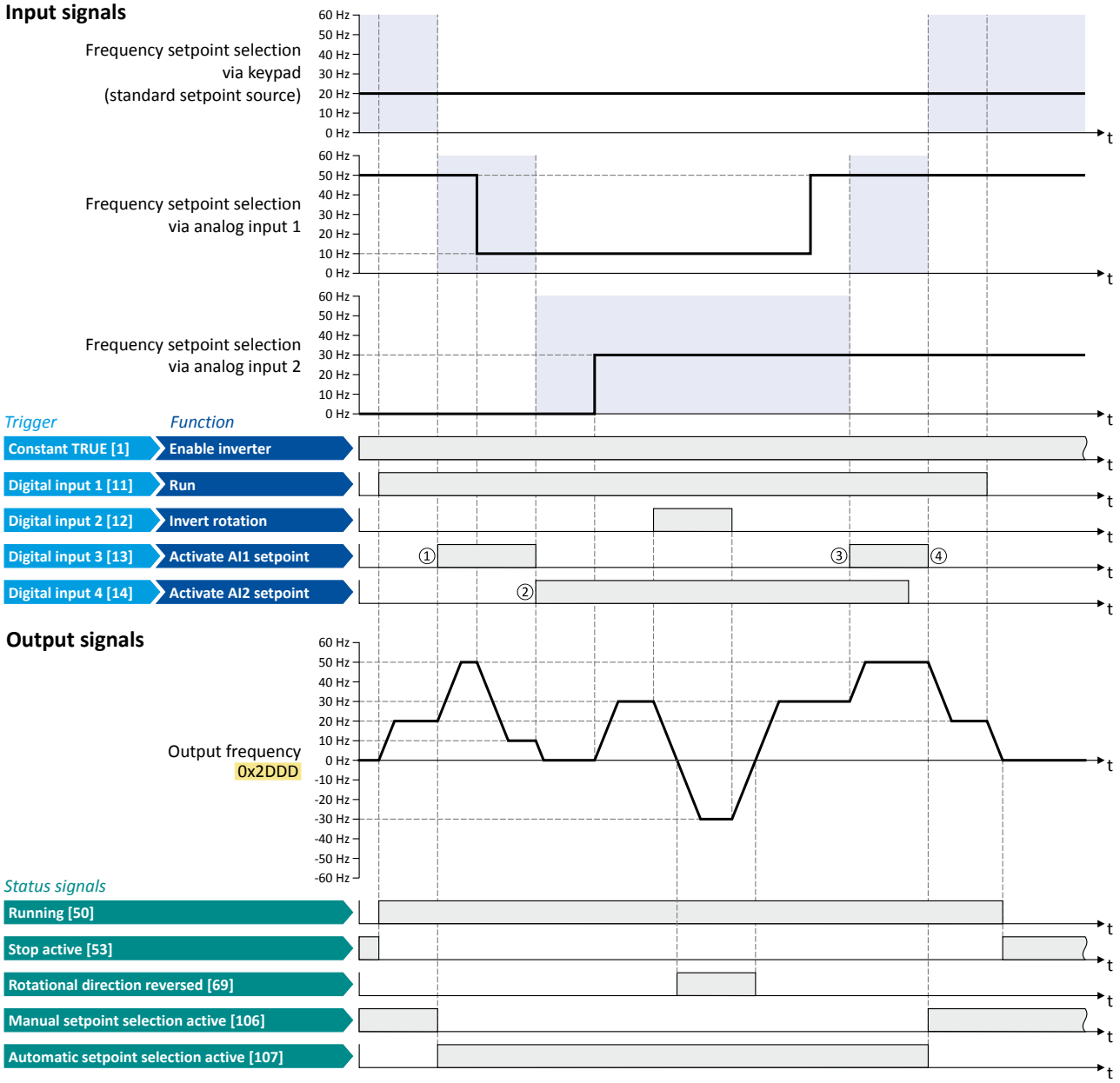
Example for operating mode

- The keypad is set as standard setpoint source.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 switches the direction of rotation.
- Switch S3 activates analog input 1 as setpoint source.
- Switch S4 activates analog input 2 as setpoint source.

If S3 and S4 are operated at the same time, the analog input 1 is active as setpoint source since the digital input 3 assigned to this function has a higher priority than the digital input 4.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection via AI1
	Potentiometer R2	Frequency setpoint selection via AI2
	Switch S1	Run
	Switch S2	Invert rotation
	Switch S3	Activate AI1 setpoint
	Switch S4	Activate AI2 setpoint

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Digital input 2 [12]
0x2631:014 (P400.14)	Activate AI1 setpoint	Digital input 3 [13]
0x2631:015 (P400.15)	Activate AI2 setpoint	Digital input 4 [14]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Keypad [1]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① Change-over from keypad setpoint (standard setpoint source) to AI1 setpoint.
② Change-over from AI1 setpoint to AI2 setpoint.
③ Change-over from AI2 setpoint to AI1 setpoint since the digital input 3 has a higher priority than the digital input 4.
④ Change-over to keypad setpoint (standard setpoint source).

12.3.3 Keypad setpoint source

The following function is used to select the keypad as setpoint source.

Preconditions

A setpoint change-over to the keypad is only effected if no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 388

Parameter	Name / value range / [default setting]	Info
0x2631:016 (P400.16)	Function list: Activate keypad setpoint (Function list: Setp: Keypad) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate keypad setpoint" function. Trigger = TRUE: the keypad is used as setpoint source (if the trigger assigned has the highest setpoint priority). Trigger = FALSE: no action / deactivate function again. Notes: • The default keypad setpoint can be changed in keypad operating mode via the arrow keys of the keypad.
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

Keypad setpoint default setting

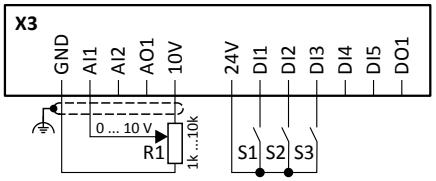
For the manual setpoint selection via keypad the following default settings are used:

- 0x2601:001 (P202.01): Keypad setpoints: Frequency setpoint
- 0x2601:002 (P202.02): Keypad setpoints: Process controller setpoint

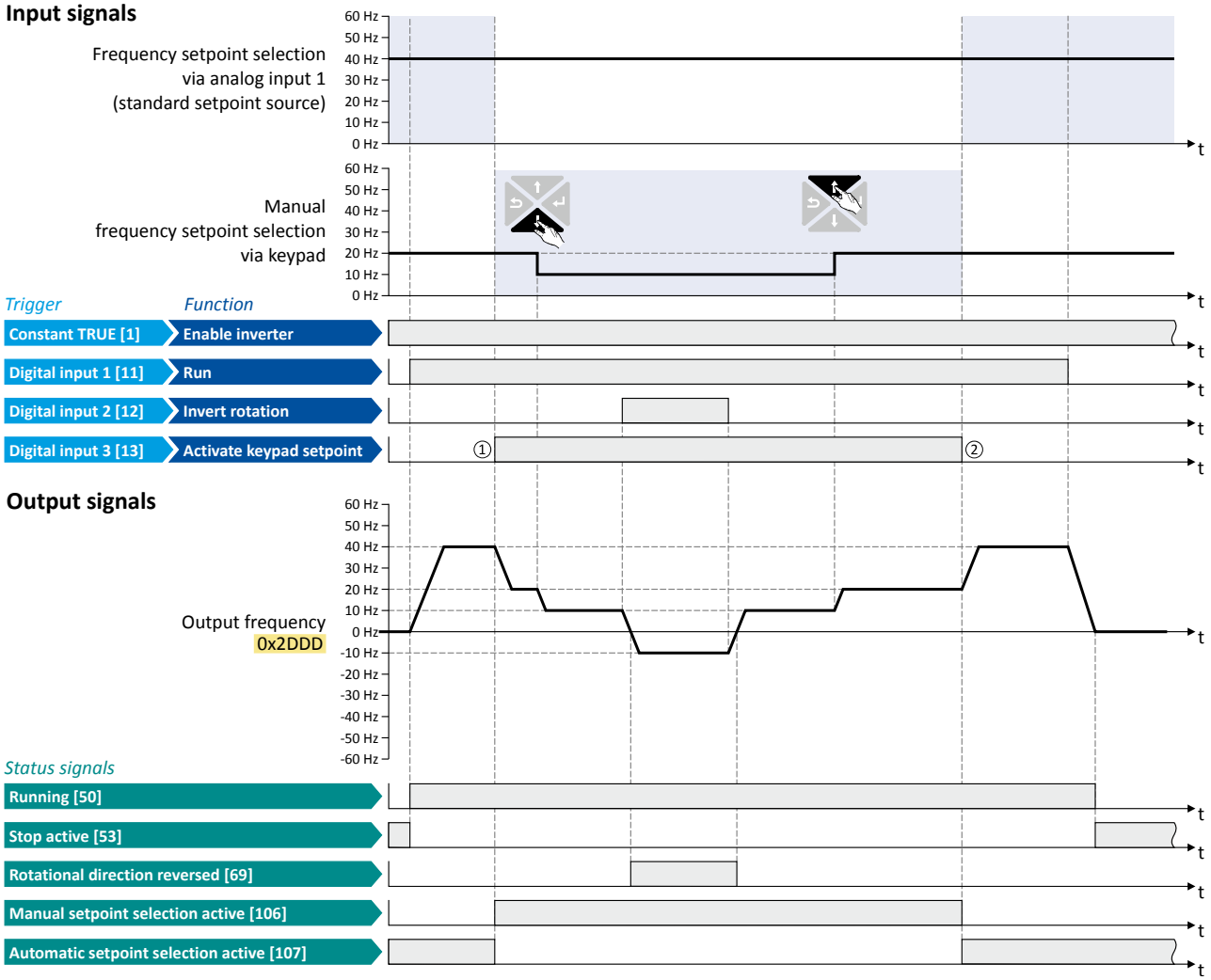
The increment for keypad setpoints can be adapted in 0x2862 (P701.00) by pressing a keypad arrow key once.

Example for operating mode

- The analog input 1 is set as standard setpoint source.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 switches the direction of rotation.
- Switch S3 activates the keypad as setpoint source. The keypad setpoint can be changed in the operating mode via the navigation keys ↑ and ↓ keypad keys.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Invert rotation
	Switch S3	Activate keypad setpoint

Parameter	Name	Setting for this example
0x2601:001 (P202.01)	Keypad setpoints: Frequency setpoint	20.0 Hz
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Digital input 2 [12]
0x2631:016 (P400.16)	Activate keypad setpoint	Digital input 3 [13]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 📖 431

① Change-over from analog input 1 (standard setpoint source) to keypad setpoint.
② Change-over from keypad setpoint back to analog input 1 (standard setpoint source).

12.3.4 Network setpoint source

The network can be set as standard setpoint source. Optionally, a change-over to the network setpoint is possible via the "Activate network setpoint" function (not if the network control is activated) or via the network control word (if the network control is activated).

If the network control is activated, all functions for setpoint change-over are inactive!

Details

In order to generally set the network as standard setpoint source, go to 0x2860:001 (P201.01) and select "Network [5]".

- If the network control is not active (0x2631:037 (P400.37) = "FALSE"), the "Activate network setpoint" 0x2631:017 (P400.17) function serves to change over to the network setpoint. The setpoint change-over only takes place if no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 🕮 388
- If the network control is activated (0x2631:037 (P400.37) = "TRUE"), a change-over to the network setpoint is possible via the used network control word:

Network control word	Change-over to network setpoint		
NetWordIN1 data word 0x4008:001 (P590.01)	Assign the functionActivate network setpoint [17]" to the bit that is to be used for activating the network setpoint. • The functions that are to be triggered via bits 0 ... 15 of the NetWordIN1 data word are defined in 0x400E:001 (P505.01) ... 0x400E:016 (P505.16).		
	Bit x		Selection:
	0		Standard setpoint source selected in 0x2860:001 (P201.01).
	1		Network setpoint
AC drive control word 0x400B:001 (P592.01)	The network setpoint is activated via bit 6 of the AC Drive control word:		
	Bit 6		Selection:
	0		Standard setpoint source selected in 0x2860:001 (P201.01).
	1		Network setpoint
LECOM control word 0x400B:002 (P592.02)	The setpoint is selected via bit 0 and bit 1 of the LECOM control word:		
	Bit 1	Bit 0	Selection:
	0	0	Standard setpoint source selected in 0x2860:001 (P201.01).
	0	1	Frequency setpoint preset 1 0x2911:001 (P450.01)
	1	0	Frequency setpoint preset 2 0x2911:002 (P450.02)
	1	1	Frequency setpoint preset 3 0x2911:003 (P450.03)
CiA 402 Controlword 0x6040	In case of control via device profile CiA 402: • In the operating mode "CiA: Velocity mode [2]", the setpoint speed defined via the "Target velocity" 0x6042 (P781.00) parameter is used. ▸ Device profile CiA 402 🕮 331 • A change-over to an alternative setpoint source via the CiA 402 Controlword is not possible.		

▸ General network settings 🕮 165

12.3.5 Setpoint source of preset setpoints

The four functions "Activate preset (bit 0)" ... " Activate preset (bit 3)" enable change-over of the setpoint to a parameterisable setpoint (preset value).

Preconditions

A setpoint change-over to the respective preset is only effected if no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 🕮 388

Details

A preset value is selected in a binary-coded fashion via the triggers assigned to the four functions "Activate preset (bit 0)" ... " Activate preset (bit 3)" in compliance with the following truth table:

Activate preset				Selection		
Bit 3 0x2631:021 (P400.21)	**Bit 2** 0x2631:020 (P400.20)	**Bit 1** 0x2631:019 (P400.19)	**Bit 0** 0x2631:018 (P400.18)	**Preset**	**frequency setpoint**	**PID setpoint**
FALSE	FALSE	FALSE	FALSE	No preset selected.		
FALSE	FALSE	FALSE	TRUE	Preset value 1	0x2911:001 (P450.01)	0x4022:001 (P451.01)
FALSE	FALSE	TRUE	FALSE	Preset value 2	0x2911:002 (P450.02)	0x4022:002 (P451.02)
FALSE	FALSE	TRUE	TRUE	Preset value 3	0x2911:003 (P450.03)	0x4022:003 (P451.03)
FALSE	TRUE	FALSE	FALSE	Preset value 4	0x2911:004 (P450.04)	0x4022:004 (P451.04)
FALSE	TRUE	FALSE	TRUE	Preset 5	0x2911:005 (P450.05)	0x4022:005 (P451.05)
FALSE	TRUE	TRUE	FALSE	Preset 6	0x2911:006 (P450.06)	0x4022:006 (P451.06)
FALSE	TRUE	TRUE	TRUE	Preset value 7	0x2911:007 (P450.07)	0x4022:007 (P451.07)
TRUE	FALSE	FALSE	FALSE	Preset value 8	0x2911:008 (P450.08)	0x4022:008 (P451.08)
TRUE	FALSE	FALSE	TRUE	Preset value 9	0x2911:009 (P450.09)	
...				...	...	
TRUE	TRUE	TRUE	TRUE	Preset value 15	0x2911:015 (P450.15)	

Notes:

- The frequency setpoint preset 5 is also used for the "Jog foward (CW)" 0x2631:010 (P400.10) function.
- The frequency setpoint preset 6 is also used for the "Jog reverse (CCW)" 0x2631:011 (P400.11) function.

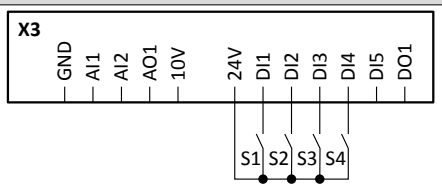
Parameter	Name / value range / [default setting]		Info
0x2631:018 (P400.18)	Function list: Activate preset (bit 0) (Function list: Setp: Preset b0) • For possible settings see description for 0x2631:001 (P400.01). 🕮 373		Assignment of a trigger for the "Activate preset (bit 0)" function. Selection bit with the valency 20 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	14	**Digital input 4**	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
0x2631:019 (P400.19)	Function list: Activate preset (bit 1) (Function list: Setp: Preset b1) • For possible settings see description for 0x2631:001 (P400.01). 🕮 373		Assignment of a trigger for the "Activate preset (bit 1)" function. Selection bit with the valency 21 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	15	**Digital input 5**	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.

Parameter	Name / value range / [default setting]	Info
0x2631:020 (P400.20)	Function list: Activate preset (bit 2) (Function list: Setp: Preset b2) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate preset (bit 2)" function. Selection bit with the valency 22 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:021 (P400.21)	Function list: Activate preset (bit 3) (Function list: Setp: Preset b3) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate preset (bit 3)" function. Selection bit with the valency 2^3 for the bit-coded selection and activation of a parameterised setpoint (preset value). Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1 (Freq. presets: Freq. preset 1) 0.0 ... [**20.0**] ... 599.0 Hz	Parameterisable frequency setpoints (presets) for operating mode "MS: Velocity mode".
0x2911:002 (P450.02)	Frequency setpoint presets: Preset 2 (Freq. presets: Freq. preset 2) 0.0 ... [**40.0**] ... 599.0 Hz	
0x2911:003 (P450.03)	Frequency setpoint presets: Preset 3 (Freq. presets: Freq. preset 3) 0.0 ... [**50.0**] ... 599.0 Hz	
0x2911:004 (P450.04)	Frequency setpoint presets: Preset 4 (Freq. presets: Freq. preset 4) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:005 (P450.05)	Frequency setpoint presets: Preset 5 (Freq. presets: Freq. preset 5) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:006 (P450.06)	Frequency setpoint presets: Preset 6 (Freq. presets: Freq. preset 6) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:007 (P450.07)	Frequency setpoint presets: Preset 7 (Freq. presets: Freq. preset 7) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:008 (P450.08)	Frequency setpoint presets: Preset 8 (Freq. presets: Freq. preset 8) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:009 (P450.09)	Frequency setpoint presets: Preset 9 (Freq. presets: Freq. preset 9) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:010 (P450.10)	Frequency setpoint presets: Preset 10 (Freq. presets: Freq. preset 10) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:011 (P450.11)	Frequency setpoint presets: Preset 11 (Freq. presets: Freq. preset 11) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:012 (P450.12)	Frequency setpoint presets: Preset 12 (Freq. presets: Freq. preset 12) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:013 (P450.13)	Frequency setpoint presets: Preset 13 (Freq. presets: Freq. preset 13) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:014 (P450.14)	Frequency setpoint presets: Preset 14 (Freq. presets: Freq. preset 14) 0.0 ... [**0.0**] ... 599.0 Hz	
0x2911:015 (P450.15)	Frequency setpoint presets: Preset 15 (Freq. presets: Freq. preset 15) 0.0 ... [**0.0**] ... 599.0 Hz	

Parameter	Name / value range / [default setting]	Info
0x4022:001 (P451.01)	PID setpoint presets: Preset 1 (PID presets: PID preset 1) -300.00 ... [**0.00**] ... 300.00 PID unit	Parameterisable process controller setpoints (presets) for PID control.
0x4022:002 (P451.02)	PID setpoint presets: Preset 2 (PID presets: PID preset 2) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:003 (P451.03)	PID setpoint presets: Preset 3 (PID presets: PID preset 3) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:004 (P451.04)	PID setpoint presets: Preset 4 (PID presets: PID preset 4) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:005 (P451.05)	PID setpoint presets: Preset 5 (PID presets: PID preset 5) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:006 (P451.06)	PID setpoint presets: Preset 6 (PID presets: PID preset 6) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:007 (P451.07)	PID setpoint presets: Preset 7 (PID presets: PID preset 7) -300.00 ... [**0.00**] ... 300.00 PID unit	
0x4022:008 (P451.08)	PID setpoint presets: Preset 8 (PID presets: PID preset 8) -300.00 ... [**0.00**] ... 300.00 PID unit	

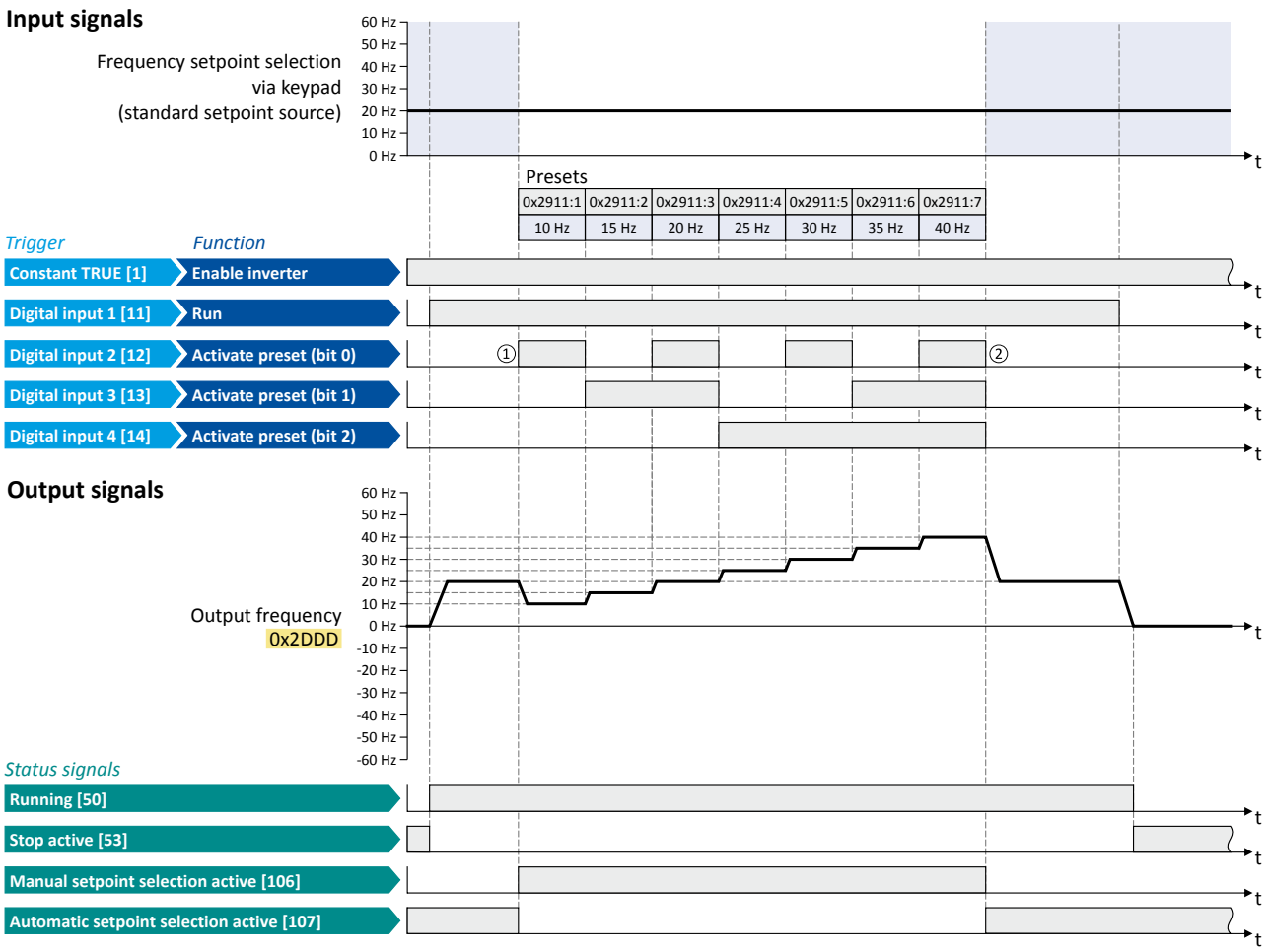
Example for operating mode

- The keypad is set as standard setpoint source.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- The switches S2 ... S4 serve to switch over to the presets 1 ... 7 (see the following table).

Connection plan	function				
	Switch S1	Run			
	Switches S2 ... S4	Preset selection:			
		S2	**S3**	**S4**	
		Off	Off	Off	Keypad setpoint
		On	Off	Off	Preset value 1
		Off	On	Off	Preset value 2
		On	On	Off	Preset value 3
		Off	Off	On	Preset value 4
		On	Off	On	Preset 5
		Off	On	On	Preset 6
		On	On	On	Preset value 7

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Digital input 2 [12]
0x2631:019 (P400.19)	Activate preset (bit 1)	Digital input 3 [13]
0x2631:020 (P400.20)	Activate preset (bit 2)	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Keypad [1]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	10 Hz
0x2911:002 (P450.02)	Frequency setpoint presets: Preset 2	15 Hz
0x2911:003 (P450.03)	Frequency setpoint presets: Preset 3	20 Hz
0x2911:004 (P450.04)	Frequency setpoint presets: Preset 4	25 Hz
0x2911:005 (P450.05)	Frequency setpoint presets: Preset 5	30 Hz
0x2911:006 (P450.06)	Frequency setpoint presets: Preset 6	35 Hz
0x2911:007 (P450.07)	Frequency setpoint presets: Preset 7	40 Hz

If the frequency presets 8 ... 15 are required as well, the digital input 5 must be additionally assigned to the "Activate preset (bit 3)" function and the terminal DI5 must be interconnected accordingly.



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 📖 431

① Change-over from keypad setpoint (standard setpoint source) to presets (first, preset 1 is selected).
② Change-over back to keypad setpoint since no preset is selected anymore (digital inputs 2 ... 4 = FALSE).

12.3.6 Motor potentiometer setpoint source (MOP)

The "Motor potentiometer" function can be used as an alternative setpoint control that is controlled via two functions: "MOP setpoint up" and "MOP setpoint down".

- The "Activate MOP setpoint" function enables a setpoint change-over to the motor potentiometer.
- The motor potentiometer can also be defined as standard setpoint source. ▸ Selection of setpoint source 📖 113

Preconditions

A setpoint change-over to the motor potentiometer is only effected if

- no setpoint source with a higher priority has been selected. ▸ Priority of the setpoint sources 📖 388
- no jog operation is active ("Jog foward (CW)" and "Jog reverse (CCW)" functions).

Details

If the motor potentiometer is active as setpoint source, the setpoint generated by this function ("MOP value") can be changed according to the truth table via the triggers assigned to the two "MOP setpoint up" and "MOP setpoint down" functions:

MOP setpoint up 0x2631:023 (P400.23)	MOP setpoint down 0x2631:024 (P400.24)	Response of the function
FALSE	FALSE	Last MOP value is maintained.
TRUE	FALSE	MOP value is increased to a maximum of the upper range limit with acceleration time 2. (The motor follows the setpoint change with acceleration time 1.)
FALSE	TRUE	MOP value is decreased to a maximum of the lower range limit with deceleration time 2. (The motor follows the setpoint change with deceleration time 1.)
TRUE	TRUE	Last MOP value is maintained.

Starting performance

- In the default setting, the last MOP value is used as initial value. As an alternative, an adjustable initial value or the minimum value can be used for starting. The starting performance can be selected in 0x4003 (P413.00).
- The last MOP value is still provided after switching the mains voltage off and on again.

Range limits, acceleration times, and deceleration times

Parameter	MS: Velocity mode	PID control
Lower range limit	Minimum frequency 0x2915 (P210.00)	PID setpoint limits: Minimum setpoint 0x404E:001 (P605.01)
Upper range limit	Maximum frequency 0x2916 (P211.00)	PID setpoint limits: Maximum setpoint 0x404E:002 (P605.02)
Acceleration time	Acceleration time 2 0x2919 (P222.00)	PID setpoint ramp 0x404B (P604.00)
Deceleration time	Deceleration time 2 0x291A (P223.00)	PID setpoint ramp 0x404B (P604.00)

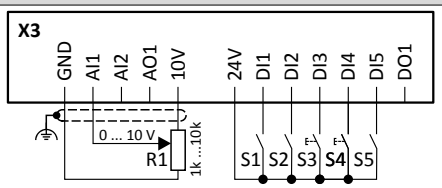
Parameter	Name / value range / [default setting]	Info
0x2631:023 (P400.23)	Function list: MOP setpoint up (Function list: MOP up) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "MOP setpoint up" function. Trigger = TRUE: setpoint generated by the "Motor potentiometer" function ("MOP value") is maximally increased to the upper range limit with acceleration time 2. Trigger = FALSE: last MOP value is maintained. Notes: • If the "MOP setpoint up" and "MOP setpoint down" functions are active at the same time, the last MOP value is maintained. • Acceleration time 2 can be set in 0x2919 (P222.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

Parameter	Name / value range / [default setting]	Info
0x2631:024 (P400.24)	Function list: MOP setpoint down (Function list: MOP down) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "MOP setpoint down" function. Trigger = TRUE: setpoint generated by the "Motor potentiometer" function ("MOP value") is maximally decreased to the lower range limit with deceleration time 2. Trigger = FALSE: last MOP value is maintained. Notes: • If the "MOP setpoint up" and "MOP setpoint down" functions are active at the same time, the last MOP value is maintained. • Deceleration time 2 can be set in 0x291A (P223.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:025 (P400.25)	Function list: Activate MOP setpoint (Function list: Setp: MOP) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate MOP setpoint" function. Trigger = TRUE: the "Motor potentiometer" function is used as setpoint source (if the trigger assigned has the highest setpoint priority). Trigger = FALSE: no action / deactivate function again.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x4003 (P413.00)	MOP starting mode (MOP startmode)	Selection of the initial value which is used after activation of the function.
	0 **Last value**	The last MOP value is used as initial value. It is still provided after the mains voltage has been switched off and on again.
	1 Starting value	Depending on the operating mode, the value set in 0x4004:1...3 is used as initial value.
	2 Minimum value	The minimum value of the corresponding operating mode is used as initial value: • Minimum frequency 0x2915 (P210.00) • PID setpoint limits: Minimum setpoint 0x404E:001 (P605.01)
0x4004:001 (P414.01)	MOP starting values: Frequency (MOP start value: Frequency) 0.0 ... [**0.0**] ... 599.0 Hz	Initial value for "MS: Velocity mode". Only relevant if 0x4003 = 1.
0x4004:002 (P414.02)	MOP starting values: PID value (MOP start value: PID value) -300.00 ... [**0.00**] ... 300.00 PID unit	Initial value for reference value of the PID control. Only relevant if 0x4003 = 1.
0x4004:003 (P414.03)	MOP starting values: Torque (MOP start value: Torque) 0.0 ... [**0.0**] ... 1000.0 %	Initial value for "Torque mode". Only relevant if 0x4003 = 1.
0x4009:001	MOP values saved: Frequency • Read only: x.x Hz	Display of the last MOP value saved internally. • This value is used as initial value in the "MS: Velocity mode" if 0x4003 is set = 0.
0x4009:002	MOP values saved: PID value • Read only: x.xx PID unit	Display of the last MOP value saved internally. • This value is used as initial value for the PID control if 0x4003 is set = 0.
0x4009:003	MOP values saved: Torque • Read only: x.x %	Display of the last MOP value saved internally. • This value is set as initial value in the "torque mode" if 0x4003 is set = 0.
0x2915 (P210.00)	Minimum frequency (Min. frequency) 0.0 ... [**0.0**] ... 599.0 Hz	Lower limit value for all frequency setpoints.
0x2916 (P211.00)	Maximum frequency (Max. frequency) 0.0 ... [**50.0**] ... 599.0 Hz	Upper limit value for all frequency setpoints.
0x2919 (P222.00)	Acceleration time 2 (Accelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Acceleration time 2 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • The acceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto switching threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The acceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331

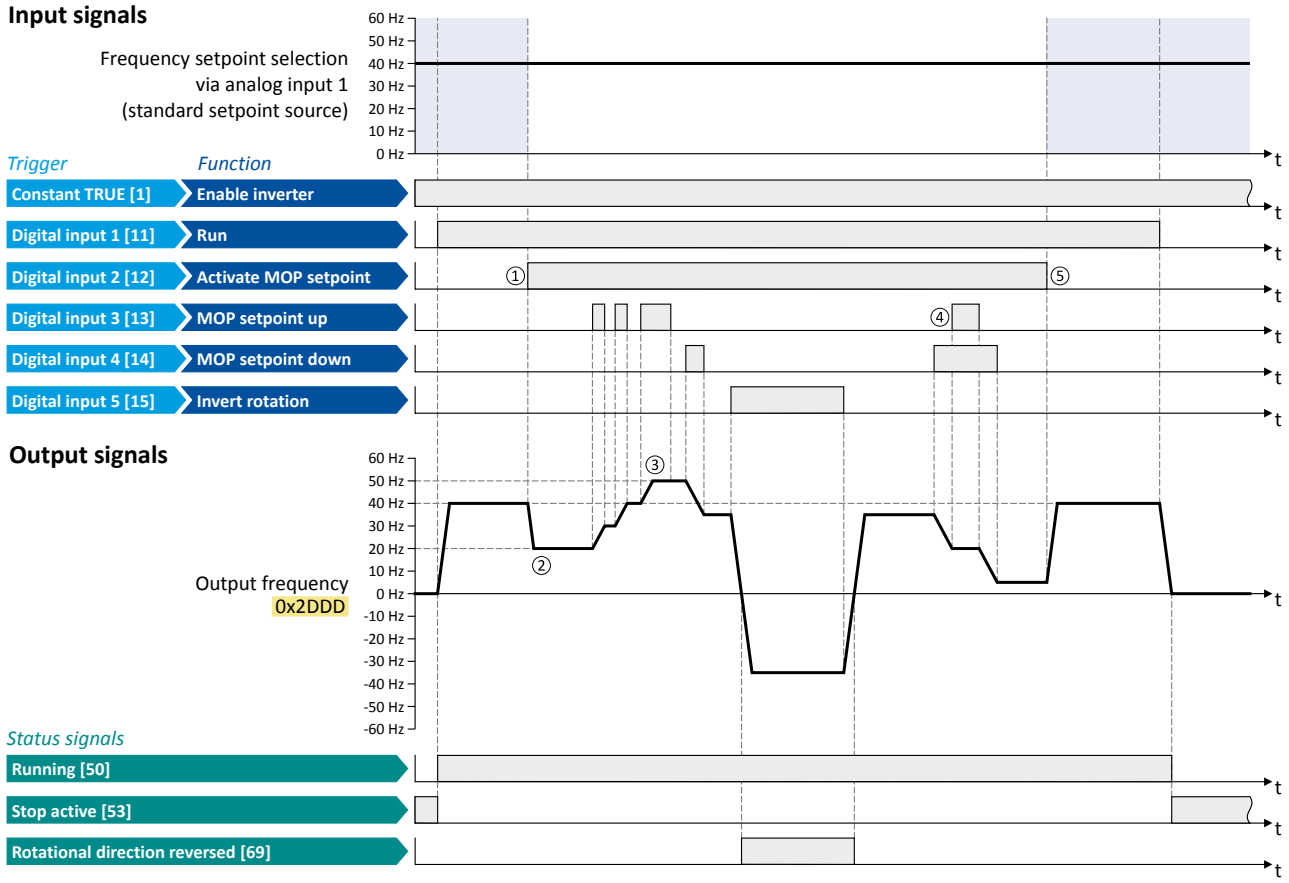
Parameter	Name / value range / [default setting]	Info
0x291A (P223.00)	Deceleration time 2 (Decelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 2 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • The deceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto change-over threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The deceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 🕮 331

Example for operating mode

- The analog input 1 is set as standard setpoint source.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 activates the motor potentiometer as setpoint source. The MOP setpoint can then be increased via button S3 and reduced via button S4. If both buttons are pressed at the same time, the MOP setpoint remains unchanged.
- Switch S5 switches the direction of rotation.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate MOP setpoint
	Button S3	MOP setpoint up
	Button S4	MOP setpoint down
	Switch S5	Invert rotation

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:025 (P400.25)	Activate MOP setpoint	Digital input 2 [12]
0x2631:023 (P400.23)	MOP setpoint up	Digital input 3 [13]
0x2631:024 (P400.24)	MOP setpoint down	Digital input 4 [14]
0x2631:013 (P400.13)	Invert rotation	Digital input 5 [15]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
0x2917 (P220.00)	Acceleration time 1	1.0 s
0x2918 (P221.00)	Deceleration time 1	1.0 s
0x2919 (P222.00)	Acceleration time 2	4.0 s (for MOP setpoint change)
0x291A (P223.00)	Deceleration time 2	4.0 s (for MOP setpoint change)
0x4003 (P413.00)	MOP starting mode	Starting value [1]
0x4004:001 (P414.01)	MOP starting values: Frequency	20 Hz



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① Change-over from analog input 1 (standard setpoint source) to MOP setpoint.

② The initial value for the motor potentiometer function depends on the setting in 0x4003 (P413.00).
In this example, the "starting value" set in 0x4004:001 (P414.01) is used (here: 20 Hz).

③ The MOP setpoint is maximally increased to the maximum frequency set in 0x2916 (P211.00) (here: 50 Hz).

④ If "MOP setpoint up" and "MOP setpoint down" are requested at the same time, the MOP setpoint remains unchanged.

⑤ Change-over from MOP setpoint back to analog input 1 (standard setpoint source).

12.4 Reset error

By means of the "Reset fault" function, an active error can be reset (acknowledged).

Preconditions

The error can only be reset if the error cause has been eliminated.

Parameter	Name / value range / [default setting]		Info
0x2631:004 (P400.04)	Function list: Reset fault (Function list: Reset fault) • For possible settings see description for 0x2631:001 (P400.01). 373		Assignment of a trigger for the "Reset fault" function. Trigger = FALSE↗TRUE (edge): Active error is reset (acknowledged) if the error condition is not active anymore and the error is resettable. Trigger = FALSE: no action.
	12	**Digital input 2**	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.

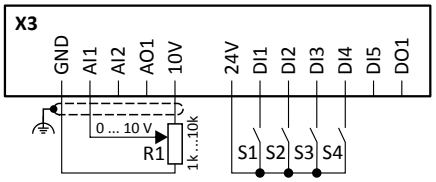
Further options for resetting an error

In addition to the "Reset error" function, there are the following options to reset an error:

function	Required state change to reset an error:
Enable inverter 0x2631:001 (P400.01)	TRUE↘FALSE (edge)
Run 0x2631:002 (P400.02)	TRUE↘FALSE (edge); see the following example
Keypad key	Keystroke

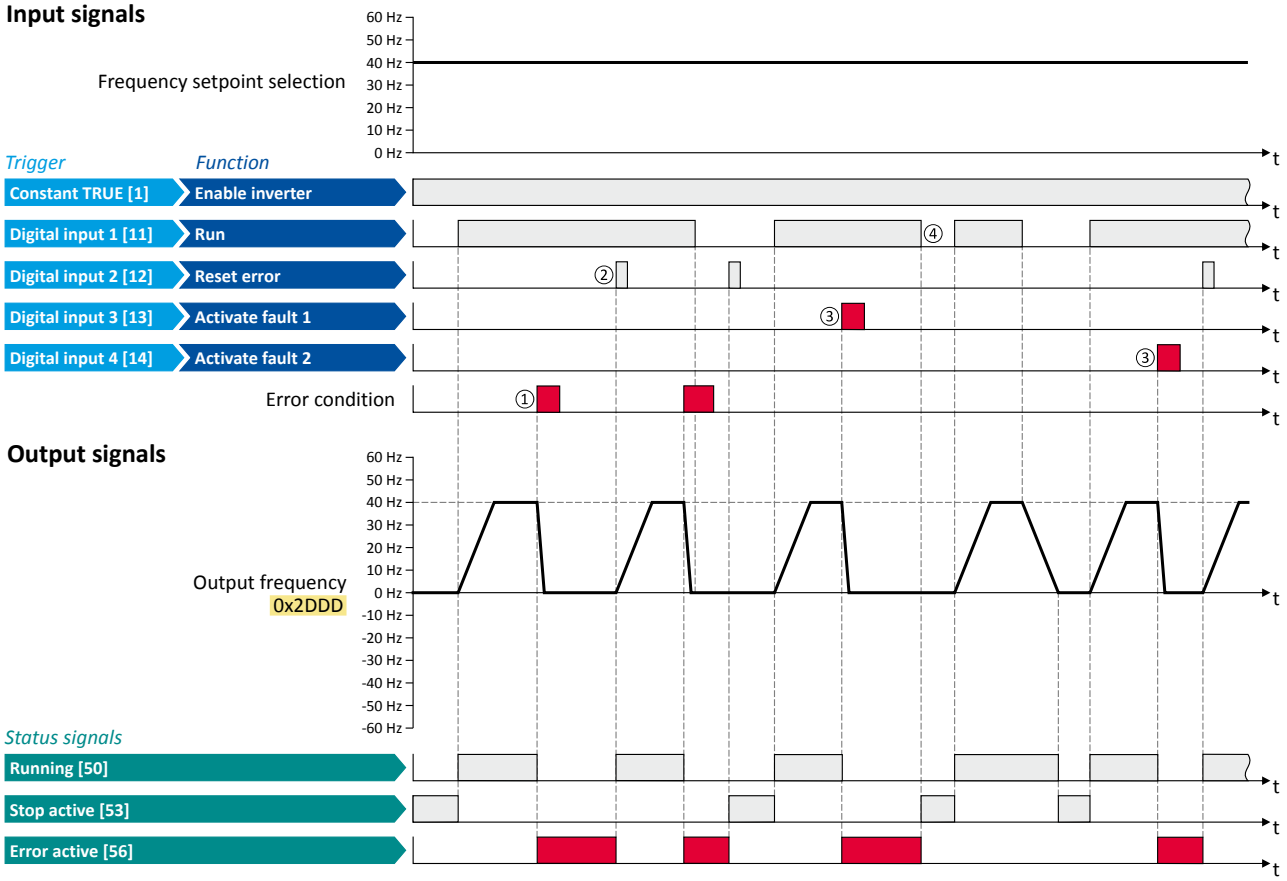
Example for operating mode

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 resets the current error if the error condition is not active anymore and the error is resettable.
- The switches/sensors S3 and S4 serve to set the inverter from the process to the error status. ▸ Triggering a user-defined fault 411

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Reset fault
	Switch S3	Activate fault 1
	Switch S4	Activate fault 2

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Digital input 2 [12]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2631:043 (P400.43)	Activate fault 1	Digital input 3 [13]
0x2631:044 (P400.44)	Activate fault 2	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
0x2918 (P221.00)	Deceleration time 1	5.0 s
0x291C (P225.00)	Quick stop deceleration time	1.0 s

The following signal flow illustrates the reset of an error both with the "Reset error" function ② and by cancelling the start command ④:



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① If an error condition is active in the inverter, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Exception: In case of a serious error, the inverter is disabled immediately. The motor becomes torqueless (coasts).

