PowerXL DM1 Series VFD Effective August 2020

Application manual

Powering Business Worldwide

Supports Firmware Version
Bundle: V1.04 and V1.05

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Safety

WARNING!
DANGEROUS ELECTRICAL VOLTAGE!

Before commencing the installation

- Disconnect the power supply of the device
- Ensure that devices cannot be accidentally restarted
- Verify isolation from the supply
- Earth and short circuit the device
- Cover or enclose any adjacent live components
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system
- Before installation and before touching the device ensure that you are free of electrostatic charge
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automation functions
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states in the automation devices
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2
- Deviations of the input voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause a restart
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed and with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented
- Wherever faults in the automation system may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, and so on)
- Depending on their degree of protection, adjustable frequency drives may contain live bright metal parts, moving or rotating components, or hot surfaces during and immediately after operation
- Removal of the required covers, improper installation, or incorrect operation of motor or adjustable frequency drive may cause the failure of the device and may lead to serious injury or damage
- The applicable national accident prevention and safety regulations apply to all work carried out on live adjustable frequency drives
- The electrical installation must be carried out in accordance with the relevant regulations (for example, with regard to cable cross sections, fuses, PE)
- Transport, installation, commissioning, and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations)
- Installations containing adjustable frequency drives must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the adjustable frequency drives using the operating software are permitted
- All covers and doors must be kept closed during operation
- To reduce hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the drive (increased motor speed or sudden standstill of motor). These measures include:
  - Other independent devices for monitoring safety-related variables (speed, travel, end positions, and so on)
  - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks)
  - Never touch live parts or cable connections of the adjustable frequency drive after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs

Definitions and symbols

WARNING

This symbol indicates high voltage. It calls your attention to items or operations that could be dangerous to you and other persons operating this equipment. Read the message and follow the instructions carefully. This symbol is the "Safety Alert Symbol". It occurs with either of two signal words: CAUTION or WARNING, as described below.

WARNING

Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, can result in minor to moderate injury, or serious damage to the product. The situation described in the CAUTION may, if not avoided, lead to serious results. Important safety measures are described in CAUTION (as well as WARNING).

Hazardous high voltage

WARNING

Motor control equipment and electronic controllers are connected to hazardous line voltages. When servicing drives and electronic controllers, there may be exposed components with housings or protrusions at or above line potential. Extreme care should be taken to protect against shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power before checking controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic controllers or rotating machinery.

Warnings and cautions

This manual contains clearly marked cautions and warnings which are intended for your personal safety and to avoid any unintentional damage to the product or connected appliances. Please read the information included in cautions and warnings carefully.

WARNING

The relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DM1 is disconnected from mains.

WARNING

Be sure not to plug the Ethernet IP cable to the terminal under the keypad! This might harm your personal computer.

WARNING

Be sure not to plug the Modbus TCP cable to the terminal under the keypad! This might harm your personal computer.

CAUTION

Remove external control signal before resetting the fault to prevent unintentional restart of the drive.

Important safety information

Hazardous high voltage

WARNING

The components of the power unit of PowerXL Series are live when the AC drive is connected to mains potential. Coming into contact with this voltage is extremely dangerous and may cause death or severe injury.

WARNING

The motor terminals U, V, W and the brake resistor terminals are live when PowerXL Series is connected to mains, even if the motor is not running.

WARNING

After disconnecting the AC drive from the mains, wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait 5 more minutes before doing any work on the connections of PowerXL Series. Do not open the cover before this time has expired. After expiration of this time, use a measuring equipment to absolutely ensure that no voltage is present. Always ensure absence of voltage before starting any electrical work!

WARNING

The control I/O-terminals are isolated from the mains potential. However, the relay outputs and other I/O-terminals may have a dangerous control voltage present even when PowerXL DM1 is disconnected from mains.

WARNING

Before connecting the AC drive to mains, confirm that the front and cable covers of PowerXL DM1 are closed.

WARNING

During a ramp stop (see the Application Manual), the motor is still generating voltage to the drive. Therefore, do not touch the components of the AC drive before the motor has completely stopped. Wait until the indicators on the keypad go out (if no keypad is attached see the indicators on the cover). Wait additional 5 minutes before starting any work on the drive.

Important warnings

WARNING

PowerXL Series AC drive is meant for fixed installations only.

WARNING

Do not perform any measurements when the AC drive is connected to the mains.

WARNING

The ground leakage current of PowerXL Series AC drives exceeds 3.5 mA AC. According to standard EN61800-5-1, a reinforced protective ground connection must be ensured.

WARNING

If the AC drive is used as a part of a machine, the machine manufacturer is responsible for providing the machine with a supply disconnecting device (EN 60204-1).

WARNING

Only spare parts delivered by Eaton can be used.

WARNING

At power-up, power brake or fault reset the motor will start immediately if the start signal is active, unless the pulse control for Start/Stop logic has been selected. Furthermore, the I/O functionalistic (including start inputs) may change if parameters, applications or software are changed. Disconnect, therefore, the motor if an unexpected start can cause danger.

WARNING

The motor starts automatically after automatic fault reset if the auto restart function is activated. See the Application Manual for more detailed information.

WARNING

Prior to measurements on the motor or the motor cable, disconnect the motor cable from the AC drive.

WARNING

Do not touch the components on the circuit boards. Static voltage discharge may damage the components.

WARNING

Check that the EMC level of the AC drive corresponds to the requirements of your supply network.

Additional cautions

CAUTION

The PowerXL DM1 AC drive must always be grounded with an grounding conductor connected to the grounding terminal.

Please follow the grounding practices from the PowerXL DM1 Installation Leaflet and Installation Manual to properly address and protect from any grounding issues.

The ground fault protection inside the AC drive protects only the drive itself against ground faults in the motor or the motor cable. It is not intended for personal safety. Due to the high capacitive currents present in the AC drive, fault current protective switches may not function properly.

Do not perform any voltage withstand tests on any part of PowerXL Series. There is a certain procedure according to which the tests shall be performed. Ignoring this procedure may result in damaged product.

Chapter 1 - PowerXL DM1 series overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the PowerXL Series Open Drive catalog numbering system.

How to use this manual

The purpose of this manual is to provide you with information necessary to install, set and customize parameters, start up, troubleshoot, and maintain the Eaton PowerXL Series variable frequency drive (VFD). To provide for safe installation and operation of the equipment, read the safety guidelines at the beginning of this manual and follow the procedures outlined in the following chapters before connecting power to the PowerXL Series VFD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Table 1. Common abbreviations.

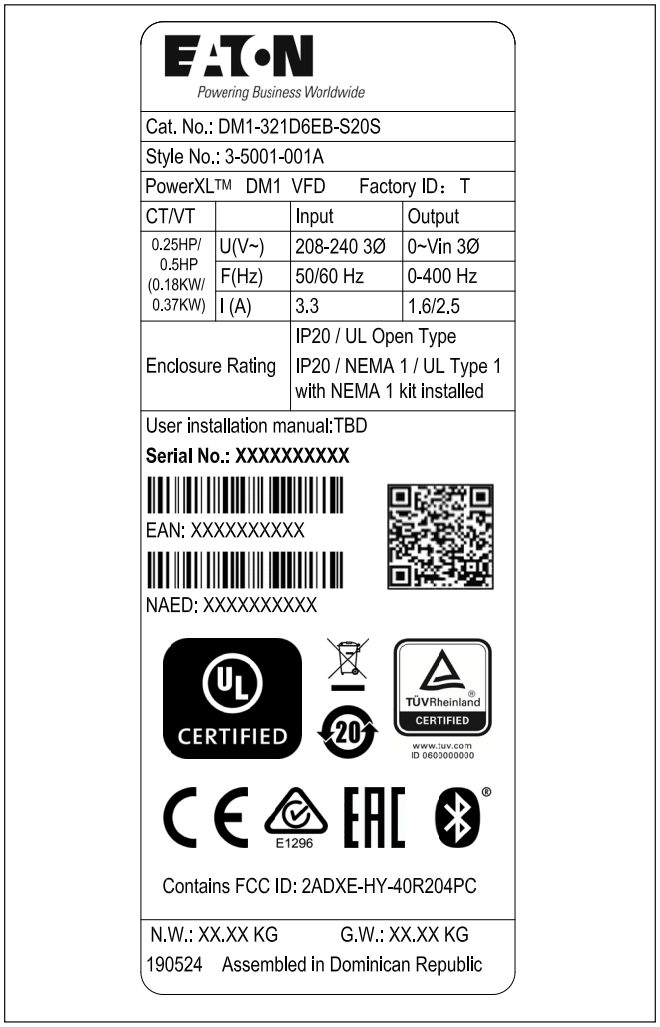
Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
IH	High overload current (150%)
I_L	Low overload current (110%)
VFD	Variable frequency drive
RTC	Real time clock

Rating label

Figure 1. Rating label.

Carton labels (U.S. and Europe)

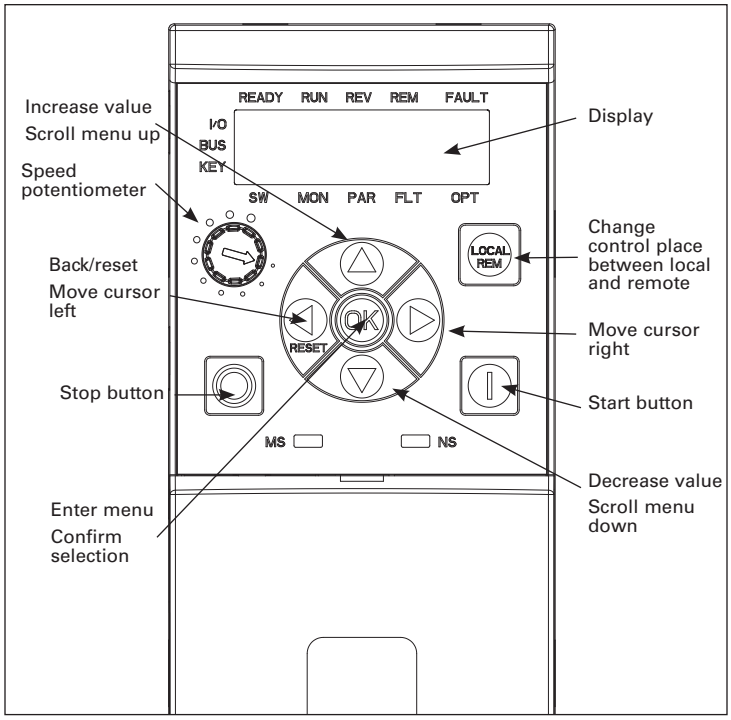
Figure 2. Carton rating label.



Chapter 2 - Keypad overview

The keypad is the interface between the drive and the user. It features an LCD display, speed potentiometer, and navigation buttons. With the control keypad, it is possible to control the speed of a motor, to supervise the state of the equipment, and to set the frequency converter's parameters (see **Figure 3**.

Figure 3. Main keypad and display.



Main keypad buttons

Buttons description

Table 2. Keypad buttons.

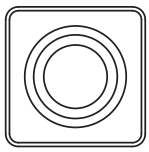
Icon	Button	Description
	Local/Remote	**Local/Remote:** Switches between LOCAL and REMOTE control for start and speed reference. The control locations corresponding to local and remote shall be selected within an application.
	Start	**Start:** This button operates as motor start button for normal operation when the "Keypad" is selected as the active control source. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen.
	Stop	**Stop:** This button operates as motor stop button for normal operation when the "Keypad" is selected as the control source and keypad stop button is active, or stop button is always enabled regardless of control source. • Motor stop from the keypad.
 	Up Down	**Up and Down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In parameter page when in read mode, move to the previous or next brother parameter of this parameter.
	Left/Back/Reset	**Left arrow:** • Navigation button, movement to left when editing a parameter digit by digit. • Backs up one step. • At Main Menu page by hitting Back/Reset takes to Default Page. **Back/Reset:** This button has three integrated functions. The button operates as backward button during normal mode. In edit mode, it is used as cancel operate. It is also used to reset faults when faults occur. • Backs up one step • Cancels Modify in edit mode • Resets the active faults (all the active faults shall be reset by pressing this button more than 2s in any page) • Hold Stop and Back Reset for 5 seconds to return drive to factory default • At Main Menu page by hitting Back/Reset takes to Default Page.

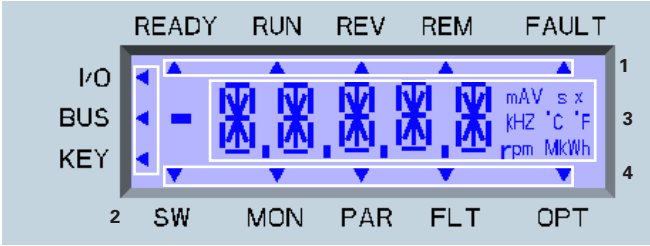
Table 2. Keypad buttons (Cont.).

Icon	Button	Description
	Right	**Right arrow:** • Enter parameter group mode. • Enter parameter mode from group mode. • Enter parameter whole edit mode when this parameter can be written. • Enter parameter bit by bit edit mode from whole edit mode. • Navigation button, movement to right when editing a parameter bit by bit.
	OK	**OK:** • To clear all the Fault History if pressed for more than 5 s (including 5 s) in any page. • This button is used in the parameter edit mode to save the parameter setting. • To confirm the start-up list at the end of the Start-Up Wizard. • To confirm the comparison item in parameters comparison mode. The following is the same with Right key: • Enter parameter whole edit mode when this parameter can be written. • Enter parameter group mode. • Enter parameter mode from group mode.

Main keypad display

The main keypad LCD display indicates the status of the motor and the drive and any faults in motor or drive functions. On the display, the user sees information about the current location in the menu structure and the item displayed.

Figure 4. Main keypad display and labels.



Overview

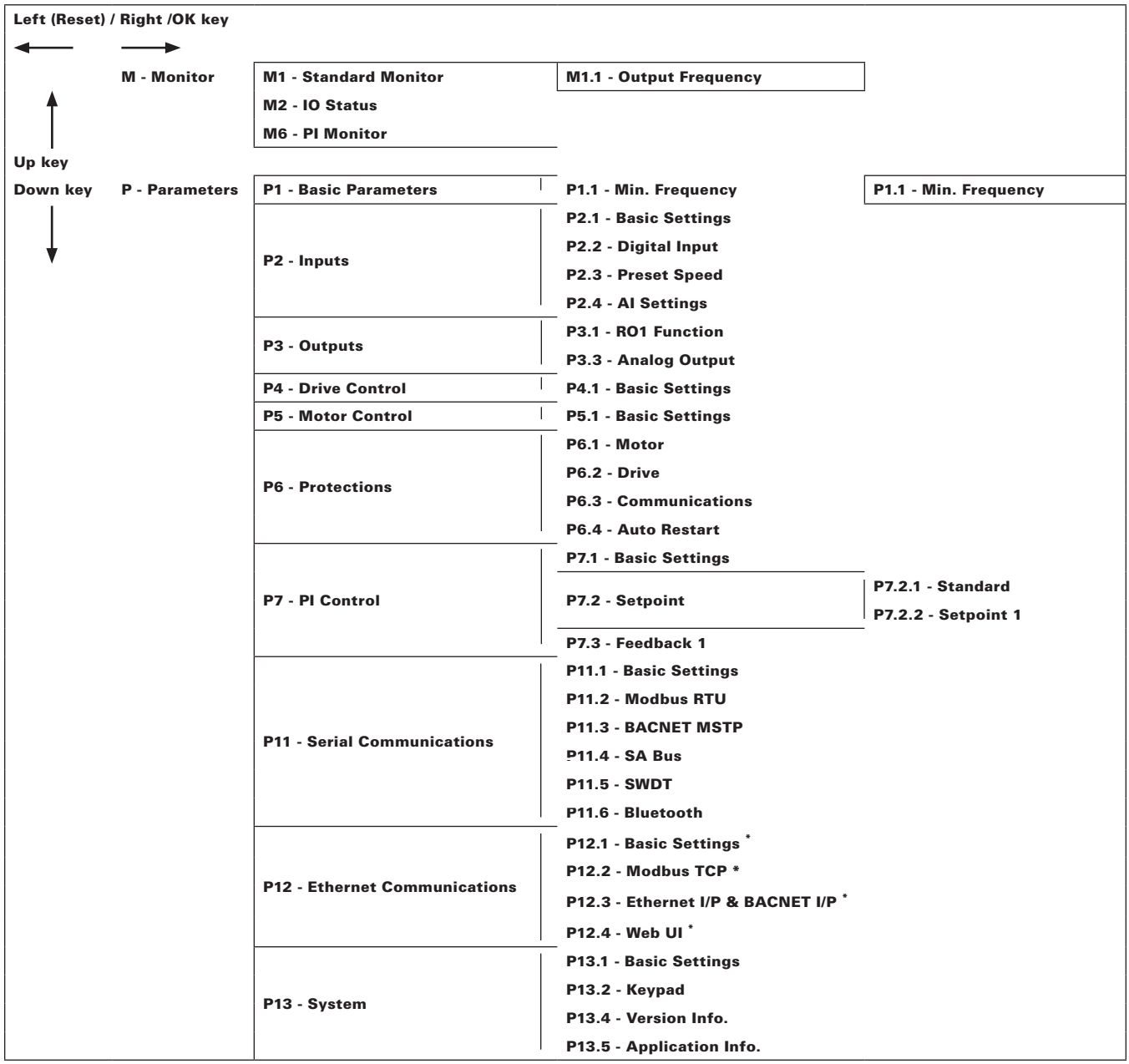
The display on the main keypad is a customized LCD with four information areas:

1. (**Top line**) The top line is state line and indicates whether the device state is:
   - Ready/NRD; Remote/Local;
   - RUN/STP;
   - REV/FWD;
   - Remote/Local; or
   - Fault (lit)/Warning (flashing).
2. (**Left line**) The left line indicates the control source:
   - IO;
   - BUS; or
   - KEY.
3. (**Middle line**) The middle line is the parameter:
   - Path;
   - Value; or
   - Unit.
4. (**Bottom line**) The bottom line is the menu line. It indicates which parameter menu is selected. The choices are:
   - SW: Start-up wizard;
   - MON: Monitor;
   - PAR: Parameter;
   - FLT: Fault; or
   - OPT: Option cards.

Menu navigation - main keypad

This section provides basic instruction on navigating each section in the menu structure from the main keypad.

Figure 5. Main keypad menu navigation.

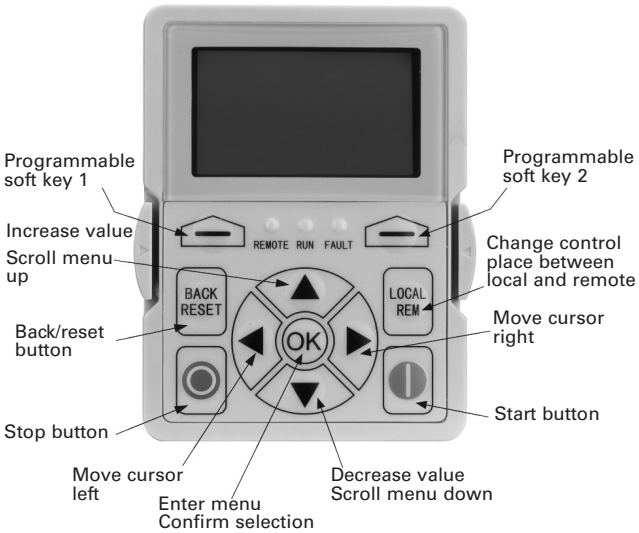


* = DM1 PRO Only.

Remote keypad overview

The remote keypad is another interface between the drive and the user. It features an LCD display, 3 LED lights and 11 buttons. With the control keypad, it is possible to control the speed of a motor, to supervise the state of the equipment, and to set the frequency converter's parameters.

Figure 6. Remote keypad and display.



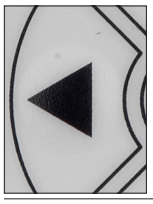
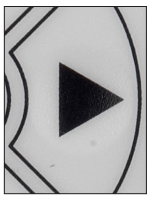
Remote keypad buttons

Buttons description

Table 3. Remote keypad buttons.

Icon	Button	Description
	Soft key 1, Soft key 2	**Soft key 1, soft key 2:** Soft keys 1 and 2 have no functionality with the DM1 device.
	Back/Reset	**Back/Reset:** This button has three integrated functions. The button operates as backward button during normal mode. In edit mode, it is used as cancel operate. It is also used to reset faults when faults occur. • Backs up one step. • Cancels Modify in edit mode. • Resets the active faults (all the active faults shall be reset by pressing this button more than 2 seconds in any page). • Hold Stop and Back Reset for 5 seconds to return drive to factory default. • At Main Menu page, pressing Back/Reset takes the user to the Default page.
	Local/Remote	**Local/Remote:** Switches between Local and Remote control for start and speed reference. The control locations corresponding to Local and Remote shall be selected within an application.
 	Up Down	**Up and down arrows:** • Move either up or down a menu list to select the desired menu item. • Editing a parameter bit by bit, while the active digit is scrolled. • Increase/decrease the reference value of the selected parameter. • In Parameter Comparison mode, scroll through the parameters of which current value is different from the comparison parameter value. • In the Parameter page when in read mode, move to the previous or next brother parameter of this parameter.

Table 3. Remote keypad buttons (Cont.).

	Left	**Left arrow:** • Navigation button, movement to left when editing a parameter digit by digit. • Backs up one step. • At Main Menu page by hitting Back/Reset takes the user to the Default page.
	Right	**Right arrow:** • Enter parameter group mode. • Enter parameter mode from group mode. • Enter parameter whole edit mode when this parameter can be written. • Enter parameter bit by bit edit mode from whole edit mode. • Navigation button, movement to right when editing a parameter bit by bit.
	OK	**OK:** • To clear all the Fault History if pressed for more than 5 seconds (including 5 seconds) in any page. • This button is used in the parameter edit mode to save the parameter setting. • To confirm the start-up list at the end of the Start-Up Wizard. • To confirm the comparison item in parameters comparison mode. The following is the same with Right key: • Enter parameter whole edit mode when this parameter can be written. • Enter parameter group mode. • Enter parameter mode from group mode..
	Stop	**Stop:** This button operates as motor stop button for normal operation when the “Keypad” is selected as the control source and keypad stop button is active, or stop button is always enabled regardless of control source. • Motor stop from the keypad.
	Start	**Start:** This button operates as motor start button for normal operation when the “Keypad” is selected as the active control source. When Keypad is the reference place after hitting the start button, it will jump directly to the Keypad Ref Screen.

LED lights

Table 4. LED state indicators.

Indicator	Description
Run	**Green Run:** Indicates that the VFD is running and controlling the load in Drive or Bypass. Blinks when a stop command has been given but the drive is still ramping down.
Fault	**Red Fault:** Turns on when there is one or more active drive fault(s).
Remote	**Yellow Local/Remote:** Local: If the local control place is selected, turns off the light. Remote: If the remote control place is selected, turns on the light.

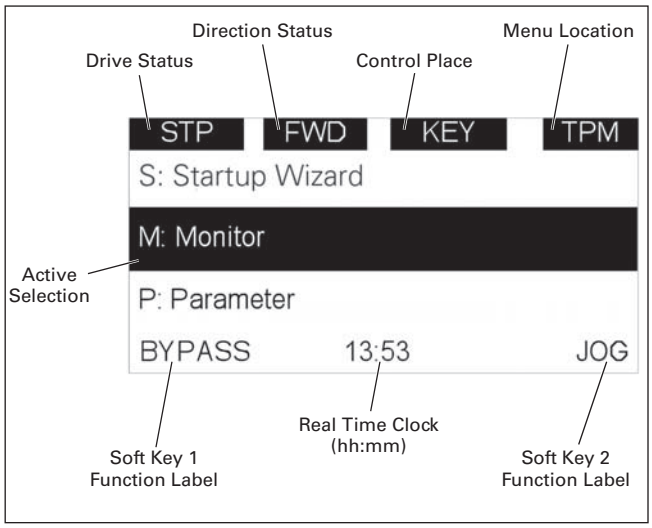
LCD display

The keypad LCD indicates the status of the motor and the drive and any faults in motor or drive functions. On the LCD, the user sees information about the current location in the menu structure and the item displayed.

Overview

Five lines shall be displayed in the screen. General view is as following in Figure 3.

Figure 7. General view of LCD.



The lines definition is as below.

The first line is State line, shows:

- **RUN/STP/NRD/FIM/TFM -** If motor is running, the run state shall display "RUN", otherwise the state display "STP". "RUN" blinks when the stop command is sent but the drive is decelerating. "NRD" is displayed if the drive is not ready or does not have a signal "FIM" is displayed to indicate it is in Fire Mode and the drive is in a Run state. "TFM" is displayed when in the Fire Mode Test Mode and the drive is in a Run State.
- **FWD/REV/JOG -** If the motor running direction is clockwise, display "FWD", otherwise display "REV". "Jog" if the drive is in Jog mode the status indication will occur.
- **KEY/I/O/BPS/RBP/BUS/OFF** - If it is in bypass currently, display "BPS"; when run command is given it will got to "RBP". otherwise, if the current control source is I/O terminal, display "I/O". If it is keypad, then display "KEY"; otherwise display "BUS." If HOA enabled and switch to OFF, it shall show OFF.
- **PAR/MON/FLT/OPE/QSW/FAV/TPM/MS1/SL1/SL2/SL3/SL4/BUx -** If the current page is parameter menu, display "PAR". If monitor menu, then display "MON". If fault menu, then display "FLT". If operation menu, then display "OPE". If quick start wizard, then display "QSW". If optional card menu, then display "BOA". If favorite menu, then display "FAV". If main menu, then display "TPM". When doing the Multi-drive Pump and Fan mode, the drive mode will be defined with MS- Master and SL being a slave drive. The 1 through 5 will indicate the number in the series it is. "BUx" indicates the drive being a backup drive when in the redundant drive system.

The second line is Code line, shows the menu code.

The third line is Name line, shows the menu name or parameters name.

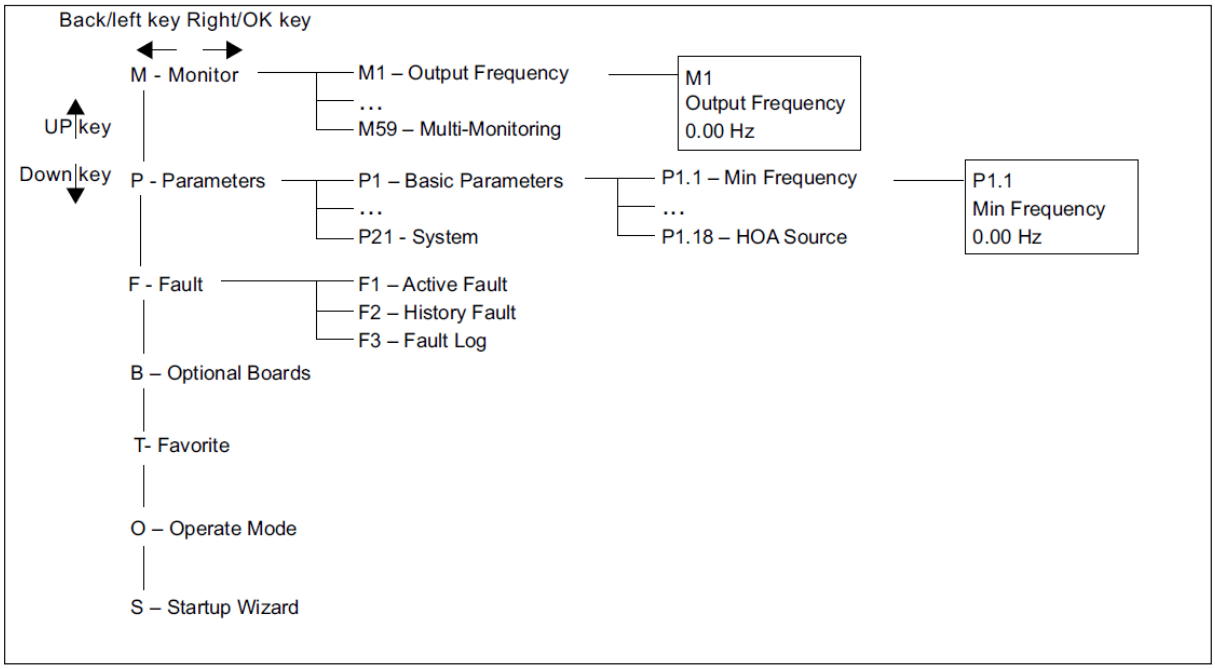
The fourth line is Value line, shows the submenu name or parameters value.

The fifth line is Soft Key line, the functions of Soft Key 1 and Soft Key 2 are changeable, and the real time is in the middle.

Menu navigation - remote keypad

This section provides basic instruction on navigating each section in the menu structure from the remote keypad.

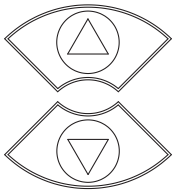
Figure 8. Remote keypad menu navigation.



Chapter 3 - Startup

Start-up wizard

In the *Start-up Wizard*, you will be prompted for essential information needed by the drive so that it can start controlling your process. In the Wizard, you will need the following keypad buttons:



Up/down buttons.

Use these to changes value(s).

OK button.

Confirm selection with this button, and enter into next question.

Left/back/reset button.

If this button was pressed at the first question, the Start-up Wizard will be cancelled.

If this button is pressed in any step on the Start-up Wizard, the Start-up Wizard will be cancelled.

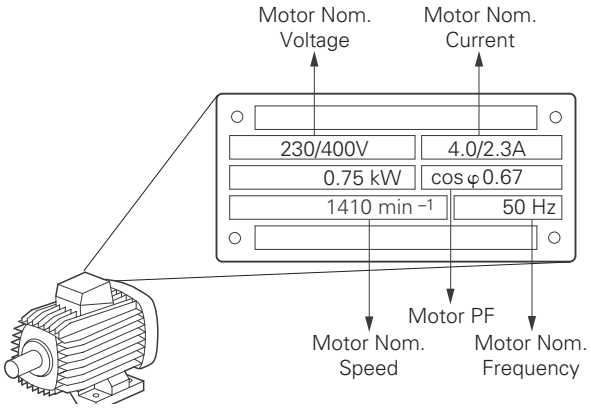
Once you have connected power to your Eaton PowerXL frequency converter, and the Start-up Wizard is enabled, follow these instructions to easily set up your drive.

Table 5. Start-up wizard instructions .

P13.1.7	***Parameter lock PIN***				**ID 624**
Minimum value:	0	**Maximum value:**	9999	**Default value:**	0
Description:	The application selection can be protected against unauthorized changes with the password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0.				
P1.1②	***Minimum frequency***				**ID 101**
Minimum value:	0.00 HZ	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	These define the frequency limits of the frequency converter. The maximum value for these parameters is 400 Hz. The minimum frequency has to be below the maximum frequency level. These will limit other frequency parameter settings; preset speeds, jog speed, 4 mA fault preset speed, fire mode speed, and brake speed settings.				
P1.2②	***Maximum frequency***				**ID 102**
Minimum value:	0.00 HZ	**Maximum value:**	400.00 Hz	**Default value:**	MaxFreqMFG
Description:	These define the frequency limits of the frequency converter. The maximum value for these parameters is 400 Hz. The minimum frequency has to be below the maximum frequency level. These will limit other frequency parameter settings; preset speeds, jog speed, 4 mA fault preset speed, fire mode speed, and brake speed settings.				

Table 5. Start-up wizard instructions (Cont.).

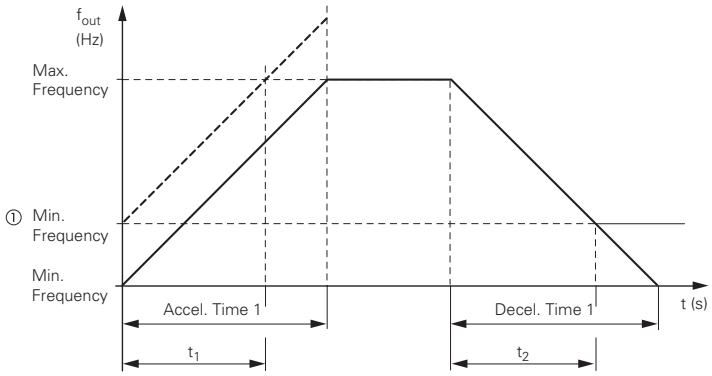
P1.6①	***Motor nominal current***				**ID 486**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT
Description:	Motor nominal nameplate full load current. Find this value on the rating plate of the motor.				



P1.7①	***Motor nominal speed***				**ID 489**
Minimum value:	300 rpm	**Maximum value:**	20,000 rpm	**Default value:**	MotorNomSpeedMFG
Description:	Motor nominal nameplate base speed. Find this value on the rating plate of the motor.				
P1.8①	***Motor power factor***				**ID 490**
Minimum value:	0.30	**Maximum value:**	1.00	**Default value:**	0.85
Description:	Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.				
P1.9①	***Motor nominal voltage***				**ID 487**
Minimum value:	180 V	**Maximum value:**	690 V	**Default value:**	MotorNomVoltMFG
Description:	Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.				
P1.10①	***Motor nominal frequency***				**ID 488**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MotorNomFreqMFG
Description:	Motor nominal nameplat ncy. Find this value on the rating plate of the motor. This parameter sets the field weakening point (P8.4) to the same .				
P1.3②	***Acceleration time 1***				**ID 103**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	20 .0 s
Description:	The time required for the output frequency to accelerate from zero frequency to maximum frequency (P1.2). When accelerating from different frequency levels, the acceleration time will be a fraction of the total ramp time.				

Table 5. Start-up wizard instructions (Cont.).

P1.4②	***Deceleration time 1***				**ID 104**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	20 .0 s
Description:	The time required for the output frequency to decelerate from maximum frequency (P1.2) to zero frequency. When decelerating from different frequency levels, the deceleration time will be a fraction of the total deceleration time.				



The values for the acceleration time t_1 and the deceleration time t_2 are calculated as follows:

$$t_1 = \frac{\text{(Max. Frequency - Min. Frequency) x Accel. Time 1}}{\text{Max. Frequency}} \qquad t_2 = \frac{\text{(Max. Frequency - Min. Frequency) x Decel. Time 1}}{\text{Max. Frequency}}$$

① When setting a minimum output frequency (decal time greater than 0 Hz), the acceleration and deceleration time of the drive is reduced to t_1 or t_2

P1.13②	***Remote control place***				**ID 135**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = IO terminal; 1 = Fieldbus; or 3 = Keypad.				
Description:	Selects where the drive will look for the start command in the remote location: I/O terminals would be from the digital hard-wired inputs; fieldbus would be a communication bus; and keypad display will indicate what mode is selected				
P1.14①②	***Remote reference***				**ID 137**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = AI; 1 = Drive reference pot; 2 = AI joystick; 3 = Motor pot; 4 = Maximum frequency; 5 = PI control output; 6 = Keypad; or 7 = Fieldbus reference.				
Description:	This parameter determines the reference for remote 1 control mode. This value can be fed from an analog input, keypad, or fieldbus reference signal				
P13.5.3	***Keypad lock PIN***				**ID 75**
Minimum value:	0	**Maximum value:**	9999	**Default value:**	0
Description:	The keypad can be protected against unauthorized changes with the keypad lock function after no keys are pressed after five minutes. When the password function is enabled, the user will be prompted to enter a password before the keypad display parameter or response to key press except up/down/left/right. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0.				

Table 5. Start-up wizard instructions (Cont.).

P11.6.1	***Blue tooth enabled***				**ID 1895**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disabled; or 1 = Enable.				
Description:	Blue tooth enable.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Now the Start-up Wizard is done. It will not show again at the next power up. If you want to reset it, please select it from the main menu ("Start-up Wizard").

The PID Mini-Wizard is activated in the Quick Setup menu

Chapter 4 - Standard

On the next pages you will find the lists of parameters within the respective parameter groups. Each parameter section within the table lists:

- Parameter code (location indication on the keypad; shows the operator the present parameter number);.
- Parameter name;
- ID (number of the parameter);

and where applicable:

- Minimum value and units;
- Maximum value and units;
- Default value and units;
- Options (when available); and
- Description of the parameter.

Table 6. Monitor.

M1 - standard.					
M1.1	***Output frequency***				**ID 1**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Output frequency (Hz).				
M1.2	***Frequency reference***				**ID 24**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Reference frequency (Hz).				
M1.3	***Motor speed***				**ID 2**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Motor output speed (rpm).				
M1.4	***Motor current***				**ID 3**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Motor output current RMS (Amps).				
M1.5	***Motor torque***				**ID 4**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor torque calculated from nameplate values and measured motor current (%).				
M1.6	***Motor power***				**ID 5**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor power calculated from nameplate values and measured motor current (%).				
M1.7	***Motor voltage***				**ID 6**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Output ac motor voltage (Vac).				
M1.8	***DC-link voltage***				**ID 7**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	DC bus voltage (Vdc).				
M1.9	***Unit temperature***				**ID 8**
Minimum value:	°C	**Maximum value:**	°C	**Default value:**	°C
Description:	Heat sink temperature (deg C).				

Table 6. Monitor (Cont.).

M1 - standard (Cont.).					
M1.10	***Motor temperature***				**ID 9**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Motor temperature value calculated from nameplate values and measured motor current (%).				
M1.11	***Latest fault code***				**ID 28**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Last active fault code value. See fault codes for the value shown here.				
M1.12	***Instant motor power***				**ID 1686**
Minimum value:	kW	**Maximum value:**	kW	**Default value:**	kW
Description:	Instantaneous motor power (kW).				
M2 - I/O status.					
M2.1	***Analog input 1***				**ID 10**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog input 1 measured value (Vdc or Amps) selectable with dipswitch.				
M2.2	***Keypad pot voltage***				**ID 1858**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Keypad potentiometer measured value (Vdc). DM1 PRO only.				
M2.3	***Analog output***				**ID 25**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog output 1 measured value (Vdc or Amps) selectable with parameter.				
M2.4	***DI1, DI2, DI3***				**ID 12**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 1/2/3 status.				
M2.5	***DI4***				**ID 13**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 4 status.				
M2.8	***RO1, RO2***				**ID 557**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Relay output 1 and 2 4 status.				
M5 - PI monitor.					
M5.1	***PI set point***				**ID 16**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI set point in process units.				
M5.2	***PI feedback***				**ID 18**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI feedback level in process units.				
M5.3	***PI error value***				**ID 20**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI error in process units.				
M5.4	***PI output***				**ID 22**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	PI output.				

Table 6. Monitor (Cont.).

M5.5	***PI status***				**ID 23**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Running; or 2 = Sleep mode.				
Description:	PI status indication, indicates if drive is stopped, running in PI mode, or in PI sleep mode.				

M9 - Multi-monitoring.

M9.1	***Multi-monitoring***				**ID 30**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0, 1, 2.
Description:	Displays any three monitoring values in a single screen. The values are selectable via the keypad menu. Multi-monitor page could see three lines of monitoring values. Up and down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down.				

Table 7. Operate mode - O.

Code	Parameter	Min.	Max.	Unit	Default	ID	Note
O1	Output frequency			Hz		1	
O2	Freq. reference			Hz		24	
O3	Motor speed			rpm		2	
O4	Motor current			A		3	
O5	Motor torque			%		4	
O6	Motor power			%		5	
O7	Motor voltage			V		6	
O8	DC-link voltage			V		7	
O9	Unit temperature			°C		8	
O10	Motor temperature			%		9	
R11②	Keypad reference	*Minimum frequency*	*Maximum frequency*	Hz	0.00	141	
R12②	PI keypad setpoint 1	*PI process minimum*	*PI process maximum*	Varies	0.00	1307	

② Parameter value will be set to be default when changing macros.

Table 8. Parameters .

P1 - Basic parameters.					
P1.1②	***Minimum frequency***				**ID 101**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the lowest frequency at which the drive will operate. This setting will limit other frequency parameter settings. 1 = Fire mode minimum frequency. 2 = Derag. 3 = MPFC staging frequency. 4 = MPFC master fixed frequency. 5 = Prime pump frequency. 6 = Prime pump frequency 2.				

Table 8. Parameters (Cont.).

P1.2②	***Maximum frequency***				**ID 102**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MaxFreqMFG
Description:	Defines the highest frequency at which the drive will operate. This will limit other frequency parameters. 1 = Keypad reference. 3 = Motor potentiometer. 3 = Jog speed. 4 = 2nd stage ramp frequency. 5 = Fire mode minimum frequency. 6 = Derag. 7 = MPFC staging frequency. 8 = MPFC master fixed frequency. 9 = Prime pump frequency. 10 = Prime pump frequency 2. 11 = Preset speed frequency. 12 = Frequency limit value. 13 = Reference limit value. 14 = Speed control_fs2. 15 = Stall frequency limit. 16 = 4 mA fault frequency. 17 = MPFC de-staging frequency. 18 = Pipe fill loss frequency low. 19 = Pipe fill loss frequency high. 20 = Broken pipe frequency limit.				
P1.3②	***Accel. time 1***				**ID 103**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to accelerate from zero frequency to maximum frequency.				
P1.4②	***Decel. time 1***				**ID 104**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to decelerate from maximum frequency to zero frequency.				
P1.6①	***Motor nom. current***				**ID 486**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT A
Description:	Motor nameplate rated full load current. This value is found on the rating plate of the motor.				
P1.7①	***Motor nom. speed***				**ID 489**
Minimum value:	300 rpm	**Maximum value:**	20,000 rpm	**Default value:**	MotorNomSpeedMFG
Description:	Motor nameplate rated speed. This value is found on the rating plate of the motor.				
P1.8①	***Motor PF***				**ID 490**
Minimum value:	0.30	**Maximum value:**	1.00	**Default value:**	0.85
Description:	Motor nameplate rated power factor. This value is found on the rating plate of the motor.				
P1.9①	***Motor nom. voltage***				**ID 487**
Minimum value:	180 V	**Maximum value:**	690 V	**Default value:**	MotorNomVoltMFG V
Description:	Motor nameplate rated voltage. This value is found on the rating plate of the motor.				
P1.10①	***Motor nom. frequency***				**ID 488**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MotorNomFreqMFG Hz
Description:	Motor nameplate rated frequency. This value is found on the rating plate of the motor.				
P1.11②	***Local control place***				**ID 1695**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = keypad; 1 = IO terminal; or 3 = fieldbus.				
Description:	Defines the signal location for the start command in local mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				

Table 8. Parameters (Cont.).

P1.12①②	***Local reference***				**ID 136**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = AI; 1 = drive ref. pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus ref.				
Description:	Defines the signal location for the speed reference in local mode.				
P1.13②	***Remote control place***				**ID 135**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = IO terminal; 1 = fieldbus; or 3 = keypad.				
Description:	Defines the signal location for the start command in remote mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.14①②	***Remote reference***				**ID 137**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = AI; 1 = drive reference pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus reference.				
Description:	Defines the signal location for the speed reference in remote mode.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 9. Inputs.

P2.1 - Basic settings.					
P2.1.3①②	***IO terminal Start/Stop logic***				**ID 143**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Forward - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 1 = Start - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 2 = Start - enable: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 to enable the drive to run. 3 = Start pulse - Stop pulse: used for three wire operation. Start signal 1 uses a normally open start and start signal 2 uses a normally closed stop.				
Description:	Defines the functionality for start signal 1 and start signal 2. By default, start signal 1 is DI1 and start signal 2 is DI2.				
	0 = P3.2: DI closed contact = start forward P3.3: DI closed contact = start reverse. This would be considered 2-wire control with either a contact used on the start FWD or start REV commands. When contacts open, the motor stops.				

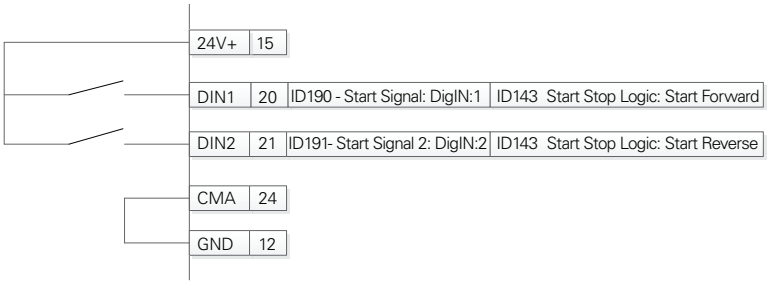
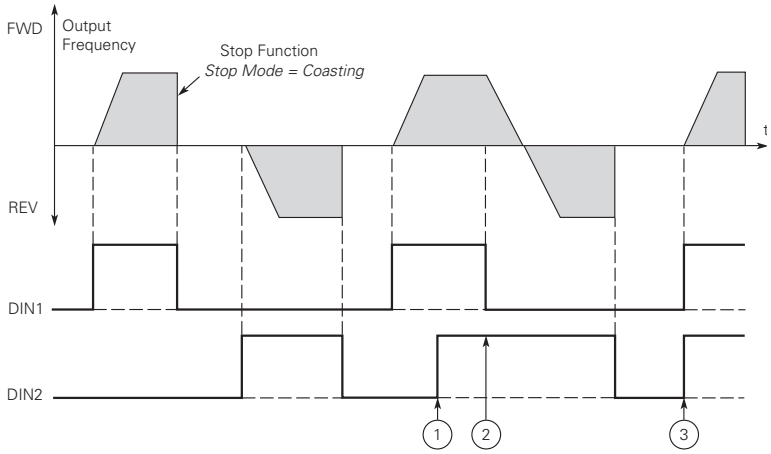
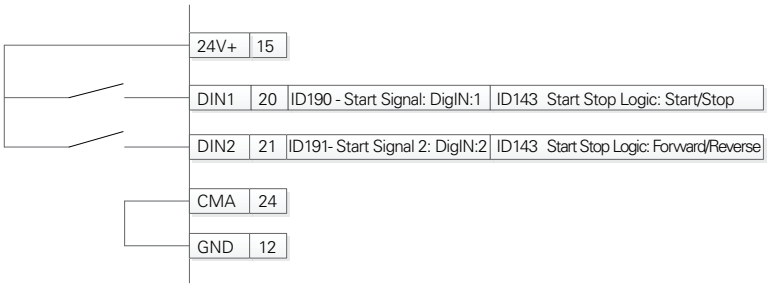


Table 9. Inputs (Cont.).



Notes: ① The first selected direction has the highest priority.
② When the DIN1 contact opens the direction of rotation starts to change.
③ If start forward (DIN1) and start reverse (DIN2) signals are active simultaneously the start forward signal (DIN1) has priority.

1 = P3.2: DI closed contact = start /open contact = stop P3.3: DI closed contact = reverse / open contact = forward. This would be considered 2-wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.



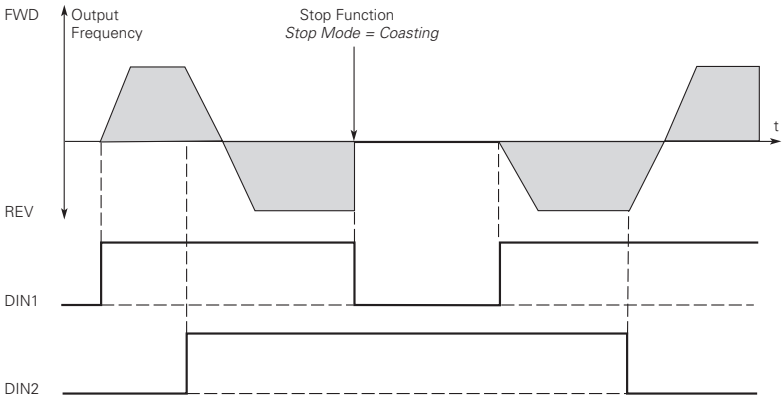
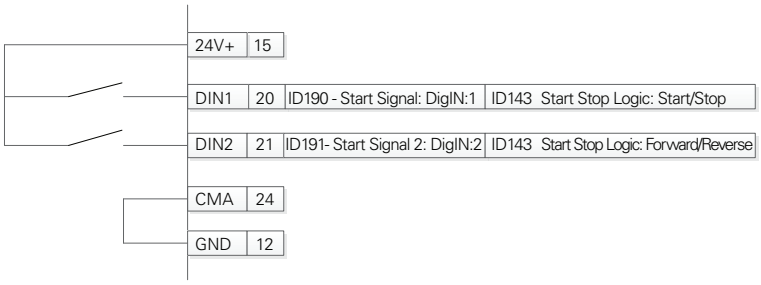
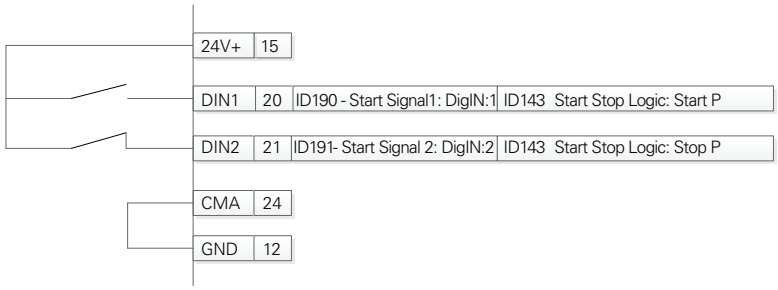


Table 9. Inputs (Cont.).

2 = P3.2: DI closed contact = start/open contact = stop P3.3: DI closed contact = start enabled/open contact = start disabled and drive stopped if running motor direction keeps forward. This would be considered 3-wire control with start signal 2 required to be closed to enable start on start signal 1.



3 = Three-wire connection (pulse control): P3.2: DI changes from open to closed = start pulse P3.3: DI changes from closed to open = stop pulse P3.5: DI closed contact = reverse/open contact = forward. This would be considered 3-wire control with start signal 1 being the start pulse and start signal 2 being the NC stop.



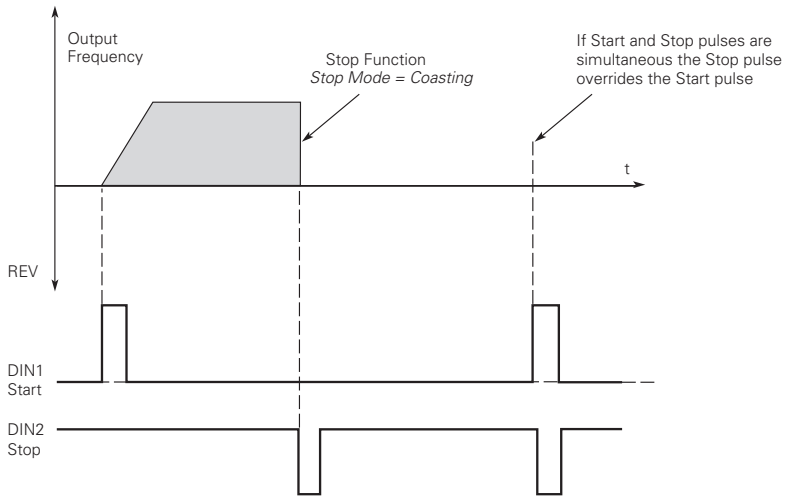


Table 9. Inputs (Cont.).

P2.2 - Digital input.					
P2.2.5②	***DI3 function***				**ID 1805**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Not used, no action. 1 = IO terminal start signal 1 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse - when Start/Stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated. 7 = Fault reset - when closed, all active faults will be reset. 8 = Run enable - when closed the drive will allow a start command and be in the ready state. 9 = Preset speed B0 - the seven preset speeds are selected via three binary inputs, this is least significant bit in that binary input. 10 = Preset speed B1 - the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2 - the seven preset speeds are selected via three binary inputs, this is most significant bit in that binary input. 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used, when closed accel./decel. time 2 will be used. 19 = Remote control - when closed, the drive will be forced to the remote control place. 20 = Local control - when closed, the drive will be forced to the local control place. 22 = PI controller - when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select - when open, parameter setpoint 1 is active, when closed, setpoint 2 is active. 24 = Motor interlock 1 - when closed, motor will be enabled to run. 29 = DC brake active - when closed, DC injection braking will be active. 31 = Derag. enable - when closed. The Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 3.				
P2.2.7②	***DI4 function***				**ID 1807**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Options:	0 = Not used, no action. 1 = IO terminal start signal 1 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse - when Start/Stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated. 7 = Fault reset - when closed, all active faults will be reset. 8 = Run enable - when closed the drive will allow a start command and be in the ready state. 9 = Preset speed B0 - the seven preset speeds are selected via three binary inputs, this is least significant bit in that binary input. 10 = Preset speed B1 - the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2 - the seven preset speeds are selected via three binary inputs, this is most significant bit in that binary input. 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used, when closed accel./decel. time 2 will be used. 19 = Remote control - when closed, the drive will be forced to the remote control place. 20 = Local control - when closed, the drive will be forced to the local control place. 22 = PI controller - when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select - when open, parameter setpoint 1 is active, when closed, setpoint 2 is active. 24 = Motor interlock 1 - when closed, motor will be enabled to run. 29 = DC brake active - when closed, DC injection braking will be active. 31 = Derag. enable - when closed. The Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 4.				

