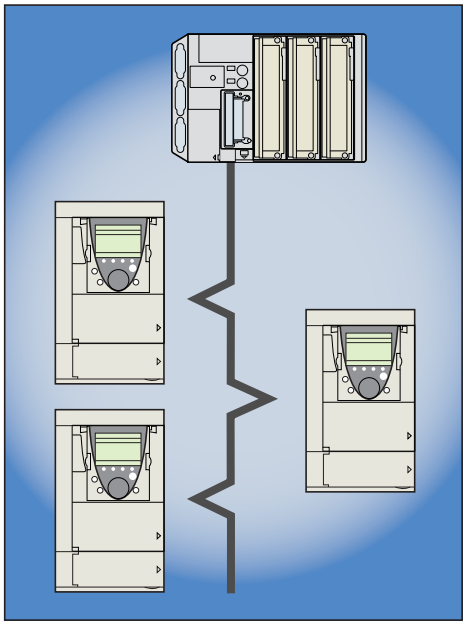
Altivar 61/71

DeviceNet™ card

User's manual

VW3 A3 309

11/2010



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Contents

NOTE

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The products described in this document may be changed or modified at any time, either from a technical point of view or in the way they are operated. Their description can in no way be considered contractual.

1. Before you begin

Read and understand these instructions before performing any procedure with this drive.

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the Installation Manual before installing or operating the Altivar 71 drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards in force concerning protective grounding of all equipment.
- Many parts of this variable speed drive, including the printed circuit cards, operate at the line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA and PC or across the DC bus capacitors.
- Install and close all the covers before applying power or starting and stopping the drive.
- Before servicing the variable speed drive
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the variable speed drive disconnect.
  - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive. WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure given in the Installation Manual to verify that the DC voltage is less than 45 VDC. The drive LEDs are not accurate indicators of the absence of DC bus voltage.

Electric shock will result in death or serious injury.

CAUTION

DAMAGED EQUIPMENT

Do not install or operate any drive that appears damaged.
Failure to follow this instruction can result in equipment damage.

2. Documentation structure

The following Altivar 61/71 technical documents are available on the Web site www.schneider-electric.com.

■ Installation manual

This manual describes:
- How to assemble the drive
- How to connect the drive

■ Programming manual

This manual describes:
- The functions
- The parameters
- How to use the drive HMI (integrated HMI and graphic HMI)

■ Communication parameters manual

This manual describes:
- The drive parameters with specific information (addresses, formats, etc.) for use via a bus or communication network
- The operating modes specific to communication (state chart)
- The interaction between communication and local control

■ Modbus, CANopen®, Ethernet™, Profibus, INTERBUS, Uni-Telway, DeviceNet™, Modbus Plus, Fipio, etc., manuals

These manuals describe:
- Connection to the bus or network
- Configuration of the communication-specific parameters via the integrated HMI or the graphic HMI
- Diagnostics
- Software setup
- The communication services specific to the protocol

■ Altivar 58/58F migration manual

This manual describes the differences between the Altivar 71 and the Altivar 58/58F.
It explains how to replace an Altivar 58 or 58F, including how to replace drives communicating on a bus or network.

3. Introduction

3. 1. Presentation

The DeviceNet communication card (catalog number VW3 A3 309) is used to connect an Altivar 61/71 drive to a DeviceNet network.

The communication card has an open-style 5-pin connector for connection to the network.

Data exchanges give access to all Altivar 61/71 functions:
- Downloading configuration and adjustment parameters,
- Command,
- Monitoring,
- Diagnostics.

DeviceNet cables and connecting accessories must be ordered separately.

The graphic display terminal or the integrated display terminal can be used to access numerous functions for communication diagnostics.

Note: All features regarding torque control are not available for ATV61 drives.

3. 2. Notation

Drive terminal displays

The graphic display terminal menus are shown in square brackets.
Example: [1.9 COMMUNICATION].

The integrated 7-segment display terminal menus are shown in round brackets.
Example: (COM-).

Parameter names are displayed on the graphic display terminal in square brackets.
Example: [Fallback speed]

Parameter codes are displayed on the integrated 7-segment display terminal in round brackets.
Example: (LFF).

Formats

Hexadecimal values are written as follows: 16#
Binary values are written as follows: 2#

Vocabulary

Depending on DeviceNet document and tools, equivalent wordings are used. The table below shows vocabulary used in the present document and other corresponding definitions.

In this document	Other	Comments
Node address	DeviceNet address, MAC ID	
Data rate	Baud rate	
kbit/s	kBPS, kbps, k	
Setpoint	Reference, target	
Path	Object Address	Class, instance, attribute

The reader should avoid mixing two terms:
- DeviceNet scanner, which is the master device on the DeviceNet network.
- Communication scanner, which is a function inside the Altivar drive.

Abbreviations

Req. = Required
Opt. = Optional

4. Quick start

This section is provided to help experienced users quickly start using the DeviceNet card. If you are unsure how to complete a step, refer to the referenced chapter.