② If the error can be reset, the error state can be left again with the "Reset fault" function (if the error condition no longer exists). The motor accelerates again to the setpoint since the start command is still active.

③ The functions "Activate fault 1" and "Activate fault 2" serve to set the inverter from the process to the error status.

④ If the error can be reset, the cancelled start command results in leaving the error state (if the error condition no longer exists).

Related topics

▸ Error handling 🕮 107

12.5 Activating DC braking manually

By means of the "Activate DC braking" function, DC braking can be activated manually.

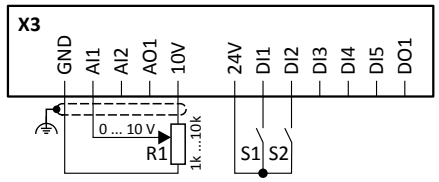
Preconditions

The current for DC braking must be set > 0 % so that the function can be executed.

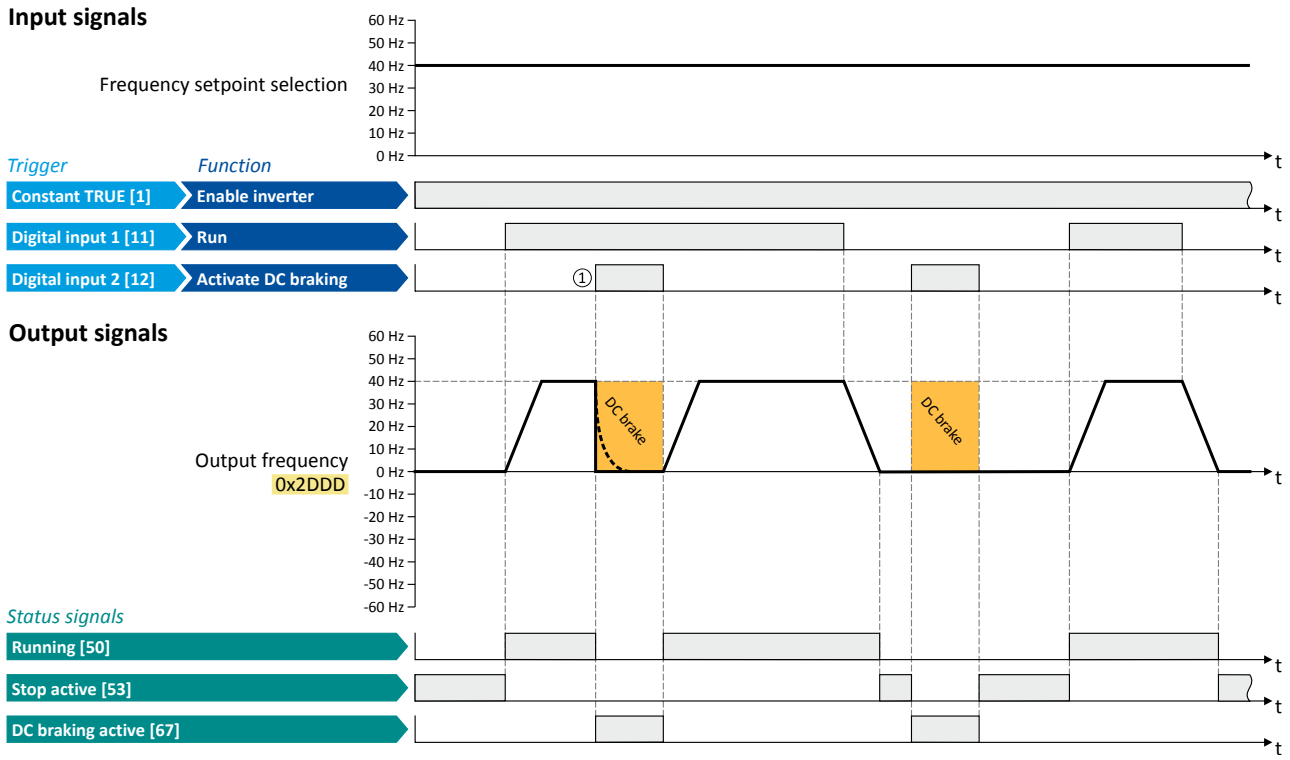
Parameter	Name / value range / [default setting]	Info
0x2631:005 (P400.05)	Function list: Activate DC braking (Function list: DC braking) • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Activate DC braking" function. Trigger = TRUE: Activate DC braking. Trigger = FALSE: Deactivate DC braking. ⚠ CAUTION! DC braking remains active as long as the trigger is set to TRUE. ▸ DC braking 290
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2B84:001 (P704.01)	DC braking: Current (DC braking: Current) 0.0 ... [**0.0**] ... 200.0 %	Braking current for DC braking. • 100 % ≡ rated motor current 0x6075 (P323.00)

Example for operating mode

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 activates DC braking.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate DC braking

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:005 (P400.05)	Activate DC braking	Digital input 2 [12]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
0x2B84:001 (P704.01)	DC braking: Current	10 %



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① If DC braking is activated while the motor is running, the output pulses of the inverter are disabled immediately. For stopping the motor, the current set in 0x2B84:001 (P704.01) is injected. The exact drive behaviour depends on the settings for the "DC braking" function and the load properties.

12.6 Releasing holding brake manually

The "Release holding brake" function serves to release the holding brake immediately. Brake application time and brake opening time as well as the conditions for the automatic operation are not effective.

Preconditions

- Observe setting and application notes in the "Holding brake control" chapter! 📖 335
- The brake mode "Automatic [0]" or "Manual [1]" must be set in 0x2820:001 (P712.01).
- The "Release holding brake [115]" trigger has to be assigned to a digital output or, in the simplest case, to the relay which then switches the brake supply.

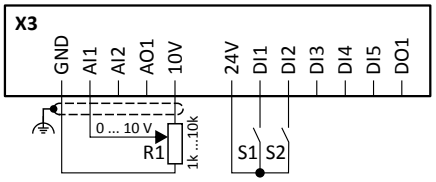
Details

Detailed information about the function and configuration of the holding brake control can be found in the "Holding brake control" chapter. 📖 335

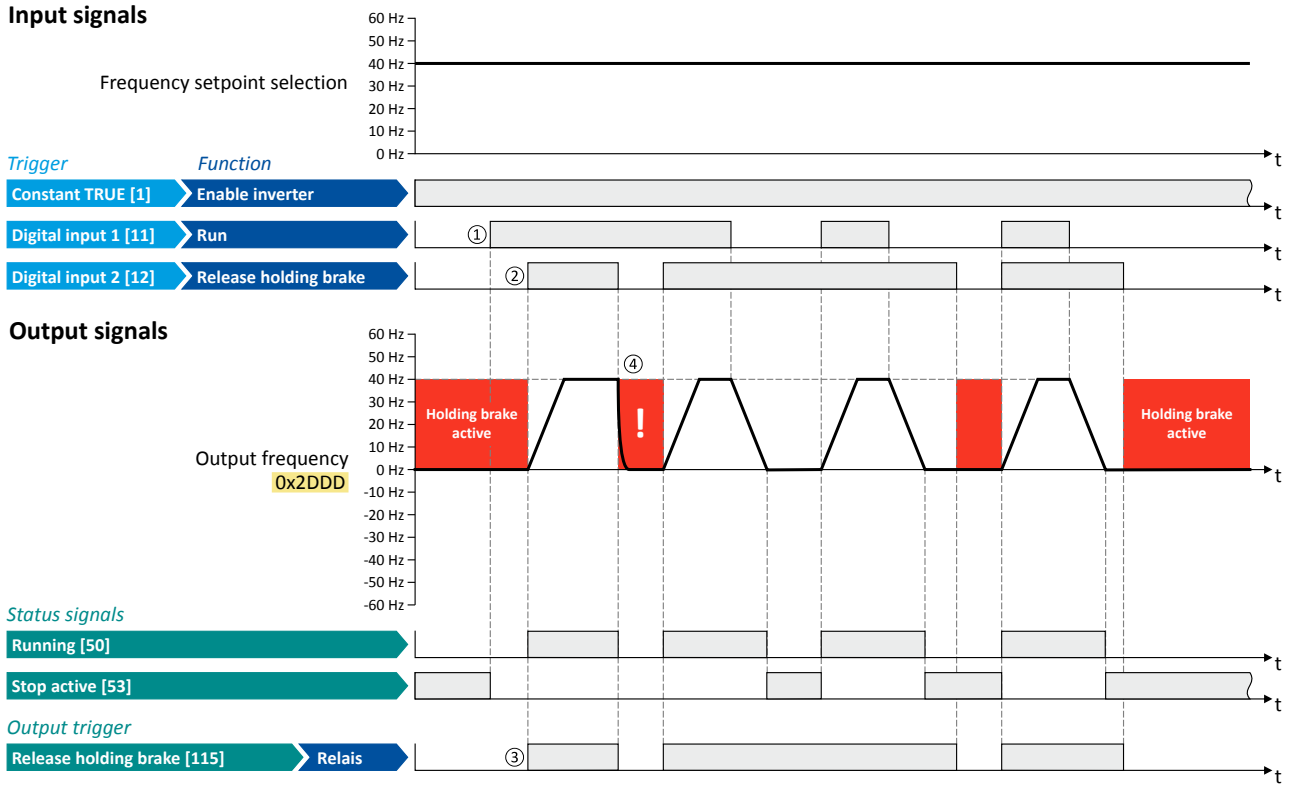
Parameter	Name / value range / [default setting]	Info
0x2631:049 (P400.49)	Function list: Release holding brake (Function list: Release brake) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Release holding brake" function. Trigger = TRUE: Release holding brake (immediately). Trigger = FALSE: no action. Notes: • Function is only executed if the brake mode 0x2820:001 (P712.01) is set to "Automatic [0]" or "Manual [1]". • The manually triggered "Release holding brake" command has a direct impact on the "Release holding brake [115]" trigger. Thus, the holding brake can be manually released if the power section is switched off. • The responsibility for a manual release of the holding brake has the external trigger source for the "Release holding brake" command!
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

Example for operating mode

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 releases the holding brake. For this purpose, in this example, trigger "Release holding brake [115]" is assigned to the relay that switches the brake supply.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Release holding brake

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:049 (P400.49)	Release holding brake	Digital input 2 [12]
0x2634:001 (P420.01)	Relay	Release holding brake [115]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① As the holding brake is active, the motor does not yet start to rotate after the start command.

② The holding brake is released. The motor is led to the setpoint.

③ In this example, the "Release holding brake [115]" trigger is assigned to the relay that switches the brake supply. In idle state, the holding brake is applied. If the relay is energised, the holding brake is released.

④ **Note:** Holding brakes are not intended for braking during operation. The increased wear caused by braking during operation may destroy the holding brakes prematurely!

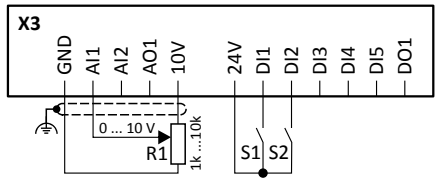
12.7 Activating ramp 2 manually

The "Activate ramp 2" function serves to manually activate acceleration time 2 and deceleration time 2.

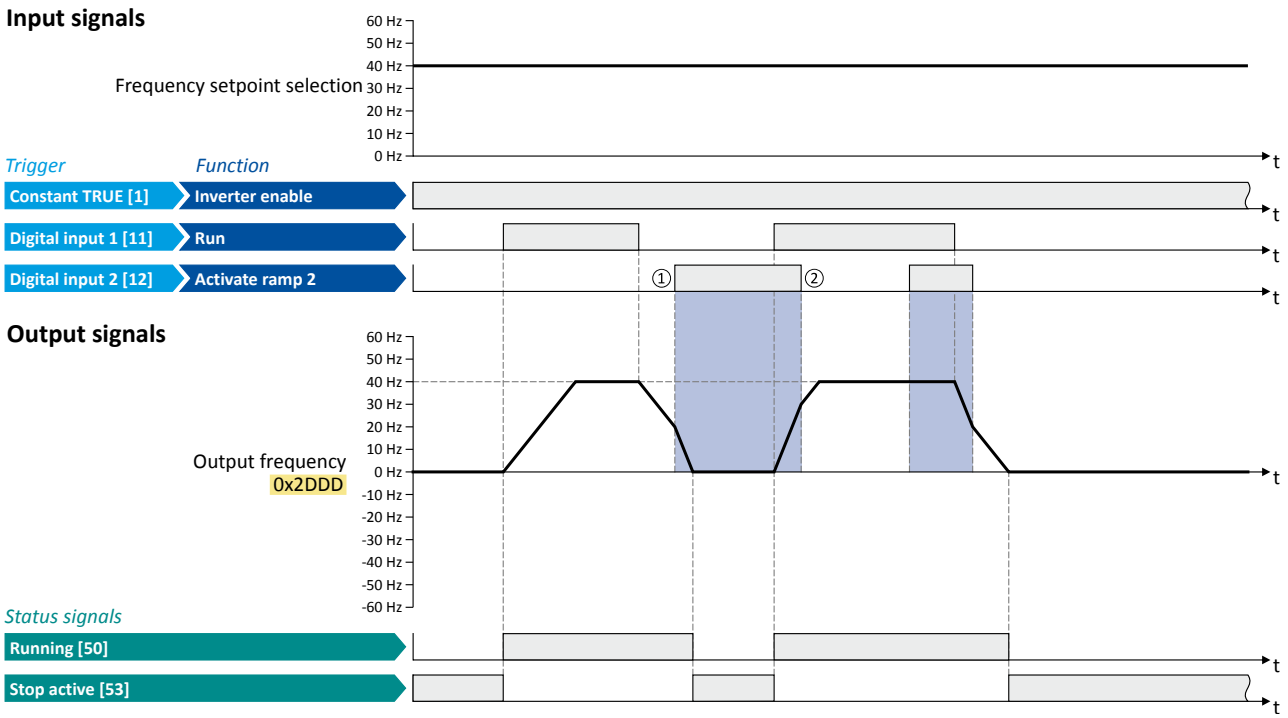
Parameter	Name / value range / [default setting]	Info
0x2631:039 (P400.39)	Function list: Activate ramp 2 (Function list: Activ. ramp 2) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate ramp 2" function. Trigger = TRUE: activate acceleration time 2 and deceleration time 2 manually. Trigger = FALSE: no action / deactivate function again. Notes: • If the function is used and the assigned trigger = TRUE, the auto change-over threshold 0x291B (P224.00) for ramp 2 is deactivated. • Acceleration time 2 can be set in 0x2919 (P222.00). • Deceleration time 2 can be set in 0x291A (P223.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2917 (P220.00)	Acceleration time 1 (Accelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s	Acceleration time 1 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331
0x2918 (P221.00)	Deceleration time 1 (Decelerat.time 1) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 1 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331
0x2919 (P222.00)	Acceleration time 2 (Accelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Acceleration time 2 for the operating mode "MS: Velocity mode". • The acceleration time set refers to the acceleration from standstill to the maximum frequency set. In the case of a lower setpoint selection, the actual acceleration time is reduced accordingly. • The acceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto switching threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The acceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331
0x291A (P223.00)	Deceleration time 2 (Decelerat.time 2) 0.0 ... [**5.0**] ... 3600.0 s	Deceleration time 2 for the operating mode "MS: Velocity mode". • The deceleration time set refers to the deceleration from the maximum frequency set to standstill. In the case of a lower actual frequency, the actual deceleration time is reduced accordingly. • The deceleration time 2 is active if the frequency setpoint (absolute value) ≥ auto change-over threshold 0x291B (P224.00) or the trigger assigned to the function "Activate ramp 2" in 0x2631:039 (P400.39) = TRUE. • The deceleration time 2 is also used for changing the MOP setpoint generated by the "motor potentiometer" function. • Setting is not effective in the operating mode 0x6060 (P301.00) = "CiA: Velocity mode [2]". ▸ Device profile CiA 402 📖 331

Example for operating mode

- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 activates the acceleration time 2 and deceleration time 2.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run
	Switch S2	Activate ramp 2

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:039 (P400.39)	Activate ramp 2	Digital input 2 [12]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
0x2917 (P220.00)	Acceleration time 1	10.0 s
0x2918 (P221.00)	Deceleration time 1	10.0 s
0x2919 (P222.00)	Acceleration time 2	5.0 s
0x291A (P223.00)	Deceleration time 2	5.0 s



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① Change-over to deceleration time 2 during the deceleration phase.
② Change-over to acceleration time 1 during the acceleration phase.

12.8 Triggering a user-defined fault

The "Activate fault 1" and "Activate fault 2" functions serve to set the inverter from the process to the error status.

Details

If, for instance, sensors or switches are provided for process monitoring, which are designed to stop the process (and thus the drive) under certain conditions, these sensors/switches can be connected to free digital inputs of the inverter. The digital inputs used for the sensors/switches then have to be assigned to the functions "Activate fault 1" and "Activate fault 2" as triggers.

Parameter	Name / value range / [default setting]	Info
0x2631:043 (P400.43)	Function list: Activate fault 1 (Function list: Fault 1) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate fault 1" function. Trigger = TRUE: Trigger user-defined error 1. Trigger = FALSE: no action. Notes: • After the error is triggered, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Associated error code: • 25217 | 0x6281 - User-defined fault 1
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:044 (P400.44)	Function list: Activate fault 2 (Function list: Fault 2) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate fault 2" function. Trigger = TRUE: Trigger user-defined error 2. Trigger = FALSE: no action. Notes: • After the error is triggered, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Associated error code: • 25218 | 0x6282 - User-defined fault 2
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

Example

An example of the operating mode can be found in the chapter "Reset error". 📖 403

Related topics

▸ Error handling 📖 107

12.9 Functions for parameter change-over

The inverter supports several parameter sets. The parameter set can be selected by means of the "Select parameter set (bit 0)" and "Select parameter set (bit 1)" functions.

⚠ DANGER!

Changed parameter settings can become effective immediately depending on the activating method set in 0x4046 (P755.00).

The possible consequence is an unexpected response of the motor shaft while the inverter is enabled.

- If possible, only carry out parameter changes while the inverter is disabled.
- Certain device commands or settings which might cause a critical state of the drive behaviour can generally only be carried our when the inverter is inhibited.

Details

The "parameter change-over" function provides a change-over between four sets with different parameter values for up to 32 freely selectable parameters. For details on the compilation of the parameters and setting of the value sets, see the chapter "Parameter change-over". 316

A value set is selected in a binary-coded fashion via the triggers assigned to the two Select parameter set (bit 0)" and " Select parameter set (bit 1)" functions in compliance with the following truth table:

Select parameter set (bit 1) 0x2631:042 (P400.42)	Select parameter set (bit 0) 0x2631:041 (P400.41)	Selection
FALSE	FALSE	Value set 1
FALSE	TRUE	Value set 2
TRUE	FALSE	Value set 3
TRUE	TRUE	Value set 4

Change-over is effected depending on the activation method selected in 0x4046 (P755.00) when a state change of the selection inputs takes place or via the trigger assigned to the "Load parameter set" function.

Parameter	Name / value range / [default setting]	Info
0x2631:040 (P400.40)	Function list: Load parameter set (Function list: Load param.set) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Load parameter set" function. Trigger = FALSE-TRUE edge: parameter change-over to the value set selected via "Select parameter set (bit 0)" and "Select parameter set (bit 1)". Trigger = FALSE: no action. Notes: • The activation method for the "Parameter change-over" function can be selected in 0x4046 (P755.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:041 (P400.41)	Function list: Select parameter set (bit 0) (Function list: Sel. paramset b0) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Select parameter set (bit 0)" function. Selection bit with the valency 2^0 for "Parameter change-over" function. Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:042 (P400.42)	Function list: Select parameter set (bit 1) (Function list: Sel. paramset b1) • Setting can only be changed if the inverter is inhibited. • For possible settings see description for 0x2631:001 (P400.01). 373	Assignment of a trigger for the "Select parameter set (bit 1)" function. Selection bit with the valency 2^1 for "Parameter change-over" function. Trigger = FALSE: selection bit = "0". Trigger = TRUE: selection bit = "1".
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).

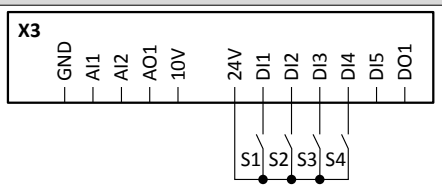
Parameter	Name / value range / [default setting]		Info
0x4046 (P755.00)	Activation of parameter set (PSet activation)		Selection of the activation method for the parameter change-over. • If the selection is changed from "Via command... [0]/[1]" to "If the selection is changed...[2]/[3]" after switch-on, the parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated immediately. In case of selection [2], however, this only takes place if the inverter is disabled, the motor is stopped or an error is active.
	0	**Via command (disable required)**	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated if the trigger assigned to the "Load parameter set" function in 0x2631:040 (P400.40) provides a FALSE-TRUE edge AND the inverter is inhibited, the motor is stopped or an error is active.
	1	Via command (immediately)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is immediately activated if the trigger assigned to the "Load parameter set" function in 0x2631:040 (P400.40) provides a FALSE-TRUE edge.
	2	If the selection is changed (disable required)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated if the state of these selection bits changes AND the inverter is inhibited, the motor is stopped or an error is active.
	3	If the selection is changed (immediately)	The parameter set selected via the functions "Select parameter set (bit 0)" and "Select parameter set (bit 1)" is activated immediately if the state of these selection bits is changed.

12.9.1 Example 1: Activation via command (only when disabled)

Activation method 0x4046 (P755.00) = "Via command (disable required) [0]":

- Switches S3 and S4 serve to select the parameter set (see the following table).
- Switch S2 activates the change-over. Since the change-over is activated with a rising edge, a button (normally-open contact) can be used instead of a switch.
- Change-over is only possible if the motor is not started (switch S1 open).

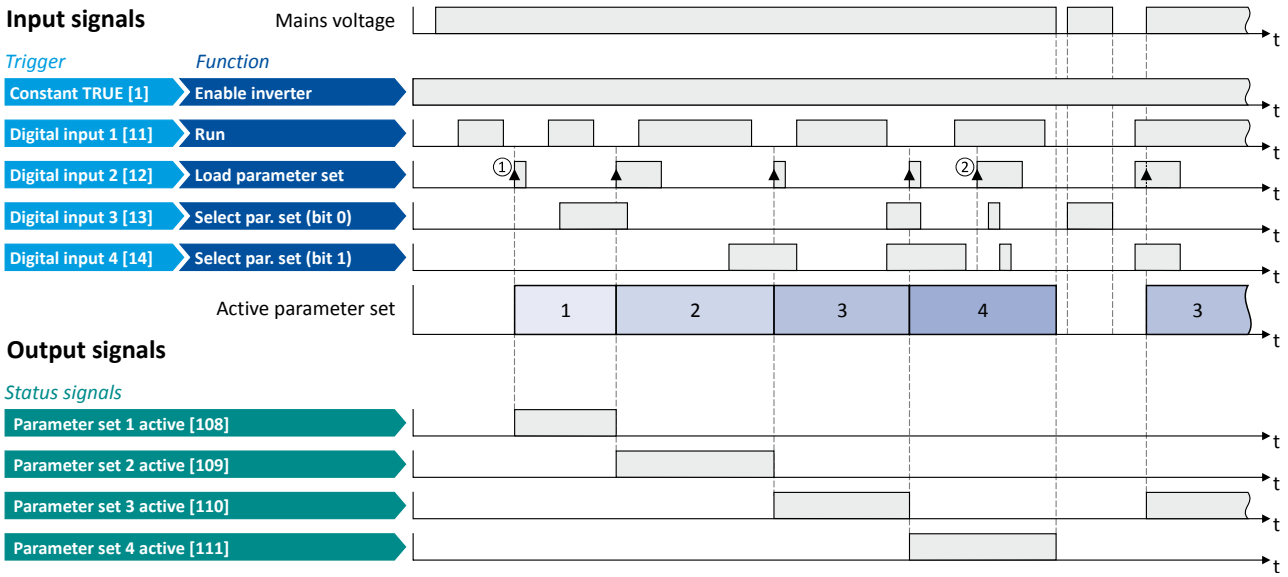
Connection plan



function

Switch S1	Run		
Switch S2	Load parameter set		
Switches S3 ... S4	Parameter set selection:		
	S3	**S4**	
	Off	Off	Parameter set 1
	On	Off	Parameter set 2
	Off	On	Parameter set 3
	On	On	Parameter set 4

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2631:040 (P400.40)	Load parameter set	Digital input 2 [12]
0x2631:041 (P400.41)	Select parameter set (bit 0)	Digital input 3 [13]
0x2631:042 (P400.42)	Select parameter set (bit 1)	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x4046 (P755.00)	Activation of parameter set	Via command (disable required) [0]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

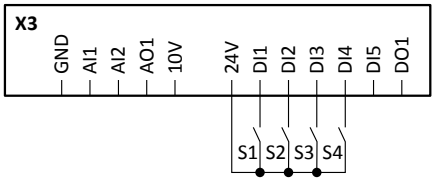
① The change-over is activated with the "Load parameter set" function (FALSE/TRUE edge).

② If the inverter is enabled and the motor is started, a change-over is not possible.

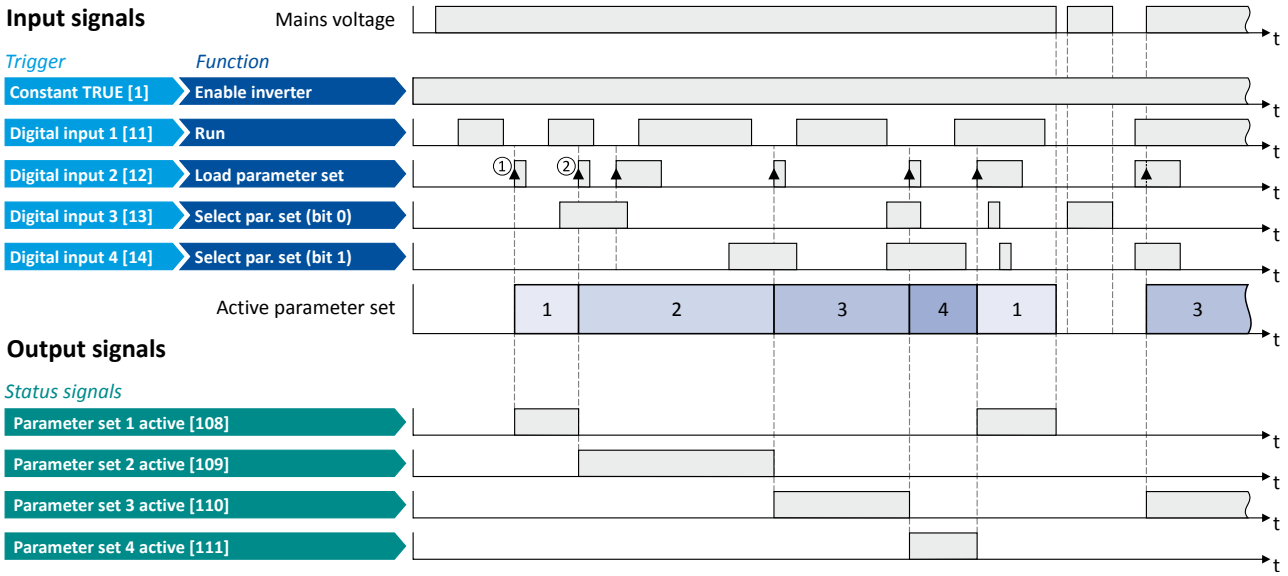
12.9.2 Example 2: Activation via command (immediately)

Activation method 0x4046 (P755.00) = "Via command (immediately) [1]":

- Switches S3 and S4 serve to select the parameter set (see the following table).
- Switch S2 activates the change-over. Since the change-over is activated with a rising edge, a button (normally-open contact) can be used instead of a switch.
- Change-over takes place immediately, even if the motor is started (switch S1 closed).

Connection plan	function			
	Switch S1	Run		
	Switch S2	Load parameter set		
	Switches S3 ... S4	Parameter set selection:		
		S3	**S4**	
		Off	Off	Parameter set 1
		On	Off	Parameter set 2
		Off	On	Parameter set 3
		On	On	Parameter set 4

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2631:040 (P400.40)	Load parameter set	Digital input 2 [12]
0x2631:041 (P400.41)	Select parameter set (bit 0)	Digital input 3 [13]
0x2631:042 (P400.42)	Select parameter set (bit 1)	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x4046 (P755.00)	Activation of parameter set	Via command (immediately) [1]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

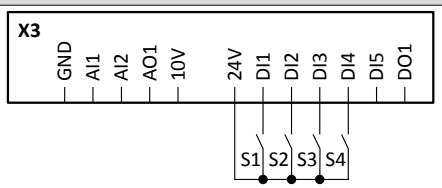
① The change-over is activated with the "Load parameter set" function (FALSE/TRUE edge).
② Change-over is also possible if the inverter is enabled and the motor is started.

12.9.3 Example 3: Activation if the selection is changed (only if the inverter is disabled)

Activation method 0x4046 (P755.00) = "If the selection is changed (disable required) [2]":

- Switches S3 and S4 serve to select the parameter set (see the following table). At the same time, the change-over is activated by a status change of the selection inputs.
- Change-over is only possible if the motor is not started (switch S1 open).
- Switch S2 ("Load parameter set") is ignored in this configuration.

Connection plan

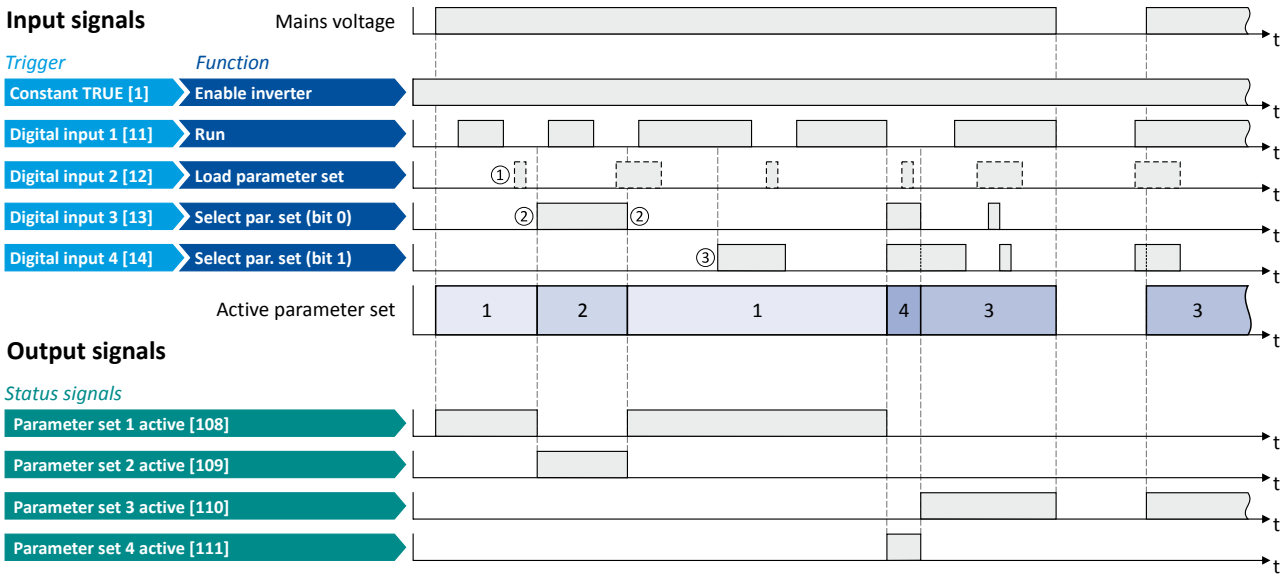


function

Switch S1	Run
Switch S2	Load parameter set (is ignored in this configuration)
Switches S3 ... S4	Parameter set selection and activation at the same time:

S3	S4	
Off	Off	Parameter set 1
On	Off	Parameter set 2
Off	On	Parameter set 3
On	On	Parameter set 4

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2631:040 (P400.40)	Load parameter set	Digital input 2 [12]
0x2631:041 (P400.41)	Select parameter set (bit 0)	Digital input 3 [13]
0x2631:042 (P400.42)	Select parameter set (bit 1)	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x4046 (P755.00)	Activation of parameter set	If the selection is changed (disable required) [2]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 431

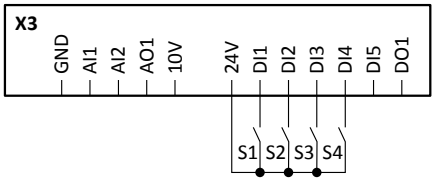
① The "Load parameter set" function is ignored in this configuration.
② Change-over takes place by a status change of the selection inputs.
③ If the inverter is enabled and the motor is started, a change-over is not possible.

12.9.4 Example 4: Activation if the selection is changed (immediately)

Activation method 0x4046 (P755.00) = "If the selection is changed (immediately) [3]":

- Switches S3 and S4 serve to select the parameter set (see the following table). At the same time, the change-over is activated by a status change of the selection inputs.
- Change-over takes place immediately, even if the motor is started (switch S1 closed).
- Switch S2 ("Load parameter set") is ignored in this configuration.

Connection plan

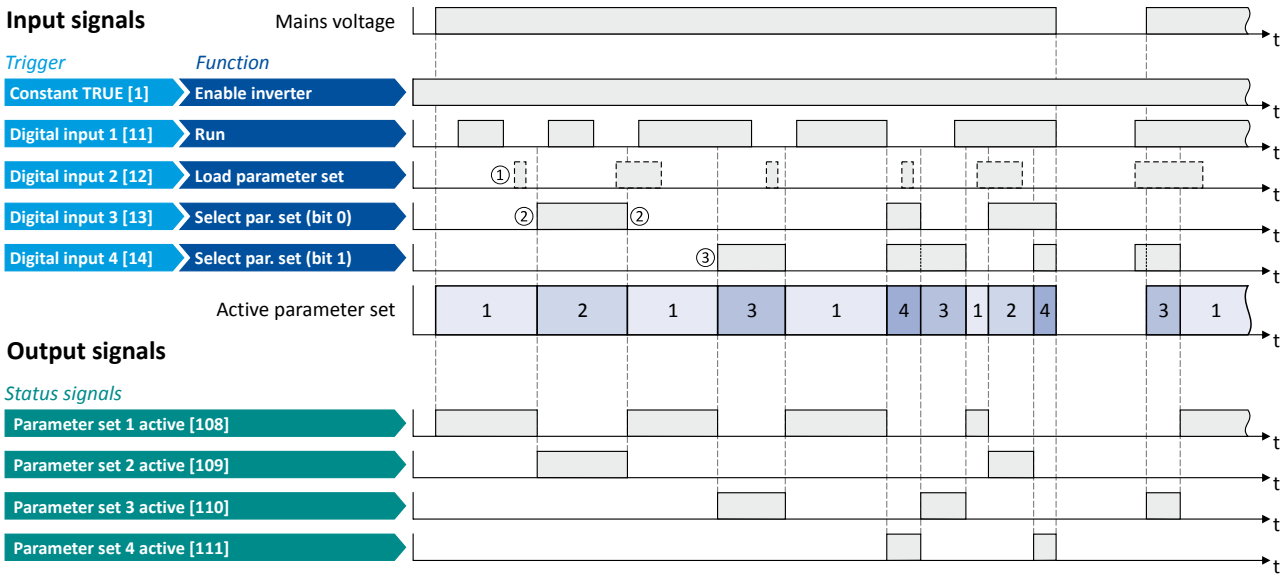


function

Switch S1	Run
Switch S2	Load parameter set (is ignored in this configuration)
Switches S3 ... S4	Parameter set selection and activation at the same time:

S3	S4	
Off	Off	Parameter set 1
On	Off	Parameter set 2
Off	On	Parameter set 3
On	On	Parameter set 4

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:013 (P400.13)	Invert rotation	Not connected [0]
0x2631:018 (P400.18)	Activate preset (bit 0)	Not connected [0]
0x2631:040 (P400.40)	Load parameter set	Digital input 2 [12]
0x2631:041 (P400.41)	Select parameter set (bit 0)	Digital input 3 [13]
0x2631:042 (P400.42)	Select parameter set (bit 1)	Digital input 4 [14]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x4046 (P755.00)	Activation of parameter set	If the selection is changed (immediately) [3]



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① The "Load parameter set" function is ignored in this configuration.
② Change-over takes place by a status change of the selection inputs.
③ Change-over is also possible if the inverter is enabled and the motor is started.

12.10 Process controller function selection

By means of the following functions, the response of the inverter can be controlled when PID control is activated. ▸ Configuring the process controller 📖 273

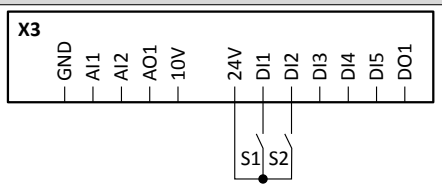
Parameter	Name / value range / [default setting]	Info
0x2631:045 (P400.45)	Function list: Deactivate PID controller (Function list: PID off) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Deactivate PID controller" function. Trigger = TRUE: If PID control is activated, ignore PID control and drive the motor in speed-controlled manner. Trigger = FALSE: If PID control is activated, drive the motor with PID control. Notes: • The PID control mode can be selected in 0x4020:001 (P600.01).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:046 (P400.46)	Function list: Set process controller output to 0 (Function list: PID output=0) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Set process controller output to 0" function. Trigger = TRUE: If PID control is activated, I component and the output of the PID controller are set to 0 and the internal control algorithm is stopped. The PID control remains active. Trigger = FALSE: no action / deactivate function again.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:047 (P400.47)	Function list: Inhibit process controller I-component (Function list: PID-I inhibited) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Inhibit process controller I-component" function. Trigger = TRUE: If PID control is activated, the I component of the PID controller is set to 0 and the integration process is stopped. Trigger = FALSE: no action / deactivate function again. Notes: • The reset time can be set in 0x4049 (P602.00).
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2631:048 (P400.48)	Function list: Activate process controller influence ramp (Function list: PID-Inf ramp on) • For possible settings see description for 0x2631:001 (P400.01). 📖 373	Assignment of a trigger for the "Activate process controller influence ramp" function. Trigger = TRUE: the influence of the process controller is shown via a ramp. Trigger = FALSE or not connected: the influence of the process controller is hidden via ramp. Notes: • The influence of the process controller is always active (not only when PID control is activated). • Acceleration time for showing the influence of the process controller can be set in 0x404C:001 (P607.01). • Deceleration time for hiding the influence of the process controller can be set in 0x404C:002 (P607.02).
	01 **Constant TRUE**	Trigger is constantly TRUE.
0x4020:001 (P600.01)	Process controller: Operating mode (Process control.: Operating mode)	Selection of the process controller operating mode.
	0 **Inhibited**	Process controller deactivated.
	1 Normal operation	The setpoint is higher than the fed back variable (actual value). If the system deviation increases, the motor speed is increased. Example: pressure-controlled booster pumps (increase in the motor speed produces an increase in pressure.)
	2 Reverse operation	The setpoint is lower than the fed back variable (actual value). If the system deviation increases, the motor speed is increased. Example: temperature-controlled cooling water pump (increase in motor speed produces decrease in temperature.)
	3 Normal bi-drectional	The direction of rotation corresponds to the sign of the system deviation. If the system deviation increases, the motor speed is increased.
	4 Reverse bi-directional	A negative system deviation causes a positive direction of rotation. If the system deviation increases, the motor speed is increased.
0x4049 (P602.00)	PID I- component (PID I- component) 20 ... [**400**] ... 6000 ms	Reset time for system deviation. • With the setting "6000 ms", the I component is deactivated. • The I component can also be deactivated via the "Inhibit process controller I-component" 0x2631:047 (P400.47) function.

Parameter	Name / value range / [default setting]	Info
0x404C:001 (P607.01)	PID influence: Acceleration time for showing (PID influence: Show time) 0.0 ... [**5.0**] ... 999.9 s	If the trigger assigned in 0x2631:048 (P400.48) of the "Activate process controller influence ramp" function is TRUE, the influence of the process controller is shown by means of a ramp with the acceleration time set here.
0x404C:002 (P607.02)	PID influence: Deceleration time for masking out (PID influence: Mask out time) 0.0 ... [**5.0**] ... 999.9 s	If the trigger assigned in 0x2631:048 (P400.48) of the "Activate process controller influence ramp" function is FALSE, the influence of the process controller is hidden via a ramp with the deceleration time set here.

Example for operating mode

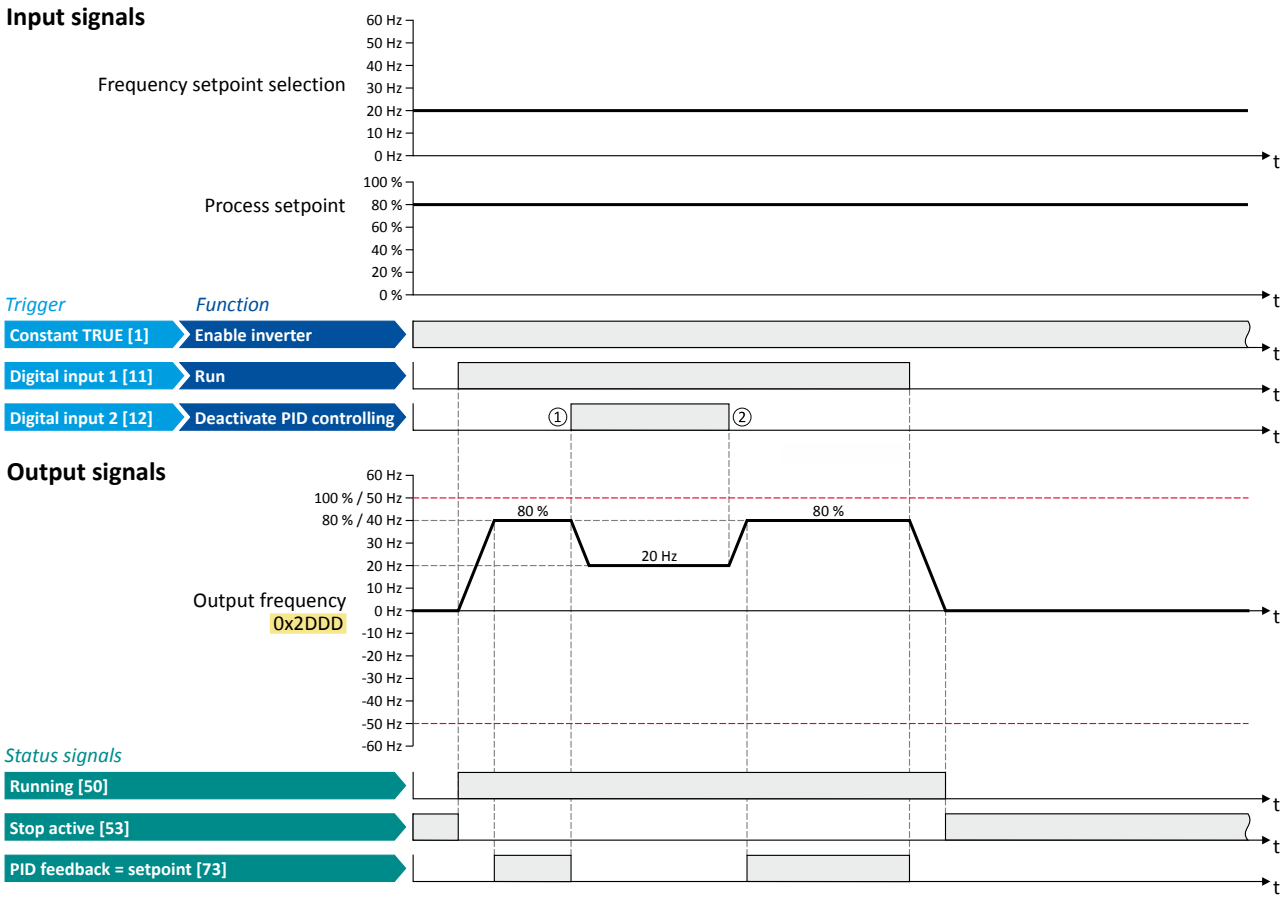
In the following example, the "Deactivate PID controller" function is used to deactivate the PID control temporarily:

- As standard setpoint source, the frequency preset 1 is set to 20 Hz.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.
- Switch S2 deactivates the PID control. The motor is then driven in a speed-controlled way.