P2.3 - Preset speed.					
P2.3.1②	***Preset speed 1***				**ID 105**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.2②	***Preset speed 2***				**ID 106**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	10.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.3②	***Preset speed 3***				**ID 118**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	15.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

Table 9. Inputs (Cont.).

P2.3.4②	***Preset speed 4***				**ID 119**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	20.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.5②	***Preset speed 5***				**ID 120**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.6②	***Preset speed 6***				**ID 121**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	30.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.7②	***Preset speed 7***				**ID 122**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	35.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

P2.4 - AI settings.

P2.4.1	***AI mode***				**ID 222**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog input mode to current or voltage the DIP switches on control board will need to be set to the same mode as this parameter. *DM1 PRO CN5 terminals 8 and 9 for current or voltage, also need to set DIP switches SW2 2 and 3 on control board, near the RJ45 port. DIP switches SW2 2 and 3 off for voltage. Current mode, if using the +10 V supply on CN5 terminals 13 of the DM1 / DM1 Pro, it will require DIP switches SW2 2 and 3 on to complete the current loop. When doing a current loop with an external supply, the DIP switches SW2 2 off and 3 on.				

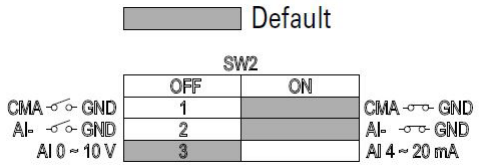
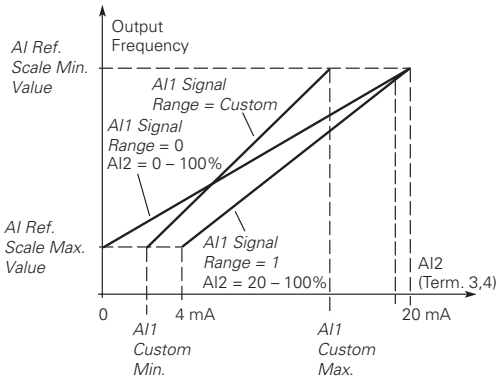


Table 9. Inputs (Cont.).

P2.4.2②	***AI signal range***				**ID 175**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0-100%/0-20 mA/0-10 V. 1 = 20-100%/4-20 mA/2-10 V.				
Description:	With this parameter, you can select the analog input 1 signal range. For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.				



① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 10. Outputs.

P3.1 - Digital output.					
P3.1.1②	***RO1 function***				**ID 152**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action. 1 = Ready - drive is ready for operation. 2 = Run - drive is running. 3 = Fault - drive is faulted. 4 = Fault invert - drive is not faulted. 5 = Warning - drive has a warning message. 6 = Reverse - drive is outputting reverse phase rotation. 7 = At speed - output frequency has reached the set reference. 8 = Zero frequency - drive output is at zero frequency. 24 = STO fault output - safe torque off input is activated. 26 = Remote control - remote is the control place. 37 = PI sleep - PI controller is in a sleep state.				
Description:	Defines the function associated with changing the state of relay output 1.				
P3.1.4②	***RO2 function***				**ID 153**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Not used - no action. 1 = Ready - drive is ready for operation. 2 = Run - drive is running. 3 = Fault - drive is faulted. 4 = Fault invert - drive is not faulted. 5 = Warning - drive has warning message. 6 = Reverse - drive is outputting reverse phase rotation. 7 = At speed - output frequency has reached the set reference. 8 = Zero frequency - drive output is at zero frequency. 24 = STO fault output - safe torque off input is activated. 26 = Remote control - remote is the control place. 37 = PI sleep - PI controller is in a sleep state.				
Description:	Defines the function associated with changing the state of relay output 2.				

Table 10. Outputs (Cont.).

P3.3 - Analog output.					
P3.3.1②	***AO mode***				**ID 227**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog output mode to current or voltage.				
P3.3.2②	***AO function***				**ID 146**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	1 = Output frequency (0 - maximum frequency). 2 = Frequency reference (0 - max frequency). 3 = Motor speed rpm (0 - nameplate rpm). 4 = Motor current (0 - nameplate current). 5 = Motor torque (0 - calculated nominal). 6 = Motor power (0 - calculated nominal). 7 = Motor voltage (0 - nameplate voltage.; 8 = DC bus voltage (0 - 1,000 Vdc). 12 = Analog input (0% - 100%).				
Description:	Select the function desired to the terminal AO1.				

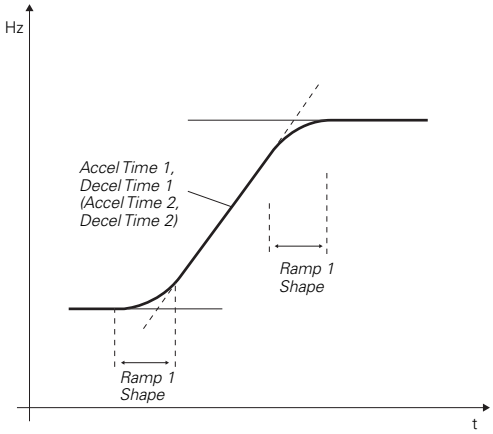
② Parameter value will be set to be default when changing macros.

Table 11. Drive control .

P4.1 - Basic settings.					
P4.1.1②	***Keypad reference***				**ID 141**
Minimum value:	MinFreq	**Maximum value:**	MaxFreq	**Default value:**	0.00 Hz
Description:	Keypad reference value.				
P4.1.3②	***Keypad stop***				**ID 114**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Enabled - keypad operation - In this mode, the keypad stop will only operate when the control source is set to keypad. 1 = Always enabled - In this mode, the stop button will always stop the drive regardless of control mode.				
Description:	Enabled or always enabled keypad operation.				
P4.1.4①	***Reverse enabled***				**ID 1679**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables or disables the reverse motor direction.				
P4.1.5	***Change phase sequence motor***				**ID 2515**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change disable; or 1 = Change enable.				
Description:	This parameter allows for swapping the motor phase output from u, v, w to u, w, v.				
P4.1.6②	***Power up local remote select***				**ID 1685**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Hold last; 1 = Local control; or 2 = Remote control.				
Description:	Selects what control place the drive will start at after power is applied. The default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.				

Table 11. Drive control (Cont.).

P4.1.8②	***Start mode***				**ID 252**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Ramp - The drive starts from 0 Hz and ramps to the frequency reference value. 1 = Flying start from stop frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the last operating frequency as a starting point. 2 = Flying start from maximum frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the maximum operating frequency as a starting point.				
Description:	Selects the start mode operation.				
P4.1.9②	***Stop mode***				**ID 253**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Coasting - After a stop command, the motor coasts to a stop uncontrolled by the drive. 1 = Ramp - After the stop command, the speed of the motor is decelerated according to the set deceleration parameters.				
Description:	Selects the stop mode operation.				
P4.1.10②	***Ramp 1 shape***				**ID 247**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 seconds gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				



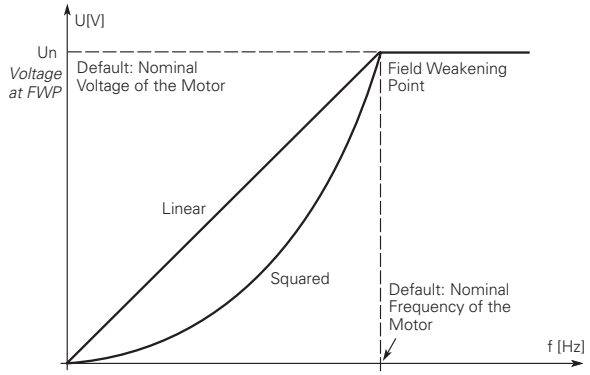
① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 12. Motor control.

P5.1 - Basic settings.					
P5.1.1①②	***Motor control mode***				**ID 287**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Frequency control - Output frequency is controlled directly by the frequency reference. 1 = Speed control - Output frequency is controlled by giving a frequency reference to it with slip compensation. 2 = Open loop vector control - Similar to the standard speed control mode, higher performance slip calculation requires running a motor identification. 3 = PM control 1 - PM motor control mode 1, used for SPM (surface mounted permanent magnet) and it also can be used for IPM. 4 = PM control 2 - PM motor control mode 2, used for IPM (internally mounted permanent magnet) and it can not be used for SPM.				
Description:	Selects the motor control mode.				

Table 12. Motor control (Cont.).

P5.1.2①	***Current limit***				**ID 107**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT*3/2 A
Description:	This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level, it goes into the current limiter controller and tries to limit the output current.				
P5.1.3①②	***V/Hz optimization***				**ID 109**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable torque boost function. 1 = Enable torque boost function.				
Description:	Automatic torque boost - the voltage to the motor increases automatically, which assists the motor to produce sufficient torque to start and run at low frequencies with high loads.				
P5.1.4①②	***V/Hz ratio***				**ID 108**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Linear - the voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied. A linear V/Hz ratio should be used in constant torque applications. 1 = Squared - the voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed. 2 = Programmable V/Hz curve - the V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint, and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. 3 = Linear with flux optimization - the drive starts to search for the minimum motor current in order to save energy. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed.				
Description:	Selects the V/Hz ratio. 0 = Linear; 1 = Squared; 2 = Programmable; or 3 = Linear + flux optimization.				



0 = Linear and 1 = Squared.

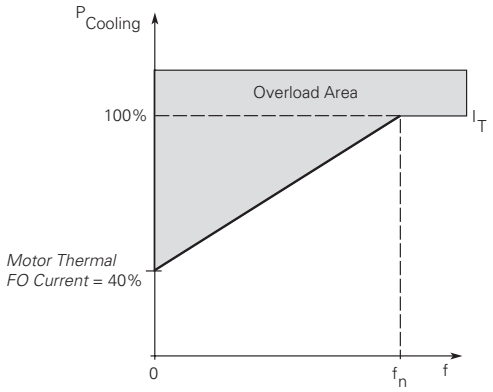
P5.1.10②	***Switching frequency***				**ID 288**
Minimum value:	MinSwitchFreq kHz	**Maximum value:**	MaxSwitchFreq kHz	**Default value:**	DefaultSwitchFreqCT kHz
Description:	Sets the switching frequency for the PWM output waveform.				
P5.1.16①②	***Identification***				**ID 299**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not action. 1 = Identification only stator resistor - does not spin the motor. This can be done with load attached. 2 = Identification with run - motor stator resistor is completed then the motor is run. This **must** be completed with unloaded motor. 3 = Identification no run - motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia - identification for the system inertia only.				
Description:	This parameter enables the drive to make an motor identification cycle of the motor once complete the drive will adjust tuning parameters to improve starting torque and open loop vector control performance. Once set and a run command is given, the operation will be active then set back to 0 when completed. When a run command is issued, the message on the keypad will indicate "Auto tuning" is being performed. If there is an issue with the motor identification, a fault message will be displayed.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 13. Protections.

P6.1 - Motor.

P6.1.4①②	***Motor thermal protection***				**ID 310**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response. 1 = Warning. 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%.				
P6.1.5②	***Motor thermal FO current***				**ID 311**
Minimum value:	0.00%	**Maximum value:**	150.00%	**Default value:**	100.00%
Description:	The current can be set between 0 - 150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). **Note:** The value is set as a percentage of the motor nameplate data, P1.6 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive.				



P6.2 - Drive.

P6.2.2①②	***Input phase fault***				**ID 332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; 3 = Fault, stop mode after fault always by coasting; or 4 = Single phase power limit.				
Description:	The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw.				
P6.2.3①②	***4 mA input fault***				**ID 306**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No response. 1 = Warning. 2 = Warning, the frequency from 10 seconds back is set as reference. 3 = Warning, the preset frequency P6.2.4 is set as reference. 4 = Fault, stop mode after fault according to parameter stop mode. 5 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated if the 4 - 20 mA reference signal is used and the signal falls below 4 mA for 5 seconds, or below 0.5 mA for 0.5 seconds. The information can also be programmed into relay outputs RO1 and RO2.				

Table 13. Protections (Cont.).

P6.2.4①②	***4 mA fault frequency***				**ID 331**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00
Description:	When 4 mA fault happens, the output frequency of drive goes to this preset speed when P6.2.3 = 3.				
P6.2.5①②	***External fault***				**ID 307**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs function select external fault). The status information can also be programmed into digital output relay outputs RO1 and RO2.				
P6.2.11②	***STO fault response***				**ID 2427**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No Action - drive will stop, no indication shown, no reset required, have to cycle start command. 1 = Warning - drive indicate warning/if STO clears drive will run without reset. 2 = Fault - drive will indicate fault/require reset to start again.				
Description:	STO fault response defines the function of how the STO input will be seen on the keypad and how the drive functions to it.				
P6.2.12①	***PI feedback AI loss response***				**ID 2401**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Warning: preset frequency (P6.2.13).				
Description:	This parameter defines the function of the PI feedback analog input loss response. If the AI feedback is lost based off the programed AI feedback.				
P6.2.13①②	***PI feedback AI loss pre-frequency***				**ID 2402**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	This parameter defines the frequency the master would run to if a feedback is lost and P6.2.12 was set to option 3.				
P6.2.14②	***PI feedback AI loss pipe fill***				**ID 2403**
Minimum value:	0.00 varies	**Maximum value:**	1000.00 varies	**Default value:**	0.00 varies
Description:	Detects loss of prime in the pump based off the measured level. If the value drops below this level for the time in P6.2.15 and below, the frequency in P6.2.13 “loss of prime” occurs.				
P6.2.15②	***PI feedback AI loss pre-frequency timeout***				**ID 2404**
Minimum value:	0.0 s	**Maximum value:**	6,000.0 s	**Default value:**	0.0 s
Description:	PI feedback AI loss pre-frequency timeout - when P6.2.12 is set to 3 or 4, when the feedback signal is lost, the drive will run at the frequency in P6.2.15 for the time set here. After this time, the drive will fault out on “feedback loss”. The time is disabled when set to 0 seconds.				

P6.3 - Communications.

P6.3.1①②	***Fieldbus fault response***				**ID 334**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.				

Table 13. Protections (Cont.).

P6.3.2①②	***OPTcard fault response***				**ID 335**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for a board slot fault caused by a missing or failed option board not communicating to the central processor.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 14. PI Controller.

P7.1 - Basic settings.					
P7.1.1②	***PI control gain***				**ID 1294**
Minimum value:	0.00%	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Defines the gain of the PI Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100%, a change of 10% in the error value causes the controller output to change 10%.				
P7.1.2②	***PI control itime***				**ID 1295**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	1.00 s
Description:	Defines the integration time of the PI controller. Over the time, the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec., a change of 10% in the error value causes the controller output to change by 10.00%/s.				

Table 14. PI Controller (Cont.).

P7.1.3①②	***PI process unit***				**ID 1297**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = %; 1 = 1/min.; 2 = rpm; 3 = ppm; 4 = pps; 5 = l/s; 6 = l/min.; 7 = l/h; 8 = kg/s; 9 = kg/min.; 10 = kg/h; 11 = m3/s; 12 = m3/min.; 13 = m3/h; 14 = m/s; 15 = mbar; 16 = bar; 17 = Pa; 18 = kPa; 19 = mVS; 20 = kW; 21 = Deg. C; 22 = GPM; 23 = gal/s; 24 = gal/min.; 25 = gal/h; 26 = lb/s; 27 = lb/min.; 28 = lb/h; 29 = CFM; 30 = ft^3/s; 31 = ft^3/min.; 32 = ft^3/h; 33 = ft/s; 34 = in. wg; 35 = ft wg; 36 = PSI; 37 = lb/in.2; 38 = HP; 39 = Deg. F; 40 = PA; 41 = WC; 42 = HG; 43 = ft; 44 = m;				
Description:	Defines the unit type for PI feedback unit.				
P7.1.4②	***PI process unit minimum***				**ID 1298**
Minimum value:	-99999.99 varies	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Defines the minimum process unit value.				
P7.1.5②	***PI process unit maximum***				**ID 1300**
Minimum value:	PI Process Unit Min	**Maximum value:**	99999.99 varies	**Default value:**	100.00 varies
Description:	Defines the maximum process unit value.				
P7.1.6①②	***PI error inversion***				**ID 1303**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal - if feedback is less than set-point, PI controller output increases. 1 = Inverted - if feedback is less than set-point, PI controller output decreases.				
Description:	Defines the way the process value output reacts to the feedback signal.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 15. Setpoint.

P7.2.1 - Standard.					
P7.2.1.1②	***PI keypad setpoint 1***				**ID 1307**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value set point 1.				
P7.2.1.3②	***PI wake-up action***				**ID 2466**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Wake-up when below wake-up level. 1 = Wake-up when above wake-up-level. 2 = Wake-up when below wake-up level % from PI setpoint. 3 = Wake-up when above wake-up level %from PI setpoint.				
Description:	This parameter defines the wake-up function action.				

P7.2.2 - Setpoint 1.					
P7.2.2.1①	***PI setpoint 1 source***				**ID 1312**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				
P7.2.2.2①	***PI setpoint 1 sleep enable***				**ID 1315**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				
P7.2.2.3②	***PI setpoint 1 sleep delay***				**ID 1317**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.2.4②	***PI setpoint 1 wake-up level***				**ID 1318**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.2.5②	***PI setpoint 1 boost***				**ID 1320**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				

Table 15. Setpoint (Cont.).

P7.2.2.6②	***PI setpoint 1 sleep level***				**ID 2450**
Minimum value:	MinFreqMin Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.2.7②	***SP1 sleep mode over cycle time***				**ID 1842**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.2.8②	***SP1 sleep mode maximum cycle time***				**ID 1843**
Minimum value:	0 s	**Maximum value:**	3,600 s	**Default value:**	300 s
Description:	Defines the maximum time for sleep over cycle checking.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 16. Feedback.

P7.3.2 - Feedback 1.					
P7.3.2.1①	***PI feedback 1 source***				**ID 1332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used; 1 = AI; 2 = Drive reference pot; 3 = FB process data input 1; or 11 = FB PI feedback.				
Description:	Defines where feedback signal is being fed into the drive, via analog or fieldbus data value.				

① Parameter value can only be changed after the drive has stopped.

Table 17. Serial communication.

P11.1 - Basic settings.					
P11.1.1①	***Serial communication***				**ID 586**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Modbus RTU; 1 = BACnet MSTP; or 2 = SWD.				
Description:	This parameter defines the communication protocol for RS-485.				

P11.2 - Modbus RTU.					
P11.2.1①	***Slave address***				**ID 587**
Minimum value:	1	**Maximum value:**	247	**Default value:**	1
Description:	This parameter defines the slave address for RS-485 communication.				

Table 17. Serial communication (Cont.).

P11.2.2①	***Baud rate***				**ID 584**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 57,600; or 4 = 115,200				
Description:	This parameter defines communication speed for RS-485 communication.				
P11.2.3①	***Parity type***				**ID 585**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = None; 1 = Odd; or 2 = Even.				
Description:	This parameter defines parity type for RS-485 communication.				
P11.2.4	***Modbus RTU protocol status***				**ID 588**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Initial; 1 = Stopped; 2 = Operational; or 3 = Faulted.				
Description:	This parameter shows the protocol status for RS-485 communication.				
P11.2.5	***Communication timeout modbus RTU***				**ID 593**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over modbus RTU if a message is not received.				
P11.2.6	***Modbus RTU fault response***				**ID 2516**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 - Only in fieldbus control mode. When fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications; if not in fieldbus control, place will not fault. 1 - In all control modes. No matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus RTU communication.				

P11.3 - BACnet RTU MSTP.

P11.3.1①	***MSTP baud rate***				**ID 594**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 76,800; or 4 = 115,200.				
Description:	This parameter defines the communication speed for RS-485 communication.				
P11.3.2①	***MSTP device address***				**ID 595**
Minimum value:	0	**Maximum value:**	127	**Default value:**	1
Description:	Defines the device address of the drive on the BACnet MSTP network.				
P11.3.3①	***MSTP instance number***				**ID 596**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Defines the instance number of the drive on the BACnet MSTP network.				
P11.3.4	***MSTP communication timeout***				**ID 598**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over BACnet MSTP if a message is not received.				

Table 17. Serial communication (Cont.).

P11.3.5	***MSTP protocol status***				**ID 599**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.6	***MSTP fault code***				**ID 600**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = None; 1 = Sole master; 2 = Duplicate MAC ID; or 3 = Baud rate fault.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.7	***MSTP fault response***				**ID 2526**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet MSTP communication.				
P11.3.8	***MSTP maximum master***				**ID 1537**
Minimum value:	1	**Maximum value:**	127	**Default value:**	127
Description:	Defines the maximum number of masters that can establish connections with the drive.				

P11.4 - SA bus.

P11.4.1①	***SA bus device address***				**ID 1726**
Minimum value:	204	**Maximum value:**	254	**Default value:**	204
Description:	This parameter is used to set the SA bus address at which the drive will be located on instance node.				
P11.4.2①	***SA bus baud rate***				**ID 1727**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = 9,600; 1 = 19,200; 2 = 38,000; 3 = 57,600; or 4 = 115,200.				
Description:	This parameter defines communication speed for SA bus communication.				
P11.4.3①	***SA instance number***				**ID 1728**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Defines the instance number of the drive on the SA bus network.				
P11.4.4	***SA communication timeout***				**ID 1730**
Minimum value:	0	**Maximum value:**	60,000	**Default value:**	10,000
Description:	Selects the time to wait before a communication fault occurs over SA bus if a message is not received.				
P11.4.5	***SA bus protocol status***				**ID 1731**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for SA bus communication.				

Table 17. Serial communication (Cont.).

P11.4.6	***SA bus fault response***				**ID 1732**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active. The drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for SA bus communication.				

P11.5 - SWD.

P11.5.1	***Parameter access***				**ID 2630**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = No permission to read/write on acyclic channel. 1 = Acyclic read/write are allowed on Profibus.				
Description:	PNU927 which specifies the operation priority of parameters for acyclic communication.				
P11.5.2①	***Parameter data access***				**ID 2631**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Local control; 1 = Fieldbus; 2 = Mixed interface; 4 = NET, local on fault; or 5 = Dual mode.				
Description:	PNU928 which specifies the control priority of the device for cyclic communication.				
P11.5.3	***Fault situation counter***				**ID 2632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	PNU952 which specifies the fault situation counter. Only write of 0 is allowed, then the whole fault buffer (actual fault situation and all other fault situations) and the fault message counter (parameter 944) are erased.				
P11.5.4	***Board status***				**ID 2609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Description:	Status of the board. B0-DCOM communication fault. B1-Board HW fault B2-IO1 24 volt overload fault. B3-Profibus communication fault. B4-fieldbus fault.				
P11.5.5	***Firmware version***				**ID 2610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	This parameter provides the firmware version of the SWD.				
P11.5.6	***Protocol status***				**ID 2612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not configured; 1 = Operational; or 2 = Diagnostics.				
Description:	This parameter specifies the protocol status for SWD card.				

P11.6 - Bluetooth.

P11.6.1	***Bluetooth enabled***				**ID 1895**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Bluetooth enabled.				

Table 17. Serial communication (Cont.).

P11.6.2②	***Bluetooth broadcast mode***				**ID 2920**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Off; or 1 = On.				
Description:	Bluetooth broadcast mode.				
P11.6.3	***Bluetooth pairing reset***				**ID 2935**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Not reset; or 1 = Reset.				
Description:	Bluetooth pairing reset.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 18. Ethernet communication.

P12.1 - Basic settings.					
P12.1.1①	***IP address mode***				**ID 1500**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Static IP; or 1 = DHCP with AutoIP.				
Description:	This parameter defined the IP address configuration mode for EIP/modbus TCP.				
P12.1.2	***Active IP address***				**ID 1507**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active IP address.				
P12.1.3	***Active subnet mask***				**ID 1509**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active subnet mask.				
P12.1.4	***Active default gateway***				**ID 1511**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active default gateway.				
P12.1.5	***MAC address***				**ID 1513**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current MAC address.				
P12.1.6①	***Static IP address***				**ID 1501**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.254
Description:	Defines the static IP address.				
P12.1.7①	***Static subnet mask***				**ID 1503**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	255.255.255.0
Description:	Defines the static subnet mask.				
P12.1.8①	***Static default gateway***				**ID 1505**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.1
Description:	Defines the static default gateway.				
P12.1.9	***Ethernet communication timeout***				**ID 611**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time it waits before a communication fault occurs over ethernet.				

Table 18. Ethernet communication (Cont.).

P12.2 - Trusted IP filter (DM1 PRO only).					
P12.2.1	***Trusted IP white list***				**ID 68**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0 0.0.0.0 192.168.1.255
Description:	Defines the IP addresses in the white list. A setting of 192.168.1.255 enables all connections on the local subnet.				
P12.2.2	***Trusted IP filter enable***				**ID 76**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables IP white listing. Devices not in the white list will not be able to establish communications with the drive.				

P12.3 - Modbus TCP (DM1 PRO only).					
P12.3.1①	***Modbus TCP enable***				**ID 1942**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	Enables modbus TCP communications, must be enabled to connect to Power Xpert inControl.				
P12.3.2	***Modbus TCP connection limit***				**ID 609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Description:	Maximum number of connections allowed to the drive.				
P12.3.3	***Modbus TCP unit identifier number***				**ID 610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Description:	Unit identifier unit value for modbus TCP.				
P12.3.4	***Modbus TCP protocol status***				**ID 612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for modbus TCP communication.				
P12.3.5	***Modbus TCP fault response***				**ID 2517**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus TCP communication.				

P12.4 - Ethernet IP (DM1 PRO only).					
P12.4.1①	***Ethernet based protocol select***				**ID 1997**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 2 = BACnet IP.				
Description:	Selects the active communication protocol on the ethernet I/P port.				
P12.4.2	***Ethernet IP protocol status***				**ID 608**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	Indicates if ethernet protocol is active or not.				

Table 18. Ethernet communication (Cont.).

P12.4.3	***Ethernet IP fault response***				**ID 2518**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for ethernet IP communication.				

P12.5 - BACnet IP (DM1 PRO only).

P12.5.1①	***BACnet IP UDP port number***				**ID 1733**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Defines the BACnet UDP port number.				
P12.5.2①	***BACnet IP foreign devise***				**ID 1734**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables BACNET IP foreign device configuration.				
P12.5.3①	***BACnet IP BBMD IP***				**ID 1735**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0
Description:	Displays the BACnet BBMD IP address.				
P12.5.4①	***BACnet IP UDP port***				**ID 1737**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Displays the BACnet BBMD UDP port number.				
P12.5.5①	***BACnet IP registration interval***				**ID 1738**
Minimum value:	0	**Maximum value:**	65,535	**Default value:**	10
Description:	Defines the registration interval.				

Table 18. Ethernet communication (Cont.).

P12.5.6	***BACnet IP communication timeout***				**ID 1739**
Minimum value:	0	**Maximum value:**	60,000	**Default value:**	0
Description:	Selects the time it waits before a communication fault occurs over BACnet IP.				
P12.5.7	***BACnet IP protocol status***				**ID 1740**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet IP communication.				
P12.5.8	***BACnet IP fault behavior***				**ID 1741**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet IP communication.				
P12.5.9①	***BACnet IP instance number***				**ID 1742**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Displays the BACnet instance number.				

P12.6 - Web UI (DM1 PRO only).

P12.6.1	***Web UI protocol status***				**ID 2915**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for web server communication.				
P12.6.2	***Web UI fault response***				**ID 2916**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for web server communication.				
P12.6.3	***Web UI communication timeout***				**ID 2919**
Minimum value:	30,000 ms	**Maximum value:**	60,000 ms	**Default value:**	60,000 ms
Description:	Selects the time it waits before a communication fault occurs over the web server.				
P12.6.4①	***Web UI enable***				**ID 2921**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables web server configuration and monitoring page.				

P12.7.2					**ID 3001**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disconnected; or 1 = Connected.				
Description:	IOT connection status.				

Table 18. Ethernet communication (Cont.).

P12.7.3	***Proxy enable***				**ID 3003**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Proxy enable.				

① Parameter value can only be changed after the drive has stopped.

Table 19. System.

P13.1 - Basic settings.					
P13.1.1	***Language***				**ID 340**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = English; 1 = English; or 2 = English.				
Description:	This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available language is English only.				
P13.1.2①	***Application***				**ID 142**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Standard; 1 = Pump; 2 = Fan; or 3 = Multi-purpose.				
Description:	This parameter sets the active application if multiple applications have been loaded.				
P13.1.3①	***Parameter sets***				**ID 619**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = Reload defaults; 2 = Reload set 1; 3 = Reload set 2; 4 = Store set 1; 5 = Store set 2; 6 = Reset; or 7 = Reload defaults VM.				
Description:	This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets.				
P13.1.4	***Up to keypad***				**ID 620**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; or 1 = Yes (all parameters).				
Description:	This function uploads all existing parameter groups to the keypad.				
P13.1.5①	***Down from keypad***				**ID 621**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = All parameters; 2 = All, no motor; or 3 = Application parameters.				
Description:	This function downloads one or all parameter groups from the keypad to the drive.				

Table 19. System (Cont.).

P13.1.7	***Parameter lock PIN***				**ID 624**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The application selection can be protected against unauthorized changes with the password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.1.8	***Keypad parameter lock***				**ID 625**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text “locked” will appear on the display if you try to edit a parameter value. **Note:** This function does not prevent unauthorized editing of parameter values.				
P13.1.9	***Start-up Wizard***				**ID 626**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enabled. 1 = Disabled.				
Description:	The Start-up Wizard facilitates commissioning the DM1 PRO. If selected “Enable”, the Start-up Wizard prompts the operator for the application desired and then advances parameters through the start-up parameter list/Application Mini wizard in keypad. After completion, it allows the user to go to the main menu or default page and this parameter is set to “Disabled”. The Start-up Wizard is always enabled for the initial power up of the DM1 PRO. By setting this parameter to “Disable” without going through the Start-up Wizard, it will not cause it to be active on start-up. If user goes into Start-up Wizard after completion, or defaults drive, the Start-up Wizard will be “Enabled”.				

P13.2 - Keypad.

P13.2.4	***Timeout time***				**ID 629**
Minimum value:	1 s	**Maximum value:**	65,535 s.	**Default value:**	30 s
Description:	The timeout time setting defines the time after which the keypad display returns to the Default Page. **Note:** If the default page value is 0, the timeout time setting has no effect.				
P13.2.5	***Contrast adjust***				**ID 630**
Minimum value:	5	**Maximum value:**	18	**Default value:**	12
Description:	If the remote keypad display is not clear, you can adjust the keypad contrast with this parameter.				
P13.2.6	***Backlight time***				**ID 631**
Minimum value:	1 min.	**Maximum value:**	65,535 min.	**Default value:**	10 min.
Description:	This parameter determines how long the backlight stays on before going out.				
P13.2.7	***Fan control***				**ID 632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Continuous - fan runs continuously. 1 = Temperature - based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C (140°F). The fan receives a stop command when the heat sink temperature falls to 55°C (131°F). The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from “Continuous” to “Temperature”. 2 = Run follow - after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment.				
Description:	This function allows you to control the DM1 PRO’s cooling fan.				

Table 19. System (Cont.).

P13.4 - Version information.					
P13.4.1	***Keypad software version***				**ID 640**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Keypad firmware version.				
P13.4.2	***Motor control software version***				**ID 642**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	DSP/motor control software version.				
P13.4.3	***Application software version***				**ID 644**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	MCU/application software version.				
P13.4.4	***Software bundle version***				**ID 1714**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Software bundle version.				

P13.5 - Application information.					
P13.5.1	***Serial number***				**ID 648**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Product serial number.				
P13.5.2	***Multi-monitor set***				**ID 627**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.				
P13.5.3	***Keypad lock PIN***				**ID 75**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The keypad can be protected against unauthorized changes with the keypad lock function after keys are not pressed five minutes. When the password function is enabled, the user will be prompted to enter a password before the keypad display parameter or response to key press except up/down/left/right. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.5.4	***Drive application name***				**ID 2922**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.

① Parameter value can only be changed after the drive has stopped.

Chapter 5 - Fan control application

Introduction

The fan application builds on the features included in standard. In addition to all of the features in the standard application, the fan application provides features specific for HVAC applications and fan related protective features.

Fan application includes functions:

- Damper control;
- Fire mode;
- Smoke purge; and
- Broken belt protection.

I/O controls

"Function to terminal" (FTT) programming

The design behind programming of the digital inputs and outs of the DM1 uses "function to terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit.
- Communication wire to be shielded.

Table 20. Fan application default I/O connection.

External wiring	Terminal	Short name	Name	Default setting	Description
	1	DI1	Digital input 1	Run forward	Starts the motor in the forward direction.
	2	DI2	Digital input 2	Run reverse	Start the motor in the reverse direction.
	3	DI3	Digital input 3	External fault	Triggers a fault in the drive.
	4	DI4	Digital input 4	Fault reset	Resets active faults in the drive.
	5	CMA	DI1 to DI4 common	Grounded	Allows for sourced input.
	6	A	RS-485 signal A	—	Fieldbus communication (Modbus RTU, BACNet).
	7	B	RS-485 signal B	—	Fieldbus communication (Modbus RTU, BACNet).
Res	8	AI1+ ①	Analog input 1	0 - 10 V	Voltage speed reference (programmable to 4 mA to 20 mA).
	9	AI1-	Analog input 1 ground	—	Analog input 1 common (ground).
	10	GND	I/O signal ground	—	I/O ground for reference and control.
	11	AO1+	Analog output 1	Output frequency	Shows output frequency to motor 0 - 60 Hz (4 mA to 20 mA).
	12	GND	I/O signal ground	—	I/O ground for reference and control.
	13	10 V	10 Vdc reference output	10.3 Vdc +/- 3%	10 Vdc reference voltage.
	14	24 V	24 Vdc control output	24 Vdc In/Out	Control voltage input/output (100 mA max.).
	15	STO_com	Safe torque common	—	Safe torque Off common.
	16	STO2	Safe torque Off 2	—	Safe torque Off 2 input.
	17	STO1	Safe torque Off 1	—	Safe torque Off 1 input.
	18	R1NO	Relay 1 normally open	Run	Changes state when the drive is in the run state.
	19	R1CM	Relay 1 common		
	20	R1NC	Relay 1 normally closed		
	21	R2NO	Relay 2 normally open	Fault	Changes state when the drive is in the fault state.
	22	R2CM	Relay 2 common		

Notes:
The above wiring demonstrates a SINK configuration. It is important that CMA is wired to ground (as shown by dashed line).
If a SOURCE configuration is desired, wire 24 V to CMA and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1- to ground (as shown by dashed line). If using +10 V for AI1, terminals 9 and 10 need to be jumpered together.

① AI1+ support 10 K potentiometer.

Fan application - parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. Each parameter section within the table lists:

- Parameter code (location indication on the keypad; shows the operator the present parameter number);.
- Parameter name;
- ID (number of the parameter);

and where applicable:

- Minimum value and units;
- Maximum value and units;
- Default value and units;
- Options (when available); and
- Description of the parameter.

Table 21. Monitor.

M1 - standard.					
M1.1	***Output frequency***				**ID 1**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Output frequency (Hz).				
M1.2	***Frequency reference***				**ID 24**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Reference frequency (Hz).				
M1.3	***Motor speed***				**ID 2**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Motor output speed (rpm).				
M1.4	***Motor current***				**ID 3**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Motor output current RMS (Amps).				
M1.5	***Motor torque***				**ID 4**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor torque calculated from nameplate values and measured motor current (%).				
M1.6	***Motor power***				**ID 5**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor power calculated from nameplate values and measured motor current (%).				
M1.7	***Motor voltage***				**ID 6**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Output ac motor voltage (Vac).				
M1.8	***DC-link voltage***				**ID 7**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	DC bus voltage (Vdc).				

Table 21. Monitor (Cont.).

M1 - standard (Cont.).					
M1.9	***Unit temperature***				**ID 8**
Minimum value:	°C	**Maximum value:**	°C	**Default value:**	°C
Description:	Heat sink temperature (deg. C).				
M1.10	***Motor temperature***				**ID 9**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Motor temperature value calculated from nameplate values and measured motor current (%).				
M1.11	***Latest fault code***				**ID 28**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Last active fault code value. See fault codes for the value shown here.				
M1.12	***Instant motor power***				**ID 1686**
Minimum value:	kW	**Maximum value:**	kW	**Default value:**	kW
Description:	Instantaneous motor power (kW).				
M2 - I/O status.					
M2.1	***Analog input 1***				**ID 10**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog input 1 measured value (Vdc or Amps) selectable with dipswitch.				
M2.2	***Keypad pot voltage***				**ID 1858**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Keypad potentiometer measured value (Vdc). DM1 PRO only.				
M2.3	***Analog output***				**ID 25**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog output 1 measured value (Vdc or Amps) selectable with parameter.				
M2.4	***DI1, DI2, DI3***				**ID 12**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 1/2/3 status.				
M2.5	***DI4***				**ID 13**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 4 status.				
M2.8	***RO1, RO2***				**ID 557**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Relay output 1 and 2 status.				
M5 - PI monitor.					
M5.1	***PI setpoint***				**ID 16**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI setpoint in process units.				
M5.2	***PI feedback***				**ID 18**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI feedback level in process units.				
M5.3	***PI error value***				**ID 20**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI error in process units.				

Table 21. Monitor (Cont.).

M5.4	***PI output***				**ID 22**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	PI output.				
M5.5	***PI status***				**ID 23**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Running; or 2 = Sleep mode.				
Description:	PI status indication, indicates if drive is stopped, running in PI mode, or in PI sleep mode.				

M9 - Multi-monitoring.

M9.1	***Multi-monitoring***				**ID 30**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0, 1, 2.
Description:	Displays any three monitoring values in a single screen. The values are selectable via the keypad menu. Multi-monitor page could see three lines of monitoring values. Up and down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down.				

Table 22. Parameters .

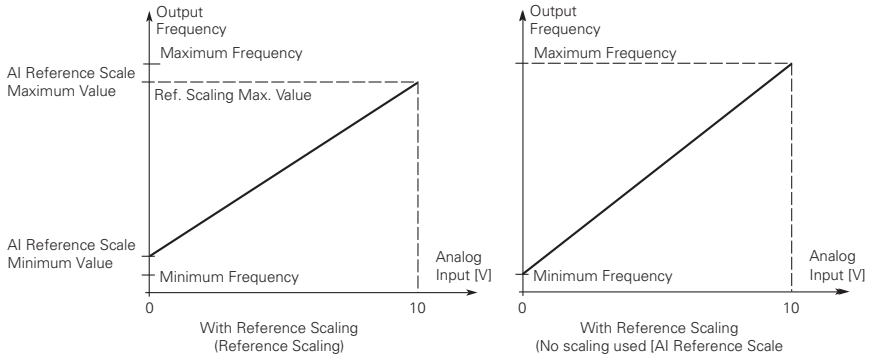
P1 - Basic parameters.					
P1.1②	***Minimum frequency***				**ID 101**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the lowest frequency at which the drive will operate. This setting will limit other frequency parameter settings. 1 = Fire mode minimum frequency. 2 = Derag. 3 = MPFC staging frequency. 4 = MPFC master fixed frequency. 5 = Prime pump frequency. 6 = Prime pump frequency 2.				
P1.2②	***Maximum frequency***				**ID 102**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MaxFreqMFG
Description:	Defines the highest frequency at which the drive will operate. This will limit other frequency parameters. 1 = Keypad reference. 3 = Motor potentiometer. 3 = Jog speed. 4 = 2nd stage ramp frequency. 5 = Fire mode minimum frequency. 6 = Derag. 7 = MPFC staging frequency. 8 = MPFC master fixed frequency. 9 = Prime pump frequency. 10 = Prime pump frequency 2. 11 = Preset speed frequency. 12 = Frequency limit value. 13 = Reference limit value. 14 = Speed control_fs2. 15 = Stall frequency limit. 16 = 4 mA fault frequency. 17 = MPFC de-staging frequency. 18 = Pipe fill loss frequency low. 19 = Pipe fill loss frequency high. 20 = Broken pipe frequency limit.				
P1.3②	***Accel. time 1***				**ID 103**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to accelerate from zero frequency to maximum frequency.				

Table 22. Parameters (Cont.)

P1.4②	***Decel. time 1***				**ID 104**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to decelerate from maximum frequency to zero frequency.				
P1.6①	***Motor nom. current***				**ID 486**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT A
Description:	Motor nameplate rated full load current. This value is found on the rating plate of the motor.				
P1.7①	***Motor nom. speed***				**ID 489**
Minimum value:	300 rpm	**Maximum value:**	20,000 rpm	**Default value:**	MotorNomSpeedMFG
Description:	Motor nameplate rated speed. This value is found on the rating plate of the motor.				
P1.8①	***Motor PF***				**ID 490**
Minimum value:	0.30	**Maximum value:**	1.00	**Default value:**	0.85
Description:	Motor nameplate rated power factor. This value is found on the rating plate of the motor.				
P1.9①	***Motor nom. voltage***				**ID 487**
Minimum value:	180 V	**Maximum value:**	690 V	**Default value:**	MotorNomVoltMFG V
Description:	Motor nameplate rated voltage. This value is found on the rating plate of the motor.				
P1.10①	***Motor nom. frequency***				**ID 488**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MotorNomFreqMFG Hz
Description:	Motor nameplate rated frequency. This value is found on the rating plate of the motor.				
P1.11②	***Local control place***				**ID 1695**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = keypad; 1 = IO terminal; or 3 = fieldbus.				
Description:	Defines the signal location for the start command in local mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.12①②	***Local reference***				**ID 136**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = AI; 1 = drive ref. pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus ref.				
Description:	Defines the signal location for the speed reference in local mode.				
P1.13②	***Remote control place***				**ID 135**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = IO terminal; 1 = fieldbus; or 3 = keypad.				
Description:	Defines the signal location for the start command in remote mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.14①②	***Remote reference***				**ID 137**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = AI; 1 = drive reference pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus reference.				
Description:	Defines the signal location for the speed reference in remote mode.				

Table 23. Inputs .

P2.1 - Basic settings.					
P2.1.1②	***AI reference scale minimum value***				**ID 144**
Minimum value:	0.00 Hz	**Maximum value:**	RefScaleMax Hz	**Default value:**	0.00 Hz
Description:	Defines the minimum frequency associated with 0% input from the analog input. Setting AI reference scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				
P2.1.2②	***AI reference scale maximim value***				**ID 145**
Minimum value:	RefScaleMin Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the maximum frequency associated with 100% input from the analog input. Setting AI reference scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				



P2.1.3①②	***IO terminal Start/Stop logic***				**ID 143**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Forward - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 1 = Start - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 2 = Start - enable: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 to enable the drive to run. 3 = Start pulse - stop pulse: used for three-wire operation, start signal 1 uses a normally open start and start signal 2 uses a normally closed stop.				
Description:	Defines the functionality for start signal 1 and start signal 2. By default, start signal 1 is DI1 and start signal 2 is DI2.				
	0 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with either a contact used on the start FWD or start REV commands. When contacts open, the motor stops.				

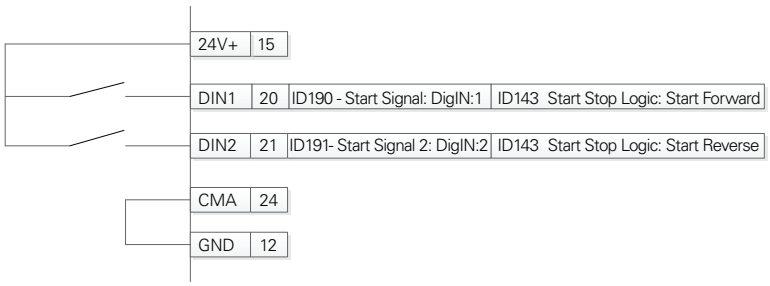
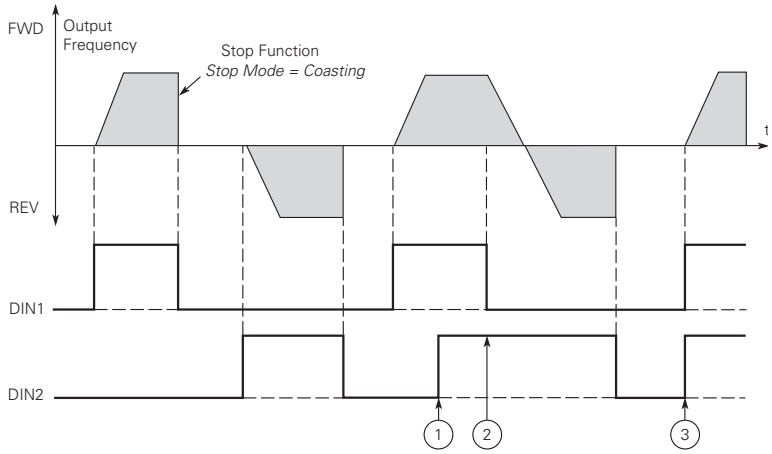
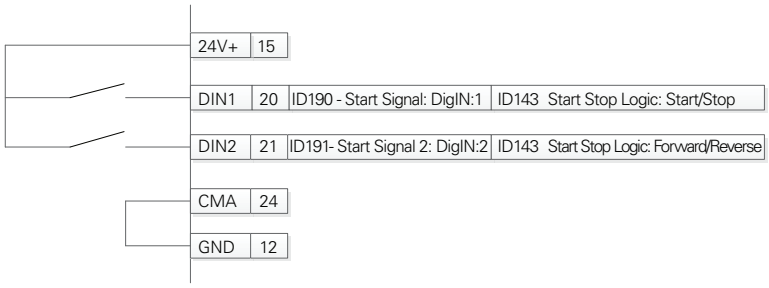


Table 23. Inputs (Cont.).



Notes: ① The first selected direction has the highest priority.
② When the DIN1 contact opens the direction of rotation starts to change.
③ If start forward (DIN1) and start reverse (DIN2) signals are active simultaneously the start forward signal (DIN1) has priority.

1 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.



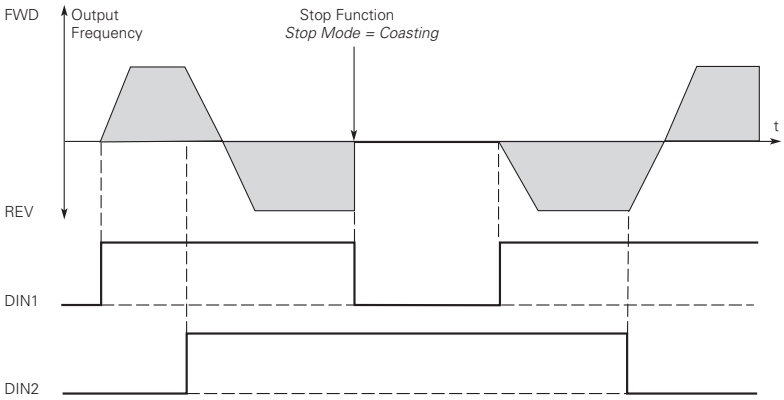
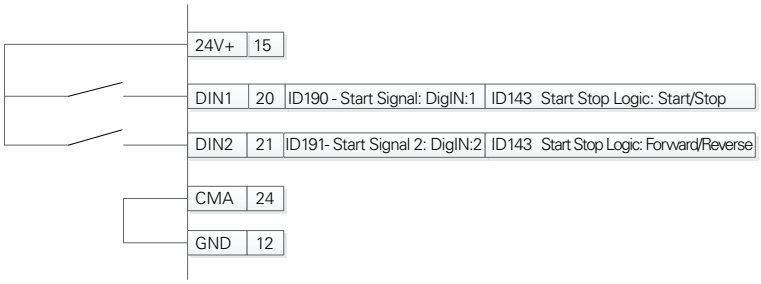
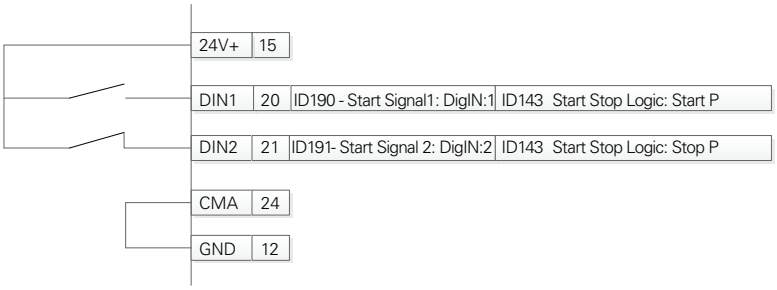


Table 23. Inputs (Cont.).

2 = P3.2: DI closed contact = start/open contact = stop P3.3: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 2 required to be closed to enable start on start signal 1.



3 = Three-wire connection (pulse control): P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 1 being the start pulse and start signal 2 being the NC stop.



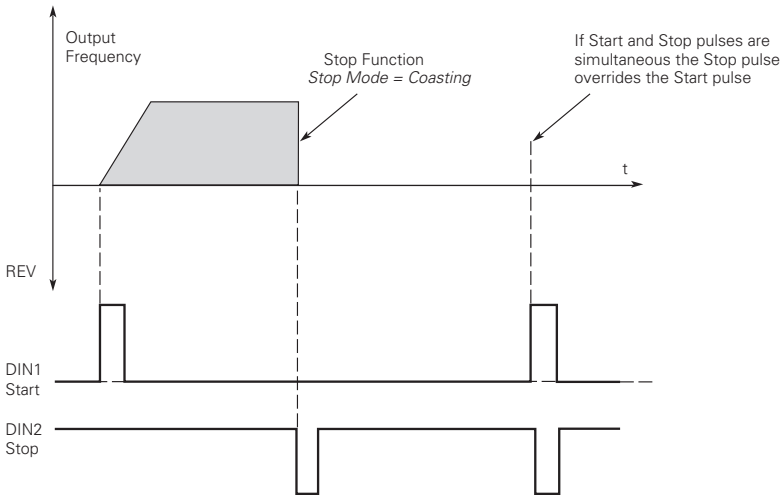


Table 23. Inputs (Cont.).

P2.2 - Digital input.					
P2.2.1②	***DI1 function***				**ID 1801**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./Decel. time set, when open, Accel./Decel. time 1 will be used. When closed, Accel./Decel. time 2 will be used. 17 = Accel./Decel. prohibit, when closed, the drive will hold the output frequncy and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed setpoint 2 is active. 24 = Motor interlock 1, when closed, motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, the fire mode will be active. 27 = Fire mode Ref. 1/2 select, when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, the preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 1.				

Table 23. Inputs (Cont.).

P2.2.3②	***DI2 function***				**ID 1803**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be intiated.				
Description:	Defines the function of digital input 2.				
P2.2.5②	***DI3 function***				**ID 1805**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Not used, no action. 1 = IO terminal start signal 1 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2 - when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse - when Start/Stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated. 7 = Fault reset - when closed, all active faults will be reset. 8 = Run enable - when closed the drive will allow a start command and be in the ready state. 9 = Preset speed B0 - the seven preset speeds are selected via three binary inputs, this is least significant bit in that binary input. 10 = Preset speed B1 - the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2 - the seven preset speeds are selected via three binary inputs, this is most significant bit in that binary input. 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used, when closed accel./decel. time 2 will be used. 19 = Remote control - when closed, the drive will be forced to the remote control place. 20 = Local control - when closed, the drive will be forced to the local control place. 22 = PI controller - when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select - when open, parameter setpoint 1 is active, when closed, setpoint 2 is active. 24 = Motor interlock 1 - when closed, motor will be enabled to run. 29 = DC brake active - when closed, DC injection braking will be active. 31 = Derag. enable - when closed. The Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 3.				

Table 23. Inputs (Cont.).

P2.2.7②	***DI4 function***				**ID 1807**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Options:	0 = Not Used, no action; 1 = IO terminal start signal 1 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 2 = IO terminal start signal 2 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 3 = Reverse - when start/stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction; 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated; 5 = Ext. fault 2 - when closed, ext. fault 2 will be activated; 6 = Ext. fault 3 - when closed, ext. fault 3 will be activated; 7 = Fault reset - when closed, all active faults will be reset; 8 = Run enable - when closed, the drive will allow a start command and be in the ready state; 9 = Preset speed B0 - the 7 preset speeds are selected via 3 binary inputs, this is least significant bit in that binary input; 10 = Preset speed B1 - the 7 preset speeds are selected via 3 binary inputs; 11 = Preset speed B2 - the 7 preset speeds are selected via 3 binary inputs, this is most significant bit in that binary input; 12 = Jog enable - when closed, the jog speed defined at P2.3.8 will override the frequency reference; 13 = Accel. pot value - when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time; 14 = Decel. pot value - when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time; 15 = Reset pot zero - when closed, the motor potentiometer value will reset to zero; 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used ; when closed accel./decel. time 2 will be used; 17 = Accel./decel. prohibit - when closed, the drive will hold the output frequency and ignore changes to the reference value; 18 = No access to parameters - when closed, no changes can be made to any setting in the drive; 19 = Remote control - when closed, the drive will be forced to the remote control place; 20 = Local control - when closed, the drive will be forced to the Local control place; 21 = Parameter 1/2 sel. - when open, parameter set 1 is active: when closed parameter set 2 is active; 22 = PI controller - when closed, the drive will force the reference source to PI controller output; 23 = PI set point select - when open, parameter set point 1 is active: when closed, set point 2 is active; 24 = Motor interlock 1 - when closed, motor will be enabled to run; 25 = Smoke mode - when closed, smoke mode will be active; 26 = Fire mode - when closed, fire mode will be active; 27 = Fire mode reference 1/2 sel. - when fire mode is active and this input is open, fire mode reference 1 will be active: when closed, fire mode reference 2 will be active; 28 = Fire mode reverse - when fire mode is active and this input is open, direction will be forward: when closed, reverse; 29 = DC brake active - when closed, DC injection braking will be active; 30 = Preheat active - when closed, preheat mode will be active; or 31 = Derag. enable - when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 4.				