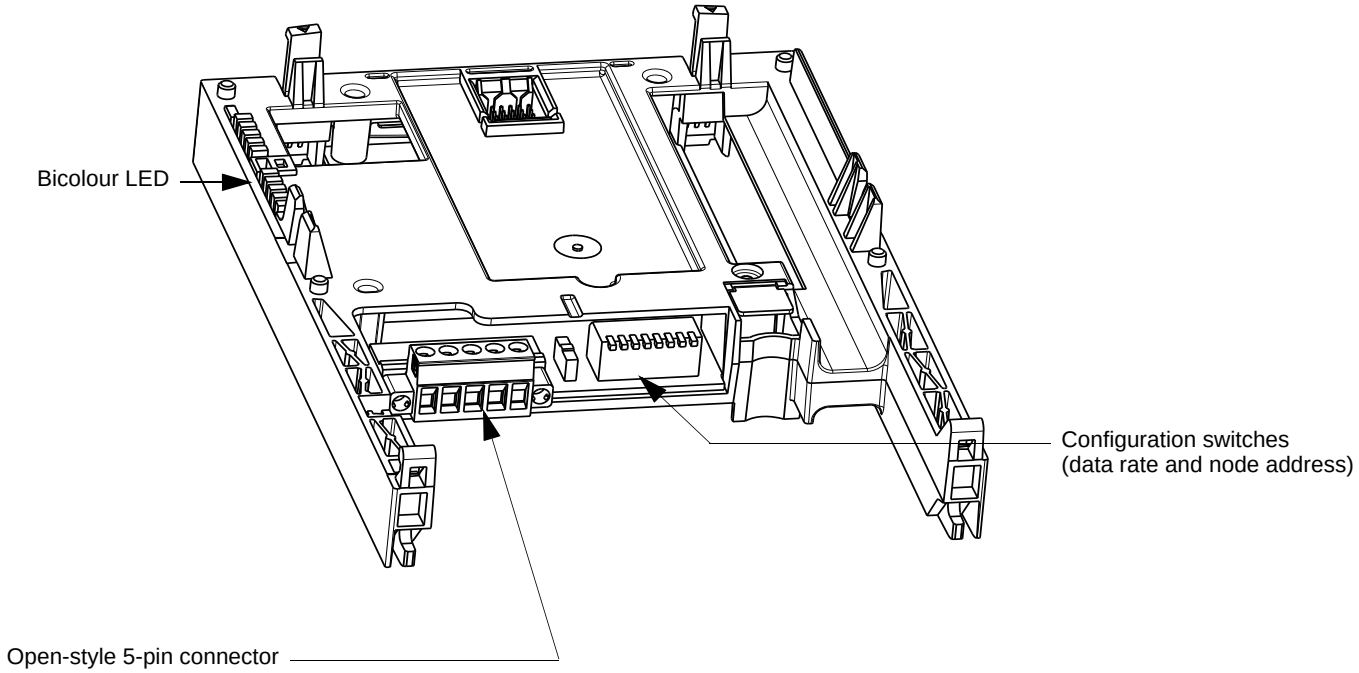
Step		Refer to
1	**Review the safety precautions for the Altivar drive and DeviceNet card.**	Installation manual
2	**Verify that the Altivar drive is properly installed.**	Installation manual
4	**Install the DeviceNet card in the drive.** Verify that the Altivar drive is not powered. Then, dismount the drive cover, mount the card in the drive. Finally mount the cover.	Installation manual
4	**Commission the DeviceNet card.** Verify that the Altivar drive is not powered. Set a unique node address and the appropriate data rate using the switches on the card. If desired, you can disable the switches and use parameter settings instead.	5. Hardware setup
5	**Connect the drive to the DeviceNet network.** Verify that the Altivar drive is not powered. Then, connect the card to the network using a DeviceNet cable.	6. Wiring to the network
6	**Apply power to the drive.** The card receives power from the drive. Apply power to the drive. The status indicator should be green.If it flashes red, there is a problem (refer to 10. 2. Signalling LED).	10. Diagnostics by the drive HMI
7	**Configure the drive for your application.** Select the functions and set the parameters as required by your application.	Programming manual
8	**Configure the drive behaviour and I/O interface for DeviceNet by the drive HMI.** Choose the suitable assemblies for your application (refer to 7. 1. Configuring the control). *If assemblies 100 or 101 are used*, select the commands assigned to the control word (refer the Programming manual). Set the parameters for the following features as requiredby your application: ❑ Control and setpoint channels (refer to 7. 1. Configuring the control), ❑ *If assemblies 100 or 101 are used*, input and output assignments (refer to 7. 2. Configuring the communication scanner), ❑ Behaviour on communication fault (refer to 7. 3. Configuring the fault management), ❑ The parameters that you would like to monitor by the drive HMI for diagnostics (refer to 7. 4. Configuring monitored parameters).	Programming manual Communication parameters manual 7. Configuring by the drive HMI
9	**Apply power to the DeviceNet master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with DeviceNet standards, and then apply power to them.	DeviceNet master manuals (DeviceNet cable system planning and Installation manual ...)
10	**Configure the scanner to communicate with the drive.** Use a network tool such as RSNetWorx for DeviceNet to configure the scanner on the network. Make sure to: ❑ Set up the scan list, ❑ Map the drive data to the scan list, ❑ Save your DeviceNet configuration to the scanner and a file.	8. 4. Configuring the DeviceNet scanner
11	**Configure the drive by the network tool.** Set the parameters for the following features as required by your application: ❑ *If the data rate switches (7 and 8) are set to 1*, Node address and data rate, ❑ *If you do not use default assemblies (100 or 101)*, select (and configure) assemblies.	8. 5. Editing parameters of the drive
12	**Create a PLC program** ❑ Control the drive using I/O (assemblies). ❑ Monitor or configure the drive using Explicit Messages.	9. Creating a PLC program DeviceNet master manuals