Connection plan	function	
	Switch S1	Run
	Switch S2	Deactivate PID controller

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2631:004 (P400.04)	Reset fault	Not connected [0]
0x2631:045 (P400.45)	Deactivate PID controller	Digital input 2 [12]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2838:003 (P203.03)	Stop method	Standard ramp [1]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Frequency preset 1 [11]
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	20 Hz
0x2916 (P211.00)	Maximum frequency	50 Hz

The example assumes that the process controller has been configured accordingly. ▸ Configuring the process controller 🕮 273



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① PID control is deactivated: Change-over from the configured PID control to the speed-controlled operation.

② PID control is activated again: Change-over from the speed-controlled operation to the configured PID control.

12.11 Frequency threshold for "Frequency threshold exceeded" trigger

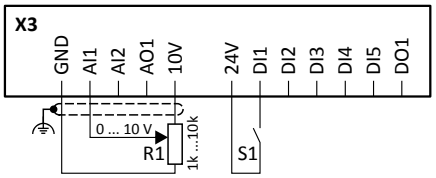
As a function of the current output frequency, the adjustable frequency threshold serves to trigger a certain function or set a digital output.

Parameter	Name / value range / [default setting]	Info
0x4005 (P412.00)	Frequency threshold (Freq. threshold) 0.0 ... [**0.0**] ... 599.0 Hz	Threshold for the "Frequency threshold exceeded [70]" trigger. • The "Frequency threshold exceeded [70]" trigger is TRUE if the current output frequency is higher than the set threshold. • The trigger can be assigned to a function or to a digital output.

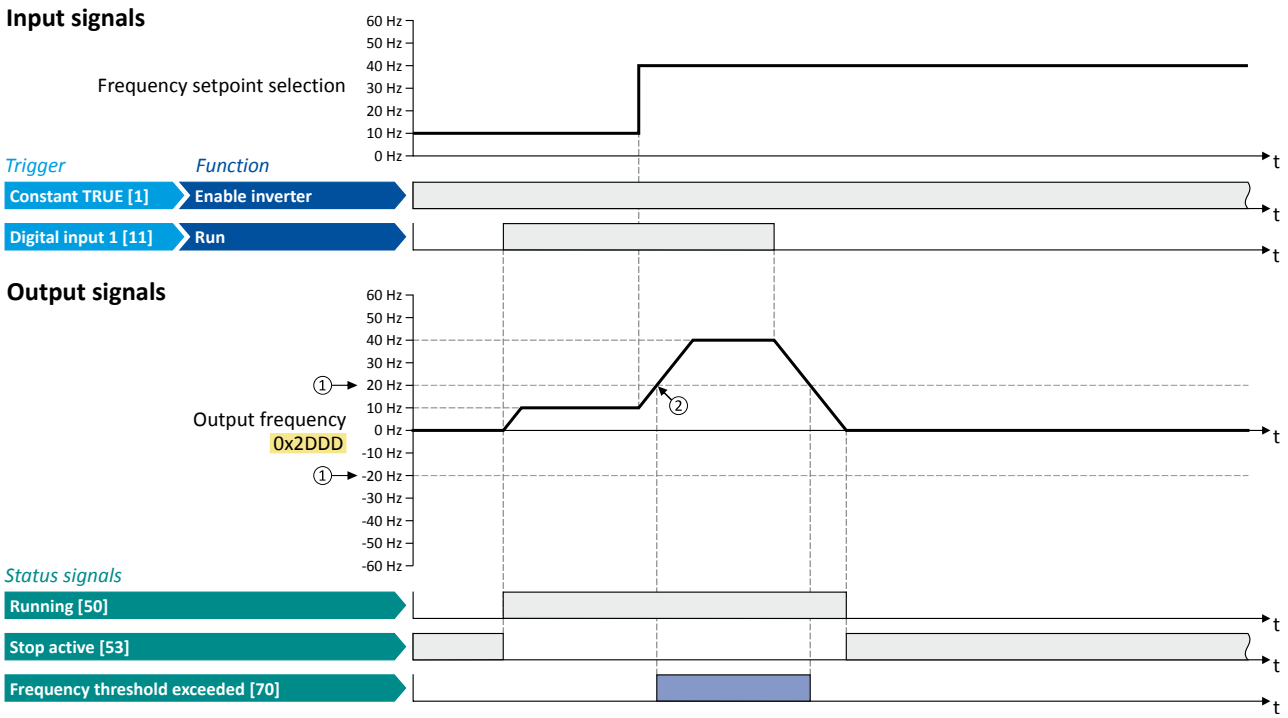
Example for operating mode

In the following example, the digital output 1 is set to TRUE if the output frequency is higher than 20 Hz.

- The analog input 1 is set as standard setpoint source.
- Switch S1 starts the motor in forward direction of rotation. Switch S1 in the initial position stops the motor again.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection
	Switch S1	Run

Parameter	Name	Setting for this example
0x2631:001 (P400.01)	Enable inverter	Constant TRUE [1]
0x2631:002 (P400.02)	Run	Digital input 1 [11]
0x2634:002 (P420.02)	Digital outputs function: Digital output 1	Frequency threshold exceeded [70]
0x2824 (P200.00)	Control selection	Flexible I/O configuration [0]
0x2860:001 (P201.01)	Frequency control: Default setpoint source	Analog input 1 [2]
0x4005 (P412.00)	Frequency threshold	20 Hz



The status signals can be assigned to digital outputs. ▸ Configuration of digital outputs 🕮 431

① Frequency threshold 0x4005 (P412.00)

② Frequency threshold exceeded: Via trigger "Frequency threshold exceeded [70]", the digital output 1 is set to TRUE.

12.12 Configuration of digital inputs

Settings for digital inputs 1 ... 7.

Preconditions

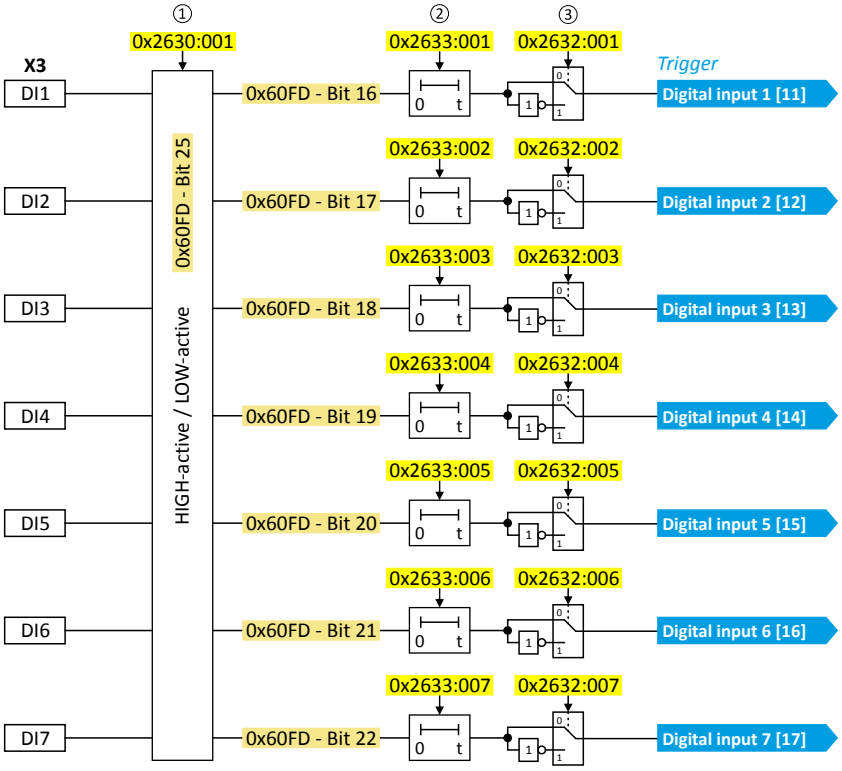
Digital input 6 and digital input 7 are only available for a Control Unit (CU) with application I/O.

Details

The digital inputs are used for control tasks. For this purpose, the digital inputs are available as selectable triggers for functions.

The following settings are possible for the digital inputs:

- Assertion level "HIGH active" or "LOW active" ①
- Debounce time ②
- Inversion ③

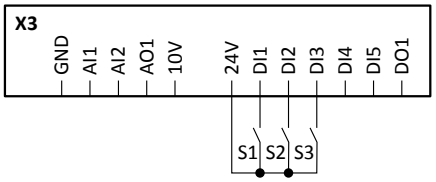
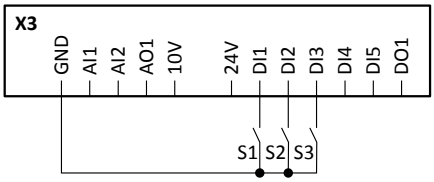


Diagnostic parameters:

- The logic status of the digital inputs is displayed in 0x60FD (P118.00).

Assertion level "HIGH active" or "LOW active"

The digital inputs can be configured in 0x2630:001 (P410.01) HIGH active (default setting) or LOW active:

HIGH active (default setting)	LOW active
• Internally, the digital input terminals are set to LOW level via pull-down resistors. • The current flows from the current supply (e.g. X3/24V) through the contact to the digital input terminal (and internally via the pull-down resistor to GND). • If the contact is closed, the digital input is set to HIGH level and is thus HIGH active.	• Internally, the digital input terminals are set to HIGH level via pull-up resistors. • The current flows from the digital input terminal through the contact to GND. • If the contact is closed, the digital input is set to LOW level and is thus LOW active.
Connection plan (example): 	Connection plan (example): 

Debounce time

For minimising interference pulses, a debounce time of 1 ms is set for all digital inputs.
Via »EASY Starter« (or network), the debounce time for can be increased individually for each digital input to maximally 50 ms.

Inversion

Each digital input can be configured in such a way that the status pending at the terminal is internally inverted logically. This way, a closed contact, for instance, serves to deactivate an assigned function instead of activating it. Thus, the control of the inverter can be flexibly adapted to the requirements of the actual application.

Parameter	Name / value range / [default setting]		Info
0x2630:001 (P410.01)	Settings for digital inputs: Assertion level (DI settings: Assertion level)		Definition of the internal hardware interconnection of the digital input terminal (X3/DIx).
	0	LOW active	Digital input terminals (X3/DIx) are set to HIGH level via pull-up resistors.
	1	**HIGH active**	Digital input terminals (X3/DIx) are set to LOW level via pull-down resistors.
0x2630:002 (P410.02)	Settings for digital inputs: Input function (DI settings: Input function)		Input function of the digital terminals DI3 and DI4.
	0	**Digital input**	DI3 = digital input DI4 = digital input
	1	Encoder (AB) • From version 02.00	DI3 = encoder input B DI4 = encoder input A
0x2632:001 (P411.01)	Inversion of digital inputs: Digital input 1 (DI inversion: DI1 inversion)		Inversion of digital input 1
	0	**Not inverted**	
	1	Inverted	
0x2632:002 (P411.02)	Inversion of digital inputs: Digital input 2 (DI inversion: DI2 inversion)		Inversion of digital input 2
	0	**Not inverted**	
	1	Inverted	
0x2632:003 (P411.03)	Inversion of digital inputs: Digital input 3 (DI inversion: DI3 inversion)		Inversion of digital input 3
	0	**Not inverted**	
	1	Inverted	
0x2632:004 (P411.04)	Inversion of digital inputs: Digital input 4 (DI inversion: DI4 inversion)		Inversion of digital input 4
	0	**Not inverted**	
	1	Inverted	

Parameter	Name / value range / [default setting]	Info
0x2632:005 (P411.05)	Inversion of digital inputs: Digital input 5 (DI inversion: DI5 inversion) **0** **Not inverted** 1 Inverted	Inversion of digital input 5
0x2632:006 (P411.06)	Inversion of digital inputs: Digital input 6 (DI inversion: DI6 inversion) • Only available for application I/O. **0** **Not inverted** 1 Inverted	Inversion of digital input 6
0x2632:007 (P411.07)	Inversion of digital inputs: Digital input 7 (DI inversion: DI7 inversion) • Only available for application I/O. **0** **Not inverted** 1 Inverted	Inversion of digital input 7
0x2633:001	Digital input 1 1 ... [**1**] ... 50 ms	Debounce time of digital input 1
0x2633:002	Digital input 2 1 ... [**1**] ... 50 ms	Debounce time of digital input 2
0x2633:003	Digital input 3 1 ... [**1**] ... 50 ms	Debounce time of digital input 3
0x2633:004	Digital input 4 1 ... [**1**] ... 50 ms	Debounce time of digital input 4
0x2633:005	Digital input 5 1 ... [**1**] ... 50 ms	Debounce time of digital input 5
0x2633:006	Digital input 6 1 ... [**1**] ... 50 ms • Only available for application I/O.	Debounce time of digital input 6
0x2633:007	Digital input 7 1 ... [**1**] ... 50 ms • Only available for application I/O.	Debounce time of digital input 7

Example: Activating two functions simultaneously via digital input 4

The principle of assigning triggers to functions also enables a digital input to be assigned to several functions. The wiring complexity is reduced since there is no necessity to interconnect several digital inputs.

If, for instance, the frequency preset 1 is to be selected via the digital input 4 and a change-over to the acceleration time 2 and deceleration time 2 is to take place at the same time, this can be easily realised by the following parameter setting:

Parameter	Name	Setting for this example
0x2631:018 (P400.18)	Activate preset (bit 0)	Digital input 4 [14]
0x2631:039 (P400.39)	Activate ramp 2	Digital input 4 [14]

In order to achieve the desired behaviour, the digital input 4 must not be assigned to any further functions!

12.13 Configuration of analog inputs

12.13.1 Analog input 1

Settings for analog input 1.

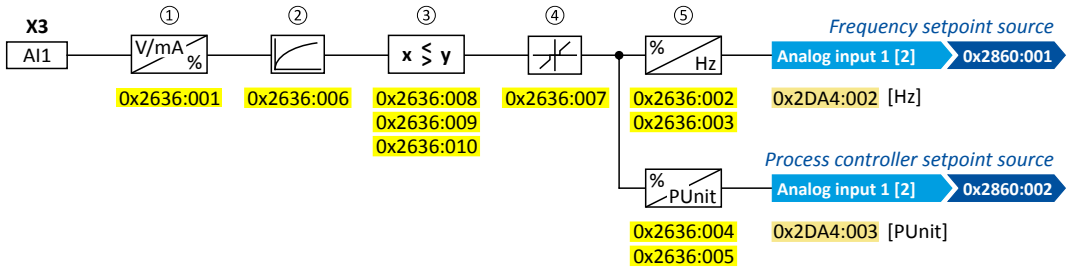
Details

The analog input 1 can be used as setpoint source. ▸ Selection of setpoint source 📖 113

For the process controller, the analog input can be used for the feedback of the variable (actual value) or speed feedforward control. ▸ Basic process controller settings 📖 274

The following settings are possible for the analog input:

- Definition of the input range ①
- Filter time for low-pass filters ②
- Monitoring of the input signal ③
- Dead band for eliminating the smallest signal levels ④
- Definition of the setting range ⑤



Diagnostic parameters:

- The frequency value is displayed in 0x2DA4:002 (P110.02).
- The process controller value is displayed in 0x2DA4:003 (P110.03).

Definition of the input range

The analog input can be configured as voltage or current input. Internally, the signal is always converted to a value in percent.

Definition of the setting range

The setting range results from the set min and max value for the respective mode.

Configuration examples

Detailed configuration examples can be found in the following subchapters:

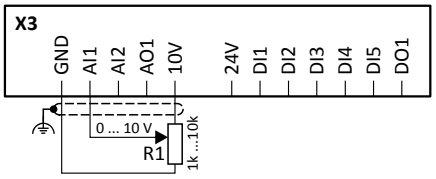
- ▸ Example 1: Input range 0 ... 10 V ≡ setting range 0 ... 50 Hz 📖 427
- ▸ Example 2: Input range 0 ... 10 V ≡ setting range -40 ... +40 Hz 📖 427
- ▸ Example 3: Input range -10 ... +10 V ≡ setting range -40 ... +40 Hz 📖 428
- ▸ Example 4: Error detection 📖 428

Parameter	Name / value range / [default setting]		Info
0x2636:001 (P430.01)	Analog input 1: Input range (Analog input 1: AI1 input range)		Definition of the input range.
	0	**0 ... 10 VDC**	
	1	0 ... 5 VDC	
	2	2 ... 10 VDC	
	3	-10 ... +10 VDC	
	4	4 ... 20 mA	
	5	0 ... 20 mA	
0x2636:002 (P430.02)	Analog input 1: Min frequency value (Analog input 1: AI1 freq @ min) -1000.0 ... [**0.0**] ... 1000.0 Hz		Definition of the setting range for operating mode "MS: Velocity mode". • Direction of rotation according to sign.
0x2636:003 (P430.03)	Analog input 1: Max frequency value (Analog input 1: AI1 freq @ max) -1000.0 ... [**50.0**] ... 1000.0 Hz		

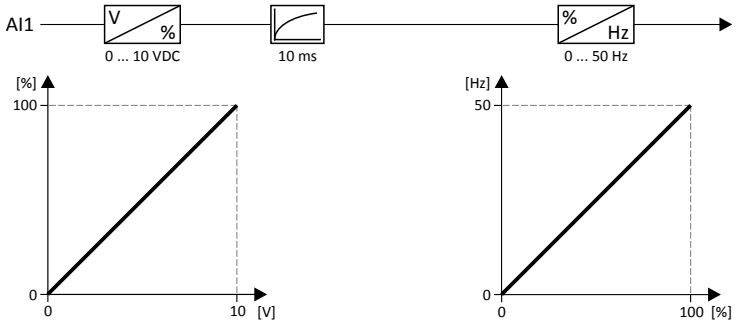
Parameter	Name / value range / [default setting]	Info
0x2636:004 (P430.04)	Analog input 1: Min PID value (Analog input 1: AI1 PID @ min) -300.00 ... [**0.00**] ... 300.00 PID unit/%	Definition of the setting range for PID control.
0x2636:005 (P430.05)	Analog input 1: Max PID value (Analog input 1: AI1 PID @ max) -300.00 ... [**100.00**] ... 300.00 PID unit/%	
0x2636:006 (P430.06)	Analog input 1: Filter time (Analog input 1: AI1 filter time) 0 ... [**10**] ... 10000 ms	PT1 time constant for low-pass filter. • By the use of a low-pass filter, the impacts of noise to an analog signal can be minimised. • For an optimum filter effect, first the noise frequency has to be determined. The time constant then has to be set so that it equals the reciprocal value of the double frequency.
0x2636:007 (P430.07)	Analog input 1: Dead band (Analog input 1: AI1 dead band) 0.0 ... [**0.0**] ... 100.0 %	Optional setting of a dead band that is placed symmetrically around the frequency zero point. • The value set defines half the width of the dead band in [%]. • Example: Setting 2 % results in a dead band of 4 %. • If the analog input value is within the dead band, the output value for the motor control is set to "0".
0x2636:008 (P430.08)	Analog input 1: Monitoring threshold (Analog input 1: AI1 monit.level) -100.0 ... [**0.0**] ... 100.0 %	Monitoring threshold for analog input 1. • 100 % ≡ 10 V (with configuration as voltage input) • 100 % ≡ 20 mA (with configuration as current loop)
0x2636:009 (P430.09)	Analog input 1: Monitoring condition (Analog input 1: AI1 monit.cond.) **0** **Input value < trigger threshold** 1 Input value > trigger threshold	Monitoring condition for analog input 1. • If the selected condition is met, the "Error of analog input 1 active [81]" trigger is set to TRUE. The trigger can be assigned to a function or a digital output. • If the selected condition is met for at least 500 ms, the error response set in 0x2636:010 (P430.10) takes place.
0x2636:010 (P430.10)	Analog input 1: Error response (Analog input 1: AI1 error resp.) • For possible settings see description for 0x2D45:001 (P310.01). 161	Error response for analog input 1. • The selected response takes place if the monitoring condition selected in 0x2636:009 (P430.09) is met for at least 500 ms. Associated error code: • 28801 | 0x7081 - Analog input 1 fault
	3 **Fault**	▸ Error types 107

12.13.1.1 Example 1: Input range 0 ... 10 V ≡ setting range 0 ... 50 Hz

In this configuration, for instance, a frequency setpoint between 0 and 50 Hz can be set with a potentiometer connected to the analog input.

Connection plan	function	
	Potentiometer R1	Frequency setpoint selection (Input voltage 1 V ≡ 5 Hz)

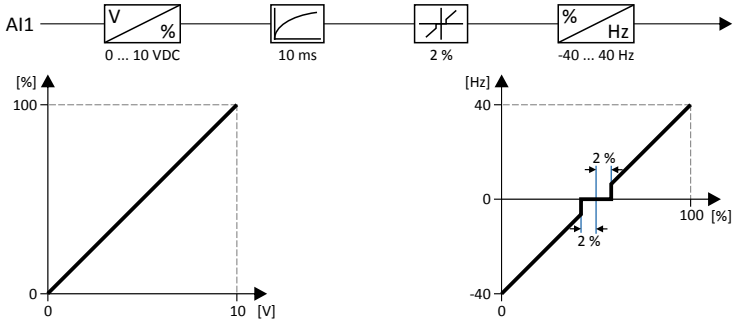
Parameter	Name	Setting for this example
0x2636:001 (P430.01)	Analog input 1: Input range	0 ... 10 VDC [0]
0x2636:002 (P430.02)	Analog input 1: Min frequency value	0.0 Hz
0x2636:003 (P430.03)	Analog input 1: Max frequency value	50.0 Hz
0x2636:006 (P430.06)	Analog input 1: Filter time	10 ms



12.13.1.2 Example 2: Input range 0 ... 10 V ≡ setting range -40 ... +40 Hz

In this example, a bipolar setting range and a dead band with 2 % are configured.

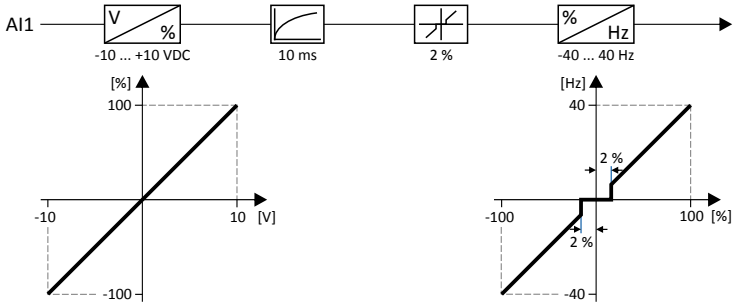
Parameter	Name	Setting for this example
0x2636:001 (P430.01)	Analog input 1: Input range	0 ... 10 VDC [0]
0x2636:002 (P430.02)	Analog input 1: Min frequency value	-40.0 Hz
0x2636:003 (P430.03)	Analog input 1: Max frequency value	40.0 Hz
0x2636:006 (P430.06)	Analog input 1: Filter time	10 ms
0x2636:007 (P430.07)	Analog input 1: Dead band	2.0 %



12.13.1.3 Example 3: Input range -10 ... +10 V ≡ setting range -40 ... +40 Hz

In this example, the input range of the analog input is bipolar. For the setting range that is bipolar as well, a dead band with 2 % is configured.

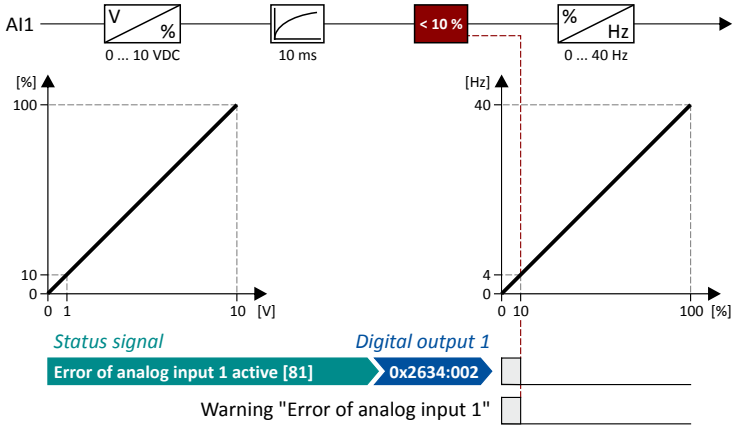
Parameter	Name	Setting for this example
0x2636:001 (P430.01)	Analog input 1: Input range	-10 ... +10 VDC [3]
0x2636:002 (P430.02)	Analog input 1: Min frequency value	-40.0 Hz
0x2636:003 (P430.03)	Analog input 1: Max frequency value	40.0 Hz
0x2636:006 (P430.06)	Analog input 1: Filter time	10 ms
0x2636:007 (P430.07)	Analog input 1: Dead band	2.0 %



12.13.1.4 Example 4: Error detection

In this example, the digital output 1 is set via the trigger "Error of analog input 1 active [81]" if the percentage input value is lower than 10 %. Additionally, a warning is output.

Parameter	Name	Setting for this example
0x2634:002 (P420.02)	Digital outputs function: Digital output 1	Error of analog input 1 active [81]
0x2636:001 (P430.01)	Analog input 1: Input range	0 ... 10 VDC [0]
0x2636:002 (P430.02)	Analog input 1: Min frequency value	0.0 Hz
0x2636:003 (P430.03)	Analog input 1: Max frequency value	40.0 Hz
0x2636:006 (P430.06)	Analog input 1: Filter time	10 ms
0x2636:008 (P430.08)	Analog input 1: Monitoring threshold	10.0 %
0x2636:009 (P430.09)	Analog input 1: Monitoring condition	Input value < trigger threshold [0]
0x2636:010 (P430.10)	Analog input 1: Error response	Warning [1]



12.13.2 Analog input 2

Settings for analog input 2.

Preconditions

Control Unit (CU) with application I/O

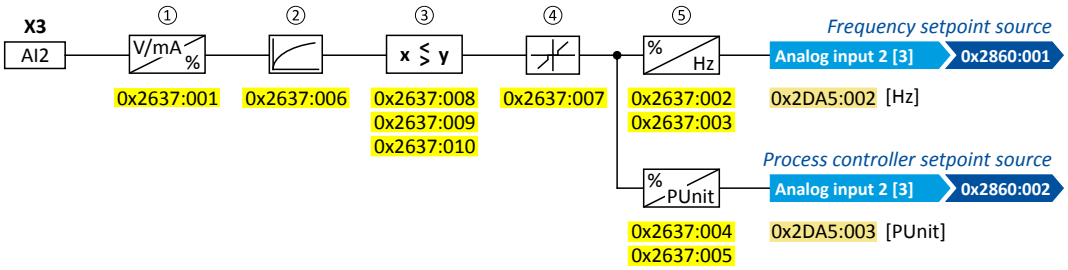
Details

The analog input 2 can be used as setpoint source. ▸ Selection of setpoint source 📖 113

For the process controller, the analog input can be used for the feedback of the variable (actual value) or speed feedforward control. ▸ Basic process controller settings 📖 274

The following settings are possible for the analog input:

- Definition of the input range ①
- Filter time for low-pass filters ②
- Monitoring of the input signal ③
- dead band for eliminating the smallest signal levels ④
- Definition of the setting range ⑤



Diagnostic parameters:

- The frequency value is displayed in 0x2DA5:002 (P111.02).
- The process controller value is displayed in 0x2DA5:003 (P111.03).

For further details and configuration examples, see chapter "Analog input 1". 📖 425

Parameter	Name / value range / [default setting]	Info
0x2637:001 (P431.01)	Analog input 2: Input range (Analog input 2: AI2 input range)	Definition of the input range.
	0 **0 ... 10 VDC**	
	1 0 ... 5 VDC	
	2 2 ... 10 VDC	
	3 -10 ... +10 VDC	
	4 4 ... 20 mA	
	5 0 ... 20 mA	
0x2637:002 (P431.02)	Analog input 2: Min frequency value (Analog input 2: AI2 freq @ min) -1000.0 ... [**0.0**] ... 1000.0 Hz	Definition of the setting range for operating mode "MS: Velocity mode". • Direction of rotation according to sign.
0x2637:003 (P431.03)	Analog input 2: Max frequency value (Analog input 2: AI2 freq @ max) -1000.0 ... [**50.0**] ... 1000.0 Hz	
0x2637:004 (P431.04)	Analog input 2: Min PID value (Analog input 2: AI2 PID @ min) -300.00 ... [**0.00**] ... 300.00 PID unit/%	Definition of the setting range for PID control.
0x2637:005 (P431.05)	Analog input 2: Max PID value (Analog input 2: AI2 PID @ max) -300.00 ... [**100.00**] ... 300.00 PID unit/%	
0x2637:006 (P431.06)	Analog input 2: Filter time (Analog input 2: AI2 filter time) 0 ... [**10**] ... 10000 ms	PT1 time constant for low-pass filter. • By the use of a low-pass filter, the impacts of noise to an analog signal can be minimised. • For an optimum filter effect, first the noise frequency has to be determined. The time constant then has to be set so that it equals the reciprocal value of the double frequency.

Parameter	Name / value range / [default setting]	Info
0x2637:007 (P431.07)	Analog input 2: Dead band (Analog input 2: AI2 dead band) 0.0 ... [**0.0**] ... 100.0 %	Optional setting of a dead band that is placed symmetrically around the frequency zero point. • The value set defines half the width of the dead band in [%]. • Example: Setting 2 % results in a dead band of 4 %. • If the analog input value is within the dead band, the output value for the motor control is set to "0".
0x2637:008 (P431.08)	Analog input 2: Monitoring threshold (Analog input 2: AI2 monit.level) -100.0 ... [**0.0**] ... 100.0 %	Monitoring threshold for analog input 2. Trigger threshold for monitoring the analog input. • 100 % ≡ 10 V (with configuration as voltage input) • 100 % ≡ 20 mA (with configuration as current loop)
0x2637:009 (P431.09)	Analog input 2: Monitoring condition (Analog input 2: AI2 error resp.)	Monitoring condition for analog input 2. Trigger condition for monitoring the analog input. • If the selected condition is met, the "Error of analog input 2 active [82]" trigger is set to TRUE. The trigger can be assigned to a function or a digital output. • If the selected condition is met for at least 500 ms, the error response set in 0x2637:010 (P431.10) takes place. • If the trigger condition is met for at least 500 ms, the response set in subindex 10 is effected.
	0 **Input value < trigger threshold**	Monitoring condition for analog input 2. • If the selected condition is met, the "Error of analog input 2 active [82]" trigger is set to TRUE. The trigger can be assigned to a function or a digital output. • If the selected condition is met for at least 500 ms, the error response set in 0x2637:010 (P431.10) takes place.
	1 Input value > trigger threshold	
0x2637:010 (P431.10)	Analog input 2: Error response (Analog input 2: AI2 error resp.) • For possible settings see description for 0x2D45:001 (P310.01). 161	Error response for analog input 2. • The selected response takes place if the monitoring condition selected in 0x2637:009 (P431.09) is met for at least 500 ms. Associated error code: • 28802 | 0x7082 - Analog input 2 fault
	3 **Fault**	▸ Error types 107

12.14 Configuration of digital outputs

12.14.1 Relay

Settings for the relay.

Relay is not suitable for direct switching of a electromechanical holding brake!

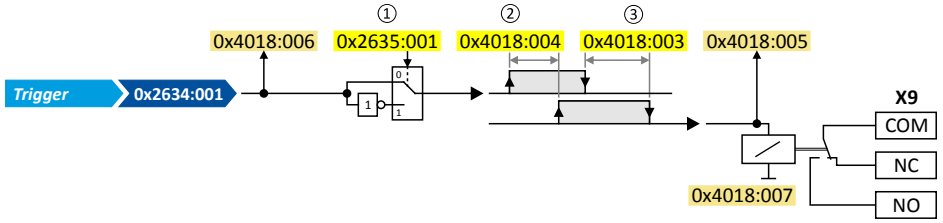
Use a corresponding suppressor circuit in case of an inductive or capacitive load!

Details

The relay is controlled with the trigger selected in 0x2634:001 (P420.01).

The following settings are possible for the relay:

- Inversion ①
- Switch-on delay ②
- Cutout delay ③



Diagnostic parameters:

- The logic status of the trigger signal is displayed in 0x4018:006.
- The logic status of the relay is displayed in 0x4018:005.
- The current switching cycles of the relay are shown in 0x4018:007.

Parameter	Name / value range / [default setting]		Info
0x2634:001 (P420.01)	Digital outputs function: Relay (Dig.out.function: Relay function)		Assignment of a trigger to the relay. Trigger = FALSE: X9/NO-COM open and NC-COM closed. Trigger = TRUE: X9/NO-COM closed and NC-COM open. Notes: • An inversion set in 0x2635:001 (P421.01)is taken into consideration here.
	0	Not connected	No trigger assigned (trigger is constantly FALSE).
	1	Constant TRUE	Trigger is constantly TRUE.
	11	Digital input 1	State of X3/DI1, taking an inversion set in 0x2632:001 (P411.01) into consideration.
	12	Digital input 2	State of X3/DI2, taking an inversion set in 0x2632:002 (P411.02) into consideration.
	13	Digital input 3	State of X3/DI3, taking an inversion set in 0x2632:003 (P411.03) into consideration.
	14	Digital input 4	State of X3/DI4, taking an inversion set in 0x2632:004 (P411.04) into consideration.
	15	Digital input 5	State of X3/DI5, taking an inversion set in 0x2632:005 (P411.05) into consideration.
	16	Digital input 6	State of X3/DI6, taking an inversion set in 0x2632:006 (P411.06) into consideration. Digital input 6 is only available in the Control Unit (CU) with application I/O.
	17	Digital input 7	State of X3/DI7, taking an inversion set in 0x2632:007 (P411.07) into consideration. Digital input 7 is only available in the Control Unit (CU) with application I/O.
	34	NetWordIN2 - bit 0	State of NetWordIN2/bit 0. • Display of NetWordIN2 in 0x4008:002 (P590.02). • For controlling the digital outputs via network, NetWordIN2 can be mapped to a process data input word.
	35	NetWordIN2 - bit 1	State of NetWordIN2/bit 1.

Parameter	Name / value range / [default setting]		Info
	36	NetWordIN2 - bit 2	State of NetWordIN2/bit 2.
	37	NetWordIN2 - bit 3	State of NetWordIN2/bit 3.
	38	NetWordIN2 - bit 4	State of NetWordIN2/bit 4.
	39	NetWordIN2 - bit 5	State of NetWordIN2/bit 5.
	40	NetWordIN2 - bit 6	State of NetWordIN2/bit 6.
	41	NetWordIN2 - bit 7	State of NetWordIN2/bit 7.
	42	NetWordIN2 - bit 8	State of NetWordIN2/bit 8.
	43	NetWordIN2 - bit 9	State of NetWordIN2/bit 9.
	44	NetWordIN2 - bit 10	State of NetWordIN2/bit 10.
	45	NetWordIN2 - bit 11	State of NetWordIN2/bit 11.
	46	NetWordIN2 - bit 12	State of NetWordIN2/bit 12.
	47	NetWordIN2 - bit 13	State of NetWordIN2/bit 13.
	48	NetWordIN2 - bit 14	State of NetWordIN2/bit 14.
	49	NetWordIN2 - bit 15	State of NetWordIN2/bit 15.
	50	Running	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
	51	**Ready for operation**	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
	52	Operation enabled	TRUE if inverter and start are enabled. Otherwise FALSE.
	53	Stop active	TRUE if inverter is enabled and motor is not started and output frequency = 0.
	54	Quick stop active	TRUE if quick stop is active. Otherwise FALSE.
	55	Safe torque off (STO) active	TRUE if the integrated safety system has triggered the "Safe torque off (STO)" function. Otherwise FALSE. ▸ Safe torque off (STO) 🕮 364
	56	Error active	TRUE if error is active. Otherwise FALSE.
	57	Error (non-resettable) active	TRUE if non-resettable error is active. Otherwise FALSE.
	58	Device warning active	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
	59	Device fault active	TRUE if a fault is active. Otherwise FALSE. • In the event of a fault, the motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • Exception: In case of a serious fault, the inverter is disabled immediately. The motor becomes torqueless (coasts). • The error state will be left automatically if the error condition is not active anymore. • The restart behaviour after trouble can be configured. ▸ Automatic restart 🕮 350
	60	Heatsink temperature warning active	TRUE if current heatsink temperature > warning threshold for temperature monitoring. Otherwise FALSE. • Display of the current heatsink temperature in 0x2D84:001 (P117.01). • Setting of the warning threshold in 0x2D84:002.
	65	Motor PTC error active	TRUE if an error of the motor PTC has been detected. Otherwise FALSE. • The trigger is set irrespective of the response set in 0x2D49:002 (P309.02) when the motor temperature monitoring is triggered. ▸ Motor temperature monitoring 🕮 157
	66	Flying restart circuit active	TRUE if flying restart circuit active is active. Otherwise FALSE. ▸ Flying restart circuit 🕮 347
	67	DC braking active	TRUE if DC braking is active. Otherwise FALSE. ▸ DC braking 🕮 290
	69	Rotational direction reversed	TRUE if output frequency is negative. Otherwise FALSE.
	70	Frequency threshold exceeded	TRUE if current output frequency > frequency threshold. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00). • Setting Frequency thresholdin 0x4005 (P412.00). ▸ Frequency threshold for "Frequency threshold exceeded" trigger 🕮 421
	71	Actual speed = 0	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).

Parameter	Name / value range / [default setting]		Info
	72	Setpoint speed reached	TRUE if frequency setpoint reached. Otherwise FALSE.
	73	PID feedback = setpoint	TRUE if the controlled variable fed back = process controller setpoint. Otherwise FALSE. ▸ Basic process controller settings 📖 274
	74	PID idle state active	TRUE if the inverter is in "PID idle state". Otherwise FALSE. ▸ Process controller idle state 📖 280
	75	PID MIN alarm active	TRUE if fed back variable (with activated PID control) < MIN alarm threshold. Otherwise FALSE. • Setting of MIN alarm threshold in 0x404D:001 (P608.01). ▸ Basic process controller settings 📖 274
	76	PID MAX alarm active	TRUE if the fed back variable (with activated PID control) > MAX alarm threshold. Otherwise FALSE. • Setting of MAX alarm threshold in 0x404D:002 (P608.02). ▸ Basic process controller settings 📖 274
	77	PID MIN-MAX alarm active	TRUE if no PID alarm is active with activated PID control (MIN alarm threshold < fed back variable < MAX alarm threshold). Otherwise FALSE. • Setting of MIN alarm threshold in 0x404D:001 (P608.01). • Setting of MAX alarm threshold in 0x404D:002 (P608.02). ▸ Basic process controller settings 📖 274
	78	Current limit reached	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).
	79	Torque limit reached	TRUE if torque limit has been reached or exceeded. Otherwise FALSE. • Setting "Positive torque limit" in 0x60E0. • Setting "Negative torque limit" in 0x60E1.
	80	Follower signal (4 ... 20 mA) lost	Reserve (do not use trigger)
	81	Error of analog input 1 active	TRUE if the monitoring of the input signal at the analog input 1 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2636:008 (P430.08) • Monitoring condition 0x2636:009 (P430.09) The setting of the Error response in 0x2636:010 (P430.10) has no effect on this trigger. ▸ Analog input 1 📖 425
	82	Error of analog input 2 active	TRUE if the monitoring of the input signal at the analog input 2 has responded. Otherwise FALSE. This trigger is set as a function of the following settings: • Monitoring threshold 0x2637:008 (P431.08) • Monitoring condition 0x2637:009 (P431.09) The setting of the Error response in 0x2637:010 (P431.10) has no effect on this trigger. ▸ Analog input 2 📖 429
	83	Load loss detected	TRUE if actual motor current < threshold for load loss detection after delay time of the load loss detection has elapsed. Otherwise FALSE. • Display of the present motor current in 0x6078 (P103.00). • Setting Threshold in 0x4006:001 (P710.01). • Setting Decelerationin 0x4006:002 (P710.02). ▸ Load loss detection 📖 301
	104	Local control active	TRUE if local keypad control ("LOC") active. Otherwise FALSE.
	105	Remote control active	TRUE if remote control ("REM") via terminals, network, etc. active. Otherwise FALSE.
	106	Manual setpoint selection active	TRUE if manual setpoint selection ("MAN") via keypad active. Otherwise FALSE. • Selection of the trigger for the "Activate keypad setpoint" function in 0x2631:016 (P400.16).
	107	Automatic setpoint selection active	TRUE if automatic setpoint selection ("AUTO") via terminals, network, etc. active. Otherwise FALSE.
	108	Parameter set 1 active	TRUE if parameter set 1 is loaded and active. Otherwise FALSE.
	109	Parameter set 2 active	TRUE if parameter set 2 is loaded and active. Otherwise FALSE.
	110	Parameter set 3 active	TRUE if parameter set 3 is loaded and active. Otherwise FALSE.
	111	Parameter set 4 active	TRUE if parameter set 4 is loaded and active. Otherwise FALSE.