P2.3 - Preset speed.	***Preset speed 1***				**105**
P2.3.1②	***Preset speed 1***				**ID 105**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.2②	***Preset speed 2***				**ID 106**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.3②	***Preset speed 3***				**ID 118**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	15.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.4②	***Preset speed 4***				**ID 119**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	20.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.5②	***Preset speed 5***				**ID 120**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.6②	***Preset speed 6***				**ID 121**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	30.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

Table 23. Inputs (Cont.).

P2.3.7②	***Preset speed 7***				**ID 122**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	35.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

P2.4 - AI settings.

P2.4.1	***AI mode***				**ID 222**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog input mode to current or voltage the DIP switches on control board will need to be set to the same mode as this parameter. *DM1 PRO CN5 terminals 8 and 9 for current or voltage, also need to set DIP switches SW2 2 and 3 on control board, near the RJ45 port. DIP switches SW2 2 and 3 off for voltage. Current mode, if using the +10 V supply on CN5 terminals 13 of the DM1 / DM1 Pro, it will require DIP switches SW2 2 and 3 on to complete the current loop. When doing a current loop with an external supply, the DIP switches SW2 2 off and 3 on.				

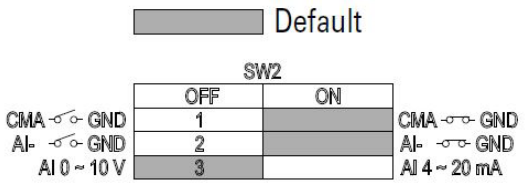
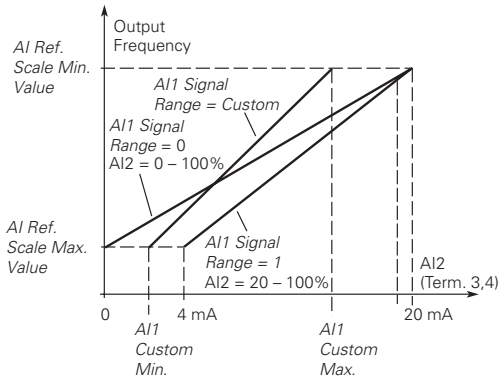


Table 23. Inputs (Cont.).

P2.4.2②	***AI signal range***				**ID 175**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0-100%/0-20 mA/0-10 V. 1 = 20-100%/4-20 mA/2-10 V.				
Description:	With this parameter, you can select the analog input 1 signal range. For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.				



① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 24. Outputs.

P3.1 - Digital output.					
P3.1.1②	***RO1 function***				**ID 152**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - drive output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controller by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active ; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - Accel/Decel time 2 is active 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 1.				

Table 24. Outputs (Cont.).

P3.1.4②	***RO2 function***				**ID 153**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - drive output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controller by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active ; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - Accel/Decel time 2 is active 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 2.				
P3.3 - Analog output.					
P3.3.1②	***AO mode***				**ID 227**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog output mode to current or voltage.				

Table 24. Outputs (Cont.).

P3.3.2②	***AO function***				**ID 146**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	1 = Output frequency (0 max frequency); 2 = Frequency reference (0 - max frequency); 3 = Motor speed RPM (0 - nameplate RPM); 4 = Motor current (0 - nameplate current); 5 = Motor torque (0 - calculated nominal); 6 = Motor power (0 - calculated nominal); 7 = Motor voltage (0 - nameplate voltage); 8 = DC bus voltage (0 - 1000 Vdc); 9 = PI setpoint (process unit minimum - process unit maximum); 10 = PI error value (process unit minimum - process unit maximum); 11 = PI output (process unit minimum - process unit maximum); 12 = Analog input (0% - 100%); 13 = Drive reference potentiometer (0% - 100%); 14 = Fieldbus process data input 1 (0% - 100%); 15 = Fieldbus process data input 2 (0% - 100%); 16 = Fieldbus process data input 3 (0% - 100%); 17 = Fieldbus process data input 4 (0% - 100%); 18 = Fieldbus process data input 5 (0% - 100%); 19 = Fieldbus process data input 6 (0% - 100%); 20 = Fieldbus process data input 7 (0% - 100%); 21 = Fieldbus process data input 8 (0% - 100%); 22 = User defined output (user defined minimum - user defined maximum); 23 = Motor torque (0% - 200%); or 24 = Motor power absolute value (0% - 100%).				
Description:	Select the function desired to the terminal AO1.				

② Parameter value will be set to be default when changing macros.

Table 25. Drive control .

P4.1 - Basic settings.					
P4.1.1②	***Keypad reference***				**ID 141**
Minimum value:	MinFreq	**Maximum value:**	MaxFreq	**Default value:**	0.00 Hz
Description:	Keypad reference value.				
P4.1.3②	***Keypad stop***				**ID 114**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Enabled - keypad operation - In this mode, the keypad stop will only operate when the control source is set to keypad. 1 = Always enabled - In this mode, the stop button will always stop the drive regardless of control mode.				
Description:	Enabled or always enabled keypad operation.				
P4.1.4①	***Reverse enabled***				**ID 1679**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables or disables the reverse motor direction.				
P4.1.5	***Change phase sequence motor***				**ID 2515**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change disable; or 1 = Change enable.				
Description:	This parameter allows for swapping the motor phase output from u, v, w to u, w, v.				

Table 25. Drive control (Cont.)

P4.1.6②	***Power up local remote select***				**ID 1685**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Hold last; 1 = Local control; or 2 = Remote control.				
Description:	Selects what control place the drive will start at after power is applied. The default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.				
P4.1.8②	***Start mode***				**ID 252**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Ramp - The drive starts from 0 Hz and ramps to the frequency reference value. 1 = Flying start from stop frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the last operating frequency as a starting point. 2 = Flying start from maximum frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the maximum operating frequency as a starting point.				
Description:	Selects the start mode operation.				
P4.1.9②	***Stop mode***				**ID 253**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Coasting - After a stop command, the motor coasts to a stop uncontrolled by the drive. 1 = Ramp - After the stop command, the speed of the motor is decelerated according to the set deceleration parameters.				
Description:	Selects the stop mode operation.				
P4.1.10②	***Ramp 1 shape***				**ID 247**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 seconds gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				

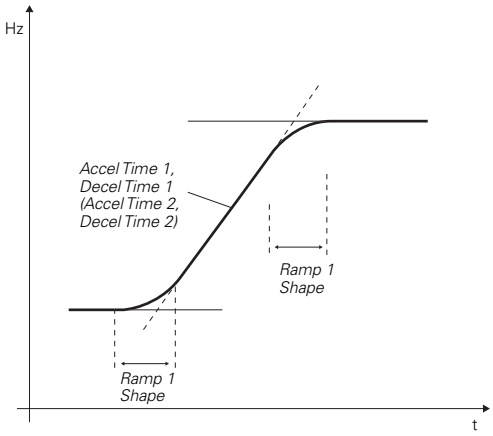
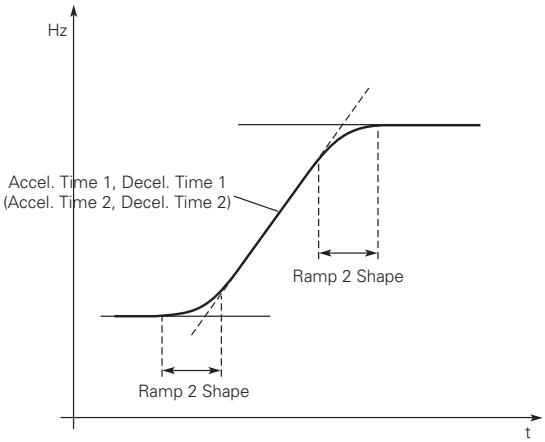


Table 25. Drive control (Cont.)

P4.1.11②	***Ramp 2 shape***				**ID 248**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				

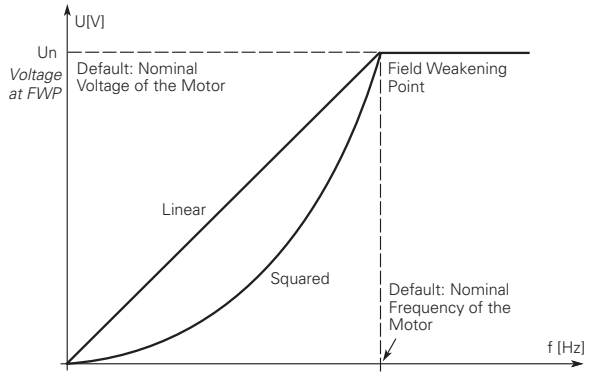


P4.1.12②	***Accel. time 2***				**ID 249**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.13②	***Decel. time 2***				**ID 250**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to decelerate from the set maximum frequency to the zero frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.14①②	***2nd Stage ramp frequency***				**ID 2444**
Minimum value:	MinFreq.	**Maximum value:**	MaxFreq.	**Default value:**	30.00 Hz
Description:	When 2nd stage ramp frequency is the frequency level at which the drive will enable the 2nd stage ramp frequency output function. This then can be used for other inputs or devices to signal a frequency level.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 26. Motor control.

P5.1 - Basic settings.					
P5.1.1①②	***Motor control mode***				**ID 287**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Frequency control - Output frequency is controlled directly by the frequency reference. 1 = Speed control - Output frequency is controlled by giving a frequency reference to it with slip compensation. 2 = Open loop vector control - Similar to the standard speed control mode, higher performance slip calculation requires running a motor identification. 3 = PM control 1 - PM motor control mode 1, used for SPM (surface mounted permanent magnet) and it also can be used for IPM. 4 = PM control 2 - PM motor control mode 2, used for IPM (internally mounted permanent magnet) and it can not be used for SPM.				
Description:	Selects the motor control mode.				
P5.1.2①	***Current limit***				**ID 107**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT*3/2 A
Description:	This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level, it goes into the current limiter controller and tries to limit the output current.				
P5.1.3①②	***V/Hz optimization***				**ID 109**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable torque boost function. 1 = Enable torque boost function.				
Description:	Automatic torque boost - the voltage to the motor increases automatically, which assists the motor to produce sufficient torque to start and run at low frequencies with high loads.				
P5.1.4①②	***V/Hz ratio***				**ID 108**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Linear - the voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied. A linear V/Hz ratio should be used in constant torque applications. 1 = Squared - the voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed. 2 = Programmable V/Hz curve - the V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint, and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. 3 = Linear with flux optimization - the drive starts to search for the minimum motor current in order to save energy. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed.				
Description:	Selects the V/Hz ratio. 0 = Linear; 1 = Squared; 2 = Programmable; or 3 = Linear + flux optimization.				



0 = Linear and 1 = Squared.

P5.1.10②	***Switching frequency***				**ID 288**
Minimum value:	MinSwitchFreq kHz	**Maximum value:**	MaxSwitchFreq kHz	**Default value:**	DefaultSwitchFreqCT kHz
Description:	Sets the switching frequency for the PWM output waveform.				

Table 26. Motor control (Cont.).

P5.1.16①②	***Identification***				**ID 299**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not action. 1 = Identification only stator resistor - does not spin the motor. This can be done with load attached. 2 = Identification with run - motor stator resistor is completed then the motor is run. This **must** be completed with unloaded motor. 3 = Identification no run - motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia - identification for the system inertia only.				
Description:	This parameter enables the drive to make an motor identification cycle of the motor once complete the drive will adjust tuning parameters to improve starting torque and open loop vector control performance. Once set and a run command is given, the operation will be active then set back to 0 when completed. When a run command is issued, the message on the keypad will indicate "Auto tuning" is being performed. If there is an issue with the motor identification, a fault message will be displayed.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 27. Protections .

P6.1 - Motor.					
P6.1.4①②	***Motor thermal protection***				**ID 310**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response. 1 = Warning. 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%.				
P6.1.5②	***Motor thermal FO current***				**ID 311**
Minimum value:	0.00%	**Maximum value:**	150.00%	**Default value:**	100.00%
Description:	The current can be set between 0 - 150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). **Note:** The value is set as a percentage of the motor nameplate data, P1.6 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive.				

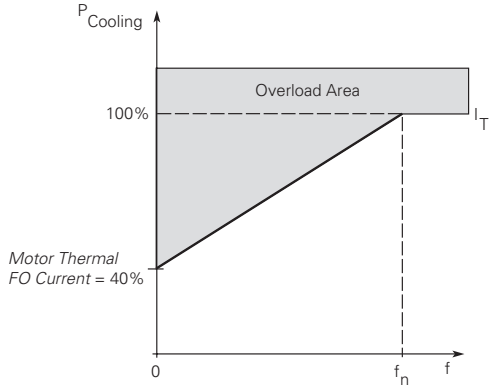


Table 27. Protections (Cont.).

P6.2.2①②	***Input phase fault***				**ID 332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; 3 = Fault, stop mode after fault always by coasting; or 4 = Single phase power limit.				
Description:	The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw.				
P6.2.3①②	***4 mA input fault***				**ID 306**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No response. 1 = Warning. 2 = Warning, the frequency from 10 seconds back is set as reference. 3 = Warning, the preset frequency P6.2.4 is set as reference. 4 = Fault, stop mode after fault according to parameter stop mode. 5 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated if the 4 - 20 mA reference signal is used and the signal falls below 4 mA for 5 seconds, or below 0.5 mA for 0.5 seconds. The information can also be programmed into relay outputs RO1 and RO2.				
P6.2.4①②	***4 mA fault frequency***				**ID 331**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	When 4 mA fault happens, the output frequency of drive goes to this preset speed when P6.2.3 = 3.				
P6.2.5①②	***External fault***				**ID 307**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs function select external fault). The status information can also be programmed into digital output relay outputs RO1 and RO2.				
P6.2.11②	***STO fault response***				**ID 2427**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No Action - drive will stop, no indication shown, no reset required, have to cycle start command. 1 = Warning - drive indicate warning/if STO clears drive will run without reset. 2 = Fault - drive will indicate fault/require reset to start again.				
Description:	STO fault response defines the function of how the STO input will be seen on the keypad and how the drive functions to it.				
P6.2.12①	***PI feedback AI loss response***				**ID 2401**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Warning: preset frequency (P6.2.13).				
Description:	This parameter defines the function of the PI feedback analog input loss response. If the AI feedback is lost based off the programed AI feedback.				
P6.2.13①②	***PI feedback AI loss pre-frequency***				**ID 2402**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	This parameter defines the frequency the master would run to if a feedback is lost and P6.2.12 was set to option 3.				
P6.2.14②	***PI feedback AI loss pipe fill***				**ID 2403**
Minimum value:	0.0 varies	**Maximum value:**	1000.0 varies	**Default value:**	0.0 varies
Description:	Detects loss of prime in the pump based off the measured level. If the value drops below this level for the time in P6.2.15 and below, the frequency in P6.2.13 “loss of prime” occurs.				

Table 27. Protections (Cont.).

P6.2.15②	***PI feedback AI loss pre-frequency timeout***				**ID 2404**
Minimum value:	0 s	**Maximum value:**	6,000 s	**Default value:**	0 s
Description:	PI feedback AI loss pre-frequency timeout - when P6.2.12 is set to 3 or 4, when the feedback signal is lost, the drive will run at the frequency in P6.2.15 for the time set here. After this time, the drive will fault out on "feedback loss". The time is disabled when set to 0 seconds.				

P6.3 - Communications.

P6.3.1①②	***Fieldbus fault response***				**ID 334**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.				
P6.3.2①②	***OPTcard fault response***				**ID 335**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for a board slot fault caused by a missing or failed option board not communicating to the central processor.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 28. PI Controller.

P7.1 - Basic settings.					
P7.1.1②	***PI control itime***				**ID 1294**
Minimum value:	0.00%	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Defines the gain of the PI Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100%, a change of 10% in the error value causes the controller output to change 10%.				
P7.1.2②	***PI control gain***				**ID 1295**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	1.00 s
Description:	Defines the integration time of the PI controller. Over the time, the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec., a change of 10% in the error value causes the controller output to change by 10.00%/s.				

Table 28. PI Controller (Cont.).

P7.1.3①②	***PI process unit***				**ID 1297**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = %; 1 = 1/min.; 2 = rpm; 3 = ppm; 4 = pps; 5 = l/s; 6 = l/min.; 7 = l/h; 8 = kg/s; 9 = kg/min.; 10 = kg/h; 11 = m3/s; 12 = m3/min.; 13 = m3/h; 14 = m/s; 15 = mbar; 16 = bar; 17 = Pa; 18 = kPa; 19 = mVS; 20 = kW; 21 = Deg. C; 22 = GPM; 23 = gal/s; 24 = gal/min.; 25 = gal/h; 26 = lb/s; 27 = lb/min.; 28 = lb/h; 29 = CFM; 30 = ft^3/s; 31 = ft^3/min.; 32 = ft^3/h; 33 = ft/s; 34 = in. wg; 35 = ft wg; 36 = PSI; 37 = lb/in.2; 38 = HP; 39 = Deg. F; 40 = PA; 41 = WC; 42 = HG; 43 = ft; 44 = m;				
Description:	Defines the unit type for PI feedback unit.				
P7.1.4②	***PI process unit minimum***				**ID 1298**
Minimum value:	-99999.99 varies	**Maximum value:**	PID1_ProcessUnitMax varies	**Default value:**	0.00 varies
Description:	Defines the minimum process unit value.				
P7.1.5②	***PI process unit maximum***				**ID 1300**
Minimum value:	PID1_ProcessUnitMin	**Maximum value:**	99999.99 varies	**Default value:**	100.00 varies
Description:	Defines the maximum process unit value.				
P7.1.6①②	***PI error inversion***				**ID 1303**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal - if feedback is less than set-point, PI controller output increases. 1 = Inverted - if feedback is less than set-point, PI controller output decreases.				
Description:	Defines the way the process value output reacts to the feedback signal.				

Table 28. PI Controller (Cont.).

P7.1.7②	***PI dead band***				**ID 1304**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0 varies
Description:	PI dead band around setpoint in process units. This is the band where no actions occur to prevent oscillation or repeated activation/ deactivation of controller. The PI output is locked if the feedback stays within the dead band area.				
P7.1.8②	***PI dead band delay***				**ID 1306**
Minimum value:	0.00 s	**Maximum value:**	320.00 s	**Default value:**	0.00 s
Description:	If the PI process value goes out of the dead band area for the desired time delay, at that point the controller will re-initialize and try to level out again.				
P7.1.9②	***PI ramp time***				**ID 1311**
Minimum value:	0.00 s	**Maximum value:**	300.00 s	**Default value:**	0.00 s
Description:	Defines the rising and falling ramp times for changes in the process value.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 29. Setpoint .

P7.2.1 - Standard.					
P7.2.1.1②	***PI keypad setpoint 1***				**ID 1307**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 1.				
P7.2.1.2②	***PI keypad setpoint 2***				**ID 1309**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 2.				
P7.2.1.3②	***PI wake-up action***				**ID 2466**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Wake-up when below wake-up level. 1 = Wake-up when above wake-up-level. 2 = Wake-up when below wake-up level % from PI setpoint. 3 = Wake-up when above wake-up level %from PI setpoint.				
Description:	This parameter defines the wake-up function action.				

P7.2.2 - Setpoint 1.

P7.2.2.1①②	***PI setpoint 1 source***				**ID 1312**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				

Table 29. Setpoint (Cont.).

P7.2.2.2①②	***PI setpoint 1 sleep enable***				**ID 1315**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				
P7.2.2.3②	***PI setpoint 1 sleep delay***				**ID 1317**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.2.4②	***PI setpoint 1 wake-up level***				**ID 1318**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.2.5②	***PI setpoint 1 boost***				**ID 1320**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.2.6②	***PI setpoint 1 sleep level***				**ID 2450**
Minimum value:	Min Freq	**Maximum value:**	Max Freq	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.2.7②	***SP1 sleep mode over cycle time***				**ID 1842**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.2.8②	***SP1 sleep mode maximum cycle time***				**ID 1843**
Minimum value:	0	**Maximum value:**	3,600	**Default value:**	0
Description:	Defines the maximum time for sleep over cycle checking.				

P7.2.3 - Setpoint 2.

P7.2.3.1①②	***PI setpoint 2 source***				**ID 1321**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = Fieldbus process data input 1; 6 = Fieldbus process data input 2; 7 = Fieldbus process data input 3; 8 = Fieldbus process data input 4; 9 = Fieldbus process data input 5; 10 = Fieldbus process data input 6; 11 = Fieldbus process data input 7; 12 = Fieldbus process data input 8; 13 = Fieldbus PI setpoint 1; or 14 = Fieldbus PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				

Table 29. Setpoint (Cont.).

P7.2.3.2①②	***PI setpoint 2 sleep enable***				**ID 1324**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				
P7.2.3.3②	***PI setpoint 2 sleep delay***				**ID 1326**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.3.4②	***PI setpoint 2 wake-up level***				**ID 1327**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.3.5②	***PI setpoint 2 boost***				**ID 1329**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.3.6②	***PI setpoint 2 sleep level***				**ID 2452**
Minimum value:	Min Freq	**Maximum value:**	Max Freq	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.3.7②	***SP2 sleep mode over cycle time***				**ID 1844**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.3.8②	***SP2 sleep mode maximum cycle time***				**ID 1845**
Minimum value:	0	**Maximum value:**	3,600	**Default value:**	0
Description:	Defines the maximum time for sleep over cycle checking.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 30. Feedback.

P7.3.1 - Standard.					
P7.3.1.1②	***PI feedback gain***				**ID 1331**
Minimum value:	-1,000.00%	**Maximum value:**	1,000.00%	**Default value:**	100.00%
Description:	Defines gain associated with the feedback signal from the measuring device.				

Table 30. Feedback (Cont.).

P7.3.2 - Feedback 1.					
P7.3.2.1①②	***PI feedback 1 source***				**ID 1332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used; 1 = AI; 2 = Drive reference pot; 3 = Fieldbus process data input 1; 4 = Fieldbus process data input 2; 5 = Fieldbus process data input 3; 6 = Fieldbus process data input 4; 7 = Fieldbus process data input 5; 8 = Fieldbus process data input 6; 9 = Fieldbus process data input 7; 10 = Fieldbus process data input 8; or 11 = Fieldbus PI feedback.				
Description:	Defines where feedback signal is being fed into the drive, via analog or fieldbus data value.				
P7.3.2.2②	***PI feedback 1 minimum***				**ID 1333**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	0.00%
Description:	Minimum unit value for the feedback signal.				
P7.3.2.3②	***PI feedback 1 maximim***				**ID 1334**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Maximim unit value for the feedback signal.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 31. HVAC parameters.

P8.1 - Damper (*DM1 PRO).					
P8.1.1①②	***Damper start***				**ID 483**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal; 1 = Damper start; 2 = Damper tout; or 3 = Damper delay.				
Description:	This parameter determines the function of th damper.				
P8.1.2①②	***Damper time out***				**ID 484**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The time out time used for an interlocked time start, after which the start sequence must be restarted if no acknowledgement contact is received.				
P8.1.3①②	***Damper delay***				**ID 485**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The delay time following a delay start, after which the frequency converter will be started.				

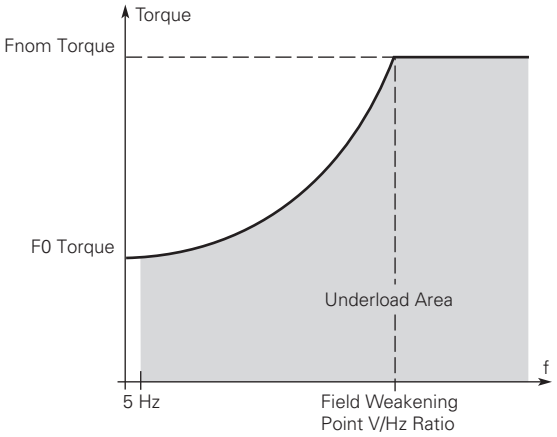
P8.2 - Fire mode (*DM1 PRO).					
P8.2.1①②	***Fire mode protection***				**ID 535**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Closing contact initiates fire mode function. 1 = Opening contact initiates fire mode function.				
Description:	This parameter determines whether the fire mode function is determined by a contact closure or contact opening on the desired digital input function select fire mode. **Note:** When fire mode is enabled, this causes the drive to ignore any fault and run till its death. Warranty will be non-valid in the case this is enabled and the drive causes issues to the system.				

Table 31. HVAC parameters (Cont.).

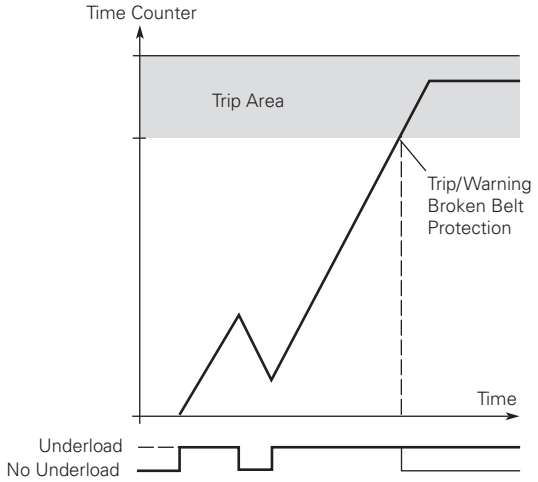
P8.2.2①②	***Fire mode reference select function***				**ID 536**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Fire mode minimum frequency; 1 = Fire mode reference; 2 = Fieldbus reference - reference from fieldbus process in; 3 = AI; or 4 = PI1 control - follows the PI control algorithm settings.				
Description:	This parameter allows for setting the reference location for when the fire mode is enabled.				
P8.2.3②	***Fire mode minimum frequency***				**ID 537**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	15.00 Hz
Description:	This parameter sets the minimum output frequency for fire mode. This can be used as a selection for reference command.				
P8.2.4②	***Fire mode frequency reference 1***				**ID 565**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	75.00%
Description:	This parameter sets the drive operating percentage based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2) for fire mode reference 1.				
P8.2.5②	***Fire mode frequency reference 2***				**ID 564**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	100.00%
Description:	This parameter sets the drive operating percentage based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2) for fire mode reference 2.				
P8.2.6	***Fire mode test enable***				**ID 2443**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This parameter allows for testing the fire mode feature. With the parameter set to enable and fire mode input enabled, the drive will run at the fire mode speed desired but all faults are enabled.				
P8.2.7①②	***Smoke purge frequency***				**ID 554**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	50.00%
Description:	Frequency setting for smoke purge. Preset speed used for a digital input selection. The percentage is based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2).				
P8.3 - Protections (*DM1 PRO).					
P8.3.1①②	***Broken belt protection***				**ID 317**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit, the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero.				

Table 31. HVAC parameters (Cont.).

P8.3.2②	***Broken belt Fnom torque***				**ID 318**
Minimum value:	10.00%	**Maximum value:**	150.00%	**Default value:**	50.00%
Description:	The torque limit can be set between 10.0-150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. If you change P1.6, nominal motor current, this parameter is automatically restored to the default value.				



P8.3.3②	***Broken belt F0 torque***				**ID 319**
Minimum value:	5.00%	**Maximum value:**	150.00%	**Default value:**	10.00%
Description:	The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed at zero frequency. If you change the value of P1.6, nominal motor current, this parameter is automatically restored to the default value.				
P8.3.4②	***Broken belt time limit***				**ID 320**
Minimum value:	2.00 s	**Maximum value:**	600.00 s	**Default value:**	20.00 s
Description:	This time can be set between 2.00 and 600.00 seconds. This is the time allowed for an fault state to exist. An internal up/down counter counts the accumulated underload time. If the underload counter value goes above this limit, the protection will cause a trip according to protection parameter. If the drive is stopped, the counter is reset to zero.				



Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 32. Serial communication.

P11.1 - Basic settings.					
P11.1.1①	***Serial communication***				**ID 586**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Modbus RTU; 1 = BACnet MS/TP (DM1 PRO); or 2 = SWD (DM1 PRO).				
Description:	This parameter defines the communication protocol for RS-485.				
P11.2 - Modbus RTU.					
P11.2.1①	***Slave address***				**ID 587**
Minimum value:	1	**Maximum value:**	247	**Default value:**	1
Description:	This parameter defines the slave address for RS-485 communication.				
P11.2.2①	***Baud rate***				**ID 584**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 57,600; or 4 = 115,200				
Description:	This parameter defines communication speed for RS-485 communication.				
P11.2.3①	***Parity type***				**ID 585**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = None; 1 = Odd; or 2 = Even.				
Description:	This parameter defines parity type for RS-485 communication.				
P11.2.4	***Modbus RTU protocol status***				**ID 588**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Initial; 1 = Stopped; 2 = Operational; or 3 = Faulted.				
Description:	This parameter shows the protocol status for RS-485 communication.				
P11.2.5	***Communication timeout modbus RTU***				**ID 593**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over modbus RTU if a message is not received.				
P11.2.6	***Modbus RTU fault response***				**ID 2516**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 - Only in fieldbus control mode. When fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications; if not in fieldbus control, place will not fault. 1 - In all control modes. No matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus RTU communication.				
P11.3 - BACnet RTU MSTP.					
P11.3.1①	***MSTP baud rate***				**ID 594**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 76,800; or 4 = 115,200.				
Description:	This parameter defines the communication speed for RS-485 communication.				

Table 32. Serial communication (Cont.).

P11.3.2①	***MSTP device address***				**ID 595**
Minimum value:	0	**Maximum value:**	127	**Default value:**	1
Description:	Defines the device address of the drive on the BACnet MSTP network.				
P11.3.3①	***MSTP instance number***				**ID 596**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Defines the instance number of the drive on the BACnet MSTP network.				
P11.3.4	***MSTP communication timeout***				**ID 598**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over BACnet MSTP if a message is not received.				
P11.3.5	***MSTP protocol status***				**ID 599**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.6	***MSTP fault code***				**ID 600**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = None; 1 = Sole master; 2 = Duplicate MAC ID; or 3 = Baud rate fault.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.7	***MSTP fault response***				**ID 2526**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet MSTP communication.				
P11.3.8	***MSTP maximum master***				**ID 1537**
Minimum value:	1	**Maximum value:**	127	**Default value:**	127
Description:	Defines the maximum number of masters that can establish connections with the drive.				

P11.5 - SWD.

P11.5.1	***Parameter access***				**ID 2630**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = No permission to read/write on acyclic channel. 1 = Acyclic read/write are allowed on Profibus.				
Description:	PNU927 which specifies the operation priority of parameters for acyclic communication.				
P11.5.2①	***Parameter data access***				**ID 2631**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Local control; 1 = Fieldbus; 2 = Mixed interface; 4 = NET, local on fault; or 5 = Dual mode.				
Description:	PNU928 which specifies the control priority of the device for cyclic communication.				

Table 32. Serial communication (Cont.).

P11.5.3	***Fault situation counter***				**ID 2632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	PNU952 which specifies the fault situation counter. Only write of 0 is allowed, then the whole fault buffer (actual fault situation and all other fault situations) and the fault message counter (parameter 944) are erased.				
P11.5.4	***Board status***				**ID 2609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Description:	Status of the board. B0-DCOM communication fault. B1-Board HW fault B2-IO1 24 volt overload fault. B3-Profibus communication fault. B4-fieldbus fault.				
P11.5.5	***Firmware version***				**ID 2610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	This parameter provides the firmware version of the SWD.				
P11.5.6	***Protocol status***				**ID 2612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not configured; 1 = Operational; or 2 = Diagnostics.				
Description:	This parameter specifies the protocol status for SWD card.				

P11.6 - Bluetooth.

P11.6.1	***Bluetooth enabled***				**ID 1895**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Bluetooth enabled.				
P11.6.2②	***Bluetooth broadcast mode***				**ID 2920**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Off; or 1 = On.				
Description:	Bluetooth broadcast mode.				
P11.6.3	***Bluetooth pairing reset***				**ID 2935**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Not reset; or 1 = Reset.				
Description:	Bluetooth pairing reset.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 33. Ethernet communication.

P12.1 - Basic settings.					
P12.1.1①	***IP address mode***				**ID 1500**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Static IP; or 1 = DHCP with AutoIP.				
Description:	This parameter defined the IP address configuration mode for EIP/modbus TCP.				

Table 33. Ethernet communication (Cont.).

P12.1.2	***Active IP address***				**ID 1507**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active IP address.				
P12.1.3	***Active subnet mask***				**ID 1509**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active subnet mask.				
P12.1.4	***Active default gateway***				**ID 1511**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active default gateway.				
P12.1.5	***MAC address***				**ID 1513**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current MAC address.				
P12.1.6①	***Static IP address***				**ID 1501**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.254
Description:	Defines the static IP address.				
P12.1.7①	***Static subnet mask***				**ID 1503**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	255.255.255.0
Description:	Defines the static subnet mask.				
P12.1.8①	***Static default gateway***				**ID 1505**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.1
Description:	Defines the static default gateway.				
P12.1.9	***Ethernet communication timeout***				**ID 611**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time it waits before a communication fault occurs over ethernet.				

P12.2 - Trusted IP filter (DM1 PRO only).

P12.2.1	***Trusted IP white list***				**ID 68**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0 0.0.0.0 192.168.1.254
Description:	Defines the IP addresses in the white list. A setting of 192.168.1.255 enables all connections on the local subnet.				
P12.2.2	***Trusted IP filter enable***				**ID 76**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables IP white listing. Devices not in the white list will not be able to establish communications with the drive.				

P12.3 - Modbus TCP (DM1 PRO only).

P12.3.1①	***Modbus TCP enable***				**ID 1942**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	Enables modbus TCP communications, must be enabled to connect to Power Xpert inControl.				
P12.3.2	***Modbus TCP connection limit***				**ID 609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Description:	Maximum number of connections allowed to the drive.				

Table 33. Ethernet communication (Cont.).

P12.3.3	***Modbus TCP unit identifier number***				**ID 610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Description:	Unit identifier unit value for modbus TCP.				
P12.3.4	***Modbus TCP protocol status***				**ID 612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for modbus TCP communication.				
P12.3.5	***Modbus TCP fault response***				**ID 2517**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus TCP communication.				

P12.4 - Ethernet IP (DM1 PRO only).

P12.4.1①	***Ethernet based protocol select***				**ID 1997**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 2 = BACnet IP.				
Description:	Selects the active communication protocol on the ethernet I/P port.				
P12.4.2	***Ethernet IP protocol status***				**ID 608**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	Indicates if ethernet protocol is active or not.				
P12.4.3	***Ethernet IP fault response***				**ID 2518**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for ethernet IP communication.				

Table 33. Ethernet communication (Cont.).

P12.5 - BACnet IP (DM1 PRO only).					
P12.5.1①	***BACnet IP UDP port number***				**ID 1733**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Defines the BACnet UDP port number.				
P12.5.2①	***BACnet IP foreign devise***				**ID 1734**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables BACNET IP foreign device configuration.				
P12.5.3①	***BACnet IP BBMD IP***				**ID 1735**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0
Description:	Displays the BACnet BBMD IP address.				
P12.5.4①	***BACnet IP UDP port***				**ID 1737**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Displays the BACnet BBMD UDP port number.				
P12.5.5①	***BACnet IP registration interval***				**ID 1738**
Minimum value:	0	**Maximum value:**	65,535	**Default value:**	10
Description:	Defines the registration interval.				
P12.5.6	***BACnet IP communication timeout***				**ID 1739**
Minimum value:	0	**Maximum value:**	60,000	**Default value:**	0
Description:	Selects the time it waits before a communication fault occurs over BACnet IP.				

Table 33. Ethernet communication (Cont.).

P12.5.7	***BACnet IP protocol status***				**ID 1740**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet IP communication.				
P12.5.8	***BACnet IP fault behavior***				**ID 1741**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet IP communication.				
P12.5.9[1]	***BACnet IP instance number***				**ID 1742**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Displays the BACnet instance number.				

P12.6 - Web UI (DM1 PRO only).

P12.6.1	***Web UI protocol status***				**ID 2915**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for web server communication.				
P12.6.2	***Web UI fault response***				**ID 2916**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for web server communication.				
P12.6.3	***Web UI communication timeout***				**ID 2919**
Minimum value:	30,000 ms	**Maximum value:**	60,000 ms	**Default value:**	60,000 ms
Description:	Selects the time it waits before a communication fault occurs over the web server.				
P12.6.4[1]	***Web UI enable***				**ID 2921**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables web server configuration and monitoring page.				

[1] Parameter value can only be changed after the drive has stopped.

Table 34. System.

P13.1.1	***Language***				**ID 340**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = English; 1 = English; or 2 = English.				
Description:	This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available language is English only.				

Table 34. System (Cont.).

P13.1.2①	***Application***				**ID 142**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Standard;; 1 = Pump; 2 = Fan; or 3 = Multi-purpose.				
Description:	This parameter sets the active application if multiple applications have been loaded.				
P13.1.3①	***Parameter sets***				**ID 619**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = Reload defaults; 2 = Reload set 1; 3 = Reload set 2; 4 = Store set 1; 5 = Store set 2; 6 = Reset; or 7 = Reload defaults VM.				
Description:	This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets.				
P13.1.4	***Up to keypad***				**ID 620**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; or 1 = Yes (all parameters).				
Description:	This function uploads all existing parameter groups to the keypad.				
P13.1.5①	***Down from keypad***				**ID 621**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = All parameters; 2 = All, no motor; or 3 = Application parameters.				
Description:	This function downloads one or all parameter groups from the keypad to the drive.				

P13.1.7	***Parameter lock PIN***				**ID 624**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The application selection can be protected against unauthorized changes with the password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.1.8	***Keypad parameter lock***				**ID 625**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text “locked” will appear on the display if you try to edit a parameter value. **Note:** This function does not prevent unauthorized editing of parameter values.				

Table 34. System (Cont.).

P13.1.9	***Start-up Wizard***				**ID 626**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enabled. 1 = Disabled.				
Description:	The Start-up Wizard facilitates commissioning the DM1 PRO. If selected "Enable", the Start-up Wizard prompts the operator for the application desired and then advances parameters through the start-up parameter list/Application Mini wizard in keypad. After completion, it allows the user to go to the main menu or default page and this parameter is set to "Disabled". The Start-up Wizard is always enabled for the initial power up of the DM1 PRO. By setting this parameter to "Disable" without going through the Start-up Wizard, it will not cause it to be active on start-up. If user goes into Start-up Wizard after completion, or defaults drive, the Start-up Wizard will be "Enabled".				

P13.2 - Keypad.

P13.2.4	***Timeout time***				**ID 629**
Minimum value:	1 s	**Maximum value:**	65,535 s.	**Default value:**	30 s
Description:	The timeout time setting defines the time after which the keypad display returns to the Default Page. **Note:** If the default page value is 0, the timeout time setting has no effect.				
P13.2.5	***Contrast adjust***				**ID 630**
Minimum value:	5	**Maximum value:**	18	**Default value:**	12
Description:	If the remote keypad display is not clear, you can adjust the keypad contrast with this parameter.				
P13.2.6	***Backlight time***				**ID 631**
Minimum value:	1 min.	**Maximum value:**	65,535 min.	**Default value:**	10 min.
Description:	This parameter determines how long the backlight stays on before going out.				
P13.2.7	***Fan control***				**ID 632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Continuous - fan runs continuously. 1 = Temperature - based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C (140°F). The fan receives a stop command when the heat sink temperature falls to 55°C (131°F). The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from "Continuous" to "Temperature". 2 = Run follow - after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment.				
Description:	This function allows you to control the DM1 PRO's cooling fan.				

P13.4 - Version information.

P13.4.1	***Keypad software version***				**ID 640**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Keypad firmware version.				
P13.4.2	***Motor control software version***				**ID 642**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	DSP/motor control software version.				
P13.4.3	***Application software version***				**ID 644**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	MCU/application software version.				
P13.4.4	***Software bundle version***				**ID 1714**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Software bundle version.				

Table 34. System (Cont.).

P13.5 - Application information.					
P13.5.1	***Serial number***				**ID 648**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Product serial number.				
P13.5.2	***Multi-monitor set***				**ID 627**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.				
P13.5.3	***Keypad lock PIN***				**ID 75**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The keypad can be protected against unauthorized changes with the keypad lock function after keys are not pressed five minutes. When the password function is enabled, the user will be prompted to enter a password before the keypad display parameter or response to key press except up/down/left/right. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.5.4	***Drive application name***				**ID 2922**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Drive application name.				

① Parameter value can only be changed after the drive has stopped.

Chapter 6 - Pump control application

Introduction

The pump application builds on the features included in standard. In addition to all of the features in the standard application, the pump application provides features specific for pumping applications and pump related protective features.

Fan application includes functions:

- Pump derag mode;
- Valve control;
- Backspin control;
- Minimum run time;
- Separate minimum frequency ramp time;
- Multi-pump control;
- Pipe fill mode;
- Loss of prime detection; and
- Broken pipe detection.

I/O controls

"Function to terminal" (FTT) programming

The design behind programming of the digital inputs and outs of the DM1 uses "function to terminal" programming. It is composed of a terminal, be it a relay output or a digital output, that is assigned a parameter. Within that parameter, it has different functions that can be set.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit.
- Communication wire to be shielded.

Table 35. Multi-Pump application default I/O connection.

External wiring	Terminal	Short name	Name	Default setting	Description
	1	DI1	Digital input 1	Run forward	Starts the motor in the forward direction.
	2	DI2	Digital input 2	Run reverse	Start the motor in the reverse direction.
	3	DI3	Digital input 3	External fault	Triggers a fault in the drive.
	4	DI4	Digital input 4	Fault reset	Resets active faults in the drive.
	5	CMA	DI1 to DI4 common	Grounded	Allows for sourced input.
	6	A	RS-485 signal A	—	Fieldbus communication (Modbus RTU, BACNet).
	7	B	RS-485 signal B	—	Fieldbus communication (Modbus RTU, BACNet).
Res	8	AI1+ ①	Analog input 1	0 - 10 V	Voltage speed reference (programmable to 4 mA to 20 mA).
	9	AI1-	Analog input 1 ground	—	Analog input 1 common (ground).
	10	GND	I/O signal ground	—	I/O ground for reference and control.
	11	AO1+	Analog output 1	Output frequency	Shows output frequency to motor 0 - 60 Hz (4 mA to 20 mA).
	12	GND	I/O signal ground	—	I/O ground for reference and control.
	13	10 V	10 Vdc reference output	10.3 Vdc +/- 3%	10 Vdc reference voltage.
	14	24 V	24 Vdc control output	24 Vdc In/Out	Control voltage input/output (100 mA max.).
	15	STO_com	Safe torque common	—	Safe torque Off common.
	16	STO2	Safe torque Off 2	—	Safe torque Off 2 input.
	17	STO1	Safe torque Off 1	—	Safe torque Off 1 input.
	18	R1NO	Relay 1 normally open	Run	Changes state when the drive is in the run state.
	19	R1CM	Relay 1 common		
	20	R1NC	Relay 1 normally closed		
	21	R2NO	Relay 2 normally open	Fault	Changes state when the drive is in the fault state.
	22	R2CM	Relay 2 common		

Notes:
The above wiring demonstrates a SINK configuration. It is important that CMA is wired to ground (as shown by dashed line).
If a SOURCE configuration is desired, wire 24 V to CMA and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1- to ground (as shown by dashed line). If using +10 V for AI1, terminals 9 and 10 need to be jumpered together.

① AI1+ support 10 K potentiometer.

Pump application - parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. Each parameter section within the table lists:

- Parameter code (location indication on the keypad; shows the operator the present parameter number);.
- Parameter name;
- ID (number of the parameter);

and where applicable:

- Minimum value and units;
- Maximum value and units;
- Default value and units;
- Options (when available); and
- Description of the parameter.

Table 36. Monitor.

M1 - standard.					
M1.1	***Output frequency***				**ID 1**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Output frequency (Hz).				
M1.2	***Frequency reference***				**ID 24**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Reference frequency (Hz).				
M1.3	***Motor speed***				**ID 2**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Motor output speed (rpm).				
M1.4	***Motor current***				**ID 3**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Motor output current RMS (Amps).				
M1.5	***Motor torque***				**ID 4**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor torque calculated from nameplate values and measured motor current (%).				
M1.6	***Motor power***				**ID 5**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor power calculated from nameplate values and measured motor current (%).				
M1.7	***Motor voltage***				**ID 6**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Output ac motor voltage (Vac).				
M1.8	***DC-link voltage***				**ID 7**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	DC bus voltage (Vdc).				

Table 36. Monitor (Cont.).

M1.9	***Unit temperature***				**ID 8**
Minimum value:	°C	**Maximum value:**	°C	**Default value:**	°C
Description:	Heat sink temperature (deg. C).				
M1 - standard (Cont.).					
M1.10	***Motor temperature***				**ID 9**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Motor temperature value calculated from nameplate values and measured motor current (%).				
M1.11	***Latest fault code***				**ID 28**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Last active fault code value. See fault codes for the value shown here.				
M1.12	***Instant motor power***				**ID 1686**
Minimum value:	kW	**Maximum value:**	kW	**Default value:**	kW
Description:	Instantaneous motor power (kW).				

M2 - I/O status.

M2.1	***Analog input 1***				**ID 10**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog input 1 measured value (Vdc or Amps) selectable with dipswitch.				
M2.2	***Keypad pot voltage***				**ID 1858**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Keypad potentiometer measured value (Vdc). DM1 PRO only.				
M2.3	***Analog output***				**ID 25**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog output 1 measured value (Vdc or Amps) selectable with parameter.				
M2.4	***DI1, DI2, DI3***				**ID 12**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 1/2/3 status.				
M2.5	***DI4***				**ID 13**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 4 status.				
M2.8	***RO1, RO2***				**ID 557**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Relay output 1 and 2 status.				

M5 - PI monitor.

M5.1	***PI setpoint***				**ID 16**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI setpoint in process units.				
M5.2	***PI feedback***				**ID 18**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI feedback level in process units.				
M5.3	***PI error value***				**ID 20**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI error in process units.				

Table 36. Monitor (Cont.).

M5.4	***PI output***				**ID 22**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	PI output.				
M5.5	***PI status***				**ID 23**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Running; or 2 = Sleep mode.				
Description:	PI status indication, indicates if drive is stopped, running in PI mode, or in PI sleep mode.				

Table 37. Multi-pump status.

M7.1 - Operation mode.					
M7.1.1	***Drive 1***				**ID 2218**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; or 2 = Master drive.				
Description:	Provides the operating mode of drive 1 while using multi-pump mode.				
M7.1.2	***Drive 2***				**ID 2230**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; or 2 = Master drive.				
Description:	Provides the operating mode of drive 2 while using multi-pump mode.				
M7.1.3	***Drive 3***				**ID 2242**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; or 2 = Master drive.				
Description:	Provides the operating mode of drive 3 while using multi-pump mode.				
M7.1.4	***Drive 4***				**ID 2254**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; or 2 = Master drive.				
Description:	Provides the operating mode of drive 4 while using multi-pump mode.				
M7.1.5	***Drive 5***				**ID 2266**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; or 2 = Master drive.				
Description:	Provides the operating mode of drive 5 while using multi-pump mode.				

Table 37. Multi-pump status (Cont.).

M7.2 - Multi-pump status.					
M7.2.1	***Drive 1***				**ID 2219**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 1 while using the multi-pump mode.				
M7.2.2	***Drive 2***				**ID 2231**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 2 while using the multi-pump mode.				
M7.2.3	***Drive 3***				**ID 2243**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 3 while using the multi-pump mode.				
M7.2.4	***Drive 4***				**ID 2255**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 4 while using the multi-pump mode.				
M7.2.5	***Drive 5***				**ID 2267**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 5 while using the multi-pump mode.				

M7.3 - Network status.					
M7.3.1	***Drive 1***				**ID 2220**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 1 while using the multi-pump mode.				

Table 37. Multi-pump status (Cont.).

M7.3.2	***Drive 2***				**ID 2232**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 2 while using the multi-pump mode.				
M7.3.3	***Drive 3***				**ID 2244**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 3 while using the multi-pump mode.				
M7.3.4	***Drive 4***				**ID 2256**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 4 while using the multi-pump mode.				
M7.3.5	***Drive 5***				**ID 2268**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 5 while using the multi-pump mode.				

Table 38. Multi-pump measurement.

M8.1 - Latest fault code.					
M8.1.1	***Drive 1***				**ID 2221**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 1 while using the multi-pump mode.				
M8.1.2	***Drive 2***				**ID 2233**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 2 while using the multi-pump mode.				
M8.1.3	***Drive 3***				**ID 2245**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 3 while using the multi-pump mode.				
M8.1.4	***Drive 4***				**ID 2257**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 4 while using the multi-pump mode.				
M8.1.5	***Drive 5***				**ID 2269**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 5 while using the multi-pump mode.				

Table 38. Multi-pump measurement (Cont.).

M8.2 - Output frequency.					
M8.2.1	***Drive 1***				**ID 2222**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 1 while using the multi-pump mode.				
M8.2.2	***Drive 2***				**ID 2234**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 2 while using the multi-pump mode.				
M8.2.3	***Drive 3***				**ID 2246**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 3 while using the multi-pump mode.				
M8.2.4	***Drive 4***				**ID 2258**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 4 while using the multi-pump mode.				
M8.2.5	***Drive 5***				**ID 2270**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 5 while using the multi-pump mode.				

M8.3 - Motor voltage.					
M8.3.1	***Drive 1***				**ID 2223**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 1 while using the multi-pump mode.				
M8.3.2	***Drive 2***				**ID 2235**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 2 while using the multi-pump mode.				
M8.3.3	***Drive 3***				**ID 2247**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 3 while using the multi-pump mode.				
M8.3.4	***Drive 4***				**ID 2259**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 4 while using the multi-pump mode.				
M8.3.5	***Drive 5***				**ID 2271**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 5 while using the multi-pump mode.				

M8.4 - Motor current.					
M8.4.1	***Drive 1***				**ID 2224**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 1 while using the multi-pump mode.				
M8.4.2	***Drive 2***				**ID 2236**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 2 while using the multi-pump mode.				
M8.4.3	***Drive 3***				**ID 2248**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 3 while using the multi-pump mode.				

Table 38. Multi-pump measurement (Cont.).

M8.4.4	***Drive 4***				**ID 2260**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 4 while using the multi-pump mode.				
M8.4.5	***Drive 5***				**ID 2272**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 5 while using the multi-pump mode.				

M8.5 - Motor torque.

M8.5.1	***Drive 1***				**ID 2225**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 1 while using the multi-pump mode.				
M8.5.2	***Drive 2***				**ID 2237**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 2 while using the multi-pump mode.				
M8.5.3	***Drive 3***				**ID 2249**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 3 while using the multi-pump mode.				
M8.5.4	***Drive 4***				**ID 2261**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 4 while using the multi-pump mode.				
M8.5.5	***Drive 5***				**ID 2273**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 5 while using the multi-pump mode.				

M8.6 - Motor power.

M8.6.1	***Drive 1***				**ID 2226**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 1 while using the multi-pump mode.				
M8.6.2	***Drive 2***				**ID 2238**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 2 while using the multi-pump mode.				
M8.6.3	***Drive 3***				**ID 2250**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 3 while using the multi-pump mode.				
M8.6.4	***Drive 4***				**ID 2262**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 4 while using the multi-pump mode.				
M8.6.5	***Drive 5***				**ID 2274**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 5 while using the multi-pump mode.				

M8.7 - Motor speed.

M8.7.1	***Drive 1***				**ID 2227**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 1 while using the multi-pump mode.				

Table 38. Multi-pump measurement (Cont.).

M8.7.2	***Drive 2***				**ID 2239**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 2 while using the multi-pump mode.				
M8.7.3	***Drive 3***				**ID 2251**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 3 while using the multi-pump mode.				
M8.7.4	***Drive 4***				**ID 2263**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 4 while using the multi-pump mode.				
M8.7.5	***Drive 5***				**ID 2275**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 5 while using the multi-pump mode.				

M8.8 - Run time.

M8.8.1	***Drive 1***				**ID 2228**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 1 while using the multi-pump mode.				
M8.8.2	***Drive 2***				**ID 2240**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 2 while using the multi-pump mode.				
M8.8.3	***Drive 3***				**ID 2252**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 3 while using the multi-pump mode.				
M8.8.4	***Drive 4***				**ID 2264**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 4 while using the multi-pump mode.				
M8.8.5	***Drive 5***				**ID 2276**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 5 while using the multi-pump mode.				