5. Hardware setup

5. 1. Receipt

- Check that the card reference printed on the label is the same as that on the delivery note corresponding to the purchase order.
- Remove the option card from its packaging and check that it has not been damaged in transit.

5. 2. Hardware description

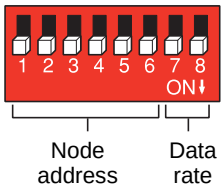


5. 3. Installing the card in the drive

Refer to the Installation manual.

5. 4. Coding the switches

■ Switches description



hight = OFF = 0
low = ON = 1

■ Overriding the switches

When switches 7 and 8 are set in position low (ON = 1), the data rate and the node address of the drive must be set by a network tool (refer to 8. Configuring by a network tool). Default values are 125 kbit/s and node address 63.

■ Coding the data rate

All devices connected to the DeviceNet network must communicate at the same data rate: 125, 250, or 500 kbit/s. The table below shows the switch settings that configure the DeviceNet data rate on the drive.

Switch 7	Switch 8	Data rate
0	0	125 kbit/s
0	1	250 kbit/s
1	0	500 kbit/s
1	1	The DeviceNet data rate and the node address of the drive must be set by a network tool.

Any change to the switch setting takes effect at the next power-up.

■ Coding the node address

All devices connected to the DeviceNet network must have a unique address, ranging from 0 to 63 (decimal).

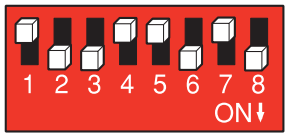
If the data rate swithes (7 and 8) are both set to 1 (on), the switches 1 to 6 are ignored and the node address must be set by a network tool (default value = 63).

The table below lists the switch setting for each valid node address.
Any change to the switch setting takes effect at the next power-up.

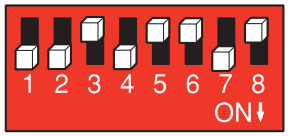
Node address	Switches 12 3456	Node address	Switches 12 3456	Node address	Switches 12 3456	Node address	Switches 12 3456
0	00 0000	16	01 0000	32	10 0000	48	11 0000
1	00 0001	17	01 0001	33	10 0001	49	11 0001
2	00 0010	18	01 0010	34	10 0010	50	11 0010
3	00 0011	19	01 0011	35	10 0011	51	11 0011
4	00 0100	20	01 0100	36	10 0100	52	11 0100
5	00 0101	21	01 0101	37	10 0101	53	11 0101
6	00 0110	22	01 0110	38	10 0110	54	11 0110
7	00 0111	23	01 0111	39	10 0111	55	11 0111
8	00 1000	24	01 1000	40	10 1000	56	11 1000
9	00 1001	25	01 1001	41	10 1001	57	11 1001
10	00 1010	26	01 1010	42	10 1010	58	11 1010
11	00 1011	27	01 1011	43	10 1011	59	11 1011
12	00 1100	28	01 1100	44	10 1100	60	11 1100
13	00 1101	29	01 1101	45	10 1101	61	11 1101
14	00 1110	30	01 1110	46	10 1110	62	11 1110
15	00 1111	31	01 1111	47	10 1111	63	11 1111

5. Hardware setup

■ Examples



Data rate = 250 kbit/s (switches 7 and 8 = 2#01)
Node address = 25 (switches 1 to 6 = 2#01 1001)



Data rate = 500 kbit/s (switches 7 and 8 = 2#10)
Node address = 52 (switches 1 to 6 = 2#11 0100)

6. Wiring to the network

6. 1. Cable routing practices

When wiring Altivar 61/71 drives to a DeviceNet network, follow all wiring practices required by national and local electrical codes. Also observe the following guidelines:
- Avoid areas of high temperature, moisture, vibration, or other mechanical stress.
- Secure the cable where necessary to prevent its weight and the weight of other cables from pulling or twisting the cable.
- Use cable ducts, raceways, or other structures to protect the cable. Use these structures for signal wiring paths. They must not contain power wiring.
- Avoid sources of electrical interference that can induce noise into the cable. Use the maximum practicable separation from such sources.

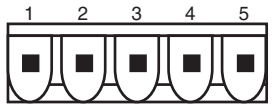
When planning cable routing within a building, follow these guidelines:
- Maintain a minimum separation of 1 m from the following equipment:
  - air conditioners and large blowers,
  - elevators and escalators,
  - radios and televisions,
  - intercom and security systems,
  - fluorescent, incandescent, and neon lighting fixtures.