Parameter	Name / value range / [default setting]		Info
	112	Parameter set load OK	TRUE after any parameter set has been loaded. Otherwise FALSE.
	113	Parameter set load fail	TRUE if any of the parameter sets could not be loaded. Otherwise FALSE.
	114	Network control active	Reserve (do not use trigger)
	115	Release holding brake	Trigger signal for releasing the holding brake (TRUE = release holding brake). ▸ Holding brake control 🕮 335
0x2635:001 (P421.01)	Inversion of digital outputs: Relay (DO inversion: Relay inverted)		Relay inversion
	0	**Not inverted**	
	1	Inverted	
0x4018:003	Relay: Switch-off delay 0.000 ... [**0.020**] ... 65.535 s		Switch-off delay for the relay.
0x4018:004	Relay: Switch-on delay 0.000 ... [**0.020**] ... 65.535 s		Switch-on delay for the relay.
0x4018:005	Relay: Relay state • Read only		Display of the logic state of the relay.
	0	FALSE	
	1	TRUE	
0x4018:006	Relay: Trigger signal state • Read only		Display of the logic state of the trigger signal for the relay (without taking a ON/OFF delay set and inversion into consideration).
	0	FALSE	
	1	TRUE	
0x4018:007	Relay: Switching cycles • Read only		Display of the previous relay switching cycles.

12.14.2 Digital output 1

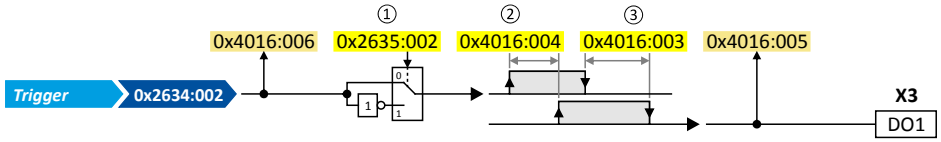
Settings for digital output 1.

Details

The digital output 1 is controlled with the trigger selected in 0x2634:002 (P420.02).

The following settings are possible for the digital output:

- Inversion ①
- Switch-on delay ②
- Cutout delay ③



Diagnostic parameters:

- The logic status of the trigger signal is displayed in 0x4016:006.
- The logic status of the digital output is displayed in 0x4016:005.

Parameter	Name / value range / [default setting]		Info
0x2634:002 (P420.02)	Digital outputs function: Digital output 1 (Dig.out.function: DO1 function) • For possible settings see description for 0x2634:001 (P420.01). 🕮 431		Assignment of a trigger to digital output 1. Trigger = FALSE: X3/DO1 set to LOW level. Trigger = TRUE: X3/DO1 set to HIGH level. Notes: • An inversion set in 0x2635:002 (P421.02) is taken into consideration here.
	115	**Release holding brake**	Trigger signal for releasing the holding brake (TRUE = release holding brake). ▸ Holding brake control 🕮 335
0x2635:002 (P421.02)	Inversion of digital outputs: Digital output 1 (DO inversion: DO1 inversion)		Inversion of digital output 1
	0	**Not inverted**	
	1	Inverted	

Parameter	Name / value range / [default setting]	Info
0x4016:003	Digital output 1: Cutout delay 0.000 ... [**0.020**] ... 65.535 s	Switch-off delay for digital output 1.
0x4016:004	Digital output 1: Switch-on delay 0.000 ... [**0.020**] ... 65.535 s	Switch-on delay for digital output 1.
0x4016:005	Digital output 1: Terminal state • Read only	Display of the logic state of output terminal X3/DO1.
	0 FALSE	
	1 TRUE	
0x4016:006	Digital output 1: Trigger signal state • Read only	Display of the logic state of the trigger signal for digital output 1 (without taking a ON/OFF delay set and inversion into consideration).
	0 FALSE	
	1 TRUE	

12.14.3 Digital output 2

Settings for digital output 2.

Preconditions

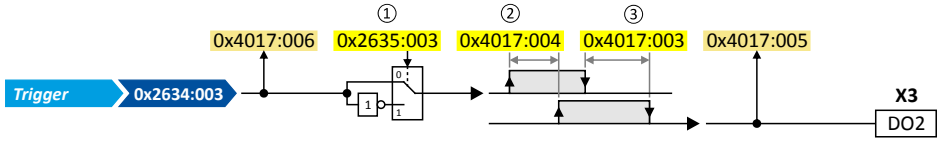
Control Unit (CU) with application I/O

Details

The digital output 2 is controlled with the trigger selected in 0x2634:003 (P420.03).

The following settings are possible for the digital output:

- Inversion ①
- Switch-on delay ②
- Cutout delay ③



Diagnostic parameters:

- The logic status of the trigger signal is displayed in 0x4017:006.
- The logic status of the digital output is displayed in 0x4017:005.

Parameter	Name / value range / [default setting]	Info
0x2634:003 (P420.03)	Digital outputs function: Digital output 2 (Dig.out.function: DO2 function) • Only available for application I/O. • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to digital output 2. Trigger = FALSE: X3/DO2 set to LOW level. Trigger = TRUE: X3/DO2 set to HIGH level. Notes: • An inversion set in 0x2635:003 (P421.03) is taken into consideration here.
	56 Error active	TRUE if error is active. Otherwise FALSE.
0x2635:003 (P421.03)	Inversion of digital outputs: Digital output 2 (DO inversion: DO2 inversion) • Only available for application I/O.	Inversion of digital output 2
	0 Not inverted	
	1 Inverted	
0x4017:003	Digital output 2: Cutout delay 0.000 ... [**0.020**] ... 65.535 s • Only available for application I/O.	Switch-off delay for digital output 2.
0x4017:004	Digital output 2: Switch-on delay 0.000 ... [**0.020**] ... 65.535 s • Only available for application I/O.	Switch-on delay for digital output 2.
0x4017:005	Digital output 2: Terminal state • Read only • Only available for application I/O.	Display of the logic state of output terminal X3/DO2.
	0 FALSE	
	1 TRUE	

Parameter	Name / value range / [default setting]	Info
0x4017:006	Digital output 2: Trigger signal state • Read only • Only available for application I/O.	Display of the logic state of the trigger signal for digital output 2 (without taking a ON/OFF delay set and inversion into consideration).
	0 FALSE	
	1 TRUE	

12.14.4 NetWordOUT1 status word

Assignment of digital triggers to bit 0 ... bit 15 of the NetWordOUT1 status word.

Details

The following table shows the preset status assignment of the NetWordOUT1 data word:

Bit	Default setting	For details and configuration, see
0	Ready for operation	0x2634:010 (P420.10)
1	Not connected	0x2634:011 (P420.11)
2	Operation enabled	0x2634:012 (P420.12)
3	Error active	0x2634:013 (P420.13)
4	Not connected	0x2634:014 (P420.14)
5	Quick stop active	0x2634:015 (P420.15)
6	Running	0x2634:016 (P420.16)
7	Device warning active	0x2634:017 (P420.17)
8	Not connected	0x2634:018 (P420.18)
9	Not connected	0x2634:019 (P420.19)
10	Setpoint speed reached	0x2634:020 (P420.20)
11	Current limit reached	0x2634:021 (P420.21)
12	Actual speed = 0	0x2634:022 (P420.22)
13	Rotational direction reversed	0x2634:023 (P420.23)
14	Release holding brake	0x2634:024 (P420.24)
15	Safe torque off (STO) active	0x2634:025 (P420.25)

The following parameters can be used to change the status assignment of the NetWordOUT1 data word.

Parameter	Name / value range / [default setting]	Info
0x2634:010 (P420.10)	Digital outputs function: NetWordOUT1 - bit 0 (Dig.out.function: NetWordOUT1.00) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 0 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	51 Ready for operation	TRUE if inverter is ready for operation (no error active, no STO active and DC-bus voltage ok). Otherwise FALSE.
0x2634:011 (P420.11)	Digital outputs function: NetWordOUT1 - bit 1 (Dig.out.function: NetWordOUT1.01) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 1 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	00 Not connected	No trigger assigned (trigger is constantly FALSE).
0x2634:012 (P420.12)	Digital outputs function: NetWordOUT1 - bit 2 (Dig.out.function: NetWordOUT1.02) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 2 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	52 Operation enabled	TRUE if inverter and start are enabled. Otherwise FALSE.
0x2634:013 (P420.13)	Digital outputs function: NetWordOUT1 - bit 3 (Dig.out.function: NetWordOUT1.03) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 3 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	56 Error active	TRUE if error is active. Otherwise FALSE.
0x2634:014 (P420.14)	Digital outputs function: NetWordOUT1 - bit 4 (Dig.out.function: NetWordOUT1.04) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 4 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	00 Not connected	No trigger assigned (trigger is constantly FALSE).

Parameter	Name / value range / [default setting]	Info
0x2634:015 (P420.15)	Digital outputs function: NetWordOUT1 - bit 5 (Dig.out.function: NetWordOUT1.05) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 5 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	54 **Quick stop active**	TRUE if quick stop is active. Otherwise FALSE.
0x2634:016 (P420.16)	Digital outputs function: NetWordOUT1 - bit 6 (Dig.out.function: NetWordOUT1.06) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 6 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	50 **Running**	TRUE if inverter and start are enabled and output frequency > 0.2 Hz. Otherwise FALSE.
0x2634:017 (P420.17)	Digital outputs function: NetWordOUT1 - bit 7 (Dig.out.function: NetWordOUT1.07) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 7 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	58 **Device warning active**	TRUE if warning is active. Otherwise FALSE. • A warning has no impact on the operating status of the inverter. • A warning is reset automatically if the cause has been eliminated.
0x2634:018 (P420.18)	Digital outputs function: NetWordOUT1 - bit 8 (Dig.out.function: NetWordOUT1.08) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 8 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2634:019 (P420.19)	Digital outputs function: NetWordOUT1 - bit 9 (Dig.out.function: NetWordOUT1.09) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 9 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	00 **Not connected**	No trigger assigned (trigger is constantly FALSE).
0x2634:020 (P420.20)	Digital outputs function: NetWordOUT1 - bit 10 (Dig.out.function: NetWordOUT1.10) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 10 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	72 **Setpoint speed reached**	TRUE if frequency setpoint reached. Otherwise FALSE.
0x2634:021 (P420.21)	Digital outputs function: NetWordOUT1 - bit 11 (Dig.out.function: NetWordOUT1.11) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 11 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	78 **Current limit reached**	TRUE if current motor current ≥ maximum current. Otherwise FALSE. • Display of the present motor current in 0x2D88 (P104.00). • Setting for the maximum current in 0x6073 (P324.00).
0x2634:022 (P420.22)	Digital outputs function: NetWordOUT1 - bit 12 (Dig.out.function: NetWordOUT1.12) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 12 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	71 **Actual speed = 0**	TRUE if current output frequency = 0 Hz (± 0.01 Hz), irrespective of the operating mode. Otherwise FALSE. • Display of the current output frequency in 0x2DDD (P100.00).
0x2634:023 (P420.23)	Digital outputs function: NetWordOUT1 - bit 13 (Dig.out.function: NetWordOUT1.13) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 13 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	69 **Rotational direction reversed**	TRUE if output frequency is negative. Otherwise FALSE.
0x2634:024 (P420.24)	Digital outputs function: NetWordOUT1 - bit 14 (Dig.out.function: NetWordOUT1.14) • For possible settings see description for 0x2634:001 (P420.01). 📖 431	Assignment of a trigger to bit 14 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	115 **Release holding brake**	Trigger signal for releasing the holding brake (TRUE = release holding brake). ▸ Holding brake control 📖 335

Parameter	Name / value range / [default setting]	Info
0x2634:025 (P420.25)	Digital outputs function: NetWordOUT1 - bit 15 (Dig.out.function: NetWordOUT1.15) • For possible settings see description for 0x2634:001 (P420.01). 431	Assignment of a trigger to bit 15 of NetWordOUT1. Trigger = FALSE: bit set to 0. Trigger = TRUE: bit set to 1.
	55 Safe torque off (STO) active	TRUE if the integrated safety system has triggered the "Safe torque off (STO)" function. Otherwise FALSE. ▸ Safe torque off (STO) 364
0x2635:010	Inversion of digital outputs: NetWordOUT1.00	Inversion of bit 0 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:011	Inversion of digital outputs: NetWordOUT1.01	Inversion of bit 1 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:012	Inversion of digital outputs: NetWordOUT1.02	Inversion of bit 2 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:013	Inversion of digital outputs: NetWordOUT1.03	Inversion of bit 3 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:014	Inversion of digital outputs: NetWordOUT1.04	Inversion of bit 4 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:015	Inversion of digital outputs: NetWordOUT1.05	Inversion of bit 5 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:016	Inversion of digital outputs: NetWordOUT1.06	Inversion of bit 6 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:017	Inversion of digital outputs: NetWordOUT1.07	Inversion of bit 7 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:018	Inversion of digital outputs: NetWordOUT1.08	Inversion of bit 8 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:019	Inversion of digital outputs: NetWordOUT1.09	Inversion of bit 9 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:020	Inversion of digital outputs: NetWordOUT1.10	Inversion of bit 10 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:021	Inversion of digital outputs: NetWordOUT1.11	Inversion of bit 11 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:022	Inversion of digital outputs: NetWordOUT1.12	Inversion of bit 12 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:023	Inversion of digital outputs: NetWordOUT1.13	Inversion of bit 13 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:024	Inversion of digital outputs: NetWordOUT1.14	Inversion of bit 14 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	
0x2635:025	Inversion of digital outputs: NetWordOUT1.15	Inversion of bit 15 of NetWordOUT1.
	0 Not inverted	
	1 Inverted	

12.15 Configuration of analog outputs

12.15.1 Analog output 1

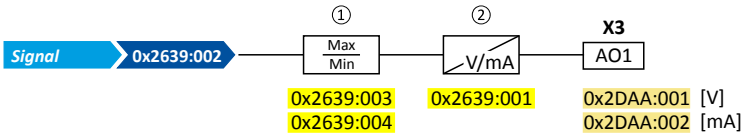
Settings for analog input 1.

Details

The analog output 1 is controlled with the signal selected in 0x2639:002 (P440.02).

The following settings are possible for the analog output:

- Definition of the signal range ①
- Definition of the output range ②



Diagnostic parameters:

- The current output voltage is displayed in 0x2DAA:001 (P112.01).
- The actual output current is displayed in 0x2DAA:002 (P112.02).

Definition of the signal range

The signal range results from the resolution of the selected signal multiplied by the set min and max signal value. Signals outside the signal range are cut off. For examples, see the following table:

Signal 0x2639:002 (P440.02)	Resolution	Min. signal 0x2639:003 (P440.03)	Max. signal 0x2639:004 (P440.04)	Signal range
output frequency	0.1 Hz	0	1000	0 ... 100.0 Hz
frequency setpoint	0.1 Hz	0	1000	0 ... 100.0 Hz
Analog input 1	0.1 %	0	1000	0 ... 100.0 %
Analog input 2	0.1 %	0	1000	0 ... 100.0 %
Motor current	0.1 A	0	100	0 ... 10.0 A
Output power	0.001 kW	0	250	0 ... 0.250 kW
NetWordIN3	0.1 %	200	500	20.0 ... 50.0 %
NetWordIN4	0.1 %	0	250	0 ... 25.0 %

Detailed configuration examples can be found in the following subchapters.

Definition of the output range

The analog output can be configured as voltage or current source. The output range selected in 0x2639:001 (P440.01) then corresponds to the configured signal range.

Configuration examples

Detailed configuration examples can be found in the following subchapters:

▸ Example 1: Output voltage 0 ... 10 V ≡ output frequency 0 ... 100 Hz 🕮 440

▸ Example 2: Output voltage 2 ... 10 V ≡ output frequency 30 ... 60 Hz 🕮 441

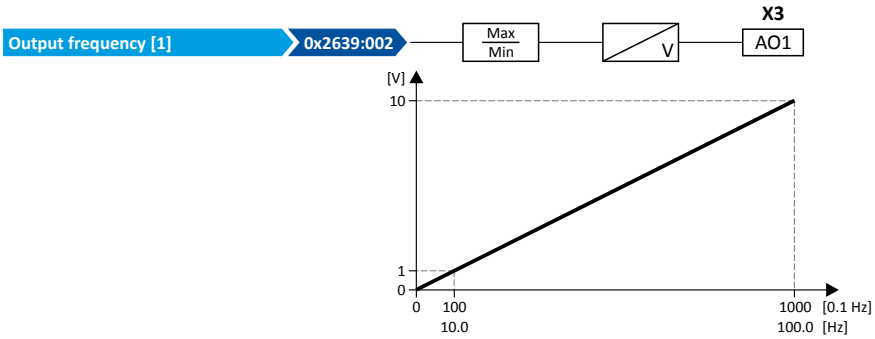
Parameter	Name / value range / [default setting]		Info
0x2639:001 (P440.01)	Analog output 1: Output range (Analog output 1: AO1 outp. range)		Definition of the output range.
	0	Inhibited	
	1	**0 ... 10 VDC**	
	2	0 ... 5 VDC	
	3	2 ... 10 VDC	
	4	4 ... 20 mA	
	5	0 ... 20 mA	

Parameter	Name / value range / [default setting]		Info
0x2639:002 (P440.02)	Analog output 1: Function (Analog output 1: AO1 function)		Selection of the signal to be shown at analog output 1.
	0	Not active	No output signal.
	1	**Output frequency**	Actual output frequency (resolution: 0.1 Hz).
	2	Frequency setpoint	Actual frequency setpoint (resolution: 0.1 Hz).
	3	Analog input 1	Input signal of analog input 1 (resolution: 0.1 %).
	4	Analog input 2	Input signal of analog input 2 (resolution: 0.1 %).
	5	Motor current	Actual motor current (resolution: 0.1 A).
	6	Output power	Actual output power (resolution: 0.001 kW).
	20	NetWordIN3	Actual value of the NetWordIN3 data word (resolution: 0.1 %). ▸ Further process data 🕮 181
	21	NetWordIN4	Actual value of the NetWordIN4 data word (resolution: 0.1 %). ▸ Further process data 🕮 181
0x2639:003 (P440.03)	Analog output 1: Min. signal (Analog output 1: AO1 min. signal) -2147483648 ... [**0**] ... 2147483647		Definition of the signal value that corresponds to the minimum value at analog output 1. Example: configuration of analog output 1 as a 4 ... 20 mA current loop: output current 4 mA ≡ 0x2639:003
0x2639:004 (P440.04)	Analog output 1: Max. signal (Analog output 1: AO1 max. signal) -2147483648 ... [**1000**] ... 2147483647		Definition of the signal value that corresponds to the maximum value at analog output 1. Example: configuration of analog output 1 as a 4 ... 20 mA current loop: output current 20 mA ≡ 0x2639:004
0x4008:003 (P590.03)	Process input words: NetWordIN3 (NetWordINx: NetWordIN3) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN3 [20]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN3 [20]"
0x4008:004 (P590.04)	Process input words: NetWordIN4 (NetWordINx: NetWordIN4) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN4 [21]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN4 [21]"

12.15.1.1 Example 1: Output voltage 0 ... 10 V ≡ output frequency 0 ... 100 Hz

In this configuration, a voltage is provided at the analog output proportionately to the current output frequency of the inverter (1 V ≡ 10 Hz, resolution 0.1 Hz).

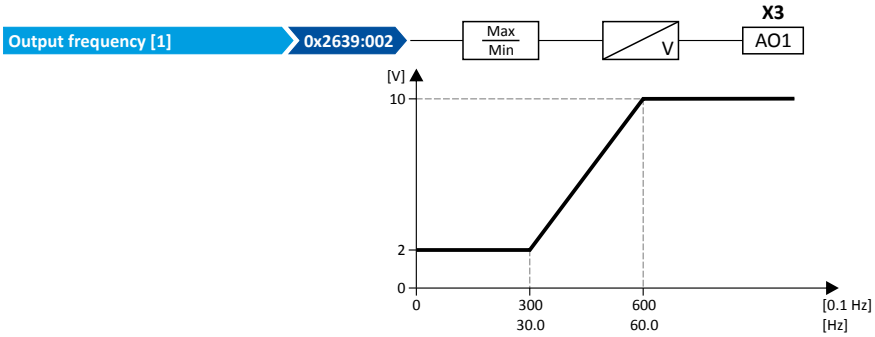
Parameter	Name	Setting for this example
0x2639:001 (P440.01)	Analog output 1: Output range	0 ... 10 VDC [1]
0x2639:002 (P440.02)	Analog output 1: Function	Output frequency [1]
0x2639:003 (P440.03)	Analog output 1: Min. signal	0
0x2639:004 (P440.04)	Analog output 1: Max. signal	1000



12.15.1.2 Example 2: Output voltage 2 ... 10 V ≡ output frequency 30 ... 60 Hz

In this configuration, the output range 2 ... 10 V is used for the output of the output frequency (resolution: 0.1 Hz). The example shows how the signals outside the signal range (here: 30 ... 60 Hz) are cut off.

Parameter	Name	Setting for this example
0x2639:001 (P440.01)	Analog output 1: Output range	2 ... 10 VDC [3]
0x2639:002 (P440.02)	Analog output 1: Function	Output frequency [1]
0x2639:003 (P440.03)	Analog output 1: Min. signal	300
0x2639:004 (P440.04)	Analog output 1: Max. signal	600



12.15.2 Analog output 2

Settings for analog input 2.

Preconditions

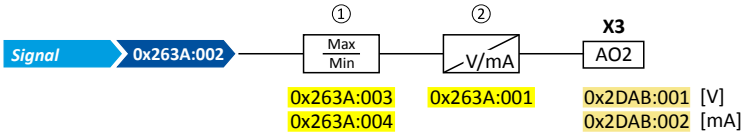
Control Unit (CU) with application I/O

Details

The analog output 2 is controlled with the signal selected in 0x263A:002 (P441.02).

The following settings are possible for the analog output:

- Definition of the signal range ①
- Definition of the output range ②



Diagnostic parameters:

- The current output voltage is displayed in 0x2DAB:002 (P113.02).
- The actual output current is displayed in 0x2DAB:001 (P113.01).

For further details and configuration examples, see chapter "Analog output 1". 📖 439

Parameter	Name / value range / [default setting]		Info
0x263A:001 (P441.01)	Analog output 2: Output range (Analog output 2: AO2 outp. range) • Only available for application I/O.		Definition of the output range.
	0	Inhibited	
	1	**0 ... 10 VDC**	
	2	0 ... 5 VDC	
	3	2 ... 10 VDC	
	4	4 ... 20 mA	
	5	0 ... 20 mA	

Parameter	Name / value range / [default setting]		Info
0x263A:002 (P441.02)	Analog output 2: Function (Analog output 2: AO2 function) • Only available for application I/O.		Selection of the signal to be shown at analog output 2.
	0	Not active	No output signal.
	1	Output frequency	Actual output frequency (resolution: 0.1 Hz).
	2	Frequency setpoint	Actual frequency setpoint (resolution: 0.1 Hz).
	3	Analog input 1	Input signal of analog input 1 (resolution: 0.1 %).
	4	Analog input 2	Input signal of analog input 2 (resolution: 0.1 %).
	5	**Motor current**	Actual motor current (resolution: 0.1 A).
	6	Output power	Actual output power (resolution: 0.001 kW).
	20	NetWordIN3	Actual value of the NetWordIN3 data word (resolution: 0.1 %). ▸ Further process data 🕮 181
	21	NetWordIN4	Actual value of the NetWordIN4 data word (resolution: 0.1 %). ▸ Further process data 🕮 181
0x263A:003 (P441.03)	Analog output 2: Min. signal (Analog output 2: AO2 min. signal) -2147483648 ... [**0**] ... 2147483647 • Only available for application I/O.		Definition of the signal value that corresponds to the minimum value at analog output 2. Example: configuration of analog output 1 as a 4 ... 20 mA current loop: output current 4 mA ≡ 0x263A:003
0x263A:004 (P441.04)	Analog output 2: Max. signal (Analog output 2: AO2 max. signal) -2147483648 ... [**1000**] ... 2147483647 • Only available for application I/O.		Definition of the signal value that corresponds to the maximum value at analog output 2. Example: configuration of analog output 1 as a 4 ... 20 mA current loop: output current 20 mA ≡ 0x263A:004
0x4008:003 (P590.03)	Process input words: NetWordIN3 (NetWordINx: NetWordIN3) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN3 [20]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN3 [20]"
0x4008:004 (P590.04)	Process input words: NetWordIN4 (NetWordINx: NetWordIN4) 0.0 ... [**0.0**] ... 100.0 %		Mappable data word for optional control of an analog output via network. Assignment of the analog outputs: • Analog output 1: 0x2639:002 (P440.02) = "NetWordIN4 [21]" • Analog output 2: 0x263A:002 (P441.02) = "NetWordIN4 [21]"

13 Technical data

13.1 Standards and operating conditions

13.1.1 Conformities/approvals

Conformities		
CE	2014/35/EU	Low-Voltage Directive
	2014/30/EU	EMC Directive (reference: CE-typical drive system)
EAC	TR TC 004/2011	Eurasian conformity: safety of low voltage equipment
	TP TC 020/2011	Eurasian conformity: electromagnetic compatibility of technical means
RoHS 2	2011/65/EU	Restrictions for the use of specific hazardous materials in electric and electronic devices
Approvals		
UL	UL 61800-5-1	for USA and Canada (requirements of the CSA 22.2 No. 274)
		0.25 kW … 45 kW (55 kW … 75 kW in preparation)

13.1.2 Protection of persons and device protection

Degree of protection		
IP20	EN 60529	
Type 1	NEMA 250	Protection against contact
Open type		only in UL-approved systems
Insulation resistance		
Overvoltage category III	EN 61800-5-1	0 … 2000 m a.m.s.l.
Overvoltage category II		above 2000 m a.m.s.l.
Control circuit isolation		
Safe mains isolation by double/reinforced insulation	EN 61800-5-1	
Protective measures against		
Short circuit		
Earth fault		Earth fault strength depends on the operating status
Overvoltage		
Motor stalling		
Motor overtemperature		PTC or thermal contact, I^2xt monitoring
Leakage current		
> 3.5 mA AC, > 10 mA DC	EN 61800-5-1	Observe regulations and safety instructions!
Cyclic mains switching		
3 times per minute		Without restrictions
Starting current		
≤ 3 x rated mains current		

13.1.3 EMC data

Operation on public supply systems		
Implement measures to limit the radio interference to be expected:		The machine or plant manufacturer is responsible for compliance with the requirements for the machine/plant!
< 1 kW: with mains choke	EN 61000-3-2	
> 1 kW at mains current ≤ 16 A: without additional measures		
Mains current > 16 A: with mains choke or mains filter, with dimensioning for rated power. Rsce ≥ 120 is to be met.	EN 61000-3-12	RSCE: short-circuit power ratio at the connection point of the machine/plant to the public network.
Noise emission		
Category C1	EN 61800-3	Type-dependent, for motor cable lengths see rated data
Category C2		
Noise immunity		
Meets requirement in compliance with	EN 61800-3	

13.1.4 Motor connection

Requirements to the shielded motor cable		
Capacitance per unit length		
C-core-core/C-core-shield < 75/150 pF/m		≤ 2.5 mm² / AWG 14
C-core-core/C-core-shield < 150/300 pF/m		≥ 4 mm² / AWG 12
Electric strength		
Uo/U = 0.6/1.0 kV		Uo = r.m.s. value external conductor to PE
U ≥ 600 V	UL	U = r.m.s. value external conductor/external conductor

13.1.5 Environmental conditions

Energy efficiency		
Class IE2	EN 50598-2	Reference: Lenze setting (switching frequency 8 kHz variable)
Climate		
1K3 (-25 ... +60 °C)	EN 60721-3-1	Storage
2K3 (-25 ... +70 °C)	EN 60721-3-2	Transport
3K3 (-10 ... +55 °C)	EN 60721-3-3	Operation
		Operation at a switching frequency of 2 or 4 kHz: above +45°C, reduce rated output current by 2.5 %/°C
		Operation at a switching frequency of 8 or 16 kHz: above +40°C, reduce rated output current by 2.5 %/°C
Site altitude		
0 … 1000 m a.m.s.l.		
1000 … 4000 m a.m.s.l.		Reduce rated output current by 5 %/1000 m
Pollution		
Degree of pollution 2	EN 61800-5-1	
Vibration resistance		
Transport		
2M2 (sine, shock)	EN 60721-3-2	
Operation		
Amplitude 1 mm	Germanischer Lloyd	5 ... 13.2 Hz
Acceleration resistant up to 0.7 g		13.2 ... 100 Hz
Amplitude 0.075 mm	EN 61800-5-1	10 ... 57 Hz
Acceleration resistant up to 1 g		57 ... 150 Hz

13.1.6 Electrical supply conditions

Permissible mains systems		
TT		Voltage to earth/ground: max. 300 V
TN		
IT		Apply the measures described for IT systems!
		IT systems are not relevant for UL-approved systems

13.2 1-phase mains connection 230/240 V

13.2.1 Rated data

Inverter		I55AE125B	I55AE137B	I55AE155B	I55AE175B	I55AE211B	I55AE215B	I55AE222B
Rated power	**kW**	**0.25**	**0.37**	**0.55**	**0.75**	**1.1**	**1.5**	**2.2**
Mains voltage range		1/N/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	4	5.7	7.6	10	14.3	16.7	22.5
with mains choke	A	3.6	4.8	7.1	8.8	11.9	13.9	16.9
Apparent output power	kVA	0.6	0.9	1.2	1.6	2.2	2.6	3.6
Output current								
2 kHz	A	-	-	3.2	4.2	6	7	9.6
4 kHz	A	1.7	2.4	3.2	4.2	6	7	9.6
8 kHz	A	1.7	2.4	3.2	4.2	6	7	9.6
16 kHz	A	1.1	1.6	2.1	2.8	4	4.7	6.4
Power loss								
4 kHz	W	15	18	23	29	37	43	60
8 kHz	W	15	20	25	33	42	50	70
Overcurrent cycle 180 s								
Max. output current	A	2.55	3.6	4.8	6.3	9	10.5	14.4
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	1.28	1.8	2.4	3.15	4.5	5.25	7.2
Overcurrent cycle 15 s								
Max. output current	A	3.4	4.8	6.4	8.4	12	14	19.2
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	1.28	1.8	2.4	3.15	4.5	5.25	7.2
Brake chopper								
Max. output current	A	2.2	2.2	3.9	3.9	12	12	12
Min. brake resistance	Ω	180	180	100	100	33	33	33
Max. motor cable length								
shielded, without EMC category	m	50						
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	3						
C2 residential area / industrial premises	m	15		20				
Weight	kg	0.8		1		1.35		

13.3 1/3-phase mains connection 230/240 V

I5xAExxx**D** inverters do not have an integrated EMC filter in the AC mains supply.

In order to comply with the EMC requirements according to EN 61800−3, an external EMC filter according to IEC EN 60939 has to be used.

The user must prove that the EN 61800−3 requirements for conformity are fulfilled.

13.3.1 Rated data

Inverter		I55AE125D	I55AE137D	I55AE155D	I55AE175D	I55AE211D	I55AE215D	I55AE222D
Rated power	**kW**	**0.25**	**0.37**	**0.55**	**0.75**	**1.1**	**1.5**	**2.2**
Mains voltage range		1/N/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	4	5.7	7.6	10	14.3	16.7	22.5
with mains choke	A	3.6	4.8	7.1	8.8	11.9	13.9	16.9
Mains voltage range		3/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	2.6	3.9	4.8	6.4	7.8	9.5	13.6
with mains choke	A	2	3	3.8	5.1	5.6	6.8	9.8
Apparent output power	kVA	0.6	0.9	1.2	1.6	2.2	2.6	3.6
Output current								
2 kHz	A	-	-	3.2	4.2	6	7	9.6
4 kHz	A	1.7	2.4	3.2	4.2	6	7	9.6
8 kHz	A	1.7	2.4	3.2	4.2	6	7	9.6
16 kHz	A	1.1	1.6	2.1	2.8	4	4.7	6.4
Power loss								
4 kHz	W	15	18	23	29	37	43	60
8 kHz	W	15	20	25	33	42	50	70
Overcurrent cycle 180 s								
Max. output current	A	2.55	3.6	4.8	6.3	9	10.5	14.4
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	1.28	1.8	2.4	3.15	4.5	5.25	7.2
Overcurrent cycle 15 s								
Max. output current	A	3.4	4.8	6.4	8.4	12	14	19.2
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	1.28	1.8	2.4	3.15	4.5	5.25	7.2
Brake chopper								
Max. output current	A	2.2	2.2	3.9	3.9	12	12	12
Min. brake resistance	Ω	180	180	100	100	33	33	33
Max. motor cable length								
shielded, without EMC category	m	50						
Weight	kg	0.8		1		1.35		

13.4 3-phase mains connection 230/240 V

13.4.1 Rated data

Inverter		I55AE240C	I55AE255C
Rated power	**kW**	**4**	**5.5**
Mains voltage range		3/PE AC 170 V ... 264 V, 45 Hz ... 65 Hz	
Rated mains current			
without mains choke	A	20.6	28.8
with mains choke	A	15.7	21.9
Apparent output power	kVA	6.4	8.7
Output current			
2 kHz	A	16.5	23
4 kHz	A	16.5	23
8 kHz	A	16.5	23
16 kHz	A	11	15.3
Power loss			
4 kHz	W	115	175
8 kHz	W	130	195
Overcurrent cycle 180 s			
Max. output current	A	24.8	34.5
Overload time	s	60	60
Recovery time	s	120	120
Max. output current during the recovery time	A	12.4	17.3
Overcurrent cycle 15 s			
Max. output current	A	33	46
Overload time	s	3	3
Recovery time	s	12	12
Max. output current during the recovery time	A	12.4	17.3
Brake chopper			
Max. output current	A	26	26
Min. brake resistance	Ω	15	15
Max. motor cable length			
shielded, without EMC category	m	50	
Weight	kg	2.1	

13.5 3-phase mains connection 400 V

13.5.1 Rated data

Inverter		I55AE137F	I55AE155F	I55AE175F	I55AE211F	I55AE215F	I55AE222F	I55AE230F
Rated power	**kW**	**0.37**	**0.55**	**0.75**	**1.1**	**1.5**	**2.2**	**3**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	1.8	2.5	3.3	4.4	5.4	7.8	9.6
with mains choke	A	1.4	2	2.6	3	3.7	5.3	6.9
Apparent output power	kVA	0.9	1.2	1.6	2.2	2.6	3.6	4.9
Output current								
2 kHz	A	-	1.8	2.4	3.2	3.9	5.6	7.3
4 kHz	A	1.3	1.8	2.4	3.2	3.9	5.6	7.3
8 kHz	A	1.3	1.8	2.4	3.2	3.9	5.6	7.3
16 kHz	A	0.9	1.2	1.6	2.1	2.6	3.7	4.9
Power loss								
4 kHz	W	20	25	32	40	48	66	85
8 kHz	W	24	31	40	51	61	85	110
Overcurrent cycle 180 s								
Max. output current	A	1.95	2.7	3.6	4.8	5.85	8.4	11
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	0.975	1.35	1.8	2.4	2.93	4.2	5.48
Overcurrent cycle 15 s								
Max. output current	A	2.6	3.6	4.8	6.4	7.8	11.2	14.6
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	0.975	1.35	1.8	2.4	2.93	4.2	5.48
Brake chopper								
Max. output current	A	2	2	2	4.3	4.3	4.3	9.5
Min. brake resistance	Ω	390	390	390	180	180	150	82
Max. motor cable length								
shielded, without EMC category	m	15	50					
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	3			-			
C2 residential area / industrial premises	m	15	20					
Weight	kg	0.8	1		1.35			2.3

Inverter		I55AE240F	I55AE255F	I55AE275F	I55AE311F	I55AE315F	I55AE318F	I55AE322F
Rated power	**kW**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**	**22**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	12.5	17.2	20	28.4	38.7	48.4	-
with mains choke	A	9	12.4	15.7	22.3	28.8	36	42
Apparent output power	kVA	6.4	8.7	11	16	22	27	32
Output current								
2 kHz	A	9.5	13	16.5	23.5	32	40	47
4 kHz	A	9.5	13	16.5	23.5	32	40	47
8 kHz	A	9.5	13	16.5	23.5	32	40	47
16 kHz	A	6.3	8.7	11	15.7	21.3	26.6	31.3
Power loss								
4 kHz	W	110	145	185	260	360	450	520
8 kHz	W	140	190	240	340	460	570	670
Overcurrent cycle 180 s								
Max. output current	A	14.3	19.5	24.8	35.3	48	60	70.5
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	7.13	9.75	12.4	17.6	24	30	35.3
Overcurrent cycle 15 s								
Max. output current	A	19	26	33	47	64	80	94
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	7.13	9.75	12.4	17.6	24	30	35.3
Brake chopper								
Max. output current	A	16.6	16.6	29	29	43	52	52
Min. brake resistance	Ω	47	47	27	27	18	15	15
Max. motor cable length								
shielded, without EMC category	m	50		100				
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	-						
C2 residential area / industrial premises	m	20						
Weight	kg	2.3		3.7		10.3		

Technical data

3-phase mains connection 400 V
Rated data

Inverter		I55AE330F	I55AE337F	I55AE345F
Rated power	**kW**	**30**	**37**	**45**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz		
Rated mains current				
without mains choke	A	-	-	-
with mains choke	A	54.9	68	80
Apparent output power	kVA	41	51	60
Output current				
2 kHz	A	61	76	89
4 kHz	A	61	76	89
8 kHz	A	61	76	89
16 kHz	A	40.7	50.7	59.4
Power loss				
4 kHz	W	680	840	980
8 kHz	W	880	1100	1280
Overcurrent cycle 180 s				
Max. output current	A	91.5	114	134
Overload time	s	60	60	60
Recovery time	s	120	120	120
Max. output current during the recovery time	A	45.8	57	66.8
Overcurrent cycle 15 s				
Max. output current	A	122	152	178
Overload time	s	3	3	3
Recovery time	s	12	12	12
Max. output current during the recovery time	A	45.8	57	66.8
Brake chopper				
Max. output current	A	98	98	98
Min. brake resistance	Ω	8	8	8
Max. motor cable length				
shielded, without EMC category	m	100		
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	-		
C2 residential area / industrial premises	m	20		
Weight	kg	17.2		

13.6 3-phase mains connection 480 V

13.6.1 Rated data

Inverter		I55AE137F	I55AE155F	I55AE175F	I55AE211F	I55AE215F	I55AE222F	I55AE230F
Rated power	**kW**	**0.37**	**0.55**	**0.75**	**1.1**	**1.5**	**2.2**	**3**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	1.5	2.1	2.8	3.7	4.5	6.5	8
with mains choke	A	1.2	1.7	2.2	2.5	3.1	4.4	5.8
Apparent output power	kVA	0.9	1.2	1.6	2.2	2.6	3.6	4.9
Output current								
2 kHz	A	-	1.6	2.1	3	3.5	4.8	6.3
4 kHz	A	1.1	1.6	2.1	3	3.5	4.8	6.3
8 kHz	A	1.1	1.6	2.1	3	3.5	4.8	6.3
16 kHz	A	0.7	1.1	1.4	2	2.3	3.2	4.2
Power loss								
4 kHz	W	20	25	32	40	48	66	85
8 kHz	W	24	31	40	51	61	85	110
Overcurrent cycle 180 s								
Max. output current	A	1.65	2.4	3.15	4.5	5.25	7.2	9.45
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	0.825	1.2	1.58	2.25	2.63	3.6	4.73
Overcurrent cycle 15 s								
Max. output current	A	2.2	3.2	4.2	6	7	9.6	12.6
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	0.825	1.2	1.58	2.25	2.63	3.6	4.73
Brake chopper								
Max. output current	A	2	2	2	4.3	4.3	4.3	9.5
Min. brake resistance	Ω	390	390	390	180	180	150	82
Max. motor cable length								
shielded, without EMC category	m	15	50					
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	3			-			
C2 residential area / industrial premises	m	15	20					
Weight	kg	0.8	1		1.35			2.3

Technical data

3-phase mains connection 480 V
Rated data

Inverter		I55AE240F	I55AE255F	I55AE275F	I55AE311F	I55AE315F	I55AE318F	I55AE322F
Rated power	**kW**	**4**	**5.5**	**7.5**	**11**	**15**	**18.5**	**22**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz						
Rated mains current								
without mains choke	A	10.5	14.3	16.6	23.7	32.3	40.3	47.4
with mains choke	A	7.5	10.3	13.1	18.6	24	30	35.3
Apparent output power	kVA	6.4	8.7	11	16	22	27	32
Output current								
2 kHz	A	8.2	11	14	21	27	34	40.4
4 kHz	A	8.2	11	14	21	27	34	40.4
8 kHz	A	8.2	11	14	21	27	34	40.4
16 kHz	A	5.5	7.3	9.3	14	18	22.6	26.9
Power loss								
4 kHz	W	110	145	185	260	360	450	520
8 kHz	W	140	190	240	340	460	570	670
Overcurrent cycle 180 s								
Max. output current	A	12.3	16.5	21	31.5	40.5	51	60.6
Overload time	s	60	60	60	60	60	60	60
Recovery time	s	120	120	120	120	120	120	120
Max. output current during the recovery time	A	6.15	8.25	10.5	15.8	20.3	25.5	30.3
Overcurrent cycle 15 s								
Max. output current	A	16.4	22	28	42	54	68	80.8
Overload time	s	3	3	3	3	3	3	3
Recovery time	s	12	12	12	12	12	12	12
Max. output current during the recovery time	A	6.15	8.25	10.5	15.8	20.3	25.5	30.3
Brake chopper								
Max. output current	A	16.6	16.6	29	29	43	52	52
Min. brake resistance	Ω	47	47	27	27	18	15	15
Max. motor cable length								
shielded, without EMC category	m	50		100				
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	-						
C2 residential area / industrial premises	m	20						
Weight	kg	2.3		3.7		10.3		

Inverter		I55AE330F	I55AE337F	I55AE345F
Rated power	**kW**	**30**	**37**	**45**
Mains voltage range		3/PE AC 340 V ... 528 V, 45 Hz ... 65 Hz		
Rated mains current				
without mains choke	A	-	-	-
with mains choke	A	45.7	57	66.7
Apparent output power	kVA	41	51	60
Output current				
2 kHz	A	52	65	77
4 kHz	A	52	65	77
8 kHz	A	52	65	77
16 kHz	A	34.7	43.4	51.4
Power loss				
4 kHz	W	680	840	980
8 kHz	W	880	1100	1280
Overcurrent cycle 180 s				
Max. output current	A	78	97.5	116
Overload time	s	60	60	60
Recovery time	s	120	120	120
Max. output current during the recovery time	A	39	48.8	57.8
Overcurrent cycle 15 s				
Max. output current	A	104	130	154
Overload time	s	3	3	3
Recovery time	s	12	12	12
Max. output current during the recovery time	A	39	48.8	57.8
Brake chopper				
Max. output current	A	98	98	98
Min. brake resistance	Ω	8	8	8
Max. motor cable length				
shielded, without EMC category	m	100		
C1 residential area (2 kHz, 4 kHz, 8 kHz)	m	-		
C2 residential area / industrial premises	m	20		
Weight	kg	17.2		

14 Appendix

14.1 Operate and parameterise the inverter with keypad

The keypad is an easy means for the local operation, parameterisation, and diagnostics of the inverter.