M9 - Multi-monitoring.					
M9.1	***Multi-monitoring***				**ID 30**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0, 1, 2.
Description:	Displays any three monitoring values in a single screen. The values are selectable via the keypad menu. Multi-monitor page could see three lines of monitoring values. Up and down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down.				

Table 39. Parameters.

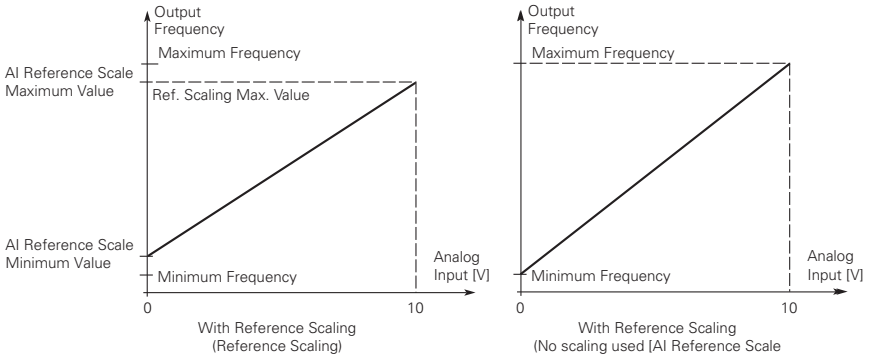
P1 - Basic parameters.					
P1.1②	***Minimum frequency***				**ID 101**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the lowest frequency at which the drive will operate. This setting will limit other frequency parameter settings. 1 = Fire mode minimum frequency. 2 = Derag. 3 = MPFC staging frequency. 4 = MPFC master fixed frequency. 5 = Prime pump frequency. 6 = Prime pump frequency 2.				
P1.2②	***Maximum frequency***				**ID 102**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MaxFreqMFG
Description:	Defines the highest frequency at which the drive will operate. This will limit other frequency parameters. 1 = Keypad reference. 2 = Motor potentiometer. 3 = Jog speed. 4 = 2nd stage ramp frequency. 5 = Fire mode minimum frequency. 6 = Derag. 7 = MPFC staging frequency. 8 = MPFC master fixed frequency. 9 = Prime pump frequency. 10 = Prime pump frequency 2. 11 = Preset speed frequency. 12 = Frequency limit value. 13 = Reference limit value. 14 = Speed control_fs2. 15 = Stall frequency limit. 16 = 4 mA fault frequency. 17 = MPFC de-staging frequency. 18 = Pipe fill loss frequency low. 19 = Pipe fill loss frequency high. 20 = Broken pipe frequency limit.				
P1.3②	***Accel. time 1***				**ID 103**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to accelerate from zero frequency to maximum frequency.				
P1.4②	***Decel. time 1***				**ID 104**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to decelerate from maximum frequency to zero frequency.				
P1.6①	***Motor nom. current***				**ID 486**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT A
Description:	Motor nameplate rated full load current. This value is found on the rating plate of the motor.				
P1.7①	***Motor nom. speed***				**ID 489**
Minimum value:	300 rpm	**Maximum value:**	20,000 rpm	**Default value:**	MotorNomSpeedMFG
Description:	Motor nameplate rated speed. This value is found on the rating plate of the motor.				
P1.8①	***Motor PF***				**ID 490**
Minimum value:	0.30	**Maximum value:**	1.00	**Default value:**	0.85
Description:	Motor nameplate rated power factor. This value is found on the rating plate of the motor.				
P1.9①	***Motor nom. voltage***				**ID 487**
Minimum value:	180 V	**Maximum value:**	690 V	**Default value:**	MotorNomVoltMFG V
Description:	Motor nameplate rated voltage. This value is found on the rating plate of the motor.				
P1.10①	***Motor nom. frequency***				**ID 488**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MotorNomFreqMFG Hz
Description:	Motor nameplate rated frequency. This value is found on the rating plate of the motor.				

Table 39. Parameters (Cont.).

P1.11②	***Local control place***				**ID 1695**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = keypad; 1 = IO terminal; or 3 = fieldbus.				
Description:	Defines the signal location for the start command in local mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.12①②	***Local reference***				**ID 136**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = AI; 1 = drive ref. pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus ref.				
Description:	Defines the signal location for the speed reference in local mode.				
P1.13②	***Remote control place***				**ID 135**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = IO terminal; 1 = fieldbus; or 3 = keypad.				
Description:	Defines the signal location for the start command in remote mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.14①②	***Remote reference***				**ID 137**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = AI; 1 = drive reference pot; 4 = maximum frequency; 6 = keypad; or 7 = fieldbus reference.				
Description:	Defines the signal location for the speed reference in remote mode.				

Table 40. Inputs.

P2.1 - Basic settings.					
P2.1.1②	***AI reference scale minimum value***				**ID 144**
Minimum value:	0.00 Hz	**Maximum value:**	RefScaleMax Hz	**Default value:**	0.00 Hz
Description:	Defines the minimum frequency associated with 0% input from the analog input. Setting AI reference scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				
P2.1.2②	***AI reference scale maximim value***				**ID 145**
Minimum value:	RefScaleMin Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the maximum frequency associated with 100% input from the analog input. Setting AI reference scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				



P2.1.3①②	***IO terminal Start/Stop logic***				**ID 143**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Forward - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 1 = Start - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 2 = Start - enable: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 to enable the drive to run. 3 = Start pulse - stop pulse: used for three-wire operation, start signal 1 uses a normally open start and start signal 2 uses a normally closed stop.				
Description:	Defines the functionality for start signal 1 and start signal 2. By default, start signal 1 is DI1 and start signal 2 is DI2.				
	0 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with either a contact used on the start FWD or start REV commands. When contacts open, the motor stops.				

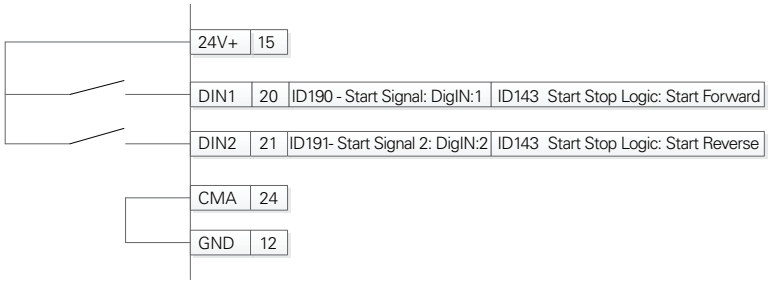
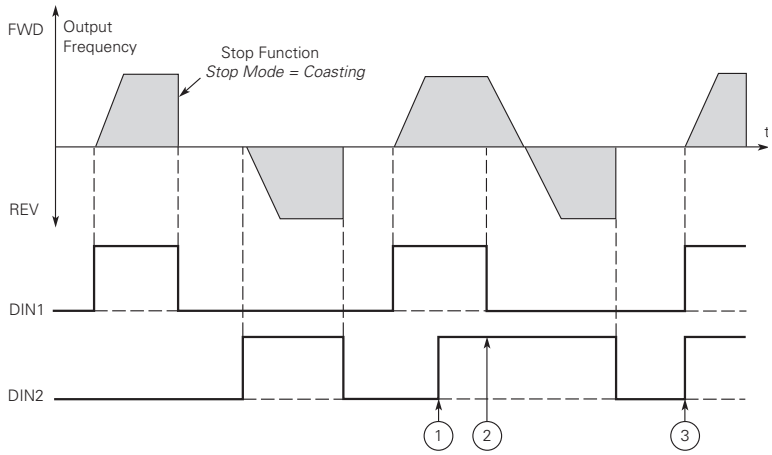
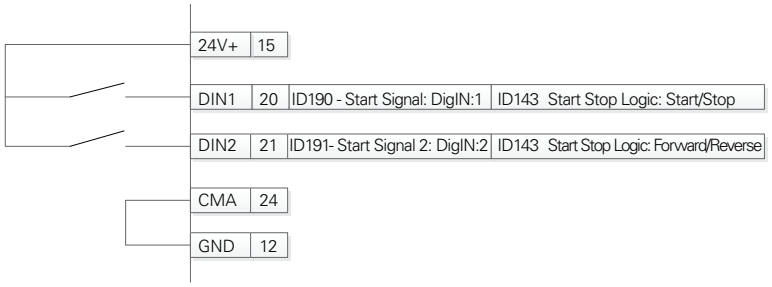


Table 40. Inputs (Cont.).



Notes: ① The first selected direction has the highest priority.
② When the DIN1 contact opens the direction of rotation starts to change.
③ If start forward (DIN1) and start reverse (DIN2) signals are active simultaneously the start forward signal (DIN1) has priority.

1 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.



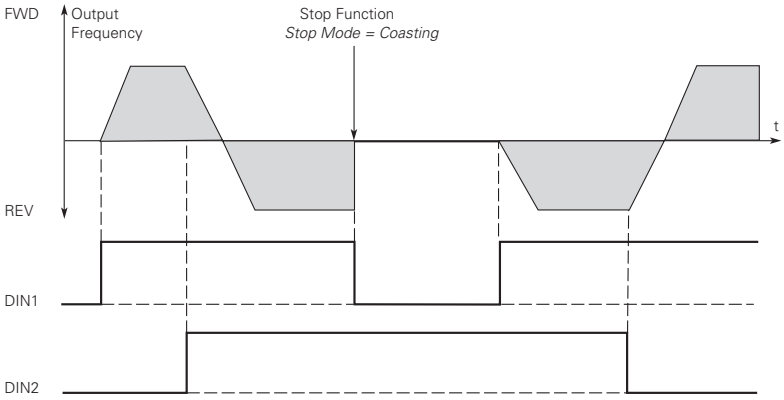
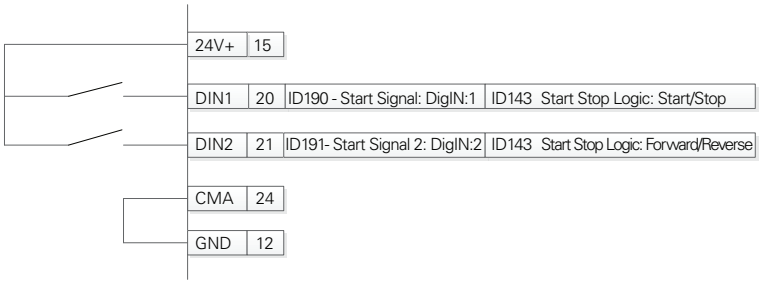
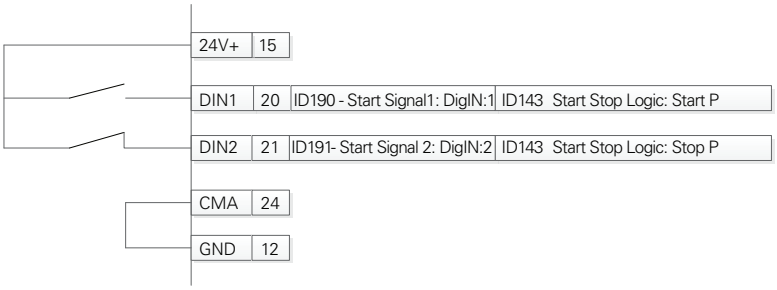


Table 40. Inputs (Cont.).

2 = P3.2: DI closed contact = start/open contact = stop P3.3: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 2 required to be closed to enable start on start signal 1.



3 = Three-wire connection (pulse control): P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 1 being the start pulse and start signal 2 being the NC stop.



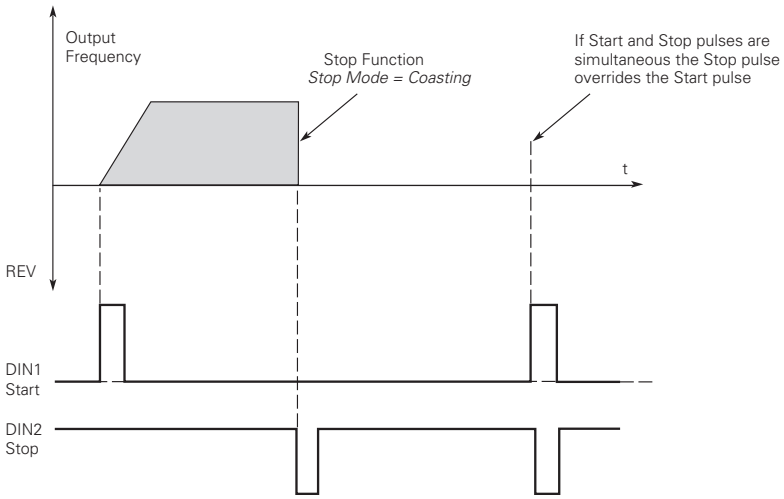


Table 40. Inputs (Cont.).

P2.2 - Digital input.					
P2.2.1②	***DI1 function***				**ID 1801**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not Used, no action; 1 = IO terminal start signal 1 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 2 = IO terminal start signal 2 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 3 = Reverse - when start/stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction; 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated; 5 = Ext. fault 2 - when closed, ext. fault 2 will be activated; 6 = Ext. fault 3 - when closed, ext. fault 3 will be activated; 7 = Fault reset - when closed, all active faults will be reset; 8 = Run enable - when closed, the drive will allow a start command and be in the ready state; 9 = Preset speed B0 - the 7 preset speeds are selected via 3 binary inputs, this is least significant bit in that binary input; 10 = Preset speed B1 - the 7 preset speeds are selected via 3 binary inputs; 11 = Preset speed B2 - the 7 preset speeds are selected via 3 binary inputs, this is most significant bit in that binary input; 12 = Jog enable - when closed, the jog speed defined at P2.3.8 will override the frequency reference; 13 = Accel. pot value - when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time; 14 = Decel. pot value - when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time; 15 = Reset pot zero - when closed, the motor potentiometer value will reset to zero; 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used ; when closed accel./decel. time 2 will be used; 17 = Accel./decel. prohibit - when closed, the drive will hold the output frequency and ignore changes to the reference value; 18 = No access to parameters - when closed, no changes can be made to any setting in the drive; 19 = Remote control - when closed, the drive will be forced to the remote control place; 20 = Local control - when closed, the drive will be forced to the Local control place; 21 = Parameter 1/2 sel. - when open, parameter set 1 is active: when closed parameter set 2 is active; 22 = PI controller - when closed, the drive will force the reference source to PI controller output; 23 = PI set point select - when open, parameter set point 1 is active: when closed, set point 2 is active; 24 = Motor interlock 1 - when closed, motor will be enabled to run; 25 = Smoke mode - when closed, smoke mode will be active; 26 = Fire mode - when closed, fire mode will be active; 27 = Fire mode reference 1/2 sel. - when fire mode is active and this input is open, fire mode reference 1 will be active: when closed, fire mode reference 2 will be active; 28 = Fire mode reverse - when fire mode is active and this input is open, direction will be forward: when closed, reverse; 29 = DC brake active - when closed, DC injection braking will be active; 30 = Preheat active - when closed, preheat mode will be active; or 31 = Derag. enable - when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 1.				

Table 40. Inputs (Cont.).

P2.2.3②	***DI2 function***				**ID 1803**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not Used, no action; 1 = IO terminal start signal 1 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 2 = IO terminal start signal 2 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 3 = Reverse - when start/stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction; 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated; 5 = Ext. fault 2 - when closed, ext. fault 2 will be activated; 6 = Ext. fault 3 - when closed, ext. fault 3 will be activated; 7 = Fault reset - when closed, all active faults will be reset; 8 = Run enable - when closed, the drive will allow a start command and be in the ready state; 9 = Preset speed B0 - the 7 preset speeds are selected via 3 binary inputs, this is least significant bit in that binary input; 10 = Preset speed B1 - the 7 preset speeds are selected via 3 binary inputs; 11 = Preset speed B2 - the 7 preset speeds are selected via 3 binary inputs, this is most significant bit in that binary input; 12 = Jog enable - when closed, the jog speed defined at P2.3.8 will override the frequency reference; 13 = Accel. pot value - when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time; 14 = Decel. pot value - when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time; 15 = Reset pot zero - when closed, the motor potentiometer value will reset to zero; 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used ; when closed accel./decel. time 2 will be used; 17 = Accel./decel. prohibit - when closed, the drive will hold the output frequency and ignore changes to the reference value; 18 = No access to parameters - when closed, no changes can be made to any setting in the drive; 19 = Remote control - when closed, the drive will be forced to the remote control place; 20 = Local control - when closed, the drive will be forced to the Local control place; 21 = Parameter 1/2 sel. - when open, parameter set 1 is active: when closed parameter set 2 is active; 22 = PI controller - when closed, the drive will force the reference source to PI controller output; 23 = PI set point select - when open, parameter set point 1 is active: when closed, set point 2 is active; 24 = Motor interlock 1 - when closed, motor will be enabled to run; 25 = Smoke mode - when closed, smoke mode will be active; 26 = Fire mode - when closed, fire mode will be active; 27 = Fire mode reference 1/2 sel. - when fire mode is active and this input is open, fire mode reference 1 will be active: when closed, fire mode reference 2 will be active; 28 = Fire mode reverse - when fire mode is active and this input is open, direction will be forward: when closed, reverse; 29 = DC brake active - when closed, DC injection braking will be active; 30 = Preheat active - when closed, preheat mode will be active; or 31 = Derag. enable - when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 2.				

Table 40. Inputs (Cont.).

P2.2.5②	***DI3 function***				**ID 1805**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Not Used, no action; 1 = IO terminal start signal 1 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 2 = IO terminal start signal 2 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 3 = Reverse - when start/stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction; 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated; 5 = Ext. fault 2 - when closed, ext. fault 2 will be activated; 6 = Ext. fault 3 - when closed, ext. fault 3 will be activated; 7 = Fault reset - when closed, all active faults will be reset; 8 = Run enable - when closed, the drive will allow a start command and be in the ready state; 9 = Preset speed B0 - the 7 preset speeds are selected via 3 binary inputs, this is least significant bit in that binary input; 10 = Preset speed B1 - the 7 preset speeds are selected via 3 binary inputs; 11 = Preset speed B2 - the 7 preset speeds are selected via 3 binary inputs, this is most significant bit in that binary input; 12 = Jog enable - when closed, the jog speed defined at P2.3.8 will override the frequency reference; 13 = Accel. pot value - when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time; 14 = Decel. pot value - when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time; 15 = Reset pot zero - when closed, the motor potentiometer value will reset to zero; 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used ; when closed accel./decel. time 2 will be used; 17 = Accel./decel. prohibit - when closed, the drive will hold the output frequency and ignore changes to the reference value; 18 = No access to parameters - when closed, no changes can be made to any setting in the drive; 19 = Remote control - when closed, the drive will be forced to the remote control place; 20 = Local control - when closed, the drive will be forced to the Local control place; 21 = Parameter 1/2 sel. - when open, parameter set 1 is active: when closed parameter set 2 is active; 22 = PI controller - when closed, the drive will force the reference source to PI controller output; 23 = PI set point select - when open, parameter set point 1 is active: when closed, set point 2 is active; 24 = Motor interlock 1 - when closed, motor will be enabled to run; 25 = Smoke mode - when closed, smoke mode will be active; 26 = Fire mode - when closed, fire mode will be active; 27 = Fire mode reference 1/2 sel. - when fire mode is active and this input is open, fire mode reference 1 will be active: when closed, fire mode reference 2 will be active; 28 = Fire mode reverse - when fire mode is active and this input is open, direction will be forward: when closed, reverse; 29 = DC brake active - when closed, DC injection braking will be active; 30 = Preheat active - when closed, preheat mode will be active; or 31 = Derag. enable - when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 3.				

Table 40. Inputs (Cont.).

P2.2.7②	***DI4 function***				**ID 1807**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Options:	0 = Not Used, no action; 1 = IO terminal start signal 1 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 2 = IO terminal start signal 2 - when the control source is set to IO terminal this input when closed will perform the action defined by P2.1.3; 3 = Reverse - when start/stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction; 4 = Ext. fault 1 - when closed, ext. fault 1 will be activated; 5 = Ext. fault 2 - when closed, ext. fault 2 will be activated; 6 = Ext. fault 3 - when closed, ext. fault 3 will be activated; 7 = Fault reset - when closed, all active faults will be reset; 8 = Run enable - when closed, the drive will allow a start command and be in the ready state; 9 = Preset speed B0 - the 7 preset speeds are selected via 3 binary inputs, this is least significant bit in that binary input; 10 = Preset speed B1 - the 7 preset speeds are selected via 3 binary inputs; 11 = Preset speed B2 - the 7 preset speeds are selected via 3 binary inputs, this is most significant bit in that binary input; 12 = Jog enable - when closed, the jog speed defined at P2.3.8 will override the frequency reference; 13 = Accel. pot value - when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time; 14 = Decel. pot value - when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time; 15 = Reset pot zero - when closed, the motor potentiometer value will reset to zero; 16 = Accel./decel. time set - when open, accel./decel. time 1 will be used ; when closed accel./decel. time 2 will be used; 17 = Accel./decel. prohibit - when closed, the drive will hold the output frequency and ignore changes to the reference value; 18 = No access to parameters - when closed, no changes can be made to any setting in the drive; 19 = Remote control - when closed, the drive will be forced to the remote control place; 20 = Local control - when closed, the drive will be forced to the Local control place; 21 = Parameter 1/2 sel. - when open, parameter set 1 is active: when closed parameter set 2 is active; 22 = PI controller - when closed, the drive will force the reference source to PI controller output; 23 = PI set point select - when open, parameter set point 1 is active: when closed, set point 2 is active; 24 = Motor interlock 1 - when closed, motor will be enabled to run; 25 = Smoke mode - when closed, smoke mode will be active; 26 = Fire mode - when closed, fire mode will be active; 27 = Fire mode reference 1/2 sel. - when fire mode is active and this input is open, fire mode reference 1 will be active: when closed, fire mode reference 2 will be active; 28 = Fire mode reverse - when fire mode is active and this input is open, direction will be forward: when closed, reverse; 29 = DC brake active - when closed, DC injection braking will be active; 30 = Preheat active - when closed, preheat mode will be active; or 31 = Derag. enable - when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 4.				

P2.3 - Preset speed.	***Preset speed 1***				**105**
P2.3.1②	***Preset speed 1***				**ID 105**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.2②	***Preset speed 2***				**ID 106**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	10.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.3②	***Preset speed 3***				**ID 118**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	15.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.4②	***Preset speed 4***				**ID 119**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	20.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.5②	***Preset speed 5***				**ID 120**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.6②	***Preset speed 6***				**ID 121**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	30.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

Table 40. Inputs (Cont.).

P2.3.7②	***Preset speed 7***				**ID 122**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	35.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

P2.4 - AI settings.

P2.4.1	***AI mode***				**ID 222**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog input mode to current or voltage the DIP switches on control board will need to be set to the same mode as this parameter. *DM1 PRO CN5 terminals 8 and 9 for current or voltage, also need to set DIP switches SW2 2 and 3 on control board, near the RJ45 port. DIP switches SW2 2 and 3 off for voltage. Current mode, if using the +10 V supply on CN5 terminals 13 of the DM1 / DM1 Pro, it will require DIP switches SW2 2 and 3 on to complete the current loop. When doing a current loop with an external supply, the DIP switches SW2 2 off and 3 on.				

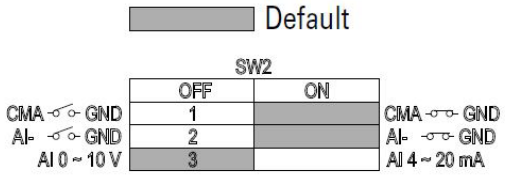
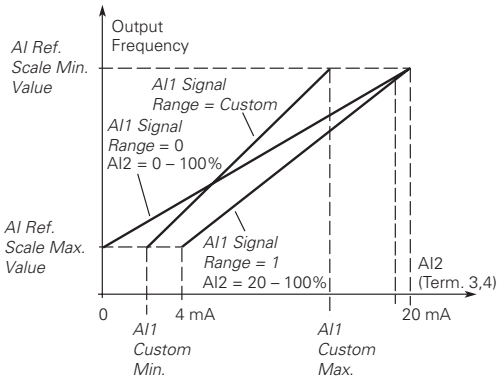


Table 40. Inputs (Cont.).

P2.4.2②	***AI signal range***				**ID 175**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0-100%/0-20 mA/0-10 V. 1 = 20-100%/4-20 mA/2-10 V.				
Description:	With this parameter, you can select the analog input 1 signal range. For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.				



① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 41. Outputs .

P3.1 - Digital output.					
P3.1.1②	***RO1 function***				**ID 152**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - drive output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controller by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active ; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - Accel/Decel time 2 is active 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 1.				

Table 41. Outputs (Cont.).

P3.1.4②	***RO2 function***				**ID 153**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - drive output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controller by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active ; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - Accel/Decel time 2 is active 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 2.				
P3.3 - Analog output.					
P3.3.1②	***AO mode***				**ID 227**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog output mode to current or voltage.				

Table 41. Outputs (Cont.).

P3.3.2②	***AO function***				**ID 146**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	1 = Output frequency (0 -max frequency); 2 = Frequency reference (0 - max frequency); 3 = Motor speed RPM (0 - nameplate RPM); 4 = Motor current (0 - nameplate current); 5 = Motor torque (0 - calculated nominal); 6 = Motor power (0 - calculated nominal); 7 = Motor voltage (0 - nameplate voltage); 8 = DC bus voltage (0 - 1000 Vdc); 9 = PI setpoint (process unit minimum - process unit maximum); 10 = PI error value (process unit minimum - process unit maximum); 11 = PI output (process unit minimum - process unit maximum); 12 = Analog input (0% - 100%); 13 = Drive reference potentiometer (0% - 100%); 14 = Fieldbus process data input 1 (0% - 100%); 15 = Fieldbus process data input 2 (0% - 100%); 16 = Fieldbus process data input 3 (0% - 100%); 17 = Fieldbus process data input 4 (0% - 100%); 18 = Fieldbus process data input 5 (0% - 100%); 19 = Fieldbus process data input 6 (0% - 100%); 20 = Fieldbus process data input 7 (0% - 100%); 21 = Fieldbus process data input 8 (0% - 100%); 22 = User defined output (user defined minimum - user defined maximum); 23 = Motor torque (0% - 200%); or 24 = Motor power absolute value (0% - 100%).				
Description:	Select the function desired to the terminal AO1.				

② Parameter value will be set to be default when changing macros.

Table 42. Drive control .

P4.1 - Basic settings.					
P4.1.1②	***Keypad reference***				**ID 141**
Minimum value:	MinFreq	**Maximum value:**	MaxFreq	**Default value:**	0.00 Hz
Description:	Keypad reference value.				
P4.1.3②	***Keypad stop***				**ID 114**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Enabled - keypad operation - In this mode, the keypad stop will only operate when the control source is set to keypad. 1 = Always enabled - In this mode, the stop button will always stop the drive regardless of control mode.				
Description:	Enabled or always enabled keypad operation.				
P4.1.4①	***Reverse enabled***				**ID 1679**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables or disables the reverse motor direction.				
P4.1.5	***Change phase sequence motor***				**ID 2515**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change disable; or 1 = Change enable.				
Description:	This parameter allows for swapping the motor phase output from u, v, w to u, w, v.				

Table 42. Drive control (Cont.).

P4.1.6②	***Power up local remote select***				**ID 1685**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Hold last; 1 = Local control; or 2 = Remote control.				
Description:	Selects what control place the drive will start at after power is applied. The default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.				
P4.1.8②	***Start mode***				**ID 252**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Ramp - The drive starts from 0 Hz and ramps to the frequency reference value. 1 = Flying start from stop frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the last operating frequency as a starting point. 2 = Flying start from maximum frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the maximum operating frequency as a starting point.				
Description:	Selects the start mode operation.				
P4.1.9②	***Stop mode***				**ID 253**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Coasting - After a stop command, the motor coasts to a stop uncontrolled by the drive. 1 = Ramp - After the stop command, the speed of the motor is decelerated according to the set deceleration parameters.				
Description:	Selects the stop mode operation.				
P4.1.10②	***Ramp 1 shape***				**ID 247**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 seconds gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				

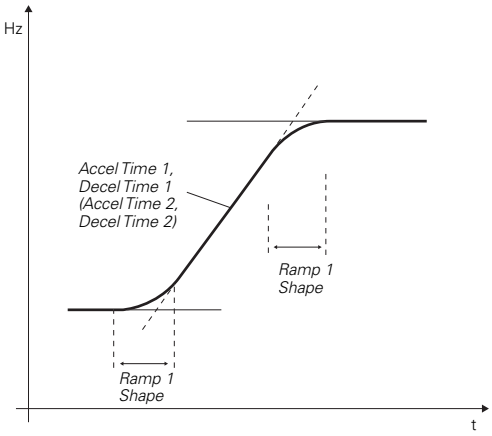
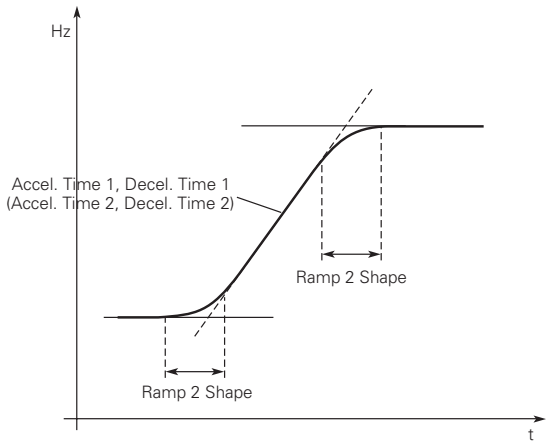


Table 42. Drive control (Cont.).

P4.1.11②	***Ramp 2 shape***				**ID 248**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				

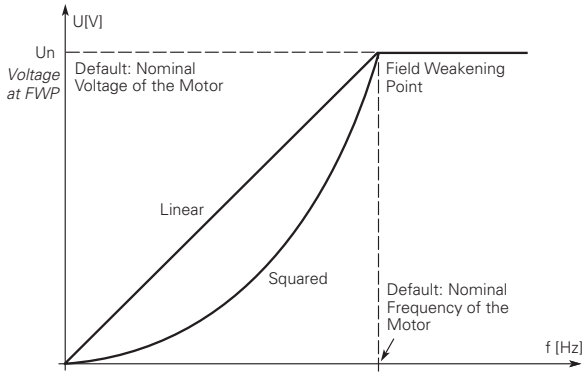


P4.1.12②	***Accel. time 2***				**ID 249**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.13②	***Decel. time 2***				**ID 250**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to decelerate from the set maximum frequency to the zero frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.14①②	***2nd Stage ramp frequency***				**ID 2444**
Minimum value:	MinFreq.	**Maximum value:**	MaxFreq.	**Default value:**	30.00 Hz
Description:	When 2nd stage ramp frequency is the frequency level at which the drive will enable the 2nd stage ramp frequency output function. This then can be used for other inputs or devices to signal a frequency level.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 43. Motor control.

P5.1 - Basic settings.					
P5.1.1①②	***Motor control mode***				**ID 287**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Frequency control - Output frequency is controlled directly by the frequency reference. 1 = Speed control - Output frequency is controlled by giving a frequency reference to it with slip compensation. 2 = Open loop vector control - Similar to the standard speed control mode, higher performance slip calculation requires running a motor identification. 3 = PM control 1 - PM motor control mode 1, used for SPM (surface mounted permanent magnet) and it also can be used for IPM. 4 = PM control 2 - PM motor control mode 2, used for IPM (internally mounted permanent magnet) and it can not be used for SPM.				
Description:	Selects the motor control mode.				
P5.1.2①	***Current limit***				**ID 107**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT*3/2 A
Description:	This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level, it goes into the current limiter controller and tries to limit the output current.				
P5.1.3①②	***V/Hz optimization***				**ID 109**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable torque boost function. 1 = Enable torque boost function.				
Description:	Automatic torque boost - the voltage to the motor increases automatically, which assists the motor to produce sufficient torque to start and run at low frequencies with high loads.				
P5.1.4①②	***V/Hz ratio***				**ID 108**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Linear - the voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied. A linear V/Hz ratio should be used in constant torque applications. 1 = Squared - the voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed. 2 = Programmable V/Hz curve - the V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. 3 = Linear with flux optimization - the drive starts to search for the minimum motor current in order to save energy. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed.				
Description:	Selects the V/Hz ratio. 0 = Linear; 1 = Squared; 2 = Programmable; or 3 = Linear + flux optimization.				



0 = Linear and 1 = Squared.

P5.1.10②	***Switching frequency***				**ID 288**
Minimum value:	MinSwitchFreq kHz	**Maximum value:**	MaxSwitchFreq kHz	**Default value:**	DefaultSwitchFreqCT kHz
Description:	Sets the switching frequency for the PWM output waveform.				

Table 43. Motor control (Cont.).

P5.1.16①②	***Identification***				**ID 299**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not action. 1 = Identification only stator resistor - does not spin the motor. This can be done with load attached. 2 = Identification with run - motor stator resistor is completed then the motor is run. This **must** be completed with unloaded motor. 3 = Identification no run - motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia - identification for the system inertia only.				
Description:	This parameter enables the drive to make an motor identification cycle of the motor once complete the drive will adjust tuning parameters to improve starting torque and open loop vector control performance. Once set and a run command is given, the operation will be active then set back to 0 when completed. When a run command is issued, the message on the keypad will indicate "Auto tuning" is being performed. If there is an issue with the motor identification, a fault message will be displayed.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 44. Protections.

P6.1 - Motor.					
P6.1.4①②	***Motor thermal protection***				**ID 310**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response. 1 = Warning. 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%.				
P6.1.5②	***Motor thermal FO current***				**ID 311**
Minimum value:	0.00%	**Maximum value:**	150.00%	**Default value:**	100.00%
Description:	The current can be set between 0 - 150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). **Note:** The value is set as a percentage of the motor nameplate data, P1.6 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive.				

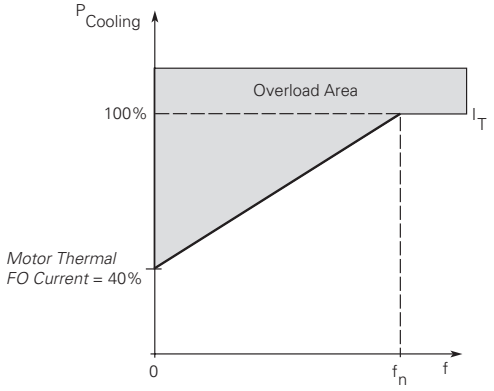


Table 44. Protections (Cont.).

P6.2 - Drive.					
P6.2.2①②	***Input phase fault***				**ID 332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; 3 = Fault, stop mode after fault always by coasting; or 4 = Single phase power limit.				
Description:	The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw.				
P6.2.3①②	***4 mA input fault***				**ID 306**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No response. 1 = Warning. 2 = Warning, the frequency from 10 seconds back is set as reference. 3 = Warning, the preset frequency P6.2.4 is set as reference. 4 = Fault, stop mode after fault according to parameter stop mode. 5 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated if the 4 - 20 mA reference signal is used and the signal falls below 4 mA for 5 seconds, or below 0.5 mA for 0.5 seconds. The information can also be programmed into relay outputs RO1 and RO2.				
P6.2.4①②	***4 mA fault frequency***				**ID 331**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00
Description:	When 4 mA fault happens, the output frequency of drive goes to this preset speed when P6.2.3 = 3.				
P6.2.5①②	***External fault***				**ID 307**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode. 3 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs function select external fault). The status information can also be programmed into digital output relay outputs RO1 and RO2.				
P6.2.11②	***STO fault response***				**ID 2427**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No Action - drive will stop, no indication shown, no reset required, have to cycle start command. 1 = Warning - drive indicate warning/if STO clears drive will run without reset. 2 = Fault - drive will indicate fault/require reset to start again.				
Description:	STO fault response defines the function of how the STO input will be seen on the keypad and how the drive functions to it.				
P6.2.12①	***PI feedback AI loss response***				**ID 2401**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Warning: preset frequency (P6.2.13).				
Description:	This parameter defines the function of the PI feedback analog input loss response. If the AI feedback is lost based off the programed AI feedback.				
P6.2.13①②	***PI feedback AI loss pre-frequency***				**ID 2402**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	This parameter defines the frequency the master would run to if a feedback is lost and P6.2.12 was set to option 3.				
P6.2.14②	***PI feedback AI loss pipe fill***				**ID 2403**
Minimum value:	0.0 varies	**Maximum value:**	1000.0 varies	**Default value:**	0.0 varies
Description:	Detects loss of prime in the pump based off the measured level. If the value drops below this level for the time in P6.2.15 and below, the frequency in P6.2.13 “loss of prime” occurs.				

Table 44. Protections (Cont.).

P6.2.15②	***PI feedback AI loss pre-frequency timeout***				**ID 2404**
Minimum value:	0.0 s	**Maximum value:**	6,000.0 s	**Default value:**	0.0 s
Description:	PI feedback AI loss pre-frequency timeout - when P6.2.12 is set to 3 or 4, when the feedback signal is lost, the drive will run at the frequency in P6.2.15 for the time set here. After this time, the drive will fault out on "feedback loss". The time is disabled when set to 0 seconds.				

P6.3 - Communications.

P6.3.1①②	***Fieldbus fault response***				**ID 334**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.				
P6.3.2①②	***OPTcard fault response***				**ID 335**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for a board slot fault caused by a missing or failed option board not communicating to the central processor.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 45. PI Controller.

P7.1 - Basic settings.					
P7.1.1②	***PI control gain***				**ID 1294**
Minimum value:	0.00%	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Defines the gain of the PI Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100%, a change of 10% in the error value causes the controller output to change 10%.				
P7.1.2②	***PI control itime***				**ID 1295**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	1.00 s
Description:	Defines the integration time of the PI controller. Over the time, the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec., a change of 10% in the error value causes the controller output to change by 10.00%/s.				

Table 45. PI Controller (Cont.).

P7.1.3①②	***PI process unit***				**ID 1297**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = %; 1 = 1/min.; 2 = rpm; 3 = ppm; 4 = pps; 5 = l/s; 6 = l/min.; 7 = l/h; 8 = kg/s; 9 = kg/min.; 10 = kg/h; 11 = m3/s; 12 = m3/min.; 13 = m3/h; 14 = m/s; 15 = mbar; 16 = bar; 17 = Pa; 18 = kPa; 19 = mVS; 20 = kW; 21 = Deg. C; 22 = GPM; 23 = gal/s; 24 = gal/min.; 25 = gal/h; 26 = lb/s; 27 = lb/min.; 28 = lb/h; 29 = CFM; 30 = ft^3/s; 31 = ft^3/min.; 32 = ft^3/h; 33 = ft/s; 34 = in. wg; 35 = ft wg; 36 = PSI; 37 = lb/in.2; 38 = HP; 39 = Deg. F; 40 = PA; 41 = WC; 42 = HG; 43 = ft; 44 = m;				
Description:	Defines the unit type for PI feedback unit.				
P7.1.4②	***PI process unit minimum***				**ID 1298**
Minimum value:	-99999.99 varies	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Defines the minimum process unit value.				
P7.1.5②	***PI process unit maximum***				**ID 1300**
Minimum value:	PI Process Unit Min	**Maximum value:**	99999.99 varies	**Default value:**	100.00 varies
Description:	Defines the maximum process unit value.				
P7.1.6①②	***PI error inversion***				**ID 1303**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal - if feedback is less than set-point, PI controller output increases. 1 = Inverted - if feedback is less than set-point, PI controller output decreases.				
Description:	Defines the way the process value output reacts to the feedback signal.				
P7.1.7②	***PI dead band***				**ID 1304**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0 varies
Description:	PI dead band around setpoint in process units. This is the band where no actions occur to prevent oscillation or repeated activation/deactivation of controller. The PI output is locked if the feedback stays within the dead band area.				

Table 45. PI Controller (Cont.).

P7.1.8②	***PI dead band delay***				**ID 1306**
Minimum value:	0.00 s	**Maximum value:**	320.00 s	**Default value:**	0.00 s
Description:	If the PI process value goes out of the dead band area for the desired time delay, at that point the controller will re-initialize and try to level out again.				
P7.1.9②	***PI ramp time***				**ID 1311**
Minimum value:	0.00 s	**Maximum value:**	300.00 s	**Default value:**	0.00 s
Description:	Defines the rising and falling ramp times for changes in the process value.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 46. Setpoint.

P7.2.1 - Standard.					
P7.2.1.1②	***PI keypad setpoint 1***				**ID 1307**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 1.				
P7.2.1.2②	***PI keypad setpoint 2***				**ID 1309**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 2.				
P7.2.1.3②	***PI wake-up action***				**ID 2466**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Wake-up when below wake-up level. 1 = Wake-up when above wake-up-level. 2 = Wake-up when below wake-up level % from PI setpoint. 3 = Wake-up when above wake-up level %from PI setpoint.				
Description:	This parameter defines the wake-up function action.				

P7.2.2 - Setpoint 1.

P7.2.2.1①	***PI setpoint 1 source***				**ID 1312**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				
P7.2.2.2①	***PI setpoint 1 sleep enable***				**ID 1315**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				

Table 46. Setpoint (Cont.).

P7.2.2.3②	***PI setpoint 1 sleep delay***				**ID 1317**
Minimum value:	0.00 s	**Maximum value:**	3,000.00 s	**Default value:**	0.00 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.2.4②	***PI setpoint 1 wake-up level***				**ID 1318**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.2.5②	***PI setpoint 1 boost***				**ID 1320**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.2.6②	***PI setpoint 1 sleep level***				**ID 2450**
Minimum value:	PID1_ProcessUnitMin Hz	**Maximum value:**	PID1_ProcessUnitMax Hz	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.2.7②	***SP1 sleep mode over cycle time***				**ID 1842**
Minimum value:	0.00 varies	**Maximum value:**	10.00 varies	**Default value:**	0.00 varies
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.2.8②	***SP1 sleep mode maximum cycle time***				**ID 1843**
Minimum value:	0.00 s	**Maximum value:**	3,600.00 s	**Default value:**	300.00 s
Description:	Defines the maximum time for sleep over cycle checking.				

P7.2.3 - Setpoint 2.

P7.2.3.1①	***PI setpoint 2 source***				**ID 1321**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				
P7.2.3.2①	***PI setpoint 2 sleep enable***				**ID 1324**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				

Table 46. Setpoint (Cont.).

P7.2.3.3②	***PI setpoint 2 sleep delay***				**ID 1326**
Minimum value:	0.00 s	**Maximum value:**	3,000.00 s	**Default value:**	0.00 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.3.4②	***PI setpoint 2 wake-up level***				**ID 1327**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.3.5②	***PI setpoint 2 boost***				**ID 1329**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.3.6②	***PI setpoint 2 sleep level***				**ID 2452**
Minimum value:	PID1_ProcessUnitMin Hz	**Maximum value:**	PID1_ProcessUnitMax Hz	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.3.7②	***SP2 sleep mode over cycle time***				**ID 1844**
Minimum value:	0.00 varies	**Maximum value:**	10.00 varies	**Default value:**	0.00 varies
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.3.8②	***SP2 sleep mode maximum cycle time***				**ID 1845**
Minimum value:	0.00 s	**Maximum value:**	3,600.00 s	**Default value:**	300.00 s
Description:	Defines the maximum time for sleep over cycle checking.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 47. Feedback .

P7.3.1 - Standard.					
P7.3.1.1②	***PI feedback gain***				**ID 1331**
Minimum value:	-1,000.00%	**Maximum value:**	1,000.00%	**Default value:**	100.00%
Description:	Defines gain associated with the feedback signal from the measuring device.				

P7.3.2 - Feedback 1.					
P7.3.2.1①	***PI feedback 1 source***				**ID 1332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used; 1 = AI; 2 = Drive reference pot; 3 = FB process data input 1; or 11 = FB PI feedback.				
Description:	Defines where feedback signal is being fed into the drive, via analog or fieldbus data value.				
P7.3.2.2②	***PI feedback 1 minimum***				**ID 1333**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	0.00%
Description:	Minimum unit value for the feedback signal.				

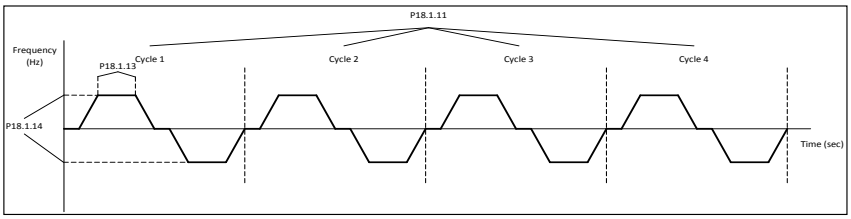
Table 47. Feedback (Cont.).

P7.3.2.3②	***PI feedback 1 maximim***				**ID 1334**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Maximim unit value for the feedback signal.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 48. Pump parameters.

P9.1 - Derag (*DM1 PRO).					
P9.1.1②	***Derag cycles***				**ID 2468**
Minimum value:	0.00	**Maximum value:**	10.00	**Default value:**	3.00
Description:	This parameter defines the number of cycles in the forward/reverse direction for removing any debris in system.				
P9.1.2②	***Derag at Start/Stop***				**ID 2469**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.00
Options:	0 = Off; 1 = Start; 2 = Stop; 3 = Start and stop; 4 = Digital input; or 5 = Current.				
Description:	Defines how the derage function will become activated; start, stop, both, or based off the digital input.				
P9.1.3②	***Deragging run time***				**ID 2470**
Minimum value:	1.00 s	**Maximum value:**	3,600.00 s	**Default value:**	0.00 s
Description:	Defines the length of time the drive will run at the derag speed in the forward and reverse direction.				
P9.1.4②	***Derag speed***				**ID 2471**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Defines the frequency the drive will run at in the forward/reverse direction when in the derag mode.				



P9.1.5②	***Derag off delay***				**ID 2472**
Minimum value:	1.00 s	**Maximum value:**	600.00 s	**Default value:**	10.00 s
Description:	Defines the length of time the drive will run the derag function when enabled at stop.				
P9.1.6①②	***Derag current***				**ID 1879**
Minimum value:	A	**Maximum value:**	A	**Default value:**	0.00 A

P9.2 - Start/stop timing (*DM1 PRO).					
P9.2.1①②	***Valve start***				**ID 1847**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal; 1 = Damper start; 2 = Damper tout; or 3 = Damper delay.				
Description:	This parameter determines the function of damper.				

Table 48. Pump parameters (Cont.).

P9.2.2①②	***Valve timeout***				**ID 1848**
Minimum value:	1.00 s	**Maximum value:**	32,500.00 s	**Default value:**	5.00 s
Description:	The timeout time used for an interlocked time start, after which the start sequence must be restarted if no acknowledgement contact is received.				
P9.2.3①②	***Valve delay***				**ID 1849**
Minimum value:	1.00 s	**Maximum value:**	32,500.00 s	**Default value:**	5.00 s
Description:	The delay time following a delay start, after which the frequency converter will be started.				
P9.2.4①②	***Back spin delay***				**ID 2423**
Minimum value:	0.00 s	**Maximum value:**	32,500.00 s	**Default value:**	0.00 s
Description:	Run delay time parameter sets the time required for the drive to wait before another run command can be received. During this time, the run signal is given. It is ignored until the time has expired upon which it will then start. This is true for keypad, I/O, or Fieldbus Control places.				
P9.2.5①②	***Minimum run time***				**ID 1813**
Minimum value:	0.00 s	**Maximum value:**	32,500.00 s	**Default value:**	0.00 s
Description:	Drive minimum run time.				
P9.2.6②	***Minimum frequency ramp time***				**ID 1850**
Minimum value:	0.10 s	**Maximum value:**	2,000.00 s	**Default value:**	10.00
Description:	Ramp time for output to minimum frequency.				
P9.3 - Multi-pump multi-drive (*DM1 PRO).					
P9.3.1①②	***Multi-pump mode***				**ID 2279**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled or 1 = Multi-drive network.				
Description:	Determines the number of drives being used in the multi-pump configuration: 0 = Single drive - single drive for main motor, contactors used on other motors; or 1 = Multi-drive - multi-follower sequence with multiple drives.				
P9.3.2①②	***Number of drives***				**ID 2449**
Minimum value:	1	**Maximum value:**	5	**Default value:**	1
Description:	This defines the number of drives active when doing the multi-drive pump and fan scheme. By default, there will be always one drive active at one time. By setting value to above one, it allows for bringing in additional drives to maintain the sytem.				

Table 34. Pump parameters (Cont.).

P9.3.3①②	***Drive ID***				**ID 2278**
Minimum value:	0	**Maximum value:**	5	**Default value:**	0
Description:	This parameter defines the drive address when using mult- drive pump mode. Based off this ID, the drive enables in the desired sequence and can be monitored at this drive ID value in the monitor screen.				
P9.3.4①②	***Regulation source***				**ID 2284**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Network only or 1 = PI controller.				
Description:	For drives that have been connected with both start/stop signal and PI feedback - can be set up as "Feedback", so they will have ability to be the master.				
P9.3.5②	***PI bandwidth***				**ID 2458**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	10.00 varies
Description:	Percentage based off the setpoint above and below which defines when the auxiliary motor will come online or offline.				

Table 34. Pump parameters (Cont.).

P9.3.6①②	***Staging frequency***				**ID 2315**
Minimum value:	MinFreq	**Maximum value:**	400.00	**Default value:**	50.00
Description:	Output frequency is above stagging frequency and PI error is out of PI bandwidth - motor should add to system.				
P9.3.7①②	***De-staging frequency***				**ID 2316**
Minimum value:	0.00	**Maximum value:**	MaxFreq	**Default value:**	0.00
Description:	Output frequency is below de-stagging frequency and PI error is out of PI bandwidth - motor should remove from system.				
P9.3.8②	***Add/remove delay***				**ID 344**
Minimum value:	0.00 s	**Maximum value:**	3,600.00 s	**Default value:**	10.00 s
Description:	With feedback outside the bandwidth, this time must pass before motors/pumps are added or removed from the system.				
P9.3.9②	***Interlock enabled***				**ID 350**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled or 1 = Enabled.				
Description:	This parameter enables the drive to look at the digital input interlocks to tell which motor is available for running or if they were brought offline.				
P9.3.10①②	***Recovery method***				**ID 2285**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Automatic or 1 = Stop.				
Description:	This parameter is for the slave when multi-drive system lost the master. The slave drive can continue run if it set to be "Automatic". However, the slave drive will stop immediately if it is set to be "Stop".				
P9.3.11②	***Add/remove drive selection***				**ID 2311**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Drive ID or 1 = Run time.				
Description:	In default, MPFC system will add/remove pump according to their drive ID, from small to large. The order can also depend on each slave drive's running time: add the drive that has shortest running time and remove the drive that has longest running time first.				
P9.3.12②	***Run time enabled***				**ID 2280**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled or 1 = Enabled.				
Description:	The run time counter will start counting only if this parameter is enabled.				
P9.3.13②	***Run time limit***				**ID 2281**
Minimum value:	0.00 h	**Maximum value:**	300,000.00 h	**Default value:**	0.00 h
Description:	If drive run time is over this limit, its network status will be "Need AIternation". Limit equals 0 means run time counter disabled.				
P9.3.14	***Run time reset***				**ID 2283**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No action or 1 = Reset.				
Description:	One-time parameter, set to be 1 will clear run time counter.				
P9.3.15②	***Master drive mode***				**ID 2473**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Follow PI; 1 = Fixed speed; or 2 = Turn off.				
Description:	Defines how the master drive will maintain the frequency control when slaves are brought in; follow PI, fixed speed, or turn off.				

Table 34. Pump parameters (Cont.).

P9.3.16②	***Master fixed speed***				**ID 2474**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	50.00 Hz
Description:	Defines the fixed speed frequency when the master drive mode is set for fixed speed control when slaves are brought in.				
P9.3.17②	***Master fixed speed delay***				**ID 2475**
Minimum value:	0.00 s	**Maximum value:**	1,000.00 s	**Default value:**	5.00 s
Description:	Defines the delay time before the master drive begins running at the fixed speed or turns off if the master mode is set for fixed speed or turn off.				

P9.4 - Pipe fill (Loss of prime) (*DM1 PRO).