- Maintain a minimum separation of 3 m from the following equipment:
  - line and motor power wiring,
  - transformers,
  - generators,
  - alternators.

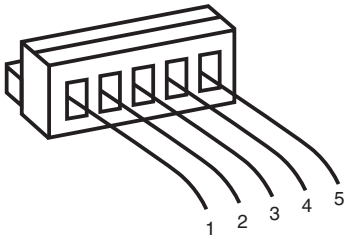
When wiring in electrical equipment rooms or large electrical equipment line-ups, observe the following guidelines for cable segregation and separation of circuits:
- Use metallic conduit for drive wiring. Do not run control network and power wiring in the same conduit.
- Separate non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control network wiring by at least 300 mm.
- Separate metallic conduits carrying power wiring or low-level control network wiring by at least 80 mm.
- Cross the metallic conduits and non-metallic conduits at right angles whenever power and control network wiring cross.
- Attenuate conducted emissions from the drive to the line in some installations to prevent interference with telecommunication, radio, and sensitive electronic equipment. Such instances may require attenuating filters. Consult the Altivar catalog for selection and application of these filters.

6. 2. Wiring the DeviceNet connector

The figures and the table below show the pin-outs of the card connectors. The removable DeviceNet female connector attaches to the network cable.



DeviceNet card male connector



Removable DeviceNet female connector

Pin	Name	Color
1	GND	Black
2	CAN_L	Blue
3	SHIELD	Bare
4	CAN_H	White
5	V+	Red

Line termination: If the drive is the first or the last device on the DeviceNet network, a line terminator (121 Ω resistor) must be wired on the removable DeviceNet female connector, between pins 2 and 4 (CAN_L and CAN_H).

6. Wiring to the network

The ODVA standards (Release 2.0) specify 7 types of cables for use in DeviceNet networks:
- Thick cable
- Thin cable
- Flat cable
- Cable I
- Cable II
- Cable IV
- Cable V

The table below lists main specifications of cables. For more information, refer to the ODVA specifications.

Type of cable	Data conductor pair size	Power conductor pair size	Data impedance
Thick cable	18 AWG	15 AWG	120 Ω +/- 10 % (at 1 MHz)
Thin cable	24 AWG	22 AWG	120 Ω +/- 10 % (at 1 MHz)
Flat cable	16 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)
Cable I	24 AWG	22 AWG	120 Ω +/- 10 % (at 1 MHz)
Cable II	18 AWG	15 AWG	120 Ω +/- 10 % (at 1 MHz)
Cable IV	18 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)
Cable V	18 AWG	16 AWG	120 Ω +/- 10 % (at 500 kHz)

The maximum permissible length of the network cable depends an the data rate and the type of cable.

Type of cable	Data rate		
	125 kbit/s	250 kbit/s	500 kbit/s
Thick cable	500 m (1640 ft)	250 m (820 ft)	100 m (328 ft)
Thin cable	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Flat cable	420 m (1378 ft)	200 m (656 ft)	75 m (246 ft)
Cable I	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Cable II	500 m (1640 ft)	250 m (820 ft)	100 m (328 ft)
Cable IV	-	-	-
Cable V	420 m (1378 ft)	200 m (656 ft)	75 m (246 ft)

For maximum length of the drops refer to table, whatever type of cable:

Data rate	Cumulative drop	Maximum drop
125 kbit/s	156 m (516 ft)	6 m (20 ft)
250 kbit/s	78 m (256 ft)	6 m (20 ft)
500 kbit/s	39 m (128 ft)	6 m (20 ft)

7. Configuring by the drive HMI

7. 1. Configuring the control

■ Principle

By the configuration of the control, it is possible to decide from what channel the drive receives its commands and setpoint, either permanently or depending on a switching command.

Numerous configurations are possible. For more information, refer to the Programming manual and Communication parameters manual. The following configurations are some of the possibilities available.

❑ Control with communication scanner

If the default assemblies (100, 101) are selected, all possibilities of Altivar 61/71 drive are available.

It is possible to use all profiles and modes of the drive:
- I/O profile,
- Drivecom profiles with separate or non separate mode.

By the configuration of the communication scanner, it is possible to assign any relevant parameter of the drive to the 4 input and 4 output variables of the assemblies.
See the input / output interface with the PLC can be fully customised depending on the application.

The use of the communication scanner is als the best way to interface with a "Controller Inside" card.

❑ Control according to ODVA AC drive profile

The ODVA AC drive profile is activated when one of the following assemblies is selected:
- 20: Basic speed control output
- 21: Extended speed control output
- 22: Speed and torque control output
- 23: Extended speed and torque control output
- 70: Basic speed control input
- 71: Extended speed control input
- 72: Speed and torque control input
- 73: Extended speed and torque control input

The advantage of using the ODVA drive profile standard is the interchangeability with other brands.

The drive must be configured in the Drivecom profile with separate mode.
The DeviceNet card translates the commands, behaviour and monitoring information from of ODVA profile (on the network) to the Drivecom profile (in the drive).