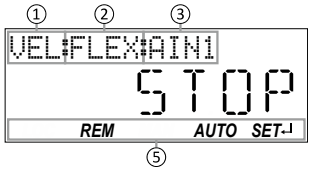
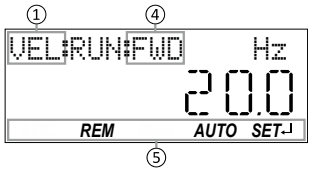
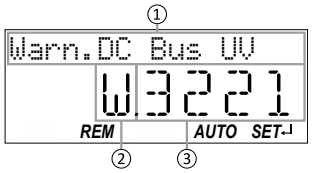
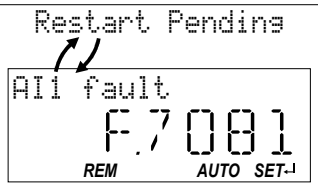
- The keypad is simply connected to the diagnostic interface on the front of the inverter.
- The keypad can also be connected and removed during operation.

14.1.1 Keypad operating mode

After switching on the inverter, the keypad plugged in is in "Operating mode" after a short initialisation phase.

14.1.1.1 Keypad status display

In the operating mode, the keypad displays information on the status of the inverter.

Keypad display	Display	Meaning
If the inverter is inhibited, the keypad shows "STOP":  If the inverter is enabled, the keypad shows the output frequency of the inverter:  • In the process controller mode, instead of the output frequency, the process controller setpoint is displayed. • The display can be configured in 0x2864 (P703.00). • The language for the keypad display is preset to "English". The language can be changed in 0x2863 (P705.00).	① Active control mode:	
	VEL	Speed mode
	PID	Process controller mode
	TRQ	Torque mode
	JOG	Manual mode
	② Active control source:	
	FLEX	Flexible I/O configuration
	KPD	Keypad
	NET	Network
	③ Active setpoint source:	
	AINx	Analog input x
	KPD	Keypad
	NET	Network
	FREQ	Digital frequency
	PRx	Preset setpoint x
	SEGx	Segment x
	MOP	Motor potentiometer
	④ Current direction of rotation:	
	FWD	Motor is rotating forwards
	REV	Motor is rotating backwards
	⑤ Lower status line:	
	LOC	Local keypad control active.
	REM	Remote control via terminals, network, etc. active.
	MAN	Manual setpoint selection via keypad active.
	AUTO	Automatic setpoint selection via terminals, network, etc. active.
	SET	Blinking if one parameter setting has been changed but has not been saved in the memory module with mains failure protection. Save settings: Press keypad enter key longer than 3 s.
If an error is pending, the keypad shows the following information:  • Faults (F) and trouble (T) are displayed continuously. • Warnings (W) are only displayed every 2 seconds for a short time.	① Error text	
	② Error type:	
	F	Error
	T	Trouble
	W	Warning
	③ Error code (hexadecimal)	
	▸ Error codes 461 ▸ Error handling 107 ▸ Error reset with keypad 456	
 	After a disturbance, a restart is possible if the error condition is not active anymore. The keypad shows this by the "Restart Pending" note. The note is displayed in a 1-second interval alternating with the error text. ▸ Automatic restart 350	

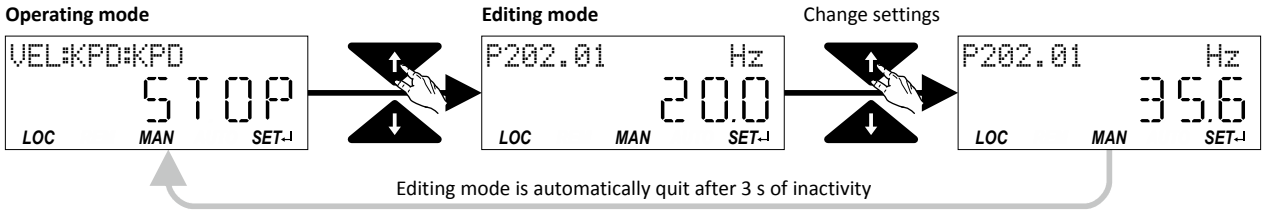
14.1.1.2 Function of keypad keys in operating mode

In the operating mode, the keypad can be used for local control and for manual setpoint selection.

Function of the keypad keys in operating mode	
	If local keypad control ("LOC" display) active: start motor. If remote control ("REM" display) active: cancel stop ("KSTOP" display) triggered via keypad again. The motor remains stopped ("STOP" display).
	Stop motor (is always possible irrespective of the active control source, exception: JOG operation).
	Briefly pressing the key: Change to parameterisation mode. ▸ Keypad parameterisation mode 457 Pressing the key longer than 3 s: Save parameter settings in the user memory of the memory module.
	If manual setpoint selection via keypad ("MAN" display) is active: Change frequency setpoint (see the following example).

Example: Change setpoint

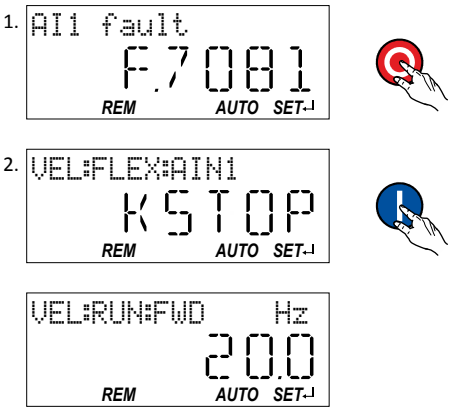
If the setpoints are selected manually via keypad, the frequency setpoint can be changed in the operating mode via the arrow keys (even while the motor is running):



14.1.1.3 Error reset with keypad

Use the keypad key to reset a resettable error if the error condition no longer exists and no blocking time is active.

- The "Error codes" table gives the blocking time (if available) for each error. 461



1. Press keypad key.
   The error is reset. The motor remains stopped via keypad (display "KSTOP").
2. In order to cancel the stop via keypad again: Press keypad key.

14.1.2 Keypad parameterisation mode

In the parameterisation mode of the keypad you can have actual values of the inverter displayed for purposes of diagnostics and change settings of the inverter.

Use the ↵ to change from operating mode to the parameterisation mode.

- If a write access protection is active for the inverter, the keypad automatically displays a log-in when changing to the parameterisation mode. You can either skip the log-in and thus keep the access protection active or remove it temporarily by entering a valid PIN.
  ▸ Write access protection 🕮 302
- Use the ⮌ to return to the operating mode.

14.1.2.1 Parameter groups

In order to provide for quick access, all parameters of the inverter are divided into different groups according to their function.

- Group 0 contains the configurable "Favorites". In the default setting these are the most common parameters for the solution of typical applications. ▸ Favorites 🕮 311
- Based on the hundreds digit of the display code (P**x**xx) you can quickly see in which group the parameter is to be found on the keypad:

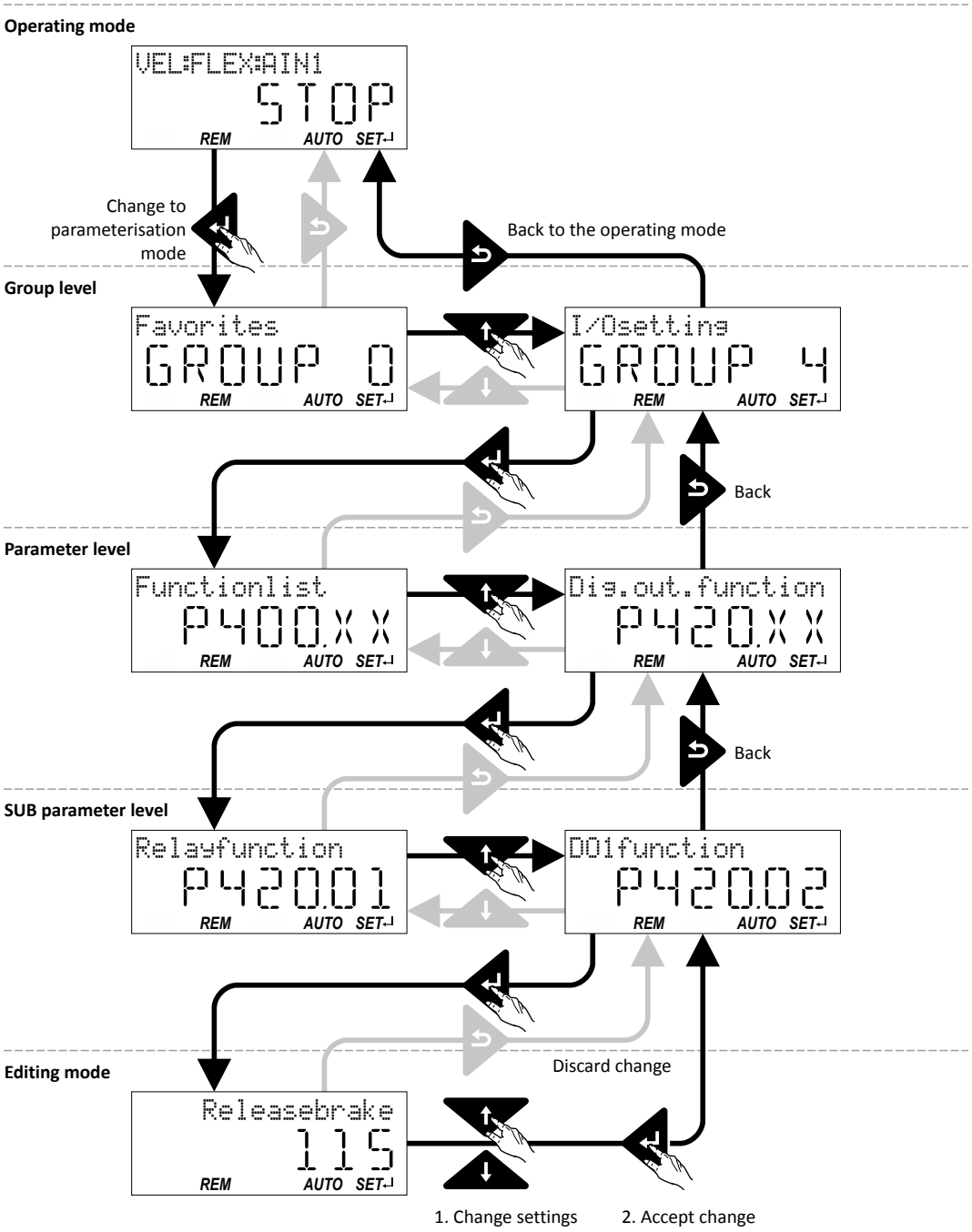
Parameter	Group/name	Description
P**1**xx	Group 1 - Diagnostics	Diagnostic/display parameters for displaying device-internal process factors, current actual values, and status messages. ▸ Diagnostics parameter 🕮 78
P**2**xx	Group 2 - Basic setting	Setting of the mains voltage, selection of the control and setpoint source, starting and stopping performance, frequency limits and ramp times. ▸ Basic setting 🕮 109
P**3**xx	Group 3 - Motor control	Configuration of the motor and motor control ▸ Motor control 🕮 125
P**4**xx	Group 4 - I/O setting	Function assignment and configuration of the inputs and outputs ▸ Flexible I/O configuration 🕮 365
P**5**xx	Group 5 - Network setting	Configuration of the network (if available) ▸ Configuring the network 🕮 164
P**6**xx	Group 6 - Process controller	Configuration of the process controller ▸ Configuring the process controller 🕮 273
P**7**xx	Group 7 - Additional functions	Parameterisable additional functions ▸ Additional functions 🕮 282

14.1.2.2 Function of the keypad keys in the parameterisation mode

In the parameterisation mode, the arrow keys serve to select and change parameters.

Function of the keypad keys in the parameterisation mode	
	If local keypad control ("LOC" display) active: start motor. If remote control ("REM" display) active: cancel stop ("KSTOP" display) triggered via keypad again. The motor remains stopped ("STOP" display).
	Stop motor (is always possible irrespective of the active control source, exception: JOG operation).
	Briefly pressing the key: Navigate one level lower: Group level → parameter level → [SUB parameter level] → editing mode Briefly pressing the key in editing mode: Exit editing mode and accept new setting. Pressing the key longer than 3 s: Save parameter settings in the user memory of the memory module.
	Navigate one level higher: [SUB parameter level] → parameter level → group level → operating mode In the editing mode: Exit editing mode without accepting the new setting (abort).
	In the group level/parameter level: Navigation (selection of the group/parameter). In the editing mode: Change setting of the parameter.

Changing inverter settings by means of the keypad (general operation)



14.1.2.3 Save parameter settings with keypad

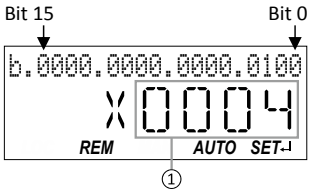
If one parameter setting has been changed with the keypad but has not been saved in the memory module with mains failure protection, the SET display is blinking.

In order to save parameter settings in the user memory of the memory module, press the keypad enter key longer than 3 s.

14.1.2.4 Display of status words on keypad

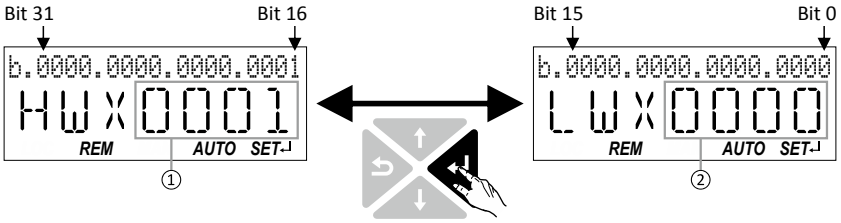
Some diagnostics parameters contain bit-coded status words. Each single bit has a certain meaning.

Display of 16-bit status words on the keypad



① Hexadecimal value

Display of 32-bit status words on the keypad



① Hexadecimal value High word (HW)
② Hexadecimal value Low word (LW)

14.2 Error codes

The following table contains all error codes of the inverter in ascending order.

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
8784	0x2250	PU over current	CiA: Continuous over current (internal)	Error	-
		This message contains three errors: 1. Continuous overcurrent on the inverter/motor side. 2. Overcurrent at the brake chopper (brake transistor). 3. DC bus relay has not been closed due to a malfunction. Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset after a blocking time of 5 s.			
8992	0x2320	Earth leak	CiA: Short circuit/earth leakage (internal)	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset after a blocking time of 5 s.			
9024	0x2340	Motor shorted	CiA: Short circuit (device internal)	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset after a blocking time of 5 s.			
9040	0x2350	i2t motor	CiA: i²*t overload (thermal state)	Fault	0x2D4B:003 (P308.03)
		▸ Motor overload monitoring (i²*t) 153 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset after a blocking time of 5 s.			
9090	0x2382	Ixt error	I*t error	Fault	0x2D40:005 (P135.05)
		The device utilisation has exceeded the warning threshold set in 0x2D40:002 (default setting: 95 %). ▸ Device overload monitoring (i*t) 105 Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset after a blocking time of 3 s.			
9091	0x2383	Ixt warning	I*t warning	Warning	-
		The device utilisation has exceeded the permanent error threshold of 100 %. ▸ Device overload monitoring (i*t) 105 Response: • Logging only (Error history buffer/Logbook)			
9095	0x2387	Clamp timeout	Imax: Clamp responded too often	Error	-
		"Clamp" = short-time inhibit of the inverter in V/f operation when the current limit shown in 0x2DDF:002 is reached. Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
12576	0x3120	Mains Phase fail	Mains phase fault	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
12816	0x3210	DC Bus OV	DC bus overvoltage	Error	-
		The DC-bus voltage of the inverter has exceeded the error threshold for overvoltage. The error threshold results from the setting of the rated mains voltage in 0x2540:001 (P208.01). ▸ Mains voltage 110 Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
12817	0x3211	Warn.DC Bus OV	DC bus overvoltage warning	Warning	-
		The DC-bus voltage of the inverter has exceeded the warning threshold for overvoltage set in 0x2540:005 (P208.05). ▸ Mains voltage 110 Response: • Logging only (Error history buffer/Logbook)			
12832	0x3220	DC Bus UV	DC bus undervoltage	Trouble	-
		The DC-bus voltage of the inverter has fallen below the error threshold for undervoltage. The error threshold results from the setting of the rated mains voltage in 0x2540:001 (P208.01). ▸ Mains voltage 110 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. • The error can only be reset after a blocking time of 5 s.			
12833	0x3221	Warn.DC Bus UV	DC bus undervoltage warning	Warning	-
		The DC-bus voltage of the inverter has fallen below the warning threshold for undervoltage set in 0x2540:002 (P208.02). ▸ Mains voltage 110 Response: • Logging only (Error history buffer/Logbook)			
12834	0x3222	DC-bus on-UV	DC-bus voltage to low for power up	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
16912	0x4210	PU Overtemp.	PU: overtemperature fault	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
17024	0x4280	Heatsink sensor	Heat sink temperature sensor fault	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
17025	0x4281	Heatsink fan	Heat sink fan warning	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
17029	0x4285	Warn.PU Overtemp	PU overtemperature warning	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
17168	0x4310	Overtemp. motor	Motor temperature error	Fault	0x2D49:002 (P309.02)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset after a blocking time of 5 s.			
20754	0x5112	24V supply low	24 V supply critical	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
21376	0x5380	Incomp. OEM HW	OEM hardware incompatible	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24592	0x6010	Watchdog timeout	Watchdog time-out	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
24961	0x6181	Timeout-125usTsk	Time-out in 125 us task	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
24962	0x6182	Timeout-250usTsk	Time-out in 250 us task	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24963	0x6183	Timeout-1ms-Task	Time-out in 1 ms task	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24964	0x6184	Timeout-8ms-Task	Time-out in 8 ms task	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24968	0x6188	Internal error	Internal error	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24969	0x6189	PU Prog. error	PU: programming fault	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
24970	0x618A	Internal fan	Internal fan warning	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
24976	0x6190	PU comm mismatch	PU: communication mismatch	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
24977	0x6191	PU Sync. Fault	PU: communication not synchronous	Trouble	-
		Response: • Serious fault: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
24978	0x6192	Comm.error PU-CU	Communication error PU-CU	Trouble	-
		Response: • Serious fault: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
24979	0x6193	PU comm error	PU: communication error	Error	-
		If this error occurs, the motor may not be able to be brought to standstill anymore. If communication is lost completely, the power output stage will switch off. Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
24980	0x6194	PU SDO comm err.	SDO communication with PU aborted	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
24981	0x6195	I2C conn. error	I2C connection lost	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
24982	0x6196	I2C bus error	I2C bus error	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
25008	0x61B0	PU uC supply err	PU: uC supply voltage drop down	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25009	0x61B1	PU general error	PU: general error	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
25216	0x6280	P400 config err	Trigger/functions connected incorrectly	Error	-
		The assignment directives have not been observed: • If the "flexible I/O configuration" is active as control source, the "Enable inverter" function or the "Run" function must be connected to a digital input in order that the motor can be stopped again any time! • In case of keypad or network control, the two functions "Enable inverter" and "Run" can also be set to "Constant TRUE [1]" to start the motor. • The use of the "Start forward (CW)" and "Start reverse (CCW)" functions excludes the use of the "Run forward (CW)" and "Run reverse (CCW)" and vice versa. ▸ Start / stop motor 🕮 372 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25217	0x6281	User fault 1	User-defined fault 1	Error	-
		The "Activate fault 1" function was triggered via the flexible I/O configuration. ▸ Triggering a user-defined fault 🕮 411 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25218	0x6282	User fault 2	User-defined fault 2	Error	-
		The "Activate fault 2" function was triggered via the flexible I/O configuration. ▸ Triggering a user-defined fault 🕮 411 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25232	0x6290	Invert rotation	Warning invert rotation	Warning	-
		The "Invert rotation" function was requested with an active limitation of rotation. ▸ Motor rotating direction 🕮 150 Response: • Logging only (Error history buffer/Logbook)			
25233	0x6291	Trouble overflow	Maximuml allowed troubles exceeded	Error	-
		▸ Automatic restart 🕮 350 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25248	0x62A0	AC Dr. UserFault	AC Drive: user fault	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25249	0x62A1	Netw.UserFault 1	Network: user fault 1	Error	-
		The "Activate fault 1" function was triggered via the NetWordIN1 data word. ▸ Further process data 🕮 181 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
25250	0x62A2	Netw.UserFault 2	Network: user fault 2	Error	-
		The "Activate fault 2" function was triggered via the NetWordIN1 data word. ▸ Further process data 181 Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25265	0x62B1	NetWordIN1 error	NetWordIN1 configuration incorrect	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
25504	0x63A0	EEPROM fault	On-board EEPROM: access error	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
25505	0x63A1	CU ID tag error	CU: load error ID tag	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
25506	0x63A2	PU ID tag error	PU: load error ID tag	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
25507	0x63A3	PU unknown	Power unit unknown	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			
25508	0x63A4	EEPROM overflow	On-board EEPROM: timer overflow	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
28800	0x7080	Assertionlevel	Assertion level monitoring (Low/High)	Error	-
		The last setting of the connection level differs from the saved setting. Remedy: 1. Check setting in 0x2630:001 (P410.01). 2. Save parameter settings: 0x2022:003 (P700.03) = "On / start [1]". 3. Switch inverter off and on again. Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
28801	0x7081	AI1 fault	Analog input 1 fault	Fault	0x2636:010 (P430.10)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
28802	0x7082	AI2 fault	Analog input 2 fault	Fault	0x2637:010 (P431.10)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
28833	0x70A1	AO1 fault	Analog output 1 fault	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
28834	0x70A2	AO2 fault	Analog output 2 fault	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
28961	0x7121	Pole pos. error	Pole position identification fault	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
29056	0x7180	Mot max current	Motor overcurrent	Fault	0x2D46:002 (P353.02)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset after a blocking time of 1 s.			
29573	0x7385	F.fdb spd limit	Feedback system: speed limit	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
30336	0x7680	EPM full	Memory module is full	Warning	-
		The memory module contains too many parameter settings. The inverter copies the current backup to the user memory without overwriting the data in the RAM. Remedy: Save parameter settings 0x2022:003 (P700.03) = "On / start [1]". The user memory is deleted and then created again with the current parameter settings. Response: • Logging only (Error history buffer/Logbook)			
30337	0x7681	EPM not present	Memory module not present	Error	-
		The default setting saved in the inverter firmware is loaded. The error cannot be reset by the user. Remedy: 1. Switch off inverter. 2. Plug the memory module into the inverter. 3. Switch the inverter on again. Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30338	0x7682	EPM invalid data	Memory module invalid user data	Error	-
		The user parameter settings are invalid both in the user memory and in the backup. Thus, the user parameter settings are lost. The default setting is loaded automatically. Remedy: 1. Execute user parameter settings again. 2. Save parameter settings: 0x2022:003 (P700.03) = "On / start [1]". Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
30340	0x7684	Save incomplete	Data not compl. saved before powerdown	Warning	-
		Saving the parameter settings was interrupted by an unexpected disconnection. The user parameter settings were not saved completely. When the inverter is switched on the next time, the backup data is copied to the user memory. Remedy: 1. Check user parameter settings. (The loaded backup is an older version.) 2. If required, repeat the changes made last. 3. Save parameter settings: 0x2022:003 (P700.03) = "On / start [1]". Response: • Logging only (Error history buffer/Logbook)			
30342	0x7686	Net.config.error	Network: configuration error	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts).			
30343	0x7687	EPM timer overfl	Memory module: timer overflow	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
30345	0x7689	OEM data invalid	Memory module: invalid OEM data	Warning	-
		The OEM memory contains invalid parameter settings or is empty. The user parameter settings are loaded automatically. Remedy: • Save OEM parameter settings: 0x2022:007 (P700.07) = "On / start [1]". • Thus, the user parameter settings get lost! Response: • Logging only (Error history buffer/Logbook)			
30346	0x768A	Wrong EPM	Memory module: wrong type	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30352	0x7690	OEM CU not match	EPM data: firmware version incompatible	Error	-
		The parameter settings saved in the memory module do not match the firmware version. Remedy: • Load default settings: 0x2022:001 (P700.01) = "On / start [1]". Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30353	0x7691	PUData not match	EPM data: firmware type incompatible	Error	-
		The parameter settings saved in the memory module do not match the firmware type. Remedy: • Load default settings: 0x2022:001 (P700.01) = "On / start [1]". Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30354	0x7692	UserCU not match	EPM data: new firmware type detected	Error	-
		The parameter settings saved in the memory module do not match the inverter hardware. Remedy: • Accept new inverter hardware: 0x2022:027 (P700.27) = "On / start [1]". • Optionally load default settings: 0x2022:001 (P700.01) = "On / start [1]". Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30355	0x7693	EPM PU size inco	EPM data: PU size incompatible	Error	-
		The parameter settings saved in the memory module do not match the power unit. Remedy: • Accept new inverter hardware: 0x2022:027 (P700.27) = "On / start [1]". • Optionally load default settings: 0x2022:001 (P700.01) = "On / start [1]". Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30356	0x7694	EPM new PU size	EPM data: new PU size detected	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
30357	0x7695	InvalidChgovrCfg	Invalid parameter changeover configuration	Warning	-
		One or several parameters cannot be used for the "parameter change-over" function. The parameter change-over is deactivated. Remedy: • Check error message for parameter change-over in 0x4047:001 (P756.01) and correct the list entry displayed in 0x4047:002 (P756.02). Response: • Logging only (Error history buffer/Logbook)			
30358	0x7696	Unkn. Par in EPM	EPM data: unknown parameter found	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
33042	0x8112	TO expl. msg	Network: timeout explicit message	Warning	0x2859:006 (P515.06)
		Response: • Logging only (Error history buffer/Logbook) • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
33044	0x8114	TO overall comm	Network: overall communication timeout	Warning	0x2859:007 (P515.07)
		Response: • Logging only (Error history buffer/Logbook) • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
33154	0x8182	CAN bus off	CAN: bus off	Trouble	0x2857:010
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
33155	0x8183	CAN bus warning	CAN: warning	Warning	0x2857:011
		Response: • Logging only (Error history buffer/Logbook) • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
33156	0x8184	CAN heartb. C1	CAN: heartbeat time-out consumer 1	Fault	0x2857:005
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33157	0x8185	CAN heartb. C2	CAN: heartbeat time-out consumer 2	Fault	0x2857:006
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33158	0x8186	CAN heartb. C3	CAN: heartbeat time-out consumer 3	Fault	0x2857:007
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33159	0x8187	CAN heartb. C4	CAN: heartbeat time-out consumer 4	Fault	0x2857:008
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33168	0x8190	Watchdog timeout	Network: watchdog timeout	Fault	See "Info" column
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Setting parameters: • 0x2859:001 (P515.01) ▸ PROFIBUS monitoring 📖 226 • 0x2859:001 (P515.01) ▸ EtherCAT monitoring 📖 268 • 0x2859:001 (P515.01) ▸ EtherNet/IP monitoring 📖 257 • 0x2859:001 (P515.01) ▸ PROFINET monitoring 📖 265			
33169	0x8191	Cycl data error	Network: disruption of cyclic data exchange	No response	0x2859:002 (P515.02)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
33170	0x8192	Net. Init. error	Network: initialisation error	Fault	See "Info" column
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Setting parameters: • 0x2859:004 (P515.04) ▸ PROFIBUS monitoring 📖 226 • 0x2859:004 (P515.04) ▸ EtherCAT monitoring 📖 268 • 0x2859:004 (P515.04) ▸ EtherNet/IP monitoring 📖 257 • 0x2859:004 (P515.04) ▸ PROFINET monitoring 📖 265			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
33171	0x8193	Inv. cyclic data	Network: invalid cyclic process data	Trouble	See "Info" column
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. Setting parameters: • 0x2859:005 (P515.05) ▸ PROFIBUS monitoring 226 • 0x2859:005 (P515.05) ▸ EtherCAT monitoring 268 • 0x2859:005 (P515.05) ▸ EtherNet/IP monitoring 257 • 0x2859:005 (P515.05) ▸ PROFINET monitoring 265			
33184	0x81A0	Modbus TX error	Modbus transmit message error	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
33185	0x81A1	Modbus time-out	Modbus: network time-out	Fault	0x2858:001 (P515.01)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33186	0x81A2	Modbus request	Modbus: incorrect request by master	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
33414	0x8286	PDO map error	Network: PDO mapping error	Fault	See "Info" column
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. Setting parameters: • 0x2859:003 (P515.03) ▸ PROFIBUS monitoring 226 • 0x2859:003 (P515.03) ▸ EtherCAT monitoring 268 • 0x2859:003 (P515.03) ▸ EtherNet/IP monitoring 257 • 0x2859:003 (P515.03) ▸ PROFINET monitoring 265			
33425	0x8291	Timeout RPDO1	CAN: RPDO1 time-out	Fault	0x2857:001
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33426	0x8292	Timeout RPDO2	CAN: RPDO2 time-out	Fault	0x2857:002
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33427	0x8293	Timeout RPDO3	CAN: RPDO3 time-out	Fault	0x2857:003
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
33553	0x8311	Torque limit	Torque limit reached	No reaction	0x2D67:001 (P329.01)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
36992	0x9080	Keypad removed	Keypad removed	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
65282	0xFF02	BrkResistor OL.F	Brake resistor: overload fault	Fault	0x2550:011 (P707.11)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset after a blocking time of 5 s.			
65285	0xFF05	STO error	Safe Torque Off error	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset by mains switching.			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
65286	0xFF06	Motor overspeed	Motor overspeed	Fault	0x2D44:002 (P350.02)
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset after a blocking time of 1 s.			
65289	0xFF09	Mot.PhaseFailure	Motor phase failure	No response	0x2D45:001 (P310.01)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. • The error can only be reset after a blocking time of 2 s.			
65290	0xFF0A	Phase U failure	Motor phase failure phase U	No response	0x2D45:001 (P310.01)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. • The error can only be reset after a blocking time of 2 s.			
65291	0xFF0B	Phase V failure	Motor phase failure phase V	No response	0x2D45:001 (P310.01)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. • The error can only be reset after a blocking time of 2 s.			
65292	0xFF0C	Phase W failure	Motor phase failure phase W	No response	0x2D45:001 (P310.01)
		Response: • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited. • The error can only be reset after a blocking time of 2 s.			
65305	0xFF19	Motor ID fault	Motor parameter identification fault	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
65328	0xFF30	Tmonit. no resp.	Test monitor generated no reaction	Info	-
		Response: • Information only.			
65329	0xFF31	Tmonit. warning	Test monitor generated warning	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			
65330	0xFF32	Tmonit. trouble	Test monitor generated trouble	Trouble	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			
65331	0xFF33	Tmonit. fault	Test monitor generated fault	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
65332	0xFF34	Tmon.Fault delay	Test monitor fault with fault reset delayed	Error	-
		Response: • Serious error: The inverter is inhibited immediately. The motor becomes torqueless (coasts). • The error can only be reset after a blocking time of 5 s.			
65333	0xFF35	Tmon.Fault bloc	Test monitor fault with fault reset blocked	Error	-
		Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled. • The error can only be reset by mains switching.			
65334	0xFF36	BrkResistor OL.W	Brake resistor: overload warning	Warning	0x2550:010 (P707.10)
		Response: • Logging only (Error history buffer/Logbook) • When the error type is set to "error" or "fault", the motor is brought to a standstill with the quick stop ramp. The inverter is then inhibited.			

Error code		Info		Error type	Adjustable in
dec	hex	Keypad display	Error message		
65335	0xFF37	Auto start disab	Automatic start disabled	Error	-
		When the mains power was switched on, there was already a start command and the automatic start at power-up is set to "Off [0]" in 0x2838:002 (P203.02). Remedy: • Deactivate start command and reset error. Response: • The motor is brought to a standstill with the quick stop ramp. The inverter is then disabled.			
65366	0xFF56	Warn. Max. Freq	Max. output frequency reached	Warning	-
		Response: • Logging only (Error history buffer/Logbook)			

14.3 Parameter attribute list

The parameter attribute list in particular contains some information required for reading and writing parameters via network.

- The parameter attribute list contains all parameters of the inverter.
- The parameter attribute list is sorted by addresses (index:subindex) in ascending order.

How to read the parameter attribute list:

Column	Meaning	
Address	Address of the parameter in the object directory. Format: index:subindex If the parameter can also be accessed via keypad, the "Display Code" is given in addition in brackets.	
Name	Parameter name	
Default setting	Default setting of the parameter	
Category	Functional assignment of the parameter, for example "motor control" or "CANopen".	
Data type	Data type of the parameter:	
	I8	1 byte, with sign
	I16	2 bytes with sign
	I32	4 bytes with sign
	I64	8 bytes with sign
	U8	1 byte without sign
	U16	2 bytes without sign
	U32	4 bytes without sign
	U64	8 bytes without sign
	REAL32	4 bytes floating point
	STRING[xx]	ASCII string (with character length xx)
	OCTET[xx]	OCTET string (with xx bytes)
	IDX	4 bytes without sign. Is used specially for addressing parameters.
Factor	Factor for data transmission via network, depending on the number of decimal positions:	
	1	No decimal positions
	10	1 decimal position
	100	2 decimal positions
	1000	3 decimal positions
	10000	4 decimal positions
A	Attributes (combinations of several attributes also possible):	
	C	Setting can only be changed if the inverter is inhibited.
	E	Value is displayed as IP address on the keypad.
	H	Value is displayed as hexadecimal value on the keypad.
	I	Parameter is not displayed.
	K	Parameter is only displayed on the keypad.
	O	Parameter can be recorded with the oscilloscope function.
	P	Setting is saved in the memory module.
	X	Parameter is not displayed in the engineering tools.
M	Mapping:	
	r	Receive mapping permissible.
	t	Transmit mapping permissible.
	rt	Receive and transmit mapping permissible.
	-	Mapping not permissible.

Parameter attribute list (short overview of all parameter indexes)

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1000	Device type	- (Read only)	CANopen	U32	1	H	-
0x1000	Device type	- (Read only)	EtherCAT	U32	1	X	-
0x1001	Error register	- (Read only)	CANopen	U8	1	H	t
0x1005	COB-ID SYNC	**0x00000080**	CANopen	U32	1	PH	-
0x1006	Communication cyclic period	**0 us**	CANopen	U32	1	P	-
0x1008	Manufacturer device name	- (Read only)	CANopen	STRING[50]	1	-	-
0x1008	Manufacturer device name	- (Read only)	EtherCAT	STRING[50]	1	X	-
* Default setting depending on the size.						Firmware version 02.01.01.00	

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1009	Manufacturer hardware version	- (Read only)	CANopen	STRING[50]	1	-	-
0x1009	Manufacturer hardware version	- (Read only)	EtherCAT	STRING[50]	1	X	-
0x100A	Manufacturer software version	- (Read only)	CANopen	STRING[50]	1	-	-
0x100A	Manufacturer software version	- (Read only)	EtherCAT	STRING[50]	1	X	-
0x1014	COB-ID EMCY	- (Read only)	CANopen	U32	1	H	-
0x1015	Inhibit time EMCY	**0.0 ms**	CANopen	U16	10	P	-
0x1016:000 (P520.00)	Consumer heartbeat time: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1016:001 (P520.01)	Consumer heartbeat time: Consumer heartbeat time 1	**0x00000000**	CANopen	U32	1	PH	-
0x1016:002 (P520.02)	Consumer heartbeat time: Consumer heartbeat time 2	**0x00000000**	CANopen	U32	1	PH	-
0x1016:003 (P520.03)	Consumer heartbeat time: Consumer heartbeat time 3	**0x00000000**	CANopen	U32	1	PH	-
0x1016:004 (P520.04)	Consumer heartbeat time: Consumer heartbeat time 4	**0x00000000**	CANopen	U32	1	PH	-
0x1017 (P522.00)	Producer heartbeat time	**0 ms**	CANopen	U16	1	P	-
0x1018:001	Identity object: Vendor ID	- (Read only)	CANopen	U32	1	-	-
0x1018:001	Identity object: Vendor ID	- (Read only)	EtherCAT	U32	1	X	-
0x1018:002	Identity object: Product code	- (Read only)	CANopen	U32	1	H	-
0x1018:002	Identity object: Product code	- (Read only)	EtherCAT	U32	1	X	-
0x1018:003	Identity object: Revision number	- (Read only)	CANopen	U32	1	-	-
0x1018:003	Identity object: Revision number	- (Read only)	EtherCAT	U32	1	X	-
0x1018:004	Identity object: Serial number	- (Read only)	CANopen	U32	1	-	-
0x1018:004	Identity object: Serial number	- (Read only)	EtherCAT	U32	1	X	-
0x1029:000	Error behavior: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1029:001	Error behavior: Communication error	**Status -> Pre-operational [0]**	CANopen	U8	1	P	-
0x1200:000	SDO1 server parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1200:001	SDO1 server parameter: COB-ID client -> server (rx)	- (Read only)	CANopen	U32	1	H	-
0x1200:002	SDO1 server parameter: COB-ID server -> client (tx)	- (Read only)	CANopen	U32	1	H	-
0x1201:000	SDO2 server parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1201:001	SDO2 server parameter: COB-ID client -> server (rx)	**0x80000640**	CANopen	U32	1	PH	-
0x1201:002	SDO2 server parameter: COB-ID server -> client (tx)	**0x800005C0**	CANopen	U32	1	PH	-
0x1201:003	SDO2 server parameter: Node-ID of the SDO client	**0**	CANopen	U8	1	P	-
0x1400:000	RPDO1 communication parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1400:001 (P540.01)	RPDO1 communication parameter: COB-ID	**0x00000200**	CANopen	U32	1	PH	-
0x1400:002 (P540.02)	RPDO1 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1400:005 (P540.05)	RPDO1 communication parameter: Event timer	**100 ms**	CANopen	U16	1	P	-
0x1401:001 (P541.01)	RPDO2 communication parameter: COB-ID	**0x80000300**	CANopen	U32	1	PH	-
0x1401:002 (P541.02)	RPDO2 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1401:005 (P541.05)	RPDO2 communication parameter: Event timer	**100 ms**	CANopen	U16	1	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1402:001 (P542.01)	RPDO3 communication parameter: COB-ID	**0x80000400**	CANopen	U32	1	PH	-
0x1402:002 (P542.02)	RPDO3 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1402:005 (P542.05)	RPDO3 communication parameter: Event timer	**100 ms**	CANopen	U16	1	P	-
0x1600:000	RPDO1 mapping parameter: Number of mapped application objects in PDO	**2**	CANopen	U8	1	P	-
0x1600:001	RPDO1 mapping parameter: Application object 1	**0x60400010**	CANopen	U32	1	PH	-
0x1600:002	RPDO1 mapping parameter: Application object 2	**0x60420010**	CANopen	U32	1	PH	-
0x1600:003	RPDO1 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1600:004	RPDO1 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1600:005	RPDO1 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1600:006	RPDO1 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1600:007	RPDO1 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1600:008	RPDO1 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1601:000	RPDO2 mapping parameter: Number of mapped application objects in PDO	**0**	CANopen	U8	1	P	-
0x1601:001	RPDO2 mapping parameter: Application object 1	**0x00000000**	CANopen	U32	1	PH	-
0x1601:002	RPDO2 mapping parameter: Application object 2	**0x00000000**	CANopen	U32	1	PH	-
0x1601:003	RPDO2 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1601:004	RPDO2 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1601:005	RPDO2 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1601:006	RPDO2 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1601:007	RPDO2 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1601:008	RPDO2 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1602:000	RPDO3 mapping parameter: Number of mapped application objects in PDO	**0**	CANopen	U8	1	P	-
0x1602:001	RPDO3 mapping parameter: Application object 1	**0x00000000**	CANopen	U32	1	PH	-
0x1602:002	RPDO3 mapping parameter: Application object 2	**0x00000000**	CANopen	U32	1	PH	-
0x1602:003	RPDO3 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1602:004	RPDO3 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1602:005	RPDO3 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1602:006	RPDO3 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1602:007	RPDO3 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1602:008	RPDO3 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1603:001	RPDO4 mapping parameter: Application object 1	- (Read only)	EtherCAT	U32	1	XH	-
0x1603:002	RPDO4 mapping parameter: Application object 2	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:001	RPDO6 mapping parameter: Application object 1	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:002	RPDO6 mapping parameter: Application object 2	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:003	RPDO6 mapping parameter: Application object 3	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:004	RPDO6 mapping parameter: Application object 4	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:005	RPDO6 mapping parameter: Application object 5	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:006	RPDO6 mapping parameter: Application object 6	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:007	RPDO6 mapping parameter: Application object 7	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:008	RPDO6 mapping parameter: Application object 8	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:009	RPDO6 mapping parameter: Application object 9	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:010	RPDO6 mapping parameter: Application object 10	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:011	RPDO6 mapping parameter: Application object 11	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:012	RPDO6 mapping parameter: Application object 12	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:013	RPDO6 mapping parameter: Application object 13	- (Read only)	EtherCAT	U32	1	XH	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1605:014	RPDO6 mapping parameter: Application object 14	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:015	RPDO6 mapping parameter: Application object 15	- (Read only)	EtherCAT	U32	1	XH	-
0x1605:016	RPDO6 mapping parameter: Application object 16	- (Read only)	EtherCAT	U32	1	XH	-
0x1800:000	TPDO1 communication parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1800:001 (P550.01)	TPDO1 communication parameter: COB-ID	**0x40000180**	CANopen	U32	1	PH	-
0x1800:002 (P550.02)	TPDO1 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1800:003 (P550.03)	TPDO1 communication parameter: Inhibit time	**0.0 ms**	CANopen	U16	10	P	-
0x1800:005 (P550.05)	TPDO1 communication parameter: Event timer	**20 ms**	CANopen	U16	1	P	-
0x1801:000	TPDO2 communication parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1801:001 (P551.01)	TPDO2 communication parameter: COB-ID	**0xC0000280**	CANopen	U32	1	PH	-
0x1801:002 (P551.02)	TPDO2 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1801:003 (P551.03)	TPDO2 communication parameter: Inhibit time	**0.0 ms**	CANopen	U16	10	P	-
0x1801:005 (P551.05)	TPDO2 communication parameter: Event timer	**0 ms**	CANopen	U16	1	P	-
0x1802:000	TPDO3 communication parameter: Highest sub-index supported	- (Read only)	CANopen	U8	1	-	-
0x1802:001 (P552.01)	TPDO3 communication parameter: COB-ID	**0xC0000380**	CANopen	U32	1	PH	-
0x1802:002 (P552.02)	TPDO3 communication parameter: Transmission type	**255**	CANopen	U8	1	P	-
0x1802:003 (P552.03)	TPDO3 communication parameter: Inhibit time	**0.0 ms**	CANopen	U16	10	P	-
0x1802:005 (P552.05)	TPDO3 communication parameter: Event timer	**0 ms**	CANopen	U16	1	P	-
0x1A00:000	TPDO1 mapping parameter: Number of mapped application objects in TPDO	**2**	CANopen	U8	1	P	-
0x1A00:001	TPDO1 mapping parameter: Application object 1	**0x60410010**	CANopen	U32	1	PH	-
0x1A00:002	TPDO1 mapping parameter: Application object 2	**0x60440010**	CANopen	U32	1	PH	-
0x1A00:003	TPDO1 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1A00:004	TPDO1 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1A00:005	TPDO1 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1A00:006	TPDO1 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1A00:007	TPDO1 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1A00:008	TPDO1 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:000	TPDO2 mapping parameter: Number of mapped application objects in TPDO	**0**	CANopen	U8	1	P	-
0x1A01:001	TPDO2 mapping parameter: Application object 1	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:002	TPDO2 mapping parameter: Application object 2	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:003	TPDO2 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:004	TPDO2 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:005	TPDO2 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:006	TPDO2 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:007	TPDO2 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1A01:008	TPDO2 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:000	TPDO3 mapping parameter: Number of mapped application objects in TPDO	**0**	CANopen	U8	1	P	-