P9.4.1①②	***Pipe fill loss response***				**ID 2410**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	Defines the response method when a "loss of prime" condition occurs.				
P9.4.2①②	***Pipe fill loss detection method***				**ID 2406**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Motor current; 1 = Motor power (%); or 2 = Motor torque (%).				
Description:	Defines the value for looking at a loss of prime.				
P9.4.3②	***Pipe fill loss low level***				**ID 2407**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	If the monitor value is less than low level value and the output frequency is more than low frequency, check the pipe fill loss start.				
P9.4.4①②	***Pipe fill loss low frequency***				**ID 2409**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the frequency point at which the drive needs to be above to enable the "loss of prime" feature. When set to 0 Hz, protection is disabled.				
P9.4.5②	***Pipe fill loss high level***				**ID 1851**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	If the monitor value is more than high level (the high level is not 0) and the output frequency is more than high frequency, check pipe fill loss start.				
P9.4.6①②	***Pipe fill loss high frequency***				**ID 1852**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines high frequency point at which the drive needs to be above to enabled the "loss of prime" feature. When set to 0 Hz, protection is disabled.				
P9.4.7②	***Pipe fill loss time***				**ID 2408**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	0.00 s
Description:	Defines the delay time before a "loss of prime" condition will occur based of the detection method and prime loss level.				
P9.4.8②	***Pipe fill loss attempts***				**ID 2411**
Minimum value:	0.00	**Maximum value:**	10.00	**Default value:**	1.00
Description:	Defines the amount of attemps to auto restart the drive on a "prime loss" condition.				

Table 34. Pump parameters (Cont.).

P9.5 - Prime pump (*DM1 PRO).					
P9.5.1②	***Prime pump enable***				**ID 2428**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Prime pump enable.				
P9.5.2②	***Prime pump level***				**ID 2429**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	0.00 varies
Description:	This defines the level at which the pre-charge function will drop out. If the feedback level raises above this value, pre-charge becomes deactivated. If the level is not reached, it will switch after the delay time.				
P9.5.3②	***Prime pump frequency***				**ID 2431**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Frequency at which the pre-charge function will operate when enabled.				
P9.5.4②	***Prime pump delay time***				**ID 2432**
Minimum value:	0.00 min.	**Maximum value:**	3,600.00 min.	**Default value:**	0.00 min.
Description:	This is the time that the drive will run the pre-charge function on start up. When set to "0 Hz", this function is not enabled.				
P9.5.5②	***Prime pump loss of prime level***				**ID 2433**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	Selects the limit to indicate a loss of prime in pump. If the measured current drops below the determined value for the value assigned in the prime loss of time setting, the drive will display "pre-charge loss of prime".				
P9.5.6②	***Prime pump level 2***				**ID 2434**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	0.00 varies
Description:	This defines the level at which the pre-charge function will drop out. If the feedback level raises above this value, pre-charge becomes deactivated. If the level is not reached, it will switch after the delay time.				
P9.5.7②	***Prime pump frequency 2***				**ID 2436**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Frequency at which the pre-charge level 2 will operate at when enabled.				
P9.5.8②	***Prime pump delay time 2***				**ID 2437**
Minimum value:	0.00 s	**Maximum value:**	3,600.00 s	**Default value:**	0.00 s
Description:	This is the time that the drive will run at the 2nd level pre-charge function level. When set to "0 Hz", this function is not enabled.				
P9.5.9②	***Prime pump loss of prime level 2***				**ID 2438**
Minimum value:	0.00 varies	**Maximum value:**	1,600.00 varies	**Default value:**	0.00 varies
Description:	Selects the limit to indicate a loss of prime in pump. If the measured current drops below the determined value for the value assigned in the prime loss of time setting, the drive will display pre-charge loss of prime.				
P9.6 - Broken pipe (*DM1 PRO).					
P9.6.1①②	***Broken pipe fault response***				**ID 1853**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault, coast; or 3 = Fault.				
Description:	Broken pipe fault/warning shall be triggered if the PI feedback is less than broken pipe level and the drive output frequency is more than broke pipe frequency for delay time.				
P9.6.2②	***Broken pipe level***				**ID 1854**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	15 varies
Description:	Broken pipe level.				

Table 34. Pump parameters (Cont.).

P9.6.3②	***Broken pipe frequency***				**ID 1856**
Minimum value:	1.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Broken pipe frequency.				
P9.6.4②	***Broken pipe delay***				**ID 1855**
Minimum value:	1.00 s	**Maximum value:**	120.00 s	**Default value:**	15.00 s
Description:	Broken pipe delay time.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 49. Serial communication.

P11.1 - Basic settings.					
P11.1.1①	***Serial communication***				**ID 586**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Modbus RTU; 1 = BACnet MSTP; or 2 = SWD.				
Description:	This parameter defines the communication protocol for RS-485.				
P11.2 - Modbus RTU.					
P11.2.1①	***Slave address***				**ID 587**
Minimum value:	1.00 varies	**Maximum value:**	247.00 varies	**Default value:**	1.00 varies
Description:	This parameter defines the slave address for RS-485 communication.				
P11.2.2①	***Baud rate***				**ID 584**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 57,600; or 4 = 115,200				
Description:	This parameter defines communication speed for RS-485 communication.				
P11.2.3①	***Parity type***				**ID 585**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = None; 1 = Odd; or 2 = Even.				
Description:	This parameter defines parity type for RS-485 communication.				
P11.2.4	***Modbus RTU protocol status***				**ID 588**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Initial; 1 = Stopped; 2 = Operational; or 3 = Faulted.				
Description:	This parameter shows the protocol status for RS-485 communication.				
P11.2.5	***Communication timeout modbus RTU***				**ID 593**
Minimum value:	0.00 ms	**Maximum value:**	60,000.00 ms	**Default value:**	10,000.00 ms
Description:	Selects the time to wait before a communication fault occurs over modbus RTU if a message is not received.				

Table 49. Serial communication (Cont.).

P11.2.6	***Modbus RTU fault response***				**ID 2516**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode. When fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications; if not in fieldbus control, place will not fault. 1 = In all control modes. No matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus RTU communication.				

P11.3 - BACnet RTU MSTP.

P11.3.1①	***MSTP baud rate***				**ID 594**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 76,800; or 4 = 115,200.				
Description:	This parameter defines the communication speed for RS-485 communication.				
P11.3.2①	***MSTP device address***				**ID 595**
Minimum value:	0	**Maximum value:**	127	**Default value:**	1
Description:	Defines the device address of the drive on the BACnet MSTP network.				
P11.3.3①	***MSTP instance number***				**ID 596**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Defines the instance number of the drive on the BACnet MSTP network.				
P11.3.4	***MSTP communication timeout***				**ID 598**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over BACnet MSTP if a message is not received.				
P11.3.5	***MSTP protocol status***				**ID 599**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.6	***MSTP fault code***				**ID 600**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = None; 1 = Sole master; 2 = Duplicate MAC ID; or 3 = Baud rate fault.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.7	***MSTP fault response***				**ID 2526**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet MSTP communication.				
P11.3.8①	***MSTP maximum master***				**ID 1537**
Minimum value:	1	**Maximum value:**	127	**Default value:**	127
Description:	Defines the maximum number of masters that can establish connections with the drive.				

Table 49. Serial communication (Cont.).

P11.5 - SWD.					
P11.5.1	***Parameter access***				**ID 2630**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = No permission to read/write on acyclic channel. 1 = Acyclic read/write are allowed on Profibus.				
Description:	PNU927 which specifies the operation priority of parameters for acyclic communication.				
P11.5.2①	***Parameter data access***				**ID 2631**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Local control; 1 = Fieldbus; 2 = Mixed interface; 4 = NET, local on fault; or 5 = Dual mode.				
Description:	PNU928 which specifies the control priority of the device for cyclic communication.				
P11.5.3	***Fault situation counter***				**ID 2632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	PNU952 which specifies the fault situation counter. Only write of 0 is allowed, then the whole fault buffer (actual fault situation and all other fault situations) and the fault message counter (parameter 944) are erased.				
P11.5.4	***Board status***				**ID 2609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Description:	Status of the board. B0-DCOM communication fault. B1-Board HW fault B2-IO1 24 volt overload fault. B3-Profibus communication fault. B4-fieldbus fault.				
P11.5.5	***Firmware version***				**ID 2610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	This parameter provides the firmware version of the SWD.				
P11.5.6	***Protocol status***				**ID 2612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not configured; 1 = Operational; or 2 = Diagnostics.				
Description:	This parameter specifies the protocol status for SWD card.				

P11.6 - Bluetooth.					
P11.6.1	***Bluetooth enabled***				**ID 1895**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Bluetooth enabled.				
P11.6.2②	***Bluetooth broadcast mode***				**ID 2920**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Off; or 1 = On.				
Description:	Bluetooth broadcast mode.				

Table 49. Serial communication (Cont.).

P11.6.3	***Bluetooth pairing reset***				**ID 2935**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Not reset; or 1 = Reset.				
Description:	Bluetooth pairing reset.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 50. Ethernet communication.

P12.1 - Basic settings.					
P12.1.1①	***IP address mode***				**ID 1500**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Static IP; or 1 = DHCP with AutoIP.				
Description:	This parameter defined the IP address configuration mode for EIP/modbus TCP.				
P12.1.2	***Active IP address***				**ID 1507**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active IP address.				
P12.1.3	***Active subnet mask***				**ID 1509**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active subnet mask.				
P12.1.4	***Active default gateway***				**ID 1511**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active default gateway.				
P12.1.5	***MAC address***				**ID 1513**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current MAC address.				
P12.1.6①	***Static IP address***				**ID 1501**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.254
Description:	Defines the static IP address.				
P12.1.7①	***Static subnet mask***				**ID 1503**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	255.255.255.0
Description:	Defines the static subnet mask.				
P12.1.8①	***Static default gateway***				**ID 1505**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.1
Description:	Defines the static default gateway.				
P12.1.9	***Ethernet communication timeout***				**ID 611**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time it waits before a communication fault occurs over ethernet.				

Table 50. Ethernet communication (Cont.).

P12.2 - Trusted IP filter (DM1 PRO only).					
P12.2.1	***Trusted IP white list***				**ID 68**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.255 0.0.0. 0 0.0.0.0
Description:	Defines the IP addresses in the white list. A setting of 192.168.1.255 enables all connections on the local subnet.				
P12.2.2	***Trusted IP filter enable***				**ID 76**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables IP white listing. Devices not in the white list will not be able to establish communications with the drive.				

P12.3 - Modbus TCP (DM1 PRO only).					
P12.3.1①	***Modbus TCP enable***				**ID 1942**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	Enables modbus TCP communications, must be enabled to connect to Power Xpert inControl.				
P12.3.2	***Modbus TCP connection limit***				**ID 609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Description:	Maximum number of connections allowed to the drive.				
P12.3.3	***Modbus TCP unit identifier number***				**ID 610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Description:	Unit identifier unit value for modbus TCP.				
P12.3.4	***Modbus TCP protocol status***				**ID 612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for modbus TCP communication.				
P12.3.5	***Modbus TCP fault response***				**ID 2517**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus TCP communication.				

P12.4 - Ethernet IP (DM1 PRO only).					
P12.4.1①	***Ethernet based protocol select***				**ID 1997**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 2 = BACnet IP.				
Description:	Selects the active communication protocol on the ethernet I/P port.				
P12.4.2	***Ethernet IP protocol status***				**ID 608**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	Indicates if ethernet protocol is active or not.				

Table 50. Ethernet communication (Cont.).

P12.4.3	***Ethernet IP fault response***				**ID 2518**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for ethernet IP communication.				

P12.5 - BACnet IP (DM1 PRO only).

P12.5.1①	***BACnet IP UDP port number***				**ID 1733**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Defines the BACnet UDP port number.				
P12.5.2①	***BACnet IP foreign devise***				**ID 1734**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables BACNET IP foreign device configuration.				
P12.5.3①	***BACnet IP BBMD IP***				**ID 1735**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0
Description:	Displays the BACnet BBMD IP address.				
P12.5.4①	***BACnet IP UDP port***				**ID 1737**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Displays the BACnet BBMD UDP port number.				
P12.5.5①	***BACnet IP registration interval***				**ID 1738**
Minimum value:	0.00	**Maximum value:**	65,535	**Default value:**	10
Description:	Defines the registration interval.				

Table 50. Ethernet communication (Cont.).

P12.5.6	***BACnet IP communication timeout***				**ID 1739**
Minimum value:	0.00	**Maximum value:**	60,000	**Default value:**	0
Description:	Selects the time it waits before a communication fault occurs over BACnet IP.				
P12.5.7	***BACnet IP protocol status***				**ID 1740**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet IP communication.				
P12.5.8	***BACnet IP fault behavior***				**ID 1741**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet IP communication.				
P12.5.9[1]	***BACnet IP instance number***				**ID 1742**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Displays the BACnet instance number.				

P12.6 - Web UI (*DM1 PRO only).

P12.6.1	***Web UI protocol status***				**ID 2915**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for web server communication.				
P12.6.2	***Web UI fault response***				**ID 2916**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for web server communication.				
P12.6.3	***Web UI communication timeout***				**ID 2919**
Minimum value:	30,000 ms	**Maximum value:**	60,000 ms	**Default value:**	60,000 ms
Description:	Selects the time it waits before a communication fault occurs over the web server.				
P12.6.4[1]	***Web UI enable***				**ID 2921**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables web server configuration and monitoring page.				

[1] Parameter value can only be changed after the drive has stopped.

Table 51. System.

P13.1.1	***Language***				**ID 340**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = English; 1 = English; or 2 = English.				
Description:	This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available language is English only.				
P13.1.2①	***Application***				**ID 142**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Standard;; 1 = Pump; or 2 = Fan 3 = Multi-purpose.				
Description:	This parameter sets the active application if multiple applications have been loaded.				
P13.1.3①	***Parameter sets***				**ID 619**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = Reload defaults; 2 = Reload set 1; 3 = Reload set 2; 4 = Store set 1; 5 = Store set 2; 6 = Reset; or 7 = Reload defaults VM.				
Description:	This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets.				
P13.1.4	***Up to keypad***				**ID 620**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; or 1 = Yes (all parameters).				
Description:	This function uploads all existing parameter groups to the keypad.				
P13.1.5①	***Down from keypad***				**ID 621**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = All parameters; 2 = All, no motor; or 3 = Application parameters.				
Description:	This function downloads one or all parameter groups from the keypad to the drive.				

P13.1.7	***Parameter lock PIN***				**ID 624**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The application selection can be protected against unauthorized changes with the password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				

Table 51. System (Cont.).

P13.1.8	***Keypad parameter lock***				**ID 625**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text "locked" will appear on the display if you try to edit a parameter value. **Note:** This function does not prevent unauthorized editing of parameter values.				
P13.1.9	***Start-up Wizard***				**ID 626**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enabled. 1 = Disabled.				
Description:	The Start-up Wizard facilitates commissioning the DM1 PRO. If selected "Enable", the Start-up Wizard prompts the operator for the application desired and then advances parameters through the start-up parameter list/Application Mini wizard in keypad. After completion, it allows the user to go to the main menu or default page and this parameter is set to "Disabled". The Start-up Wizard is always enabled for the initial power up of the DM1 PRO. By setting this parameter to "Disable" without going through the Start-up Wizard, it will not cause it to be active on start-up. If user goes into Start-up Wizard after completion, or defaults drive, the Start-up Wizard will be "Enabled".				

P13.2 - Keypad.

P13.2.4	***Timeout time***				**ID 629**
Minimum value:	1 s	**Maximum value:**	65.535 s.	**Default value:**	30 s
Description:	The timeout time setting defines the time after which the keypad display returns to the Default Page. **Note:** If the default page value is 0, the timeout time setting has no effect.				
P13.2.5	***Contrast adjust***				**ID 630**
Minimum value:	5	**Maximum value:**	18	**Default value:**	12
Description:	If the remote keypad display is not clear, you can adjust the keypad contrast with this parameter.				
P13.2.6	***Backlight time***				**ID 631**
Minimum value:	1 min.	**Maximum value:**	65,535 min.	**Default value:**	10 min.
Description:	This parameter determines how long the backlight stays on before going out.				
P13.2.7	***Fan control***				**ID 632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Continuous - fan runs continuously. 1 = Temperature - based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C (140°F). The fan receives a stop command when the heat sink temperature falls to 55°C (131°F). The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from "Continuous" to "Temperature". 2 = Run follow - after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment.				
Description:	This function allows you to control the DM1 PRO's cooling fan.				

P13.4 - Version information.

P13.4.1	***Keypad software version***				**ID 640**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Keypad firmware version.				

Table 51. System (Cont.).

P13.4.2	***Motor control software version***				**ID 642**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	DSP/motor control software version.				
P13.4.3	***Application software version***				**ID 644**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	MCU/application software version.				
P13.4.4	***Software bundle version***				**ID 1714**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Software bundle version.				

P13.5 - Application information.

P13.5.1	***Serial number***				**ID 648**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Product serial number.				
P13.5.2	***Multi-monitor set***				**ID 627**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.				
P13.5.3	***Keypad lock PIN***				**ID 75**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The keypad can be protected against unauthorized changes with the keypad lock function after keys are not pressed five minutes. When the password function is enabled, the user will be prompted to enter a password before the keypad display parameter or response to key press except up/down/left/right. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.5.4	***Drive application name***				**ID 2922**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Drive application name.				

① Parameter value can only be changed after the drive has stopped.

Chapter 7- Multi-purpose application

Introduction

The multi-purpose application is designed for a large set of applications with the ability to have advanced motor control systems. It takes the same functions provided in the standard, fan, and multi-pump applications and adds in some additional control techniques. The application is designed with two control places that use eight digital inputs, two analog inputs, three relay outputs, one digital output, and two analog outputs that are programmable. Motor control-wise, it provides the ability to do frequency and speed control and adds open loop speed control as well as torque control. For tuning the V/Hz curve, it has the ability to go out and ID the motor characteristic and enters those specific measurements into its parameters for better control. Drive/motor protections are programmable for desired actions depending on the application. Below is a list of additional features available in addition to the standard, fan, and multi-pump application features that are available in the multi-purpose application.

- Motor potentiometer reference control;
- External brake control;
- Droop function with multiple loads;
- Motor identification;
- Motor control modes; and
- I/O controls:
  - "Terminal to function" (TTF) programming

    The design behind the programming of the digital inputs in the DM1 drive is to use "terminal to function" programming. It is composed of multiple functions that get assigned a digital input to that function. The parameters in the drive are set up with specific functions and by defining the digital input and slot in some cases depending on the what options are available. For use of the drives control board inputs, they will be referred to as DigIN:1 through DigIN:8. When additional option cards are used, they will be defined as DigIN:X:IOY:Z. The X indicates the slot that the card is being installed in which will be either A or B, then the IOY determines the type of card it is, which would be IO1 or IO5, and the Z would indicate which input is being used on that available option card.
  - "Function to terminal" (FTT) programming

    The design behind the programming of the relay outputs and digital output in the DM1 drive is to use "function to terminal" programming. It is composed of a terminal be it a relay output or a digital output that is assigned a parameter. Within that parameter, it has different functions that can be set.

For the DI function, we use terminal programming method to function (TTF), where there is a fixed input that gets programmed to a list of functions. This allows for multiple inputs to be used for different functions. Connecting a certain input with a certain parameter function is done by giving a parameter an appropriate value. The value is formed by the location of the input, either being on the standard control board or an external option board and the slot in which it is located.

Control I/O configuration

- Run 240 Vac and 24 Vdc control wiring in separate conduit.
- Communication wire to be shielded.

Table 52. Multi-purpose application default I/O connection.

External wiring	Terminal	Short name	Name	Default setting	Description
	1	DI1	Digital input 1	Run forward	Starts the motor in the forward direction.
	2	DI2	Digital input 2	Run reverse	Start the motor in the reverse direction.
	3	DI3	Digital input 3	External fault	Triggers a fault in the drive.
	4	DI4	Digital input 4	Fault reset	Resets active faults in the drive.
	5	CMA	DI1 to DI4 common	Grounded	Allows for sourced input.
	6	A	RS-485 signal A	—	Fieldbus communication (Modbus RTU, BACNet).
	7	B	RS-485 signal B	—	Fieldbus communication (Modbus RTU, BACNet).
Res	8	AI1+ ①	Analog input 1	0 - 10 V	Voltage speed reference (programmable to 4 mA to 20 mA).
	9	AI1-	Analog input 1 ground	—	Analog input 1 common (ground).
	10	GND	I/O signal ground	—	I/O ground for reference and control.
	11	AO1+	Analog output 1	Output frequency	Shows output frequency to motor 0 - 60 Hz (4 mA to 20 mA).
	12	GND	I/O signal ground	—	I/O ground for reference and control.
	13	10 V	10 Vdc reference output	10.3 Vdc +/- 3%	10 Vdc reference voltage.
	14	24 V	24 Vdc control output	24 Vdc In/Out	Control voltage input/output (100 mA max.).
	15	STO1	Safe torque Off 1	—	Safe torque Off 1 input.
	16	STO2	Safe torque Off 2	—	Safe torque Off 2 input.
	17	STO_COM	Safe torque common	—	Safe torque Off common.
	18	R1NO	Relay 1 normally open	Run	Changes state when the drive is in the run state.
	19	R1CM	Relay 1 common		
	20	R1NC	Relay 1 normally closed		
	21	R2NO	Relay 2 normally open	Fault	Changes state when the drive is in the fault state.
	22	R2CM	Relay 2 common		

Notes:
The above wiring demonstrates a SINK configuration. It is important that CMA is wired to ground (as shown by dashed line).
If a SOURCE configuration is desired, wire 24 V to CMA and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1- to ground (as shown by dashed line). If using +10 V for AI1, terminals 9 and 10 need to be jumpered together.

① AI1+ support 10 K potentiometer.

Figure 9. Example application with three auxiliary drives.

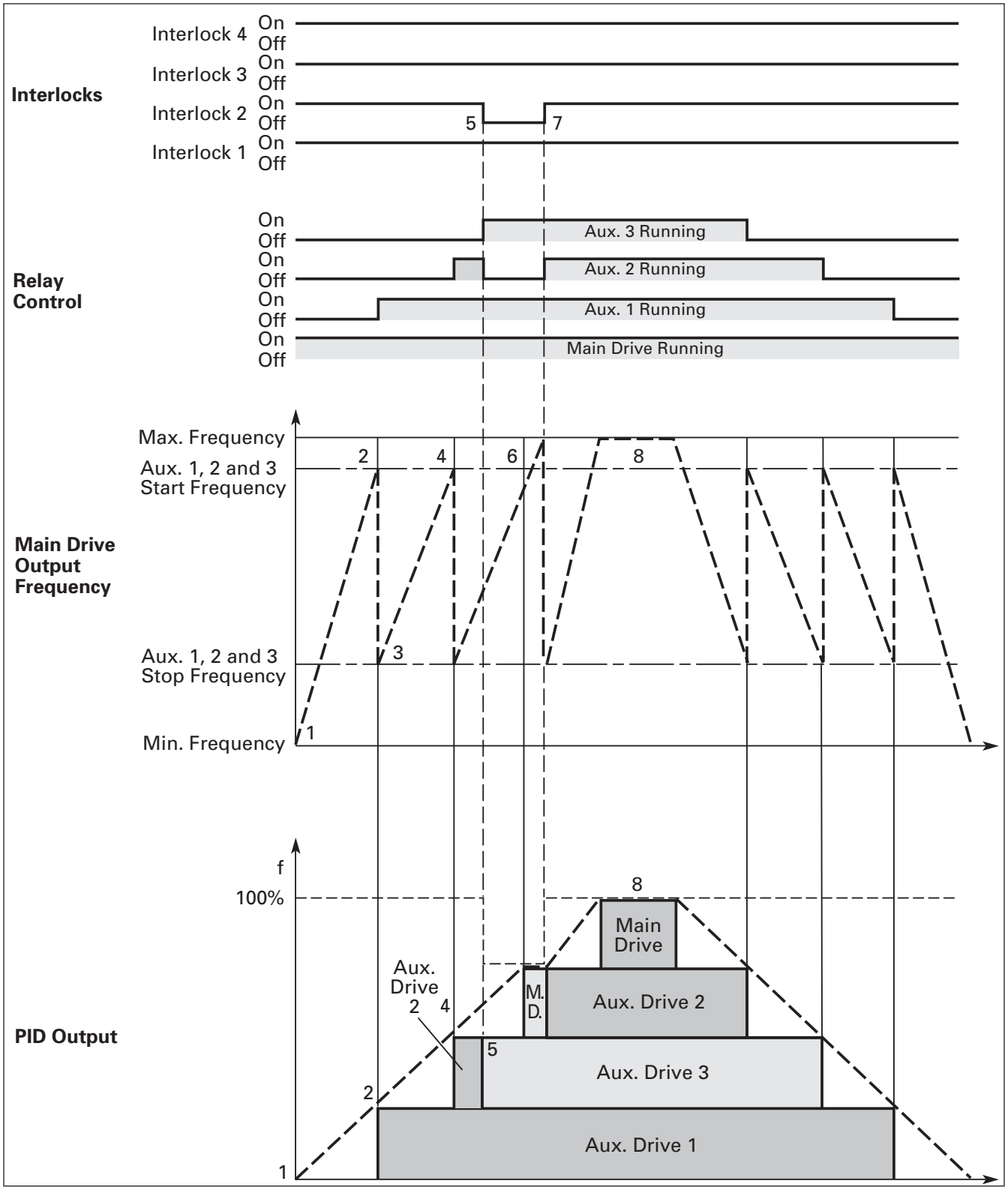


Figure 10. Multi-pump control curve.

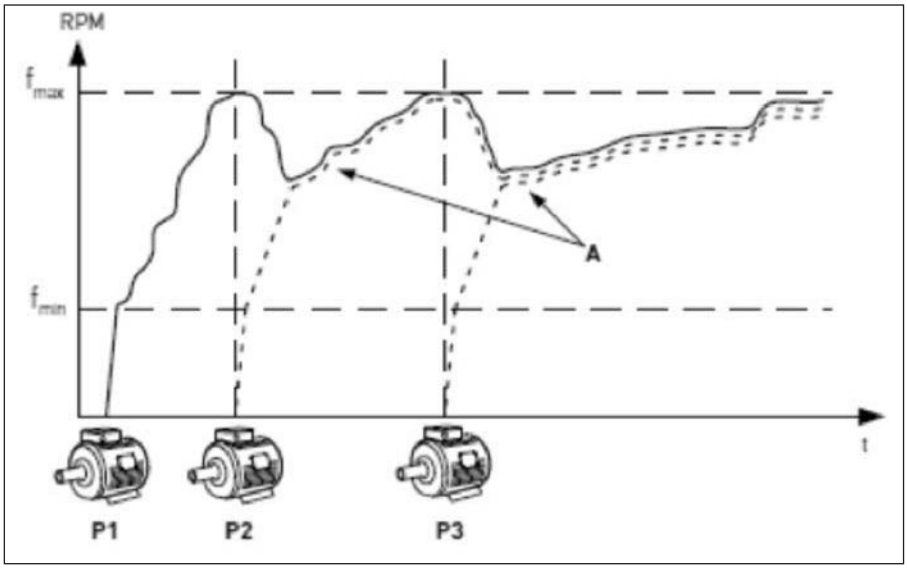


Figure 11. Multi-drive/multi-pump layout.

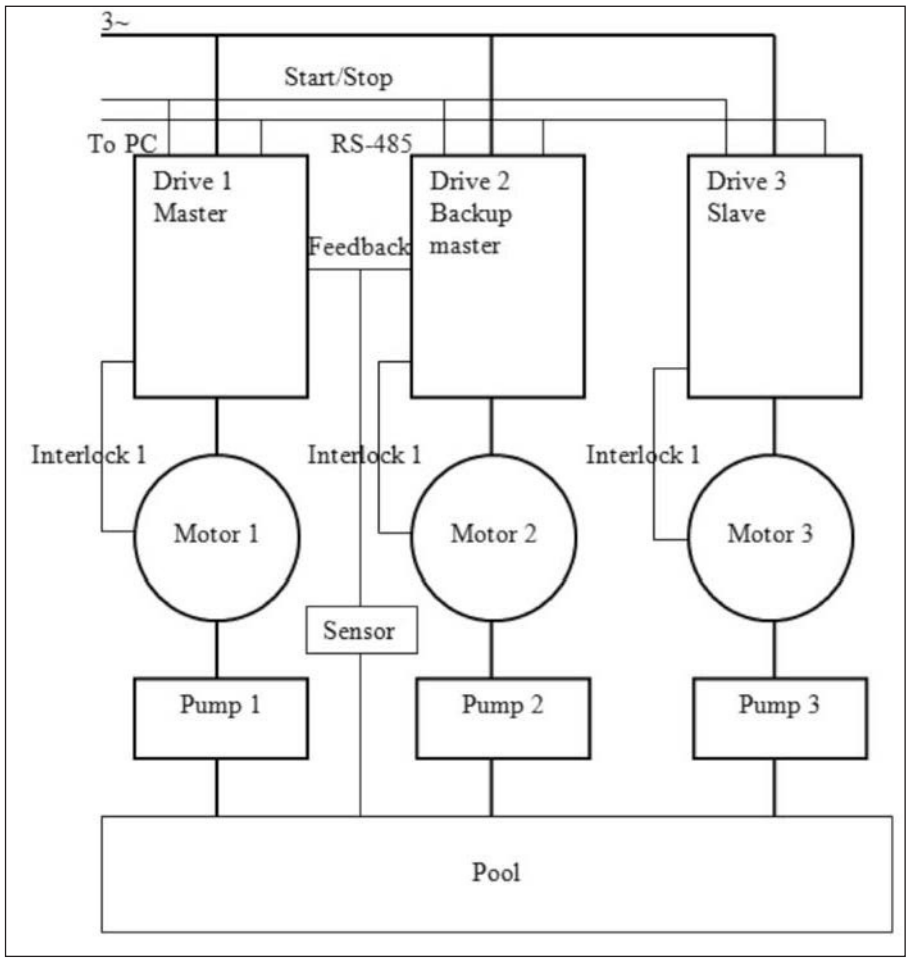
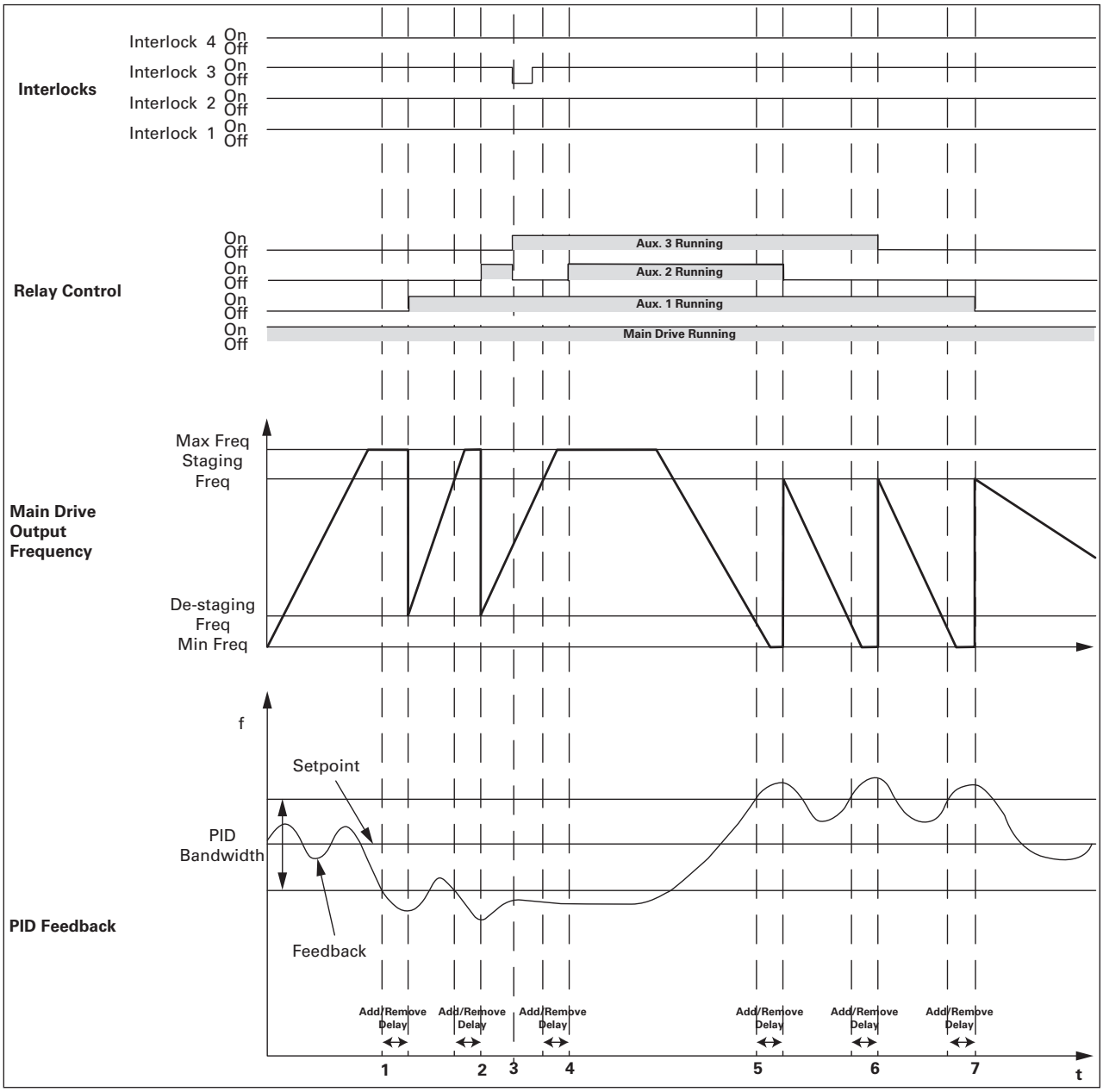


Figure 12. Bandwidth feedback.



1. Feedback out of bandwidth, output frequency over staging frequency, start delay counter; delay times out, and interlock 2 is OK, add aux. 1 motor by closing its corresponding relay.
2. As above, add aux. 2 motor.
3. Aux. 2's interlock lost, add aux. 3 as backup immediately.
4. Add aux. 2 motor again since its interlock resumed.
5. Feedback out of bandwidth, output frequency below de-staging frequency, start delay counter; delay times out, remove aux. 2 motor first because it's the last one which been added.
6. As above, remove aux. 3 motor.
7. As above, remove aux. 1 motor.

Multi-purpose application - parameters list

On the next pages you will find the lists of parameters within the respective parameter groups. Each parameter section within the table lists:

- Parameter code (location indication on the keypad; shows the operator the present parameter number);.
- Parameter name;
- ID (number of the parameter);

and where applicable:

- Minimum value and units;
- Maximum value and units;
- Default value and units;
- Options (when available); and
- Description of the parameter.

Table 53. Monitor.

M1 - standard.					
M1.1	***Output frequency***				**ID 1**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Output frequency (Hz).				
M1.2	***Frequency reference***				**ID 24**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Reference frequency (Hz).				
M1.3	***Motor speed***				**ID 2**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Motor output speed (rpm).				
M1.4	***Motor current***				**ID 3**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Motor output current RMS (Amps).				
M1.5	***Motor torque***				**ID 4**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor torque calculated from nameplate values and measured motor current (%).				
M1.6	***Motor power***				**ID 5**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Percent motor power calculated from nameplate values and measured motor current (%).				
M1.7	***Motor voltage***				**ID 6**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Output ac motor voltage (Vac).				
M1.8	***DC-link voltage***				**ID 7**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	DC bus voltage (Vdc).				
M1.9	***Unit temperature***				**ID 8**
Minimum value:	°C	**Maximum value:**	°C	**Default value:**	°C
Description:	Heat sink temperature (deg C).				

Table 53. Monitor (Cont.).

M1 - standard (Cont.).					
M1.10	***Motor temperature***				**ID 9**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Motor temperature value calculated from nameplate values and measured motor current (%).				
M1.11	***Latest fault code***				**ID 28**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Last active fault code value. See fault codes for the value shown here.				
M1.12	***Instant motor power***				**ID 1686**
Minimum value:	kW	**Maximum value:**	kW	**Default value:**	kW
Description:	Instantaneous motor power (kW).				
M2 - I/O status.					
M2.1	***Analog input 1***				**ID 10**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog input 1 measured value (Vdc or Amps) selectable with dipswitch.				
M2.2	***Keypad pot voltage***				**ID 1858**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Keypad potentiometer measured value (Vdc). DM1 PRO only.				
M2.3	***Analog output***				**ID 25**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	Analog output 1 measured value (Vdc or Amps) selectable with parameter.				
M2.4	***DI1, DI2, DI3***				**ID 12**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 1/2/3 status.				
M2.5	***DI4***				**ID 13**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Digital input 4 status.				
M2.6	***Virtual DI1, Virtual DI2***				**ID 1998**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Virtual digital output status. Internal use, not external output. The virtual RO1 as virtual DI1 input. The virtual RO2 as virtual DI2 input.				
M2.7	***Virtual RO1, Virtual RO2***				**ID 1817**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Virtual relay output 1 and 2 status.				
M2.8	***RO1, RO2***				**ID 557**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Relay output 1 and 2 4 status.				
M3 - Energy savings					
M3.1②	***Energy savings***				**ID 2120**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	0.000 varies
Description:	Displays the energy savings of the drive compared to linear V/f curve.				

Table 53. Monitor (Cont.).

M3.2②	***CO2 savings***				**ID 1818**
Minimum value:	mt/y	**Maximum value:**	mt/y	**Default value:**	0.000 mt/y
Description:	Displays the CO2 savings of the drive compared to linear V/f curve.				

M4 - FB monitor menu.

M4.1	***Control board DIDO status***				**ID 2209**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	Bit 0 = DI1_Status; Bit 1 = DI2_Status; Bit 2 = DI3_Status; Bit 3 = DI4_Status; Bit 4 = RO1_Status; Bit 5 = RO2_Status; Bit 6 = SlotA with board; Bit 7 = Virtual_RO1_Status; or Bit 8 = Virtual_RO2_Status.				
Description:	Control board digital input and relay output status provides the status of inputs and outputs on the control board.				
M4.2	***Application status word***				**ID 29**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	Bit 0 = MC_Ready; Bit 1 = MC_Run; Bit 2 = MC_Fault or Fault Trip; Bit 3 = FB_Ref_Active; Bit 4 = MC_Stopping; Bit 5 = MC_Reverse; Bit 6 = MC_Warning or AR-Fault; Bit 7 = MC_ZeroSpeed; Bit 8 = IO control indicator; Bit 9 = Panel control indicator; Bit 10 = Panel fieldbus control indicator; Bit 11 = MC_DC_Brake; Bit 12 = Run enable; Bit 13 = Run bypass; Bit 14 = External brake control; or Bit 15 = In bypass mode.				
Description:	Application status word will provide additional status indication of the health of the drive.				
M4.3	***Standard status word***				**ID 2414**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	Bit 0 = See STD status word B0 Sel (default = ready); Bit 1 = See STD status word B1 Sel (default = run); Bit 2 = See STD status word B2 Sel (default = fault); Bit 3 = See STD status word B3 Sel (default = fault Invert); Bit 4 = See STD status word B4 Sel (default = warning); Bit 5 = See STD status word B5 Sel (default = reversed); Bit 6 = See STD status word B6 Sel (default = at speed); Bit 7 = See STD status word B7 Sel (default = zero frequency); or Bit 8 - 15 = Not used.				
Description:	Standard status word is defined based of the parameter setting in the fieldbus process data group, define the first 8 bits of this status word. The options for these bits are based off the standard relay functions.				
M4.4	***FB PI setpoint 1***				**ID 2542**
Minimum value:	Varies	**Maximum value:**	PID1_ProcessUnit Max	**Default value:**	Varies.
Description:	PID setpoint 1 value from fieldbus.				
M4.5	***FB PI setpoint 2***				**ID 2544**
Minimum value:	PID1_ProcessUnitMin	**Maximum value:**	PID1_ProcessUnit Max	**Default value:**	Varies.
Description:	PID setpoint 2 value from fieldbus.				

Table 53. Monitor (Cont.).

M4.6	***FB PI feedback***				**ID 2550**
Minimum value:	% varies	**Maximum value:**	% varies	**Default value:**	% varies.
Description:	PID feedback 1 value from fieldbus.				

M5 - PI monitor.

M5.1	***PI set point***				**ID 16**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI set point in process units.				
M5.2	***PI feedback***				**ID 18**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI feedback level in process units.				
M5.3	***PI error value***				**ID 20**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	PI error in process units.				
M5.4	***PI output***				**ID 22**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	PI output.				
M5.5	***PI status***				**ID 23**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Running; or 2 = Sleep mode.				
Description:	PI status indication, indicates if drive is stopped, running in PI mode, or in PI sleep mode.				

M6 - User defined scale.

M6.1	***Output***				**ID 2445**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	User defined output value that can be configured with the users desired unit and scale.				
M6.2	***Reference***				**ID 2447**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	Varies
Description:	User defined reference value that can be configured with the users desired unit and scale.				

Table 54. Multi-pump status .

M7.1 - Operation mode.					
M7.1.1	***Drive 1***				**ID 2218**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; 2 = Master drive; or 3 = Redundant drive.				
Description:	Provides the operating mode of drive 1 while using multi-pump mode.				

Table 54. Multi-pump status (Cont.).

M7.1.2	***Drive 2***				**ID 2230**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; 2 = Master drive; or 3 = Redundant drive.				
Description:	Provides the operating mode of drive 2 while using multi-pump mode.				
M7.1.3	***Drive 3***				**ID 2242**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; 2 = Master drive; or 3 = Redundant drive.				
Description:	Provides the operating mode of drive 3 while using multi-pump mode.				
M7.1.4	***Drive 4***				**ID 2254**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; 2 = Master drive; or 3 = Redundant drive.				
Description:	Provides the operating mode of drive 4 while using multi-pump mode.				
M7.1.5	***Drive 5***				**ID 2266**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Offline; 1 = Slave drive; 2 = Master drive; or 3 = Redundant drive.				
Description:	Provides the operating mode of drive 5 while using multi-pump mode.				

M7.2 - Multi-pump status.

M7.2.1	***Drive 1***				**ID 2219**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 1 while using the multi-pump mode.				
M7.2.2	***Drive 2***				**ID 2231**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 2 while using the multi-pump mode.				

Table 54. Multi-pump status (Cont.).

M7.2.3	***Drive 3***				**ID 2243**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 3 while using the multi-pump mode.				
M7.2.4	***Drive 4***				**ID 2255**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 4 while using the multi-pump mode.				
M7.2.5	***Drive 5***				**ID 2267**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Stopped; 1 = Sleep; 2 = Regulating; 3 = Wait for CMD 4 = Following; or 5 = Unknown.				
Description:	Provides the run status of drive 5 while using the multi-pump mode.				

M7.3 - Network status.

M7.3.1	***Drive 1***				**ID 2220**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 1 while using the multi-pump mode.				
M7.3.2	***Drive 2***				**ID 2232**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 2 while using the multi-pump mode.				
M7.3.3	***Drive 3***				**ID 2244**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 3 while using the multi-pump mode.				

Table 54. Multi-pump status (Cont.).

M7.3.4	***Drive 4***				**ID 2256**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 4 while using the multi-pump mode.				
M7.3.5	***Drive 5***				**ID 2268**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disconnected; 1 = Fault; 2 = Pump lost; 3 = Need alternation; or 4 = No error.				
Description:	Provides the network status of drive 5 while using the multi-pump mode.				

Table 55. Multi-pump measurement.

M8.1 - Latest fault code.					
M8.1.1	***Drive 1***				**ID 2221**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 1 while using the multi-pump mode.				
M8.1.2	***Drive 2***				**ID 2233**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 2 while using the multi-pump mode.				
M8.1.3	***Drive 3***				**ID 2245**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 3 while using the multi-pump mode.				
M8.1.4	***Drive 4***				**ID 2257**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 4 while using the multi-pump mode.				
M8.1.5	***Drive 5***				**ID 2269**
Minimum value:		**Maximum value:**		**Default value:**	
Description:	Provides the latest fault code of drive 5 while using the multi-pump mode.				
M8.2 - Output frequency.					
M8.2.1	***Drive 1***				**ID 2222**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 1 while using the multi-pump mode.				
M8.2.2	***Drive 2***				**ID 2234**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 2 while using the multi-pump mode.				
M8.2.3	***Drive 3***				**ID 2246**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 3 while using the multi-pump mode.				

Table 55. Multi-pump measurement (Cont.).

M8.2.4	***Drive 4***				**ID 2258**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 4 while using the multi-pump mode.				
M8.2.5	***Drive 5***				**ID 2270**
Minimum value:	Hz	**Maximum value:**	Hz	**Default value:**	Hz
Description:	Provides the output frequency (Hz) of drive 5 while using the multi-pump mode.				

M8.3 - Motor voltage.

M8.3.1	***Drive 1***				**ID 2223**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 1 while using the multi-pump mode.				
M8.3.2	***Drive 2***				**ID 2235**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 2 while using the multi-pump mode.				
M8.3.3	***Drive 3***				**ID 2247**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 3 while using the multi-pump mode.				
M8.3.4	***Drive 4***				**ID 2259**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 4 while using the multi-pump mode.				
M8.3.5	***Drive 5***				**ID 2271**
Minimum value:	V	**Maximum value:**	V	**Default value:**	V
Description:	Provides the motor voltage (Vac) of drive 5 while using the multi-pump mode.				

M8.4 - Motor current.

M8.4.1	***Drive 1***				**ID 2224**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 1 while using the multi-pump mode.				
M8.4.2	***Drive 2***				**ID 2236**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 2 while using the multi-pump mode.				
M8.4.3	***Drive 3***				**ID 2248**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 3 while using the multi-pump mode.				
M8.4.4	***Drive 4***				**ID 2260**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 4 while using the multi-pump mode.				
M8.4.5	***Drive 5***				**ID 2272**
Minimum value:	A	**Maximum value:**	A	**Default value:**	A
Description:	Provides the motor current (Amps) of drive 5 while using the multi-pump mode.				

Table 55. Multi-pump measurement (Cont.).

M8.5 - Motor torque.					
M8.5.1	***Drive 1***				**ID 2225**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 1 while using the multi-pump mode.				
M8.5.2	***Drive 2***				**ID 2237**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 2 while using the multi-pump mode.				
M8.5.3	***Drive 3***				**ID 2249**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 3 while using the multi-pump mode.				
M8.5.4	***Drive 4***				**ID 2261**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 4 while using the multi-pump mode.				
M8.5.5	***Drive 5***				**ID 2273**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor torque (%) of drive 5 while using the multi-pump mode.				

M8.6 - Motor power.					
M8.6.1	***Drive 1***				**ID 2226**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 1 while using the multi-pump mode.				
M8.6.2	***Drive 2***				**ID 2238**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 2 while using the multi-pump mode.				
M8.6.3	***Drive 3***				**ID 2250**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 3 while using the multi-pump mode.				
M8.6.4	***Drive 4***				**ID 2262**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 4 while using the multi-pump mode.				
M8.6.5	***Drive 5***				**ID 2274**
Minimum value:	%	**Maximum value:**	%	**Default value:**	%
Description:	Provides the motor power (%) of drive 5 while using the multi-pump mode.				

M8.7 - Motor speed.					
M8.7.1	***Drive 1***				**ID 2227**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 1 while using the multi-pump mode.				
M8.7.2	***Drive 2***				**ID 2239**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 2 while using the multi-pump mode.				
M8.7.3	***Drive 3***				**ID 2251**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 3 while using the multi-pump mode.				

Table 55. Multi-pump measurement (Cont.).

M8.7.4	***Drive 4***				**ID 2263**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 4 while using the multi-pump mode.				
M8.7.5	***Drive 5***				**ID 2275**
Minimum value:	rpm	**Maximum value:**	rpm	**Default value:**	rpm
Description:	Provides the motor speed (rpm) of drive 5 while using the multi-pump mode.				

M8.8 - Run time.

M8.8.1	***Drive 1***				**ID 2228**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 1 while using the multi-pump mode.				
M8.8.2	***Drive 2***				**ID 2240**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 2 while using the multi-pump mode.				
M8.8.3	***Drive 3***				**ID 2252**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 3 while using the multi-pump mode.				
M8.8.4	***Drive 4***				**ID 2264**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 4 while using the multi-pump mode.				
M8.8.5	***Drive 5***				**ID 2276**
Minimum value:	Hours	**Maximum value:**	Hours	**Default value:**	Hours
Description:	Provides the motor run time (h) of drive 5 while using the multi-pump mode.				

M9 - Multi-monitoring.

M9.1	***Multi-monitoring***				**ID 30**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0, 1, 2.
Description:	Displays any three monitoring values in a single screen. The values are selectable via the keypad menu. Multi-monitor page could see three lines of monitoring values. Up and down keys can be used to select the row and then hitting the left arrow key will allow for editing the value then by going up and down.				

Table 56. Parameters.

P1 - Basic parameters.					
P1.1②	***Minimum frequency***				**ID 101**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the lowest frequency at which the drive will operate. This setting will limit other frequency parameter settings. 1 = Fire mode minimum frequency. 2 = Derag. 3 = MPFC staging frequency. 4 = MPFC master fixed frequency. 5 = Prime pump frequency. 6 = Prime pump frequency 2.				

Table 56. Parameters (Cont.).

P1.2②	***Maximum frequency***				**ID 102**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MaxFreqMFG
Description:	Defines the highest frequency at which the drive will operate. This will limit other frequency parameters. 1 = Keypad reference. 2 = Motor potentiometer. 3 = Jog speed. 4 = 2nd stage ramp frequency. 5 = Fire mode minimum frequency. 6 = Derag. 7 = MPFC staging frequency. 8 = MPFC master fixed frequency. 9 = Prime pump frequency. 10 = Prime pump frequency 2. 11 = Preset speed frequency. 12 = Frequency limit value. 13 = Reference limit value. 14 = Speed control_fs2. 15 = Stall frequency limit. 16 = 4 mA fault frequency. 17 = MPFC de-staging frequency. 18 = Pipe fill loss frequency low. 19 = Pipe fill loss frequency high. 20 = Broken pipe frequency limit.				
P1.3②	***Accel. time 1***				**ID 103**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to accelerate from zero frequency to maximum frequency.				
P1.4②	***Decel. time 1***				**ID 104**
Minimum value:	0.1 s	**Maximum value:**	3,000.0 s	**Default value:**	20.0 s
Description:	Defines the time required for the output frequency to decelerate from maximum frequency to zero frequency.				
P1.5②	***Motor type selection***				**ID 1820**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Inverter duty; 1 = IPM; or 2 = SPM.				
Description:	Defines the type of motor connected to the drive: standard induction motor, internally mounted permanent magnet, or surface mount permanent magnet.				
P1.6①	***Motor nom. current***				**ID 486**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT A
Description:	Motor nameplate rated full load current. This value is found on the rating plate of the motor.				
P1.7①	***Motor nom. speed***				**ID 489**
Minimum value:	300 rpm	**Maximum value:**	20,000 rpm	**Default value:**	MotorNomSpeedMFG
Description:	Motor nameplate rated speed. This value is found on the rating plate of the motor.				
P1.8①	***Motor PF***				**ID 490**
Minimum value:	0.30	**Maximum value:**	1.00	**Default value:**	0.85
Description:	Motor nameplate rated power factor. This value is found on the rating plate of the motor.				
P1.9①	***Motor nom. voltage***				**ID 487**
Minimum value:	180 V	**Maximum value:**	690 V	**Default value:**	MotorNomVoltMFG V
Description:	Motor nameplate rated voltage. This value is found on the rating plate of the motor.				
P1.10①	***Motor nom. frequency***				**ID 488**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	MotorNomFreqMFG Hz
Description:	Motor nameplate rated frequency. This value is found on the rating plate of the motor.				

Table 56. Parameters (Cont.).

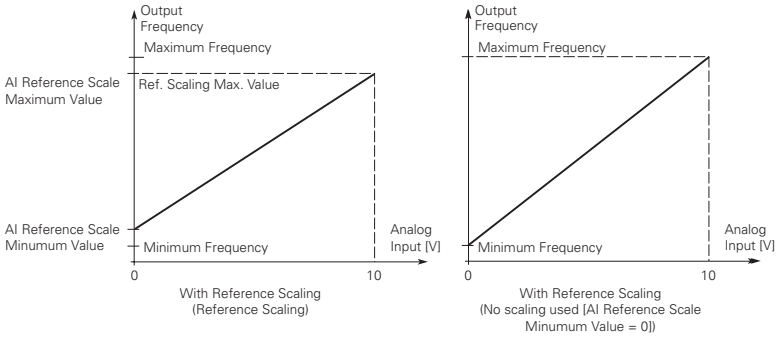
P1.11②	***Local control place***				**ID 1695**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = keypad; 1 = IO terminal; or 3 = fieldbus.				
Description:	Defines the signal location for the start command in local mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.12①②	***Local reference***				**ID 136**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = AI; 1 = Drive reference pot; 2 = AI joystick; 3 = Motor pot; 4 = Maximum frequency; 5 = PI control output; 6 = Keypad; or 7 = Fieldbus reference.				
Description:	Defines the signal location for the speed reference in local mode.				
P1.13②	***Remote control place***				**ID 135**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = IO terminal; 1 = fieldbus; or 3 = keypad.				
Description:	Defines the signal location for the start command in remote mode. I/O terminals would be from the digital hard-wired inputs or keypad for Start/Stop buttons on the drive. Keypad display will indicate which mode is selected.				
P1.14①②	***Remote reference***				**ID 137**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = AI; 1 = Drive reference pot; 2 = AI joystick; 3 = Motor pot; 4 = Maximum frequency; 5 = PI control output; 6 = Keypad; or 7 = Fieldbus reference.				
Description:	Defines the signal location for the speed reference in remote mode.				

