

Options for ABB drives, converters and inverters

User's manual

FDNA-01 DeviceNet adapter module



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List of related manuals

See section [Related manuals](#) on page 16.

User's manual

FDNA-01 DeviceNet adapter module

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1

Safety

What this chapter contains

The chapter presents the warning symbols used in this manual and the safety instructions which you must follow when installing an optional module into a drive, converter or inverter. If ignored, physical injury or death may follow, or damage may occur to the equipment. Read this chapter before you start the installation.



Use of warnings

Warnings caution you about conditions which can result in serious injury or death and/or damage to the equipment and advise on how to avoid the danger. The following warning symbols are used in this manual:



Electricity warning warns of hazards from electricity which can cause physical injury and/or damage to the equipment.



General warning warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the equipment.



Safety in installation

These warnings are intended for all who install an optional module into a drive, converter or inverter.



WARNING! Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- Only qualified electricians are allowed to install and maintain the drive, converter or inverter!
- Disconnect the drive, converter or inverter into which the module will be installed from all possible power sources. After disconnecting, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you proceed.
- Do not work on the control cables when power is applied to the external control circuits of the drive, converter or inverter. Externally supplied control circuits may carry dangerous voltage.





2

About the manual

What this chapter contains

This chapter introduces this manual.

Applicability

This manual applies to the FDNA-01 DeviceNet adapter module (+K451), SW version 0.223 or later.

Compatibility

The FDNA-01 DeviceNet adapter module is compatible with the following drives:

- ACS355
- ACSM1
- ACS850
- ACQ810
- ACS880.

The FDNA-01 DeviceNet adapter module is compatible with all master stations that support the DeviceNet™ protocol.

Target audience

The reader is expected to have a basic knowledge of fieldbus interface, electrical fundamentals, electrical wiring practices and how to operate the drive.

Purpose of the manual

The manual provides information on installing, commissioning and using an FDNA-01 DeviceNet adapter module.

Related manuals

The related manuals are listed below.

	Code (English)
Drive user's manuals	
<i>ACS355 drives (0.37...22 kW, 0.5...30 hp) user's manual</i>	3AUA0000066143
Drive hardware manuals and guides	
<i>ACSM1-204 regen supply modules (5.3 to 61 kW) hardware manual</i>	3AUA0000053713
<i>ACSM1-04 drive modules (0.75 to 45 kW) hardware manual</i>	3AFE68797543
<i>ACSM1-04 drive modules (55 to 110 kW) hardware manual</i>	3AFE68912130
<i>ACSM1-04Lx liquid-cooled drive modules (55 to 160 kW) hardware manual</i>	3AUA0000022083
<i>ACS850-04 (0.37...45 kW) hardware manual</i>	3AUA0000045496
<i>ACS850-04 (55...160 kW, 75...200 hp) hardware manual</i>	3AUA0000045487
<i>ACS850-04 (200...500 kW, 250...600 hp) hardware manual</i>	3AUA0000026234
<i>ACQ810-04 drive modules (0.37...45 kW, 0.5...60 hp) hardware manual</i>	3AUA0000055160
<i>ACQ810-04 drive modules (55 to 160 kW, 75 to 200 hp) hardware manual</i>	3AUA0000055161

	Code (English)
ACQ810-04 drive modules (200...400 kW, 250...600 hp) hardware manual	3AUA0000055155
ACS880-01 (0.55 to 250 kW, 0.75 to 350 hp) hardware manual	3AUA0000078093

Drive firmware manuals and guides

ACSM1 motion control program firmware manual	3AFE68848270
ACSM1 speed and torque control program firmware manual	3AFE68848261
ACSM1 regen supply control program firmware manual	3AUA0000052174
ACS850 standard control program firmware manual	3AUA0000045497
ACQ810 standard pump control program firmware manual	3AUA0000055144
ACS880 primary control program firmware manual	3AUA0000085967

Option manuals and guides

FDNA-01 DeviceNet adapter module user's manual	3AFE68573360
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You can find manuals and other product documents in PDF format on the Internet. See section [Document library on the Internet](#) on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

Before you start

It is assumed that the drive is installed and ready to operate before you start the installation of the adapter module.

In addition to conventional installation tools, have the drive manuals available during the installation as they contain important information not included in this manual. The drive manuals are referred to at various points of this manual.

Contents

The manual consists of the following chapters:

- *Safety* presents the safety instructions which you must follow when installing a fieldbus adapter module.
 - *About the manual* introduces this manual.
 - *Overview of the DeviceNet network and the FDNA-01 module* contains a short description of the DeviceNet network and the adapter module.
 - *Mechanical installation* contains a delivery checklist and instructions on mounting the adapter module.
 - *Electrical installation* contains cabling and bus termination instructions and instructions on connecting the module to the DeviceNet network.
 - *Start-up* presents the steps to take during the start-up of the drive with the adapter module and gives examples of configuring the master system.
 - *Communication profiles* describes the communication profiles used in the communication between the DeviceNet network, the adapter module and the drive.
 - *Communication protocol* describes the DeviceNet communication protocol for the adapter module and the configuration of the scanner.
 - *Diagnostics* explains how to trace faults with the status LEDs on the adapter module.
 - *Technical data* contains the technical data of the adapter module and the DeviceNet link.
 - *Appendix A – Varying the number of drive parameters* describes how to reduce the number of drive parameter members in FDNA-01 assemblies by modifying the EDS file.
-

Terms and abbreviations used in this manual

■ General terms and abbreviations

Term	Explanation
Command word	See Control word.
Communication module	Communication module is a name for a device (eg, a fieldbus adapter) through which the drive is connected to an external communication network (eg, a fieldbus). The communication with the module is activated with a drive parameter.
Control word	16-bit or 32-bit word from master to slave with bit-coded control signals (sometimes called the Command word).
DCU profile	Drive Control Unit profile, native profile used in the ACS350 and ACS355 drives
DTC	Direct Torque Control is a motor control method for AC drives. DTC allows accurate control of both motor speed and torque without pulse encoder feedback from the motor shaft.
FBA profile	Fieldbus Adapter profile, native profile used in the ACQ810, ACS850 and ACSM1 drives
FDNA-01 DeviceNet adapter module	One of the optional fieldbus adapter modules available for ABB drives. FDNA-01 is a device through which an ABB drive is connected to a DeviceNet serial communication bus.
LSW	Least significant word
MSW	Most significant word
Parameter	An operating instruction for the drive. Parameters can be read and programmed with the drive control panel, drive PC tools or through the adapter module.
Profile	Adaptation of the protocol for certain application field, for example, drives. In this manual, drive-internal profiles (eg, DCU or FBA) are called native profiles.
RFG	Ramp Function Generator

Term	Explanation
Status word	16-bit or 32-bit word from slave to master with bit-coded status messages

■ DeviceNet terms and abbreviations

Term	Explanation
Change of State/Cyclic Message	Change of State/Cyclic Message is transmitted by either the master or the slave. A Change of State/Cyclic Message is directed towards a single specific node (point-to-point). An Acknowledge Message may be returned in response to this message.
CIP™	Common Industrial Protocol (CIP) is an industrial protocol for industrial automation applications. It is managed by ODVA.
EDS File	Electronic Data Sheet (EDS) file identifies the properties of the device to the DeviceNet Scanner. Each type of drive and application program requires its own EDS file.
Input	In the ODVA DeviceNet specification the word 'input' is used to describe data flow from a device (such as FDNA-01) to the network.
I/O assembly selection	Smart networked devices (like FDNA-01) can produce and/or consume more than one I/O value. Typically, they produce and/or consume one or more I/O value, as well as status and diagnostic information. Each piece of data communicated by a device is represented by an attribute of one of the device's internal objects. Communicating multiple pieces of data (attributes) across a single I/O connection requires that the attributes be grouped or assembled together into a single block.
MAC ID	Every node on DeviceNet network has to have a unique identifier. This node number is called MAC ID (Media Access Control Identifier).

Term	Explanation
ODVA™	ODVA stands for Open DeviceNet Vendor Association. ODVA is an independent organization that promotes interoperativity between different manufacturers' DeviceNet products. ABB is an Associate Member at ODVA.
Output	In the ODVA DeviceNet specification the word 'output' is used to describe data flow from the network into a device (such as FDNA-01).
Poll Message	Most DeviceNet Scanners as well as the FDNA-01 module support two different data services. These are Poll and Change of State/Cyclic messages. The Poll Command is an I/O Message that is transmitted by the master. A Poll Command is directed towards a single, specific slave (point-to-point, FDNA-01 always acts as a slave). A master must transmit a separate Poll Command Message for each of its slaves that is to be polled. The Poll Response is an I/O Message that a slave transmits back to the master when the Poll Command is received.
Scanlist	DeviceNet Scanner communicates with the DeviceNet slaves in a user-defined order. This order of communication is the scanlist. The scanlist contains a complete list of the slave nodes and the order in which the slaves are accessed.

3

Overview of the DeviceNet network and the FDNA-01 module

What this chapter contains

This chapter contains a short description of the DeviceNet network and the FDNA-01 DeviceNet adapter module.

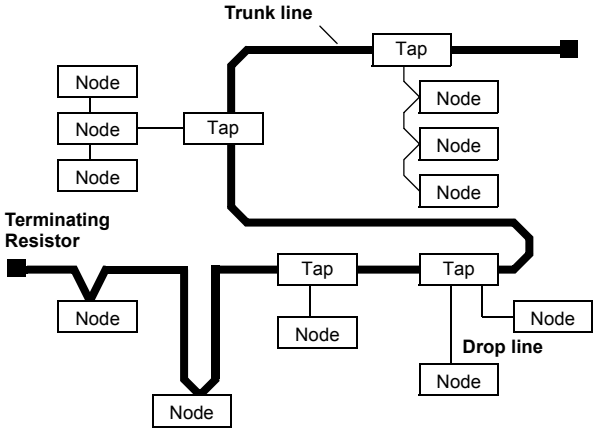
DeviceNet network

The DeviceNet network has a linear bus topology. Terminating resistors are required on each end of the trunk line. Drop lines as long as 6 metres (20 feet) each are permitted, allowing one or more nodes to be attached. DeviceNet allows branching structures only on drop lines.

The maximum length of the trunk cable depends on the data rate and on the type of the cable used (see chapter [Technical data](#)).

Example topology of the DeviceNet link

An example of an allowable topology is shown below.



FDNA-01 DeviceNet adapter module

The FDNA-01 DeviceNet Adapter module is an optional device for ABB drives. It enables the connection of the drive to a DeviceNet network. The drive is considered a slave in the DeviceNet network.

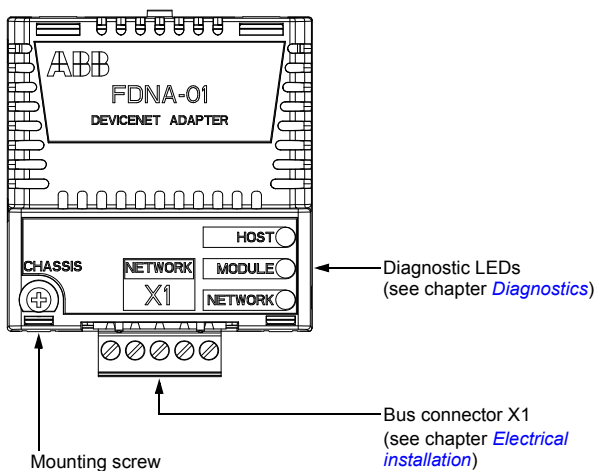
Through the adapter module you can:

- give control commands to the drive (for example, Start, Stop, Run enable)
- feed a motor speed or torque reference to the drive
- give the actual value or reference of the process to the PID controller of the drive
- read status information and actual values from the drive
- change drive parameter values
- reset a drive fault.

The adapter module acts as a class 2 slave only with predefined master-slave connection set services. These include the explicit messaging, the poll-response service and the change of state/cyclic service. The DeviceNet commands and services supported by the adapter module are described in chapter [Communication protocol](#).

The adapter module is mounted into an option slot on the motor control board of the drive. See the drive manuals for the module placement options.

Layout of the adapter module



4

Mechanical installation

What this chapter contains

This chapter contains a delivery checklist and instructions on mounting the adapter module.



WARNING! Follow the safety instructions given in this manual and the drive documentation.



Delivery check

The option package for the adapter module contains:

- DeviceNet adapter module, type FDNA-01
 - this manual.
-

Mounting the adapter module

The adapter module is to be inserted into its specific position in the drive. The module is held in place with plastic pins and one screw. The screw also provides the electrical connection between the module and drive frame for cable shield termination.

When the module is installed, the signal and power connection to the drive is made through a 20-pin connector. (All drives do not use all the available signals so the connector on the drive may have fewer pins.)

Mounting procedure:

1. Insert the module carefully into its position on the drive.
2. Fasten the screw.

Note: It is essential to install the screw properly to fulfill the EMC requirements and to ensure the proper operation of the module.

For more information on mounting, see the drive manuals.



5

Electrical installation

What this chapter contains

This chapter contains:

- general cabling instructions
- instructions on connecting the module to the DeviceNet network
- instructions on switching on the bus termination.



WARNING! Before installation, switch off the drive power supply. Wait five minutes to ensure that the capacitor bank of the drive is discharged. Switch off all dangerous voltages connected from external control circuits to the inputs and outputs of the drive.



General cabling instructions

- Arrange the bus cables as far away from the motor cables as possible.
 - Avoid parallel runs.
 - Use bushings at cable entries.
-

Connecting the module to the DeviceNet network

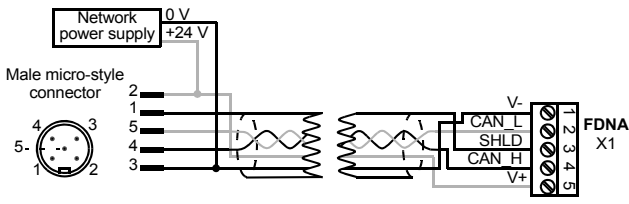
Connect the bus cable to terminal block X1 on the adapter module.

Terminal block description

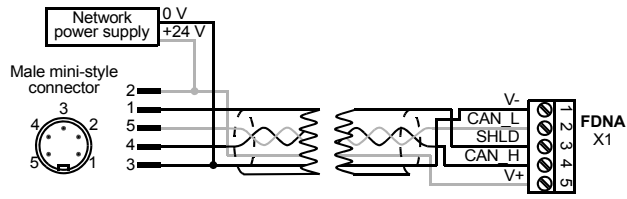
X1		Description
1	V-	Network power supply ground (0V DC)
2	CAN_L	CAN_L bus line
3	SHLD	Network cable shield
4	CAN_H	CAN_H bus line
5	V+	Network power supply source (24V DC)

Connection examples

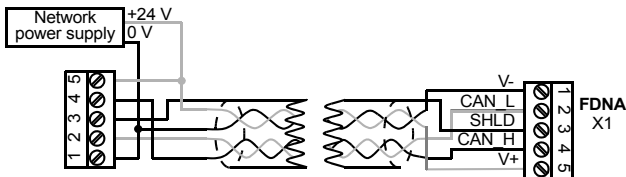
5-pin micro-style connector:



5-pin mini-style connector:

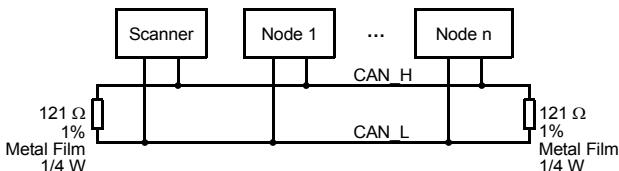


Standard open-style screw connector:



Switching on the bus termination

The adapter module does not provide bus termination. The DeviceNet network should be terminated at both ends of the trunk cable with a 121 ohm, 1/4 W, 1% metal film resistor. Connect the resistor between the two signal wires (CAN_H, CAN_L) on the DeviceNet cable, as shown in the figure below.



Further information on the DeviceNet protocol is available at www.odva.org.



6

Start-up

What this chapter contains

This chapter contains:

- information on configuring the drive for operation with the adapter module
- drive-specific instructions on starting up the drive with the adapter module
- examples of configuring the master station for communication with the adapter module.



WARNING! Follow the safety instructions given in this manual and the drive documentation.



Drive configuration

The following information applies to all drive types compatible with the adapter module, unless otherwise stated.

■ DeviceNet connection configuration

After the adapter module has been mechanically and electrically installed according to the instructions in chapters [Mechanical installation](#) and [Electrical installation](#), the drive must be prepared for communication with the module.