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1A02:001	TPDO3 mapping parameter: Application object 1	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:002	TPDO3 mapping parameter: Application object 2	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:003	TPDO3 mapping parameter: Application object 3	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:004	TPDO3 mapping parameter: Application object 4	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:005	TPDO3 mapping parameter: Application object 5	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:006	TPDO3 mapping parameter: Application object 6	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:007	TPDO3 mapping parameter: Application object 7	**0x00000000**	CANopen	U32	1	PH	-
0x1A02:008	TPDO3 mapping parameter: Application object 8	**0x00000000**	CANopen	U32	1	PH	-
0x1A03:001	TPDO4 mapping parameter: Application object 1	- (Read only)	EtherCAT	U32	1	XH	-
0x1A03:002	TPDO4 mapping parameter: Application object 2	- (Read only)	EtherCAT	U32	1	XH	-
0x1A03:003	TPDO4 mapping parameter: Application object 3	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:001	TPDO6 mapping parameter: Application object 1	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:002	TPDO6 mapping parameter: Application object 2	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:003	TPDO6 mapping parameter: Application object 3	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:004	TPDO6 mapping parameter: Application object 4	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:005	TPDO6 mapping parameter: Application object 5	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:006	TPDO6 mapping parameter: Application object 6	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:007	TPDO6 mapping parameter: Application object 7	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:008	TPDO6 mapping parameter: Application object 8	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:009	TPDO6 mapping parameter: Application object 9	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:010	TPDO6 mapping parameter: Application object 10	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:011	TPDO6 mapping parameter: Application object 11	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:012	TPDO6 mapping parameter: Application object 12	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:013	TPDO6 mapping parameter: Application object 13	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:014	TPDO6 mapping parameter: Application object 14	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:015	TPDO6 mapping parameter: Application object 15	- (Read only)	EtherCAT	U32	1	XH	-
0x1A05:016	TPDO6 mapping parameter: Application object 16	- (Read only)	EtherCAT	U32	1	XH	-
0x1C00:001	Sync Manager communication type: SM1 communication type	- (Read only)	EtherCAT	U8	1	X	-
0x1C00:002	Sync Manager communication type: SM2 communication type	- (Read only)	EtherCAT	U8	1	X	-
0x1C00:003	Sync Manager communication type: SM3 communication type	- (Read only)	EtherCAT	U8	1	X	-
0x1C00:004	Sync Manager communication type: SM4 communication type	- (Read only)	EtherCAT	U8	1	X	-
0x1C12:000	Number of assigned PDOs	- (Read only)	EtherCAT	U8	1	X	-
0x1C12:001	PDO mapping object index of assigned RxPDO 1	- (Read only)	EtherCAT	U16	1	XH	-
0x1C12:002	PDO mapping object index of assigned RxPDO 2	- (Read only)	EtherCAT	U16	1	XH	-
0x1C13:000	Number of assigned PDOs	- (Read only)	EtherCAT	U8	1	X	-
0x1C13:001	PDO mapping object index of assigned RxPDO 1	- (Read only)	EtherCAT	U16	1	XH	-
0x1C13:002	PDO mapping object index of assigned RxPDO 2	- (Read only)	EtherCAT	U16	1	XH	-
0x1C32:001	Sync Manager 2: Synchronization type	**Free run [0]**	EtherCAT	U16	1	X	-
0x1C32:002	Sync Manager 2: Cycle time	x ns (Read only)	EtherCAT	U32	1	X	-
0x1C32:003	Sync Manager 2: Shift time	x ns (Read only)	EtherCAT	U32	1	X	-
0x1C32:004	Sync Manager 2: Synchronization types supported	- (Read only)	EtherCAT	U16	1	X	-
0x1C32:005	Sync Manager 2: Minimum cycle time	x ns (Read only)	EtherCAT	U32	1	X	-
0x1C33:001	Sync Manager 3: Synchronization type	**Free run [0]**	EtherCAT	U16	1	X	-
0x1C33:002	Sync Manager 3: Cycle time	x ns (Read only)	EtherCAT	U32	1	X	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x1C33:003	Sync Manager 3: Shift time	x ns (Read only)	EtherCAT	U32	1	X	-
0x1C33:004	Sync Manager 3: Synchronization types supported	- (Read only)	EtherCAT	U16	1	X	-
0x1C33:005	Sync Manager 3: Minimum cycle time	x ns (Read only)	EtherCAT	U32	1	X	-
0x2000:001 (P190.01)	Device data: Product code	- (Read only)	general	STRING[18]	1	-	-
0x2000:002 (P190.02)	Device data: Serial number	- (Read only)	general	STRING[50]	1	-	-
0x2000:004 (P190.04)	Device data: CU firmware version	- (Read only)	general	STRING[50]	1	-	-
0x2000:005 (P190.05)	Device data: CU firmware type	- (Read only)	general	STRING[50]	1	-	-
0x2000:006 (P190.06)	Device data: CU bootloader version	- (Read only)	general	STRING[50]	1	-	-
0x2000:007 (P190.07)	Device data: CU bootloader type	- (Read only)	general	STRING[50]	1	-	-
0x2000:008 (P190.08)	Device data: Object directory version	- (Read only)	general	U32	1	-	-
0x2000:010 (P190.10)	Device data: PU firmware version	- (Read only)	general	STRING[50]	1	-	-
0x2000:011 (P190.11)	Device data: PU firmware type	- (Read only)	general	STRING[50]	1	-	-
0x2000:012 (P190.12)	Device data: PU bootloader version	- (Read only)	general	STRING[50]	1	-	-
0x2000:013 (P190.13)	Device data: PU bootloader type	- (Read only)	general	STRING[50]	1	-	-
0x2000:014 (P190.14)	Device data: Module - firmware version	- (Read only)	general	STRING[11]	1	-	-
0x2001 (P191.00)	Device name	**My Device**	general	STRING[128]	1	PK	-
0x2002:004 (P192.04)	Device module: CU type code	- (Read only)	general	STRING[19]	1	-	-
0x2002:005 (P192.05)	Device module: PU type code	- (Read only)	general	STRING[19]	1	-	-
0x2002:006 (P192.06)	Device module: CU serial number	- (Read only)	general	STRING[23]	1	-	-
0x2002:007 (P192.07)	Device module: PU serial number	- (Read only)	general	STRING[23]	1	-	-
0x2006:000 (P155.00)	Error history buffer: Keypad display	- (Read only)	general	U8	1	-	-
0x2006:001	Error history buffer: Maximum number of messages	- (Read only)	general	U8	1	-	-
0x2006:002	Error history buffer: Latest message	- (Read only)	general	U8	1	-	-
0x2006:003	Error history buffer: Latest acknowledgement message	**1**	general	U8	1	-	-
0x2006:004	Error history buffer: New message	- (Read only)	general	U8	1	-	t
0x2006:005	Error history buffer: Buffer overflow	- (Read only)	general	U16	1	-	-
0x2006:006	Error history buffer: Message 0	- (Read only)	general	OCTET[19]	1	-	-
0x2006:007	Error history buffer: Message 1	- (Read only)	general	OCTET[19]	1	-	-
0x2006:008	Error history buffer: Message 2	- (Read only)	general	OCTET[19]	1	-	-
0x2006:009	Error history buffer: Message 3	- (Read only)	general	OCTET[19]	1	-	-
0x2006:010	Error history buffer: Message 4	- (Read only)	general	OCTET[19]	1	-	-
0x2006:011	Error history buffer: Message 5	- (Read only)	general	OCTET[19]	1	-	-
0x2006:012	Error history buffer: Message 6	- (Read only)	general	OCTET[19]	1	-	-
0x2006:013	Error history buffer: Message 7	- (Read only)	general	OCTET[19]	1	-	-
0x2006:014	Error history buffer: Message 8	- (Read only)	general	OCTET[19]	1	-	-
0x2006:015	Error history buffer: Message 9	- (Read only)	general	OCTET[19]	1	-	-
0x2006:016	Error history buffer: Message 10	- (Read only)	general	OCTET[19]	1	-	-

* Default setting depending on the size.

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2006:017	Error history buffer: Message 11	- (Read only)	general	OCTET[19]	1	-	-
0x2006:018	Error history buffer: Message 12	- (Read only)	general	OCTET[19]	1	-	-
0x2006:019	Error history buffer: Message 13	- (Read only)	general	OCTET[19]	1	-	-
0x2006:020	Error history buffer: Message 14	- (Read only)	general	OCTET[19]	1	-	-
0x2006:021	Error history buffer: Message 15	- (Read only)	general	OCTET[19]	1	-	-
0x2006:022	Error history buffer: Message 16	- (Read only)	general	OCTET[19]	1	-	-
0x2006:023	Error history buffer: Message 17	- (Read only)	general	OCTET[19]	1	-	-
0x2006:024	Error history buffer: Message 18	- (Read only)	general	OCTET[19]	1	-	-
0x2006:025	Error history buffer: Message 19	- (Read only)	general	OCTET[19]	1	-	-
0x2006:026	Error history buffer: Message 20	- (Read only)	general	OCTET[19]	1	-	-
0x2006:027	Error history buffer: Message 21	- (Read only)	general	OCTET[19]	1	-	-
0x2006:028	Error history buffer: Message 22	- (Read only)	general	OCTET[19]	1	-	-
0x2006:029	Error history buffer: Message 23	- (Read only)	general	OCTET[19]	1	-	-
0x2006:030	Error history buffer: Message 24	- (Read only)	general	OCTET[19]	1	-	-
0x2006:031	Error history buffer: Message 25	- (Read only)	general	OCTET[19]	1	-	-
0x2006:032	Error history buffer: Message 26	- (Read only)	general	OCTET[19]	1	-	-
0x2006:033	Error history buffer: Message 27	- (Read only)	general	OCTET[19]	1	-	-
0x2006:034	Error history buffer: Message 28	- (Read only)	general	OCTET[19]	1	-	-
0x2006:035	Error history buffer: Message 29	- (Read only)	general	OCTET[19]	1	-	-
0x2006:036	Error history buffer: Message 30	- (Read only)	general	OCTET[19]	1	-	-
0x2006:037	Error history buffer: Message 31	- (Read only)	general	OCTET[19]	1	-	-
0x2021:001 (P230.01)	Optical tracking: Start detection	**Stop [0]**	general	U8	1	-	-
0x2021:002 (P230.02)	Optical tracking: Blinking duration	**5 s**	general	U16	1	-	-
0x2022:001 (P700.01)	Device commands: Load default settings	**Off / ready [0]**	general	U8	1	C	-
0x2022:003 (P700.03)	Device commands: Save user data	**Off / ready [0]**	general	U8	1	-	-
0x2022:004 (P700.04)	Device commands: Load user data	**Off / ready [0]**	general	U8	1	C	-
0x2022:005 (P700.05)	Device commands: Load OEM data	**Off / ready [0]**	general	U8	1	C	-
0x2022:006 (P700.06)	Device commands: Save OEM data	**Off / ready [0]**	general	U8	1	-	-
0x2022:007 (P700.07)	Device commands: Load parameter set 1	**Off / ready [0]**	general	U8	1	-	-
0x2022:008 (P700.08)	Device commands: Load parameter set 2	**Off / ready [0]**	general	U8	1	-	-
0x2022:009 (P700.09)	Device commands: Load parameter set 3	**Off / ready [0]**	general	U8	1	-	-
0x2022:010 (P700.10)	Device commands: Load parameter set 4	**Off / ready [0]**	general	U8	1	-	-
0x2022:011 (P700.11)	Device commands: Save parameter set 1	**Off / ready [0]**	general	U8	1	-	-
0x2022:012 (P700.12)	Device commands: Save parameter set 2	**Off / ready [0]**	general	U8	1	-	-
0x2022:013 (P700.13)	Device commands: Save parameter set 3	**Off / ready [0]**	general	U8	1	-	-
0x2022:014 (P700.14)	Device commands: Save parameter set 4	**Off / ready [0]**	general	U8	1	-	-
0x2022:015 (P700.15)	Device commands: Delete logbook	**Off / ready [0]**	general	U8	1	C	-
0x2022:027 (P700.27)	Device commands: Accept new inverter hardware	**Off / ready [0]**	general	U8	1	C	-
0x2022:032	Device commands: Deactivate PDO Communication	**Off / ready [0]**	general	U8	1	-	-

* Default setting depending on the size.

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2022:033	Device commands: Activate PDO Communication	**Off / ready [0]**	general	U8	1	-	-
0x2030	CRC parameter set	- (Read only)	general	U32	1	-	-
0x203D (P730.00)	PIN1 access protection	**0**	general	I16	1	-	-
0x203E (P731.00)	PIN2 access protection	**0**	general	I16	1	-	-
0x203F	PIN1/PIN2 log-in	**0**	general	I16	1	-	-
0x2040 (P197.00)	Access protection status	- (Read only)	general	U16	1	-	-
0x2300 (P508.00)	CANopen communication	**No action/no error [0]**	CANopen	U8	1	C	-
0x2301:001 (P510.01)	CANopen settings: Node ID	**1**	CANopen	U8	1	P	-
0x2301:002 (P510.02)	CANopen settings: Baud rate	**500 kbps [5]**	CANopen	U8	1	P	-
0x2301:003 (P510.03)	CANopen settings: Slave/Master	**Slave [0]**	CANopen	U8	1	P	-
0x2301:004 (P510.04)	CANopen settings: Start remote delay	**3000 ms**	CANopen	U16	1	P	-
0x2301:005 (P510.05)	CANopen settings: Activate SDO2 channel	**Not active [0]**	CANopen	U8	1	-	-
0x2302:001 (P511.01)	Active CANopen settings: Active node ID	- (Read only)	CANopen	U8	1	-	-
0x2302:002 (P511.02)	Active CANopen settings: Active baud rate	- (Read only)	CANopen	U8	1	-	-
0x2303 (P509.00)	CANopen switch position	- (Read only)	CANopen	U16	1	-	-
0x2307 (P515.00)	CANopen time-out status	- (Read only)	CANopen	U32	1	-	-
0x2308 (P516.00)	CANopen status	- (Read only)	CANopen	U16	1	-	-
0x2309 (P517.00)	CANopen controller status	- (Read only)	CANopen	U16	1	-	-
0x230A:000	CANopen statistics: Highest subindex	- (Read only)	CANopen	U8	1	-	-
0x230A:001 (P580.01)	CANopen statistics: PDO1 received	- (Read only)	CANopen	U16	1	-	-
0x230A:002 (P580.02)	CANopen statistics: PDO2 received	- (Read only)	CANopen	U16	1	-	-
0x230A:003 (P580.03)	CANopen statistics: PDO3 received	- (Read only)	CANopen	U16	1	-	-
0x230A:005 (P580.05)	CANopen statistics: PDO1 transmitted	- (Read only)	CANopen	U16	1	-	-
0x230A:006 (P580.06)	CANopen statistics: PDO2 transmitted	- (Read only)	CANopen	U16	1	-	-
0x230A:007 (P580.07)	CANopen statistics: PDO3 transmitted	- (Read only)	CANopen	U16	1	-	-
0x230A:009 (P580.09)	CANopen statistics: SDO1 telegrams	- (Read only)	CANopen	U16	1	-	-
0x230A:010 (P580.10)	CANopen statistics: SDO2 telegrams	- (Read only)	CANopen	U16	1	-	-
0x230B (P518.00)	CANopen error counter	- (Read only)	CANopen	U16	1	-	-
0x231F:001 (P500.01)	Module ID: Active module ID	- (Read only)	general	U8	1	P	-
0x231F:002 (P500.02)	Module ID: Module ID connected	- (Read only)	general	U8	1	-	-
0x2320 (P508.00)	Modbus communication	**0**	Modbus	U8	1	-	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2321:001 (P510.01)	Modbus settings: Node ID	**1**	Modbus	U8	1	P	-
0x2321:002 (P510.02)	Modbus settings: Baud rate	**Automatic [0]**	Modbus	U8	1	P	-
0x2321:003 (P510.03)	Modbus settings: Data format	**Automatic [0]**	Modbus	U8	1	P	-
0x2321:004 (P510.04)	Modbus settings: Minimum response time	**0 ms**	Modbus	U16	1	P	-
0x2322:001 (P511.01)	Active Modbus settings: Active node ID	- (Read only)	Modbus	U8	1	-	-
0x2322:002 (P511.02)	Active Modbus settings: Active baud rate	- (Read only)	Modbus	U8	1	-	-
0x2322:003 (P511.03)	Active Modbus settings: Data format	- (Read only)	Modbus	U8	1	-	-
0x2323 (P509.00)	Modbus switch position	- (Read only)	Modbus	U16	1	-	-
0x232A:001 (P580.01)	Modbus statistics: Messages received	- (Read only)	Modbus	U32	1	-	-
0x232A:002 (P580.02)	Modbus statistics: Valid messages received	- (Read only)	Modbus	U32	1	-	-
0x232A:003 (P580.03)	Modbus statistics: Messages with exceptions	- (Read only)	Modbus	U32	1	-	-
0x232A:004 (P580.04)	Modbus statistics: Messages with errors	- (Read only)	Modbus	U32	1	-	-
0x232A:005 (P580.05)	Modbus statistics: Messages sent	- (Read only)	Modbus	U32	1	-	-
0x232B:001 (P530.01)	Modbus parameter mapping: Parameter 1	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:002 (P530.02)	Modbus parameter mapping: Parameter 2	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:003 (P530.03)	Modbus parameter mapping: Parameter 3	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:004 (P530.04)	Modbus parameter mapping: Parameter 4	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:005 (P530.05)	Modbus parameter mapping: Parameter 5	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:006 (P530.06)	Modbus parameter mapping: Parameter 6	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:007 (P530.07)	Modbus parameter mapping: Parameter 7	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:008 (P530.08)	Modbus parameter mapping: Parameter 8	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:009 (P530.09)	Modbus parameter mapping: Parameter 9	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:010 (P530.10)	Modbus parameter mapping: Parameter 10	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:011 (P530.11)	Modbus parameter mapping: Parameter 11	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:012 (P530.12)	Modbus parameter mapping: Parameter 12	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:013 (P530.13)	Modbus parameter mapping: Parameter 13	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:014 (P530.14)	Modbus parameter mapping: Parameter 14	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:015 (P530.15)	Modbus parameter mapping: Parameter 15	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:016 (P530.16)	Modbus parameter mapping: Parameter 16	**0x00000000**	Modbus	IDX	1	PH	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x232B:017 (P530.17)	Modbus parameter mapping: Parameter 17	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:018 (P530.18)	Modbus parameter mapping: Parameter 18	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:019 (P530.19)	Modbus parameter mapping: Parameter 19	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:020 (P530.20)	Modbus parameter mapping: Parameter 20	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:021 (P530.21)	Modbus parameter mapping: Parameter 21	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:022 (P530.22)	Modbus parameter mapping: Parameter 22	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:023 (P530.23)	Modbus parameter mapping: Parameter 23	**0x00000000**	Modbus	IDX	1	PH	-
0x232B:024 (P530.24)	Modbus parameter mapping: Parameter 24	**0x00000000**	Modbus	IDX	1	PH	-
0x232C:001 (P531.01)	Modbus register assignment: Register 1	- (Read only)	Modbus	U16	1	-	-
0x232C:002 (P531.02)	Modbus register assignment: Register 2	- (Read only)	Modbus	U16	1	-	-
0x232C:003 (P531.03)	Modbus register assignment: Register 3	- (Read only)	Modbus	U16	1	-	-
0x232C:004 (P531.04)	Modbus register assignment: Register 4	- (Read only)	Modbus	U16	1	-	-
0x232C:005 (P531.05)	Modbus register assignment: Register 5	- (Read only)	Modbus	U16	1	-	-
0x232C:006 (P531.06)	Modbus register assignment: Register 6	- (Read only)	Modbus	U16	1	-	-
0x232C:007 (P531.07)	Modbus register assignment: Register 7	- (Read only)	Modbus	U16	1	-	-
0x232C:008 (P531.08)	Modbus register assignment: Register 8	- (Read only)	Modbus	U16	1	-	-
0x232C:009 (P531.09)	Modbus register assignment: Register 9	- (Read only)	Modbus	U16	1	-	-
0x232C:010 (P531.10)	Modbus register assignment: Register 10	- (Read only)	Modbus	U16	1	-	-
0x232C:011 (P531.11)	Modbus register assignment: Register 11	- (Read only)	Modbus	U16	1	-	-
0x232C:012 (P531.12)	Modbus register assignment: Register 12	- (Read only)	Modbus	U16	1	-	-
0x232C:013 (P531.13)	Modbus register assignment: Register 13	- (Read only)	Modbus	U16	1	-	-
0x232C:014 (P531.14)	Modbus register assignment: Register 14	- (Read only)	Modbus	U16	1	-	-
0x232C:015 (P531.15)	Modbus register assignment: Register 15	- (Read only)	Modbus	U16	1	-	-
0x232C:016 (P531.16)	Modbus register assignment: Register 16	- (Read only)	Modbus	U16	1	-	-
0x232C:017 (P531.17)	Modbus register assignment: Register 17	- (Read only)	Modbus	U16	1	-	-
0x232C:018 (P531.18)	Modbus register assignment: Register 18	- (Read only)	Modbus	U16	1	-	-
0x232C:019 (P531.19)	Modbus register assignment: Register 19	- (Read only)	Modbus	U16	1	-	-
0x232C:020 (P531.20)	Modbus register assignment: Register 20	- (Read only)	Modbus	U16	1	-	-
0x232C:021 (P531.21)	Modbus register assignment: Register 21	- (Read only)	Modbus	U16	1	-	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x232C:022 (P531.22)	Modbus register assignment: Register 22	- (Read only)	Modbus	U16	1	-	-
0x232C:023 (P531.23)	Modbus register assignment: Register 23	- (Read only)	Modbus	U16	1	-	-
0x232C:024 (P531.24)	Modbus register assignment: Register 24	- (Read only)	Modbus	U16	1	-	-
0x232D (P532.00)	Modbus verification code	- (Read only)	Modbus	U16	1	-	-
0x232E:001 (P583.01)	Modbus diagnostics of last Rx data: Offset	**0**	Modbus	U8	1	-	-
0x232E:002 (P583.02)	Modbus diagnostics of last Rx data: Data byte 0	- (Read only)	Modbus	U8	1	-	-
0x232E:003 (P583.03)	Modbus diagnostics of last Rx data: Data byte 1	- (Read only)	Modbus	U8	1	-	-
0x232E:004 (P583.04)	Modbus diagnostics of last Rx data: Data byte 2	- (Read only)	Modbus	U8	1	-	-
0x232E:005 (P583.05)	Modbus diagnostics of last Rx data: Data byte 3	- (Read only)	Modbus	U8	1	-	-
0x232E:006 (P583.06)	Modbus diagnostics of last Rx data: Data byte 4	- (Read only)	Modbus	U8	1	-	-
0x232E:007 (P583.07)	Modbus diagnostics of last Rx data: Data byte 5	- (Read only)	Modbus	U8	1	-	-
0x232E:008 (P583.08)	Modbus diagnostics of last Rx data: Data byte 6	- (Read only)	Modbus	U8	1	-	-
0x232E:009 (P583.09)	Modbus diagnostics of last Rx data: Data byte 7	- (Read only)	Modbus	U8	1	-	-
0x232E:010 (P583.10)	Modbus diagnostics of last Rx data: Data byte 8	- (Read only)	Modbus	U8	1	-	-
0x232E:011 (P583.11)	Modbus diagnostics of last Rx data: Data byte 9	- (Read only)	Modbus	U8	1	-	-
0x232E:012 (P583.12)	Modbus diagnostics of last Rx data: Data byte 10	- (Read only)	Modbus	U8	1	-	-
0x232E:013 (P583.13)	Modbus diagnostics of last Rx data: Data byte 11	- (Read only)	Modbus	U8	1	-	-
0x232E:014 (P583.14)	Modbus diagnostics of last Rx data: Data byte 12	- (Read only)	Modbus	U8	1	-	-
0x232E:015 (P583.15)	Modbus diagnostics of last Rx data: Data byte 13	- (Read only)	Modbus	U8	1	-	-
0x232E:016 (P583.16)	Modbus diagnostics of last Rx data: Data byte 14	- (Read only)	Modbus	U8	1	-	-
0x232E:017 (P583.17)	Modbus diagnostics of last Rx data: Data byte 15	- (Read only)	Modbus	U8	1	-	-
0x232F:001 (P585.01)	Modbus diagnostics of last Tx data: Offset	**0**	Modbus	U8	1	-	-
0x232F:002 (P585.02)	Modbus diagnostics of last Tx data: Data byte 0	- (Read only)	Modbus	U8	1	-	-
0x232F:003 (P585.03)	Modbus diagnostics of last Tx data: Data byte 1	- (Read only)	Modbus	U8	1	-	-
0x232F:004 (P585.04)	Modbus diagnostics of last Tx data: Data byte 2	- (Read only)	Modbus	U8	1	-	-
0x232F:005 (P585.05)	Modbus diagnostics of last Tx data: Data byte 3	- (Read only)	Modbus	U8	1	-	-
0x232F:006 (P585.06)	Modbus diagnostics of last Tx data: Data byte 4	- (Read only)	Modbus	U8	1	-	-
0x232F:007 (P585.07)	Modbus diagnostics of last Tx data: Data byte 5	- (Read only)	Modbus	U8	1	-	-
0x232F:008 (P585.08)	Modbus diagnostics of last Tx data: Data byte 6	- (Read only)	Modbus	U8	1	-	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x232F:009 (P585.09)	Modbus diagnostics of last Tx data: Data byte 7	- (Read only)	Modbus	U8	1	-	-
0x232F:010 (P585.10)	Modbus diagnostics of last Tx data: Data byte 8	- (Read only)	Modbus	U8	1	-	-
0x232F:011 (P585.11)	Modbus diagnostics of last Tx data: Data byte 9	- (Read only)	Modbus	U8	1	-	-
0x232F:012 (P585.12)	Modbus diagnostics of last Tx data: Data byte 10	- (Read only)	Modbus	U8	1	-	-
0x232F:013 (P585.13)	Modbus diagnostics of last Tx data: Data byte 11	- (Read only)	Modbus	U8	1	-	-
0x232F:014 (P585.14)	Modbus diagnostics of last Tx data: Data byte 12	- (Read only)	Modbus	U8	1	-	-
0x232F:015 (P585.15)	Modbus diagnostics of last Tx data: Data byte 13	- (Read only)	Modbus	U8	1	-	-
0x232F:016 (P585.16)	Modbus diagnostics of last Tx data: Data byte 14	- (Read only)	Modbus	U8	1	-	-
0x232F:017 (P585.17)	Modbus diagnostics of last Tx data: Data byte 15	- (Read only)	Modbus	U8	1	-	-
0x2341:001 (P510.01)	PROFIBUS settings: Station address	**3**	PROFIBUS	U8	1	P	-
0x2342:001 (P511.01)	Active PROFIBUS settings: Active station address	- (Read only)	PROFIBUS	U8	1	-	-
0x2342:002 (P511.02)	Active PROFIBUS settings: Active baud rate	- (Read only)	PROFIBUS	U8	1	-	-
0x2342:003 (P511.03)	Active PROFIBUS settings: Watchdog time	- (Read only)	PROFIBUS	U16	1	-	-
0x2343 (P509.00)	PROFIBUS switch position	- (Read only)	PROFIBUS	U16	1	-	-
0x2344:001 (P512.01)	PROFIBUS Configuration: Extended diagnostic bit	**Delete [0]**	PROFIBUS	U8	1	P	-
0x2348:001 (P516.01)	PROFIBUS Status: Bus status	- (Read only)	PROFIBUS	U8	1	-	-
0x2348:002 (P516.02)	PROFIBUS Status: Watchdog status	- (Read only)	PROFIBUS	U8	1	-	-
0x2349 (P517.00)	PROFIBUS error	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:001 (P580.01)	PROFIBUS statistics: Data cycles per second	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:002 (P580.02)	PROFIBUS statistics: Parameterization events	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:003 (P580.03)	PROFIBUS statistics: Configuration events	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:004 (P580.04)	PROFIBUS statistics: Diagnostics events	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:005 (P580.05)	PROFIBUS statistics: C1 messages	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:006 (P580.06)	PROFIBUS statistics: C2 messages	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:007 (P580.07)	PROFIBUS statistics: Watchdog events	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:008 (P580.08)	PROFIBUS statistics: Data exchange aborts	- (Read only)	PROFIBUS	U32	1	-	-
0x234A:009 (P580.09)	PROFIBUS statistics: Total data cycles	- (Read only)	PROFIBUS	U32	1	-	-
0x2360 (P508.00)	EtherCAT communication	**No action/no error [0]**	EtherCAT	U8	1	-	-
0x2361:004 (P510.04)	EtherCAT settings: Device identifier	**0**	EtherCAT	U16	1	P	-

* Default setting depending on the size.