Table 57. Inputs .

P2.1 - Basic settings.					
P2.1.1②	***AI reference scale minimum value***				**ID 144**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the minimum frequency associated with 0% input from the analog input. Setting AI ref scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				

Table 57. Inputs (Cont.).

P2.1.2②	***AI reference scale maximum value***				**ID 145**
Minimum value:	RefScaleMin Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the maximum frequency associated with 100% input from the analog input. Setting AI reference scale minimum value and AI reference scale maximum value both to zero will cause the analog input to scale to the minimum and maximum frequencies.				



P2.1.3①②	***IO terminal Start/Stop logic***				**ID 143**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Forward - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 1 = Start - reverse: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 for reverse. 2 = Start - enable: maintained input on start signal 1 to run forward and a maintained signal on start signal 2 to enable the drive to run. 3 = Start pulse - stop pulse: used for three-wire operation, start signal 1 uses a normally open start and start signal 2 uses a normally closed stop.				
Description:	Defines the functionality for start signal 1 and start signal 2. By default, start signal 1 is DI1 and start signal 2 is DI2.				

0 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with either a contact used on the start FWD or start REV commands. When contacts open, the motor stops.

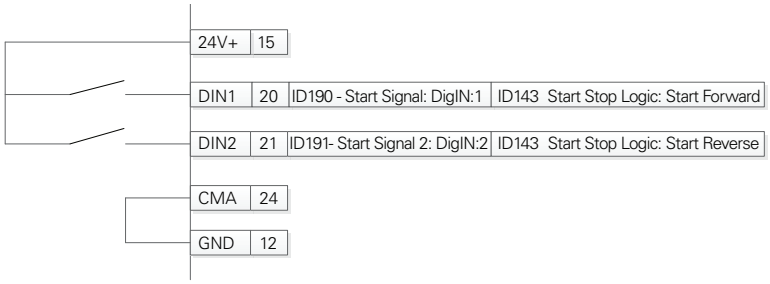
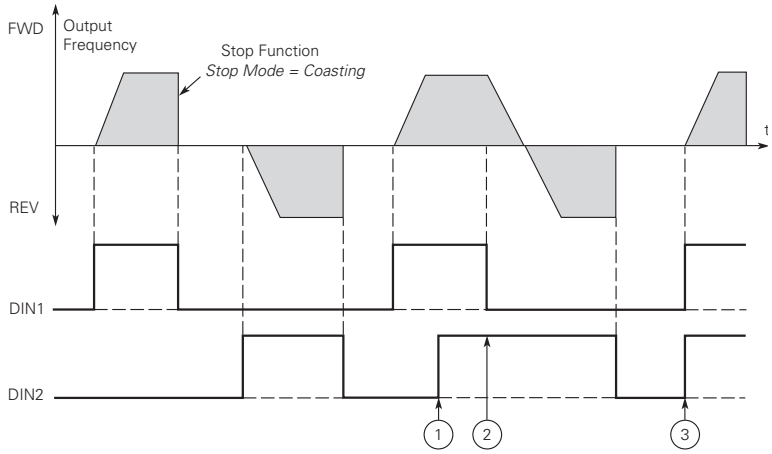
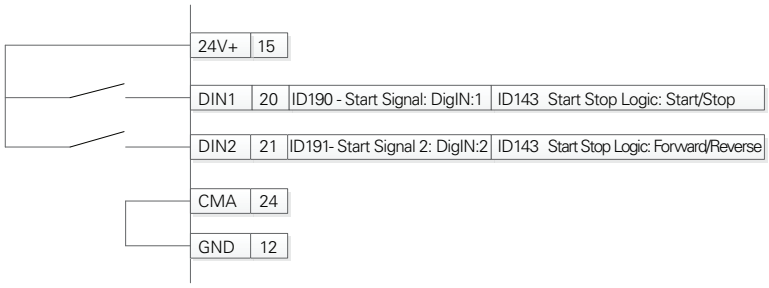


Table 57. Inputs (Cont.).



Notes: ① The first selected direction has the highest priority.
② When the DIN1 contact opens the direction of rotation starts to change.
③ If start forward (DIN1) and start reverse (DIN2) signals are active simultaneously the start forward signal (DIN1) has priority.

1 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 2-wire control with a contact on start/stop, contact open it stops and direction on 2nd start signal.



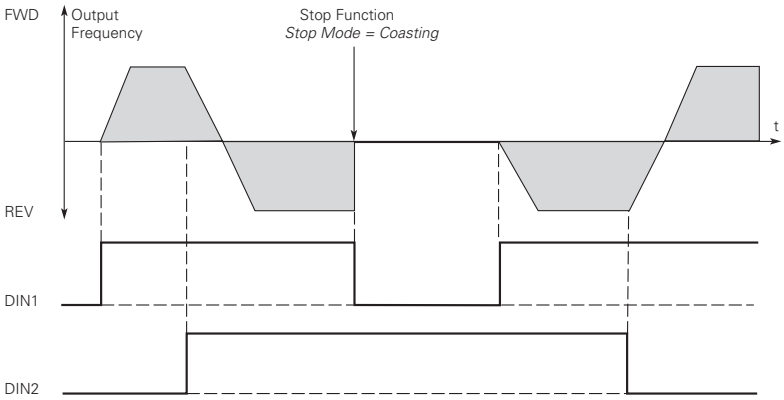
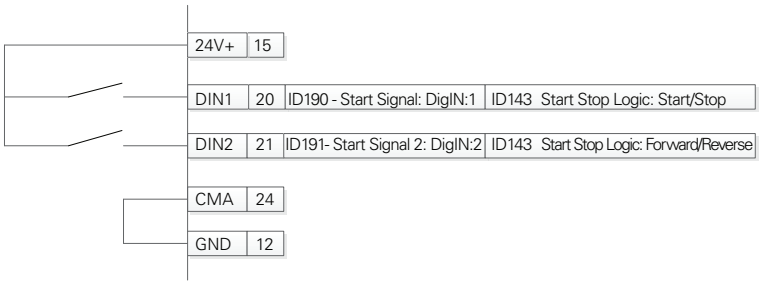
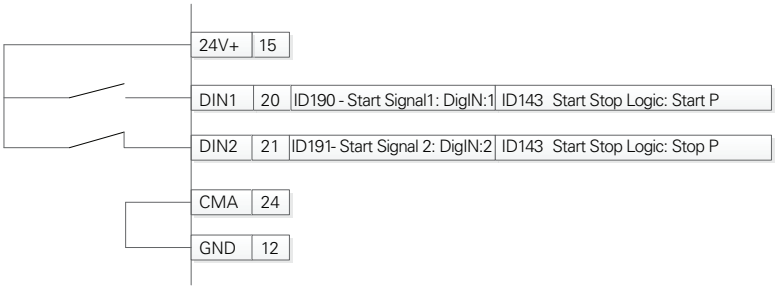


Table 57. Inputs (Cont.).

2 = P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 2 required to be closed to enable start on start signal 1.



3 = Three-wire connection (pulse control): P3.2: IO terminal start signal 1 = start forward - P3.3: IO terminal start signal 2 = start reverse. This would be considered 3-wire control with start signal 1 being the start pulse and start signal 2 being the NC stop.



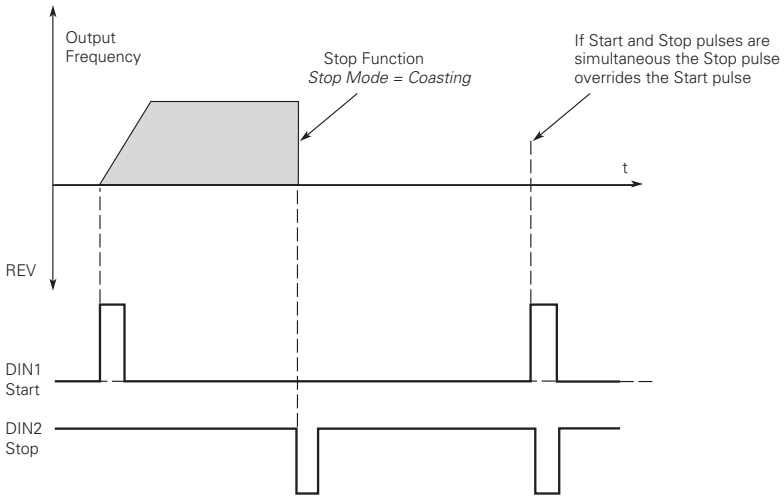


Table 57. Inputs (Cont.).

P2.1.4②	***External fault 1 text***				**ID 2227**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = External fault; 1 = Vibration cutout; 2 = High motor temperature; 3 = Low pressure; 4 = High pressure; 5 = Low water; 6 = Damper interlock; 7 = Run enable; 8 = Freeze stat trip; 9 = Smoke detect; 10 = Seal leakage; 11 = Rod breakage; or 12 = Belt break.				
Description:	Defines the text to be displayed when external fault 1 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in web server.				
P2.1.5②	***External fault 2 text***				**ID 2298**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = External fault; 1 = Vibration cutout; 2 = High motor temperature; 3 = Low pressure; 4 = High pressure; 5 = Low water; 6 = Damper interlock; 7 = Run enable; 8 = Freeze stat trip; 9 = Smoke detect; 10 = Seal leakage; 11 = Rod breakage; or 12 = Belt break.				
Description:	Defines the text to be displayed when external fault 2 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in webserver.				
P2.1.6②	***External fault 3 text***				**ID 2299**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = External fault; 1 = Vibration cutout; 2 = High motor temperature; 3 = Low pressure; 4 = High pressure; 5 = Low water; 6 = Damper interlock; 7 = Run enable; 8 = Freeze stat trip; 9 = Smoke detect; 10 = Seal leakage; 11 = Rod breakage; or 12 = Belt break.				
Description:	Defines the text to be displayed when external fault 3 NO or NC is triggered. This text will be viewable using a remote keypad, PowerXpert inControl, or the built in webserver.				
P2.1.7②	***Motor pot ramp time***				**ID 156**
Minimum value:	0.1 Hz/s	**Maximum value:**	2,000.0 Hz/s	**Default value:**	10.0 Hz/s
Description:	Defines the speed of change for the motor potentiometer reference value.				
P2.1.8②	***Motor pot reference reset***				**ID 169**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No reset - reference stays at last setting; 1 = Memory reset in stop and power down - reference resets to 0 when drive is stopped or the power is cycled to the drive; or 2 = Memory reset in power down - reference resets to 0 when drive is powered down only.				
Description:	Defines how the motor pot reference signal is handled on shutting down frequency converter output or powering down the frequency converter.				

Table 57. Inputs (Cont.).

P2.2 - Digital input.					
P2.2.1②	***DI1 function***				**ID 1801**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to 3 start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./Decel. time set, when open, Accel./Decel. time 1 will be used. When closed, Accel./Decel. time 2 will be used. 17 = Accel./Decel. prohibit, when closed, the drive will hold the output frequncy and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed setpoint 2 is active. 24 = Motor interlock 1, when closed, motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, the fire mode will be active. 27 = Fire mode Ref. 1/2 select, when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, the preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 1.				
P2.2.2②	***DI1 invert***				**ID 1802**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	When enabled, the function assigned to DI1 will be activated with the opposite state of DI1.				

Table 57. Inputs (Cont.).

P2.2.3②	***DI2 function***				**ID 1803**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 2.				
P2.2.4②	***DI2 invert***				**ID 1804**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	When enabled, the function assigned to DI2 will be activated with the opposite state of DI2.				

Table 57. Inputs (Cont.).

P2.2.5②	***DI3 function***				**ID 1805**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 2, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 3.				
P2.2.6②	***DI3 invert***				**ID 1806**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	When enabled, the function assigned to DI3 will be activated with the opposite state of DI3.				

Table 57. Inputs (Cont.).

P2.2.7②	***DI4 function***				**ID 1807**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 3, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of digital input 4.				
P2.2.8②	***DI4 invert***				**ID 1808**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	When enabled, the function assigned to DI4 will be activated with the opposite state of DI4.				

Table 57. Inputs (Cont.).

P2.2.9②	***Virtual RO1 input***				**ID 1809**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 3, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of virtual RO1.				
P2.2.10②	***Virtual RO1 invert***				**ID 1810**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	When enabled, the function assigned to virtual RO1 input will be activated with the opposite state of virtual RO1 input.				

Table 57. Inputs (Cont.).

P2.2.11②	***Virtual RO2 input***				**ID 1811**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not used, no action. 1 = IO terminal start signal 1, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 2 = IO terminal start signal 3, when the control source is set to IO terminal, this input when closed will perform the action defined by P2.1.3. 3 = Reverse, when Start/Stop logic is set to three start pulse stop pulse, this input will cause the drive to start in the reverse direction. 4 = Ext. fault 1, when closed, Ext. fault 1 will be activated. 5 = Ext. fault 2, when closed, Ext. fault 2 will be activated. 6 = Ext. fault 3, when closed, Ext. fault 3 will be activated. 7 = Fault reset, when closed, all active faults will be reset. 8 = Run enable, when closed, the drive will allow a start command and be in the ready state. 9 = Preset speed B0, the seven preset speeds are selected via three binary inputs. This is least significant bit in that binary input. 10 = Preset speed B1, the seven preset speeds are selected via three binary inputs. 11 = Preset speed B2, the seven preset speeds are selected via three binary inputs. This is most significant bit in that binary input. 12 = Jog enable, when closed, the jog speed defined at P2.3.8 will override the frequency reference. 13 = Accel. pot value, when closed, the motor potentiometer value will increment at the rate defined by motor pot ramp time. 14 = Decel. pot value, when closed, the motor potentiometer value will decrement at the rate defined by motor pot ramp time. 15 = Reset pot zero, when closed, the motor potentiometer value will reset to zero. 16 = Accel./decel. time set, when open, accel./decel. time 1 will be used. When closed, accel./decel. time 2 will be used. 17 = Accel./decel. prohibit, when closed, the drive will hold the output frequency and ignore changes to the reference value. 18 = No access to param., when closed, no changes can be made to any setting in the drive. 19 = Remote control, when closed, the drive will be forced to the remote control place. 20 = Local control, when closed, the drive will be forced to the local control place. 21 = Parameter 1/2 Sel., when open, parameter set 1 is active. When closed, Parameter set 2 is active. 22 = PI controller, when closed, the drive will force the reference source to PI controller output. 23 = PI setpoint select, when open, parameter setpoint 1 is active. When closed, setpoint 2 is active. 24 = Motor interlock 1, when closed, the motor will be enabled to run. 25 = Smoke mode, when closed, smoke mode will be active. 26 = Fire mode, when closed, fire mode will be active. 27 = Fire mode Ref. 1/2 Sel., when fire mode is active and this input is open, fire mode Ref. 1 will be active. When closed, fire mode Ref. 2 will be active. 28 = Fire mode reverse, when fire mode is active and this input is open, the direction will be forward. When closed, the direction will be reverse. 29 = DC brake active, when closed, DC injection braking will be active. 30 = Preheat active, when closed, preheat mode will be active. 31 = Derag. enable, when closed, the Derag. cycle for pumps will be initiated.				
Description:	Defines the function of virtual RO2.				
P2.2.12②	***Virtual RO2 invert***				**ID 1810**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	When enabled, the function assigned to virtual RO2 input will be activated with the opposite state of virtual RO2 input.				

P2.3 - Preset speed.

P2.3.1②	***Preset speed 1***				**ID 105**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.2②	***Preset speed 2***				**ID 106**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	10.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.3②	***Preset speed 3***				**ID 118**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	15.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.4②	***Preset speed 4***				**ID 119**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	20.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				

Table 57. Inputs (Cont.).

P2.3.5②	***Preset speed 5***				**ID 120**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.6②	***Preset speed 6***				**ID 121**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	30.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.7②	***Preset speed 7***				**ID 122**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	35.00 Hz
Description:	Preset speed is selected with digital inputs using a binary input.				
P2.3.8②	***Jog reference***				**ID 117**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the jogging speed set point - this speed is selected with the digital input programmed for jogging speed. When enabled, the drive starts and ramps to this speed, input removed drive stops.				

P2.4 - AI settings.

P2.4.1	***AI mode***				**ID 222**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog input mode to current or voltage the DIP switches on control board will need to be set to the same mode as this parameter. *DM1 PRO CN5 terminals 8 and 9 for current or voltage, also need to set DIP switches SW2 2 and 3 on control board, near the RJ45 port. DIP switches SW2 2 and 3 off for voltage. Current mode, if using the +10 V supply on CN5 terminals 13 of the DM1 / DM1 Pro, it will require DIP switches SW2 2 and 3 on to complete the current loop. When doing a current loop with an external supply, the DIP switches SW2 2 off and 3 on.				

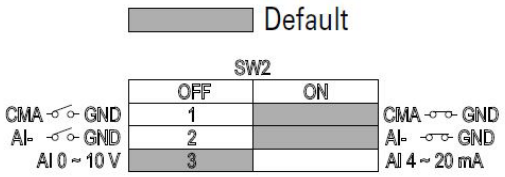
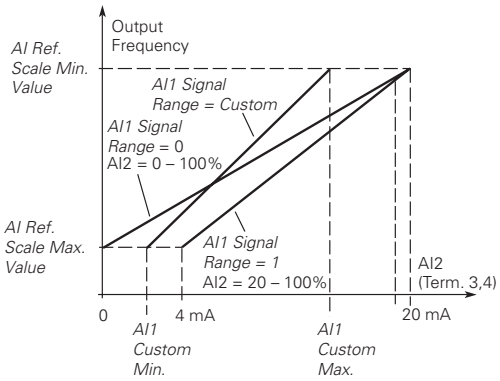
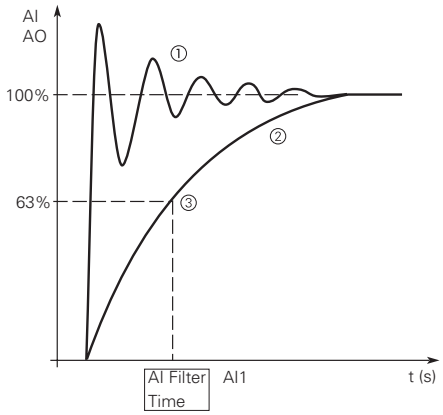


Table 57. Inputs (Cont.).

P2.4.2②	***AI signal range***				**ID 175**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0-100%/0-20 mA/0-10 V. 1 = 20-100%/4-20 mA/2-10 V. 2 = Customized.				
Description:	With this parameter, you can select the analog input 1 signal range. For selection "Customized," see "AI Custom Min" and "AI Custom Max", this enables a customized signal range.				



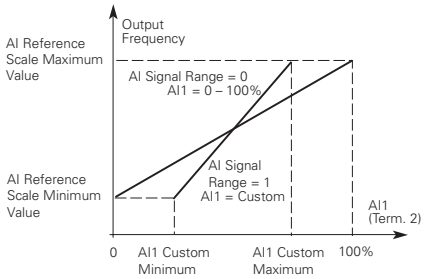
P2.4.3②	***AI custom minimum***				**ID 176**
Minimum value:	0.00%	**Maximum value:**	Ai1CustomMax %	**Default value:**	0.00%
Descriptions:	Defines the minimum percentage for the input range to be associated with AI reference minimum scale.				
P2.4.4②	***AI custom maximim***				**ID 177**
Minimum value:	Ai1CustomMin %	**Maximum value:**	100.00%	**Default value:**	100.00%
Descriptions:	Defines the minimum percentage for the input range to be associated with AI reference maximum scale.				
P2.4.5②	***AI filter time***				**ID 174**
Minimum value:	0.00 s	**Maximum value:**	10.00 s	**Default value:**	0.10 s
Descriptions:	Defines the filter time applied to the analog input signal, zero equals no filtering.				



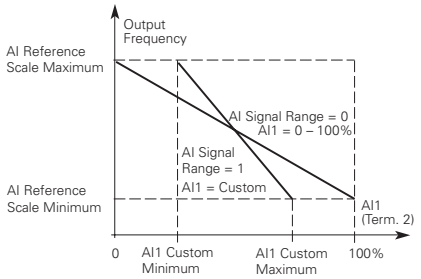
Notes: ① Analog signal with faults (unfiltered).
② Filtered analog signal.
③ Filter time constant at 63% of the set value.

Table 57. Inputs (Cont.).

P2.4.6②	***AI signal invert***			**ID 181**
Minimum value:		**Maximum value:**	**Default value:**	0
Options:	0 = Not invert; or 1 = Invert.			
Descriptions:	Defines the filter time applied to the analog input signal, zero equals no filtering.			



AI1 Signal Inversion



Maximum AI1 signal = minimum set speed.
Minimum AI1 signal = maximum set speed.

P2.4.7②	***AI joystick hysteresis***				**ID 178**
Minimum value:	0.00%	**Maximum value:**	20.00%	**Default value:**	0.00%
Descriptions:	Defines the joystick hysteresis - when the analog input is within this range, the drive will interpret this as a zero speed reference.				

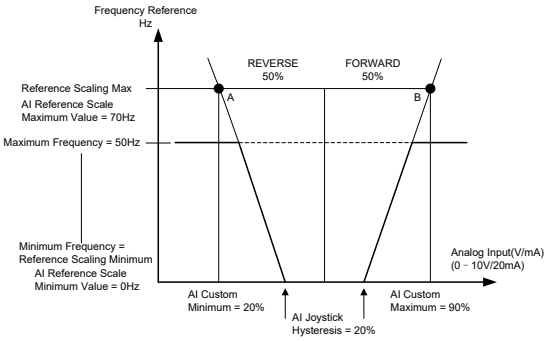
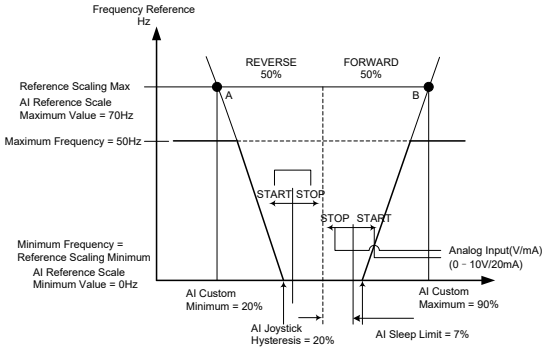


Table 57. Inputs (Cont.).

P2.4.8②	***AI sleep limit***				**ID 179**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	0.00%
Descriptions:	Defines the sleep level of the analog input - if the analog input signal is below this level for a time greater than the analog sleep delay, the drive will transition to a sleep state and restart when the analog input increases above this level.				



P2.4.9②	***AI sleep delay***				**ID 180**
Minimum value:	0.00 s	**Maximum value:**	320.00 s	**Default value:**	0.00 s
Descriptions:	Defines the delay for the analog input sleep level.				
P2.4.10②	***AI joystick offset***				**ID 133**
Minimum value:	-50.00%	**Maximum value:**	50.00%	**Default value:**	0.00%
Descriptions:	Joysticks zero point by default is the middle of AI range. Joystick offset defines how much the zero point is moved in the forward or reverse from this analog input center point.				

P2.5 - Drive reference pot.

P2.5.1②	***Pot custom minimum***				**ID 1814**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	20.00%
Description:	Defines the minimum percentage for the input range to be associated with AI reference minimum scale.				
P2.5.2②	***Pot custom maximim***				**ID 1815**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	100.00%
Description:	Defines the maximum percentage for the input range to be associated with AI reference maximum scale.				
P2.5.3②	***Pot filter time***				**ID 1816**
Minimum value:	0.00 s	**Maximum value:**	10.00 s	**Default value:**	1.00 s
Description:	Defines the filter time applied to the analog input signal - zero equals no filtering.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 58. Outputs.

P3.1 - Digital output.					
P3.1.1②	***RO1 function***				**ID 152**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - the output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Un-requested rotation direction - the active direction isn't the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controled by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - Cold weather mode is active; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - accel./decel. time 2 is active; 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 1.				
P3.1.2②	***RO1 on delay***				**ID 2112**
Minimum value:	0.0 s	**Maximum value:**	320.0 s	**Default value:**	0.0 s
Description:	Delay time for RO1 relay to turn on after signal received.				
P3.1.3②	***RO1 off delay***				**ID 2113**
Minimum value:	0.0 s	**Maximum value:**	320.0 s	**Default value:**	0.0 s
Description:	Delay time for RO1 relay to turn off after signal removed.				

Table 58. Outputs (Cont.).

P3.1.4②	***RO2 function***				**ID 153**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - drive is outputting reverse phase rotation; 7 = At speed - the output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque Off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Un-requested rotation direction - the active direction isn't the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controled by fieldbus control word; 33 = Fieldbus input 2 - controled by fieldbus control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - Cold weather mode is active; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - accel./decel. time 2 is active; 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of relay output 2.				
P3.1.5②	***RO2 on delay***				**ID 2114**
Minimum value:	0.0 s	**Maximum value:**	320.0 s	**Default value:**	0.0 s
Description:	Delay time for RO2 relay to turn on after signal received.				
P3.1.6②	***RO2 off delay***				**ID 2115**
Minimum value:	0.0 s	**Maximum value:**	320.0 s	**Default value:**	0.0 s
Description:	Delay time for RO2 relay to turn off after signal removed.				
P3.1.7②	***RO2 reverse***				**ID 2118**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No; or 1 = Yes.				
Description:	Inverts RO2 to be normally closed on the Form A relay.				

Table 58. Outputs (Cont.).

P3.1.8②	***Virtual RO1 function***				**ID 2463**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - the drive is outputting reverse phase rotation; 7 = At speed - the output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - the active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controled by FB control word; 33 = Fieldbus input 2 - controled by FB control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - accel./decel. time 2 is active; 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of virtual RO.				

Table 58. Outputs (Cont.).

P3.1.9②	***Virtual RO2 function***				**ID 2464**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used - no action; 1 = Ready - drive is ready for operation; 2 = Run - drive is running; 3 = Fault - drive is faulted; 4 = Fault invert - drive is not faulted; 5 = Warning - drive has a warning message; 6 = Reverse - the drive is outputting reverse phase rotation; 7 = At speed - the output frequency has reached the set reference; 8 = Zero frequency - drive output is at zero frequency; 9 = Frequency limit supervision - supervision for frequency limit 1 is activated; 10 = PI supervision - supervision for PI controller is activated; 11 = Torque limit supervision - supervision for torque limit; 12 = Reference limit supervision - supervision for reference limit; 13 = Power limit supervision - supervision for power limit; 14 = Temperature limit supervision - supervision for drive temperature limit; 15 = Analog input supervision - supervision for analog input limit; 16 = Motor current supervision - supervision for motor current limit; 17 = Over heat fault - drive over heat fault has occurred; 18 = Over current regular - over current regulator is enabled; 19 = Over volt regular - over volt regulator is enabled; 20 = Under volt regular - under volt regulator is enabled; 21 = 4 mA fault - 4 mA fault has occurred; 22 = External fault - external fault has occurred; 23 = Motor thermal fault - motor thermal fault has occurred; 24 = STO fault output - safe torque off input is activated; 25 = Control from IO - I/O is the selected start command location; 26 = Remote control - remote is the control place; 27 = Unrequested rotation direction - the active direction is not the same as the reference direction; 28 = Fire mode - drive is in fire mode; 29 = Damper control - damper control output; 30 = Valve control - valve control output; 31 = Jog speed - drive is in jog mode; 32 = Fieldbus input 1 - controled by FB control word; 33 = Fieldbus input 2 - controled by FB control word; 34 = DC charge switch close - DC pre-charge relay is closed; 35 = Preheat active - preheat control mode is activated; 36 = Cold weather active - cold weather mode is active; 37 = PI sleep - PI controller is in a sleep state; 38 = 2nd stage ramp frequency active - accel./decel. time 2 is active; 39 = Prime pump active - drive is running in prime pump mode; 40 = Master drive state - indicates it is the master drive in the multi-pump control mode; 41 = Slave drive state - indicates it is the slave drive in the multi-pump control mode; or 43 = Single drive control - indicates the motor contactor is open or close in multi-pump control mode.				
Description:	Defines the function associated with changing the state of virtual RO.				

P3.2 - Supervisions.

P3.2.1②	***Frequency limit supervision***				**ID 154**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit Supervision.				
Description:	Selects how the drives frequency limit supervision controller functions.				
P3.2.2②	***Frequency limit display***				**ID 1821**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				

Table 58. Outputs (Cont.).

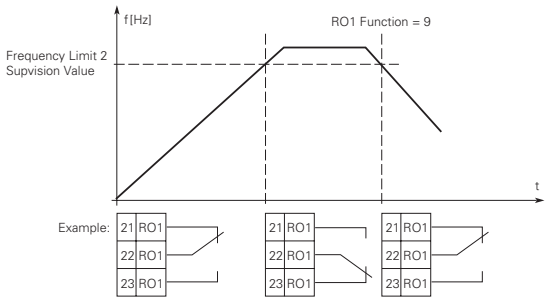
P3.2.3②	***Frequency limit supervision value***				**ID 155**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Selects the frequency value supervised by the frequency limit supervision function.				
P3.2.4②	***Frequency limit supervision hysteresis***				**ID 2200**
Minimum value:	0.10 Hz	**Maximum value:**	1.00 Hz	**Default value:**	0.10 Hz
Description:	This value selects the bandwidth between when the output frequency supervision enables and disables.				
P3.2.5②	***Torque limit supervision***				**ID 159**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	Supervision display selection.  				
P3.2.6②	***Torque limit display***				**ID 1822**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.7②	***Torque limit supervision value***				**ID 160**
Minimum value:	-1,000.00%	**Maximum value:**	1,000.00%	**Default value:**	100.00%
Description:	Selects the torque value supervised by the torque limit supervision function.				
P3.2.8②	***Torque limit supervision hysteresis***				**ID 2202**
Minimum value:	1.00%	**Maximum value:**	5.00%	**Default value:**	1.00%
Description:	This value selects the bandwidth between when the torque supervision enables and disables.				
P3.2.9②	***Reference limit supervision***				**ID 161**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	This value selects the bandwidth between when the torque supervision enables and disables.				
P3.2.10②	***Reference limit display***				**ID 1823**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				

Table 58. Outputs (Cont.).

P3.2.11②	***Reference limit supervision value***				**ID 162**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Selects the reference frequency value supervised by the reference frequency limit supervision function.				
P3.2.12②	***Reference limit supervision hysteresis***				**ID 12203**
Minimum value:	0.10 Hz	**Maximum value:**	1.00 Hz	**Default value:**	0.10 Hz
Description:	This value selects the bandwidth between when the reference limit supervision enables and disables.				
P3.2.13②	***Temperature limit supervision***				**ID 165**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	Selects how the drives temperature limit supervision controller functions.				
P3.2.14②	***Temperature limit display***				**ID 1842**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.15②	***Temperature limit supervision value***				**ID 166**
Minimum value:	-10.0°C	**Maximum value:**	75.0°C	**Default value:**	40.0°C
Description:	Selects the drive temperature value supervised by the drive temperature limit supervision function.				
P3.2.16②	***Temperature limit supervision hysteresis***				**ID 2204**
Minimum value:	1.0°C	**Maximum value:**	10.0°C	**Default value:**	1.0°C
Description:	This value selects the bandwidth between when the temperature limit supervision enables and disables.				
P3.2.17②	***Power limit supervision***				**ID 167**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	Selects how the drives power limit supervision controller function.				
P3.2.18②	***Power limit display***				**ID 1825**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.19②	***Power limit supervision value***				**ID 168**
Minimum value:	-200.0%	**Maximum value:**	200.0%	**Default value:**	0.0%
Description:	Selects the output power value supervised by the power limit supervision function.				
P3.2.20②	***Power limit supervision hysteresis***				**ID 2205**
Minimum value:	0.1%	**Maximum value:**	10.0%	**Default value:**	0.1%
Description:	This value selects the bandwidth between when the power limit supervision enables and disables.				

Table 58. Outputs (Cont.).

P3.2.21②	***AI supervision select***				**ID 170**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Analog reference from AI; or 1 = Analog reference from keypad potentiometer.				
Description:	Selects analog signal to use for the analog input supervision.				
P3.2.22②	***AI limit supervision***				**ID 171**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	Selects analog signal to use for the analog input supervision.				
P3.2.23②	***AI limit display***				**ID 1826**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.24②	***AI limit supervision value***				**ID 172**
Minimum value:	1.00%	**Maximum value:**	10.00%	**Default value:**	0.00%
Description:	Selects the analog reference value supervised by the analog reference limit supervision function.				
P3.2.25②	***AI supervision hysteresis***				**ID 2198**
Minimum value:	1.00%	**Maximum value:**	10.00%	**Default value:**	1.00%
Description:	This value selects the bandwidth between when the AI supervision enables and disables.				
P3.2.26②	***Motor current supervision***				**ID 2189**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No limit; 1 = Low limit supervision; or 2 = High limit supervision.				
Description:	Selects how the motor current limit supervision controller functions.				
P3.2.27②	***Motor current limit display***				**ID 1827**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.28②	***Motor current supervision value***				**ID 2190**
Minimum value:	0.00 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT A
Description:	Selects the motor current value supervised by the motor current limit supervision function.				
P3.2.29②	***Motor current supervision hysteresis***				**ID 2196**
Minimum value:	0.10 A	**Maximum value:**	1.00 A	**Default value:**	0.10 A
Description:	This value selects the bandwidth between when the motor current supervision enables and disables.				

Table 58. Outputs (Cont.).

P3.2.30②	***PI supervision enable***				**ID 1346**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Upper and lower limits around the reference are set. When the actual value goes above or below the upper limit and lower limit, the delay timer will increment. When the actual value is within the allowed area, the delay counter decrements. After the delay time expires, the relay output for PI supervision will be activated. This function is used for process value out of range faults.				
P3.2.31②	***PI supervision display***				**ID 1828**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enable DO; 1 = Warning (W/O S)/enable DO; 2 = Warning (W S)/enable DO; or 3 = Fault/enable DO.				
Description:	Supervision display selection.				
P3.2.32②	***PI supervision upper limit***				**ID 1347**
Minimum value:	PI Process Unit Min varies	**Maximum value:**	PI Process Unit Max varies	**Default value:**	0.00 varies
Description:	Upper limit for PI feedback value used with the PI supervision controller.				
P3.2.33②	***PI supervision lower limit***				**ID 1349**
Minimum value:	PI Process Unit Min varies	**Maximum value:**	PI Process Unit Max varies	**Default value:**	0.00 varies
Description:	Lower limit for PI feedback value used with the PI supervision controller.				
P3.2.34②	***PI supervision delay***				**ID 1351**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	Defines the delay time that the PI feedback value must be out of range before activating the PI supervision output.				

P3.3 - Analog output.

P3.3.1②	***AO mode***				**ID 227**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = 0 - 20 mA; or 1 = 0 - 10 V.				
Description:	Defines the analog output mode to current or voltage.				

Table 58. Outputs (Cont.).

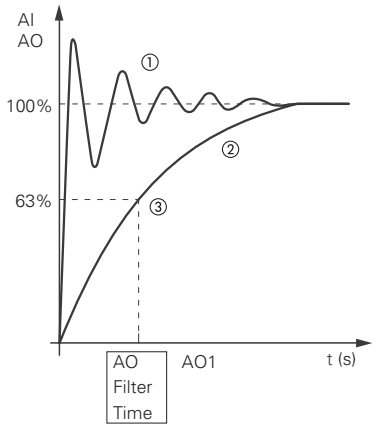
P3.3.2②	***AO function***				**ID 146**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	1 = Output frequency (0 -mMax frequency); 2 = Frequency reference (0 - max frequency); 3 = Motor speed RPM (0 - nameplate RPM); 4 = Motor current (0 - nameplate current); 5 = Motor torque (0 - calculated nominal); 6 = Motor power (0 - calculated nominal); 7 = Motor voltage (0 - nameplate voltage); 8 = DC bus voltage (0 - 1000 Vdc); 9 = PI setpoint (process unit minimum - process unit maximum); 10 = PI error value (process unit minimum - process unit maximum); 11 = PI output (process unit minimum- process unit maximum); 12 = Analog input (0% - 100%); 13 = Drive reference potentiometer (0% - 100%); 14 = Fieldbus process data input 1 (0% - 100%); 15 = Fieldbus process data input 2 (0% - 100%); 16 = Fieldbus process data input 3 (0% - 100%); 17 = Fieldbus process data input 4 (0% - 100%); 18 = Fieldbus process data input 5 (0% - 100%); 19 = Fieldbus process data input 6 (0% - 100%); 20 = Fieldbus process data input 7 (0% - 100%); 21 = Fieldbus process data input 8 (0% - 100%); 22 = User defined output (user defined minimum - user defined maximum); 23 = Motor torque (0% - 200%); or 24 = Motor power absolute value (0% - 100%).				
Description:	Select the function desired to the terminal AO1.				
P3.3.3②	***AO filter time***				**ID 147**
Minimum value:	0.00 s	**Maximum value:**	10.00 s	**Default value:**	1.00 s
Description:	Defines the filter time applied to the analog output signal. Zero equals no filtering.  **Notes** ① Analog signal with faults (unfiltered). ② Filtered analog signal. ③ Filter time constant at 63% of the set value.				
P3.3.4②	***AO custom minimum***				**ID 1863**
Minimum value:	N.A.%	**Maximum value:**	N.A.%	**Default value:**	0.00%
Description:	Input axis start point x1, define AO function selected signal minimum value (percent) that user wants. Default value is 0. Negative value shall be allowed for x1. From (x1, y1) and (x2, y2) will get gain and offset. Then expected AO will calculate from gain and offset.				
P3.3.5②	***AO custom maximum***				**ID 1865**
Minimum value:	N.A.%	**Maximum value:**	N.A.%	**Default value:**	100.00%
Description:	Input axis end piont x2, define AO function selected signal maximum value (percent) that user wants. Default value is 100%. Negative value shall be allowed for x2. From (x1,y1) and (x2,y2) will get gain and offset. Then expected AO will calculate from gain and offset.				

Table 58. Outputs (Cont.).

P3.3.6②	***AO value minimum***				**ID 1867**
Minimum value:	0.00 varies	**Maximum value:**	100.00 varies	**Default value:**	0.00 varies
Description:	Start point output axis y1, define AO value selected by AO mode, y1 is related to x1. Default value is 0 mA. From (x1,y1) and (x2,y2) will get gain and offset. Then expected AO will calculate from gain and offset.				
P3.3.7②	***AO value maximum***				**ID 1868**
Minimum value:	0.00 varies	**Maximum value:**	100.00 varies	**Default value:**	20.00 varies
Description:	End point output axis y2, define AO value selected by AO mode, y2 is related to x2. Default value is 20 mA. From (x1,y1) and (x2,y2) will get gain and offset. Then expected AO will calculate from gain and offset.				

② Parameter value will be set to be default when changing macros.

Table 59. Drive control.

P4.1 - Basic settings.					
P4.1.1②	***Keypad reference***				**ID 141**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq HZ	**Default value:**	0.00 Hz
Description:	Keypad reference value.				
P4.1.2②	***Keypad/drive reference pot direction***				**ID 141**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options"	0 = Forward; or 1 = Reverse.				
Description:	Forward - the rotation of the motor is forward or clockwise direction, when the keypad is the active control place. Reverse - the rotation of the motor is reversed or counter clockwise direction, when the keypad is the active control place.				
P4.1.3②	***Keypad stop***				**ID 114**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Enabled - keypad operation - In this mode, the keypad stop will only operate when the control source is set to keypad. 1 = Always enabled - In this mode, the stop button will always stop the drive regardless of control mode.				
Description:	Enabled or always enabled keypad operation.				
P4.1.4①	***Reverse enabled***				**ID 1679**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables or disables the reverse motor direction.				
P4.1.5	***Change phase sequence motor***				**ID 2515**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change disable; or 1 = Change enable.				
Description:	This parameter allows for swapping the motor phase output from u, v, w to u, w, v.				
P4.1.6②	***Power up local remote select***				**ID 1685**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Hold last; 1 = Local control; or 2 = Remote control.				
Description:	Selects what control place the drive will start at after power is applied. The default setting will hold the last state that the drive was in when powered down, selecting Local or Remote will cause the drive to start in that mode regardless of last state.				

Table 59. Drive control (Cont.).

P4.1.8②	***Start mode***				**ID 252**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Ramp - The drive starts from 0 Hz and ramps to the frequency reference value. 1 = Flying start from stop frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the last operating frequency as a starting point. 2 = Flying start from maximum frequency - The drive will catch a spinning motor. This setting searches for the current frequency using the maximum operating frequency as a starting point.				
Description:	Selects the start mode operation.				
P4.1.9②	***Stop mode***				**ID 253**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Coasting - After a stop command, the motor coasts to a stop uncontrolled by the drive. 1 = Ramp - After the stop command, the speed of the motor is decelerated according to the set deceleration parameters.				
Description:	Selects the stop mode operation.				
P4.1.10②	***Ramp 1 shape***				**ID 247**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 seconds gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				

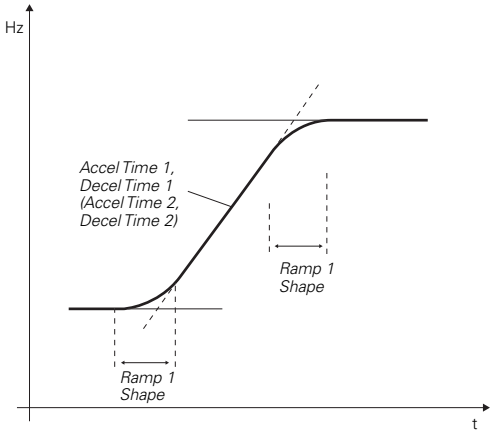
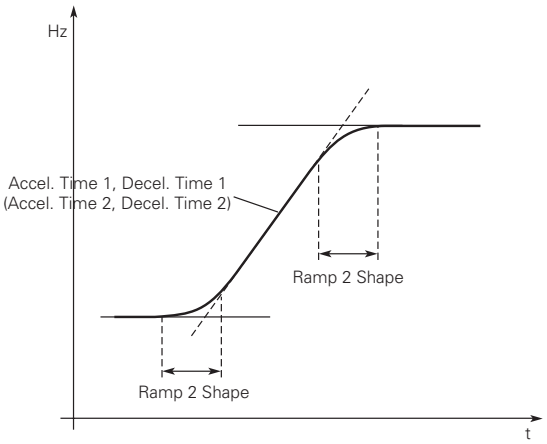


Table 59. Drive control (Cont.).

P4.1.11②	***Ramp 2 shape***				**ID 248**
Minimum value:	0.0 s	**Maximum value:**	10.0 s	**Default value:**	0.0 s
Description:	The start and end of the acceleration and deceleration ramps can be smoothed with these parameters. Setting a value of 0.00 gives a linear ramp shape that causes acceleration and deceleration to react immediately to the changes in the reference signal. Setting a value from 0.10 to 10.00 seconds for this parameter produces an S-shaped acceleration/deceleration at the start and stop of the slope.				



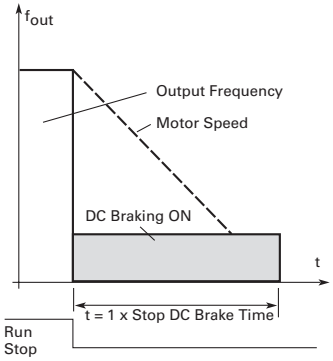
P4.1.12②	***Accel. time 2***				**ID 249**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to accelerate from the zero frequency to the set maximum frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.13②	***Decel. time 2***				**ID 250**
Minimum value:	0.1 s	**Maximum value:**	3000.0 s	**Default value:**	10.0 s
Description:	These values correspond to the time required for the output frequency to decelerate from the set maximum frequency to the zero frequency. These parameters provide the possibility to set two different acceleration/deceleration time sets for one application. The active set can be selected with the programmable digital input.				
P4.1.14①②	***2nd Stage ramp frequency***				**ID 2444**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	30.00 Hz
Description:	When 2nd stage ramp frequency is the frequency level at which the drive will enable the 2nd stage ramp frequency output function. This then can be used for other inputs or devices to signal a frequency level.				
P4.1.15①②	***Fult reset start***				**ID 2483**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Start/stop after fault reset - the run command has to be cycled to restart after fault reset; or 1 = Restart after fault reset - the run command is still active after fault the drive will restart without re-sending command.				
Description:	Defines how the drive run command responds after a fault reset command.				

P4.2 - Brake.

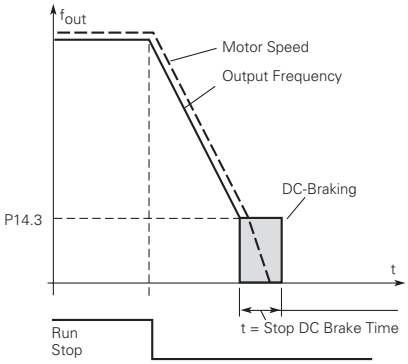
P4.2.1①②	***Brake chopper enable***				**ID 829**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable - dynamic brake OFF; or 1 = Enable - dynamic brake ON.				
Description:	If an external resistor is connected to the drive setting, this parameter to enabled will allow excess DC bus voltage to be bled off through the attached resistor.				

Table 59. Drive control (Cont.).

P4.2.2①②	***DC brake current***				**ID 254**
Minimum value:	DriveNomCurrCT*15/100 A	**Maximum value:**	DriveNomCurrCT*15/10 A	**Default value:**	DriveNomCurrCT*1/2 A
Description:	Defines the current level injected into the motor during DC-braking.				
P4.2.3①②	***Start DC brake time***				**ID 263**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	0.00 s
Description:	This parameter defines the time the drive injects DC braking current before starting to ramp. This can be used to stop motors that are potentially spinning before a run command is given or before ramping to reference level. This is to stop motors that are potentially spinning before a run command is given.				
P4.2.4①②	***Stop DC brake frequency***				**ID 262**
Minimum value:	0.10 Hz	**Maximum value:**	10.00 Hz	**Default value:**	1.50 Hz
Description:	During a ramp to stop, this parameter defines the output frequency to be below to begin DC braking.				
P4.2.5①②	***Stop DC brake time***				**ID 255**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	0.00 s
Description:	Determines the length of DC braking while stopping. 0.00 = DC brake is not used; or >0.0 = The amount of time DC-braking will occur after falling below the stop DC brake frequency.				



DC braking time when stop mode = coasting.



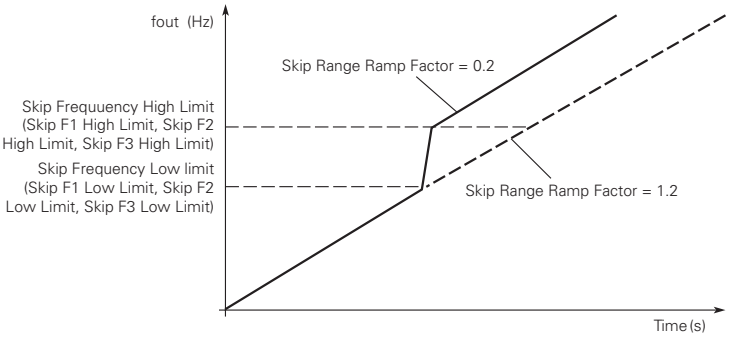
DC braking time when stop mode = ramp.

Table 59. Drive control (Cont.).

P4.2.6①②	***Flux brake***				**ID 266**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Flux braking OFF; or 1 = Flux braking ON.				
Description:	While stopping, the output frequency is reduced and the flux in the motor is increased, which in turn increases the motor's capability to brake. Unlike DC braking, the motor speed remains controlled during braking. The flux braking can be set ON or OFF. **Note:** Flux braking converts the energy into heat in the motor and should be used carefully to avoid motor damage.				
P4.2.7①②	***Flux brake current***				**ID 265**
Minimum value:	MotorNomCurr*1/10	**Maximum value:**	CurrLimit A	**Default value:**	MotorNomCurr*1/2 A
Description:	Defines the flux braking current value output when flux brake is enabled.				

P4.3 - Skip frequency.

P4.3.1②	***Skip range ramp factor***				**ID 264**
Minimum value:	0.1	**Maximum value:**	10.0	**Default value:**	1.0
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				



Ramp speed scaling between skip frequencies.

P4.3.2②	***Skip F1 low limit***				**ID 256**
Minimum value:	0.00 Hz	**Maximum value:**	SkipRange1HighLimit Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				
P4.3.3②	***Skip F1 high limit***				**ID 257**
Minimum value:	SkipRange1LowLimit Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				
P4.3.4②	***Skip F2 low limit***				**ID 258**
Minimum value:	0.00 HZ	**Maximum value:**	SkipRange2HighLimit Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				
P4.3.5②	***Skip F2 high limit***				**ID 259**
Minimum value:	SkipRange2LowLimit HZ	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				

Table 59. Drive control (Cont.).

P4.3.6②	***Skip F3 low limit***				**ID 260**
Minimum value:	0.00 HZ	**Maximum value:**	SkipRange3HighLimit Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				
P4.3.7②	***Skip F3 high limit***				**ID 261**
Minimum value:	SkipRange3LowLimit HZ	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	Defines the acceleration/deceleration time when the output frequency is between the selected prohibit frequency range limits. The ramping speed (selected acceleration/deceleration time 1 or 2) is multiplied with this factor: e.g., value 0.1 makes the acceleration time 10 times shorter than outside the prohibit frequency range limits.				

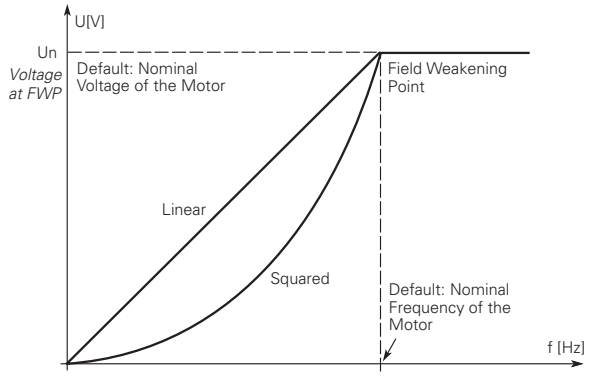
P4.4 - Energy savings calculations.

P4.4.1②	***Currency***				**ID 2122**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = $; 1 = £; 2 = €; 3 = ¥; 4 = Rs; 5 = R$; 6 = Fr; or 7 = kr.				
Description:	Sets the local currency used for energy savings estimation.				
P4.4.2②	***Energy cost***				**ID 2123**
Minimum value:	Varies	**Maximum value:**	Varies	**Default value:**	0.00 varies
Description:	Sets the local energy cost per kW. Used for energy savings estimation.				
P4.4.3②	***Data type***				**ID 2124**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Cumulative; 1 = Daily average; 2 = Weekly average; 3 = Monthly average; or 4 = Yearly average.				
Description:	Selects the format to view energy savings. The drive takes four recordings in an hour and then calculates the average based off this parameter. The savings estimation is based on comparing the drives energy usage compared to a across the line starter.				
P4.4.4	***Energy savings reset***				**ID 2125**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Not reset; or 1 = Reset.				
Description:	Resets the energy savings value.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 60. Motor control.

P5.1 - Basic settings.					
P5.1.1①②	***Motor control mode***				**ID 287**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Frequency control - Output frequency is controlled directly by the frequency reference. 1 = Speed control - Output frequency is controlled by giving a frequency reference to it with slip compensation. 2 = Open loop vector control - Similar to the standard speed control mode, higher performance slip calculation requires running a motor identification. 3 = PM control 1 - PM motor control mode 1, used for SPM (surface mounted permanent magnet) and it also can be used for IPM. 4 = PM control 2 - PM motor control mode 2, used for IPM (internally mounted permanent magnet) and it can not be used for SPM.				
Description:	Selects the motor control mode.				
P5.1.2①	***Current limit***				**ID 107**
Minimum value:	DriveNomCurrCT*1/10 A	**Maximum value:**	DriveNomCurrCT*2 A	**Default value:**	DriveNomCurrCT*3/2 A
Description:	This parameter determines the maximum output current allowed from the drive. The parameter value range differs from size to size. Once the motor current hits this level, it goes into the current limiter controller and tries to limit the output current.				
P5.1.3①②	***V/Hz optimization***				**ID 109**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable torque boost function. 1 = Enable torque boost function.				
Description:	Automatic torque boost - the voltage to the motor increases automatically, which assists the motor to produce sufficient torque to start and run at low frequencies with high loads.				
P5.1.4①②	***V/Hz ratio***				**ID 108**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Linear - the voltage of the motor changes linearly with the frequency in the constant flux area from 0 Hz to the field weakening point where the nominal voltage is supplied. A linear V/Hz ratio should be used in constant torque applications. 1 = Squared - the voltage of the motor changes following a squared curve with the frequency in the area from 0 Hz to the field weakening point where the nominal voltage is supplied. The motor runs under magnetized below the field weakening point and produces less torque and electromechanical noise. A squared V/Hz ratio can be used in applications where the torque demand of the load is proportional to the square of the speed. 2 = Programmable V/Hz curve - the V/Hz curve can be programmed with three different points. These points are the 0 frequency voltage, midpoint and weakening point. A programmable V/Hz curve can be used if the other settings do not satisfy the needs of the application. 3 = Linear with flux optimization - the drive starts to search for the minimum motor current in order to save energy. This mode is called Eaton's Active Energy Control which will reduce the voltage and current but still maintain the desired speed.				
Description:	Selects the V/Hz ratio. 0 = Linear; 1 = Squared; 2 = Programmable; or 3 = Linear + flux optimization.				