The detailed procedure of activating the module for DeviceNet communication with the drive depends on the drive type. Normally, a parameter must be adjusted to activate the communication. See the drive-specific start-up procedures starting on page [49](#).

Once communication between the drive and the adapter module has been established, several configuration parameters are copied to the drive. These parameters are shown in the tables below and must be checked first and adjusted where necessary.

Note: Not all drives display descriptive names for the configuration parameters. To help you identify the parameters in different drives, the names displayed by each drive are given in grey boxes in the tables.

Note: The new settings take effect only when the adapter module is powered up the next time or when the fieldbus adapter refresh parameter is activated.

Note: If communication between the adapter module and DeviceNet master is established, changes to the configuration parameters can be done also through [Fieldbus configuration object 91h](#).



FDNA-01 configuration parameters – group A (group 1)

Note: The actual parameter group number depends on the drive type. Group A (group 1) corresponds to:

- parameter group 51 in ACS355, ACSM1, ACS850 and ACQ810
- parameter group 51 in ACS880 if the adapter is installed as fieldbus adapter A or group 54 if the adapter is installed as fieldbus adapter B.

No.	Name/Value	Description	Default
01	FBA TYPE	Read-only. Shows the fieldbus adapter type as detected by the drive. Value cannot be adjusted by the user. If the value is 0 = None, the communication between the drive and the module has not been established.	1 = DeviceNet
02	MAC ID ACS355: FB PAR 2 ACSM1: FBA PAR2 ACS850/ACQ810: FBA par2 ACS880: MAC ID	Defines the MAC ID number for the drive the adapter module is connected to. Each device on the DeviceNet network must have a unique MAC ID number.	63
	0...63	MAC ID	
03	BAUD RATE ACS355: FB PAR 3 ACSM1: FBA PAR3 ACS850/ACQ810: FBA par3 ACS880: Baud rate	Read-only. Indicates the detected communication speed in kbit/s.	0 = 125 kbit/s
	0 = 125 kbit/s	Communication speed is 125 kbit/s.	
	1 = 250 kbit/s	Communication speed is 250 kbit/s.	
	2 = 500 kbit/s	Communication speed is 500 kbit/s.	



No.	Name/Value	Description	Default
04	DRIVE PROFILE ACS355: FB PAR 4 ACSM1: FBA PAR4 ACS850/ACQ810: FBA par4 ACS880: Drive profile	Defines the communication used between the module and the drive (not fieldbus and module). If a drive supports more than one drive profile, this parameter is used to select the preferred profile. Presently, to use the ODVA and ABB Drives profiles, the drive must support a native profile (eg, DCU or FBA). Transparent16 and Transparent32 profiles may be used with any drive profile.	0 = Native prof
	0 = Native prof	Native profile of the drive selected	
05	ODVA STOP FUNC ACS355: FB PAR 5 ACSM1: FBA PAR5 ACS850/ACQ810: FBA par5 ACS880: ODVA stop func	Used with the ODVA AC/DC drive profile. Determines how the motor is stopped when a stop command is received via DeviceNet.	0 = Ramp stop
	0 = Ramp stop	Motor decelerates along the active deceleration ramp.	
	1 = Coast stop	Motor comes to a stop by coasting.	



No.	Name/Value	Description	Default
06	OUTPUT INSTANCE ACS355: FB PAR 6 ACSM1: FBA PAR6 ACS850/ACQ810: FBA par6 ACS880: Output instance	Configures the output assembly instances used by the adapter module. Tables below list the supported assemblies and allowed combinations. For the descriptions of the assembly instances, see section Assembly objects on page 98.	20

Name	Output instance	Input instance	Default input size (bytes)	Profile
Basic speed control	20	70	4	ODVA AC/DC drive
Extended speed control	21	71	4	ODVA AC/DC drive
Basic speed and torque control	22	72	6	ODVA AC/DC drive
Extended speed and torque control	23	73	6	ODVA AC/DC drive
Basic speed control plus drive parameters	120	170	24	ODVA AC/DC drive
Extended speed control plus drive parameters	121	171	24	ODVA AC/DC drive
Basic speed and torque control plus drive parameters	122	172	26	ODVA AC/DC drive
Extended speed and torque control plus drive parameters	123	173	26	ODVA AC/DC drive
ABB Drives profile with set speed	801	851	4	ABB Drives
ABB Drives profile with set speed and set torque	802	852	6	ABB Drives
(continued)				



No.	Name/Value	Description			Default
	Name	Output instance	Input instance	Default input size (bytes)	Profile
	(continued)				
	ABB Drives profile with set speed plus drive parameters	901	951	24	ABB Drives
	ABB Drives profile with set speed and set torque plus drive parameters	902	952	26	ABB Drives
	ABB Drives profile with set speed plus drive parameters	901	951	24	ABB Drives
	Transparent16 with one	811	861	4	Transparent16
	Transparent16 with two	812	862	6	Transparent16
	Transparent16 with one plus drive parameters	911	961	24	Transparent16
	Transparent16 with two plus drive parameters	912	962	26	Transparent16
	Transparent32 with one	821	871	8	Transparent32
	Transparent32 with two	822	872	12	Transparent32
	Transparent32 with one plus drive parameters	921	971	28	Transparent32
	Transparent32 with two plus drive parameters	922	972	32	Transparent32

No.	Name/Value	Description	Default									
Note: With ACSM1, ACQ810, ACS850 and ACS880, when using the ODVA AC/DC drive or ABB Drives profile, make sure that drive parameter 50.04 FBA REF MODESEL is set to SPEED. With ACSM1, ACS850 and ACS880, make sure that 50.05 FBA REF2 MODESEL is set to TORQUE.												
		<table><tr><th colspan="4">Input</th></tr><tr><th></th><th>ODVA (70-73; 170-173)</th><th>ABB DRIVES (851-852; 951-952)</th><th>TRANSPARENT16 (861-862; 961-962)</th><th>TRANSPARENT32 (871-872; 971-972)</th></tr></table>		Input					ODVA (70-73; 170-173)	ABB DRIVES (851-852; 951-952)	TRANSPARENT16 (861-862; 961-962)	TRANSPARENT32 (871-872; 971-972)
Input												
	ODVA (70-73; 170-173)	ABB DRIVES (851-852; 951-952)	TRANSPARENT16 (861-862; 961-962)	TRANSPARENT32 (871-872; 971-972)								
Output	ODVA (20-23; 120-123)	x										
	ABB DRIVES (801-802; 901-902)		x									
	TRANSPARENT16 (811-812; 911-912)			x								
	TRANSPARENT32 (821-822; 921-922)				x							

		For alternative values, see column <i>Output instance</i> in the table describing parameter <i>06 OUTPUT INSTANCE</i> .	
07	OUTPUT NUM PARS ACS355: FBA PAR 7 ACSM1: FBA PAR7 ACS850/ACQ810: FBA par7 ACS880: Output num pars	Some assembly instances support transferring drive parameter values between the I/O scanner and drive. Parameters <i>07 OUTPUT NUM PARS</i> and <i>09 INPUT NUM PARS</i> specify how many drive parameter values should be included in the respective assembly instance. Changing the numbers of the drive parameters to values other than the defaults also changes the lengths of the associated assembly instances. This requires manual changes to either the EDS file or I/O scanner configuration. Before changing these parameters, consult <i>Appendix A – Varying the number of drive parameters</i> . Note: This parameter is only used when the output assembly instance is 120, 121, 122, 123, 901, 902, 911, 912, 921, 922. It must always be set to the default, 10, except as described in <i>Appendix A – Varying the number of drive parameters</i>	10
1...10		Number of drive parameter values to be included in the assembly instance	



No.	Name/Value	Description	Default
08	INPUT INSTANCE ACS355: FB PAR 9 ACSM1: FBA PAR9 ACS850/ACQ810: FBA par9 ACS880: Input instance	Configures the input assembly instances used by the adapter module. See parameter 06 OUTPUT INSTANCE . For alternative values, see parameter 06 OUTPUT INSTANCE .	70
09	INPUT NUM PARS ACS355: FB PAR 9 ACSM1: FBA PAR9 ACS850/ACQ810: FBA par9 ACS880: Input num pars	See parameter 07 OUTPUT NUM PARS . Note: This parameter is only used when the input assembly instance is 170, 171, 172, 173, 951, 952, 961, 962, 971, 972. It must always be set to the default, 10, except as described in Appendix A – Varying the number of drive parameters .	10
	1...10	Number or drive parameter values to be included in the assembly instance	



No.	Name/Value	Description	Default
10	ODVA SPEED SCALE ACS355: FB PAR 10 ACSM1: FBA PAR10 ACS850/ACQ810: FBA par10 ACS880: ODVA speed scale	Defines the speed scale in the ODVA AC/DC drive profile. Units of reference and actual speeds for the ODVA AC/DC drive profile are given by the formula below. No effect on the ABB Drives profiles. Note: While a wide range of resolutions may be configured, the actual performance is limited to the performance capabilities of the drive. Speed unit = RPM X 2^(-1 X ODVA speed scale value) Table below shows how the values of drive parameter ODVA SPEED SCALE correspond to the ODVA Speed Scale units.	128

ODVA speed scale value ¹⁾	Speed scale value of drive parameter ²⁾	Unit
-5	123	32 RPM
-4	124	16 RPM
-3	125	8 RPM
-2	126	4 RPM
-1	127	2 RPM
0 (default)	128	1 RPM
1	129	0.5 RPM
2	130	0.25 RPM
3	131	0.125 RPM
4	132	0.0625 RPM
5	133	0.03125 RPM

¹⁾ Use the ODVA speed scale value when reading/writing parameter *ODVA SPEED SCALE* via *AC/DC-drive object, class 2Ah*. When written via the AC/DC drive object, the new value takes effect immediately.

²⁾ Use the speed scale value of the drive parameter when reading/writing parameter *ODVA SPEED SCALE* via the drive control panel, *Drive parameter object, Class 90h* and *Fieldbus configuration object 91h*. When written via these methods, the new value takes effect after the drive is repowered or a "Fieldbus Adapter Parameter refresh" is given.

123...133	Speed scale value of the drive parameter	
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No.	Name/Value	Description	Default
11	ODVA TORQUE SCALE ACS355: FB PAR 11 ACSM1: FBA PAR11 ACS850/ACQ810: FBA par11 ACS880: ODVA torque scale	Defines the torque scale in the ODVA AC/DC drive profile. Units of reference and actual torques for the ODVA AC/DC drive profile are given by the formula below. No effect on the ABB Drives profiles. Note: While a wide range of resolutions may be configured, the actual performance is limited to the performance capabilities of the drive. (N·m = Newton x Meter) Torque unit = N·m x 2^(-1 X ODVA torque scale) Table below shows how the values of drive parameter ODVA TORQUE SCALE correspond to the ODVA Torque Scale units.	128

ODVA torque scale value ¹⁾	Torque scale value of drive parameter ²⁾	Unit
-5	123	32 N·m
-4	124	16 N·m
-3	125	8 N·m
-2	126	4 N·m
-1	127	2 N·m
0 (default)	128	1 N·m
1	129	0.5 N·m
2	130	0.25 N·m
3	131	0.125 N·m
4	132	0.0625 N·m
5	133	0.03125 N·m

1) Use the ODVA torque scale value when reading/writing parameter **ODVA TORQUE SCALE** via **AC/DC-drive object, class 2Ah**. When written via the AC/DC drive object, the new value takes effect immediately.

2) Use the torque scale value of the drive parameter when reading/writing parameter **ODVA TORQUE SCALE** via the drive control panel, **Drive parameter object, Class 90h** and **Fieldbus configuration object 91h**. When written via these methods, the new value takes effect after the drive is repowered or a "Fieldbus Adapter Parameter refresh" is given.

123...133	Torque scale value of the drive parameter	
12 ... 25	Reserved Not used by the adapter module.	N/A

No.	Name/Value	Description	Default																																												
26	UNRECOVERABLE ERROR ACS355: FB PAR 26 ACSM1: FBA PAR26 ACS850/ACQ810: FBA par26 ACS880: Unrecover. error	Read-only. Shows information about the cause of an unrecoverable error in the adapter module. Bit field parameter, that is, several status bits can be set at a time. Value 0 indicates that there are no errors.	0																																												
<table border="1"> <thead> <tr> <th>Bit</th><th>Name</th><th>Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>1</td><td>DUP_MAC_ERROR</td><td>0x0001</td><td>Duplicate MAC ID error</td></tr> <tr> <td>2</td><td>RX_QUEUE_OVERRUN</td><td>0x0002</td><td>Message receive queue is full.</td></tr> <tr> <td>3</td><td>TX_QUEUE_OVERRUN</td><td>0x0004</td><td>Message transmit queue is full.</td></tr> <tr> <td>4</td><td>IO_SEND_ERROR</td><td>0x0008</td><td>Transmitting I/O data has failed.</td></tr> <tr> <td>5</td><td>CAN_BUS_OFF</td><td>0x0010</td><td>Bus-off is detected.</td></tr> <tr> <td>6</td><td>CAN_OVERRUN</td><td>0x0020</td><td>CAN message was lost.</td></tr> <tr> <td>7</td><td>DNS_RESET</td><td>0x0040</td><td>DeviceNet driver of the module is reset.</td></tr> <tr> <td>8</td><td>DNS_BUS_SENSE_ERROR</td><td>0x0080</td><td>No voltage detected in the network.</td></tr> <tr> <td>9</td><td>DNS_SWITCH_ERROR</td><td>0x0100</td><td>DeviceNet driver reset failed due to an invalid MAC ID or baud rate.</td></tr> <tr> <td>13</td><td>SYS_FILE_ERR</td><td>0x1000</td><td>Initialization with the drive failed.</td></tr> </tbody> </table>				Bit	Name	Value	Description	1	DUP_MAC_ERROR	0x0001	Duplicate MAC ID error	2	RX_QUEUE_OVERRUN	0x0002	Message receive queue is full.	3	TX_QUEUE_OVERRUN	0x0004	Message transmit queue is full.	4	IO_SEND_ERROR	0x0008	Transmitting I/O data has failed.	5	CAN_BUS_OFF	0x0010	Bus-off is detected.	6	CAN_OVERRUN	0x0020	CAN message was lost.	7	DNS_RESET	0x0040	DeviceNet driver of the module is reset.	8	DNS_BUS_SENSE_ERROR	0x0080	No voltage detected in the network.	9	DNS_SWITCH_ERROR	0x0100	DeviceNet driver reset failed due to an invalid MAC ID or baud rate.	13	SYS_FILE_ERR	0x1000	Initialization with the drive failed.
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0...65535		Active unrecoverable errors																																													
27	FBA PAR REFRESH ACS355/ACSM1: FBA PAR REFRESH ACS850/ACQ810/ACS880: FBA par refresh	Validates any changed adapter module configuration parameter settings. After refreshing, the value reverts automatically to 0 = Done . Note: This parameter cannot be changed while the drive is running.	0 = Done																																												
0 = Done		Refreshing done																																													
1 = Refresh/Configure		Refreshing																																													



No.	Name/Value	Description	Default
28	PAR TABLE VER ACS355: FILE CPI FW REV ACSM1: PAR TABLE VER ACS850/ACQ810/ ACS880: Par table ver	Read-only. Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive. In format xyz , where x = major revision number y = minor revision number z = correction number OR in format axyz , where a = major revision number xy = minor revision numbers z = correction number or letter.	N/A
	0x0000...0xFFFF	Parameter table revision	
29	DRIVE TYPE CODE ACS355: FILE CONFIG ID ACSM1: DRIVE TYPE CODE ACS850/ACQ810/ ACS880: Drive type code	Read-only. Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.	N/A
	0...65535	Drive type code of the fieldbus adapter module mapping file	
30	MAPPING FILE VER ACS355: FILE CONFIG REV ACSM1: MAPPING FILE VER ACS850/ACQ810/ ACS880: Mapping file ver	Read-only. Displays the fieldbus adapter module mapping file revision stored in the memory of the drive in decimal format. Example: 0x107 = revision 1.07.	N/A
	0...65535	Mapping file revision	

No.	Name/Value	Description	Default
31	D2FBA COMM STA ACS355: FBA STATUS ACSM1: D2FBA COMM STA ACS850/ACQ810/ACS880: D2FBA comm sta	Read-only. Displays the status of the fieldbus adapter module communication. Note: The value names may vary by drive.	0 = Idle
	0 = Idle	Adapter is not configured.	
	1 = Exec.init	Adapter is initializing.	
	2 = Time out	Time-out has occurred in the communication between the adapter and the drive.	
	3 = Conf.err	Adapter configuration error: Major or minor revision code of the common program revision in the fieldbus adapter module is not the revision required by the module or mapping file upload has failed more than three times.	
	4 = Off-line	Adapter is off-line.	
	5 = On-line	Adapter is on-line.	
	6 = Reset	Adapter is performing a hardware reset.	
32	FBA COMM SW VER ACS355: FBA CPI FW REV ACSM1: FBA COMM SW VER ACS850/ACQ810/ACS880: FBA comm SW ver	Read-only. Displays the common program revision of the adapter module in format axyz , where: a = major revision number xy = minor revision numbers z = correction number or letter. Example: 190A = revision 1.90A	N/A
	0x0000...0xFFFF	Common program version of the adapter module	



No.	Name/Value	Description	Default
33	FBA APPL SW VER ACS355: FBA CPI APPL REV ACSM1: FBA COMM APPL VER ACS850/ACQ810/ ACS880: FBA appl SW ver	Read-only. Displays the application program revision of the adapter module in format axyz , where: a = major revision number xy = minor revision numbers z = correction number or letter. Example: 190A = revision 1.90A	N/A
	0x0000...0xFFFF	Application program revision of the adapter module	



FDNA-01 configuration parameters – group B (group 2)

Note: The actual parameter group number depends on the drive type. Group B (group 2) corresponds to:

- parameter group 55 in ACS355
- parameter group 53 in ACSM1, ACS850 and ACQ810
- parameter group 53 in ACS880 if the adapter is installed as fieldbus adapter A or group 56 if the adapter is installed as fieldbus adapter B.