❑ Control according to Allen-Bradley® drive profile

The Allen-Bradley® Drive profile is activated when one of the following assemblies is selected:
- 103: Allen-Bradley® drive output
- 104: Allen-Bradley® drive input
- 105: Allen-Bradley® drive input with parameters

If you need to replace Allen-Bradley® drives, in an existing application, this profile is a good way to minimise the modifications.

The drive must be configured in the Drivecom profile with separate mode.
The DeviceNet card translates the commands, behaviour and monitoring information from of Allen-Bradley® drive profile (on the network) to the Drivecom profile (in the drive).

Note 1: If the DeviceNet communication is active while changing a configuration parameter, it will generate an EPF2 fault.
Note 2: When changing (CHCF) [Profile], assemblies are set to their default values.

7. Configuring by the drive HMI

■ Available configurations

❑ **If you use the communication scanner:**

- 100: Communication scanner output
- 101: Communication scanner input there is no limitation in the configuration of the control.

The examples below are only possible if you use the communication scanner.

❑ **If you use the ODVA AC drive profile or Allen-Bradley® Drive profile, that is, the assemblies:**

- 20: Basic speed control output
- 21: Extended speed control output
- 22: Speed and torque control output
- 23: Extended speed and torque control output
- 70: Basic speed control input
- 71: Extended speed control input
- 72: Speed and torque control input
- 73: Extended speed and torque control input
- 103: Allen-Bradley® drive output
- 104: Allen-Bradley® drive input
- 105: Allen-Bradley® drive input with parameters only some configurations are permitted, they are listed in the table below.

Parameter	Permitted value	Comment
Profile	Drivecom profile separate	The run commands are in Drivecom profile, the command and the reference can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from DeviceNet.
Setpoint 1B configuration	Terminals	Setpoint 2 comes from terminals (AI1 or AI2).
Setpoint 2 configuration	Terminals	Setpoint 2 comes from terminals (AI1 or AI2).
Command 1 configuration	Network card	Command 1 comes from DeviceNet.
Command 2 configuration	Terminals	Command 2 comes from terminals.
Setpoint switching	Network card bit 13	Bit 13 of the control word switches the setpoint (1 <-> 1B or 1 <-> 2).
Command switching	Network card bit 12	Bit 12 of the control word switches the command.

Configuration via the graphic display terminal or the integrated display terminal:

Case 1: Setpoint 1B is connected to the functions (Summing, PID, etc) which remain active even after switching.

Menu	Parameter	Permitted value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Ref.1B channel] (Fr1b)	[Ref. AI1] (AI1) or [Ref. AI2] (AI2)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd channel 2] (Cd2)	[Terminals] (tEr)
	[Cmd switching] (CCS)	[C312] (C312)
[1.7 APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH.]	[Ref 1B switching] (rCb)	[C313] (C313)

Case 2: Setpoint 2 is directly connected to the drive reference limit. If switching is performed, the functions that affect the reference (summing, PID, etc.) are inhibited.

Menu	Parameter	Permitted value
[1.6 - COMMAND] (CtL-) [1.7 APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH.]	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Ref.2 channel] (Fr2)	[Ref. AI1] (AI1) or [Ref. AI2] (AI2)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd channel 2] (Cd2)	[Terminals] (tEr)
	[Cmd switching] (CCS)	[C312] (C312)
	[Ref. 2 switching] (rFC)	[C313] (C313)

Note: It is not possible to configure the display terminal as a channel.
To switch to the display terminal, use the function force local and assign the parameter [Forced local Ref.] to [HMI] (LCC).

■ Control via DeviceNet in I/O profile

Note: This configuration can only be used if the communication scanner assemblies (100 and 101) are selected.

The command and the setpoint come from DeviceNet.
Control is in I/O profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	I/O profile	The run command is simply obtained by bit 0 of the command word.
Setpoint 1 configuration	Network card	The setpoint comes from DeviceNet.
Command 1 configuration	Network card	The command comes from DeviceNet.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[I/O profile] (IO)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (Cd1)	[Com. opt card] (nEt)

■ Control via DeviceNet or via the terminals in I/O profile

Note: This configuration can only be used if the communication scanner assemblies (100 and 101) are selected.

The command and the setpoint both come from DeviceNet or the terminals. Input LI5 at the terminals is used to switch between DeviceNet and the terminals.
Control is in I/O profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	I/O profile	The run command is simply obtained by bit 0 of the control word.
Setpoint 1 configuration	Network card	Setpoint 1 comes from DeviceNet.
Setpoint 1B configuration	Analog input 1 on the terminals	Setpoint 1B comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1 ↔1B).
Command 1 configuration	Network card	Command 1 comes from DeviceNet.
Command 2 configuration	Terminals	Command 2 comes from the terminals.
Command switching	Input LI5	Input LI5 switches the command.

Note: Setpoint 1B is connected to the functions (Summing, PID, etc) which remain active even after switching.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[I/O profile] (IO)
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd channel 2] (Cd2)	[Terminals] (tErm)
	[Cmd switching] (CCS)	[LI5] (LI5)
[1.7 APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH.]	[Ref.1B chan] (Fr1b)	[AI1 ref.] (AI1)
	[Ref 1B switching] (rCb)	[LI5] (LI5)

■ Control via DeviceNet in Drivecom profile

Note: This configuration can only be used if the communication scanner assemblies (100 and 101) are selected.