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2362:004 (P511.04)	Active EtherCAT settings: Device identifier	- (Read only)	EtherCAT	U16	1	-	-
0x2362:006 (P511.06)	Active EtherCAT settings: Station address	- (Read only)	EtherCAT	U16	1	-	-
0x2362:007 (P511.07)	Active EtherCAT settings: Tx length	- (Read only)	EtherCAT	U16	1	-	-
0x2362:008 (P511.08)	Active EtherCAT settings: Rx length	- (Read only)	EtherCAT	U16	1	-	-
0x2363 (P509.00)	EtherCAT switch position	- (Read only)	EtherCAT	U16	1	-	-
0x2368 (P516.00)	EtherCAT status	- (Read only)	EtherCAT	U16	1	-	-
0x2369 (P517.00)	EtherCAT error	- (Read only)	EtherCAT	U16	1	-	-
0x2380 (P508.00)	PROFINET communication	**No action/no error [0]**	PROFINET	U8	1	-	-
0x2381:001 (P510.01)	PROFINET settings: IP address	**0**	PROFINET	U32	1	PE	-
0x2381:002 (P510.02)	PROFINET settings: Subnet	**0**	PROFINET	U32	1	PE	-
0x2381:003 (P510.03)	PROFINET settings: Gateway	**0**	PROFINET	U32	1	PE	-
0x2381:004 (P510.04)	PROFINET settings: Station name		PROFINET	STRING[240]	1	P	-
0x2381:005	PROFINET settings: I&M1 System designation		PROFINET	STRING[32]	1	P	-
0x2381:006	PROFINET settings: I&M1 Installation site		PROFINET	STRING[22]	1	P	-
0x2381:007	PROFINET settings: I&M2 Installation date		PROFINET	STRING[16]	1	P	-
0x2381:008	PROFINET settings: I&M3 additional information		PROFINET	STRING[54]	1	P	-
0x2381:009	PROFINET settings: I&M4 signature code		PROFINET	OCTET[54]	1	P	-
0x2382:001 (P511.01)	Active PROFINET settings: IP address	- (Read only)	PROFINET	U32	1	E	-
0x2382:002 (P511.02)	Active PROFINET settings: Subnet	- (Read only)	PROFINET	U32	1	E	-
0x2382:003 (P511.03)	Active PROFINET settings: Gateway	- (Read only)	PROFINET	U32	1	E	-
0x2382:004 (P511.04)	Active PROFINET settings: Station name	- (Read only)	PROFINET	STRING[240]	1	-	-
0x2382:005 (P511.05)	Active PROFINET settings: MAC Address	- (Read only)	PROFINET	OCTET[6]	1	-	-
0x2388 (P516.00)	PROFINET status	- (Read only)	PROFINET	U16	1	-	-
0x2389:001 (P517.01)	PROFINET error: Error 1	- (Read only)	PROFINET	U16	1	-	-
0x2389:002 (P517.02)	PROFINET error: Error 2	- (Read only)	PROFINET	U16	1	-	-
0x23A0 (P508.00)	EtherNet/IP communication	**No action/no error [0]**	EtherNet/IP	U8	1	-	-
0x23A1:001 (P510.01)	EtherNet/IP settings: IP address	**276605120**	EtherNet/IP	U32	1	PE	-
0x23A1:002 (P510.02)	EtherNet/IP settings: Subnet	**16777215**	EtherNet/IP	U32	1	PE	-
0x23A1:003 (P510.03)	EtherNet/IP settings: Gateway	**0**	EtherNet/IP	U32	1	PE	-
0x23A1:004 (P510.04)	EtherNet/IP settings: Host name		EtherNet/IP	STRING[64]	1	P	-
0x23A1:005 (P510.05)	EtherNet/IP settings: IP configuration	**BOOTP [1]**	EtherNet/IP	U8	1	P	-
0x23A1:006 (P510.06)	EtherNet/IP settings: Multicast TTL	**1**	EtherNet/IP	U8	1	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x23A1:007 (P510.07)	EtherNet/IP settings: Multicast allocation	**Default allocation [0]**	EtherNet/IP	U8	1	P	-
0x23A1:008 (P510.08)	EtherNet/IP settings: Multicast IP address	**3221373167**	EtherNet/IP	U32	1	PE	-
0x23A1:009 (P510.09)	EtherNet/IP settings: Multicast number	**1**	EtherNet/IP	U8	1	P	-
0x23A1:010 (P510.10)	EtherNet/IP settings: Timeout	**10000 ms**	EtherNet/IP	U16	1	P	-
0x23A2:001 (P511.01)	Active EtherNet/IP settings: IP address	- (Read only)	EtherNet/IP	U32	1	E	-
0x23A2:002 (P511.02)	Active EtherNet/IP settings: Subnet	- (Read only)	EtherNet/IP	U32	1	E	-
0x23A2:003 (P511.03)	Active EtherNet/IP settings: Gateway	- (Read only)	EtherNet/IP	U32	1	E	-
0x23A2:005 (P511.05)	Active EtherNet/IP settings: MAC address	- (Read only)	EtherNet/IP	OCTET[6]	1	-	-
0x23A2:006 (P511.06)	Active EtherNet/IP settings: Multicast address	- (Read only)	EtherNet/IP	U32	1	E	-
0x23A3 (P509.00)	EtherNet/IP switch position	- (Read only)	EtherNet/IP	U8	1	-	-
0x23A4:001 (P512.01)	Port settings: Port 1	**Auto-Negotiation [0]**	EtherNet/IP	U16	1	P	-
0x23A4:002 (P512.02)	Port settings: Port 2	**Auto-Negotiation [0]**	EtherNet/IP	U16	1	P	-
0x23A5:001 (P519.01)	Active port settings: Port 1	- (Read only)	EtherNet/IP	U16	1	-	-
0x23A5:002 (P519.02)	Active port settings: Port 2	- (Read only)	EtherNet/IP	U16	1	-	-
0x23A6 (P513.00)	Quality of service	- (Read only)	EtherNet/IP	U8	1	-	-
0x23A7 (P514.00)	Address conflict detection	**Enabled [1]**	EtherNet/IP	U8	1	P	-
0x23A8 (P516.00)	CIP module status	- (Read only)	EtherNet/IP	U16	1	-	-
0x23A9 (P517.00)	EtherNet/IP status	- (Read only)	EtherNet/IP	U16	1	-	-
0x2440	Initiate WLAN	**No action/no error [0]**	WLAN	U8	1	-	-
0x2441:001	IP address	**28485824**	WLAN	U32	1	PE	-
0x2441:002	Netmask	**16777215**	WLAN	U32	1	PE	-
0x2441:003	Gateway	**28485824**	WLAN	U32	1	PE	-
0x2441:004	DHCP	**Enabled [1]**	WLAN	U8	1	P	-
0x2441:005	DHCP start address	**0**	WLAN	U32	1	PE	-
0x2441:006	WLAN operation mode	**Access point mode [0]**	WLAN	U8	1	P	-
0x2441:007	WLAN SSID	**i5**	WLAN	STRING[32]	1	P	-
0x2441:008	WLAN password	**password**	WLAN	STRING[64]	1	P	-
0x2441:009	WLAN security	**WPA2 [1]**	WLAN	U8	1	P	-
0x2441:010	WLAN access	**Enabled (WLAN on) [1]**	WLAN	U8	1	P	-
0x2441:011	WLAN channel	**Channel 1 [1]**	WLAN	U8	1	P	-
0x2441:012	WLAN SSID broadcast	**Activated [0]**	WLAN	U8	1	P	-
0x2442:001	Active IP address	- (Read only)	WLAN	U32	1	E	-
0x2442:002	Active netmask	- (Read only)	WLAN	U32	1	E	-
0x2442:003	Active gateway	- (Read only)	WLAN	U32	1	E	-
0x2442:004	Active module mode	- (Read only)	WLAN	U8	1	-	-
0x2442:005	MAC address	- (Read only)	WLAN	OCTET[6]	1	-	-
0x2448:001	WLAN status: Connection time	- (Read only)	WLAN	U32	1	-	-
0x2448:002	WLAN status: Number of connections	- (Read only)	WLAN	U16	1	-	-
0x2448:003	WLAN status: Rx frame counter	- (Read only)	WLAN	U16	1	-	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2448:004	WLAN status: Error statistics	- (Read only)	WLAN	U16	1	-	-
0x2449	WLAN error	- (Read only)	WLAN	U16	1	-	-
0x24E0:000	Generic RPDO mapping: Highest subindex	**2**	Mapping	U8	1	PI	-
0x24E0:001	Generic RPDO mapping: Entry 1	**0x60400010**	Mapping	U32	1	PH	-
0x24E0:002	Generic RPDO mapping: Entry 2	**0x60420010**	Mapping	U32	1	PH	-
0x24E0:003	Generic RPDO mapping: Entry 3	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:004	Generic RPDO mapping: Entry 4	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:005	Generic RPDO mapping: Entry 5	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:006	Generic RPDO mapping: Entry 6	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:007	Generic RPDO mapping: Entry 7	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:008	Generic RPDO mapping: Entry 8	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:009	Generic RPDO mapping: Entry 9	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:010	Generic RPDO mapping: Entry 10	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:011	Generic RPDO mapping: Entry 11	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:012	Generic RPDO mapping: Entry 12	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:013	Generic RPDO mapping: Entry 13	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:014	Generic RPDO mapping: Entry 14	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:015	Generic RPDO mapping: Entry 15	**0x00000000**	Mapping	U32	1	PH	-
0x24E0:016	Generic RPDO mapping: Entry 16	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:000	Generic TPDO mapping: Highest subindex	**3**	Mapping	U8	1	PI	-
0x24E1:001	Generic TPDO mapping: Entry 1	**0x60410010**	Mapping	U32	1	PH	-
0x24E1:002	Generic TPDO mapping: Entry 2	**0x60440010**	Mapping	U32	1	PH	-
0x24E1:003	Generic TPDO mapping: Entry 3	**0x603F0010**	Mapping	U32	1	PH	-
0x24E1:004	Generic TPDO mapping: Entry 4	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:005	Generic TPDO mapping: Entry 5	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:006	Generic TPDO mapping: Entry 6	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:007	Generic TPDO mapping: Entry 7	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:008	Generic TPDO mapping: Entry 8	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:009	Generic TPDO mapping: Entry 9	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:010	Generic TPDO mapping: Entry 10	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:011	Generic TPDO mapping: Entry 11	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:012	Generic TPDO mapping: Entry 12	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:013	Generic TPDO mapping: Entry 13	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:014	Generic TPDO mapping: Entry 14	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:015	Generic TPDO mapping: Entry 15	**0x00000000**	Mapping	U32	1	PH	-
0x24E1:016	Generic TPDO mapping: Entry 16	**0x00000000**	Mapping	U32	1	PH	-
0x2540:001 (P208.01)	Mains settings: Rated mains voltage	**230 Veff [0]**	general	U8	1	PC	-
0x2540:002 (P208.02)	Mains settings: Undervoltage warning threshold	**0 V** *	general	U16	1	P	-
0x2540:003 (P208.03)	Mains settings: Undervoltage error threshold	x V (Read only)	general	U16	1	-	-
0x2540:004 (P208.04)	Mains settings: Undervoltage reset threshold	x V (Read only)	general	U16	1	-	-
0x2540:005 (P208.05)	Mains settings: Overvoltage warning threshold	**0 V** *	general	U16	1	P	-
0x2540:006 (P208.06)	Mains settings: Overvoltage error threshold	x V (Read only)	general	U16	1	-	-
0x2540:007 (P208.07)	Mains settings: Overvoltage reset threshold	x V (Read only)	general	U16	1	-	-
0x2541:001 (P706.01)	Brake energy management: Operating mode	**Ramp function generator stop (RFGS) [1]**	general	U8	1	P	-
0x2541:002 (P706.02)	Brake energy management: Active threshold	x V (Read only)	general	U16	1	P	-
0x2541:003 (P706.03)	Brake energy management: Reduced threshold	**0 V**	general	U16	1	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2541:004 (P706.04)	Brake energy management: Additional frequency	**0.0 Hz**	general	U16	10	P	-
0x2541:005 (P706.05)	Brake energy management: Deceleration override time	**2.0 s**	general	U16	10	P	-
0x2541:006 (P706.06)	Brake energy management: Brake resistor response	**Off: disable and error [0]**	general	U8	1	PC	-
0x2550:002 (P707.02)	Brake resistor: Resistance value	**180.0 Ω** *	general	U16	10	P	-
0x2550:003 (P707.03)	Brake resistor: Rated power	**50 W** *	general	U32	1	P	-
0x2550:004 (P707.04)	Brake resistor: Maximum thermal load	**8.0 kWs** *	general	U32	10	P	-
0x2550:007 (P707.07)	Brake resistor: Thermal load	x.x % (Read only)	general	U16	10	-	-
0x2550:008 (P707.08)	Brake resistor: Warning threshold	**90.0 %**	general	U16	10	P	-
0x2550:009 (P707.09)	Brake resistor: Error threshold	**100.0 %**	general	U16	10	P	-
0x2550:010 (P707.10)	Brake resistor: Response to warning	**Warning [1]**	general	U8	1	P	-
0x2550:011 (P707.11)	Brake resistor: Response to error	**Fault [3]**	general	U8	1	P	-
0x2601:001 (P202.01)	Keypad setpoints: Frequency setpoint	**20.0 Hz**	general	U16	10	P	r
0x2601:002 (P202.02)	Keypad setpoints: Process controller setpoint	**0.00 PID unit**	general	I16	100	P	r
0x261C:001 (P740.01)	Favorites settings: Parameter 1	**0x2DDD0000**	general	IDX	1	PH	-
0x261C:002 (P740.02)	Favorites settings: Parameter 2	**0x60780000**	general	IDX	1	PH	-
0x261C:003 (P740.03)	Favorites settings: Parameter 3	**0x2D890000**	general	IDX	1	PH	-
0x261C:004 (P740.04)	Favorites settings: Parameter 4	**0x603F0000**	general	IDX	1	PH	-
0x261C:005 (P740.05)	Favorites settings: Parameter 5	**0x28240000**	general	IDX	1	PH	-
0x261C:006 (P740.06)	Favorites settings: Parameter 6	**0x28600100**	general	IDX	1	PH	-
0x261C:007 (P740.07)	Favorites settings: Parameter 7	**0x28380100**	general	IDX	1	PH	-
0x261C:008 (P740.08)	Favorites settings: Parameter 8	**0x28380300**	general	IDX	1	PH	-
0x261C:009 (P740.09)	Favorites settings: Parameter 9	**0x25400100**	general	IDX	1	PH	-
0x261C:010 (P740.10)	Favorites settings: Parameter 10	**0x29150000**	general	IDX	1	PH	-
0x261C:011 (P740.11)	Favorites settings: Parameter 11	**0x29160000**	general	IDX	1	PH	-
0x261C:012 (P740.12)	Favorites settings: Parameter 12	**0x29170000**	general	IDX	1	PH	-
0x261C:013 (P740.13)	Favorites settings: Parameter 13	**0x29180000**	general	IDX	1	PH	-
0x261C:014 (P740.14)	Favorites settings: Parameter 14	**0x2C000000**	general	IDX	1	PH	-
0x261C:015 (P740.15)	Favorites settings: Parameter 15	**0x2B000000**	general	IDX	1	PH	-
0x261C:016 (P740.16)	Favorites settings: Parameter 16	**0x2B010100**	general	IDX	1	PH	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x261C:017 (P740.17)	Favorites settings: Parameter 17	**0x2B010200**	general	IDX	1	PH	-
0x261C:018 (P740.18)	Favorites settings: Parameter 18	**0x283A0000**	general	IDX	1	PH	-
0x261C:019 (P740.19)	Favorites settings: Parameter 19	**0x29390000**	general	IDX	1	PH	-
0x261C:020 (P740.20)	Favorites settings: Parameter 20	**0x2D4B0100**	general	IDX	1	PH	-
0x261C:021 (P740.21)	Favorites settings: Parameter 21	**0x2B120100**	general	IDX	1	PH	-
0x261C:022 (P740.22)	Favorites settings: Parameter 22	**0x60730000**	general	IDX	1	PH	-
0x261C:023 (P740.23)	Favorites settings: Parameter 23	**0x26310100**	general	IDX	1	PH	-
0x261C:024 (P740.24)	Favorites settings: Parameter 24	**0x26310200**	general	IDX	1	PH	-
0x261C:025 (P740.25)	Favorites settings: Parameter 25	**0x26310300**	general	IDX	1	PH	-
0x261C:026 (P740.26)	Favorites settings: Parameter 26	**0x26310400**	general	IDX	1	PH	-
0x261C:027 (P740.27)	Favorites settings: Parameter 27	**0x26310500**	general	IDX	1	PH	-
0x261C:028 (P740.28)	Favorites settings: Parameter 28	**0x26310600**	general	IDX	1	PH	-
0x261C:029 (P740.29)	Favorites settings: Parameter 29	**0x26310700**	general	IDX	1	PH	-
0x261C:030 (P740.30)	Favorites settings: Parameter 30	**0x26310800**	general	IDX	1	PH	-
0x261C:031 (P740.31)	Favorites settings: Parameter 31	**0x26310900**	general	IDX	1	PH	-
0x261C:032 (P740.32)	Favorites settings: Parameter 32	**0x26310D00**	general	IDX	1	PH	-
0x261C:033 (P740.33)	Favorites settings: Parameter 33	**0x26311200**	general	IDX	1	PH	-
0x261C:034 (P740.34)	Favorites settings: Parameter 34	**0x26311300**	general	IDX	1	PH	-
0x261C:035 (P740.35)	Favorites settings: Parameter 35	**0x26311400**	general	IDX	1	PH	-
0x261C:036 (P740.36)	Favorites settings: Parameter 36	**0x26340100**	general	IDX	1	PH	-
0x261C:037 (P740.37)	Favorites settings: Parameter 37	**0x26340200**	general	IDX	1	PH	-
0x261C:038 (P740.38)	Favorites settings: Parameter 38	**0x26360100**	general	IDX	1	PH	-
0x261C:039 (P740.39)	Favorites settings: Parameter 39	**0x26360200**	general	IDX	1	PH	-
0x261C:040 (P740.40)	Favorites settings: Parameter 40	**0x26360300**	general	IDX	1	PH	-
0x261C:041 (P740.41)	Favorites settings: Parameter 41	**0x26390100**	general	IDX	1	PH	-
0x261C:042 (P740.42)	Favorites settings: Parameter 42	**0x26390200**	general	IDX	1	PH	-
0x261C:043 (P740.43)	Favorites settings: Parameter 43	**0x26390300**	general	IDX	1	PH	-
0x261C:044 (P740.44)	Favorites settings: Parameter 44	**0x26390400**	general	IDX	1	PH	-
0x261C:045 (P740.45)	Favorites settings: Parameter 45	**0x29110100**	general	IDX	1	PH	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x261C:046 (P740.46)	Favorites settings: Parameter 46	**0x29110200**	general	IDX	1	PH	-
0x261C:047 (P740.47)	Favorites settings: Parameter 47	**0x29110300**	general	IDX	1	PH	-
0x261C:048 (P740.48)	Favorites settings: Parameter 48	**0x29110400**	general	IDX	1	PH	-
0x261C:049 (P740.49)	Favorites settings: Parameter 49	**0x00000000**	general	IDX	1	PH	-
0x261C:050 (P740.50)	Favorites settings: Parameter 50	**0x00000000**	general	IDX	1	PH	-
0x2630:001 (P410.01)	Settings for digital inputs: Assertion level	**HIGH active [1]**	general	U8	1	P	-
0x2630:002 (P410.02)	Settings for digital inputs: Input function	**Digital input [0]**	general	U8	1	P	-
0x2631:001 (P400.01)	Function list: Enable inverter	**Constant TRUE [1]**	general	U8	1	CP	-
0x2631:002 (P400.02)	Function list: Run	**Digital input 1 [11]**	general	U8	1	CP	-
0x2631:003 (P400.03)	Function list: Activate quick stop	**Not connected [0]**	general	U8	1	CP	-
0x2631:004 (P400.04)	Function list: Reset fault	**Digital input 2 [12]**	general	U8	1	P	-
0x2631:005 (P400.05)	Function list: Activate DC braking	**Not connected [0]**	general	U8	1	P	-
0x2631:006 (P400.06)	Function list: Start forward (CW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:007 (P400.07)	Function list: Start reverse (CCW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:008 (P400.08)	Function list: Run forward (CW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:009 (P400.09)	Function list: Run reverse (CCW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:010 (P400.10)	Function list: Jog foward (CW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:011 (P400.11)	Function list: Jog reverse (CCW)	**Not connected [0]**	general	U8	1	CP	-
0x2631:012 (P400.12)	Function list: Activate keypad control	**Not connected [0]**	general	U8	1	P	-
0x2631:013 (P400.13)	Function list: Invert rotation	**Digital input 3 [13]**	general	U8	1	CP	-
0x2631:014 (P400.14)	Function list: Activate AI1 setpoint	**Not connected [0]**	general	U8	1	P	-
0x2631:015 (P400.15)	Function list: Activate AI2 setpoint	**Not connected [0]**	general	U8	1	P	-
0x2631:016 (P400.16)	Function list: Activate keypad setpoint	**Not connected [0]**	general	U8	1	P	-
0x2631:017 (P400.17)	Function list: Activate network setpoint	**Not connected [0]**	general	U8	1	P	-
0x2631:018 (P400.18)	Function list: Activate preset (bit 0)	**Digital input 4 [14]**	general	U8	1	P	-
0x2631:019 (P400.19)	Function list: Activate preset (bit 1)	**Digital input 5 [15]**	general	U8	1	P	-
0x2631:020 (P400.20)	Function list: Activate preset (bit 2)	**Not connected [0]**	general	U8	1	P	-
0x2631:021 (P400.21)	Function list: Activate preset (bit 3)	**Not connected [0]**	general	U8	1	P	-
0x2631:023 (P400.23)	Function list: MOP setpoint up	**Not connected [0]**	general	U8	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2631:024 (P400.24)	Function list: MOP setpoint down	**Not connected [0]**	general	U8	1	P	-
0x2631:025 (P400.25)	Function list: Activate MOP setpoint	**Not connected [0]**	general	U8	1	P	-
0x2631:037 (P400.37)	Function list: Activate network control	**Not connected [0]**	general	U8	1	P	-
0x2631:039 (P400.39)	Function list: Activate ramp 2	**Not connected [0]**	general	U8	1	P	-
0x2631:040 (P400.40)	Function list: Load parameter set	**Not connected [0]**	general	U8	1	CP	-
0x2631:041 (P400.41)	Function list: Select parameter set (bit 0)	**Not connected [0]**	general	U8	1	CP	-
0x2631:042 (P400.42)	Function list: Select parameter set (bit 1)	**Not connected [0]**	general	U8	1	CP	-
0x2631:043 (P400.43)	Function list: Activate fault 1	**Not connected [0]**	general	U8	1	P	-
0x2631:044 (P400.44)	Function list: Activate fault 2	**Not connected [0]**	general	U8	1	P	-
0x2631:045 (P400.45)	Function list: Deactivate PID controller	**Not connected [0]**	general	U8	1	P	-
0x2631:046 (P400.46)	Function list: Set process controller output to 0	**Not connected [0]**	general	U8	1	P	-
0x2631:047 (P400.47)	Function list: Inhibit process controller I-component	**Not connected [0]**	general	U8	1	P	-
0x2631:048 (P400.48)	Function list: Activate process controller influence ramp	**Constant TRUE [1]**	general	U8	1	P	-
0x2631:049 (P400.49)	Function list: Release holding brake	**Not connected [0]**	general	U8	1	CP	-
0x2632:001 (P411.01)	Inversion of digital inputs: Digital input 1	**Not inverted [0]**	general	U8	1	P	-
0x2632:002 (P411.02)	Inversion of digital inputs: Digital input 2	**Not inverted [0]**	general	U8	1	P	-
0x2632:003 (P411.03)	Inversion of digital inputs: Digital input 3	**Not inverted [0]**	general	U8	1	P	-
0x2632:004 (P411.04)	Inversion of digital inputs: Digital input 4	**Not inverted [0]**	general	U8	1	P	-
0x2632:005 (P411.05)	Inversion of digital inputs: Digital input 5	**Not inverted [0]**	general	U8	1	P	-
0x2632:006 (P411.06)	Inversion of digital inputs: Digital input 6	**Not inverted [0]**	Appl. I/O	U8	1	P	-
0x2632:007 (P411.07)	Inversion of digital inputs: Digital input 7	**Not inverted [0]**	Appl. I/O	U8	1	P	-
0x2633:001	Digital input 1	**1 ms**	general	U8	1	P	-
0x2633:002	Digital input 2	**1 ms**	general	U8	1	P	-
0x2633:003	Digital input 3	**1 ms**	general	U8	1	P	-
0x2633:004	Digital input 4	**1 ms**	general	U8	1	P	-
0x2633:005	Digital input 5	**1 ms**	general	U8	1	P	-
0x2633:006	Digital input 6	**1 ms**	Appl. I/O	U8	1	P	-
0x2633:007	Digital input 7	**1 ms**	Appl. I/O	U8	1	P	-
0x2634:001 (P420.01)	Digital outputs function: Relay	**Ready for operation [51]**	general	U8	1	P	-
0x2634:002 (P420.02)	Digital outputs function: Digital output 1	**Release holding brake [115]**	general	U8	1	P	-
0x2634:003 (P420.03)	Digital outputs function: Digital output 2	**Error active [56]**	Appl. I/O	U8	1	P	-
0x2634:010 (P420.10)	Digital outputs function: NetWordOUT1 - bit 0	**Ready for operation [51]**	general	U8	1	P	-
0x2634:011 (P420.11)	Digital outputs function: NetWordOUT1 - bit 1	**Not connected [0]**	general	U8	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2634:012 (P420.12)	Digital outputs function: NetWordOUT1 - bit 2	**Operation enabled [52]**	general	U8	1	P	-
0x2634:013 (P420.13)	Digital outputs function: NetWordOUT1 - bit 3	**Error active [56]**	general	U8	1	P	-
0x2634:014 (P420.14)	Digital outputs function: NetWordOUT1 - bit 4	**Not connected [0]**	general	U8	1	P	-
0x2634:015 (P420.15)	Digital outputs function: NetWordOUT1 - bit 5	**Quick stop active [54]**	general	U8	1	P	-
0x2634:016 (P420.16)	Digital outputs function: NetWordOUT1 - bit 6	**Running [50]**	general	U8	1	P	-
0x2634:017 (P420.17)	Digital outputs function: NetWordOUT1 - bit 7	**Device warning active [58]**	general	U8	1	P	-
0x2634:018 (P420.18)	Digital outputs function: NetWordOUT1 - bit 8	**Not connected [0]**	general	U8	1	P	-
0x2634:019 (P420.19)	Digital outputs function: NetWordOUT1 - bit 9	**Not connected [0]**	general	U8	1	P	-
0x2634:020 (P420.20)	Digital outputs function: NetWordOUT1 - bit 10	**Setpoint speed reached [72]**	general	U8	1	P	-
0x2634:021 (P420.21)	Digital outputs function: NetWordOUT1 - bit 11	**Current limit reached [78]**	general	U8	1	P	-
0x2634:022 (P420.22)	Digital outputs function: NetWordOUT1 - bit 12	**Actual speed = 0 [71]**	general	U8	1	P	-
0x2634:023 (P420.23)	Digital outputs function: NetWordOUT1 - bit 13	**Rotational direction reversed [69]**	general	U8	1	P	-
0x2634:024 (P420.24)	Digital outputs function: NetWordOUT1 - bit 14	**Release holding brake [115]**	general	U8	1	P	-
0x2634:025 (P420.25)	Digital outputs function: NetWordOUT1 - bit 15	**Safe torque off (STO) active [55]**	general	U8	1	P	-
0x2635:001 (P421.01)	Inversion of digital outputs: Relay	**Not inverted [0]**	general	U8	1	P	-
0x2635:002 (P421.02)	Inversion of digital outputs: Digital output 1	**Not inverted [0]**	general	U8	1	P	-
0x2635:003 (P421.03)	Inversion of digital outputs: Digital output 2	**Not inverted [0]**	Appl. I/O	U8	1	P	-
0x2635:010	Inversion of digital outputs: NetWordOUT1.00	**Not inverted [0]**	general	U8	1	P	-
0x2635:011	Inversion of digital outputs: NetWordOUT1.01	**Not inverted [0]**	general	U8	1	P	-
0x2635:012	Inversion of digital outputs: NetWordOUT1.02	**Not inverted [0]**	general	U8	1	P	-
0x2635:013	Inversion of digital outputs: NetWordOUT1.03	**Not inverted [0]**	general	U8	1	P	-
0x2635:014	Inversion of digital outputs: NetWordOUT1.04	**Not inverted [0]**	general	U8	1	P	-
0x2635:015	Inversion of digital outputs: NetWordOUT1.05	**Not inverted [0]**	general	U8	1	P	-
0x2635:016	Inversion of digital outputs: NetWordOUT1.06	**Not inverted [0]**	general	U8	1	P	-
0x2635:017	Inversion of digital outputs: NetWordOUT1.07	**Not inverted [0]**	general	U8	1	P	-
0x2635:018	Inversion of digital outputs: NetWordOUT1.08	**Not inverted [0]**	general	U8	1	P	-
0x2635:019	Inversion of digital outputs: NetWordOUT1.09	**Not inverted [0]**	general	U8	1	P	-
0x2635:020	Inversion of digital outputs: NetWordOUT1.10	**Not inverted [0]**	general	U8	1	P	-
0x2635:021	Inversion of digital outputs: NetWordOUT1.11	**Not inverted [0]**	general	U8	1	P	-
0x2635:022	Inversion of digital outputs: NetWordOUT1.12	**Not inverted [0]**	general	U8	1	P	-
0x2635:023	Inversion of digital outputs: NetWordOUT1.13	**Not inverted [0]**	general	U8	1	P	-
0x2635:024	Inversion of digital outputs: NetWordOUT1.14	**Not inverted [0]**	general	U8	1	P	-
0x2635:025	Inversion of digital outputs: NetWordOUT1.15	**Not inverted [0]**	general	U8	1	P	-
0x2636:001 (P430.01)	Analog input 1: Input range	**0 ... 10 VDC [0]**	general	U8	1	P	-
0x2636:002 (P430.02)	Analog input 1: Min frequency value	**0.0 Hz**	general	I16	10	P	-
0x2636:003 (P430.03)	Analog input 1: Max frequency value	**50.0 Hz**	general	I16	10	P	-
0x2636:004 (P430.04)	Analog input 1: Min PID value	**0.00 PID unit/%**	general	I16	100	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2636:005 (P430.05)	Analog input 1: Max PID value	**100.00 PID unit/%**	general	I16	100	P	-
0x2636:006 (P430.06)	Analog input 1: Filter time	**10 ms**	general	U16	1	P	-
0x2636:007 (P430.07)	Analog input 1: Dead band	**0.0 %**	general	U16	10	P	-
0x2636:008 (P430.08)	Analog input 1: Monitoring threshold	**0.0 %**	general	I16	10	P	-
0x2636:009 (P430.09)	Analog input 1: Monitoring condition	**Input value < trigger threshold [0]**	general	U8	1	P	-
0x2636:010 (P430.10)	Analog input 1: Error response	**Fault [3]**	general	U8	1	P	-
0x2637:001 (P431.01)	Analog input 2: Input range	**0 ... 10 VDC [0]**	general	U8	1	P	-
0x2637:002 (P431.02)	Analog input 2: Min frequency value	**0.0 Hz**	general	I16	10	P	-
0x2637:003 (P431.03)	Analog input 2: Max frequency value	**50.0 Hz**	general	I16	10	P	-
0x2637:004 (P431.04)	Analog input 2: Min PID value	**0.00 PID unit/%**	general	I16	100	P	-
0x2637:005 (P431.05)	Analog input 2: Max PID value	**100.00 PID unit/%**	general	I16	100	P	-
0x2637:006 (P431.06)	Analog input 2: Filter time	**10 ms**	general	U16	1	P	-
0x2637:007 (P431.07)	Analog input 2: Dead band	**0.0 %**	general	U16	10	P	-
0x2637:008 (P431.08)	Analog input 2: Monitoring threshold	**0.0 %**	general	I16	10	P	-
0x2637:009 (P431.09)	Analog input 2: Monitoring condition	**Input value < trigger threshold [0]**	general	U8	1	P	-
0x2637:010 (P431.10)	Analog input 2: Error response	**Fault [3]**	general	U8	1	P	-
0x2639:001 (P440.01)	Analog output 1: Output range	**0 ... 10 VDC [1]**	general	U8	1	P	-
0x2639:002 (P440.02)	Analog output 1: Function	**Output frequency [1]**	general	U8	1	P	-
0x2639:003 (P440.03)	Analog output 1: Min. signal	**0**	general	I32	1	P	-
0x2639:004 (P440.04)	Analog output 1: Max. signal	**1000**	general	I32	1	P	-
0x263A:001 (P441.01)	Analog output 2: Output range	**0 ... 10 VDC [1]**	Appl. I/O	U8	1	P	-
0x263A:002 (P441.02)	Analog output 2: Function	**Motor current [5]**	Appl. I/O	U8	1	P	-
0x263A:003 (P441.03)	Analog output 2: Min. signal	**0**	Appl. I/O	I32	1	P	-
0x263A:004 (P441.04)	Analog output 2: Max. signal	**1000**	Appl. I/O	I32	1	P	-
0x2820:001 (P712.01)	Holding brake control: Brake mode	**Off [2]**	general	U8	1	P	r
0x2820:002 (P712.02)	Holding brake control: Brake closing time	**100 ms**	general	U16	1	P	-
0x2820:003 (P712.03)	Holding brake control: Brake opening time	**100 ms**	general	U16	1	P	-
0x2820:007 (P712.07)	Holding brake control: Brake closing threshold	**0.2 Hz**	general	U16	10	P	-
0x2820:008 (P712.08)	Holding brake control: Brake holding load	**0.0 %**	general	I16	10	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2820:015 (P712.15)	Holding brake control: Brake status	- (Read only)	general	U8	1	-	-
0x2822:001	Axis commands: Enable inverter	**Inverter inhibited [0]**	general	U8	1	-	-
0x2822:002	Axis commands: Activate quick stop	**0**	general	U8	1	-	-
0x2822:003	Axis commands: Reset error	**0**	general	U8	1	-	-
0x2822:004 (P327.04)	Axis commands: Identify motor data (energized)	**0**	general	U8	1	-	-
0x2822:005 (P327.05)	Axis commands: Calibrate motor data (non-energized)	**0**	general	U8	1	-	-
0x2822:019	Axis commands: Calculate Imax controller parameter	**0**	general	U8	1	-	-
0x2822:028	Axis commands: Initialize device controller	**0**	general	U8	1	-	-
0x2823:001	Last subindex	- (Read only)	general	U8	1	-	-
0x2823:002	Status of last axis command	- (Read only)	general	U8	1	-	-
0x2824 (P200.00)	Control selection	**Flexible I/O configuration [0]**	general	U8	1	P	-
0x2826	Time-out for error response	**6.0 s**	general	U16	10	P	-
0x2827 (P198.00)	Currently loaded parameter settings	- (Read only)	general	U8	1	-	-
0x2829 (P732.00)	Automatic storage in the memory module	**Inhibit [0]**	general	U8	1	P	-
0x282A:001 (P126.01)	Status words: Cause of disable	- (Read only)	general	U32	1	O	-
0x282A:002 (P126.02)	Status words: Cause of quick stop	- (Read only)	general	U16	1	O	-
0x282A:003 (P126.03)	Status words: Cause of stop	- (Read only)	general	U16	1	O	-
0x282A:004	Status words: Extended status word	- (Read only)	general	U16	1	O	t
0x282A:005 (P126.05)	Status words: Device status	- (Read only)	general	U8	1	O	t
0x282B:001 (P125.01)	Inverter diagnostics: Active control source	- (Read only)	general	U8	1	O	t
0x282B:002 (P125.02)	Inverter diagnostics: Active setpoint source	- (Read only)	general	U8	1	O	t
0x282B:003 (P125.03)	Inverter diagnostics: Keypad LCD status	- (Read only)	general	U8	1	O	-
0x282B:004 (P125.04)	Inverter diagnostics: Active drive mode	- (Read only)	general	U8	1	O	t
0x282B:005 (P125.05)	Inverter diagnostics: Most recently used control register	- (Read only)	general	U32	1	OH	-
0x282B:006 (P125.06)	Inverter diagnostics: Most recently used setpoint register	- (Read only)	general	U32	1	OH	-
0x2831	Inverter status word	- (Read only)	general	U16	1	O	t
0x2832	Motor identification status	- (Read only)	general	U16	1	O	-
0x2833	Inverter status word 2	- (Read only)	general	U16	1	O	t
0x2838:001 (P203.01)	Start/stop configuration: Start method	**Normal [0]**	general	U8	1	CP	-
0x2838:002 (P203.02)	Start/stop configuration: Start at power-up	**Off [0]**	general	U8	1	P	-
0x2838:003 (P203.03)	Start/stop configuration: Stop method	**Standard ramp [1]**	general	U8	1	P	-
0x2839:002 (P760.02)	Fault configuration: Restart delay	**3.0 s**	general	U16	10	P	-
0x2839:003 (P760.03)	Fault configuration: Number of restart attempts	**5**	general	U8	1	P	-
0x2839:004 (P760.04)	Fault configuration: Trouble counter reset time	**5.0 s**	general	U16	10	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2839:005 (P760.05)	Fault configuration: Trouble counter	- (Read only)	general	U8	1	-	-
0x283A (P304.00)	Limitation of rotation	**Both rotation directions [1]**	general	U8	1	P	-
0x2857:001	CANopen monitoring: RPDO1-Timeout	**Fault [3]**	CANopen	U8	1	P	-
0x2857:002	CANopen monitoring: RPDO2-Timeout	**Fault [3]**	CANopen	U8	1	P	-
0x2857:003	CANopen monitoring: RPDO3-Timeout	**Fault [3]**	CANopen	U8	1	P	-
0x2857:005	CANopen monitoring: Heartbeat-Timeout Consumer 1	**Fault [3]**	CANopen	U8	1	P	-
0x2857:006	CANopen monitoring: Heartbeat-Timeout Consumer 2	**Fault [3]**	CANopen	U8	1	P	-
0x2857:007	CANopen monitoring: Heartbeat-Timeout Consumer 3	**Fault [3]**	CANopen	U8	1	P	-
0x2857:008	CANopen monitoring: Heartbeat-Timeout Consumer 4	**Fault [3]**	CANopen	U8	1	P	-
0x2857:010	CANopen monitoring: "Bus-off" state change	**Trouble [2]**	CANopen	U8	1	P	-
0x2857:011	CANopen monitoring: Warning	**Warning [1]**	CANopen	U8	1	P	-
0x2858:001 (P515.01)	Modbus monitoring: Response to time-out	**Fault [3]**	Modbus	U8	1	P	-
0x2858:002 (P515.02)	Modbus monitoring: Time-out time	**2.0 s**	Modbus	U16	10	P	-
0x2859:001 (P515.01)	PROFIBUS monitoring: Watchdog elapsed	**Fault [3]**	PROFIBUS	U8	1	P	-
0x2859:001 (P515.01)	EtherNet/IP monitoring: Watchdog elapsed	**Trouble [2]**	EtherNet/IP	U8	1	P	-
0x2859:001 (P515.01)	PROFINET monitoring: Watchdog elapsed	**Trouble [2]**	PROFINET	U8	1	P	-
0x2859:001 (P515.01)	EtherCAT monitoring: Watchdog elapsed	**Trouble [2]**	EtherCAT	U8	1	P	-
0x2859:002 (P515.02)	PROFIBUS monitoring: Data exchange completed	**No response [0]**	PROFIBUS	U8	1	P	-
0x2859:003 (P515.03)	PROFIBUS monitoring: Invalid configuration	**Fault [3]**	PROFIBUS	U8	1	P	-
0x2859:003 (P515.03)	EtherNet/IP monitoring: Invalid configuration	**Trouble [2]**	EtherNet/IP	U8	1	P	-
0x2859:003 (P515.03)	PROFINET monitoring: Invalid configuration	**Trouble [2]**	PROFINET	U8	1	P	-
0x2859:003 (P515.03)	EtherCAT monitoring: Invalid configuration	**Trouble [2]**	EtherCAT	U8	1	P	-
0x2859:004 (P515.04)	PROFIBUS monitoring: Initialisation error	**Fault [3]**	PROFIBUS	U8	1	P	-
0x2859:004 (P515.04)	EtherNet/IP monitoring: Initialisation error	**Trouble [2]**	EtherNet/IP	U8	1	P	-
0x2859:004 (P515.04)	PROFINET monitoring: Initialisation error	**Trouble [2]**	PROFINET	U8	1	P	-
0x2859:004 (P515.04)	EtherCAT monitoring: Initialisation error	**Trouble [2]**	EtherCAT	U8	1	P	-
0x2859:005 (P515.05)	PROFIBUS monitoring: Invalid process data	**Trouble [2]**	PROFIBUS	U8	1	P	-
0x2859:005 (P515.05)	EtherNet/IP monitoring: Invalid process data	**Trouble [2]**	EtherNet/IP	U8	1	P	-
0x2859:005 (P515.05)	PROFINET monitoring: Invalid process data	**Trouble [2]**	PROFINET	U8	1	P	-
0x2859:005 (P515.05)	EtherCAT monitoring: Invalid process data	**Trouble [2]**	EtherCAT	U8	1	P	-
0x2859:006 (P515.06)	EtherNet/IP monitoring: Timeout explicit message	**Warning [1]**	EtherNet/IP	U8	1	P	-
0x2859:007 (P515.07)	EtherNet/IP monitoring: Timeout communication	**Warning [1]**	EtherNet/IP	U8	1	P	-
* Default setting depending on the size.					Firmware version 02.01.01.00		

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2860:001 (P201.01)	Frequency control: Default setpoint source	**Analog input 1 [2]**	general	U8	1	P	-
0x2860:002 (P201.02)	PID control: Default setpoint source	**Keypad [1]**	general	U8	1	P	-
0x2862 (P701.00)	Keypad setpoint increment	**1**	general	U16	1	P	-
0x2863 (P705.00)	Keypad language selection	**English [1]**	general	U8	1	P	-
0x2864 (P703.00)	Keypad status display	**0x00000000**	general	IDX	1	PH	-
0x2900:001 (P332.01)	Speed controller settings: Gain	**0.00193 Nm/rpm** *	MCTRL	U32	100000	P	-
0x2900:002 (P332.02)	Speed controller settings: Reset time	**80.0 ms** *	MCTRL	U16	10	P	-
0x2904	Actual speed filter time	**2.0 ms**	MCTRL	U16	10	P	-
0x2910:001 (P335.01)	Motor moment of inertia	**3.70 kg cm²** *	MCTRL	U32	100	P	-
0x2910:002 (P335.02)	Load moment of inertia	**3.70 kg cm²** *	MCTRL	U32	100	P	-
0x2910:003	Coupling	**With backlash [2]**	MCTRL	U8	1	P	-
0x2911:001 (P450.01)	Frequency setpoint presets: Preset 1	**20.0 Hz**	general	U16	10	P	-
0x2911:002 (P450.02)	Frequency setpoint presets: Preset 2	**40.0 Hz**	general	U16	10	P	-
0x2911:003 (P450.03)	Frequency setpoint presets: Preset 3	**50.0 Hz**	general	U16	10	P	-
0x2911:004 (P450.04)	Frequency setpoint presets: Preset 4	**0.0 Hz**	general	U16	10	P	-
0x2911:005 (P450.05)	Frequency setpoint presets: Preset 5	**0.0 Hz**	general	U16	10	P	-
0x2911:006 (P450.06)	Frequency setpoint presets: Preset 6	**0.0 Hz**	general	U16	10	P	-
0x2911:007 (P450.07)	Frequency setpoint presets: Preset 7	**0.0 Hz**	general	U16	10	P	-
0x2911:008 (P450.08)	Frequency setpoint presets: Preset 8	**0.0 Hz**	general	U16	10	P	-
0x2911:009 (P450.09)	Frequency setpoint presets: Preset 9	**0.0 Hz**	general	U16	10	P	-
0x2911:010 (P450.10)	Frequency setpoint presets: Preset 10	**0.0 Hz**	general	U16	10	P	-
0x2911:011 (P450.11)	Frequency setpoint presets: Preset 11	**0.0 Hz**	general	U16	10	P	-
0x2911:012 (P450.12)	Frequency setpoint presets: Preset 12	**0.0 Hz**	general	U16	10	P	-
0x2911:013 (P450.13)	Frequency setpoint presets: Preset 13	**0.0 Hz**	general	U16	10	P	-
0x2911:014 (P450.14)	Frequency setpoint presets: Preset 14	**0.0 Hz**	general	U16	10	P	-
0x2911:015 (P450.15)	Frequency setpoint presets: Preset 15	**0.0 Hz**	general	U16	10	P	-
0x2915 (P210.00)	Minimum frequency	**0.0 Hz**	general	U16	10	P	-
0x2916 (P211.00)	Maximum frequency	**50.0 Hz**	general	U16	10	P	-
0x2917 (P220.00)	Acceleration time 1	**5.0 s**	general	U16	10	P	r
0x2918 (P221.00)	Deceleration time 1	**5.0 s**	general	U16	10	P	r

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2919 (P222.00)	Acceleration time 2	**5.0 s**	general	U16	10	P	-
0x291A (P223.00)	Deceleration time 2	**5.0 s**	general	U16	10	P	-
0x291B (P224.00)	Auto-changeover threshold of ramp 2	**0.0 Hz**	general	U16	10	P	-
0x291C (P225.00)	Quick stop deceleration time	**1.0 s**	general	U16	10	P	-
0x291E:001 (P226.01)	S-Ramp characteristic: Smoothing factor	**0.0 %**	general	U16	10	P	-
0x291F:001 (P317.01)	Skip frequencies: Skip frequency 1	**0.0 Hz**	general	U16	10	P	-
0x291F:002 (P317.02)	Skip frequencies: Skip bandwidth 1	**0.0 Hz**	general	U8	10	P	-
0x291F:003 (P317.03)	Skip frequencies: Skip frequency 2	**0.0 Hz**	general	U16	10	P	-
0x291F:004 (P317.04)	Skip frequencies: Skip bandwidth 2	**0.0 Hz**	general	U8	10	P	-
0x291F:005 (P317.05)	Skip frequencies: Skip frequency 3	**0.0 Hz**	general	U16	10	P	-
0x291F:006 (P317.06)	Skip frequencies: Skip bandwidth 3	**0.0 Hz**	general	U8	10	P	-
0x291F:016	Skip frequencies: Status	- (Read only)	general	U16	1	-	-
0x291F:032	Skip frequencies: Input frequency	x.xx Hz (Read only)	general	I32	100	-	-
0x291F:033	Skip frequencies: Output frequency	x.xx Hz (Read only)	general	I32	100	-	-
0x2939 (P305.00)	Switching frequency	**8 kHz variable / drive-optimised / 4 kHz min. [21]**	general	U8	1	P	-
0x2942:001 (P334.01)	Current controller parameters: Gain	**42.55 V/A** *	MCTRL	U32	100	P	-
0x2942:002 (P334.02)	Current controller parameters: Reset time	**4.50 ms** *	MCTRL	U32	100	P	-
0x2947:001	Inverter characteristic: Value y1	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:002	Inverter characteristic: Value y2	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:003	Inverter characteristic: Value y3	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:004	Inverter characteristic: Value y4	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:005	Inverter characteristic: Value y5	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:006	Inverter characteristic: Value y6	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:007	Inverter characteristic: Value y7	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:008	Inverter characteristic: Value y8	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:009	Inverter characteristic: Value y9	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:010	Inverter characteristic: Value y10	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:011	Inverter characteristic: Value y11	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:012	Inverter characteristic: Value y12	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:013	Inverter characteristic: Value y13	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:014	Inverter characteristic: Value y14	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:015	Inverter characteristic: Value y15	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:016	Inverter characteristic: Value y16	**0.00 V** *	MCTRL	U16	100	P	-
0x2947:017	Inverter characteristic: Value y17	**0.00 V** *	MCTRL	U16	100	P	-
0x29C0:001	Field controller settings: Gain	**59.68 A/Vs** *	MCTRL	U32	100	P	-
0x29C0:002	Field controller settings: Reset time	**45.5 ms** *	MCTRL	U16	10	P	-
0x29E0:001	Field weakening controller settings: Gain	**0.000 Vs/V** *	MCTRL	U32	1000	P	-
0x29E0:002	Field weakening controller settings: Reset time	**1478.3 ms** *	MCTRL	U32	10	P	-
0x2B00 (P302.00)	V/f characteristic shape	**Linear [0]**	general	U8	1	CP	-
0x2B01:001 (P303.01)	V/f shape data: Base voltage	**230 V** *	MCTRL	U16	1	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2B01:002 (P303.02)	V/f shape data: Base frequency	**50 Hz** *	MCTRL	U16	1	P	-
0x2B08:001 (P333.01)	V/f Imax controller: Gain	**0.284 Hz/A** *	MCTRL	U32	1000	P	-
0x2B08:002 (P333.02)	V/f Imax controller: Reset time	**2.3 ms** *	MCTRL	U32	10	P	-
0x2B09:001 (P315.01)	Slip compensation: Gain	**100.00 %**	general	I16	100	P	-
0x2B09:002 (P315.02)	Slip compensation: Filter time	**5 ms**	general	U16	1	P	-
0x2B0A:001 (P318.01)	Gain	**20 %**	MCTRL	I16	1	P	-
0x2B0A:002 (P318.02)	Filter time	**5 ms**	MCTRL	U16	1	P	-
0x2B0C (P319.00)	Override field weakening	**0.0 Hz**	general	I16	10	P	-
0x2B0D:001 (P330.01)	Minimum voltage	**20 %**	MCTRL	I16	1	P	-
0x2B0E (P102.00)	Frequency setpoint	x.x Hz (Read only)	general	I16	10	O	t
0x2B0F	VFC output frequency	x.x Hz (Read only)	MCTRL	I16	10	O	t
0x2B12:001 (P316.01)	V/f voltage boost: Fixed boost	**2.5 %** *	general	U8	10	P	-
0x2B12:002 (P316.02)	V/f voltage boost: Boost at acceleration	**0.0 %**	general	U8	10	P	-
0x2B13:001	Additive voltage impression: Enable Function	**Disable [0]**	general	U8	1	P	-
0x2B13:002	Additive voltage impression: Setpoint source	**Analog input 1 [1]**	general	U8	1	P	-
0x2B13:003	Additive voltage impression: Actual voltage	x V (Read only)	general	I16	1	-	-
0x2B40:001	SLVC: Gain	**0.2686 Hz/A** *	MCTRL	U32	10000	P	-
0x2B40:002	SLVC: Reset time	**2.3 ms** *	MCTRL	U32	10	P	-
0x2B84:001 (P704.01)	DC braking: Current	**0.0 %**	general	U16	10	P	-
0x2B84:002 (P704.02)	DC braking: Automatic hold time	**0.0 s**	general	U16	10	P	-
0x2B84:003 (P704.03)	DC braking: Automatic operating threshold	**0.0 Hz**	general	U16	10	P	-
0x2BA1:001 (P718.01)	Flying restart circuit: Current	**30 %**	MCTRL	U16	1	P	-
0x2BA1:002 (P718.02)	Flying restart circuit: Start frequency	**20.0 Hz**	MCTRL	I16	10	P	-
0x2BA1:003 (P718.03)	Flying restart circuit: Restart time	**5911 ms** *	MCTRL	U16	1	P	-
0x2BA1:008 (P718.08)	Flying restart circuit: Flying restart frequency	x.x Hz (Read only)	MCTRL	I16	10	O	t
0x2C00 (P300.00)	Motor control mode	**V/f characteristic control (VFC open loop) [6]**	general	U8	1	CP	-
0x2C01:001	Motor parameters: Number of pole pairs	- (Read only)	MCTRL	U8	1	-	-
0x2C01:002	Motor parameters: Stator resistance	**10.1565 Ω** *	MCTRL	U32	10000	P	-
0x2C01:003	Motor parameters: Stator leakage inductance	**23.566 mH** *	MCTRL	U32	1000	P	-
0x2C01:004 (P320.04)	Motor parameters: Rated speed	**1450 rpm**	MCTRL	U16	1	P	-
0x2C01:005 (P320.05)	Motor parameters: Rated frequency	**50.0 Hz**	MCTRL	U16	10	P	-
0x2C01:006 (P320.06)	Motor parameters: Rated power	**0.25 kW** *	MCTRL	U16	100	P	-
0x2C01:007 (P320.07)	Motor parameters: Rated voltage	**230 V** *	MCTRL	U16	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x2C01:008 (P320.08)	Motor parameters: Cosine phi	**0.80**	MCTRL	U16	100	P	-
0x2C01:010	Motor parameters: Motor name		MCTRL	STRING[25]	1	P	-
0x2C02:001 (P351.01)	Motor parameter (ASM): Rotor resistance	**8.8944 Ω** *	MCTRL	U32	10000	P	-
0x2C02:002 (P351.02)	Motor parameter (ASM): Mutual inductance	**381.9 mH** *	MCTRL	U32	10	P	-
0x2C02:003 (P351.03)	Motor parameter (ASM): Magnetising current	**0.96 A** *	MCTRL	U16	100	P	-
0x2C02:004 (P351.04)	Slip frequency	x.x Hz (Read only)	general	U16	10	-	-
0x2C03:001 (P352.01)	EMK constant	**41.8 V/1000rpm**	MCTRL	U32	10	P	-
0x2C11:001	Lower limit	**30 %**	general	U16	1	P	-
0x2C11:002	Tracking controller gain	**250 %**	general	U16	1	P	-
0x2C11:003	Tracking controller reset time	**3.30 ms**	general	U16	100	P	-
0x2C11:004	Tracking controller decouple time	**0.50 ms**	general	U16	100	P	-
0x2C12:001	Acceleration current	**100 %**	MCTRL	U16	1	P	-
0x2C12:002	Standstill current	**40 %**	MCTRL	U16	1	P	-
0x2C42:001 (P341.01)	Increments/revolution	**128**	general	U32	1	CP	-
0x2C42:006	Actual velocity	x rpm (Read only)	general	I32	1	O	-
0x2D40:002	Device utilisation (i*t): Warning threshold	**95 %**	general	U16	1	P	-
0x2D40:004 (P135.04)	Device utilisation (i*t)	x % (Read only)	general	U16	1	O	t
0x2D40:005 (P135.05)	Device utilisation (i*t): Error response	**Fault [3]**	general	U8	1	P	-
0x2D44:001 (P350.01)	Overspeed monitoring: Threshold	**8000 rpm**	general	U16	1	P	-
0x2D44:002 (P350.02)	Overspeed monitoring: Response	**Fault [3]**	general	U8	1	P	-
0x2D45:001 (P310.01)	Motor phase failure detection: Response	**No response [0]**	general	U8	1	P	-
0x2D45:002 (P310.02)	Motor phase failure detection: Current threshold	**5.0 %**	general	U8	10	P	-
0x2D45:003 (P310.03)	Motor phase failure detection: Voltage threshold	**10.0 V**	general	U16	10	P	-
0x2D46:001 (P353.01)	Overcurrent monitoring: Threshold	**6.8 A** *	general	U16	10	P	-
0x2D46:002 (P353.02)	Overcurrent monitoring: Response	**Fault [3]**	general	U8	1	P	-
0x2D49:002 (P309.02)	Motor temperature monitoring: Response	**Fault [3]**	general	U8	1	P	-
0x2D4B:001 (P308.01)	Motor overload monitoring (i^2*t): Maximum utilisation [60 s]	**150 %**	general	U16	1	P	-
0x2D4B:002 (P308.02)	Motor overload monitoring (i^2*t): Speed compensation	**On [0]**	general	U8	1	P	-
0x2D4B:003 (P308.03)	Motor overload monitoring (i^2*t): Response	**Fault [3]**	general	U8	1	P	-
0x2D4B:005	Motor overload monitoring (i^2*t): Thermal load	- (Read only)	general	U16	1	-	-
0x2D4F (P123.00)	Motor utilisation (i^2*t)	x % (Read only)	general	U16	1	O	t
0x2D66:001 (P721.01)	Mains failure control: Enable function	**Disabled [0]**	general	U8	1	P	-
0x2D66:002 (P721.02)	Mains failure control: DC-bus activation level	**0 %** *	general	U8	1	P	-
0x2D66:003 (P721.03)	Mains failure control: Gain V-controller	**0.01000 Hz/V**	general	U16	100000	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2D66:004 (P721.04)	Mains failure control: Reset time V-controller	**20 ms**	general	U16	1	P	-
0x2D66:005 (P721.05)	Mains failure control: DC voltage setpoint	**100 %**	general	U8	1	P	-
0x2D66:006 (P721.06)	Mains failure control: Setpoint ramp	**20 ms**	general	U16	1	P	-
0x2D66:007 (P721.07)	Mains failure control: Clear time	**20 ms**	general	U16	1	P	-
0x2D66:008 (P721.08)	Mains failure control: Restart threshold	**0.0 Hz**	general	U16	10	P	-
0x2D66:009 (P721.09)	Mains failure control: Status mains failure control	- (Read only)	general	U8	1	O	t
0x2D67:001 (P329.01)	Maximum torque monitoring: Response	**No reaction [0]**	MCTRL	U8	1	P	-
0x2D67:002 (P329.02)	Maximum torque monitoring: Triggering delay	**0.000 s**	MCTRL	U16	1000	P	-
0x2D81:001 (P151.01)	Life-diagnosis: Operating time	x s (Read only)	general	U32	1	T	-
0x2D81:002 (P151.02)	Life-diagnosis: Operating time	x s (Read only)	general	U32	1	T	-
0x2D81:003 (P151.03)	Life-diagnosis: Control unit operating time	x ns (Read only)	general	U64	1	T	-
0x2D81:004 (P151.04)	Life-diagnosis: Main switching cycles	- (Read only)	general	U32	1	-	-
0x2D81:005 (P151.05)	Life-diagnosis: Relay switching cycles	- (Read only)	general	U32	1	-	-
0x2D81:006 (P151.06)	Life-diagnosis: Short-circuit counter	- (Read only)	general	U16	1	-	-
0x2D81:007 (P151.07)	Life-diagnosis: Earth fault counter	- (Read only)	general	U16	1	-	-
0x2D81:008 (P151.08)	Life-diagnosis: Clamp active	- (Read only)	general	U16	1	-	-
0x2D81:009 (P151.09)	Life-diagnosis: Fan operating time	x s (Read only)	general	U32	1	T	-
0x2D84:001 (P117.01)	Heatsink temperature	x.x °C (Read only)	general	I16	10	O	-
0x2D84:002	Heatsink temperature: Warning threshold	**80.0 °C** *	general	I16	10	P	-
0x2D87 (P105.00)	DC-bus voltage	x V (Read only)	general	U16	1	O	t
0x2D88 (P104.00)	Motor current	x.x A (Read only)	general	I16	10	O	t
0x2D89 (P106.00)	Motor voltage	x VAC (Read only)	general	U16	1	O	t
0x2DA2:001 (P108.01)	Output power: Effective power	x.xxx kW (Read only)	general	I32	1000	O	t
0x2DA2:002 (P108.02)	Output power: Apparent power	x.xxx kVA (Read only)	general	I32	1000	O	t
0x2DA3:001 (P109.01)	Output energy: Motor	x.xx kWh (Read only)	general	I32	100	O	t
0x2DA3:002 (P109.02)	Output energy: Generator	x.xx kWh (Read only)	general	I32	100	O	t
0x2DA4:001 (P110.01)	Diagnostics of analog input 1: Value in percent	x.x % (Read only)	general	I16	10	O	t
0x2DA4:002 (P110.02)	Diagnostics of analog input 1: Frequency value	x.x Hz (Read only)	general	I16	10	O	t
0x2DA4:003 (P110.03)	Diagnostics of analog input 1: Process controller value	x.xx PID unit (Read only)	general	I16	100	O	t
0x2DA4:004 (P110.04)	Diagnostics of analog input 1: Torque value	x.xx % (Read only)	general	I16	100	O	t