No. ¹⁾	Name/Value	Description	Default						
01	DATA OUT 1 (master to drive) ACS355: FBA DATA OUT 1 ACSM1: FBA DATA OUT1 ACS850/ACQ810/ ACS880: FBA data out1	In the output assembly instances that include drive parameters, this parameter specifies which parameter's value is placed in location DATA OUT 1 value received by the drive from the DeviceNet network. Content is defined by a decimal number in the range of 0 to 9999 as follows: <table><tr><td>0</td><td>Not used</td></tr><tr><td>1...99</td><td>Virtual address area of drive control. Not used with the FDNA-01 module.</td></tr><tr><td>101...9999</td><td>Parameter area of the drive</td></tr></table> Note: The FDNA-01 configuration parameters are 16-bit parameters. If the mapped parameter is a 32-bit parameter, it automatically reserves two consecutive parameters. For example, mapping a 32-bit parameter to parameter no. 1 also reserves parameter no. 2.	0	Not used	1...99	Virtual address area of drive control. Not used with the FDNA-01 module.	101...9999	Parameter area of the drive	0
0	Not used								
1...99	Virtual address area of drive control. Not used with the FDNA-01 module.								
101...9999	Parameter area of the drive								
	0	Not used							
	101...9999	Parameter index with format xxyy , where xx is the parameter group number (1...99) and yy is the parameter number index within that group (01...99).							
02... 10	DATA OUT 2... DATA OUT 10	See parameter <i>DATA OUT 1</i> .	0						

¹⁾ The number of parameters in this group may vary by drive type and drive firmware.

FDNA-01 configuration parameters – group C (group 3)

Note: The actual parameter group number depends on the drive type. Group C (group 3) corresponds to:

- parameter group 54 in ACS355
- parameter group 52 in ACSM1, ACS850 and ACQ810
- parameter group 52 in ACS880 if the adapter is installed as fieldbus adapter A or group 55 if the adapter is installed as fieldbus adapter B.

No. ¹⁾	Name/Value	Description	Default						
01	DATA IN 1 (drive to master) ACS355: FBA DATA IN 1 ACSM1: FBA DATA IN1 ACS850/ACQ810/ ACS880: FBA data in1	In input assembly instances that include drive parameters, this parameter specifies which parameter's value is placed in location DATA IN 1 value sent by the drive to the DeviceNet network. Content is defined by a decimal number in the range of 0 to 9999 as follows: <table><tr><td>0</td><td>Not used</td></tr><tr><td>1...99</td><td>Virtual address area of drive control. Not used with the FDNA-01 module.</td></tr><tr><td>101...9999</td><td>Parameter area of the drive</td></tr></table> Note: The FDNA-01 configuration parameters are 16-bit parameters. If the mapped parameter is a 32-bit parameter, it automatically reserves two consecutive parameters. For example, mapping a 32-bit parameter to parameter no. 1 also reserves parameter no. 2.	0	Not used	1...99	Virtual address area of drive control. Not used with the FDNA-01 module.	101...9999	Parameter area of the drive	0
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101...9999	Parameter area of the drive								
	0	Not used							
	101...9999	Parameter index with format xyyy , where xx is the parameter group number (1...99) and yy is the parameter number index within that group (01...99).							
02... 10	DATA IN 2... DATA IN 10	See parameter <i>DATA IN 1</i> .	0						

¹⁾ The number of parameters in this group may vary by drive type and drive firmware.

■ Control locations

ABB drives can receive control information from multiple sources including digital inputs, analog inputs, the drive control panel and a communication module (for example, the adapter module). ABB drives allow the user to separately determine the source for each type of control information (Start, Stop, Direction, Reference, Fault Reset, and so on).

To give the fieldbus master station the most complete control over the drive, the communication module must be selected as the source for this information. The parameter setting examples below contain the drive control parameters needed in the examples. For a complete parameter list, see the drive documentation.

Starting up ACS355 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 9802 COMM PROT SEL to EXT FBA.
3. Set the FDNA-01 configuration parameters in parameter group 51.

At the minimum, set the required number in parameter 5102 MAC ID and the required baud rate in 5103 BAUD RATE. In addition, select the communication profile in 5104 DRIVE PROFILE. With the ODVA AC/DC drive profile select the way in which the motor is stopped in 5105 ODVA STOP FUNC.

4. Define the process data transferred to and from the drive in FDNA-01 parameter groups 54 and 55.

Note: If communication between the FDNA-01 and DeviceNet master is established, changes to the configuration parameters can be done also through [Fieldbus configuration object 91h](#).

5. Validate the settings made in parameter group 51 by setting parameter 5127 FBA PAR REFRESH to REFRESH.



6. Set the relevant drive control parameters to control the drive according to the application. Examples of appropriate values are shown in the tables below.

■ Parameter setting examples – ACS355

ABB Drives profile

This example shows how to configure the ACS355 drive to use the ABB Drives profile with set speed and set torque plus drive parameters assembly.

The used I/O assembly instances are 902 and 952.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS355 drives	Description
9802 COMM PROT SEL	4 = EXT FBA	Enables communication between drive and adapter module.
5101 FBA TYPE	DEVICENET ¹⁾	Displays the type of the adapter module.
5102 FB PAR 2 (MAC ID)	2	Defines the MAC ID number of the adapter module.
5103 FB PAR 3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
5104 FB PAR 4 (DRIVE PROFILE)	0 (= DCU Profile)	Selects the profile used in the communication between drive and adapter module.
5105 FB PAR 5 (ODVA STOP FUNC)	0 (= Ramp)	Motor decelerates along the active deceleration ramp.
5106 FB PAR 6 (OUTPUT INSTANCE)	902	Selects the ABB Drives profile with speed and torque plus drive parameters output instance.
5107 FB PAR 7 (OUTPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
5108 FB PAR 8 (INPUT INSTANCE)	952	Selects the ABB Drives profile with speed and torque plus drive parameters input instance.

Drive parameter	Setting for ACS355 drives	Description
5109 FB PAR 9 (INPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
5110 FB PAR 10 (ODVA SPEED SCALE)	128	Sets the scaling as 1 rpm for the ODVA speed reference.
5111 FB PAR 11 (ODVA TORQUE SCALE)	128	Sets the scaling as 1 Nm for the ODVA torque reference.
5401 FBA DATA IN 1	104	Current
5402 FBA DATA IN 2	107	DC bus voltage
5403 FB DATA IN 3 ...5410 DATA IN 10	0	
5501 FBA DATA OUT 1	2205	Acceleration time 2
5502 FBA DATA OUT 2	2206	Deceleration time 2
5503 FB DATA OUT 3 ...5510 DATA OUT 10	0	
51.27 FBA PAR REFRESH	1 = REFRESH	Validates the FDNA-01 configuration parameter settings.
1001 EXT1 COMMANDS	10 = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
1003 DIRECTION	3 = REQUEST	Allows control of rotation direction.
1103 REF1 SELECT	8 = COMM	Selects the fieldbus reference 1 as the source for speed reference.
1604 FAULT RESET SEL	8 = COMM	Selects the fieldbus interface as the source for the fault reset signal.
9904 MOTOR CTRL MODE	2 = VECTOR: TORQ	Selects the vector control mode as the motor control mode.
1002 EXT2 COMMANDS	10 = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 2.
1102 EXT1/EXT2 SEL	8 = COMM	Enables external control location 1/2 selection through the fieldbus.
1106 REF2 SELECT	8 = COMM	Selects the fieldbus reference 2 as the source for torque reference.



Drive parameter	Setting for ACS355 drives	Description
1601 RUN ENABLE	7 = COMM	Selects the fieldbus interface as the source for the inverted Run enable signal (Run disable).

¹⁾ Read-only or automatically detected/set

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) → READY TO SWITCH ON
- 47Fh (1151 decimal) → OPERATING (Speed mode)

or

C7Fh (3199 decimal) → OPERATING (Torque mode).

ODVA AC/DC drive profile

The following example shows how to configure the ACS355 drive to use the Extended speed and torque control assembly of the ODVA AC/DC drive profile.

The used I/O assembly instances are 23 and 73.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS355 drives	Description
9802 COMM PROT SEL	4 = EXT FBA	Enables communication between drive and adapter module.
5101 FBA TYPE	DEVICENET ¹⁾	Displays the type of the adapter module.
5102 FB PAR 2 (MAC ID)	5	Defines the MAC ID number of the adapter module.
5103 FB PAR 3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
5104 FB PAR 4 (DRIVE PROFILE)	0 (= DCU Profile)	Selects the profile used in the communication between drive and adapter module.
5105 FB PAR 5 (ODVA STOP FUNC)	0 (= Ramp)	Motor decelerates along the active deceleration ramp.



Drive parameter	Setting for ACS355 drives	Description
5106 FB PAR 6 (OUTPUT INSTANCE)	23	Selects the ODVA extended speed and torque control output instance.
5108 FB PAR 8 (INPUT INSTANCE)	73	Selects the ODVA extended speed and torque control input instance.
5110 FB PAR 10 (ODVA SPEED SCALE)	128	Sets the scaling as 1 rpm for the ODVA speed reference.
5111 FB PAR 11 (ODVA TORQUE SCALE)	128	Sets the scaling as 1 Nm for the ODVA torque reference.
51.27 FBA PAR REFRESH	1 = REFRESH	Validates the FDNA-01 configuration parameter settings.
1001 EXT1 COMMANDS	10 = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
1003 DIRECTION	3 = REQUEST	Allows control of rotation direction.
1103 REF1 SELECT	8 = COMM	Selects the fieldbus reference 1 as the source for speed reference.
1604 FAULT RESET SEL	8 = COMM	Selects the fieldbus interface as the source for the fault reset signal.
9904 MOTOR CTRL MODE	2 = VECTOR: TORQ	Selects the vector control mode as the motor control mode.
1002 EXT2 COMMANDS	10 = COMM	Selects the fieldbus interface as the source of the start and stop commands for external control location 2.
1102 EXT1/EXT2 SEL	1 = DI1	Selects digital input DI1 as the source for the external control location EXT1/EXT2 selection.
1106 REF2 SELECT	8 = COMM	Selects the fieldbus reference 2 as the source for torque reference.
1601 RUN ENABLE	7 = COMM	Selects the fieldbus interface as the source for the inverted Run enable signal (Run disable).

¹⁾ Read-only or automatically detected/set

Note: In this example, digital input DI1 has been configured to control whether to use the speed or torque control mode.

The start sequence for the parameter example above is given below.

Control word:

- 0h (0 decimal) → READY
- 1h (1 decimal) → ENABLED (Running forward)
- 2h (2 decimal) → ENABLED (Running reverse)

Starting up ACSM1 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 50.01 FBA ENABLE to Enable.
3. Ensure that 50.04 FBA REF1 MODESEL is set to Speed and 50.05 FBA REF2 MODESEL is set to Torque.
4. Set the FDNA-01 configuration parameters in parameter group 51.
5. Define the process data transferred to and from the drive in FDNA-01 parameter groups 52 and 53.

Note: If communication between the FDNA-01 and DeviceNet master is established, changes to the configuration parameters can be done also through [Fieldbus configuration object 91h](#).

6. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA PAR REFRESH to REFRESH.
7. Set the relevant drive control parameters to control the drive according to the application. Examples of appropriate values are shown in the tables below.



■ Parameter setting examples – ACSM1

ABB Drives profile

The following example shows how to configure the ACSM1 drive to use the ABB Drives profile.

The used I/O assembly instances are 902 and 952.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACSM1 drives	Description
50.01 FBA ENABLE	1 = Enable	Enables communication between drive and adapter module.
50.04 FBA REF1 MODESEL	Speed	Selects speed as the adapter module REF1 type.
50.05 FBA REF2 MODESEL	Torque	Selects torque as the adapter module REF2 type.
51.01 FBA TYPE	DEVICENET ¹⁾	Displays the type of the adapter module.
51.02 FBA PAR2 (MAC ID)	6	Defines the MAC ID number of the adapter module.
51.03 FBA PAR3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
51.06 FBA PAR6 (OUTPUT INSTANCE)	902	Selects the ABB Drives profile with speed and torque plus drive parameters output instance.
51.07 FBA PAR7 (OUTPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
51.08 FBA PAR8 (INPUT INSTANCE)	952	Selects the ABB Drives profile with speed and torque plus drive parameters input instance.
51.09 FBA PAR9 (INPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
52.01 FBA DATA IN1	117	Motor temp
52.02 FBA DATA IN2	104	Motor current - MSW
52.03 FBA DATA IN3	0	Motor current - LSW
52.04 FBA DATA IN4	107	DC voltage - MSW



Drive parameter	Setting for ACSM1 drives	Description
52.05 FBA DATA IN5	0	DC voltage - LSW
52.06 FBA DATA IN6	108	Encoder 1 speed - MSW
52.07 FBA DATA IN7	0	Encoder 1 speed - LSW
52.08 FBA DATA IN8... 52.10 FBA DATA IN10	0	
53.01 FBA DATA OUT1	2503	Acceleration time - MSW
53.02 FBA DATA OUT2	0	Acceleration time - LSW
53.03 FBA DATA OUT3	2504	Deceleration time - MSW
53.04 FBA DATA OUT4	0	Deceleration time - LSW
53.05 FBA DATA OUT5	2408	Constant speed
53.06 FBA DATA OUT6	2410	Speed ref jog1
53.07 FBA DATA OUT7	2411	Speed ref jog2
53.08 FBA DATA OUT8... 53.10 FBA DATA OUT10	0	

51.27 FBA PAR REFRESH	1 = REFRESH	Validates the FDNA-01 configuration parameter settings.
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10.01 EXT1 START FUNC	3 = FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
10.04 EXT2 START FUNC	3 = FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 2.
24.01 SPEED REF1 SEL	3 = FBA REF1	Selects the fieldbus reference 1 as the source for speed reference 1.
32.01 TORQ REF1 SEL	4 = FBA REF2	Selects the fieldbus reference 2 as the source for torque reference 1.
34.02 EXT1 MODE 1/2SEL	P.2.12.15 = P.FBA MAIN CW.15	Selects FBA Control word bit 15 as the source for the external control location EXT1/EXT2 selection.
34.03 EXT1 CTRL MODE1	1 = Speed	Selects speed as the control mode for external control location 1.
34.05 EXT2 CTRL MODE1	2 =Torque	Selects torque as the control mode for external control location 2.

Drive parameter	Setting for ACSM1 drives	Description
99.05 MOTOR CTRL MODE	0 = DTC	Selects DTC as the motor control mode.

¹⁾ Read-only or automatically detected/set

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) → READY TO SWITCH ON
 - 47Fh (1151 decimal) → OPERATING (Speed mode)
- or
- C7Fh (3199 decimal) → OPERATING (Torque mode).

ODVA AC/DC drive profile

The following example shows how to configure the ACSM1 drive to use the ODVA AC/DC drive profile.

The used I/O assembly instances are 23 and 73.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACSM1 drives	Description
50.01 FBA ENABLE	1 = Enable	Enables communication between drive and adapter module.
50.04 FBA REF1 MODESEL	Speed	Selects speed as the adapter module REF1 type.
50.05 FBA REF2 MODESEL	Torque	Selects torque as the adapter module REF2 type.
51.01 FBA TYPE	DEVICENET ¹	Displays the type of the adapter module.
51.02 FBA PAR2 (MAC ID)	5	Defines the MAC ID number of the adapter module.
51.03 FBA PAR3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
51.06 FBA PAR6 (OUTPUT INSTANCE)	23	Selects the ODVA extended speed and torque control output instance.