0 = Linear and 1 = Squared.

P5.1.5①②	***Field weakening point***				**ID 289**
Minimum value:	8.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	FieldWeakPointMFG Hz
Description:	The field weakening point is the frequency at which the output voltage reaches the set maximum value. This value is usually determined by the motor nameplate value.				

Table 60. Motor control (Cont.).

P5.1.6①②	***Voltage at FWP***				**ID 290**
Minimum value:	10.00%	**Maximum value:**	200.00%	**Default value:**	00.00%
Description:	Defines the voltage at the field weakening point, when the output frequency exceeds the field weakening point, the voltage will remain constant.				
P5.1.7①②	***VV/Hz mid frequency***				**ID 291**
Minimum value:	0.00 H	**Maximum value:**	FieldWeakPoint Hz	**Default value:**	VHzCurveMidFreqMFG Hz
Description:	If the programmable V/Hz curve has been selected, this parameter defines the midpoint frequency of the curve. This value can be set anywhere between 0 and the field weakening point. To either have a different V/Hz ramp or if set to the FWP, it will provide the field weakening point voltage all the way up the curve.				
P5.1.8①②	***VV/Hz mid voltage***				**ID 292**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	100.00%
Description:	If the programmable V/Hz curve has been selected, this parameter defines the mid-point voltage of the curve. This value can be set anywhere between zero frequency volt and the field weakening point voltage.				
P5.1.9①②	***Zero frequency voltage***				**ID 293**
Minimum value:	0.00%	**Maximum value:**	40.00%	**Default value:**	0.00%
Description:	If the programmable V/Hz curve has been selected, this parameter defines the zero frequency voltage of the curve.				
P5.1.10②	***Switching frequency***				**ID 288**
Minimum value:	MinSwitchFreq kHz	**Maximum value:**	MaxSwitchFreq kHz	**Default value:**	DefaultSwitchFreqCT kHz
Description:	Sets the switching frequency for the PWM output waveform.				
P5.1.11②	***Sine filter enabled***				**ID 1665**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This parameter enables the drive to have a fixed switching frequency which is required by some sine filters. The drive no longer automatically adjusts the switching frequency based on the unit temperature.				
P5.1.12①②	***Over voltage controller***				**ID 294**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Disable over voltage controller; 1 = The maximum controller output frequency is the (ramp frequency + 8 Hz); 2 = The maximum controller output frequency is the maximum frequency; or 3 = The maximum controller output frequency is the (maximum frequency + 8 Hz).				
Description:	The over voltage control is used to limit the DC link voltage below the preset limit value. If over voltage control is enabled, the drive will control the DC link voltage below the preset limit value by increasing the output frequency to allow the motor to use the energy.				
P5.1.13①	***Over voltage controller reference***				**ID 1874**
Minimum value:	DCLinkUnderVolt-ResumeExcursion V	**Maximum value:**	DCLinkOverVoltBrake-ChopperStartLimit V	**Default value:**	DCLinkRegenerating-EnergyControlExcursion V
Description:	The over voltage reference defines the preset limit value used in the overvoltage controller.				
P5.1.14②	***Load drooping***				**ID 298**
Minimum value:	0.00%	**Maximum value:**	100.00%	**Default value:**	0.00%
Description:	The drooping function enables speed drop as a function of load. This parameter sets that amount corresponding to the nominal torque of the motor.				
P5.1.15②	***Droop control filter time constant***				**ID 1630**
Minimum value:	0 ms	**Maximum value:**	3,000 ms	**Default value:**	0 ms
Description:	Filter time when using droop control.				

Table 60. Motor control (Cont.).

P5.1.16①②	***Identification***				**ID 299**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not action. 1 = Identification only stator resistor - does not spin the motor. This can be done with load attached. 2 = Identification with run - motor stator resistor is completed then the motor is run. This **must** be completed with unloaded motor. 3 = Identification no run - motor is supplied with current and voltage but at zero frequency. 4 = Identification only inertia - identification for the system inertia only.				
Description:	This parameter enables the drive to make an motor identification cycle of the motor once complete the drive will adjust tuning parameters to improve starting torque and open loop vector control performance. Once set and a run command is given, the operation will be active then set back to 0 when completed. When a run command is issued, the message on the keypad will indicate "Auto tuning" is being performed. If there is an issue with the motor identification, a fault message will be displayed.				
P5.1.17①	***Stator resistor***				**ID 771**
Minimum value:	0.001 ohm	**Maximum value:**	65.535 ohm	**Default value:**	Base on motor.
Description:	Motor stator resistor real value - this value is the stator winding resistance of the windings in the motor. The value is measured when performing identification.				
P5.1.18①	***Rotor resistor***				**ID 772**
Minimum value:	0.001 ohm	**Maximum value:**	65.535 ohm	**Default value:**	Base on motor.
Description:	Motor rotor resistor real value - this value is the rotor resistance of the motor. The value is measured when performing identification.				
P5.1.19①	***Leak inductance***				**ID 773**
Minimum value:	0.01 mh	**Maximum value:**	655.35 mh	**Default value:**	Base on motor.
Description:	Motor leakage inductance real value - this value is the amount of magnetic inductance that does not link to a winding in the motor. The value is measured when performing identification.				
P5.1.20①	***Mutual inductance***				**ID 774**
Minimum value:	0.10 mh	**Maximum value:**	6553.50 mh	**Default value:**	Base on motor.
Description:	Motor mutual inductance real value - this value is the amount of inductance between two sets of windings in the motor. The value is measured when performing identification.				
P5.1.21①	***Excitation current***				**ID 775**
Minimum value:	0.01 A	**Maximum value:**	655.35 A	**Default value:**	Base on motor.
Description:	Motor no-load current real value - this value is the amount of electrical current required to generate a rotating magnetic field in the motor. The value is measured when performing identification (P5.1.16).				
P5.1.22①	***Motor inertia***				**ID 1881**
Minimum value:	0.000 kgm^2	**Maximum value:**	65.535 kgm^2	**Default value:**	Base on motor.
Description:	System rotation inertia - real value for speed loop parameter tuning. The value is measured when performing identification.				
P5.1.23①	***PM back electromotive force (BEMF) voltage***				**ID 1882**
Minimum value:	0.0 V	**Maximum value:**	6553.5 V	**Default value:**	0.1 V
Description:	Back electromotive force (BEMF) voltage. The value is measured when performing identification.				
P5.1.24①	***PM d-axis stator inductance***				**ID 1884**
Minimum value:	0.00 mh	**Maximum value:**	655.35 mh	**Default value:**	0.01 mh
Description:	Voltage across the d-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. The value is measured when performing identification.				
P5.1.25①	***PM q-axis stator inductance***				**ID 1883**
Minimum value:	0.00 mh	**Maximum value:**	655.35 mh	**Default value:**	0.01 mh
Description:	Voltage across the q-axis stator inductance of the PM motor at the rated motor current and the rated motor frequency displayed in line-to-line rms value. The value is measured when performing identification.				
P5.1.26	***Slip compensation coefficient***				**ID 1664**
Minimum value:	0%	**Maximum value:**	500%	**Default value:**	100%
Description:	The linear coefficient of the slip compensation frequency, which is valid only in the speed control mode.				

Table 60. Motor control (Cont.).

P5.1.27	***VF stable Kd***				**ID 1888**
Minimum value:	0%	**Maximum value:**	1,000%	**Default value:**	100%
Description:	The compensation coefficient of the d-axis, which is used to suppress oscillation.				
P5.1.28	***VF stable Kq***				**ID 1889**
Minimum value:	0%	**Maximum value:**	1,000%	**Default value:**	100%
Description:	The compensation coefficient of the q-axis, which is used to suppress oscillation.				
P5.1.29①②	***Over-modulation enable***				**ID 2835**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	The linear coefficient of the slip compensation frequency, which is valid only in the speed control mode.				

P5.2 - Sensorless Vector Control parameters.

P5.2.1②	***Speed error filter time constant***				**ID 1591**
Minimum value:	0 ms	**Maximum value:**	3,000 ms	**Default value:**	20 ms
Description:	Filter time constant for speed reference and actual speed error.				
P5.2.2	***Speed control Kp1***				**ID 1830**
Minimum value:	0.0%	**Maximum value:**	6,000.0%	**Default value:**	100.0%
Description:	Sets P-gain of “Vector” control mode when in frequency region 1 for faster speed response.				
P5.2.3	***Speed control Ti1***				**ID 1831**
Minimum value:	1 ms	**Maximum value:**	3,000 ms	**Default value:**	100 ms
Description:	Sets time constant of “Vector” control mode when in frequency region 1 for faster speed response.				
P5.2.4②	***Speed control FS1***				**ID 1832**
Minimum value:	0.00 Hz	**Maximum value:**	SPEED_CONTROL_FS2 Hz	**Default value:**	5.00 Hz
Description:	Sets the “Vector” control mode frequency.				
P5.2.5②	***Speed control FS2***				**ID 1833**
Minimum value:	SPEED_CONTROL_ FS1 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	10.00 Hz
Description:	Sets the “Vector” control mode frequency.				
P5.2.6②	***Speed control Kp2***				**ID 1834**
Minimum value:	0.0%	**Maximum value:**	6,000.0%	**Default value:**	50.0%
Description:	Sets P-gain of “Vector” control mode when in frequency region two for faster speed response.				
P5.2.7②	***Speed control Ti2***				**ID 1835**
Minimum value:	1 ms	**Maximum value:**	3,000 ms	**Default value:**	100 ms
Description:	Sets time constant of “Vector” control mode when in frequency region two for faster speed response.				
P5.2.8②	***Motoring torque limit FWD***				**ID 1836**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Motoring torque limit in the forward direction.				
P5.2.9②	***Generator torque limit FWD***				**ID 1837**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Generation torque limit in the forward direction.				

Table 60. Motor control (Cont.).

P5.2.10②	***Motoring torque limit REV***				**ID 1838**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Motoring torque limit in the reverse direction.				
P5.2.11②	***Generator torque limit REV***				**ID 1839**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Generation torque limit in the reverse direction.				
P5.2.12②	***Motoring power limit***				**ID 1607**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Motor power limit setting.				
P5.2.13②	***Generator power limit***				**ID 1608**
Minimum value:	0.0%	**Maximum value:**	300.0%	**Default value:**	300.0%
Description:	Generator power limit setting.				
P5.2.14①②	***Flux reference***				**ID 1620**
Minimum value:	0.0%	**Maximum value:**	500.0%	**Default value:**	100.0%
Description:	This parameter defines the amount of flux that is output to the motor, which is valid only in open loop vector control.				
P5.2.15①	***PM initial selection***				**ID 1890**
Minimum value:	N.S.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Align; 1 = Six pluse; or 2 = HFI.				
Description:	PM initial angle detect method.				
P5.2.16①	***PM initial time***				**ID 1891**
Minimum value:	0.0 s	**Maximum value:**	60.0 s	**Default value:**	0.7 s
Description:	PM initial angle detect time.				
P5.2.17①	***PM excited current***				**ID 1892**
Minimum value:	0%	**Maximum value:**	200%	**Default value:**	20%
Description:	PM excited current during the low speed.				
P5.2.18①	***PM excited current off frequency***				**ID 1893**
Minimum value:	10.00%	**Maximum value:**	MotorNomFreq %	**Default value:**	20.00%
Description:	PM excited current cut off frequency.				
P5.2.19	***Observer Kp***				**ID 2901**
Minimum value:	1%	**Maximum value:**	3,000%	**Default value:**	100%
Description:	Linear gain of the PM/IM observer.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 61. Protections.

P6.1 - Motor.					
P6.1.1①②	***Output phase fault***				**ID 308**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	Output phase supervision of the motor ensures that the motor phases have equal currents. If phases are 5% difference from one another, the frequency converter will respond corresponding to this setting.				

Table 61. Protections (Cont.).

P6.1.2①②	***Ground fault***				**ID 309**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	Earth (ground) fault protection ensures that the sum of the motor phase currents is zero. There is a current level setting parameter ground fault limit that allows for setting the allowable ground current level based off the total drive current. The overcurrent protection is always working and protects the frequency converter from earth faults with high currents. Frequency converter will correspond the setting (see Options above).				
P6.1.3①②	***Ground fault limit***				**ID 2158**
Minimum value:	0%	**Maximum value:**	30%	**Default value:**	15%
Description:	Sets the level of the ground fault protection. This protection is based off the amount of leakage current that is seen to ground on the output of the drive.				
P6.1.4①②	***Motor thermal protection***				**ID 310**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	If a fault condition is selected, the drive will stop and activate the fault stage based off the % of calculated motor temperature. The calculated motor temp is based off the install power on values of the drive and monitoring values as the drive is running. Deactivating this protection, i.e., setting parameter to 0, will reset the thermal stage of the motor to 0%.				
P6.1.5②	***Motor thermal FO current***				**ID 311**
Minimum value:	0.00%	**Maximum value:**	150.00%	**Default value:**	100.00%
Description:	The current can be set between 0 - 150.0% x InMotor. This parameter sets the value for thermal current at zero frequency. The default value is set assuming that there is no external fan cooling the motor. If an external fan is used, this parameter can be set to 90% (or even higher). **Note:** The value is set as a percentage of the motor nameplate data, P1.6 (nominal current of the motor), not the drive's nominal output current. The motor's nominal current is the current that the motor can withstand in direct on-line use without being overheated. If you change the parameter nominal current of motor, this parameter is automatically restored to the default value. Setting this parameter does not affect the maximum output current of the drive.				

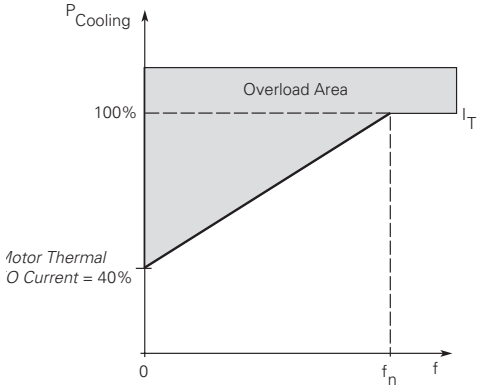
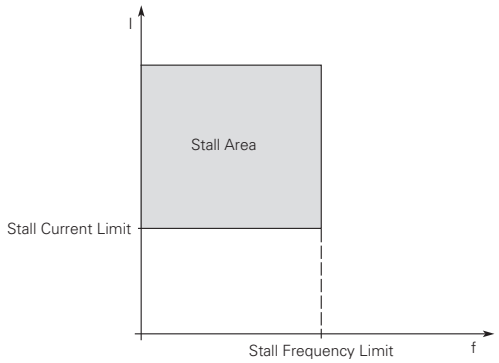
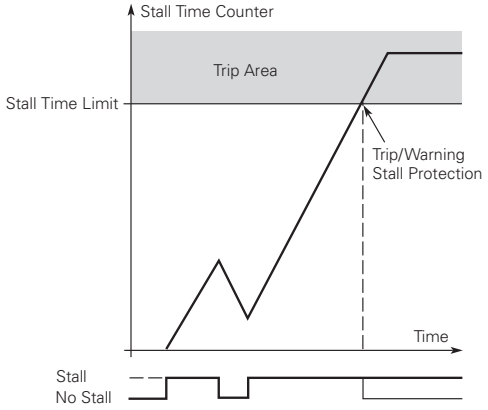


Table 61. Protections (Cont.).

P6.1.6①②	***Stall protection***				**ID 313**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	Stall protection is a user defined of overcurrent protection. It protects the motor from short time overload situations like a stalled shaft. This is customer selectable based off of current level, frequency level, and time.				
P6.1.7②	***Stall current limit***				**ID 314**
Minimum value:	0.10 A	**Maximum value:**	2 * MotorNomCurr A	**Default value:**	1.3 * MotoNomCurr A
Description:	The current can be set to 0.1–InMotor*2. For a stall stage to occur, the current must have exceeded this limit. The software does not allow entering a greater value than InMotor*2. If P1.6, nominal motor current is changed, this parameter is automatically restored to the default value (IL).				



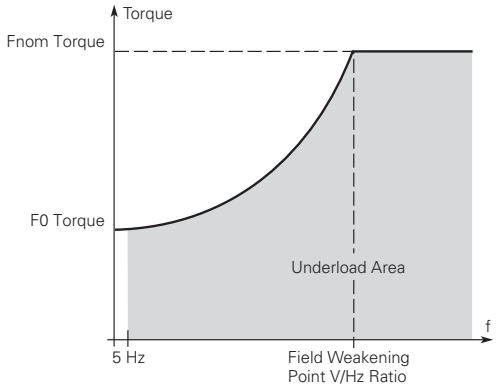
P6.1.8②	***Stall time limit***				**ID 315**
Minimum value:	1.0 s	**Maximum value:**	120.0 s	**Default value:**	15.0 s
Description:	This time can be set between 1.0 and 120.0s. This is the maximum time allowed for a stall stage. The stall time is counted by an internal up/down counter based off the current being above the limit setting. If the stall time counter value goes above this limit the protection will cause a trip (see P6.1.6).				



P6.1.9②	***Stall frequency limit***				**ID 316**
Minimum value:	1.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	The frequency can be set between 1–fmax (P1.2). For a stall state to occur, the output frequency must have remained below this limit, above the current limit for the stall time to occur.				

Table 61. Protections (Cont.).

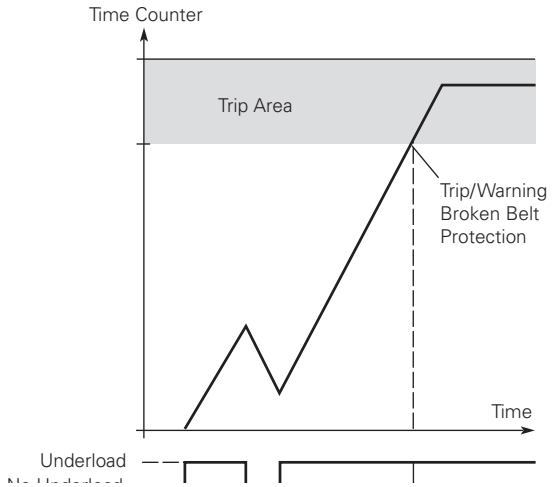
P6.1.10①②	***Underload protection***				**ID 317**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No response; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0, torque levels for the time limit the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero.				
P6.1.11①②	***Underload Fnom torque***				**ID 318**
Minimum value:	10.0%	**Maximum value:**	150.0%	**Default value:**	50.0%
Description:	The torque limit can be set between 10.0 - 150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. If you change P1.6, nominal motor current, this parameter is automatically restored to the default value.				



P6.1.12②	***Underload F0 torque***				**ID 319**
Minimum value:	5.0%	**Maximum value:**	150.0%	**Default value:**	10.0%
Description:	The torque limit can be set between 5.00 - 150.00% x TnMotor. This parameter gives value for the minimum torque allowed at zero frequency. If you change the value of P1.6, nominal motor current, this parameter is automatically restored to the default value.				

Table 61. Protections (Cont.).

P6.1.13②	***Underload time limit***				**ID 320**
Minimum value:	2.00 s	**Maximum value:**	600.00 s	**Default value:**	20.00 s
Description:	This time can be set between 2.00 and 600.00 seconds. This is the time allowed for an fault state to exist. An internal up/down counter counts the accumulated underload time. If the underload counter value goes above this limit, the protection will cause a trip according to protection parameter. If the drive is stopped, the counter is reset to zero.				



P6.1.14②	***Preheat mode***				**ID 2159**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable				
Description:	This parameter enables/disables the preheat function where this is used where the temperature being read from the drive will turn on the output to allow current to flow to the motor, this is typically used when the motor is not running.				
P6.1.15②	***Preheat control source***				**ID 2160**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = DI function; or 1 = Drive temperature.				
Description:	Selects the source of where the temperature is coming from, either digital input or the drive heat sink temperature, which potentially could be at a different temperature.				
P6.1.16②	***Preheat enter temperature***				**ID 2161**
Minimum value:	-10.0°C	**Maximum value:**	20.0°C	**Default value:**	10.0°C
Description:	Temperature when the preheat is enabled - drive goes into a run state to all the preheat voltage to flow through the motor an create some current.				
P6.1.17②	***Preheat quit temperature***				**ID 2162**
Minimum value:	-10.0°C	**Maximum value:**	39.9°C	**Default value:**	20.0°C
Description:	Temperature when the preheat is disabled - drive goes into a stop state if the temperature is above this rating.				

Table 61. Protections (Cont.).

P6.2 - Drive.					
P6.2.1②	***Line start lockout***				**ID 750**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Respond to I/O run command when power is applied. If in another control place and switched to I/O, control does not respond. (Run command has to be cycled.) 1 = Do not respond to I/O run command when power is applied. If in another control place and switched to I/O, control does not respond. (Run command has to be cycled.) 2 = Respond to I/O commands when power is applied. If in another control place and switched to I/O control, the drive will respond to a maintained run command. 3 = Do not respond to I/O commands when power is applied. If in another control place and switched to I/O control, the drive will respond to a maintained run command.				
Description:	Determines the response of frequency converter going to a run state cycle with I/O run command is still active as the control place.				
P6.2.2①②	***Input phase fault***				**ID 332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; 3 = Fault, stop mode after fault always by coasting; or 4 = Single phase power limit.				
Description:	The input phase supervision ensures that the input phases of the frequency converter have approximately equal current draw.				
P6.2.3①②	***4 mA input fault***				**ID 306**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No response; 1 = Warning; 2 = Warning - he frequency from 10 seconds back is set as reference; 3 = Warning - the preset frequency P6.2.4 is set as reference; 4 = Fault - stop mode after fault according to parameter stop mode; or 5 = Fault - stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated if the 4 - 20 mA reference signal is used and the signal falls below 4 mA for 5 seconds, or below 0.5 mA for 0.5 seconds. The information can also be programmed into relay outputs RO1 and RO2.				
P6.2.4①②	***4 mA fault frequency***				**ID 331**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	When 4 mA fault happens, the output frequency of drive goes to this preset speed when P6.2.3 = 3.				
P6.2.5①②	***External fault***				**ID 307**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; or 3 = Fault, stop mode after fault always by coasting.				
Description:	A warning or a fault action and message is generated from the external fault signal in the programmable (digital inputs function select external fault). The status information can also be programmed into digital output relay outputs RO1 and RO2.				
P6.2.6①②	***Undervoltage fault response***				**ID 330**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No response; 1 = Warning; 2 = Fault, stop mode after fault according to parameter stop mode; or 3 = Fault, stop mode after fault always by coasting.				
Description:	Frequency converter monitors DC Bus voltage if it drops below set level (via trouble shooting guide for more information on fault level), the drive will respond corresponding to this setting.				

Table 61. Protections (Cont.).

P6.2.7①②	***Unit under temperature protection***				**ID 1564**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This protection sets the response to a low frequency converter temperature on the heat sink.				
P6.2.8②	***Cold weather mode***				**ID 2126**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	With this parameter, you are able to enable the cold weather function of the causing the frequency converter's under temp limit to drop from -10°C to -30°C. This then enables a warm-up feature when the frequency converter is between -30°C and -20°C. The motor, when given a run command, will turn on for the cold weather time-out and output the cold weather voltage at 0.5 Hz to allow the motor to warm up. If it does not warm up above -20°C, after that the time frequency converter will fault on under temp fault. If the frequency converter does go above -20°C, output will begin to follow reference.				
P6.2.10②	***Cold weather time out***				**ID 2128**
Minimum value:	0 min	**Maximum value:**	10 min	**Default value:**	3 min
Description:	With this parameter, you are able to select the time limit that the frequency converter will run in the warm-up period.				
P6.2.11②	***STO fault response***				**ID 2427**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No Action - drive will stop, no indication shown, no reset required, have to cycle start command. 1 = Warning - drive indicate warning/if STO clears drive will run without reset. 2 = Fault - drive will indicate fault/require reset to start again.				
Description:	STO fault response defines the function of how the STO input will be seen on the keypad and how the drive functions to it.				
P6.2.12①	***PI feedback AI loss response***				**ID 2401**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Warning: preset frequency (P6.2.13).				
Description:	This parameter defines the function of the PI feedback analog input loss response. If the AI feedback is lost based off the programed AI feedback.				
P6.2.13①②	***PI feedback AI loss pre-frequency***				**ID 2402**
Minimum value:	0.00 Hz	**Maximum value:**	400.00 Hz	**Default value:**	0.00 Hz
Description:	This parameter defines the frequency the master would run to if a feedback is lost and P6.2.12 was set to option 3.				
P6.2.14②	***PI feedback AI loss pipe fill***				**ID 2403**
Minimum value:	0.0 varies	**Maximum value:**	1000.0 varies	**Default value:**	0.0 varies
Description:	Detects loss of prime in the pump based off the measured level. If the value drops below this level for the time in P6.2.15 and below, the frequency in P6.2.13 "loss of prime" occurs.				
P6.2.15②	***PI feedback AI loss pre-frequency timeout***				**ID 2404**
Minimum value:	0 s	**Maximum value:**	6,000 s	**Default value:**	0 s
Description:	PI feedback AI loss pre-frequency timeout - when P6.2.12 is set to 3 or 4, when the feedback signal is lost, the drive will run at the frequency in P6.2.15 for the time set here. After this time, the drive will fault out on "feedback loss". The time is disabled when set to 0 seconds.				
P6.2.16①②	***Overvoltage controller response***				**ID 1840**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning (W/O S); or 2 = Warning (W S).				
Description:	Display options for overvoltage controller warning.				

Table 61. Protections (Cont.).

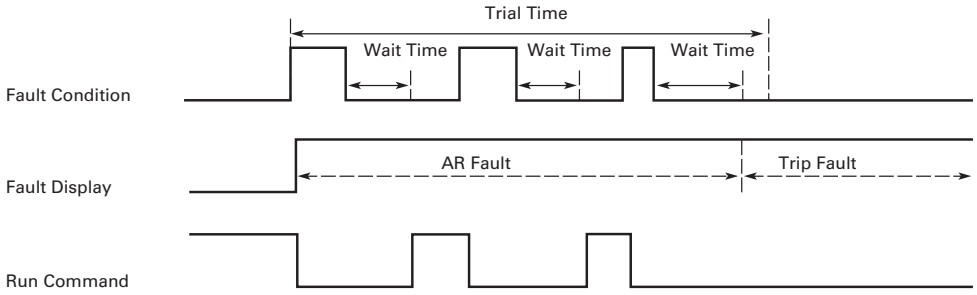
P6.2.17①②	***Overcurrent controller response***				**ID 1841**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning (W/O S); or 2 = Warning (W S).				
Description:	Display options for current limit controller warning.				
P6.2.18	***Cold weather password***				**ID 2129**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Description:	This password allows access to override the under temperature fault protection. This parameter is seen by pressing the left and right soft keys on the keypad. Password should be set to 62385. This value gets reset on cycle of power.				
P6.2.19	***Under-temperature fault override***				**ID 2130**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No; or 1 = Yes.				
Description:	With the password set to the correct value, this parameter is enabled and will give the ability to override the under temp fault. This function gets reset when power is cycled.				

P6.3 - Communications.

P6.3.1①②	***Fieldbus fault response***				**ID 334**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for the fieldbus fault when a fieldbus mode is used and communication is lost between the PLC and communication port. Each protocol has another parameter to select in all control or only in fieldbus control to set fault or warning.				
P6.3.2①②	***OPTcard fault response***				**ID 335**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This sets the response mode for a board slot fault caused by a missing or failed option board not communicating to the central processor.				
P6.3.3①②	***IP address confliction response***				**ID 1678**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = No action; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	Indicates there is a conflict in the IP address assigned to the drive, typically meaning there are multiple devices with the same IP address assigned. .				
P6.3.4①②	***Keypad communication fault response***				**ID 2157**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	This parameter defines the function of the keypad communication response in the case the keypad is removed.				

Table 61. Protections (Cont.).

P6.4 - Auto restart.					
P6.4.1②	***AR wait time***				**ID 321**
Minimum value:	1.00 s	**Maximum value:**	300.00 s	**Default value:**	1.00 s
Description:	Defines the time before the frequency converter tries to automatically restart the motor after a specific fault condition has been clear.				
P6.4.2②	***AR trail time***				**ID 322**
Minimum value:	1.00 s	**Maximum value:**	600.00 s	**Default value:**	30.00 s
Description:	Amount of time after fault set that the drive uses the restart attempts to reset the fault and restart the motor, after this time has run out without resetting the alarm drive will fault. P6.4.4 to P6.4.11 determine the maximum number of automatic restarts during the trial time set by P6.4.2. The time count starts from the first auto restart. If the number of faults occurring during the trial time exceeds the values of P6.4.4 to P6.4.11, the fault state becomes active. Otherwise the fault is cleared after the trial time has elapsed and the next fault starts the trial time count again. If a single fault remains during the trial time, a fault state is true.				



Auto Restart Fail (Try Number >2.)

P6.4.3②	***AR start function***				**ID 323**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Flying start from stop frequency; 1 = Start according to parameter stop mode; or 2 = Flying start from maximum frequency.				
Description:	The start function for automatic restart is selected with this parameter. The parameter defines the start mode upon an auto restart condition. Defines the time before the frequency converter tries to automatically restart the motor after a specific fault condition has been clear.				
P6.4.4②	***Undervoltage attempts***				**ID 324**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time after an undervoltage trip. 0 = No automatic restart. >0 = Number of automatic restarts after undervoltage fault. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.				
P6.4.5②	***Overvoltage attempts***				**ID 325**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time after an overvoltage trip. 0 = No automatic restart after overvoltage fault trip. >0 = Number of automatic restarts after overvoltage fault trip. The fault is reset and the drive is started automatically after the DC-link voltage has returned to the normal level.				

Table 61. Protections (Cont.).

P6.4.6②	***Overcurrent attempts***				**ID 326**
Minimum value:	0	**Maximum value:**	3	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time. **Note:** An IGBT temperature fault, saturation fault, and overcurrent faults are included as part of this fault. 0 = No automatic restart after overcurrent fault trip. >0 = Number of automatic restarts after an overcurrent trip, saturation trip, or IGBT temperature fault.				
P6.4.7②	***4 mA fault attempts***				**ID 327**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after reference fault trip. >0 = Number of automatic restarts after the analog current signal (4–20 mA) has returned to the normal level (>4 mA).				
P6.4.8②	***Motor temperature fault attempts***				**ID 329**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after Motor temperature fault trip. >0 = Number of automatic restarts after the motor temperature has returned to its normal level.				
P6.4.9②	***External fault attempts***				**ID 328**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after external fault trip. >0 = Number of automatic restarts after external fault trip.				
P6.4.10②	***Underload attempts***				**ID 336**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter determines how many automatic restarts can be made during the trial time. 0 = No automatic restart after an underload fault trip. >0 = Number of automatic restarts after an underload fault trip.				
P6.4.11②	***PI feedback AI loss attempts***				**ID 2405**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	This parameter sets the amount of tries it will try to auto restart the feedback AI loss fault.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 62. PI Controller.

P7.1 - Basic settings.					
P7.1.1②	***PI control gain***				**ID 1294**
Minimum value:	0.00%	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Defines the gain of the PI Controller. It adjust the slope of the speed increase according to the initial of the load. If this value is set to 100%, a change of 10% in the error value causes the controller output to change 10%.				
P7.1.2②	***PI control itime***				**ID 1295**
Minimum value:	0.00 s	**Maximum value:**	600.00 s	**Default value:**	1.00 s
Description:	Defines the integration time of the PI controller. Over the time, the integral time contributes to the deviation between the reference and the feedback signal. If this value is set to 1.00 sec., a change of 10% in the error value causes the controller output to change by 10.00%/s.				

Table 62. PI Controller (Cont.).

P7.1.3①②	***PI process unit***				**ID 1297**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = %; 1 = 1/min.; 2 = rpm; 3 = ppm; 4 = pps; 5 = l/s; 6 = l/min.; 7 = l/h; 8 = kg/s; 9 = kg/min.; 10 = kg/h; 11 = m3/s; 12 = m3/min.; 13 = m3/h; 14 = m/s; 15 = mbar; 16 = bar; 17 = Pa; 18 = kPa; 19 = mVS; 20 = kW; 21 = Deg. C; 22 = GPM; 23 = gal/s; 24 = gal/min.; 25 = gal/h; 26 = lb/s; 27 = lb/min.; 28 = lb/h; 29 = CFM; 30 = ft^3/s; 31 = ft^3/min.; 32 = ft^3/h; 33 = ft/s; 34 = in. wg; 35 = ft wg; 36 = PSI; 37 = lb/in.2; 38 = HP; 39 = Deg. F; 40 = PA; 41 = WC; 42 = HG; 43 = ft; or 44 = m.				
Description:	Defines the unit type for PI feedback unit.				
P7.1.4②	***PI process unit minimum***				**ID 1298**
Minimum value:	-99999.99 varies	**Maximum value:**	PI Process Unit Max varies	**Default value:**	0.00 varies
Description:	Defines the minimum process unit value.				
P7.1.5②	***PI process unit maximum***				**ID 1300**
Minimum value:	PI Process Unit Min	**Maximum value:**	99999.99 varies	**Default value:**	100.00 varies
Description:	Defines the maximum process unit value.				
P7.1.6①②	***PI error inversion***				**ID 1303**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal - if feedback is less than set-point, PI controller output increases. 1 = Inverted - if feedback is less than set-point, PI controller output decreases.				
Description:	Defines the way the process value output reacts to the feedback signal.				

Table 62. PI Controller (Cont.).

P7.1.7②	***PI dead band***				**ID 1304**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0 varies
Description:	PI dead band around setpoint in process units. This is the band where no actions occur to prevent oscillation or repeated activation/ deactivation of controller. The PI output is locked if the feedback stays within the dead band area.				
P7.1.8②	***PI dead band delay***				**ID 1306**
Minimum value:	0.00 s	**Maximum value:**	320.00 s	**Default value:**	0.00 s
Description:	If the PI process value goes out of the dead band area for the desired time delay, at that point the controller will re-initialize and try to level out again.				
P7.1.9②	***PI ramp time***				**ID 1311**
Minimum value:	0.00 s	**Maximum value:**	300.00 s	**Default value:**	0.00 s
Description:	Defines the rising and falling ramp times for changes in the process value.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 63. Setpoint .

P7.2.1 - Standard.					
P7.2.1.1②	***PI keypad setpoint 1***				**ID 1307**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 1.				
P7.2.1.2②	***PI keypad setpoint 2***				**ID 1309**
Minimum value:	PI Process Unit Min	**Maximum value:**	PI Process Unit Max	**Default value:**	0.00 varies
Description:	Keypad PI reference value setpoint 2.				
P7.2.1.3②	***PI wake-up action***				**ID 2466**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Wake-up when below wake-up level. 1 = Wake-up when above wake-up-level. 2 = Wake-up when below wake-up level % from PI setpoint. 3 = Wake-up when above wake-up level %from PI setpoint.				
Description:	This parameter defines the wake-up function action.				

P7.2.2 - Setpoint 1.

P7.2.2.1①	***PI setpoint 1 source***				**ID 1312**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				

Table 63. Setpoint (Cont.).

P7.2.2.2①	***PI setpoint 1 sleep enable***				**ID 1315**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				
P7.2.2.3②	***PI setpoint 1 sleep delay***				**ID 1317**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.2.4②	***PI setpoint 1 wake-up level***				**ID 1318**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.2.5②	***PI setpoint 1 boost***				**ID 1320**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.2.6②	***PI setpoint 1 sleep level***				**ID 2450**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.2.7②	***SP1 sleep mode over cycle time***				**ID 1842**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on "pump over cycle" fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear "pump over cycle" fault.				
P7.2.2.8②	***SP1 sleep mode maximum cycle time***				**ID 1843**
Minimum value:	0 s	**Maximum value:**	3,600 s	**Default value:**	300 s
Description:	Defines the maximum time for sleep over cycle checking.				

P7.2.3 - Setpoint 2.

P7.2.3.1①	***PI setpoint 2 source***				**ID 1321**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = PI keypad setpoint 1; 2 = PI keypad setpoint 2; 3 = AI; 4 = Drive reference pot; 5 = FB process data input 1; 6 = FB process data input 2; 7 = FB process data input 3; 8 = FB process data input 4; 9 = FB process data input 5; 10 = FB process data input 6; 11 = FB process data input 7; 12 = FB process data input 8; 13 = FB PI setpoint 1; or 14 = FB PI setpoint 2.				
Description:	Defines source of the setpoint value the drive uses. This can either be an internal preset value, keypad setpoint, analog signal, or fieldbus message.				

Table 63. Setpoint (Cont.).

P7.2.3.2①	***PI setpoint 2 sleep enable***				**ID 1324**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This function will disable the output when the frequency drops below the sleep frequency for the sleep delay time. The output re-engages when feedback rises above the wake-up level.				
P7.2.3.3②	***PI setpoint 2 sleep delay***				**ID 1326**
Minimum value:	0 s	**Maximum value:**	3,000 s	**Default value:**	0 s
Description:	This parameter sets the delay time after the setpoint drops below the sleep level for this amount of time and then the drives output will shut off till the wake up level is met. It is to prevent large fluctuations when going into the sleep function to save motor run time.				
P7.2.3.4②	***PI setpoint 2 wake-up level***				**ID 1327**
Minimum value:	-99999.99 varies	**Maximum value:**	99999.99 varies	**Default value:**	0.00 varies
Description:	Defines the level for the PI feedback value to go above top enable the PI output to be re enabled. This value is based of the % of feedback which can be scaled based off the PI unit min./max, values.				
P7.2.3.5②	***PI setpoint 2 boost***				**ID 1329**
Minimum value:	-2.00 varies	**Maximum value:**	2.00 varies	**Default value:**	1.00 varies
Description:	The setpoint can be boosted via a multiplier value.				
P7.2.3.6②	***PI setpoint 2 sleep level***				**ID 2452**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the level of which the unit value is used to look at to go into the sleep mode. When the unit drops below this level for the sleep delay time, it will put the drive into the sleep mode.				
P7.2.3.7②	***SP2 sleep mode over cycle time***				**ID 1844**
Minimum value:	0	**Maximum value:**	10	**Default value:**	0
Description:	Defines the count the drive come in and out of sleep mode. If multiple times done in this time frame, the drive would trip on “pump over cycle” fault. One cycle is defined when the drive transfers from normal mode to sleep mode. 0 value means do not do the sleep over cycle check and clear “pump over cycle” fault.				
P7.2.3.8②	***SP2 sleep mode maximum cycle time***				**ID 1845**
Minimum value:	0 s	**Maximum value:**	3,600 s	**Default value:**	300 s
Description:	Defines the maximum time for sleep over cycle checking.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 64. Feedback.

P7.3.1 - Standard.					
P7.3.1.1②	***PI feedback gain***				**ID 1331**
Minimum value:	-1,000.0%	**Maximum value:**	1,000.0%	**Default value:**	100.0%
Description:	Defines gain associated with the feedback signal from the measuring device.				
P7.3.2 - Feedback 1.					
P7.3.2.1①	***PI feedback 1 source***				**ID 1332**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used; 1 = AI; 2 = Drive reference pot; 3 = FB process data input 1; 4 = FB Process Data Input 2; 5 = FB Process Data Input 3; 6 = FB Process Data Input 4; 7 = FB Process Data Input 5; 8 = FB Process Data Input 6; 9 = FB Process Data Input 7; 10 = FB Process Data Input 8; or 11 = FB PI feedback.				
Description:	Defines where feedback signal is being fed into the drive, via analog or fieldbus data value.				
P7.3.2.2②	***PI feedback 1 minimum***				**ID 1333**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	0.00%
Description:	Minimum unit value for the feedback signal.				
P7.3.2.3②	***PI feedback 1 maximim***				**ID 1334**
Minimum value:	-200.00 %	**Maximum value:**	200.00%	**Default value:**	100.00%
Description:	Maximim unit value for the feedback signal.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 65. HVAC parameters.

P8.1 - Damper (*DM1 PRO).					
P8.1.1①②	***Damper start***				**ID 483**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Start - standard start. 1 = Interlocked start: To use this, a relay output, RO1/RO2, needs to be programmed for selections 29 “Damper Control” and a digital input function must be programmed for selection “RunEnable”. The relay output is used to energize an element of the driven system, such as a damper, seal water solenoid, or a pre-lube pump. Upon a return acknowledgement of contact closure to the programmed digital input, the frequency converter will start. 2 = Interlock time start: This functions the same as the interlocked start, except that if the return acknowledgement contact is not received within the interlock timeout, a “prevent-up start” fault is displayed in keypad and the start sequence will need to be restarted. 3 = Delay start: This start is similar to the interlocked start, except that a return contact is not used. After the “Delay Time” following the relay output closure, the frequency converter starts.				
Description:	This parameter determines the function of the damper.				
P8.1.2①②	***Damper time out***				**ID 484**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The time out time used for an interlocked time start, after which the start sequence must be restarted if no acknowledgement contact is received.				
P8.1.3①②	***Damper delay***				**ID 485**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The delay time following a delay start, after which the frequency converter will be started.				

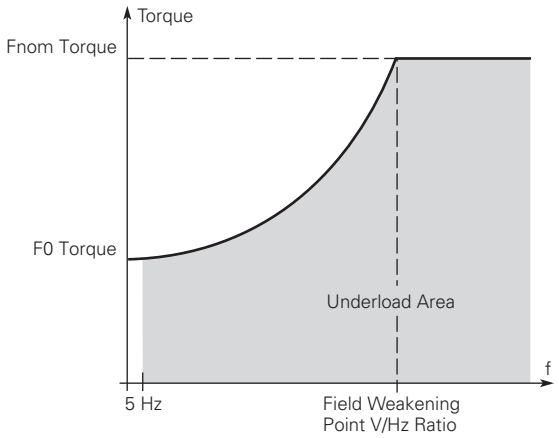
Table 65. HVAC parameters (Cont.).

P8.2 - Fire mode (*DM1 PRO).					
P8.2.1①②	***Fire mode protection***				**ID 535**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Closing contact initiates fire mode function. 1 = Opening contact initiates fire mode function.				
Description:	This parameter determines whether the fire mode function is determined by a contact closure or contact opening on the desired digital input function select fire mode. **Note:** When fire mode is enabled, this causes the drive to ignore any fault and run till its death. Warranty will be non-valid in the case this is enabled and the drive causes issues to the system.				
P8.2.2①②	***Fire mode reference select function***				**ID 536**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Fire mode minimum frequency; 1 = Fire mode reference; 2 = Fieldbus reference - reference from fieldbus process in; 3 = AI; or 4 = PI1 control - follows the PI control algorithm settings.				
Description:	This parameter allows for setting the reference location for when the fire mode is enabled.				
P8.2.3②	***Fire mode minimum frequency***				**ID 537**
Minimum value:	MinFreq. Hz	**Maximum value:**	MaxFreq. Hz	**Default value:**	15.00
Description:	This parameter sets the minimum output frequency for fire mode. This can be used as a selection for reference command.				
P8.2.4②	***Fire mode frequency reference 1***				**ID 565**
Minimum value:	0.0%	**Maximum value:**	100.0%	**Default value:**	75.0%
Description:	This parameter sets the drive operating percentage based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2) for fire mode reference 1.				
P8.2.5②	***Fire mode frequency reference 2***				**ID 564**
Minimum value:	0.0%	**Maximum value:**	100.0%	**Default value:**	100.0%
Description:	This parameter sets the drive operating percentage based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2) for fire mode reference 2.				
P8.2.6	***Fire mode test enable***				**ID 2443**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This parameter allows for testing the fire mode feature. With the parameter set to enable and fire mode input enabled, the drive will run at the fire mode speed desired but all faults are enabled.				
P8.2.7①②	***Smoke purge frequency***				**ID 554**
Minimum value:	0.0%	**Maximum value:**	100.0%	**Default value:**	50.0%
Description:	Frequency setting for smoke purge. Preset speed used for a digital input selection. The percentage is based off the 0% being minimum frequency (P1.1) and 100% being maximum frequency (P1.2).				

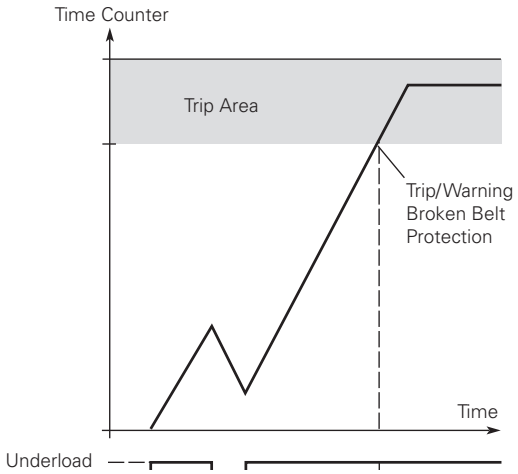
P8.3 - Protections (*DM1 PRO).					
P8.3.1①②	***Broken belt protection***				**ID 317**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault - stop mode after fault according to parameter stop mode; or 3 = Fault - stop mode after fault always by coasting.				
Description:	If fault is set as the function, the drive will stop and activate the fault stage based on the parameter conditions and the monitoring status of the motor. If the motor torque drops below the Fnom and F0 torque levels for the time limit, the protection is enabled. Deactivating the protection by setting the parameter to 0 will reset the underload time counter to zero.				

Table 65. HVAC parameters (Cont.).

P8.3.2②	***Broken belt Fnom torque***				**ID 318**
Minimum value:	10.0%	**Maximum value:**	150.0%	**Default value:**	50.0%
Description:	The torque limit can be set between 10.0-150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed when the output frequency is at or above the field weakening point. If you change P1.6, nominal motor current, this parameter is automatically restored to the default value.				



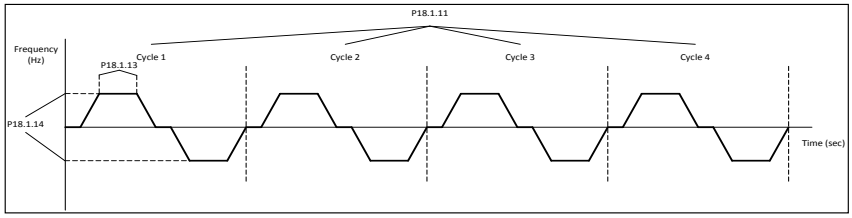
P8.3.3②	***Broken belt F0 torque***				**ID 319**
Minimum value:	5.0%	**Maximum value:**	150.0%	**Default value:**	10.0%
Description:	The torque limit can be set between 5.0–150.0 % x TnMotor. This parameter gives the value for the minimum torque allowed at zero frequency. If you change the value of P1.6, nominal motor current, this parameter is automatically restored to the default value.				
P8.3.4②	***Broken belt time limit***				**ID 320**
Minimum value:	2.00 s	**Maximum value:**	600.00 s	**Default value:**	20.00 s
Description:	This time can be set between 2.00 and 600.00 seconds. This is the time allowed for a fault state to exist. An internal up/down counter counts the accumulated underload time. If the underload counter value goes above this limit, the protection will cause a trip according to protection parameter. If the drive is stopped, the counter is reset to zero.				



① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 66. Pump parameters.

P9.1 - Derag (*DM1 PRO).					
P9.1.1②	***Derag cycles***				**ID 2468**
Minimum value:	0	**Maximum value:**	10	**Default value:**	3
Description:	This parameter defines the number of cycles in the forward/reverse direction for removing any debris in system.				
P9.1.2②	***Derag at Start/Stop***				**ID 2469**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Off; 1 = Start; 2 = Stop; 3 = Start and stop; 4 = Digital input; or 5 = Current.				
Description:	Defines how the derage function will become activated; start, stop, both, or based off the digital input.				
P9.1.3②	***Deragging run time***				**ID 2470**
Minimum value:	1 s	**Maximum value:**	3,600 s	**Default value:**	0 s
Description:	Defines the length of time the drive will run at the derag speed in the forward and reverse direction.				
P9.1.4②	***Derag speed***				**ID 2471**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	5.00 Hz
Description:	Defines the frequency the drive will run at in the forward/reverse direction when in the derag mode.				



P9.1.5②	***Derag off delay***				**ID 2472**
Minimum value:	1 s	**Maximum value:**	600 s	**Default value:**	10 s
Description:	Defines the length of time the drive will run the derag function when enabled at stop.				
P9.1.6①②	***Derag current***				**ID 1879**
Minimum value:	N.A. A	**Maximum value:**	N.A. A	**Default value:**	0.00 A

P9.2 - Start/stop timing (*DM1 PRO).					
P9.2.1①②	***Valve start***				**ID 1847**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Normal; 1 = Damper start; 2 = Damper tout; or 3 = Damper delay.				
Description:	This parameter determines the function of damper.				
P9.2.2①②	***Valve timeout***				**ID 1848**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The timeout time used for an interlocked time start, after which the start sequence must be restarted if no acknowledgement contact is received.				
P9.2.3①②	***Valve delay***				**ID 1849**
Minimum value:	1 s	**Maximum value:**	32,500 s	**Default value:**	5 s
Description:	The delay time following a delay start, after which the frequency converter will be started.				

Table 66. Pump parameters (Cont.).

P9.2.4①②	***Back spin delay***				**ID 2423**
Minimum value:	0 s	**Maximum value:**	32,500 s	**Default value:**	0 s
Description:	Run delay time parameter sets the time required for the drive to wait before another run command can be received. During this time, the run signal is given. It is ignored until the time has expired upon which it will then start. This is true for keypad, I/O, or Fieldbus Control places.				
P9.2.5①②	***Minimum run time***				**ID 1813**
Minimum value:	0 s	**Maximum value:**	32,500 s	**Default value:**	0 s
Description:	Drive minimum run time.				
P9.2.6②	***Minimum frequency ramp time***				**ID 1850**
Minimum value:	0.1 s	**Maximum value:**	2,000.0 s	**Default value:**	10.0 s
Description:	Ramp time for output to minimum frequency.				

P9.3 - Multi-pump multi-drive (*DM1 PRO).

P9.3.1①②	***Multi-pump mode***				**ID 2279**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled or 1 = Multi-drive network.				
Description:	Determines the number of drives being used in the multi-pump configuration: 0 = Disabled - single drive for motor; or 1 = Multi-drive - multi-follower sequence with multiple drives.				
P9.3.2①②	***Number of drives***				**ID 2449**
Minimum value:	1	**Maximum value:**	5	**Default value:**	1
Description:	This defines the number of drives active when doing the multi-drive pump and fan scheme. By default, there will be always one drive active at one time. By setting value to above one, it allows for bringing in additional drives to maintain the sytem.				
P9.3.3①②	***Drive ID***				**ID 2278**
Minimum value:	0	**Maximum value:**	5	**Default value:**	0
Description:	This parameter defines the drive address when using mult- drive pump mode. Based off this ID, the drive enables in the desired sequence and can be monitored at this drive ID value in the monitor screen.				
P9.3.4①②	***Regulation source***				**ID 2284**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Network only; or 1 = PI controller.				
Description:	For drives that have been connected with both start/stop signal and PI feedback - can be set up as "Feedback", so they will have ability to be the master.				
P9.3.5②	***PI bandwidth***				**ID 2458**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	10.00 varies
Description:	Percentage based off the setpoint above and below which defines when the auxiliary motor will come online or offline.				
P9.3.6①②	***Staging frequency***				**ID 2315**
Minimum value:	MinFreq	**Maximum value:**	400.00	**Default value:**	50.00
Description:	Output frequency is above stagging frequency and PI error is out of PI bandwidth - motor should add to system.				
P9.3.7①②	***De-staging frequency***				**ID 2316**
Minimum value:	0.00	**Maximum value:**	MaxFreq	**Default value:**	0.00
Description:	Output frequency is below de-stagging frequency and PI error is out of PI bandwidth - motor should remove from system.				
P9.3.8②	***Add/remove delay***				**ID 344**
Minimum value:	0 s	**Maximum value:**	3,600 s	**Default value:**	10 s
Description:	With feedback outside the bandwidth, this time must pass before motors/pumps are added or removed from the system.				

Table 66. Pump parameters (Cont.).