The command and the setpoint come from DeviceNet.

Configure the following parameters:

Parameter	Value	Comment
Profile	Separate Drivecom profile	The run commands are in Drivecom profile, the command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	The setpoint comes from DeviceNet.
Command 1 configuration	Network card	Command 1 comes from DeviceNet.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)

■ Control via DeviceNet or the terminals in Drivecom profile

Note: This configuration can only be used if the communication scanner assemblies (100 and 101) are selected.

The command and the setpoint both come from DeviceNet or the terminals. Input LI5 at the terminals is used to switch between DeviceNet and the terminals.

Configure the following parameters:

Parameter	Value	Comment
Profile	Separate Drivecom profile	The run commands are in Drivecom profile, the command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from DeviceNet.
Setpoint 2 configuration	Analog input 1 on the terminals	Setpoint 2 comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1 ↔ 2) and the command.
Command 1 configuration	Network card	Command 1 comes from DeviceNet.
Command 2 configuration	Terminals	Command 2 comes from the terminals.
Command switching	Input LI5	Input LI5 switches the command.

Note: Setpoint 2 is directly connected to the drive reference limit. If switching is performed, the functions that affect the reference (summing, PID, etc) are inhibited.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Ref.2 chan] (Fr2)	[AI1 ref.] (AI1)
	[Ref. 2 switching] (rFC)	[LI5] (LI5)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd channel 2] (Cd2)	[Terminals] (tEr)
	[Cmd switching] (CCS)	[LI5] (LI5)

■ Control in Drivecom profile via DeviceNet and setpoint switching at the terminals

Note: This configuration can only be used if the communication scanner assemblies (100 and 101) are selected.

The command comes from DeviceNet.
The setpoint comes either from DeviceNet or from the terminals. Input LI5 at the terminals is used to switch the setpoint between DeviceNet and the terminals.
Control is in Drivecom profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	Separate Drivecom profile	The run commands are in Drivecom profile, the command and the setpoint can come from different channels.
Setpoint 1 configuration	Network card	Setpoint 1 comes from DeviceNet.
Setpoint 1B configuration	Analog input 1 on the terminals	Setpoint 1B comes from input AI1 on the terminals.
Setpoint switching	Input LI5	Input LI5 switches the setpoint (1 ↔1B).
Command 1 configuration	Network card	Command 1 comes from DeviceNet.
Command switching	Channel 1	Channel 1 is the command channel.

Note: Setpoint 1B is connected to the functions (summing, PID, etc) that remain active, even after switching.

Configuration via the graphic display terminal or the integrated display terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Separate] (SEP)
	[Ref.1 chan] (Fr1)	[Com. card] (nEt)
	[Cmd channel 1] (Cd1)	[Com. card] (nEt)
	[Cmd switching] (CCS)	[ch1 active] (Cd1)
[1.7 APPLICATION FUNCT.] (FUn-) [REFERENCE SWITCH.]	[Ref.1B chan] (Fr1b)	[AI1 ref.] (AI1)
	[Ref 1B switching] (rCb)	[LI5] (LI5)

7. 2. Configuring the communication scanner

You need to read this chapter only if you use the assemblies 100 or 101 that use the drive communication scanner.

The variables exchanged by the output assembly 100 and input assembly 101 are selected by configuring the communication scanner.

The 4 output variables are assigned by means of the 4 parameters [Scan. Out● address] (nCA●). They are configured using the graphic display terminal via the [1.9 - COMMUNICATION] (COM-) menu, [COM. SCANNER OUTPUT] (OCS-) submenu.

The 4 input variables of the assembly 101 are assigned by means of the 4 parameters [Scan. In● address] (nMA●). They are configured using the graphic display terminal via the [1.9 - COMMUNICATION] (COM-) menu, [COM. SCANNER INPUT] (ICS-) submenu.

Enter the logic address of the parameter (see the Communication parameters manual).
If a parameter [Scan. Out● address] (nCA●) or [Scan. In● address] (nMA●) is equal to zero, the corresponding period variable is not used by the drive.

These 8 assignment parameters are described in the tables below:

Parameter name	Output assembly 100	Default assignment
[Scan. Out1 address] (nCA1)	Bytes 0 and 1	Control word (CMd)
[Scan. Out2 address] (nCA2)	Bytes 2 and 3	Speed reference (LFrd)
[Scan. Out3 address] (nCA3)	Bytes 4 and 5	Not used
[Scan. Out4 address] (nCA4)	Bytes 6 and 7	Not used

[Scan. Out5 address] (nCA5) to [Scan. Out8 address] (nCA8) are not useful for the DeviceNet card.

Parameter name	Input assembly 101	Default assignment
[Scan. In1 address] (nMA1)	Bytes 0 and 1	Status word (EtA)
[Scan. In2 address] (nMA2)	Bytes 2 and 3	Output speed (rFrd)
[Scan. In3 address] (nMA3)	Bytes 4 and 5	Not used
[Scan. In4 address] (nMA4)	Bytes 6 and 7	Not used

[Scan. In5 address] (nCA5) to [Scan. In8 address] (nCA8) are not useful for the DeviceNet card.