Drive parameter	Setting for ACSM1 drives	Description
51.08 FBA PAR8 (INPUT INSTANCE)	73	Selects the ODVA extended speed and torque control input instance.
51.27 FBA PAR REFRESH	1 = REFRESH	Validates the FDNA-01 configuration parameter settings.
10.01 EXT1 START FUNC	3 = FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
10.04 EXT2 START FUNC	3 = FBA	Selects the fieldbus interface as the source of the start and stop commands for external control location 2
24.01 SPEED REF1 SEL	3 = FBA REF1	Selects the fieldbus reference 1 as the source for speed reference 1.
32.01 TORQ REF1 SEL	4 = FBA REF2	Selects the fieldbus reference 2 as the source for torque reference 1.
34.01 EXT1/EXT2 SEL	P.2.1.0 = PI.DI STATUS.0	Selects digital input DI1 as the source for the external control location EXT1/EXT2 selection.
34.03 EXT1 CTRL MODE1	1 = Speed	Selects speed as the control mode for external control location 1.
34.05 EXT2 CTRL MODE1	2 = Torque	Selects torque as the control mode for external control location 2.
99.05 MOTOR CTRL MODE	0 = DTC	Selects DTC as the motor control mode.

¹⁾ Read-only or automatically detected/set

Note: In this example, digital input DI1 has been configured to control whether to use the speed or torque control mode.

The start sequence for the parameter example above is given below.

Control word:

- 0h (0 decimal) → READY
- 1h (1 decimal) → ENABLED (Running forward)
- 2h (2 decimal) → ENABLED (Running reverse)

Starting up ACS850 and ACQ810 drives

1. Power up the drive.
2. Enable the communication between the adapter module and the drive by setting parameter 50.01 Fba enable to Enable.
3. Ensure that 50.04 Fb ref1 modesel is set to Speed (both ACS850 and ACQ810) and 50.05 Fb ref2 modesel is set to Torque (only ACS850).
4. Set the FDNA-01 configuration parameters in drive parameter group 51.
5. Define the process data transferred to and from the drive in FDNA-01 parameter groups 52 and 53.

Note: If communication between the FDNA-01 and DeviceNet master is established, changes to the configuration parameters can be done also through [Fieldbus configuration object 91h](#).

6. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA par refresh to Refresh.
7. Set the relevant drive control parameters to control the drive according to the application. Examples of appropriate values are shown in the tables below.



■ Parameter setting examples – ACS850 and ACQ810

ABB Drives profile

The following example shows how to configure the ACS850 or ACQ810 drive to use the ABB Drives profile.

The used I/O assembly instances are 902 and 952.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS850/ACQ810 drives	Description
50.01 Fba enable	1 = Enable	Enables communication between drive and adapter module.
50.04 Fb ref1 modesel	Speed	Selects speed as the adapter module ref1 type.
50.05 Fb ref2 modesel	Torque	Selects torque as the adapter module ref2 type (only with ACS850).
51.01 Fba type	DEVICENET ¹⁾	Displays the type of the adapter module.
51.02 FBA par2 (MAC ID)	5	Defines the MAC ID number of the adapter module.
51.03 FBA par3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
51.06 FBA par6 (OUTPUT INSTANCE)	902	Selects the ABB Drives profile with speed and torque plus drive parameters output instance.
51.07 FBA par7 (OUTPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
51.08 FBA par8 (INPUT INSTANCE)	952	Selects the ABB Drives profile with speed and torque plus drive parameters input instance.
51.09 FBA par9 (INPUT NUM PARS)	10	Must always be set to 10, except as provided in Appendix A – Varying the number of drive parameters .
52.01 FBA data in1	123	Motor power
52.02 FBA data in2	0	Motor power - LSW



Drive parameter	Setting for ACS850/ACQ810 drives	Description
52.03 FBA data in3	105	Motor current percent
52.04 FBA data in4	107	DC voltage
52.05 FBA data in5	0	DC voltage - LSW
52.06 FBA data in6	108	Encoder1 speed
52.07 FBA data in7	0	Encoder 1 speed - LSW
52.08 FBA data in8... 52.10 FBA data in10	0	
53.01 FBA data out1	2204	Acc time 2
53.02 FBA data out2	0	Acceleration time 2 - LSW
53.03 FBA data out3	2205	Dec time 2
53.04 FBA data out4	0	Deceleration time 2 - LSW
53.05 FBA data out5	2606	Const speed1
53.06 FBA data out6	2607	Const speed2
53.07 FBA data out7	2608	Const speed3
53.08 FBA data out8... 53.10 FBA data out10	0	
51.27 FBA par refresh	1 = Refresh	Validates the FDNA-01 configuration parameter settings.
10.01 Ext1 start func	FB	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
10.04 Ext2 Start func	3 = FB	Selects the fieldbus as the source for start and stop commands for external control location EXT2 (only with ACS850).
12.01 Ext1/Ext sel	P.2.22.15 = P.FBA main cw.15	Selects FBA Control word bit 15 as the source for external control location EXT1/EXT2 selection (only with ACS850).
12.03 Ext1 ctrl mode	1 = Speed	Selects speed as the operating mode for external control location EXT1.



Drive parameter	Setting for ACS850/ACQ810 drives	Description
12.05 Ext2 ctrl mode	2 = Torque	Selects torque as the operating mode for external control location EXT2 (only with ACS850).
16.15 Menu set sel (ACS850) 16.21 Menu selection (ACQ810)	2 = Load long (ACS850) 2 = Full (ACQ810)	Load long parameter list. All parameters will be displayed.
21.01 Speed ref1 sel	FB	Selects the fieldbus reference 1 as the source for speed reference 1.
24.01 Torq ref1 sel	FBA ref2	Selects fieldbus reference 2 as the source of the torque reference 1 (only with ACS850).

¹⁾ Read-only or automatically detected/set

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) → READY TO SWITCH ON
- 47Fh (1151 decimal) → OPERATING (Speed mode)

or

C7Fh (3199 decimal) → OPERATING (Torque mode in ACS850).



ODVA AC/DC drive profile

The following example shows how to configure the ACS850 or ACQ810 drive to use the ODVA AC/DC drive profile.

The used I/O assembly instances are 23 and 73.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS850/ACQ810 drives	Description
50.01 Fba enable	1 = Enable	Enables communication between drive and adapter module.
50.04 Fb ref1 modesel	Speed	Selects speed as the adapter module ref1 type.
50.05 Fb ref2 modesel	Torque	Selects torque as the adapter module ref2 type (only with ACS850).
51.01 FBA type	DEVICENET ¹⁾	Displays the type of the adapter module.
51.02 FBA par2 (MAC ID)	5	Defines the MAC ID number of the adapter module.
51.03 FBA par3 (BAUD RATE)	0 (= 125 kbit/s)	Sets the baud rate for the DeviceNet interface.
51.06 FBA par6 (OUTPUT INSTANCE)	23	Selects the ODVA AC/DC drive profile output instance.
51.08 FBA par8 (INPUT INSTANCE)	73	Selects the ODVA AC/DC profile input instance.
51.27 FBA par refresh	1 = Refresh	Validates the FDNA-01 configuration parameter settings.
10.01 Ext1 start func	3 = FB	Selects the fieldbus interface as the source of the start and stop commands for external control location 1.
10.04 Ext2 Start func	3 = FB	Selects the fieldbus as the source for start and stop commands for external control location EXT2 (only with ACS850).



Drive parameter	Setting for ACS850/ACQ810 drives	Description
12.01 Ext1/Ext2 sel	DI1	Selects digital input DI1 as the source for external control location EXT1/EXT2 selection (only with ACS850).
12.05 Ext2 ctrl mode	2 = Torque	Selects torque as the operating mode for external control location EXT2 (only with ACS850).
16.15 Menu set sel (ACS850) 16.21 Menu selection (ACQ810)	2 = Load long (ACS850) 1 = Full (ACQ810)	Load long parameter list. All parameters will be displayed.
21.01 Speed ref1 sel	FBA ref1	Selects the fieldbus reference 1 as the source for speed reference 1.
24.01 Torq ref1 sel	FBA ref2	Selects fieldbus reference 2 as the source of the torque reference 1 (only with ACS850).

¹⁾ Read-only or automatically detected/set

Note: For ACS850 in this example, digital input DI1 has been configured to control whether to use the speed or torque control mode.

The start sequence for the parameter example above is given below.

Control word:

0h (0 decimal) → READY

1h (1 decimal) → ENABLED (Running forward)

2h (2 decimal) → ENABLED (Running reverse)



Starting up ACS880 drives

This example sets up the fieldbus adapter installed as fieldbus adapter A. To set up the fieldbus adapter B, perform the same tasks with the corresponding parameters in parameter groups 50, 54, 55, and 56.

1. Power up the drive.
 2. Enable the communication between the adapter module and the drive by setting parameter 50.01 FBA A enable to Enable.
 3. Ensure that parameter 50.04 FBA A ref1 type is set to Speed and parameter 50.05 FBA A ref2 type is set to Torque.
 4. Set the FDNA-01 configuration parameters in drive parameter group 51.
 5. Define the process data transferred to and from the drive in FDNA-01 parameter groups 52 and 53.
- Note:** If communication between the FDNA-01 and DeviceNet master is established, changes to the configuration parameters can be done also through [Fieldbus configuration object 91h](#).
6. Validate the settings made in parameter groups 51, 52 and 53 by setting parameter 51.27 FBA par refresh to Refresh.
 7. Set the relevant drive control parameters to control the drive according to the application.

Examples of appropriate values are shown in the tables below.



■ Parameter setting examples – ACS880

ABB Drives profile

The following example shows how to configure the ACS880 drive to use the ABB Drives profile.

The used I/O assembly instances are 902 and 952.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS880 drives	Description
50.01 FBA A enable	1 = Enable	Enables communication between drive and adapter module.
50.04 FBA A ref1 type	4 = Speed	Selects speed as the fieldbus A reference 1 type.
50.05 FBA A ref2 type	3 = Torque	Selects torque as the fieldbus A reference 2 type.
51.01 FBA type	DeviceNet ¹⁾	Displays the type of the adapter module.
51.02 MAC ID	6	Defines the MAC ID number of the adapter module.
51.03 Baud rate	0 = 125kbit/s	Sets the baud rate for the DeviceNet interface.
51.06 Output instance	902	Selects the ABB Drives profile with speed and torque plus drive parameters output instance.
51.07 Output num pars	10	Must always be set to 10. For exceptions, see Appendix A – Varying the number of drive parameters .
52.01 FBA data in1	1.7	Motor current - MSW
52.02 FBA data in2	0 = None	Motor current - LSW
52.03 FBA data in3	1.11	DC voltage - MSW
52.04 FBA data in4	0 = None	DC voltage - LSW
52.05 FBA data in5... 52.10 FBA data in10	0 = None	
53.01 FBA data out1	23.12	Acceleration time - MSW
53.02 FBA data out2	0 = None	Acceleration time - LSW
53.03 FBA data out3	23.13	Deceleration time - MSW
53.04 FBA data out4	0 = None	Deceleration time - LSW
53.05 FBA data out5... 53.10 FBA data out10	0 = None	
51.27 FBA par refresh	1 = Configure	Validates the FDNA-01 configuration parameter settings.



Drive parameter	Setting for ACS880 drives	Description
19.11 Ext1/Ext2 selection	2 = MCW bit11: Ext ctrl	Selects FBA Control word bit 11 as the source for the external control location EXT1/EXT2 selection.
19.12 Ext1 control mode 1	2 = MCW bit11: Ext ctrl loc	Selects speed control as the control mode 1 for external control location EXT1.
19.14 Ext2 control mode 1	3 = Torque	Selects torque control as the control mode 1 for external control location EXT2.
20.01 Ext1 commands	12 = Fieldbus A	Selects fieldbus interface A as the source of the start and stop commands for external control location EXT1.
20.06 Ext2 commands	12 = Fieldbus A	Selects fieldbus interface A as the source of the start and stop commands for external control location EXT2.
22.11 Speed ref1 selection	4 = FB A ref1	Selects fieldbus A reference 1 as the source for speed reference 1.
26.11 Torque ref1 selection	5 = FB A ref2	Selects fieldbus reference 2 as the source for torque reference 1.

¹⁾ Read-only or automatically detected/set

²⁾ Example

The start sequence for the parameter example above is given below.

Control word:

- 47Eh (1150 decimal) → READY TO SWITCH ON
 - 47Fh (1151 decimal) → OPERATING (Speed mode)
- or
- C7Fh (3199 decimal) → OPERATING (Torque mode)



ODVA AC/DC drive profile

The following example shows how to configure the ACS880 drive to use the ODVA AC/DC drive profile.

The used I/O assembly instances are 23 and 73.

The table below gives the recommended drive parameter settings.

Drive parameter	Setting for ACS880 drives	Description
50.01 FBA A enable	1 = Enable	Enables communication between drive and adapter module.
50.04 FBA A ref1 type	4 = Speed	Selects Speed as the fieldbus A reference 1 type.
50.05 FBA A ref2 type	3 = Torque	Selects Torque as the fieldbus A reference 2 type.
51.01 FBA type	DeviceNet ¹⁾	Displays the type of the adapter module.
51.02 MAC ID	6	Defines the MAC ID number of the adapter module.
51.03 Baud rate	0 = 125kbit/s	Sets the baud rate for the DeviceNet interface.
51.06 Output instance	23	Selects the ABB Drives profile with speed and torque plus drive parameters output instance.
51.07 Output num pars	10	Must always be set to 10. For exceptions, see Appendix A – Varying the number of drive parameters .
51.27 FBA par refresh	1 = Configure	Validates the FDNA-01 configuration parameter settings.
19.11 Ext1/Ext2 selection	3 = DI1	Selects digital input DI1 as the source for the external control location EXT1/EXT2selection.
19.12 Ext1 control mode 1	2 = Speed	Selects speed control as the control mode 1 for external control location EXT1.
19.14 Ext2 control mode 1	3 = Torque	Selects torque control as the control mode 1 for external control location EXT2.
20.01 Ext1 commands	12 = Fieldbus A	Selects fieldbus interface A as the source of the start and stop commands for external control location EXT1.



Drive parameter	Setting for ACS880 drives	Description
20.06 Ext2 commands	12 = Fieldbus A	Selects fieldbus interface A as the source of the start and stop commands for external control location EXT2.
22.11 Speed ref1 selection	4 = FB A ref1	Selects fieldbus A reference 1 as the source for speed reference 1.
26.11 Torque ref1 selection	5 = FB A ref2	Selects fieldbus reference 2 as the source for torque reference 1.

1) Read-only or automatically detected/set

2) Example

Note: In this example, digital input DI1 has been configured to control whether to use the speed or torque control mode.

The start sequence for the parameter example above is given below.

Control word:

- 0h (0 decimal) → READY
- 1h (1 decimal) → ENABLED (Running forward)
- 2h (2 decimal) → ENABLED (Running reverse)



Configuring the master station

After the adapter module has been initialized by the drive, the master station must be prepared for communication with the module. An example of an Allen-Bradley® PLC is given below. If you are using another master system, refer to its documentation for more information.

The example can be applied to all drive types compatible with the module.

■ EDS files

The Electronic Data Sheet (EDS) files specify the properties of the device for the DeviceNet scanner. The DeviceNet scanner identifies the device by means of the product code, device type, and major revision attributes. For more information, see *Identity object, class 01h* on page 134.

To enable the use of different ABB drive types on the same DeviceNet network, a unique product code has been given to each drive type and application combination.

EDS files are available from the Document library (www.abb.com/drives).

Note: Only one EDS file with the same DeviceNet product code can be installed in the PLC at a time.



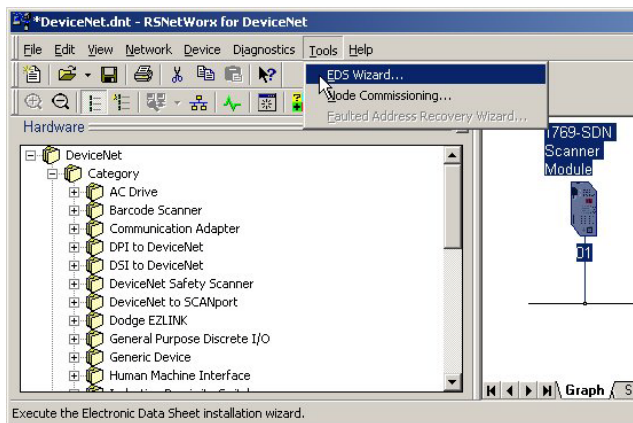
■ Configuring an Allen-Bradley® PLC

This example shows how to set up an Allen-Bradley CompactLogix PLC with a 1769-SDN DeviceNet Scanner to use a drive equipped with a FDNA-01 fieldbus adapter, using RSNetWorx and RSLogix 5000 to configure and control the network. Slight vendor-specific differences may exist when using other programs or master devices.