P9.3.9②	***Interlock enabled***				**ID 350**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	This parameter enables the drive to look at the digital input interlocks to tell which motor is available for running or if they were brought offline.				
P9.3.10①②	***Recovery method***				**ID 2285**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Automatic; or 1 = Stop.				
Description:	This parameter is for the slave when multi-drive system lost the master. The slave drive can continue run if it set to be "Automatic". However, the slave drive will stop immediately if it is set to be "Stop".				
P9.3.11②	***Add/remove drive selection***				**ID 2311**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Drive ID; or 1 = Run time.				
Description:	In default, MPFC system will add/remove pump according to their drive ID, from small to large. The order can also depend on each slave drive's running time: add the drive that has shortest running time and remove the drive that has longest running time first.				
P9.3.12②	***Run time enabled***				**ID 2280**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	The run time counter will start counting only if this parameter is enabled.				
P9.3.13②	***Run time limit***				**ID 2281**
Minimum value:	0.0 h	**Maximum value:**	300,000.0 h	**Default value:**	0.0 h
Description:	If drive run time is over this limit, its network status will be "Need AIternation". Limit equals 0 means run time counter disabled.				
P9.3.14	***Run time reset***				**ID 2283**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No action; or 1 = Reset.				
Description:	One-time parameter, set to be 1 will clear run time counter.				
P9.3.15②	***Master drive mode***				**ID 2473**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Follow PI; 1 = Fixed speed; or 2 = Turn off.				
Description:	Defines how the master drive will maintain the frequency control when slaves are brought in; follow PI, fixed speed, or turn off.				
P9.3.16②	***Master fixed speed***				**ID 2474**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	50.00 Hz
Description:	Defines the fixed speed frequency when the master drive mode is set for fixed speed control when slaves are brought in.				
P9.3.17②	***Master fixed speed delay***				**ID 2475**
Minimum value:	0 s	**Maximum value:**	1,000 s	**Default value:**	5 s
Description:	Defines the delay time before the master drive begins running at the fixed speed or turns off if the master mode is set for fixed speed or turn off.				

Table 66. Pump parameters (Cont.).

P9.4 - Pipe fill (Loss of prime) (*DM1 PRO).					
P9.4.1①②	***Pipe fill loss response***				**ID 2410**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault; or 3 = Fault, coast.				
Description:	Defines the response method when a "loss of prime" condition occurs.				
P9.4.2①②	***Pipe fill loss detection method***				**ID 2406**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Motor current; 1 = Motor power (%); or 2 = Motor torque (%).				
Description:	Defines the value for looking at a loss of prime.				
P9.4.3②	***Pipe fill loss low level***				**ID 2407**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	If the monitor value is less than low level value and the output frequency is more than low frequency, check the pipe fill loss start.				
P9.4.4①②	***Pipe fill loss low frequency***				**ID 2409**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines the frequency point at which the drive needs to be above to enable the "loss of prime" feature. When set to 0 Hz, protection is disabled.				
P9.4.5②	***Pipe fill loss high level***				**ID 1851**
Minimum value:	0.0 varies	**Maximum value:**	1,000.0 varies	**Default value:**	0.0 varies
Description:	If the monitor value is more than high level (the high level is not 0) and the output frequency is more than high frequency, check pipe fill loss start.				
P9.4.6①②	***Pipe fill loss high frequency***				**ID 1852**
Minimum value:	0.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Defines high frequency point at which the drive needs to be above to enabled the "loss of prime" feature. When set to 0 Hz, protection is disabled.				
P9.4.7②	***Pipe fill loss time***				**ID 2408**
Minimum value:	0 s	**Maximum value:**	600 s	**Default value:**	0 s
Description:	Defines the delay time before a "loss of prime" condition will occur based of the detection method and prime loss level.				
P9.4.8②	***Pipe fill loss attempts***				**ID 2411**
Minimum value:	0	**Maximum value:**	10	**Default value:**	1
Description:	Defines the amount of attemps to auto restart the drive on a "prime loss" condition.				

P9.5 - Prime pump (*DM1 PRO).					
P9.5.1②	***Prime pump enable***				**ID 2428**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Prime pump enable.				

Table 66. Pump parameters (Cont.).

P9.5.2②	***Prime pump level***				**ID 2429**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	0.00 varies
Description:	This defines the level at which the prime pump function will drop out. If the feedback level raises above this value, prime pump becomes deactivated. If the level is not reached, it will switch after the delay time.				
P9.5.3②	***Prime pump frequency***				**ID 2431**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Frequency at which the prime pump function will operate when enabled.				
P9.5.4②	***Prime pump delay time***				**ID 2432**
Minimum value:	0 min.	**Maximum value:**	3,600 min.	**Default value:**	0 min.
Description:	This is the time that the drive will run the pre-charge function on start up.				
P9.5.5②	***Prime pump loss of prime level***				**ID 2433**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	Selects the limit to indicate a loss of prime in pump. If the measured current drops below the determined value for the value assigned in the prime loss of time setting, the drive will display "pipe fill loss".				
P9.5.6②	***Prime pump level 2***				**ID 2434**
Minimum value:	0.00 varies	**Maximum value:**	6,000.00 varies	**Default value:**	0.00 varies
Description:	This defines the level at which the prime pump function will drop out. If the feedback level raises above this value, prime pump becomes deactivated. If the level is not reached, it will switch after the delay time.				
P9.5.7②	***Prime pump frequency 2***				**ID 2436**
Minimum value:	MinFreq Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	0.00 Hz
Description:	Frequency at which the prime pump level 2 will operate at when enabled.				
P9.5.8②	***Prime pump delay time 2***				**ID 2437**
Minimum value:	0.0 min	**Maximum value:**	3,600.0 min	**Default value:**	0.0 min
Description:	This is the time that the drive will run at the 2nd level prime pump function level.				
P9.5.9②	***Prime pump loss of prime level 2***				**ID 2438**
Minimum value:	0.00 varies	**Maximum value:**	1,000.00 varies	**Default value:**	0.00 varies
Description:	Selects the limit to indicate a loss of prime in pump. If the measured current drops below the determined value for the value assigned in the prime loss of time setting, the drive will display pipe fill loss.				

P9.6 - Broken pipe (*DM1 PRO).

P9.6.1①②	***Broken pipe fault response***				**ID 1853**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = No action; 1 = Warning; 2 = Fault, coast; or 3 = Fault.				
Description:	Broken pipe fault/warning shall be triggered if the PI feedback is less than broken pipe level and the drive output frequency is more than broke pipe frequency for delay time.				
P9.6.2②	***Broken pipe level***				**ID 1854**
Minimum value:	0.0 varies	**Maximum value:**	6,000.0 varies	**Default value:**	15.0 varies
Description:	Broken pipe level.				
P9.6.3②	***Broken pipe frequency***				**ID 1856**
Minimum value:	1.00 Hz	**Maximum value:**	MaxFreq Hz	**Default value:**	25.00 Hz
Description:	Broken pipe frequency.				

Table 66. Pump parameters (Cont.).

P9.6.4②	***Broken pipe delay***				**ID 1855**
Minimum value:	1.0 s	**Maximum value:**	120.0 s	**Default value:**	15.0 s
Description:	Broken pipe delay time.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 67. Fieldbus (FB) status .

P10.1 - FB process data input selection.					
P10.1.1②	***FB process data input 1 selection***				**ID 2533**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	0
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				
P10.1.2②	***FB process data input 2 selection***				**ID 2534**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	2,542
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				
P10.1.3②	***FB process data input 3 selection***				**ID 2535**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	2,550
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				

Table 67. Fieldbus (FB) status (Cont.).

P10.1.4②	***FB process data input 4 selection***				**ID 2536**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	103
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				
P10.1.5②	***FB process data input 5 selection***				**ID 2537**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	104
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				
P10.1.6②	***FB process data input 6 selection***				**ID 2538**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	107
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				
P10.1.7②	***FB process data input 7 selection***				**ID 2539**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	0
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				

Table 67. Fieldbus (FB) status (Cont.).

P10.1.8②	***FB process data input 8 selection***				**ID 2540**
Minimum value:	0	**Maximum value:**	12,464	**Default value:**	0
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data in: Process data IN1 = NULL = ID 0; Process data IN2 = FB PI Set Point1= ID 2542; Process data IN3 = FB PI Feedback1= ID 2550; Process data IN4 = Acceleration time 1= ID 103; Process data IN5 = Deceleration time 1= ID 104; Process data IN6 = Current limit= ID 107; Process data IN7 = NULL= ID 0; or Process data IN8 = NULL= ID 0.				

P10.2 - FB process data output selection.

P10.2.1②	***FB process data output 1 selection***				**ID 1556**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				
P10.2.2②	***FB process data output 2 selection***				**ID 1557**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				
P10.2.3②	***FB process data output 3 selection***				**ID 1558**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				

Table 67. Fieldbus (FB) status (Cont.).

P10.2.4②	***FB process data output 4 selection***				**ID 1559**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				
P10.2.5②	***FB process data output 5 selection***				**ID 1560**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				
P10.2.6②	***FB process data output 6 selection***				**ID 1561**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	6
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				
P10.2.7②	***FB process data output 7 selection***				**ID 1562**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				

Table 67. Fieldbus (FB) status (Cont.).

P10.2.8②	***FB process data output 8 selection***				**ID 1563**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	28
Description:	With the fieldbus data output selections, parameter/monitor IDs can be assigned to these registers and then read over the desired fieldbus network word for process data. Any drive parameter with an ID can be read over these values. Default values for process data out in fieldbus (build table for below values): Process data Out1 = Output frequency = ID 1; Process data Out2 = Motor speed = ID 2; Process data Out3 = Motor current = ID 3; Process data Out4 = Motor torque = ID 4; Process data Out5 = Motor power = ID 5; Process data Out6 = Motor voltage = ID 6; Process data Out7 = DC link voltage = ID 7; or Process data Out8 = Latest fault code = ID 28.				

P10.3 - Standard status word.

P10.3.1②	***Standard status word Bit0 function select***				**ID 2415**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.2②	***Standard status word Bit 1 function select***				**ID 2416**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.3②	***Standard status word Bit 2 function select***				**ID 2417**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	3
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.4②	***Standard status word Bit 3 function select***				**ID 2418**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.5②	***Standard status word Bit 4 function select***				**ID 2419**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.6②	***Standard status word Bit 5 function select***				**ID 2420**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	6
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.7②	***Standard status word Bit 6 function select***				**ID 2421**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	7
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

Table 67. Fieldbus (FB) status (Cont.).

P10.3.8②	***Standard status word Bit 7 function select***				**ID 2422**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	8
Options:	0 = Not used; 1 = Ready; 2 = Run; 3 = Fault; 4 = Fault invert; 5 = Warning; 6 = Reversed; 7 = At speed; 8 = Zero frequency; 9 = Frequency limit supervision; 10 = PI supervision; 11 = Torque limit supervision; 12 = Reference limit supervision; 13 = Power limit supervision; 14 = Temperature limit supervision; 15 = Analog input supervision; 16 = Motor current supervision; 17 = Over heat fault; 18 = Overcurrent regular; 19 = Overvoltage regular; 20 = Undervoltage regular; 21 = 4 mA reference fault/warning; 22 = External fault/warning; 23 = Motor thermal protection; 24 = STO fault output; 25 = Control from I/O; 26 = Remote control; 27 = Un-requested rotation direction; 28 = Fire mode; 29 = Damper control; 30 = Valve control; 31 = Jog speed select; 32 = Fieldbus digital input 1; 33 = Fieldbus digital input 2; 34 = DC charge switch close; 35 = Preheat active; 36 = Cold weather active; 37 = PI Sleep 38 = 2nd stage ramp frequency active; 39 = Prime pump active; 40 = Master drive state; 41 = Slave drive state; or 43 = Single drive control.				
Description:	This parameter allows for setting one of the RO functions to a status word that then can be read over the communication standard status word. This also can be viewed in the keypad monitor value M5.3.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 68. Serial communication .

P11.1 - Basic settings.					
P11.1.1①	***Serial communication***				**ID 586**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Modbus RTU; 1 = BACnet MSTP (*DM1 PRO); or 2 = SWD (*DM1 PRO).				
Description:	This parameter defines the communication protocol for RS-485.				

P11.2 - Modbus RTU.					
P11.2.1①	***Slave address***				**ID 587**
Minimum value:	1	**Maximum value:**	247	**Default value:**	1
Description:	This parameter defines the slave address for RS-485 communication.				

Table 68. Serial communication (Cont.).

P11.2.2①	***Baud rate***				**ID 584**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 57,600; or 4 = 115,200				
Description:	This parameter defines communication speed for RS-485 communication.				
P11.2.3①	***Parity type***				**ID 585**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = None; 1 = Odd; or 2 = Even.				
Description:	This parameter defines parity type for RS-485 communication.				
P11.2.4	***Modbus RTU protocol status***				**ID 588**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Initial; 1 = Stopped; 2 = Operational; or 3 = Faulted.				
Description:	This parameter shows the protocol status for RS-485 communication.				
P11.2.5	***Communication timeout modbus RTU***				**ID 593**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over modbus RTU if a message is not received.				
P11.2.6	***Modbus RTU fault response***				**ID 2516**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 - Only in fieldbus control mode. When fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications; if not in fieldbus control, place will not fault. 1 - In all control modes. No matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus RTU communication.				

P11.3 - BACnet MSTP.

P11.3.1①	***MSTP baud rate***				**ID 594**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	2
Options:	0 = 9,600; 1 = 19,200; 2 = 38,400; 3 = 76,800; or 4 = 115,200.				
Description:	This parameter defines the communication speed for RS-485 communication.				
P11.3.2①	***MSTP device address***				**ID 595**
Minimum value:	0	**Maximum value:**	127	**Default value:**	1
Description:	Defines the device address of the drive on the BACnet MSTP network.				
P11.3.3①	***MSTP instance number***				**ID 596**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Defines the instance number of the drive on the BACnet MSTP network.				
P11.3.4	***MSTP communication timeout***				**ID 598**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time to wait before a communication fault occurs over BACnet MSTP if a message is not received.				

Table 68. Serial communication (Cont.).

P11.3.5	***MSTP protocol status***				**ID 599**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.6	***MSTP fault code***				**ID 600**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = None; 1 = Sole master; 2 = Duplicate MAC ID; or 3 = Baud rate fault.				
Description:	This parameter shows the protocol status for BACnet MSTP communication.				
P11.3.7	***MSTP fault response***				**ID 2526**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet MSTP communication.				
P11.3.8	***MSTP maximum master***				**ID 1537**
Minimum value:	1	**Maximum value:**	127	**Default value:**	127
Description:	Defines the maximum number of masters that can establish connections with the drive.				

P11.5 - SWD.

P11.5.1	***Parameter access***				**ID 2630**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = No permission to read/write on acyclic channel; or 1 = Acyclic read/write are allowed on Profibus.				
Description:	PNU927 which specifies the operation priority of parameters for acyclic communication.				
P11.5.2①	***Parameter data access***				**ID 2631**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	4
Options:	0 = Local control; 1 = Fieldbus; 2 = Mixed interface; 4 = NET, local on fault; or 5 = Dual mode.				
Description:	PNU928 which specifies the control priority of the device for cyclic communication.				
P11.5.3	***Fault situation counter***				**ID 2632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	PNU952 which specifies the fault situation counter. Only write of 0 is allowed, then the whole fault buffer (actual fault situation and all other fault situations) and the fault message counter (parameter 944) are erased.				
P11.5.4	***Board status***				**ID 2609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Description:	Status of the board: B0-DCOM communication fault; B1-Board HW fault; B2-IO1 24 volt overload fault; B3-Profibus communication fault; or B4-fieldbus fault.				

Table 68. Serial communication (Cont.).

P11.5.5	***Firmware version***				**ID 2610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	This parameter provides the firmware version of the SWD.				
P11.5.6	***Protocol status***				**ID 2612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not configured; 1 = Operational; or 2 = Diagnostics.				
Description:	This parameter specifies the protocol status for SWD card.				

P11.6 - Bluetooth.

P11.6.1	***Bluetooth enabled***				**ID 1895**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Bluetooth enabled.				
P11.6.2②	***Bluetooth broadcast mode***				**ID 2920**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Off; or 1 = On.				
Description:	Bluetooth broadcast mode.				
P11.6.3	***Bluetooth pairing reset***				**ID 2935**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Not reset; or 1 = Reset.				
Description:	Bluetooth pairing reset.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 69. Ethernet communication.

P12.1 - Basic settings.					
P12.1.1①	***IP address mode***				**ID 1500**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Static IP; or 1 = DHCP with AutoIP.				
Description:	This parameter defined the IP address configuration mode for EIP/modbus TCP.				
P12.1.2	***Active IP address***				**ID 1507**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active IP address.				
P12.1.3	***Active subnet mask***				**ID 1509**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active subnet mask.				
P12.1.4	***Active default gateway***				**ID 1511**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current active default gateway.				

Table 69. Ethernet communication (Cont.).

P12.1.5	***MAC address***				**ID 1513**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Reads the current MAC address.				
P12.1.6①	***Static IP address***				**ID 1501**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.254
Description:	Defines the static IP address.				
P12.1.7①	***Static subnet mask***				**ID 1503**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	255.255.255.0
Description:	Defines the static subnet mask.				
P12.1.8①	***Static default gateway***				**ID 1505**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	192.168.1.1
Description:	Defines the static default gateway.				
P12.1.9	***Ethernet communication timeout***				**ID 611**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	10,000 ms
Description:	Selects the time it waits before a communication fault occurs over ethernet.				

P12.2 - Trusted IP filter (DM1 PRO only).

P12.2.1	***Trusted IP white list***				**ID 68**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0 0.0.0.0 192.168.1.255
Description:	Defines the IP addresses in the white list. A setting of 192.168.1.255 enables all connections on the local subnet.				
P12.2.2	***Trusted IP filter enable***				**ID 76**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables IP white listing. Devices not in the white list will not be able to establish communications with the drive.				

P12.3 - Modbus TCP (DM1 PRO only).

P12.3.1①	***Modbus TCP enable***				**ID 1942**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disable; or 1 = Enable.				
Description:	Enables modbus TCP communications, must be enabled to connect to Power Xpert inControl.				
P12.3.2	***Modbus TCP connection limit***				**ID 609**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	5
Description:	Maximum number of connections allowed to the drive.				
P12.3.3	***Modbus TCP unit identifier number***				**ID 610**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Description:	Unit identifier unit value for modbus TCP.				
P12.3.4	***Modbus TCP protocol status***				**ID 612**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for modbus TCP communication.				

Table 69. Ethernet communication (Cont.).

P12.3.5	***Modbus TCP fault response***				**ID 2517**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting, if communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for modbus TCP communication.				

P12.4 - Ethernet IP (DM1 PRO only).

P12.4.1①	***Ethernet based protocol select***				**ID 1997**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 2 = BACnet IP.				
Description:	Selects the active communication protocol on the ethernet I/P port.				
P12.4.2	***Ethernet IP protocol status***				**ID 608**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	Indicates if ethernet protocol is active or not.				
P12.4.3	***Ethernet IP fault response***				**ID 2518**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for ethernet IP communication.				

P12.5 - BACnet IP (DM1 PRO only).

P12.5.1①	***BACnet IP UDP port number***				**ID 1733**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Defines the BACnet UDP port number.				
P12.5.2①	***BACnet IP foreign devise***				**ID 1734**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables BACNET IP foreign device configuration.				

Table 69. Ethernet communication (Cont.).

P12.5.3①	***BACnet IP BBMD IP***				**ID 1735**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0.0.0.0
Description:	Displays the BACnet BBMD IP address.				
P12.5.4①	***BACnet IP UDP port***				**ID 1737**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	47,808
Options:	47808 = BAC0; 47809 = BAC1; 47810 = BAC2; 47811 = BAC3; 47812 = BAC4; 47813 = BAC5; 47814 = BAC6; 47815 = BAC7; 47816 = BAC8; 47817 = BAC9; 47818 = BACA; 47819 = BACB; 47820 = BACC; 47821 = BACD; 47822 = BACE; or 47823 = BACF.				
Description:	Displays the BACnet BBMD UDP port number.				
P12.5.5①	***BACnet IP registration interval***				**ID 1738**
Minimum value:	0	**Maximum value:**	65,535	**Default value:**	10
Description:	Defines the registration interval.				
P12.5.6	***BACnet IP communication timeout***				**ID 1739**
Minimum value:	0 ms	**Maximum value:**	60,000 ms	**Default value:**	0 ms
Description:	Selects the time it waits before a communication fault occurs over BACnet IP.				
P12.5.7	***BACnet IP protocol status***				**ID 1740**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Stopped; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for BACnet IP communication.				
P12.5.8	***BACnet IP fault behavior***				**ID 1741**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and Fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for BACnet IP communication.				
P12.5.9①	***BACnet IP instance number***				**ID 1742**
Minimum value:	0	**Maximum value:**	4,194,302	**Default value:**	0
Description:	Displays the BACnet instance number.				

P12.6 - Web UI (DM1 PRO only).

P12.6.1	***Web UI protocol status***				**ID 2915**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Off; 1 = Operational; or 2 = Faulted.				
Description:	This parameter shows the protocol status for web server communication.				

Table 69. Ethernet communication (Cont.).

P12.6.2	***Web UI fault response***				**ID 2916**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Only in fieldbus control mode - when fieldbus is the control place and fieldbus fault is active, the drive will fault on loss of communications. If not in fieldbus control, place will not fault. 1 = In all control modes - no matter the control place setting. If communication is lost, fieldbus fault response will occur.				
Description:	Defines the fieldbus fault condition for web server communication.				
P12.6.3	***Web UI communication timeout***				**ID 2919**
Minimum value:	30,000 ms	**Maximum value:**	60,000 ms	**Default value:**	60,000 ms
Description:	Selects the time it waits before a communication fault occurs over the web server.				
P12.6.4①	***Web UI enable***				**ID 2921**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Disabled; or 1 = Enabled.				
Description:	Enables web server configuration and monitoring page.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Table 70. System .

P13.1 - Basic settings.					
P13.1.1	***Language***				**ID 340**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = English; 1 = English; or 2 = English.				
Description:	This parameter offers the ability to control the frequency converter through the keypad in the language of your choice. Currently available language is English only.				
P13.1.2①	***Application***				**ID 142**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = Standard;; 1 = Pump; 2 = Fan; or 3 = Multi-purpose.				
Description:	This parameter sets the active application if multiple applications have been loaded.				
P13.1.3①	***Parameter sets***				**ID 619**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = Load factory default parameters; 2 = Reload set 1; 3 = Reload set 2; 4 = Store parameter set 1; 5 = Store parameter set 2; 6 = Reset; or 7 = Reload defaults VM.				
Description:	This parameter allows you to reload the factory default parameter values, and to store and load two customized parameter sets.				
P13.1.4	***Up to keypad***				**ID 620**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; or 1 = Yes (all parameters).				
Description:	This function uploads all existing parameter groups to the keypad.				

Table 70. System (Cont.).

P13.1.5①	***Down from keypad***				**ID 621**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = All parameters; 2 = All, no motor; or 3 = Application parameters.				
Description:	This function downloads one or all parameter groups from the keypad to the drive.				
P13.1.6	***Parameter comparison***				**ID 623**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Options:	0 = No; 1 = Compare with keypad; 2 = Compare with default; 3 = Compare with Set 1; or 4 = Compare with Set 2.				
Description:	With the parameter comparison function, you can compare the actual parameter values to the values of your customized parameter sets and those loaded to the control keypad. The actual parameter values are first compared to those of the customized parameter Set 1. If no differences are detected, a “0” is displayed on the lowermost line of the keypad. If any of the parameter values differ from those of the Set 1 parameters, the number of the deviations is displayed together. By pressing the right arrow button, once again you will see both the actual value and the value it was compared to. In this display, the value on the description line (in the middle) is the default value, and the one on the value line (lowermost line) is the edited value. You can also edit the actual value by pushing the right arrow button. Actual values can also be compared to Set 2, factory settings, and keypad set values.				
P13.1.7	***Parameter lock PIN***				**ID 624**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The application selection can be protected against unauthorized changes with the password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.1.8	***Keypad parameter lock***				**ID 625**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text “locked” will appear on the display if you try to edit a parameter value. **Note:** This function does not prevent unauthorized editing of parameter values.				
P13.1.9	***Start-up Wizard***				**ID 626**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Enabled. 1 = Disabled.				
Description:	The Start-up Wizard facilitates commissioning the DM1 PRO. If selected “Enable”, the Start-up Wizard prompts the operator for the application desired and then advances parameters through the start-up parameter list/Application Mini wizard in keypad. After completion, it allows the user to go to the main menu or default page and this parameter is set to “Disabled”. The Start-up Wizard is always enabled for the initial power up of the DM1 PRO. By setting this parameter to “Disable” without going through the Start-up Wizard, it will not cause it to be active on start-up. If user goes into Start-up Wizard after completion, or defaults drive, the Start-up Wizard will be “Enabled”.				

Table 70. System (Cont.).

P13.2 - Keypad.					
P13.2.1	***Local default page***				**ID 1875**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = None; or 1 = Monitor.				
Description:	Local default page selection.				
P13.2.2	***Local monitor parameter set***				**ID 1876**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1,1,0
Description:	Local monitor parameter path. Default path is M1.1.				
P13.2.3	***Default page***				**ID 628**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = None; 1 = Main menu; 2 = Multi-monitor; 3 = Favorite menu; or 4 = Keypad reference.				
Description:	This parameter sets the view to which the display automatically moves as the timeout time expires or when the keypad power is switched on. If the default page value is 0, the function is not activated: i.e., the last displayed page remains on the keypad display.				
P13.2.4	***Timeout time***				**ID 629**
Minimum value:	1 s	**Maximum value:**	65,535 s.	**Default value:**	30 s
Description:	The timeout time setting defines the time after which the keypad display returns to the Default Page. **Note:** If the default page value is 0, the timeout time setting has no effect.				
P13.2.5	***Contrast adjust***				**ID 630**
Minimum value:	5	**Maximum value:**	18	**Default value:**	12
Description:	If the remote keypad display is not clear, you can adjust the keypad contrast with this parameter.				
P13.2.6	***Backlight time***				**ID 631**
Minimum value:	1 min.	**Maximum value:**	65,535 min.	**Default value:**	10 min.
Description:	This parameter determines how long the backlight stays on before going out.				
P13.2.7	***Fan control***				**ID 632**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	1
Options:	0 = Continuous - fan runs continuously. 1 = Temperature - based on the temperature of the unit. The fan is switched on automatically when the heat sink temperature reaches 60°C (140°F). The fan receives a stop command when the heat sink temperature falls to 55°C (131°F). The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from “Continuous” to “Temperature”. 2 = Run follow - after power up, the fan is stopped until the run command is given and then fan runs continuously. This is mainly made for common DC-bus systems to prevent cooling fans to load charging resistors on power up moment.				
Description:	This function allows you to control the DM1 PRO’s cooling fan. You can set the fan to run as stated in the options.				
P13.2.8	***Keypad ACK timeout***				**ID 633**
Minimum value:	200 ms	**Maximum value:**	5,000 ms	**Default value:**	200 ms
Description:	This function allows the user to change the timeout of the keypad acknowledgement time. This is the communication performed between the control module and the keypad. This would be adjusted when using long communication cables between drive and a keypad to delay message timeouts. Example: = Transfer delay between the frequency converter and the PC = 600.00 ms. = The value of HMI acknowledge timeout is set to 1200.00 ms (2 x 600.00, sending delay + receiving delay). = The corresponding setting shall be entered in the [Misc]-part of the file. It must also be considered that intervals shorter than the HMI acknowledge timeout time cannot be used in frequency converter drive monitoring.				

Table 70. System (Cont.).

P13.2.9	***Keypad retry number***				**ID 634**
Minimum value:	1	**Maximum value:**	10	**Default value:**	5
Description:	With this parameter you can set the number of times the drive will try to receive acknowledgement when it has not been received within the acknowledgement time (HMI acknowledge timeout) or if the received acknowledgement is faulty.				

P13.3 - User display.

P13.3.1②	***Output display unit***				**ID 2424**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	45
Options:	0 = %; 1 = 1/min; 2 = rpm; 3 = ppm; 4 = pps; 5 = l/s; 6 = l/min; 7 = l/h; 8 = kg/s; 9 = kg/min; 10 = kg/h; 11 = m3/s; 12 = m3/min; 13 = m3/h; 14 = m/s; 15 = mbar; 16 = bar; 17 = Pa; 18 = kPa; 19 = mVS; 20 = kW; 21 = Deg. C; 22 = GPM; 23 = gal/s; 24 = gal/min; 25 = gal/h; 26 = lb/s; 27 = lb/min; 28 = lb/h; 29 = CFM; 30 = ft3/s; 31 = ft3/min; 32 = ft3/h; 33 = ft/s; 34 = in wg; 35 = ft wg; 36 = PSI; 37 = lb/in2; 38 = HP; 39 = Deg. F; 40 = PA; 41 = WC; 42 = HG; 43 = ft; 44 = m; 45 = Hz; 46 = strokes/min.				
Description:	Allows for changing the M1.1 and M1.2 value to a desired unit that will reflect the application. From there with P13.3.2 and P13.3.3, it will allow setting a minimum/maximum limit for the value to display desired output.				
P13.3.2②	***Output display unit minimum***				**ID 2460**
Minimum value:	-60,000.00 varies	**Maximum value:**	OutputDisplayUnitMax varies	**Default value:**	0.00 varies
Description:	Sets the minimum scaled value when changing the display unit to a value other than the default Hz.				

Table 70. System (Cont.).

P13.3.3②	***Output display unit maximum***				**ID 2425**
Minimum value:	OutputDisplayUnitMin varies	**Maximum value:**	60,000.00 varies	**Default value:**	MotorNomFreqMFG varies
Description:	Sets the maximum scaled value when changing the display unit to a value other than the default Hz.				

P13.4 - Version information.

P13.4.1	***Keypad software version***				**ID 640**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Keypad firmware version.				
P13.4.2	***Motor control software version***				**ID 642**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	DSP/motor control software version.				
P13.4.3	***Application software version***				**ID 644**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	MCU/application software version.				
P13.4.4	***Software bundle version***				**ID 1714**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Software bundle version.				

P13.5 - Application information.

P13.5.1	***Serial number***				**ID 648**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Product serial number.				
P13.5.2	***Multi-monitor set***				**ID 627**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Change enable; or 1 = Change disable.				
Description:	The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values monitored with other values.				
P13.5.3	***Keypad lock PIN***				**ID 75**
Minimum value:	0	**Maximum value:**	9,999	**Default value:**	0
Description:	The keypad can be protected against unauthorized changes with the keypad lock function after keys are not pressed five minutes. When the password function is enabled, the user will be prompted to enter a password before the keypad display parameter or response to key press except up/down/left/right. By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9,999. To deactivate the password, reset the parameter value to 0.				
P13.5.4	***Drive application name***				**ID 2922**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.

P13.6 - User information.

P13.6.1	***Total MWh count***				**ID 601**
Minimum value:	N.A. MWh	**Maximum value:**	N.A. MWh	**Default value:**	N.A. MWh
Description:	Megawatt hours total operation time counter of the drive output active.				

Table 70. System (Cont.).

P13.6.2	***Total power day count***				**ID 603**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Number of days the drive has been supplied with power.				
P13.6.3	***Total power hour count***				**ID 606**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Number of hours the drive has been supplied with power.				
P13.6.4	***Total motor hour count***				**ID 1872**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	h
Description:	Number of hours the DM1 PRO has been running a motor.				
P13.6.5	***Trip MWh count***				**ID 604**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	MWh
Description:	Megawatts hours of the drive output active since last reset.				
P13.6.6	***TClear trip MWh count***				**ID 639**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	0
Options:	0 = Not reset; 1 = Clear trip MWh count; or 2 = Clear trip power count.				
Description:	Resets the day and hour motor or drive running counter and resets the motor run time in the menu.				
P13.6.7	***Trip power day count***				**ID 636**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Number of days since the last reset.				
P13.6.8	***Trip power hour count***				**ID 637**
Minimum value:	N.A.	**Maximum value:**	N.A.	**Default value:**	N.A.
Description:	Number of hours the DM1 PRO has been running a motor since the last reset.				

① Parameter value can only be changed after the drive has stopped.
② Parameter value will be set to be default when changing macros.

Application notes

Faults and warning codes

Under this menu, you can find active faults, history faults, and fault codes.

Table 71. Active faults.

Menu	Function	Note
Active faults	When a fault/faults appear(s), the display with the name and fault time of the fault will be pop. Press DETAIL to see the fault data. The active faults submenu shows the list of faults. Select the fault and push DETAIL to see the fault data.	The fault remains active until it is cleared with the Reset button push for 2s) or with a reset signal from the I/O terminal or fieldbus. The memory of active faults can store the maximum of 10 faults in the order of appearance.

Table 72. History faults.

Menu	Function	Note
History faults	10 latest faults are stored in the fault history. Select the fault and push DETAIL to see the fault data.	The history fault will be stored until it is cleared with the OK button (push for 5 s). The memory of active faults can store the maximum of 10 faults in the order of appearance.

Fault codes and descriptions

Configurable 1 = The fault type of this fault is configurable, fault type can be configured as:
0 = No action; 1 = Warning; 2 = Fault; 3= Fault, Coast.

Fault code	Fault name/ description	Fault type	Default configuration	Possible cause	Remedy
1	Over current	Fault		AC drive has detected too high a current (>4*IH) in the motor cable: • Sudden heavy load increase; • Short circuit in motor cables; • Unsuitable motor.	• Check loading. • Check motor. • Check cables and connections. • Make identification run. • Check ramp times.
2	Over voltage	Fault		The DC-link voltage has exceeded the limits defined: • Too short a deceleration time; • Brake chopper is disabled; • High overvoltage spikes in supply; • Start/stop sequence too fast.	• Make deceleration time longer. • Use brake chopper or brake resistor (available as options). • Activate overvoltage controller. • Check input voltage.
3	Earth fault	Fault	Configurable	Current measurement has detected that the sum of motor phase current is not zero: • Insulation failure in cables or motor.	• Check motor cables and motor.
9	Under voltage	Fault	Configurable	DC link voltage is under the voltage limits defined: • Most probable cause: Too low a supply voltage; • AC drive internal fault; • Defect input fuse; • External charge switch not closed. **Note:** This fault is activated only if the drive is in the Run state.	• In case of temporary supply voltage break reset the fault and restart the AC drive. Check the supply voltage. If it is adequate, an internal failure has occurred. Contact the distributor near you.
10	Input phase superv	No action	Configurable	Input line phase is missing.	• Check supply voltage, fuses, and cable.
11	Output phase superv	Fault	Configurable	Current measurement has detected that there is no current in one motor phase.	Check motor cable and motor.
13	Drive under temp	Warning	Configurable	Too low temperature measured in power. Unit's heat sink or board. Heat sink temperature is under -10°C.	
14	Drive over temp	Fault		Too high temperature measured in power. Unit's heat sink or board. Heat sink temperature is over 90°C.	• Check the correct amount and flow of cooling air. • Check the heat sink for dust. • Check the ambient temperature. • Make sure that the switching frequency is not too high in relation to ambient temperature and motor load.
15	Motor stalled	No action	Configurable	Motor is stalled.	Check motor and load.

Fault code	Fault name/ description	Fault type	Default configuration	Possible cause	Remedy
16	Motor over load	No action	Configurable	Motor is too hot, based on either the drive's estimate or on temperature feedback.	Decrease motor load. If no motor overload exists, check the temperature model parameters.
17	Motor under load	No action	Configurable	Condition defined by parameter underload protection, underload Fnom torque, underload F0 torque, valid longer than the time defined by underload time limit.	Check load.
18	IP address conflict	Warning	Configurable	IP setting issue.	Check settings for IP address. Verify no duplicates are on the network.
19	Power board EEPROM fault	Fault		Power board EEPROM fault, memory lost in EEPROM.	Cycle power to drive. Try updating software. If issue continues, contact distributor near you.
20	Control board EEPROM fault (MCU EEPROM fault)	Fault		EEPROM data error in EEPROM memory.	Cycle power to drive. Try updating software. If issue continues, contact a distributor near you.
21	S-flash fault	Warning		Serial flash error; serial flash memory failed.	Cycle power to drive. Try updating software. If issue continues, contact a distributor near you.
22	Speed deviation	Fault		Estimated speed is greater than 115% of maximum frequency. Or current loop is oscillating.	Check motor parameters and run identification. Adjust the Observer Kp.
23	STO circuit fault	Fault		STO switch is broken; STO circuit failure.	Check STO switch and STO circuit. If issue continues, contact a distributor near you.
25	MCU watchdog fault	Fault		Watchdog register overflows in MCU.	Cycle power to drive. Try updating software. If issue continues, contact a distributor near you.
26	Start-up prevent	Fault		The time when interlock signal activates is over setting time.	Stop drive and resend start command.
37	Device change	Warning		Power board or option card change.	Alarm will reset.
38	Device added	Warning		Power board or option board added.	Device is ready for use. Old parameter settings will be used.
39	Device removed	Fault		Optional board removed from slot; or power board removed from control board.	Device no longer available in drive.
40	Device unknown	Fault		Unknown device connected (power board/option board).	Check EEPROM connection. Check board connection on slot A/B. Power cycle to drive..
41	IGBT over temp	Fault		IGBT temperature is too high.	• Check output loading. • Check motor size. • Decrease switching frequency.
50	AI < 4 mA (4 to 20 mA)	No action	Configurable	Loss in analog input signal, dropped below 4 mA.	Verify analog input current reference value on either AI1 or AI2, check cabling.
51	External fault	Fault	Configurable	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.
52	Keypad comm. Fault	Fault	Configurable	The connection between the control keypad and frequency converter is broken, and the local reference is keypad reference or the local control place is keypad, and the keypad communication fault protection is not "NO action"	Check keypad connection and possible keypad cable.
54	Option card fault	Fault	Configurable	Defective option card or option card slot.	Check right option card and option card slot connections. Check board status on keypad for exact cause of fault. Contact distributor nearest you.
57	Motor ID fault	Fault		The motor parameters identification running was not completed successfully.	Check motor size. Verify the input and output wiring is connected properly.
58	Current measure fault	Fault		Current measurement is out of range.	Restart the drive again. Should the fault re-occur, contact the distributor nearest to you.
66	Safety torque off	Fault	Configurable	STO triggered; STO input is open.	Reset STO trigger and verify wiring. Reset fault after input is enabled.
67	Current limit control	Warning		The output current has reached the current limit value.	Check the load. Set the acceleration time longer.

Fault code	Fault name/ description	Fault type	Default configuration	Possible cause	Remedy
68	Over voltage control	Warning		The DC link voltage has reached its voltage limit value.	Check the input voltage. Set the acceleration/deceleration time longer.
70	System fault	Fault		MCU sending wrong parameters to DSP.	Restart the drive again. Should the fault re-occur, contact the distributor nearest to you.
80	Fieldbus fault	Fault	Configurable	BACnet IP fieldbus fault.	Check the fieldbus communication wiring. Verify drive parameters are set correctly. Check BACnet master programming to verify proper addressing.
81	Fieldbus fault	Fault	Configurable	SA bus fieldbus fault.	Check the fieldbus communication wiring on A/B terminal. Verify drive parameters are set correctly. Check SA bus master programming to verify proper addressing.
83	Fieldbus fault	Fault	Configurable	(1) DCI_ubRTUBacNetFaultBehavior parameter's value is 0, loss of communication with modbus RTU, and the fieldbus reference is the remote reference or the fieldbus control place is the remote control place ,and the fault protection is not "NO action"; (2) DCI_ubRTUBacNetFaultBehavior parameter's value is 1, loss of communication with modbus RTU.	Check RS485 communication wiring. Verify drive parameters are set correctly. Check master programming to verify proper addressing.
84	Fieldbus fault	Fault	Configurable	(1) DCI_ubTCPFaultBehavior parameter's value is 0, loss of communication with modbus TCP ,and the fieldbus reference is the remote reference or the fieldbus control place is the remote control place ,and the fault protection is not "NO action";(2)DCI_ubTCPFaultBehavior parameter's value is 1, loss of communication with modbus TCP.	Check ethernet communication wiring. Verify drive parameter are set correctly. Check master programming to verify proper addressing.
85	Fieldbus fault	Fault	Configurable	Loss of communication with BACnet, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check RS485 communication wiring. Verify drive parameters are set correctly. Check BACnet master configuration programming to verify proper addressing.
86	Fieldbus fault	Fault	Configurable	Loss of communication with ethernet IP, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Check ethernet communication wiring. Verify drive parameters are set correctly. Check EIP master configuration programming to verify proper addressing.
87	Fieldbus fault	Fault	Configurable	Loss of communication with Profibus/Canopen/Devicenet master on Slot A, and the fieldbus reference is the remote reference OR the fieldbus control place is the remote control place, and the fault protection is not "NO action".	Profibus/Canopen/Devicenet communication wiring. Verify drive parameters are set correctly. Check Profibus/Canopen/Devicenet master configuration programming to verify proper addressing.
90	Drive under temp. (Cold weather drive under temp.)	Warning		• Cold weather mode is not enabled, and unit temperature is less than -10°C. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is less than -30°C. • Cold weather mode is enabled and Under Temp Fault Override is not set, unit temperature is -20 ~ -30°C. The temp <-20°C when cold weather start time out.	If unit temp -20 ~ -10°C, start motor in cold weather mode. If unit temp <-20°C, warm up unit above -20°C for proper operation using cold weather mode. If still < -20°C when cold weather mode time out, try higher output voltage in cold weather mode.
92	External fault (External fault 2)	Fault	Configurable	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.
93	External fault (External fault 3)	Fault	Configurable	Digital input is activated for external fault input.	Check digital input settings and verify input level, could be an external device causing fault.
97	Pipe fill loss (Prime loss)	No action	Configurable	• In single drive control mode of MPFC, include FC, interlock enable, and all interlock signals lost. • In single drive control mode of MPFC, not include FC, interlock enable, and interlock 1 lost. • In multi drive network mode of MPFC, interlock enable, and interlock 1 lost.	Check digital inputs for interlock.
98	PI feedback AI loss	No action	Configurable	The feedback function has a relationship with feedback 1/2 and the feedback 1/2 source has relationship with AI. The AI signal range is 1 (20-100%/2-10 V/4-20m A). The AI value is out of range (AI mode: 0~20 mA, AI < 4 mA or AI > 20 mA, AI mode: 0~10 V, AI < 2 V or AI > 10 V) of PID1 feedback.	Check the AI of PI1 feedback, the AI value whether is out of range or not, the AI range shall be 2~10 V (AI mode is 0~10 V) or 4~20 mA (AI mode is 0~20 mA).

Fault code	Fault name/ description	Fault type	Default configuration	Possible cause	Remedy
100	Fieldbus fault (Fieldbus SMDT fault)	Fault	Configurable	Smart wire sus fieldbus fault.	Check SmartWire DT card.
101	Option card fault	Fault	Configurable	SMDT board hardware fault.	Check SmartWire DT card.
102	External fault (External fault from SWD)	Fault	Configurable	External fault from SWD.	Check SmartWire DT card.
103	Drive over temperature	Warning		Drive degree greater than (DCI_wDriveOverTempThreshold value - 10 degree) and less than DCI_ wDriveOverTempThreshold value,report drive over temperature warning.	Check the drive degree.
111	Profibus firmware incompatible	Warning		Profibus card firmware is not compatible with MCB firmware.	Check the Profibus card firmware revision.
113	CANOpen firmware incompatible	Warning		CANOpen card firmware is not compatible with MCB firmware.	Check the CANOpen firmware revision.
114	SWD firmware incompatible	Warning		SWD card firmware is not compatible with MCB firmware.	Check the SWD card firmware revision.
115	Fieldbus fault	Fault	Configurable	FieldBus EIP idle fault	Check ethernet IP master programming to verify proper addressing and ensure idle communication bit is not set.
117	Pump over cycle	Warning		During a period, the times which the drive sleeps and wakes up exceed a user configurable value.	Check the reason that drive is not stable. Check why the drive sleeps and wakes up frequently.
118	Broken pipe	Warning	Configurable	PID feedback is less than broken pipe level and the drive output frequency is more than broke pipe frequency for delay time.	
125	Freq. limit supv. (Freq. limit)	No action		The output frequency exceeds the range of frequency supervision limit.	Check the output frequency and check the setting of frequency supervision limit.
126	Torque limit supv. (Torque limit)	No action		The motor torque exceeds the range of torque supervision limit.	Check the motor torque and check the setting of torque supervision limit.
127	Ref. limit supv. (Ref. limit)	No action		The frequency reference exceeds the range of freq. reference supervision limit.	Check the frequency reference and check the setting of frequency reference supervision limit.
128	Power limit supv. (Power limit)	No action		The motor power exceeds the range of power supervision limit.	Check the motor power and check the setting of power supervision limit.
129	Temp. limit supv. (Temp. limit)	No action		The unit temperature exceeds the range of temperature supervision limit.	Check the unit temperature and check the setting of temperature supervision limit.
130	AI limit supv. (AI limit)	No action		The AI value exceeds the range of AI supervision limit.	Check the AI value and check the setting of AI supervision limit.
131	Motor current supv. (Motor current limit)	No action		The motor current exceeds the range of current supervision limit	Check the motor current and check the setting of current supervision limit.
132	PI superv.	No action		The PI1 feedback exceeds the range of PI1 supervision limit.	Check the PI1 feedback and check the setting of PI1 supervision limit.
133	Fieldbus fault (Fieldbus web UI fault)	Fault	Configurable	FieldBus web UI fault.	Check the web connection with RJ45 connector. Verify drive parameters are set correctly. Check the web UI tool to know if there is proper request going to drive or not.

Recommended secure hardening guidelines

Introduction

This section "secure configuration" or "hardening" guidelines provide information to the users to securely deploy and maintain this product to adequately minimize the cybersecurity risks to their system.

Eaton is committed to minimizing the Cybersecurity risk in its products and deploys cybersecurity best practices and latest cybersecurity technologies in its products and solutions; making them more secure, reliable and competitive for our customers. Eaton also offers Cybersecurity Best Practices whitepapers to its customers that can be referenced at www.eaton.com/cybersecurity

PowerXL - secure configuration guidelines

Category	Description
Asset identification and Inventory	Keeping track of all the devices in the system is a pre-requisite for effective management of Cybersecurity of a system. Ensure you maintain an inventory of all the components in your system in a manner in which you uniquely identify each component. To facilitate this PowerXL Series VFD supports the following identifying information - manufacturer, type, serial number, f/w version number, and location. Customers/users can read following information from product label • Model Number • Serial Number • Device Name Information specific to communication protocols is available form parameter menu as below • IP Address Mode • Active IP Address • MAC Address See application manual for these parameter locations.

Restrict Physical access	Industrial Control Protocols don't offer cryptographic protections at protocol level leaving them exposed to Cybersecurity risk. Physical security is an important layer of defense in such cases. PowerXL Series VFD is designed with the consideration that it would be deployed and operated in a physically secure location.
	• Eaton suggests that physical access to cabinets and/or enclosures containing PowerXL Series VFD and the associated system should be restricted, monitored and logged at all times.
	• Physical access to the communication lines should be restricted to prevent any attempts of wiretapping, sabotage. It's a best practice to use metal conduits for the communication lines running between one cabinet to another cabinet.
	• Attacker with unauthorized physical access to the device could cause serious disruption of the device functionality. A combination of physical access controls to the location should be used, such as locks, card readers, and/or guards etc.
	• PowerXL Series VFD supports the following physical access ports,
	  • RJ45 connector for removable keypad as well as Modbus RTU communications
	  • RJ45 for EtherNet IP/Modbus TCP communications
	  • Terminal block for Modbus RTU and other Digital IOs
	Eaton suggests access to above physical ports need to be restricted.

Category	Description
Restrict logical access to PowerXL series drive	It is extremely important to securely configure the logical access mechanisms provided in PowerXL Series VFD to safeguard the device from unauthorized access. PowerXL Series VFD provides various types of administrative, operational, configuration privilege levels. Eaton recommends that the available access control mechanisms be used properly to ensure that access to the system is restricted to legitimate users only. And, such users are restricted to only the privilege levels necessary to complete their job roles/functions. Eaton recommends below best practices to be followed to ensure adequate cybersecurity of the setup/system • Default credentials are changed upon first login. PowerXL Series VFD should not be commissioned for production with Default credentials, it's a serious Cybersecurity flaw as the default credentials are published in the manuals. Restrict administrative privileges - Threat actors are increasingly focused on gaining control of legitimate credentials, especially those associated with highly privileged accounts. Limit privileges to only those needed for a user's duties. Make sure that the password used in the device is only available to authorized users like Configuring Engineers and not shared among all operational users. • Perform periodic account maintenance to make sure that password is changed whenever there is personnel change. • Change passwords and other system access credentials as appropriate • PowerXL Series VFD is provided with data/access protection mechanism on keypad, follow below steps to utilize it PowerXL Series VFD provides four levels of data protection for users to ensure the security: 1. Lock parameters on keypad. User can lock the parameters through DI or disable change, in which way all the parameters cannot be edited. 2. Lock parameters while motor running. Motor control parameters can only be modified when motor is in stop mode. In which way to enhance the motor security. The parameters are listed in the application manual. 3. Through Power Xpert inControl tool, facility to hide parameters on keypad is available. User can hide the parameters he/she thinks are significant for himself/herself. Such as IP address and so on. 4. Password on keypad. • 0000 means no password, which is the default. • Password range is 0001 ~ 9999. • With password, user can monitor parameters value but need enter password if he/she wants to edit parameters. • User needs to re-enter the password if there is no key operation in 1 min after enter the password. • User needs to enter the old password if he/she wants to change to a new one.
Restrict network access	PowerXL Series VFD provides network access to facilitate communication with other devices in the systems and configuration. But this capability could open up a big security hole if it's not configured securely. Eaton recommends segmentation of networks into logical enclaves and restrict the communication to host-to-host paths. This helps protect sensitive information and critical services and limits damage from network perimeter breaches. At a minimum, a utility Industrial Control Systems network should be segmented into a three-tiered architecture (as recommended by NIST SP800-82[R3]) for better security control. Deploy adequate network protection devices like Firewalls, Intrusion Detection / Protection devices, Below are the protocols and their port details available on PowerXL Series VFD. Use below information for configuring the firewalls. PowerXL Series VFD provides below communication protocols – • EtherNet IP protocols on RJ45 connector – enabled by default on port 44818 and 2222 • Modbus TCP protocol on RJ45 connector – enabled by default on port 502 • Modbus RTU on RS485 physical layer – enabled by default • BACnet MS/TP on RS485 physical layer – disabled by default, when this is enabled, Modbus RTU is disabled. All the protocols have dedicated menu structure, and details are described in User's Manual for how to activate or configure them. • Eaton has published detailed information about various Network level protection strategies in Eaton Cybersecurity Considerations for Electrical Distribution Systems [R1].

Category	Description
Logging and event management	**Best practices** • PowerXL Series VFD provides parameters change log and fault log functions for user, to help diagnose the drive 1. Parameters change log: • PowerXL Series VFD will log the parameter information in FRAM when the parameter changes. The max number of 66 items can be logged. New log will rewrite the old one. User cannot clear this fault information. 2. Fault log: • PowerXL Series VFD will log the drive information in FRAM when fault occurs. The max number of 10 items can be logged. New log will rewrite the old one. User can clear the history fault by pressing OK key more than 5 Sec. • PowerXL Series VFD will log the fault information in FRAM when fault occurs. The max number of 50 items can be logged. New log will rewrite the old one. User cannot clear this fault information.
Secure maintenance	**Best practices** **Apply firmware updates and patches regularly** Due to rapidly increasing Cyber Threats in Industrial Control Systems, Eaton implements a comprehensive patch and update process for its products. Users are encouraged to maintain a consistent process to promptly monitor for fresh firmware updates and apply the update whenever required. • The latest firmware can be acquired from the www.eaton.com/drives website. There will be separate link for PowerXL Series VFD FR0 to FR6 and PowerXL Series VFD FR7 & FR8 • Users can also sign up on our website to get emails when new material is released to the site if desired. • Using the PC Tool or verifying on the keypad the current version of firmware can be verified. • For additional information or technical support on Eaton's Variable frequency drive products contact us at TRCDrives@eaton.com or by phone at 800-386-2273 for US customers. For European customers contact us at AfterSalesEGBonn@eaton.com or by phone at +49 (0) 228602-3640 Eaton also has a robust vulnerability response process. In the event of any security vulnerability getting discovered in its products, Eaton patches the vulnerability and releases information bulletin through its cybersecurity website - http://www.eaton.com/cybersecurity and patches through www.eaton.com/drives.

References

[R1] Cybersecurity Considerations for Electrical Distribution Systems (WP152002EN):

http://www.eaton.com/ecm/groups/public/@pub/@eaton/@corp/documents/content/pct_1603172.pdf

[R2] Cybersecurity Best Practices Checklist Reminder (WP910003EN):

http://www.cooperindustries.com/content/dam/public/powersystems/resources/library/1100_EAS/WP910003EN.pdf

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Printed in USA
Publication No. MN040049EN/TBG001491
August 2020

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