Example of configuration via the graphic display terminal:

RDY	NET	+0.00Hz	0A
COM. SCANNER INPUT			☐
Scan. In1 address	:		3201
Scan. In2 address	:		8604
Scan. In3 address	:		0
Scan. In4 address	:		0
Scan. In5 address	:		0
Code		Quick	☑
Scan. In6 address	:		0
Scan. In7 address	:		0
Scan. In8 address	:		0

RDY	NET	+0.00Hz	0A
COM. SCANNER OUTPUT			☐
Scan. Out1 address	:		8501
Scan. Out2 address	:		8602
Scan. Out3 address	:		0
Scan. Out4 address	:		0
Scan. Out5 address	:		0
Code		Quick	☑
Scan. Out6 address	:		0
Scan. Out7 address	:		0
Scan. Out8 address	:		0

Note:
All modifications to parameters [Scan. Out● address] (nCA●) or [Scan. In● address] (nMA●) must be made with the motor stopped. The master PLC program should be updated to take account of this modification.

7. Configuring by the drive HMI

Example of configuration of communication scanner assemblies 100 and 101

The following output and input variables are to be configured:

Output assembly 100	Parameter assigned
Bytes 0 and 1	Control word (CMd)
Bytes 2 and 3	Speed reference (LFrd)
Bytes 4 and 5	Acceleration (ACC)
Bytes 6 and 7	Deceleration (dEC)

Input assembly 101	Parameter assigned
Bytes 0 and 1	Status word (EtA)
Bytes 2 and 3	Output speed (rFrd)
Bytes 4 and 5	Speed reference before ramp (FrHd)
Bytes 6 and 7	Logic input map (IL1r)

Configuration settings to be made:

Communication scanner inputs	Parameter logic address
[Scan. Out1 address] (nCA1)	8501
[Scan. Out2 address] (nCA2)	8602
[Scan. Out3 address] (nCA3)	9001
[Scan. Out4 address] (nCA4)	9002

Communication scanner outputs	Parameter logic address
[Scan. IN1 address] (nMA1)	3201
[Scan. IN2 address] (nMA2)	8604
[Scan. IN3 address] (nMA3)	8605
[Scan. IN4 address] (nMA4)	5202

7. 3. Configuring the fault management

The DeviceNet card may detect 2 types of faults:
- Communication fault,
- Configuration fault.

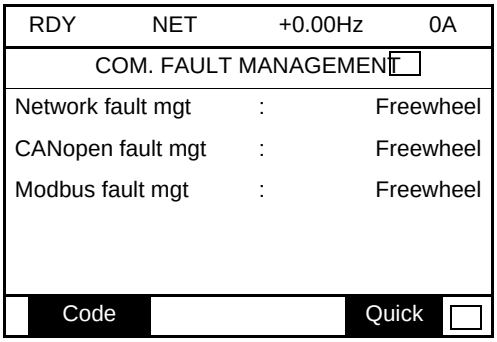
The communication fault occurs when there is a time out on control traffic: COS, cyclic, polling or explicit messaging. In factory setting, the communication fault triggers a [Com. network] (CnF) fault.

The configuration fault occurs when:
- ODVA AC drive profile or Allen-Bradley® Drive profile are used (assemblies 20, 21, 22, 23, 70, 71, 72, 73, 103, 104, 105),
- the configuration of the drive control parameters is not correct (refer to 7. 1. Configuring the control),
- a DeviceNet connection is active between the drive and the PLC.

In factory setting, the communication fault triggers a [External fault com.] (EPF2) fault.

The response of the drive in the event of a DeviceNet communication fault can also be configured.

Configuration can be performed using the graphic display terminal or integrated display terminal in the [1.8 - FAULT MANAGEMENT] (FLt-) menu:
- For the communication fault, in the [COM. FAULT MANAGEMENT] (CLL-) submenu, via the [Network fault mgt] (CLL) parameter.
- For the configuration fault, in the [EXTERNAL FAULT] (EtF-) submenu, via the [External fault ass.] (EPL) parameter.



The values of the [Network fault mgt] (CLL) or [External fault ass.] (EPL) parameters, which trigger a drive fault [Com. network] (CnF), are:

Value	Meaning
[Freewheel] (YES)	Freewheel stop (factory setting)
[Ramp stop] (rMP)	Stop on ramp
[Fast stop] (FSt)	Fast stop
[DC injection] (dCI)	DC injection stop

The values of the [Network fault mgt] (CLL) or [External fault ass.] (EPL) parameters, which do not trigger a drive fault, are:

Value	Meaning
[Ignore] (nO)	Fault ignored
[Per STT] (Stt)	Stop according to configuration of [Type of stop] (Stt).
[fallback spd] (LFF)	Switch to fallback speed, maintained as long as the fault is present and the run command is not disabled.
[Spd maint.] (rLS)	The drive maintains the speed at the time the fault occurred, as long as the fault persists and the run command has not been removed.