In this example, ACS880 is used as the drive.

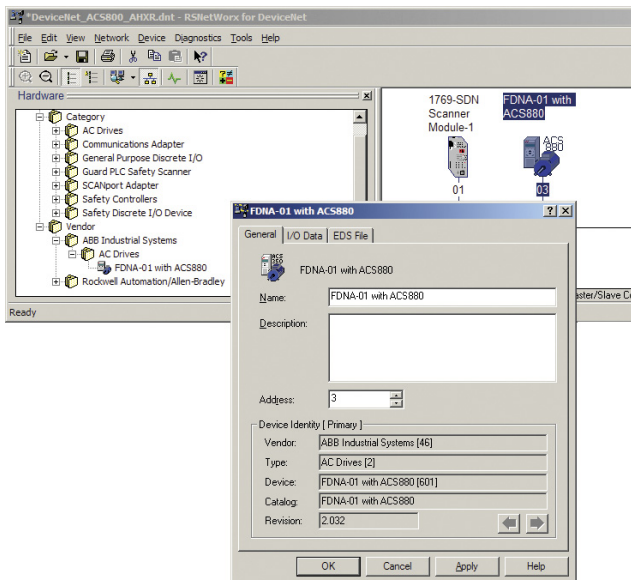
1. Select and import the EDS file for the drive, for example, ACS880_FDNA01_v2.23_eu.EDS. For more help on choosing the correct file, refer to ABB EDS Selection Guide delivered with the EDS files.

Note: Only one EDS file with the same Product ID can be installed in the PLC at a time.

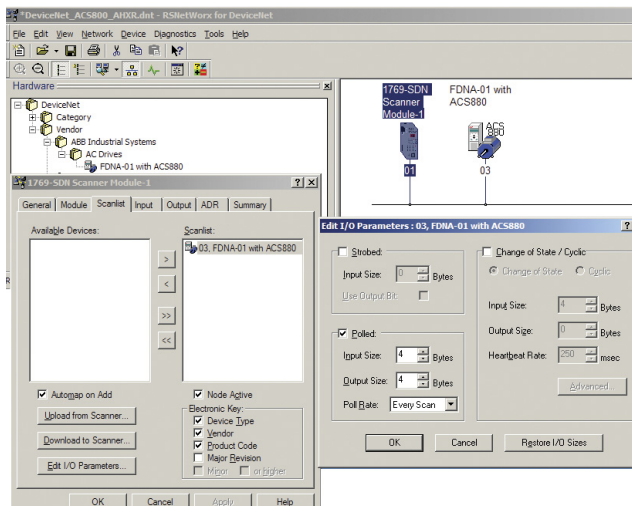


2. Add a drive to the network in RSNetWorx for DeviceNet.

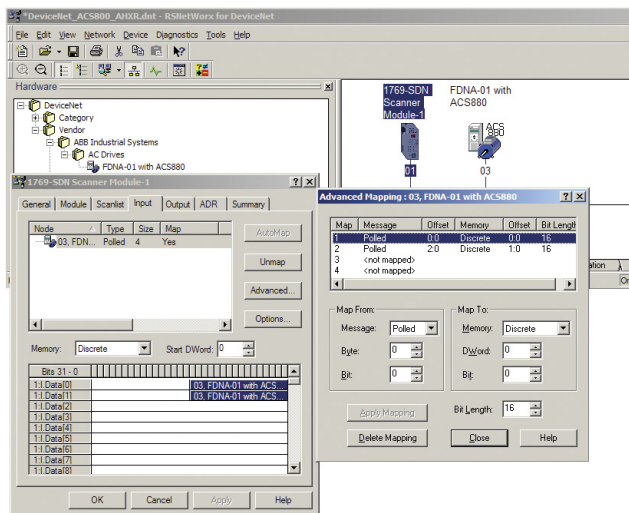
3. Configure the device MAC address.



4. Configure the DeviceNet Scanner. Add the drive to Scanlist and edit I/O parameters. Select Polled or Change of State/Cyclic. Then enter the input and output sizes of the I/O assemblies that are used (for example, for Basic Speed Control Assemblies 20 and 70, each size is set to 4 bytes.).



5. For convenience, you can also edit the Input and Output memory mappings. By default, the two 16-bit input words are mapped into a single 32-bit double word. It is more convenient to map them into separate double words. Output words can be mapped similarly.



6. Download the scanner settings to the device in the online mode.

7. Add your DeviceNet scanner to an RSLogix 5000 project. You should get new Controller Tags Local:<slot>:I and Local:<slot>:O. You can use them to access the data as mapped above:

- Local:<slot>:O.Data[0] is the Control word
- Local:<slot>:O.Data[1] is the Reference
- Local:<slot>:I.Data[0] is the Status word
- Local:<slot>:I.Data[1] is the Actual value

Note: You may need to change the value of Local:<slot>:O.CommandRegister.Run or Local:<slot>:I.CommandRegister.Run to 1.





7

Communication profiles

What this chapter contains

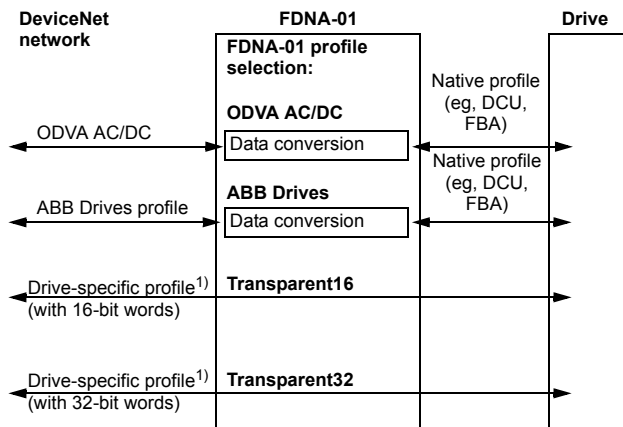
This chapter describes the communication profiles used in the communication between the DeviceNet network, the adapter module and the drive.

Communication profiles

Communication profiles are ways of conveying control commands (Control word, Status word, references and actual values) between the master station and the drive.

With the FDNA-01 module, the DeviceNet network may employ either the ODVA AC/DC drive profile or the ABB Drives profile. Both are converted to the native profile (eg, DCU or FBA) by the adapter module. In addition, two Transparent modes – for 16-bit and 32-bit words respectively – are available. With the Transparent modes, no data conversion takes place.

The figure below illustrates the operation of the profiles:



The following sections describe the Control word, the Status word, references and actual values for the ODVA AC/DC drive and ABB Drives communication profiles. Refer to the drive manuals for details on the native profiles.

ODVA AC/DC drive profile

This section briefly describes the ODVA AC/DC drive profile. Additional information can be obtained at www.odva.org.

A DeviceNet node is modelled as a collection of abstract objects. Each object represents the interface to and behavior of a component within the product. The ODVA AC/DC drive profile defines a collection of objects suitable for the control of the AC and DC drives. The objects supported by the FDNA-01 DeviceNet adapter are listed in Class objects on page 107.

The objects are defined by:

- Service
- Class
- Instance
- Attribute
- Behavior.

For example, to set the drive speed reference, the Set_Attribute_Single service can be requested for the SpeedRef attribute of the AC/DC drive object class. The resulting behavior is that the reference speed of the drive is set to the requested value.

This is an example of explicit messaging, where each attribute of a class is set individually. While this is allowed, it is inefficient. Instead, implicit messaging using input and output assembly instances is recommended. Implicit messaging allows the DeviceNet Master to set or get predefined groups of attributes in a single message exchange. The assembly instances supported by the adapter module are listed and defined in Assembly objects on page 74.

ODVA output attributes

This section briefly describes the instances found in the output assemblies of the ODVA AC/DC drive profile. Note that all output assembly instances do not support all attributes listed here.

Run Forward & Run Reverse (Control supervisor object)

These attributes are used to assert run and stop commands to the Control supervisor object state machine according to the following Run/Stop event matrix. See State (Control supervisor object) on page 60.

RunFwd	RunRev	Trigger event	Run type
0	0	Stop	N/A
0 → 1	0	Run	RunFwd
0	0 → 1	Run	RunRev
0 → 1	0 → 1	No Action	N/A
1	1	No Action	N/A
0 → 1	1	Run	RunRev
1	1 → 0	Run	RunFwd

Fault Reset (Control supervisor object)

This attribute resets a drive fault on a transition from zero to one if the condition that caused the fault has been cleared.

Net Ctrl (Control supervisor object)

This attribute requests that the drive Run/Stop command is supplied locally (Net Ctrl = 0) or by the network (Net Ctrl = 1).

Net Ref (AC/DC drive object)

This attribute requests that the drive Speed and Torque References are supplied locally (Net Ref = 0) or by the network (Net Ref = 1).

Speed Reference (AC/DC drive object)

This attribute is the speed reference for the drive. The units are scaled by the Speed Scale attribute of the AC/DC drive object. See Table 4. for details.

Scalar mode

When the drive is operating in the scalar mode, the adapter module provides the drive with a frequency reference. The ODVA AC/DC drive profile uses rpm units for the Speed Reference. The drive frequency reference is calculated as follows:

$$Dfr = \frac{Osr \times Us \times Mf}{Mss}$$

where

Dfr = Drive frequency reference in Hz

Osr = ODVA Speed Reference

Us = ODVA speed unit (see [10 ODVA SPEED SCALE](#) on page 41)

Mf = Motor nominal frequency in Hz

Mss = Motor synchronous speed in rpm (not motor nominal speed)

For example, for a 4-pole 60 Hz motor (Mss = 1800 rpm) with a unit of 1 rpm and an ODVA Speed Reference of 900, the drive frequency reference is:

$$Dfr = \frac{Osr \times Us \times Mf}{Mss} = \frac{900 \times 1 \text{ rpm} \times 60 \text{ Hz}}{1800 \text{ rpm}} = 30 \text{ Hz}$$

Vector mode

When the drive is operating in the vector mode, the adapter module provides the drive with a speed reference. The ODVA AC/DC drive profile uses rpm units for the speed reference. The drive speed reference is calculated as follows:

$$Dsr = Osr \times Us$$

where

Dsr = Drive Speed Reference in rpm

Osr = ODVA Speed Reference

Us = ODVA speed unit (see [10 ODVA SPEED SCALE](#) on page 41)

For example, for an ODVA Speed Reference of 900 rpm with a unit of 0.5 rpm, the drive speed reference is:

$$Dsr = Osr \times Us = 900 \times 0.5 \text{rpm} = 450 \text{rpm}$$

Torque Reference (AC/DC drive object)

This attribute is the torque reference for the drive. The units are scaled by the Torque Scale attribute of the AC/DC drive object. See Table 5. for details.

The adapter module provides the drive with a Torque Reference in percent of the motor nominal torque. The ODVA AC/DC drive profile uses Newton-meter (N·m) units for the Torque Reference. The drive torque reference is calculated as follows:

$$Dtr = \frac{100 \times Otr \times Ut}{Mt}$$

where

Dtr = Drive torque reference in percent of motor nominal torque

Otr = ODVA Torque Reference

Ut = ODVA torque unit (see [11 ODVA TORQUE SCALE](#) on page 42)

Mt = Motor nominal torque in Nm.

For example, for a 1000 Nm motor nominal torque with a unit of 1 Nm and an ODVA Torque Reference of 500, the drive torque reference is:

$$Dtr = \frac{100 \times Otr \times Ut}{Mt} = \frac{100 \times 500 \times 1 \text{Nm}}{1000 \text{Nm}} = 50$$

■ ODVA input attributes

This section briefly describes the instances found in the input assemblies of the ODVA AC/DC drive profile. Note that all input assembly instances do not support all attributes listed here.

Faulted (Control supervisor object)

This attribute indicates that the drive has experienced a fault. The fault code may be read from the FaultCode attribute of the Control supervisor object.

Warning (Control supervisor object)

This attribute indicates that the drive is experiencing a warning condition. The warning code may be read from the WarnCode attribute of the Control supervisor object.

Running Forward (Control supervisor object)

This attribute indicates that the drive is running in the forward direction.

Running Reverse (Control supervisor object)

This attribute indicates that the drive is running in the reverse direction.

Ready (Control supervisor object)

This attribute indicates that the Control supervisor object state machine is in the Ready, Running or Stopping state. See State (Control supervisor object) on page 60.

Ctrl From Net (Control supervisor object)

This attribute indicates if the Run/Stop command is being supplied locally (Ctrl From Net = 0) or by the network (Ctrl From Net = 1).

Ref From Net (AC/DC drive object)

This attribute indicates if the Speed and Torque References are being supplied locally (Ref From Net = 0) or by the network (Ref From Net = 1).

At Reference (AC/DC drive object)

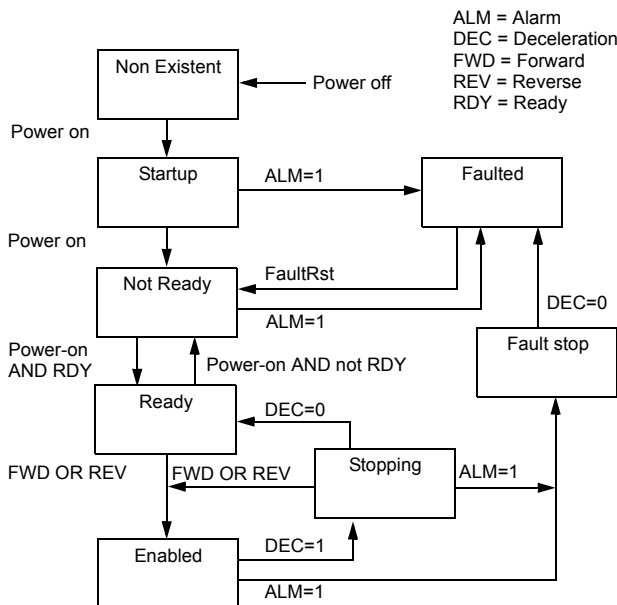
This attribute indicates that the drive is operating at the specified Speed or Torque Reference.

State (Control supervisor object)

This attribute indicates the current state of the Control supervisor object.

State	Description	State	Description
0	Vendor Specific	4	Enabled
1	Startup	5	Stopping
2	Not Ready	6	Fault Stop
3	Ready	7	Faulted

The ODVA state transition diagram is shown below:



Speed Actual (AC/DC drive object)

This attribute indicates the actual speed at which the drive is operating. The units are scaled by the SpeedScale attribute of the AC/DC drive object. See Table 4. for details.

Scalar mode

When the drive is operating in the scalar mode, the drive provides the adapter module with a frequency actual. The ODVA AC/DC drive profile uses rpm units for the speed actual. The ODVA Speed Actual is calculated as follows:

$$Osa = \frac{Dfa \times Mss}{Mf \times Us}$$

where

Osa = ODVA Speed Actual

Dfa = Drive frequency actual in Hz

Us = ODVA speed unit (see [10 ODVA SPEED SCALE](#) on page 41)

Mf = Motor nominal frequency in Hz

Mss = Motor synchronous speed in rpm (not motor nominal speed)

For example, for a 4 pole 60 Hz motor (Mss = 1800 rpm) with a unit of 1 rpm and a Drive frequency actual of 30 Hz, the ODVA Speed Actual is:

$$Osa = \frac{Dfa \times Mss}{Mf \times Us} = \frac{30\text{Hz} \times 1800\text{rpm}}{60\text{Hz} \times 1\text{rpm}} = 900$$

Vector Mode

When the drive is operating in the vector mode, the drive provides the adapter module with a speed actual. The ODVA AC/DC drive profile uses rpm units for the speed actual. The ODVA Speed Actual is calculated as follows:

$$Osa = \frac{Dsa}{Us}$$

where

Dsa = Drive speed actual in rpm

Osa = ODVA Speed Actual

Us = ODVA speed unit (see [10 ODVA SPEED SCALE](#) on page 41)

For example, for a drive speed actual of 900 rpm with a unit of 0.5 rpm, the ODVA Speed Actual is:

$$Osa = \frac{Dsa}{Us} = \frac{450 \text{ rpm}}{0.5 \text{ rpm}} = 900$$

Torque Actual (AC/DC drive object)

This attribute indicates the actual torque at which the drive is operating. The units are scaled by the Torque Scale attribute of the AC/DC drive object. See Table 5. for details.