* Default setting depending on the size.

Address	Name	Default setting	Category	Data type	Factor	A	M
0x2DA4:016 (P110.16)	Diagnostics of analog input 1: Status	- (Read only)	general	U16	1	O	-
0x2DA5:001 (P111.01)	Diagnostics of analog input 2: Value in percent	x.x % (Read only)	general	I16	10	O	t
0x2DA5:002 (P111.02)	Diagnostics of analog input 2: Frequency value	x.x Hz (Read only)	general	I16	10	O	t
0x2DA5:003 (P111.03)	Diagnostics of analog input 2: Process controller value	x.xx PID unit (Read only)	general	I16	100	O	t
0x2DA5:004 (P111.04)	Diagnostics of analog input 2: Torque value	x.xx % (Read only)	general	I16	100	O	t
0x2DA5:016 (P111.16)	Diagnostics of analog input 2: Status	- (Read only)	general	U16	1	O	-
0x2DAA:001 (P112.01)	Diagnostics of analog output 1: Voltage	x.xx V (Read only)	general	U16	100	O	t
0x2DAA:002 (P112.02)	Diagnostics of analog output 1: Current	x.xx mA (Read only)	general	U16	100	O	t
0x2DAB:001 (P113.01)	Diagnostics of analog output 2: Voltage	x.xx V (Read only)	Appl. I/O	U16	100	O	t
0x2DAB:002 (P113.02)	Diagnostics of analog output 2: Current	x.xx mA (Read only)	Appl. I/O	U16	100	O	t
0x2DAC (P119.00)	Keypad status	- (Read only)	general	U16	1	O	t
0x2DAD (P120.00)	Internal hardware states	- (Read only)	general	U16	1	O	-
0x2DDD (P100.00)	Output frequency	x.x Hz (Read only)	general	I16	10	O	t
0x2DDF:001	Axis information: Rated current	x.xx A (Read only)	general	U16	100	O	t
0x2DDF:002	Axis information: Maximum current	x.xx A (Read only)	general	U16	100	O	t
0x2EFF:001	Bootloader activation key 1	**0**	general	U32	1	C	-
0x2EFF:002	Bootloader activation key 2	**0**	general	U32	1	C	-
0x2EFF:003	Bootloader activation key 3	**0**	general	U32	1	C	-
0x4002 (P702.00)	Speed display scaling	**0.00**	general	U16	100	P	-
0x4003 (P413.00)	MOP starting mode	**Last value [0]**	general	U8	1	P	-
0x4004:001 (P414.01)	MOP starting values: Frequency	**0.0 Hz**	general	U16	10	P	-
0x4004:002 (P414.02)	MOP starting values: PID value	**0.00 PID unit**	general	I16	100	P	-
0x4004:003 (P414.03)	MOP starting values: Torque	**0.0 %**	general	U16	10	P	-
0x4005 (P412.00)	Frequency threshold	**0.0 Hz**	general	U16	10	P	-
0x4006:001 (P710.01)	Load loss detection: Threshold	**0.0 %**	general	U16	10	P	-
0x4006:002 (P710.02)	Load loss detection: Deceleration	**0.0 s**	general	U16	10	P	-
0x4008:001 (P590.01)	Process input words: NetWordIN1	**0x0000**	general	U16	1	KH	r
0x4008:002 (P590.02)	Process input words: NetWordIN2	**0x0000**	general	U16	1	KH	r
0x4008:003 (P590.03)	Process input words: NetWordIN3	**0.0 %**	general	U16	10	K	r
0x4008:004 (P590.04)	Process input words: NetWordIN4	**0.0 %**	general	U16	10	K	r
0x4009:001	MOP values saved: Frequency	x.x Hz (Read only)	general	U16	10	CP	t
0x4009:002	MOP values saved: PID value	x.xx PID unit (Read only)	general	U16	100	CP	t
0x4009:003	MOP values saved: Torque	x.x % (Read only)	general	U16	10	CP	t

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x400A:001 (P591.01)	Process output words: NetWordOUT1	- (Read only)	general	U16	1	H	t
0x400A:002 (P591.02)	Process output words: NetWordOUT2	- (Read only)	general	U16	1	-	t
0x400B:001 (P592.01)	Process input data: AC Drive control word	**0x0000**	general	U16	1	OK H	r
0x400B:002 (P592.02)	Process input data: LECOM control word	**0x0000**	general	U16	1	OK H	r
0x400B:003 (P592.03)	Process input data: Network setpoint frequency	**0.0 Hz**	general	U16	10	OK	r
0x400B:004 (P592.04)	Process input data: Network setpoint speed	**0 rpm**	general	U16	1	OK	r
0x400B:005 (P592.05)	Process input data: Network setpoint frequency	**0.00 Hz**	general	U16	100	OK	r
0x400B:006 (P592.06)	Process input data: Velocity mode setpoint	**0.0 Hz**	general	I16	10	OK	r
0x400B:007 (P592.07)	Process input data: PID setpoint	**0.00 PID unit**	general	I16	100	OK	r
0x400B:008 (P592.08)	Process input data: Torque mode setpoint	**0 Nm**	general	I16	1	OK	r
0x400B:009 (P592.09)	Process input data: Torque scaling	**0**	general	I8	1	OK	-
0x400B:010	AC Drive mode	**Speed control (open loop) [1]**	EtherNet/IP	U8	1	IOK	-
0x400C:001 (P593.01)	Process output data: AC Drive status word	- (Read only)	general	U16	1	-	t
0x400C:002 (P593.02)	Process output data: LECOM status word	- (Read only)	general	U16	1	-	t
0x400C:003 (P593.03)	Process output data: Frequency [0.1 Hz]	x.x Hz (Read only)	general	U16	10	-	t
0x400C:004 (P593.04)	Process output data: Motor speed	x rpm (Read only)	general	U16	1	-	t
0x400C:005 (P593.05)	Process output data: Drive status	- (Read only)	general	U16	1	-	t
0x400C:006 (P593.06)	Process output data: Frequency [0.01 Hz]	x.xx Hz (Read only)	general	U16	100	-	t
0x400C:007 (P593.07)	Process output data: Torque scaled	- (Read only)	general	I16	1	-	t
0x400D (P101.00)	Scaled actual value	x Units (Read only)	general	I16	1	O	t
0x400E:001 (P505.01)	NetWordIN1 function: Bit 0	**Not active [0]**	general	U8	1	CP	-
0x400E:002 (P505.02)	NetWordIN1 function: Bit 1	**Not active [0]**	general	U8	1	CP	-
0x400E:003 (P505.03)	NetWordIN1 function: Bit 2	**Activate quick stop [3]**	general	U8	1	CP	-
0x400E:004 (P505.04)	NetWordIN1 function: Bit 3	**Not active [0]**	general	U8	1	CP	-
0x400E:005 (P505.05)	NetWordIN1 function: Bit 4	**Run forward (CW) [8]**	general	U8	1	CP	-
0x400E:006 (P505.06)	NetWordIN1 function: Bit 5	**Activate preset (bit 0) [18]**	general	U8	1	CP	-
0x400E:007 (P505.07)	NetWordIN1 function: Bit 6	**Activate preset (bit 1) [19]**	general	U8	1	CP	-
0x400E:008 (P505.08)	NetWordIN1 function: Bit 7	**Reset error [4]**	general	U8	1	CP	-
0x400E:009 (P505.09)	NetWordIN1 function: Bit 8	**Not active [0]**	general	U8	1	CP	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x400E:010 (P505.10)	NetWordIN1 function: Bit 9	**Activate DC braking [5]**	general	U8	1	CP	-
0x400E:011 (P505.11)	NetWordIN1 function: Bit 10	**Not active [0]**	general	U8	1	CP	-
0x400E:012 (P505.12)	NetWordIN1 function: Bit 11	**Not active [0]**	general	U8	1	CP	-
0x400E:013 (P505.13)	NetWordIN1 function: Bit 12	**Invert rotation [13]**	general	U8	1	CP	-
0x400E:014 (P505.14)	NetWordIN1 function: Bit 13	**Not active [0]**	general	U8	1	CP	-
0x400E:015 (P505.15)	NetWordIN1 function: Bit 14	**Not active [0]**	general	U8	1	CP	-
0x400E:016 (P505.16)	NetWordIN1 function: Bit 15	**Not active [0]**	general	U8	1	CP	-
0x4016:003	Digital output 1: Cutout delay	**0.020 s**	general	U16	1000	P	-
0x4016:004	Digital output 1: Switch-on delay	**0.020 s**	general	U16	1000	P	-
0x4016:005	Digital output 1: Terminal state	- (Read only)	general	U8	1	-	-
0x4016:006	Digital output 1: Trigger signal state	- (Read only)	general	U8	1	-	-
0x4017:003	Digital output 2: Cutout delay	**0.020 s**	Appl. I/O	U16	1000	P	-
0x4017:004	Digital output 2: Switch-on delay	**0.020 s**	Appl. I/O	U16	1000	P	-
0x4017:005	Digital output 2: Terminal state	- (Read only)	Appl. I/O	U8	1	-	-
0x4017:006	Digital output 2: Trigger signal state	- (Read only)	Appl. I/O	U8	1	-	-
0x4018:003	Relay: Switch-off delay	**0.020 s**	general	U16	1000	P	-
0x4018:004	Relay: Switch-on delay	**0.020 s**	general	U16	1000	P	-
0x4018:005	Relay: Relay state	- (Read only)	general	U8	1	-	-
0x4018:006	Relay: Trigger signal state	- (Read only)	general	U8	1	-	-
0x4018:007	Relay: Switching cycles	- (Read only)	general	U32	1	-	-
0x401F:001 (P121.01)	Process controller diagnostics: Current setpoint	x.xx PID unit (Read only)	general	I16	100	O	t
0x401F:002 (P121.02)	Process controller diagnostics: Current process variable	x.xx PID unit (Read only)	general	I16	100	O	t
0x401F:003 (P121.03)	Process controller diagnostics: Status	- (Read only)	general	U8	1	O	t
0x4020:001 (P600.01)	Process controller: Operating mode	**Inhibited [0]**	general	U8	1	P	-
0x4020:002 (P600.02)	Process controller: PID process variable	**Analog input 1 [1]**	general	U8	1	P	-
0x4020:003 (P600.03)	Process controller: Closed-loop controlled speed range	**100 %**	general	U16	1	P	-
0x4020:004 (P600.04)	Process controller: Speed feedforward control source	**Without speed addition [0]**	general	U8	1	P	-
0x4021:001 (P606.01)	PID speed operation: Acceleration time	**1.0 s**	general	U16	10	P	-
0x4021:002 (P606.02)	PID speed operation: Deceleration time	**1.0 s**	general	U16	10	P	-
0x4022:001 (P451.01)	PID setpoint presets: Preset 1	**0.00 PID unit**	general	I16	100	P	-
0x4022:002 (P451.02)	PID setpoint presets: Preset 2	**0.00 PID unit**	general	I16	100	P	-
0x4022:003 (P451.03)	PID setpoint presets: Preset 3	**0.00 PID unit**	general	I16	100	P	-
0x4022:004 (P451.04)	PID setpoint presets: Preset 4	**0.00 PID unit**	general	I16	100	P	-
0x4022:005 (P451.05)	PID setpoint presets: Preset 5	**0.00 PID unit**	general	I16	100	P	-
0x4022:006 (P451.06)	PID setpoint presets: Preset 6	**0.00 PID unit**	general	I16	100	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4022:007 (P451.07)	PID setpoint presets: Preset 7	**0.00 PID unit**	general	I16	100	P	-
0x4022:008 (P451.08)	PID setpoint presets: Preset 8	**0.00 PID unit**	general	I16	100	P	-
0x4023:001 (P610.01)	PID sleep mode: Activation	**Disabled [0]**	general	U8	1	P	-
0x4023:002 (P610.02)	PID sleep mode: Stop method	**Coasting [0]**	general	U8	1	P	-
0x4023:003 (P610.03)	PID sleep mode: Frequency threshold	**0.0 Hz**	general	U16	10	P	-
0x4023:004 (P610.04)	PID sleep mode: Feedback threshold	**0.00 PID unit**	general	I16	100	P	-
0x4023:005 (P610.05)	PID sleep mode: Delay time	**0.0 s**	general	U16	10	P	-
0x4023:006 (P610.06)	PID sleep mode: Recovery	**Setpoint > threshold OR system deviation > bandwidth [0]**	general	U8	1	P	-
0x4023:007 (P610.07)	PID sleep mode: Bandwidth	**0.00 PID unit**	general	U16	100	P	-
0x4023:008 (P610.08)	PID sleep mode: Recovery threshold	**0.00 PID unit**	general	I16	100	P	-
0x4024:001 (P615.01)	Automatic rinsing: Rinsing in idle state	**Inhibited [0]**	general	U8	1	P	-
0x4024:002 (P615.02)	Automatic rinsing: Rinse interval	**30.0 min**	general	U16	10	P	-
0x4024:003 (P615.03)	Automatic rinsing: Rinse speed	**0.0 Hz**	general	I16	10	P	-
0x4024:004 (P615.04)	Automatic rinsing: Rinse period	**0.0 s**	general	U16	10	P	-
0x4041:001 (P750.01)	Parameter change-over: Parameter 1	**0x00000000**	general	IDX	1	PH	-
0x4041:002 (P750.02)	Parameter change-over: Parameter 2	**0x00000000**	general	IDX	1	PH	-
0x4041:003 (P750.03)	Parameter change-over: Parameter 3	**0x00000000**	general	IDX	1	PH	-
0x4041:004 (P750.04)	Parameter change-over: Parameter 4	**0x00000000**	general	IDX	1	PH	-
0x4041:005 (P750.05)	Parameter change-over: Parameter 5	**0x00000000**	general	IDX	1	PH	-
0x4041:006 (P750.06)	Parameter change-over: Parameter 6	**0x00000000**	general	IDX	1	PH	-
0x4041:007 (P750.07)	Parameter change-over: Parameter 7	**0x00000000**	general	IDX	1	PH	-
0x4041:008 (P750.08)	Parameter change-over: Parameter 8	**0x00000000**	general	IDX	1	PH	-
0x4041:009 (P750.09)	Parameter change-over: Parameter 9	**0x00000000**	general	IDX	1	PH	-
0x4041:010 (P750.10)	Parameter change-over: Parameter 10	**0x00000000**	general	IDX	1	PH	-
0x4041:011 (P750.11)	Parameter change-over: Parameter 11	**0x00000000**	general	IDX	1	PH	-
0x4041:012 (P750.12)	Parameter change-over: Parameter 12	**0x00000000**	general	IDX	1	PH	-
0x4041:013 (P750.13)	Parameter change-over: Parameter 13	**0x00000000**	general	IDX	1	PH	-
0x4041:014 (P750.14)	Parameter change-over: Parameter 14	**0x00000000**	general	IDX	1	PH	-
0x4041:015 (P750.15)	Parameter change-over: Parameter 15	**0x00000000**	general	IDX	1	PH	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4041:016 (P750.16)	Parameter change-over: Parameter 16	**0x00000000**	general	IDX	1	PH	-
0x4041:017 (P750.17)	Parameter change-over: Parameter 17	**0x00000000**	general	IDX	1	PH	-
0x4041:018 (P750.18)	Parameter change-over: Parameter 18	**0x00000000**	general	IDX	1	PH	-
0x4041:019 (P750.19)	Parameter change-over: Parameter 19	**0x00000000**	general	IDX	1	PH	-
0x4041:020 (P750.20)	Parameter change-over: Parameter 20	**0x00000000**	general	IDX	1	PH	-
0x4041:021 (P750.21)	Parameter change-over: Parameter 21	**0x00000000**	general	IDX	1	PH	-
0x4041:022 (P750.22)	Parameter change-over: Parameter 22	**0x00000000**	general	IDX	1	PH	-
0x4041:023 (P750.23)	Parameter change-over: Parameter 23	**0x00000000**	general	IDX	1	PH	-
0x4041:024 (P750.24)	Parameter change-over: Parameter 24	**0x00000000**	general	IDX	1	PH	-
0x4041:025 (P750.25)	Parameter change-over: Parameter 25	**0x00000000**	general	IDX	1	PH	-
0x4041:026 (P750.26)	Parameter change-over: Parameter 26	**0x00000000**	general	IDX	1	PH	-
0x4041:027 (P750.27)	Parameter change-over: Parameter 27	**0x00000000**	general	IDX	1	PH	-
0x4041:028 (P750.28)	Parameter change-over: Parameter 28	**0x00000000**	general	IDX	1	PH	-
0x4041:029 (P750.29)	Parameter change-over: Parameter 29	**0x00000000**	general	IDX	1	PH	-
0x4041:030 (P750.30)	Parameter change-over: Parameter 30	**0x00000000**	general	IDX	1	PH	-
0x4041:031 (P750.31)	Parameter change-over: Parameter 31	**0x00000000**	general	IDX	1	PH	-
0x4041:032 (P750.32)	Parameter change-over: Parameter 32	**0x00000000**	general	IDX	1	PH	-
0x4042:001 (P751.01)	Parameter value set 1: Value of parameter 1	**0**	general	I32	1	P	-
0x4042:002 (P751.02)	Parameter value set 1: Value of parameter 2	**0**	general	I32	1	P	-
0x4042:003 (P751.03)	Parameter value set 1: Value of parameter 3	**0**	general	I32	1	P	-
0x4042:004 (P751.04)	Parameter value set 1: Value of parameter 4	**0**	general	I32	1	P	-
0x4042:005 (P751.05)	Parameter value set 1: Value of parameter 5	**0**	general	I32	1	P	-
0x4042:006 (P751.06)	Parameter value set 1: Value of parameter 6	**0**	general	I32	1	P	-
0x4042:007 (P751.07)	Parameter value set 1: Value of parameter 7	**0**	general	I32	1	P	-
0x4042:008 (P751.08)	Parameter value set 1: Value of parameter 8	**0**	general	I32	1	P	-
0x4042:009 (P751.09)	Parameter value set 1: Value of parameter 9	**0**	general	I32	1	P	-
0x4042:010 (P751.10)	Parameter value set 1: Value of parameter 10	**0**	general	I32	1	P	-
0x4042:011 (P751.11)	Parameter value set 1: Value of parameter 11	**0**	general	I32	1	P	-
0x4042:012 (P751.12)	Parameter value set 1: Value of parameter 12	**0**	general	I32	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4042:013 (P751.13)	Parameter value set 1: Value of parameter 13	**0**	general	I32	1	P	-
0x4042:014 (P751.14)	Parameter value set 1: Value of parameter 14	**0**	general	I32	1	P	-
0x4042:015 (P751.15)	Parameter value set 1: Value of parameter 15	**0**	general	I32	1	P	-
0x4042:016 (P751.16)	Parameter value set 1: Value of parameter 16	**0**	general	I32	1	P	-
0x4042:017 (P751.17)	Parameter value set 1: Value of parameter 17	**0**	general	I32	1	P	-
0x4042:018 (P751.18)	Parameter value set 1: Value of parameter 18	**0**	general	I32	1	P	-
0x4042:019 (P751.19)	Parameter value set 1: Value of parameter 19	**0**	general	I32	1	P	-
0x4042:020 (P751.20)	Parameter value set 1: Value of parameter 20	**0**	general	I32	1	P	-
0x4042:021 (P751.21)	Parameter value set 1: Value of parameter 21	**0**	general	I32	1	P	-
0x4042:022 (P751.22)	Parameter value set 1: Value of parameter 22	**0**	general	I32	1	P	-
0x4042:023 (P751.23)	Parameter value set 1: Value of parameter 23	**0**	general	I32	1	P	-
0x4042:024 (P751.24)	Parameter value set 1: Value of parameter 24	**0**	general	I32	1	P	-
0x4042:025 (P751.25)	Parameter value set 1: Value of parameter 25	**0**	general	I32	1	P	-
0x4042:026 (P751.26)	Parameter value set 1: Value of parameter 26	**0**	general	I32	1	P	-
0x4042:027 (P751.27)	Parameter value set 1: Value of parameter 27	**0**	general	I32	1	P	-
0x4042:028 (P751.28)	Parameter value set 1: Value of parameter 28	**0**	general	I32	1	P	-
0x4042:029 (P751.29)	Parameter value set 1: Value of parameter 29	**0**	general	I32	1	P	-
0x4042:030 (P751.30)	Parameter value set 1: Value of parameter 30	**0**	general	I32	1	P	-
0x4042:031 (P751.31)	Parameter value set 1: Value of parameter 31	**0**	general	I32	1	P	-
0x4042:032 (P751.32)	Parameter value set 1: Value of parameter 32	**0**	general	I32	1	P	-
0x4043:001 (P752.01)	Parameter value set 2: Value of parameter 1	**0**	general	I32	1	P	-
0x4043:002 (P752.02)	Parameter value set 2: Value of parameter 2	**0**	general	I32	1	P	-
0x4043:003 (P752.03)	Parameter value set 2: Value of parameter 3	**0**	general	I32	1	P	-
0x4043:004 (P752.04)	Parameter value set 2: Value of parameter 4	**0**	general	I32	1	P	-
0x4043:005 (P752.05)	Parameter value set 2: Value of parameter 5	**0**	general	I32	1	P	-
0x4043:006 (P752.06)	Parameter value set 2: Value of parameter 6	**0**	general	I32	1	P	-
0x4043:007 (P752.07)	Parameter value set 2: Value of parameter 7	**0**	general	I32	1	P	-
0x4043:008 (P752.08)	Parameter value set 2: Value of parameter 8	**0**	general	I32	1	P	-
0x4043:009 (P752.09)	Parameter value set 2: Value of parameter 9	**0**	general	I32	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4043:010 (P752.10)	Parameter value set 2: Value of parameter 10	**0**	general	I32	1	P	-
0x4043:011 (P752.11)	Parameter value set 2: Value of parameter 11	**0**	general	I32	1	P	-
0x4043:012 (P752.12)	Parameter value set 2: Value of parameter 12	**0**	general	I32	1	P	-
0x4043:013 (P752.13)	Parameter value set 2: Value of parameter 13	**0**	general	I32	1	P	-
0x4043:014 (P752.14)	Parameter value set 2: Value of parameter 14	**0**	general	I32	1	P	-
0x4043:015 (P752.15)	Parameter value set 2: Value of parameter 15	**0**	general	I32	1	P	-
0x4043:016 (P752.16)	Parameter value set 2: Value of parameter 16	**0**	general	I32	1	P	-
0x4043:017 (P752.17)	Parameter value set 2: Value of parameter 17	**0**	general	I32	1	P	-
0x4043:018 (P752.18)	Parameter value set 2: Value of parameter 18	**0**	general	I32	1	P	-
0x4043:019 (P752.19)	Parameter value set 2: Value of parameter 19	**0**	general	I32	1	P	-
0x4043:020 (P752.20)	Parameter value set 2: Value of parameter 20	**0**	general	I32	1	P	-
0x4043:021 (P752.21)	Parameter value set 2: Value of parameter 21	**0**	general	I32	1	P	-
0x4043:022 (P752.22)	Parameter value set 2: Value of parameter 22	**0**	general	I32	1	P	-
0x4043:023 (P752.23)	Parameter value set 2: Value of parameter 23	**0**	general	I32	1	P	-
0x4043:024 (P752.24)	Parameter value set 2: Value of parameter 24	**0**	general	I32	1	P	-
0x4043:025 (P752.25)	Parameter value set 2: Value of parameter 25	**0**	general	I32	1	P	-
0x4043:026 (P752.26)	Parameter value set 2: Value of parameter 26	**0**	general	I32	1	P	-
0x4043:027 (P752.27)	Parameter value set 2: Value of parameter 27	**0**	general	I32	1	P	-
0x4043:028 (P752.28)	Parameter value set 2: Value of parameter 28	**0**	general	I32	1	P	-
0x4043:029 (P752.29)	Parameter value set 2: Value of parameter 29	**0**	general	I32	1	P	-
0x4043:030 (P752.30)	Parameter value set 2: Value of parameter 30	**0**	general	I32	1	P	-
0x4043:031 (P752.31)	Parameter value set 2: Value of parameter 31	**0**	general	I32	1	P	-
0x4043:032 (P752.32)	Parameter value set 2: Value of parameter 32	**0**	general	I32	1	P	-
0x4044:001 (P753.01)	Parameter value set 3: Value of parameter 1	**0**	general	I32	1	P	-
0x4044:002 (P753.02)	Parameter value set 3: Value of parameter 2	**0**	general	I32	1	P	-
0x4044:003 (P753.03)	Parameter value set 3: Value of parameter 3	**0**	general	I32	1	P	-
0x4044:004 (P753.04)	Parameter value set 3: Value of parameter 4	**0**	general	I32	1	P	-
0x4044:005 (P753.05)	Parameter value set 3: Value of parameter 5	**0**	general	I32	1	P	-
0x4044:006 (P753.06)	Parameter value set 3: Value of parameter 6	**0**	general	I32	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4044:007 (P753.07)	Parameter value set 3: Value of parameter 7	**0**	general	I32	1	P	-
0x4044:008 (P753.08)	Parameter value set 3: Value of parameter 8	**0**	general	I32	1	P	-
0x4044:009 (P753.09)	Parameter value set 3: Value of parameter 9	**0**	general	I32	1	P	-
0x4044:010 (P753.10)	Parameter value set 3: Value of parameter 10	**0**	general	I32	1	P	-
0x4044:011 (P753.11)	Parameter value set 3: Value of parameter 11	**0**	general	I32	1	P	-
0x4044:012 (P753.12)	Parameter value set 3: Value of parameter 12	**0**	general	I32	1	P	-
0x4044:013 (P753.13)	Parameter value set 3: Value of parameter 13	**0**	general	I32	1	P	-
0x4044:014 (P753.14)	Parameter value set 3: Value of parameter 14	**0**	general	I32	1	P	-
0x4044:015 (P753.15)	Parameter value set 3: Value of parameter 15	**0**	general	I32	1	P	-
0x4044:016 (P753.16)	Parameter value set 3: Value of parameter 16	**0**	general	I32	1	P	-
0x4044:017 (P753.17)	Parameter value set 3: Value of parameter 17	**0**	general	I32	1	P	-
0x4044:018 (P753.18)	Parameter value set 3: Value of parameter 18	**0**	general	I32	1	P	-
0x4044:019 (P753.19)	Parameter value set 3: Value of parameter 19	**0**	general	I32	1	P	-
0x4044:020 (P753.20)	Parameter value set 3: Value of parameter 20	**0**	general	I32	1	P	-
0x4044:021 (P753.21)	Parameter value set 3: Value of parameter 21	**0**	general	I32	1	P	-
0x4044:022 (P753.22)	Parameter value set 3: Value of parameter 22	**0**	general	I32	1	P	-
0x4044:023 (P753.23)	Parameter value set 3: Value of parameter 23	**0**	general	I32	1	P	-
0x4044:024 (P753.24)	Parameter value set 3: Value of parameter 24	**0**	general	I32	1	P	-
0x4044:025 (P753.25)	Parameter value set 3: Value of parameter 25	**0**	general	I32	1	P	-
0x4044:026 (P753.26)	Parameter value set 3: Value of parameter 26	**0**	general	I32	1	P	-
0x4044:027 (P753.27)	Parameter value set 3: Value of parameter 27	**0**	general	I32	1	P	-
0x4044:028 (P753.28)	Parameter value set 3: Value of parameter 28	**0**	general	I32	1	P	-
0x4044:029 (P753.29)	Parameter value set 3: Value of parameter 29	**0**	general	I32	1	P	-
0x4044:030 (P753.30)	Parameter value set 3: Value of parameter 30	**0**	general	I32	1	P	-
0x4044:031 (P753.31)	Parameter value set 3: Value of parameter 31	**0**	general	I32	1	P	-
0x4044:032 (P753.32)	Parameter value set 3: Value of parameter 32	**0**	general	I32	1	P	-
0x4045:001 (P754.01)	Parameter value set 4: Value of parameter 1	**0**	general	I32	1	P	-
0x4045:002 (P754.02)	Parameter value set 4: Value of parameter 2	**0**	general	I32	1	P	-
0x4045:003 (P754.03)	Parameter value set 4: Value of parameter 3	**0**	general	I32	1	P	-

* Default setting depending on the size. Firmware version 02.01.01.00

Address	Name	Default setting	Category	Data type	Factor	A	M
0x4045:004 (P754.04)	Parameter value set 4: Value of parameter 4	**0**	general	I32	1	P	-
0x4045:005 (P754.05)	Parameter value set 4: Value of parameter 5	**0**	general	I32	1	P	-
0x4045:006 (P754.06)	Parameter value set 4: Value of parameter 6	**0**	general	I32	1	P	-
0x4045:007 (P754.07)	Parameter value set 4: Value of parameter 7	**0**	general	I32	1	P	-
0x4045:008 (P754.08)	Parameter value set 4: Value of parameter 8	**0**	general	I32	1	P	-
0x4045:009 (P754.09)	Parameter value set 4: Value of parameter 9	**0**	general	I32	1	P	-
0x4045:010 (P754.10)	Parameter value set 4: Value of parameter 10	**0**	general	I32	1	P	-
0x4045:011 (P754.11)	Parameter value set 4: Value of parameter 11	**0**	general	I32	1	P	-
0x4045:012 (P754.12)	Parameter value set 4: Value of parameter 12	**0**	general	I32	1	P	-
0x4045:013 (P754.13)	Parameter value set 4: Value of parameter 13	**0**	general	I32	1	P	-
0x4045:014 (P754.14)	Parameter value set 4: Value of parameter 14	**0**	general	I32	1	P	-
0x4045:015 (P754.15)	Parameter value set 4: Value of parameter 15	**0**	general	I32	1	P	-
0x4045:016 (P754.16)	Parameter value set 4: Value of parameter 16	**0**	general	I32	1	P	-
0x4045:017 (P754.17)	Parameter value set 4: Value of parameter 17	**0**	general	I32	1	P	-
0x4045:018 (P754.18)	Parameter value set 4: Value of parameter 18	**0**	general	I32	1	P	-
0x4045:019 (P754.19)	Parameter value set 4: Value of parameter 19	**0**	general	I32	1	P	-
0x4045:020 (P754.20)	Parameter value set 4: Value of parameter 20	**0**	general	I32	1	P	-
0x4045:021 (P754.21)	Parameter value set 4: Value of parameter 21	**0**	general	I32	1	P	-
0x4045:022 (P754.22)	Parameter value set 4: Value of parameter 22	**0**	general	I32	1	P	-
0x4045:023 (P754.23)	Parameter value set 4: Value of parameter 23	**0**	general	I32	1	P	-
0x4045:024 (P754.24)	Parameter value set 4: Value of parameter 24	**0**	general	I32	1	P	-
0x4045:025 (P754.25)	Parameter value set 4: Value of parameter 25	**0**	general	I32	1	P	-
0x4045:026 (P754.26)	Parameter value set 4: Value of parameter 26	**0**	general	I32	1	P	-
0x4045:027 (P754.27)	Parameter value set 4: Value of parameter 27	**0**	general	I32	1	P	-
0x4045:028 (P754.28)	Parameter value set 4: Value of parameter 28	**0**	general	I32	1	P	-
0x4045:029 (P754.29)	Parameter value set 4: Value of parameter 29	**0**	general	I32	1	P	-
0x4045:030 (P754.30)	Parameter value set 4: Value of parameter 30	**0**	general	I32	1	P	-
0x4045:031 (P754.31)	Parameter value set 4: Value of parameter 31	**0**	general	I32	1	P	-
0x4045:032 (P754.32)	Parameter value set 4: Value of parameter 32	**0**	general	I32	1	P	-

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x4046 (P755.00)	Activation of parameter set	**Via command (disable required) [0]**	general	U8	1	P	-
0x4047:001 (P756.01)	Parameter change-over error message: Status	- (Read only)	general	U16	1	-	-
0x4047:002 (P756.02)	Parameter change-over error message: List entry	- (Read only)	general	U8	1	-	-
0x4048 (P601.00)	PID P-component	**5.0 %**	general	U16	10	P	-
0x4049 (P602.00)	PID I- component	**400 ms**	general	U16	1	P	-
0x404A (P603.00)	PID D-component	**0.0 s**	general	U8	10	P	-
0x404B (P604.00)	PID setpoint ramp	**20.0 s**	general	U16	10	P	-
0x404C:001 (P607.01)	PID influence: Acceleration time for showing	**5.0 s**	general	U16	10	P	-
0x404C:002 (P607.02)	PID influence: Deceleration time for masking out	**5.0 s**	general	U16	10	P	-
0x404D:001 (P608.01)	PID alarms: MIN alarm threshold	**0.00 PID unit**	general	I16	100	P	-
0x404D:002 (P608.02)	PID alarms: MAX alarm threshold	**100.00 PID unit**	general	I16	100	P	-
0x404E:001 (P605.01)	PID setpoint limits: Minimum setpoint	**-300.00 PID unit**	general	I16	100	P	-
0x404E:002 (P605.02)	PID setpoint limits: Maximum setpoint	**300.00 PID unit**	general	I16	100	P	-
0x603F (P150.00)	Error code	- (Read only)	general	U16	1	O	t
0x6040	CiA: Controlword	**0**	general	U16	1	O	r
0x6041 (P780.00)	CiA: Statusword	- (Read only)	general	U16	1	O	t
0x6042 (P781.00)	Target velocity	**0 rpm**	general	I16	1	OK	r
0x6043 (P782.00)	Velocity demand	x rpm (Read only)	general	I16	1	O	t
0x6044 (P783.00)	Velocity actual value	x rpm (Read only)	general	I16	1	O	t
0x6046:001 (P784.01)	Velocity min max amount: Velocity min amount	**0 rpm**	general	U32	1	P	r
0x6046:002 (P784.02)	Velocity min max amount: Velocity max amount	**2147483647 rpm**	general	U32	1	P	r
0x6048:001 (P785.01)	Velocity acceleration: Delta speed	**3000 rpm**	general	U32	1	PO	r
0x6048:002 (P785.02)	Velocity acceleration: Delta time	**10 s**	general	U16	1	PO	r
0x6049:001 (P786.01)	Velocity deceleration: Delta speed	**3000 rpm**	general	U32	1	PO	r
0x6049:002 (P786.02)	Velocity deceleration: Delta time	**10 s**	general	U16	1	PO	r
0x605A	Quick stop option code	**Quick stop ramp -> switch-on inhibited [2]**	general	I16	1	P	-
0x6060 (P301.00)	Modes of operation	**MS: Velocity mode [-2]**	general	I8	1	CP O	r
0x6061 (P788.00)	Modes of operation display	- (Read only)	general	I8	1	O	t
0x6071	Target torque	**0.0 %**	general	I16	10	OK	r
0x6072 (P326.00)	Max torque	**250.0 %**	general	U16	10	PO	r

* Default setting depending on the size.

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Address	Name	Default setting	Category	Data type	Factor	A	M
0x6073 (P324.00)	Max current	**200.0 %**	general	U16	10	P	-
0x6074	Torque demand value	x.x % (Read only)	MCTRL	I16	10	O	-
0x6075 (P323.00)	Motor rated current	**1.700 A** *	MCTRL	U32	1000	CP	-
0x6076 (P325.00)	Motor rated torque	**1.650 Nm** *	MCTRL	U32	1000	CP	-
0x6077 (P107.00)	Torque actual value	x.x % (Read only)	general	I16	10	O	t
0x6078 (P103.00)	Current actual value	x.x % (Read only)	general	I16	10	O	t
0x6079	DC link circuit voltage	x.xxx V (Read only)	general	U32	1000	O	t
0x6080 (P322.00)	Max motor speed	**6075 rpm**	general	U32	1	PO	r
0x6085 (P790.00)	Quick stop deceleration	**546000 pos. unit/s²**	general	U32	1	P	-
0x60E0	Positive torque limit	**250.0 %**	general	U16	10	P	r
0x60E1	Negative torque limit	**250.0 %**	general	U16	10	P	r
0x60FD (P118.00)	Digital inputs	- (Read only)	general	U32	1	O	t
0x6402	Motor type	**Squirrel cage induction [7]**	MCTRL	U16	1	P	-
0x6502 (P789.00)	Supported drive modes	- (Read only)	general	U32	1	-	-
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