The drive provides the adapter module with a torque actual in percent of the motor nominal torque. The ODVA AC/DC drive profile uses Newton-meter (N·m) units for the Torque Actual. The ODVA Torque Actual is calculated as follows:

$$Ota = \frac{Dta \times Mt}{100 \times Ut}$$

where

Dta = Drive torque actual in percent of motor nominal torque

Ota = ODVA Torque Actual

Ut = ODVA torque unit (see [11 ODVA TORQUE SCALE](#) on page 42)

Mt = Motor nominal torque in Nm

For example, for a 1000 Nm motor nominal torque with a unit of 1 Nm and a drive torque actual of 50%, the ODVA Torque Actual is:

$$O_{ta} = \frac{D_{ta} \times M_t}{100 \times U_t} = \frac{50 \times 1000 \text{ Nm}}{100 \times 1 \text{ Nm}} = 500$$

ABB Drives communication profile

Control word and Status word

The Control word is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions in the Control word, and returns status information to the master in the Status word.

The contents of the Control word and the Status word are detailed below. The drive states are presented on page 93.

Control word contents

The table below shows the contents of the Control word for the ABB Drives communication profile. The upper case boldface text refers to the states shown in the state machine on page 93.

Bit	Name	Value	STATE/Description
0	OFF1_ CONTROL	1	Proceed to READY TO OPERATE .
		0	Stop along currently active deceleration ramp. Proceed to OFF1 ACTIVE ; proceed to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.
1	OFF2_ CONTROL	1	Continue operation (OFF2 inactive).
		0	Emergency OFF, coast to stop. Proceed to OFF2 ACTIVE ; proceed to SWITCH-ON INHIBITED .

Bit	Name	Value	STATE/Description
2	OFF3_CONTROL	1	Continue operation (OFF3 inactive).
		0	Emergency stop, stop within time defined with the drive parameter. Proceed to OFF3 ACTIVE ; proceed to SWITCH-ON INHIBITED . Warning: Ensure motor and driven machine can be stopped using this stop mode.
3	INHIBIT_OPERATION	1	Proceed to OPERATION ENABLED . Note: Run enable signal must be active; see drive documentation. If the drive is set to receive the Run enable signal from the fieldbus, this bit activates the signal.
		0	Inhibit operation. Proceed to OPERATION INHIBITED .
4	RAMP_OUT_ZERO	1	Normal operation. Proceed to RFG: OUTPUT ENABLED .
		0	Force the Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).
5	RAMP_HOLD	1	Enable ramp function. Proceed to RFG: ACCELERATOR ENABLED .
		0	Halt ramping (Ramp Function Generator output held).
6	RAMP_IN_ZERO	1	Normal operation. Proceed to OPERATION . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force the Ramp Function Generator input to zero.

Bit	Name	Value	STATE/Description
7	RESET	0=>1	Fault reset if an active fault exists. Proceed to SWITCH-ON INHIBITED . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Continue normal operation.
8...9	Reserved.		
10	REMOTE_CMD	1	Fieldbus control enabled.
		0	Control Word and reference not getting through to the drive, except for CW bits OFF1, OFF2 and OFF3.
11	EXT_CTRL_LOC	1	Select External Control Location EXT2. Effective if the control location parameterized to be selected from the fieldbus.
		0	Select External Control Location EXT1. Effective if the control location parameterized to be selected from the fieldbus.
12...15	Reserved.		

Status word contents

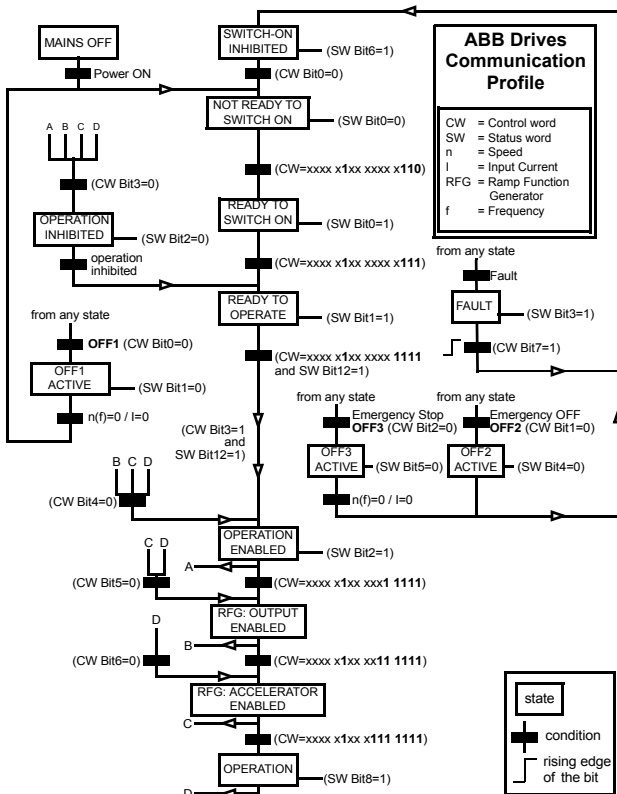
The table below shows the contents of the Status word for the ABB Drives communication profile. The upper case boldface text refers to the states shown in the state machine on page 93.

Bit	Name	Value	STATE/Description
0	RDY_ON	1	READY TO SWITCH ON.
		0	NOT READY TO SWITCH ON.
1	RDY_RUN	1	READY TO OPERATE.
		0	OFF1 ACTIVE.
2	RDY_REF	1	OPERATION ENABLED.
		0	OPERATION INHIBITED.
3	TRIPPED	1	FAULT.
		0	No fault.
4	OFF_2_STA	1	OFF2 inactive.
		0	OFF2 ACTIVE.
5	OFF_3_STA	1	OFF3 inactive.
		0	OFF3 ACTIVE.
6	SWC_ON_INHIB	1	SWITCH-ON INHIBITED.
		0	–
7	ALARM	1	Warning/Alarm.
		0	No warning/alarm.
8	AT_SETPOINT	1	OPERATION. Actual value equals reference = is within tolerance limits, ie, in speed control, speed error is 10% max. of nominal motor speed.
		0	Actual value differs from reference = is outside tolerance limits.
9	REMOTE	1	Drive control location: REMOTE (EXT1 or EXT2).
		0	Drive control location: LOCAL.

Bit	Name	Value	STATE/Description
10	ABOVE_ LIMIT	1	Actual frequency or speed equals or exceeds the supervision limit (set by the drive parameter). Valid in both directions of rotation.
		0	Actual frequency or speed within supervision limit.
11	EXT_CTRL_ LOC	1	External Control Location EXT2 selected. Note concerning ACS880: This bit is effective only if the fieldbus interface is set as the target for this signal by drive parameters. User bit 0 selection (06.30).
		0	External Control Location EXT1 selected.
12	EXT_RUN_ ENABLE	1	External Run Enable signal received. Note concerning ACS880: This bit is effective only if the fieldbus interface is set as the target for this signal by drive parameters. User bit 1 selection (06.31).
		0	No External Run Enable signal received
13... 14	Reserved.		
15	FBA_ERROR	1	Communication error detected by the fieldbus adapter module.
		0	Fieldbus adapter communication OK.

State machine

The state machine for the ABB Drives communication profile is shown below.



References

References are 16-bit signed two's complement integers. A negative reference indicates a reverse direction of rotation.

ABB drives can receive control information from multiple sources including analogue and digital inputs, the drive control panel and a communication module (for example, FDNA-01). To have the drive controlled through the fieldbus, the module must be defined as the source for control information, for example, reference.

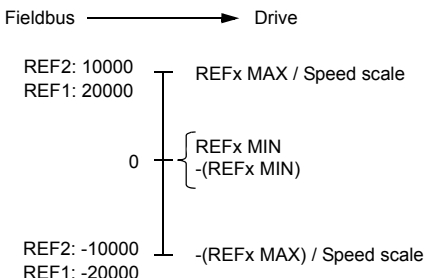
Scaling

References are scaled as shown below.

Note: The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive documentation for further information.

In ACSM1, ACS850, ACQ810 and ACS880, the speed reference (REFx) in decimal (0...20000) corresponds to 0 ... 100% of the speed scaling value (as defined with a drive parameter, eg, ACS880 parameter 46.10 Speed scaling).

In ACS355, drive parameter REFx MIN may limit the actual minimum reference.



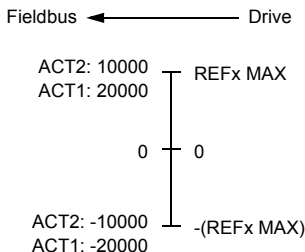
Actual values

Actual values are 16-bit signed two's complement integers containing information on the operation of the drive. A negative reference indicates a reverse direction of rotation. The functions to be monitored are selected with a drive parameter.

Scaling

Actual values are scaled as shown below.

Note: The values of REF1 MAX and REF2 MAX are set with drive parameters. See the drive documentation for further information.



Communication protocol

What this chapter contains

This chapter describes the DeviceNet communication protocol for the adapter module and the configuration of the scanner. For detailed information on DeviceNet communication, refer to ODVA DeviceNet Specifications Release 2.0.

DeviceNet

DeviceNet is a protocol based on the CAN technology. CAN specifies the physical layer interface. DeviceNet specifies the wiring and the data transfer through CAN.

The FDNA-01 module is a device acting as a Group 2 only Server realizing the Predefined Master Slave Connection Set functionality. The Off-line Connection Set functionality and Unconnected Message Manager (UCMM) are not supported.

Object modeling and functional properties

One of the main features of DeviceNet is object modeling. A group of objects can be described with a Functional Profile. The FDNA-01 adapter module realizes the ODVA AC/DC drive Functional Profile with additional features.

Instance 120								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21	DATA OUT 9 Value (High Byte)							
22	DATA OUT 10 Value (Low Byte)							
23	DATA OUT 10 Value (High Byte)							

The format of the input assembly is:

Instance 170								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1 (Fwd)		Faulted
1								
2	Speed Actual (Low Byte)							
3	Speed Actual (High Byte)							
4	DATA IN 1 Value (Low Byte)							
5	DATA IN 1 Value (High Byte)							
6	DATA IN 2 Value (Low Byte)							
7	DATA IN 2 Value (High Byte)							
8	DATA IN 3 Value (Low Byte)							
9	DATA IN 3 Value (High Byte)							
10	DATA IN 4 Value (Low Byte)							
11	DATA IN 4 Value (High Byte)							
12	DATA IN 5 Value (Low Byte)							
13	DATA IN 5 Value (High Byte)							
14	DATA IN 6 Value (Low Byte)							
15	DATA IN 6 Value (High Byte)							
16	DATA IN 7 Value (Low Byte)							
17	DATA IN 7 Value (High Byte)							
18	DATA IN 8 Value (Low Byte)							
19	DATA IN 8 Value (High Byte)							

- **Extended speed control plus drive parameters assembly**

The Extended speed control plus drive parameters assembly, defined by ABB, adds configurable drive parameters to the Extended speed control assembly of the ODVA AC/DC drive profile.

The format of the output assembly is:

Instance 121								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	NetCtrl			Fault Reset	Run Rev	Run Fwd
1								
2	Speed Reference (Low Byte)							
3	Speed Reference (High Byte)							
4	DATA OUT 1 Value (Low Byte)							
5	DATA OUT 1 Value (High Byte)							
6	DATA OUT 2 Value (Low Byte)							
7	DATA OUT 2 Value (High Byte)							
8	DATA OUT 3 Value (Low Byte)							
9	DATA OUT 3 Value (High Byte)							
10	DATA OUT 4 Value (Low Byte)							
11	DATA OUT 4 Value (High Byte)							
12	DATA OUT 5 Value (Low Byte)							
13	DATA OUT 5 Value (High Byte)							
14	DATA OUT 6 Value (Low Byte)							
15	DATA OUT 6 Value (High Byte)							
16	DATA OUT 7 Value (Low Byte)							
17	DATA OUT 7 Value (High Byte)							
18	DATA OUT 8 Value (Low Byte)							
19	DATA OUT 8 Value (High Byte)							
20	DATA OUT 9 Value (Low Byte)							

Instance 122								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
10	DATA OUT 3 Value (Low Byte)							
11	DATA OUT 3 Value (High Byte)							
12	DATA OUT 4 Value (Low Byte)							
13	DATA OUT 4 Value (High Byte)							
14	DATA OUT 5 Value (Low Byte)							
15	DATA OUT 5 Value (High Byte)							
16	DATA OUT 6 Value (Low Byte)							
17	DATA OUT 6 Value (High Byte)							
18	DATA OUT 7 Value (Low Byte)							
19	DATA OUT 7 Value (High Byte)							
20	DATA OUT 8 Value (Low Byte)							
21	DATA OUT 8 Value (High Byte)							
22	DATA OUT 9 Value (Low Byte)							
23	DATA OUT 9 Value (High Byte)							
24	DATA OUT 10 Value (Low Byte)							
25	DATA OUT 10 Value (High Byte)							

The format of the input assembly is:

Instance 172								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Run- ning1 (Fwd)		Faulted
1								
2	Speed Actual (Low Byte)							
3	Speed Actual (High Byte)							
4	Torque Actual (Low Byte)							
5	Torque Actual (High Byte)							

Instance 23								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	NetCtrl			Fault Reset	Run Rev	Run Fwd
1								
2	Speed Reference (Low Byte)							
3	Speed Reference (High Byte)							
4	Torque Reference (Low Byte)							
5	Torque Reference (High Byte)							

Instance 73								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference	Ref From Net	Ctrl From Net	Ready	Run-ning2 (Rev)	Run-ning1 (Fwd)	Warn-ing	Faulted
1	Drive State (See section <i>State (Control supervisor object).</i>)							
2	Speed Actual (Low Byte)							
3	Speed Actual (High Byte)							
4	Torque Actual (Low Byte)							
5	Torque Actual (High Byte)							

Instance 123								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
21	DATA OUT 8 Value (High Byte)							
22	DATA OUT 9 Value (Low Byte)							
23	DATA OUT 9 Value (High Byte)							
24	DATA OUT 10 Value (Low Byte)							
25	DATA OUT 10 Value (High Byte)							

The format of the input assembly is:

Instance 173								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference	Ref From Net	Ctrl From Net	Ready	Run-ning2 (Rev)	Run-ning1 (Fwd)	Warn-ing	Faulted
1	Drive State (See section State (Control supervisor object).)							
2	Speed Actual (Low Byte)							
3	Speed Actual (High Byte)							
4	Torque Actual (Low Byte)							
5	Torque Actual (High Byte)							
6	DATA IN 1 Value (Low Byte)							
7	DATA IN 1 Value (High Byte)							
8	DATA IN 2 Value (Low Byte)							
9	DATA IN 2 Value (High Byte)							
10	DATA IN 3 Value (Low Byte)							
11	DATA IN 3 Value (High Byte)							
12	DATA IN 4 Value (Low Byte)							
13	DATA IN 4 Value (High Byte)							
14	DATA IN 5 Value (Low Byte)							
15	DATA IN 5 Value (High Byte)							
16	DATA IN 6 Value (Low Byte)							

Instance 901								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reset	Ramp in Zero	Ramp Hold	Ramp Out Zero	Inhibit Operation	Off 3 Control	Off 2 Control	Off 1 Control
1					Ext Ctrl Loc	Remote Cmd		
2	Set Speed (Low Byte)							
3	Set Speed (High Byte)							
4	DATA OUT 1 Value (Low Byte)							
5	DATA OUT 1 Value (High Byte)							
6	DATA OUT 2 Value (Low Byte)							
7	DATA OUT 2 Value (High Byte)							
8	DATA OUT 3 Value (Low Byte)							

■ **ABB Drives profile with set speed and set torque plus drive parameters assembly**

Instance 952								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
14	DATA IN 5 Value (Low Byte)							
15	DATA IN 5 Value (High Byte)							
16	DATA IN 6 Value (Low Byte)							
17	DATA IN 6 Value (High Byte)							
18	DATA IN 7 Value (Low Byte)							
19	DATA IN 7 Value (High Byte)							
20	DATA IN 8 Value (Low Byte)							
21	DATA IN 8 Value (High Byte)							
22	DATA IN 9 Value (Low Byte)							
23	DATA IN 9 Value (High Byte)							
24	DATA IN 10 Value (Low Byte)							
25	DATA IN 10 Value (High Byte)							

■ **Transparent 16 with one assembly**

The Transparent 16 with one assembly, defined by ABB, provides unaltered 16-bit access to the configured drive profile.

The format of the output assembly is:

Instance 811								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Drive Profile 16-bit Control word (Low Byte)							
1	Drive Profile 16-bit Control word (High Byte)							
2	Drive Profile 16-bit Reference 1 word (Low Byte)							
3	Drive Profile 16-bit Reference 1 word (High Byte)							

Instance 911								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
14	DATA OUT 6 Value (Low Byte)							
15	DATA OUT 6 Value (High Byte)							
16	DATA OUT 7 Value (Low Byte)							
17	DATA OUT 7 Value (High Byte)							
18	DATA OUT 8 Value (Low Byte)							
19	DATA OUT 8 Value (High Byte)							
20	DATA OUT 9 Value (Low Byte)							
21	DATA OUT 9 Value (High Byte)							
22	DATA OUT 10 Value (Low Byte)							
23	DATA OUT 10 Value (High Byte)							

The format of the input assembly is:

Instance 961								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Drive Profile 16-bit Status word (Low Byte)							
1	Drive Profile 16-bit Status word (High Byte)							
2	Drive Profile 16-bit Actual 1 word (Low Byte)							
3	Drive Profile 16-bit Actual 1 word (High Byte)							
4	DATA IN 1 Value (Low Byte)							
5	DATA IN 1 Value (High Byte)							
6	DATA IN 2 Value (Low Byte)							
7	DATA IN 2 Value (High Byte)							
8	DATA IN 3 Value (Low Byte)							
9	DATA IN 3 Value (High Byte)							
10	DATA IN 4 Value (Low Byte)							
11	DATA IN 4 Value (High Byte)							
12	DATA IN 5 Value (Low Byte)							
13	DATA IN 5 Value (High Byte)							

Instance 912								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Drive Profile 16-bit Control word (Low Byte)							
1	Drive Profile 16-bit Control word (High Byte)							
2	Drive Profile 16-bit Reference 1 word (Low Byte)							
3	Drive Profile 16-bit Reference 1 word (High Byte)							
4	Drive Profile 16-bit Reference 2 word (Low Byte)							
5	Drive Profile 16-bit Reference 2 word (High Byte)							
6	DATA OUT 1 Value (Low Byte)							
7	DATA OUT 1 Value (High Byte)							
8	DATA OUT 2 Value (Low Byte)							
9	DATA OUT 2 Value (High Byte)							
10	DATA OUT 3 Value (Low Byte)							
11	DATA OUT 3 Value (High Byte)							

Class objects

The following table lists the data types used in the class object descriptions of this manual. The table also includes the corresponding data type names of the Common Industrial Protocol (CIP) Specification.

Data type	CIP data type name	Data type description
UINT8	USINT	Unsigned 8-bit integer value
UINT16	UINT	Unsigned 16-bit integer value
UINT32	UDINT	Unsigned 32-bit integer value
SINT8	SINT	Signed 8-bit integer value
SINT16	INT	Signed 16-bit integer value
BYTE	BYTE	Bit string – 8 bits
WORD	WORD	Bit string – 16 bits
BOOL	BOOL	Logical Boolean with values TRUE (1) and FALSE (0)
Short String	SHORT_STRING	Character string (1 byte per character, 1-byte length indicator)

Note: The adapter module is designed to provide DeviceNet communications for a variety of drives with different capabilities. Default, minimum and maximum values for attributes necessarily vary based upon the capabilities of the drive to which the module is attached and are not documented herein. Default, minimum and maximum values for attributes may be found in the:

- User's manual for the drive
- Electronic Data Sheet Files (EDS) for the drive.

Note that the units of the attributes may differ from those of the parameters documented elsewhere and those differences must be considered when interfacing to the drive via the module.

The table below lists the service names of the objects:

Service	Name
GET	0x0E Get_Attribute_Single
SET	0x10 Set_Attribute_Single
SET ALL	0x02 Set_Attribute_All
GET ALL	0x01 Get_Attribute_All

Identity object, class 01h

This object provides identification of and general information about the device.

Class attributes (Instance #0)

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the Identity Object	UINT8

Instance attributes (Instance #1)

#	Attribute name	Services	Description	Data type
1	Vendor ID	Get	Identification of the device vendor	UINT16
2	Device Type	Get	Identification of the general product type	UINT16
3	Product Code	Get	Assigned vendor code describing the device	UINT16
4	Revision	Get	Revision of the item that the identity object represents	Array[UINT8 UINT8]
5	Status	Get	Summary status of the device	WORD
6	ODVA Serial Number	Get	Serial number of the DeviceNet module	UINT32
7	Product Name	Get	Product identification; max 32 characters	Short String
8	State	Get	Present state of the device	UINT8

Attribute explanations*Vendor ID*

Vendor IDs are managed by the Open DeviceNet Vendor Association, Inc. (ODVA). The ABB Vendor ID is 46.

Device Type

The list of device types is managed by ODVA. It is used to identify the device profile that a particular product is using. For example, 2 = AC drive, 13 = DC drive

Product Code

Every ABB drive type or application of the drive has a dedicated product code.

Revision

Revision attribute, which consists of Major and Minor Revisions, identifies the revision of the item the identity object represents.

Status

This attribute represents the current status of the entire device. Its value changes as the state of the device changes. The Status attribute is a WORD with the following bit definitions:

Bit(s)	Type/Name	Definition
0	Owned	TRUE indicates that the device (or an object within the device) has an owner. Within the Master/Slave paradigm the setting of this bit means that the Predefined Master/Slave Connection Set has been allocated to a master. Outside the Master/Slave paradigm the meaning of this bit is to be defined.
1		Reserved, set to 0
2	Configured	TRUE indicates the application of the device has been configured to do something that differs from the “out-of-box” default. This does not include configuration of the communications.
3		Reserved, set to 0
4, 5, 6, 7		Vendor-specific, set to 0
8	Minor Recoverable Fault	TRUE indicates the device detected a recoverable problem. The problem does not cause the device fault state.
9	Minor Unrecoverable Fault	TRUE indicates the device detected a unrecoverable problem. The problem does not cause the device fault state.
10	Major Recoverable Fault	TRUE indicates the device detected a problem which caused the device to transfer into the “Major Recoverable Fault” state.
11	Major Unrecoverable Fault	TRUE indicates the device detected a problem which caused the device to transfer into the “Major Unrecoverable Fault” state.
12, 13, 14, 15		Reserved, set to 0

ODVA Serial Number:

This attribute is a number used in conjunction with the Vendor ID to form a unique identifier for each device on DeviceNet. The value of this attribute is 02000000h plus the SERNO value from the device label.

Product Name:

This text string should represent a short description of the product/product family represented by the product code in attribute 3.

State:

Represents current state of the identity object

Value	State
0	Nonexistent
1	Device Self Testing
2	Standby
3	Operational
4	Major Unrecoverable Fault
5	Minor Unrecoverable Fault

■ DeviceNet object, class 03h

The DeviceNet object provides the configuration and status of a DeviceNet port. Each DeviceNet product must support one (and only one) DeviceNet object per physical connection to the DeviceNet communication link.

Class attributes

#	Attribute name	Class attributes (Instance #0)	Description	Data type
1	Revision	Get	Revision of the DeviceNet Object Class Definition on which the implementation is based	UINT8

Instance attributes

#	Attribute name	Instance attributes (Instance #1)	Description	Data type
1	MAC ID	Get, Set	Node address	UINT8
2	Baud Rate	Get, Set	Baud rate of the device	UINT8
5	Allocation information	Get, Set	Allocation Choice Master's MAC ID	Struct: BYTE UINT8

The Allocation Information attribute consists of the following:

- Allocation Choice Byte (BYTE)

The Allocation Choice byte indicates which of the Predefined Master/Slave Connections are active (in the Configuring, or Established state).

The Allocation Choice byte is initialized to 00 at device power-up or reset.

- Master's MAC ID (UINT8)

The range of values is 0...63 and 255 decimal. A value in the range of 0...63 indicates that the Predefined Master/Slave Connection Set is currently allocated and denotes the MAC ID of the device that performed the allocation. The value 255 means that the Predefined Master/Slave Connection set has not been allocated. The Master's MAC ID attribute is initialized to 255 (FF hex) at device power-up/reset.

Connection object, class 05h

Note: Do not modify this object. This object is only used while establishing the connection between the adapter module and the PLC.

The connection class allocates and manages the internal resources associated with both I/O and explicit messaging connections. The specific instance generated by the connection class is referred to as connection instance or connection object.

The table below shows the connection object states:

State	Description	State	Description
00	Nonexistent	03	Established
01	Configuring	04	Timed Out
02	Waiting for Connection ID	05	Deferred Delete

Class attributes

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the connection object	UINT8

Instance attributes

Instance number	Description
1	Explicit messaging connection
2	Polled I/O connection
4	Change-of-state/Cyclic I/O connection

#	Attribute name	Services	Description	Data type
1	State	Get	State of the object (See the state table on page 138.)	UINT8
2	Instance Type	Get	Indicates either I/O (1) or messaging connection (0).	UINT8
3	Transport Class Trigger	Get	Defines the behavior of the connection.	UINT8
4	Produced Cnxn Id	Get	Placed in the CAN Identifier Field when the connection transmits	UINT16
5	Consumed Cnxn Id	Get	CAN Identifier Field value that denotes the message to be received	UINT16

#	Attribute name	Services	Description	Data type
6	Comm Characteristics	Get	Defines the message group(s) across which productions and consumptions are associated in this connection.	UINT8
7	Produced Connection Size	Get	Maximum number of bytes transmitted across this connection	UINT16
8	Consumed Connection size	Get	Maximum number of bytes received across this connection	UINT16
9	Expected Packet Rate	Get, Set	Defines the timing associated with this connection in milliseconds. A value of 0 deactivates the associated timers.	UINT16
12	Watchdog Timeout Action	Get, Set	Defines how to handle inactivity/watchdog time-outs.	UINT8
13	Produced Connection Path Length	Get	Number of bytes in the produced_connection_path length attribute	UINT16
14	Produced Connection Path	Get	Application object producing data on this connection	Array of UINT8
15	Consumed Connection Path Length	Get	Number of bytes in the consumed_connection_path length attribute	UINT16
16	Consumed Connection Path	Get	Specifies the application object(s) receiving the data consumed by this connection object.	Array of UINT8
17	Production Inhibit Time	Get	Defines the minimum time between new data production in milliseconds	UINT16

■ Acknowledge handler object, class 2Bh

The acknowledge handler object is used to manage the reception of message acknowledgements. This object communicates with a message producing application object within the device. The acknowledge handler object notifies the producing application of acknowledge reception, acknowledge time-outs and production retry limit.

Class attributes (Instance #0)

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the DeviceNet Object Class Definition upon which the implementation is based	UINT8

Instance attributes (Instance #1)

#	Attribute name	Services	Description	Data type
1	Acknowledge Timer	Get, Set	Time in milliseconds to wait for acknowledge before resending	UINT16
2	Retry Limit	Get, Set	Number of Acknowledge Timeouts to wait before informing the producing application of a Retry-Limit_Reached event	UINT8
3	COS Producing Connection Instance	Get	Connection Instance Id which contains the path of the producing I/O application object which is notified of the Acknowledge Handler events	UINT16

■ Motor data object, class 28h

This object serves as a database for motor parameters. Different motor types require different data to describe the motor. For example, AC induction motors do not need field current data like a DC motor to describe the motor.

Motor class	Motor types in class
AC motors	3 - PM synchronous 6 - Wound rotor induction 7 - Squirrel cage induction motor
DC motors	1 - PM DC motor 2 - FC DC motor

Class attributes (Instance #0)

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the DeviceNet Object Class Definition upon which the implementation is based	UINT8

Instance attributes (Instance #1)

#	Attribute name	Services	Description	Motor type	Data type
3	Motor Type	Get	See the table describing the motor types above.	AC	UINT16
6	Rated Current	Get, Set	Rated stator current from motor name plate Units: [100mA]	AC/DC	UINT16
7	Rated Voltage	Get, Set	Rated base voltage from motor name plate Units: [V]	AC/DC	UINT16
8	Rated Power	Get, Set	Rated power at rated frequency Units: [W]	AC/DC	UINT32
9	Rated Frequency	Get, Set	Rated electrical frequency Units: [Hz]	AC	UINT16
12	Pole Count	Get	Number of poles in the motor	AC	UINT16
15	Base Speed	Get, Set	Nominal speed at rated frequency from nameplate units [RPM]	AC/DC	UINT16

■ Control supervisor object, class 29h

The object models all the management functions for devices within the 'Hierarchy of Motor Control Devices'. The behavior of motor control devices is described by the [AC/DC-drive object, class 2Ah](#) and the Run/Stop event matrix under [Run Forward & Run Reverse \(Control supervisor object\)](#). Section [State \(Control supervisor object\)](#) defines the states of the object.

Class attributes (Instance #0)

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the DeviceNet Object Class Definition upon which the implementation is based	UINT8

Instance attributes (Instance #1)

#	Attribute name	Services	Description	Data type
3	Run 1	Get, Set	0 = Stop, 1 = Run (See the Run/Stop event matrix on page 80.)	BOOL
4	Run 2	Get, Set	0 = Stop, 1 = Run (See the Run/Stop event matrix on page 80.)	BOOL
5	Net Control	Get, Set	0 = Local Control, 1 = Network Control	BOOL
6	State	Get	State of Object (See section <i>State (Control supervisor object).</i>)	UINT8
7	Running 1	Get	0 = Stopped, 1 = Running	BOOL
8	Running 2	Get	0 = Stopped, 1 = Running	BOOL
9	Ready	Get	1 = Ready, Enabled or Stopping; 0 = Other state	BOOL
10	Faulted	Get	0 = Not faulted, 1 = Fault occurred	BOOL
11	Warning	Get	0 = No Warnings present, 1 = Warning	BOOL
12	FaultRst	Get, Set	0 → 1 Fault Reset	BOOL

#	Attribute name	Services	Description	Data type
13	Fault Code	Get	The fault that caused the last transition to the Faulted state. DRIVECOMM codes are reported. See the drive manual for further information on the DRIVECOMM codes.	UINT16
14	Warning Code	Get	Code word indicating a warning. If multiple warnings are present, the lowest code value is displayed. DRIVECOMM codes are reported. See the drive manual for further information on DRIVECOMM codes.	UINT16
15	CtlFromNet	Get	0 = NetControl disabled 1 = NetControl enabled	BOOL
16	DNFaultMode	Get, Set	2 = Vendor specified	UINT8
17	ForceFault	Get, Set	0 → 1 forces the drive to fault	BOOL

■ AC/DC-drive object, class 2Ah

This object models the functions specific to an AC or DC Drive.

Class attributes (Instance #0)

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the DeviceNet Object Class Definition upon which the implementation is based	UINT8

Instance attributes (Instance #1)

#	Attribute name	Services	Description	Data type
3	At Reference	Get	Frequency arrival	BOOL
4	NetRef	Get, Set	Requests torque or speed reference to be local or from the network. 0 = Set Reference not DN Control 1 = Set Reference at DN Control Note that the actual status of Torque or Speed Reference is reflected in attribute 29, RefFromNet.	BOOL
6	Drive mode	Get, Set	0 = Vendor specific	UINT8
7	Speed Actual	Get	Units = See parameter description 10 ODVA SPEED SCALE .	SINT16
8	SpeedRef	Get, Set	Units = See parameter description 10 ODVA SPEED SCALE .	SINT16
11	Torque Actual	Get	Units = See parameter description 11 ODVA TORQUE SCALE .	SINT16
12	TorqueRef	Get, Set	Units = See parameter description 11 ODVA TORQUE SCALE .	SINT16
18	AccelTime	Get, Set	Units = milliseconds [ms]	UINT16
19	DecelTime	Get, Set	Units = milliseconds [ms]	UINT16

#	Attribute name	Services	Description	Data type
22	Speed Scale	Get, Set	Speed scaling factor. See parameter description 10 ODVA SPEED SCALE .	UINT8
24	Torque Scale	Get, Set	Torque scaling factor. See parameter description 11 ODVA TORQUE SCALE .	UINT8
29	Ref From Net	Get	Reflecting attribute 4	BOOL

■ Drive parameter object, Class 90h

With FDNA-01, drive parameters can also be accessed via explicit messaging. Explicit messaging makes use of objects consisting of three parts: *class*, *instance* and *attribute*.

Note: When using the Drive parameter object to update the fieldbus configuration groups, changes to the fieldbus configuration will only take effect when the module is powered up the next time or when a 'Fieldbus Adapter parameter refresh' is given.

Class is always 144 (90h). *Instance* and *attribute* correspond to the drive parameter group and index in the following way:

- *Instance* = Parameter group (0...99)
- *Attribute* = Parameter index (01...99)

For example, parameter 99.01 is accessed as follows:

- *Class* = 144 = 90h
- *Instance* = 99 = 63h
- *Attribute* = 1 = 01h

■ Fieldbus configuration object 91h

The Fieldbus configuration object allows the user to configure the fieldbus configuration groups without needing to know the drive-specific groups associated with the configuration groups.

Note: When using the Fieldbus configuration object to update the fieldbus configuration groups, changes to the fieldbus configuration will only take effect when a reset service of the Identity Object is requested, the module is powered up the next time or when a 'Fieldbus Adapter parameter refresh' is given.

Class attributes

#	Attribute name	Services	Description	Data type
1	Revision	Get	Revision of the configuration object	UINT8

Instance #1: FDNA-01 configuration parameters group A (group 1)

The actual parameter group number depends on the drive type. Group A (group 1) corresponds to:

- parameter group 51 in ACS355, ACSM1, ACS850 and ACQ810
- parameter group 51 in ACS880 if the adapter is installed as fieldbus adapter A or group 54 if the adapter is installed as fieldbus adapter B.

#	Attribute name	Services	Description	Data type
1	Configuration Group A (Group 1) – Parameter 1	Get, Set	See 01 FBA TYPE .	UINT16
2	Configuration Group A (Group 1) – Parameter 2	Get, Set	See 02 MAC ID .	UINT16
3	Configuration Group A (Group 1) – Parameter 3	Get, Set	See 03 BAUD RATE .	UINT16

#	Attribute name	Services	Description	Data type
4	Configuration Group A (Group 1) – Parameter 4	Get, Set	See <i>04 DRIVE PROFILE</i> .	UINT16
5	Configuration Group A (Group 1) – Parameter 5	Get, Set	See <i>05 ODVA STOP FUNC</i> .	UINT16
6	Configuration Group A (Group 1) – Parameter 6	Get, Set	See <i>06 OUTPUT INSTANCE</i> .	UINT16
7	Configuration Group A (Group 1) – Parameter 7	Get, Set	See <i>07 OUTPUT NUM PARS</i> .	UINT16
8	Configuration Group A (Group 1) – Parameter 8	Get, Set	See <i>08 INPUT INSTANCE</i> .	UINT16
9	Configuration Group A (Group 1) – Parameter 9	Get, Set	See <i>09 INPUT NUM PARS</i> .	UINT16
10	Configuration Group A (Group 1) – Parameter 10	Get, Set	See <i>10 ODVA SPEED SCALE</i> .	UINT16
11	Configuration Group A (Group 1) – Parameter 11	Get, Set	See <i>11 ODVA TORQUE SCALE</i> .	UINT16
12	Configuration Group A (Group 1) – Parameter 12	Get, Set	See <i>12 ... 25 Reserved</i> .	UINT16
13	Configuration Group A (Group 1) – Parameter 13	Get, Set	See <i>12 ... 25 Reserved</i> .	UINT16
14	Configuration Group A (Group 1) – Parameter 14	Get, Set	See <i>12 ... 25 Reserved</i> .	UINT16
15	Configuration Group A (Group 1) – Parameter 15	Get, Set	See <i>12 ... 25 Reserved</i> .	UINT16

#	Attribute name	Services	Description	Data type
16	Configuration Group A (Group 1) – Parameter 16	Get, Set	See 12 ... 25 Reserved.	UINT16
17	Configuration Group A (Group 1) – Parameter 17	Get, Set	See 12 ... 25 Reserved.	UINT16
18	Configuration Group A (Group 1) – Parameter 18	Get, Set	See 12 ... 25 Reserved.	UINT16
19	Configuration Group A (Group 1) – Parameter 19	Get, Set	See 12 ... 25 Reserved.	UINT16
20	Configuration Group A (Group 1) – Parameter 20	Get, Set	See 12 ... 25 Reserved.	UINT16
21	Configuration Group A (Group 1) – Parameter 21	Get, Set	See 12 ... 25 Reserved.	UINT16
22	Configuration Group A (Group 1) – Parameter 22	Get, Set	See 12 ... 25 Reserved.	UINT16
23	Configuration Group A (Group 1) – Parameter 23	Get, Set	See 12 ... 25 Reserved.	UINT16
24	Configuration Group A (Group 1) – Parameter 24	Get, Set	See 12 ... 25 Reserved.	UINT16
25	Configuration Group A (Group 1) – Parameter 25	Get, Set	See 12 ... 25 Reserved.	UINT16
26	Configuration Group A (Group 1) – Parameter 26	Get, Set	See 26 UNRECOVERABLE ERROR.	UINT16
27	Configuration Group A (Group 1) – Parameter 27	Get, Set	See 27 FBA PAR REFRESH.	UINT16

#	Attribute name	Services	Description	Data type
28	Configuration Group A (Group 1) – Parameter 28	Get	See 28 PAR TABLE VER.	UINT16
29	Configuration Group A (Group 1) – Parameter 29	Get	See 29 DRIVE TYPE CODE.	UINT16
30	Configuration Group A (Group 1) – Parameter 30	Get	See 30 MAPPING FILE VER.	UINT16
31	Configuration Group A (Group 1) – Parameter 31	Get	See 31 D2FBA COMM STA.	UINT16
32	Configuration Group A (Group 1) – Parameter 32	Get	See 32 FBA COMM SW VER.	UINT16
33	Configuration Group A (Group 1) – Parameter 33	Get	See 33 FBA APPL SW VER.	UINT16

Instance #2: FDNA-01 configuration parameters group B (group 2)

The actual parameter group number depends on the drive type. Group B (group 2) corresponds to

- parameter group 55 in ACS355
- parameter group 53 in ACSM1, ACS850 and ACQ810
- parameter group 53 in ACS880 if the adapter is installed as fieldbus adapter A or group 56 if the adapter is installed as fieldbus adapter B.

#	Attribute name	Services	Description	Data type
1	Configuration Group B (Group 2) – Parameter 1	Get, Set	See 01 DATA OUT 1.	UINT16
2	Configuration Group B (Group 2) – Parameter 2	Get, Set	See 01 DATA OUT 1.	UINT16

#	Attribute name	Services	Description	Data type
3	Configuration Group B (Group 2) – Parameter 3	Get, Set	See 01 DATA OUT 1.	UINT16
4	Configuration Group B (Group 2) – Parameter 4	Get, Set	See 01 DATA OUT 1.	UINT16
5	Configuration Group B (Group 2) – Parameter 5	Get, Set	See 01 DATA OUT 1.	UINT16
6	Configuration Group B (Group 2) – Parameter 6	Get, Set	See 01 DATA OUT 1.	UINT16
7	Configuration Group B (Group 2) – Parameter 7	Get, Set	See 01 DATA OUT 1.	UINT16
8	Configuration Group B (Group 2) – Parameter 8	Get, Set	See 01 DATA OUT 1.	UINT16
9	Configuration Group B (Group 2) – Parameter 9	Get, Set	See 01 DATA OUT 1.	UINT16
10	Configuration Group B (Group 2) – Parameter 10	Get, Set	See 01 DATA OUT 1.	UINT16

Instance #3: FDNA-01 configuration parameters group C (group 3)

The actual parameter group number depends on the drive type. Group C (group 3) corresponds to:

- parameter group 54 in ACS355
- parameter group 52 in ACSM1, ACS850 and ACQ810
- parameter group 52 in ACS880 if the adapter is installed as fieldbus adapter A or group 55 if the adapter is installed as fieldbus adapter B.

#	Attribute name	Services	Description	Data type
1	Configuration Group C (Group 3) - Parameter 1	Get, Set	See 01 DATA IN 1.	UINT16
2	Configuration Group C (Group 3) - Parameter 2	Get, Set	See 01 DATA IN 1.	UINT16

#	Attribute name	Services	Description	Data type
3	Configuration Group C (Group 3) - Parameter 3	Get, Set	See 01 DATA IN 1.	UINT16
4	Configuration Group C (Group 3) - Parameter 4	Get, Set	See 01 DATA IN 1.	UINT16
5	Configuration Group C (Group 3) - Parameter 5	Get, Set	See 01 DATA IN 1.	UINT16
6	Configuration Group C (Group 3) - Parameter 6	Get, Set	See 01 DATA IN 1.	UINT16
7	Configuration Group C (Group 3) - Parameter 7	Get, Set	See 01 DATA IN 1.	UINT16
8	Configuration Group C (Group 3) - Parameter 8	Get, Set	See 01 DATA IN 1.	UINT16
9	Configuration Group C (Group 3) - Parameter 9	Get, Set	See 01 DATA IN 1.	UINT16
10	Configuration Group C (Group 3) - Parameter 10	Get, Set	See 01 DATA IN 1.	UINT16

9

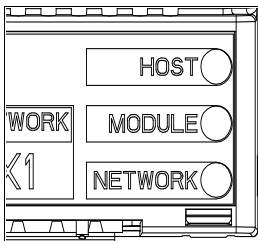
Diagnostics

What this chapter contains

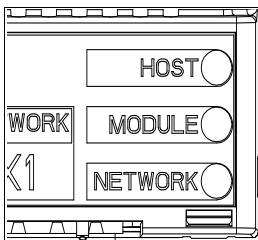
This chapter explains how to trace faults with the status LEDs on the adapter module.

LED indications

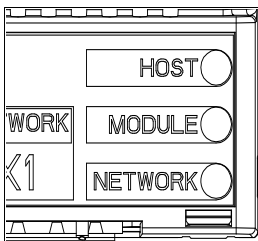
The adapter module is equipped with three diagnostic LEDs. The LEDs are described below.



Name	Color	Function
HOST	Blinking green	Establishing communication to host
	Green	Communication to host ok
	Blinking red	Communication to host lost temporarily
	Flashing orange, alternating with the MODULE flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.



Name	Color	Function
MODULE	Off	There is no power applied to the device.
	Green	Device is operating in a normal condition.
	Flashing green	Device needs commissioning due to configuration missing, incomplete or incorrect. The device may be in the standby state.
	Flashing red	Recoverable fault
	Red	Device has an unrecoverable fault. This may be cleared by: • Fieldbus Adapter parameter refresh • cycling DeviceNet network power or • cycling drive power. This may have been caused by: • duplicate MAC error • bus-off condition or • buffer overflow.
	Flashing red-green	Device is in self-test.
	Flashing orange, alternating with the HOST flashing orange	Internal file system error. The error may be cleared by cycling drive power. If the error persists, contact your local ABB representative.



Name	Color	Function
NETWORK	Off	Device is not on-line. • Device has not completed the Dup_MAC_ID test yet. • Device may not be powered. Look at the Module Status LED.
	Flashing green	Device is on-line but has no connections in the established state. • Device has passed the Dup_MAC_ID test, is on-line, but has no established connections to other nodes. • For a Group 2 Only device it means that this device is not allocated to a master.
	Green	Device is on-line and has connections in the established state. • For a Group 2 Only device it means that the device is allocated to a master.
	Flashing red	One or more I/O connections are in the timed-out state.
	Red	Failed communication device. The device has detected an error that has rendered it incapable of communicating on the network (Duplicate MAC ID, or Bus-off).

10

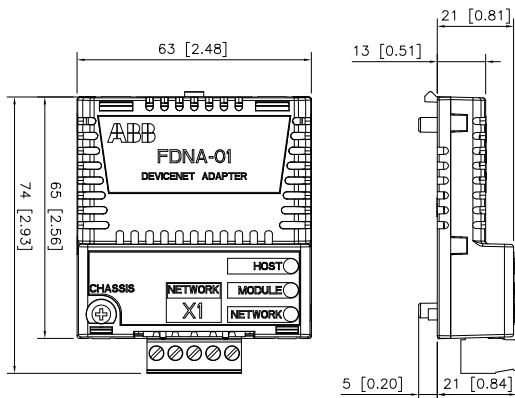
Technical data

What this chapter contains

This chapter contains the technical data of the adapter module and the DeviceNet link.

FDNA-01

The figure below shows the enclosure of the adapter module from the front and side.



Mounting	Into the option slot of the drive
Degree of protection	IP20
Ambient conditions	Applicable ambient conditions specified for the drive in its manuals are in effect.
Indicators	Three bicolor LEDs (HOST, MODULE, NETWORK)
Connectors	20-pin connector to the drive Removable 5-pole screw type connector for bus connection (max. 2.5 mm ² cross section)

Power supply	Input voltage: • From the drive: +3.3 V DC (+/- 5%) • From the network: +24 V DC nominal (+11 V to +30 V) Input current: • From the drive: 180 mA typical, 300 mA maximum (+3.3 V) • From the network: 20 mA typical, 50 mA maximum (+24 V)
General	Estimated min. lifetime 100 000 h All materials UL/CSA-approved Complies with EMC standard EN 61800-3:2004 Bus interface functionally isolated from the drive Printed circuit board conformal coated

DeviceNet link

Compatible devices	Any ODVA-compliant DeviceNet scanner supporting Poll - Response commands to Group 2 only Slaves
Medium	• DeviceNet cables: YR-29790 (Thick DeviceNet Cable), YR-29832 (Thin DeviceNet Cable) • Termination: 121 ohm, 1%, Metal Film, 1/4 W • Maximum bus length: 1200 m
Topology	Multi-drop
Transfer rate	125, 250 or 500 kBit/s
Serial communication type	Asynchronous, Half duplex
Protocol	DeviceNet

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Appendix A – Varying the number of drive parameters

What this chapter contains

This chapter describes how to reduce the number of drive parameter members in FDNA-01 assemblies by modifying the EDS file.

Modification of the EDS file

Assembly object instances can either be dynamic or static. The FDNA-01 adapter module only supports static assembly objects. For each supported assembly, the member list (and implicitly, the length in bytes) has been fixed either by the ODVA AC/DC drive profile or ABB Drives profile.

The FDNA-01 assemblies that include “plus drive parameters” have ten members each reserved for the output or input of drive parameters. In some cases, it may be desirable for these assemblies to have fewer drive parameter members. The adapter module provides the flexibility to accomplish this.

However, this behavior is non-standard and usually requires additional configuration of the DeviceNet master as well. In particular, the length in bytes of the assembly must be changed to match the drive configuration. This can usually be accomplished by editing the EDS file for the drive or via manual configuration of the DeviceNet master. A description of how to change the EDS file

is provided below. For manual configuration, see the documentation for the DeviceNet master.

Note: Only one EDS file with the same Product ID can be installed at a time. Changing the EDS file changes it for all drives with that Product ID. In situations where it is necessary to have different sizes of the same assembly on devices with the same Product ID, manual configuration is required.

The number of drive parameters may be configured between one and ten for output and input by changing the configuration value of parameters **07 OUTPUT NUM PARS** or **09 INPUT NUM PARS** respectively. To use zero drive parameters, use the assembly upon which the "plus drive parameters" assembly is based.

To change the EDS file, copy it to a new file name and open the copy with a text editor. Search for the [IO_Info] section of the file for the appropriate assembly. For example, the entry for the Basic speed control input plus drive parameters is below.

```

Input7=
      (24), 0, 0x0005,
Length in bytes      Basic speed control input + drive parameters",
                      7, "20 04 24 AA 30 03",
                      "Basic speed control input + drive parameters";
  
```

The length in bytes needs to be updated to match the value from the table below. If more than one assembly "plus drive parameters" is being used, both assembly entries in the file must be changed. The assembly entries must be changed in all the "plus drive parameters" assemblies needing a custom number of parameters. Save the file. Use the new EDS file to configure the DeviceNet master.

Assembly	Number of drive parameters									
	1	2	3	4	5	6	7	8	9	10
120	6	8	10	12	14	16	18	20	22	24
121	6	8	10	12	14	16	18	20	22	24
122	8	10	12	14	16	18	20	22	24	26
123	8	10	12	14	16	18	20	22	24	26
170	6	8	10	12	14	16	18	20	22	24
171	6	8	10	12	14	16	18	20	22	24
172	8	10	12	14	16	18	20	22	24	26
173	8	10	12	14	16	18	20	22	24	26
901	6	8	10	12	14	16	18	20	22	24
902	8	10	12	14	16	18	20	22	24	26
951	6	8	10	12	14	16	18	20	22	24
952	8	10	12	14	16	18	20	22	24	26
961	6	8	10	12	14	16	18	20	22	24
962	8	10	12	14	16	18	20	22	24	26
971	10	12	14	16	18	20	22	24	26	28
972	14	16	18	20	22	24	26	28	30	32

Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

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