The fallback speed can be configured in the [1.8 – FAULT MANAGEMENT] (FLt-) menu using the [Fallback speed] (LFF) parameter.

7. 4. Configuring monitored parameters

It is possible to select up to 4 parameters to display their values in the [1.2 - MONITORING] menu ([COMMUNICATION MAP] submenu) on the graphic display terminal.

The selection is made via the [6 – MONITOR CONFIG.] menu ([6.3 - CONFIG. COMM. MAP] submenu).

Each parameter [Address 1 select] ... [Address 4 select] can be used to choose the logic address of the parameter. Select an address of zero to disable the function.

In the example given here, the monitored words are:

- Parameter 1 = Motor current (LCr): Logic address 3204; signed decimal format
- Parameter 2 = Motor torque (Otr): logic address 3205; signed decimal format
- Parameter 3 = Last fault occurred (LFt): logic address 7121; hexadecimal format
- Disabled parameter: Address W0; default format: hexadecimal format

RDY	NET	+0.00Hz	0A
6.3 CONFIG. COMM. MAP.			☐
Address 1 select	:		3204
FORMAT 1	:		Signed
Address 2 select	:		3205
FORMAT 2	:		Signed
Address 3 select	:		7121
Code		Quick	☑
FORMAT 3	:		Hex
Address 4 select	:		0
FORMAT 4	:		Hex

One of the three display formats below can be assigned to each monitored word:

Format	Range	Terminal display
Hexadecimal	0000 ... FFFF	[Hex]
Signed decimal	-32 767 ... 32 767	[Signed]
Unsigned decimal	0 ... 65 535	[Unsigned]

8. Configuring by a network tool

8. 1. Network tool

RSNetWorx for DeviceNet is a Rockwell® software application that can be used to set up DeviceNet networks and configure connected devices.

RSNetWorx for DeviceNet (version 2.22.18) is used for examples in this manual. Different versions of software may differ in appearance and procedures.

Proper EDS file (A71v●_E.eds) and icone (Altivar_71.ico) for Altivar drives are distributed on the CD-ROM delivered with each drive. They are also available on the Internet : www.schneider-electric.com

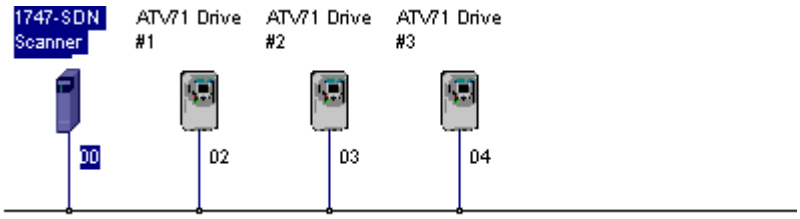
8. 2. Going online with RSNetWorx

You can view the devices on a DeviceNet network by going online. A device may appear as an unrecognised device if RSNetWorx does not have an EDS file for it.

1 After setting up a driver in RSLinx, start RSNetWorx for DeviceNet.

2 Select **Network > Online**. If the Browse for Network dialog box appears, RSLinx has multiple drivers configured.
Select your DeviceNet network, and click **OK**. A prompt appears.

3 Click **OK** to go online. The devices on the network appear in the Configuration View. You can select Graph, Spreadsheet, or Master/Slave views. The figure below shows an example network in a Graph view.



8. 3. Creating an EDS file

If the adapter and drive appear as an unrecognized device, create an EDS file for it.

1 Right-click the "Unrecognized Device" icon, and select **Register Device** in the menu. The EDS Wizard appears.

2 Click **Next** to display the next step.

3 Select **Upload EDS**, and then click **Next**.

4 Type a description (if desired), and then click **Next**.

5 Under Polled, select **Enabled**, type **4** in the Input Size and Output Size boxes, and then click **Next**. RSNetWorx will upload the EDS file from the deviceNet card.

6 Click **Next** to display the icon options for the node. We recommend that you use the icon for your product. You can change icons by clicking **Change icon**.
Proper icon (Altivar_71.ico) is distributed on the CD-ROM delivered with each drive. They are also available on the Internet : www.schneider-electric.com

7 Click **Next** to view a summary, and then click **Next** again to accept it.

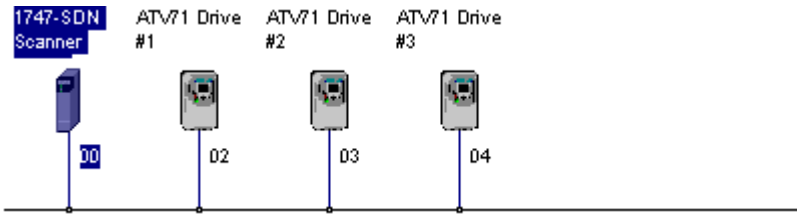
8 Click **Finish** to finish the EDS creation. A new icon represents the Altivar drive in the Configuration View.

8. 4. Configuring the DeviceNet scanner

■ Setting up the scan list

For the scanner to communicate with a drive, the scanner must be configured and the drive's node number must be added to its scan list.

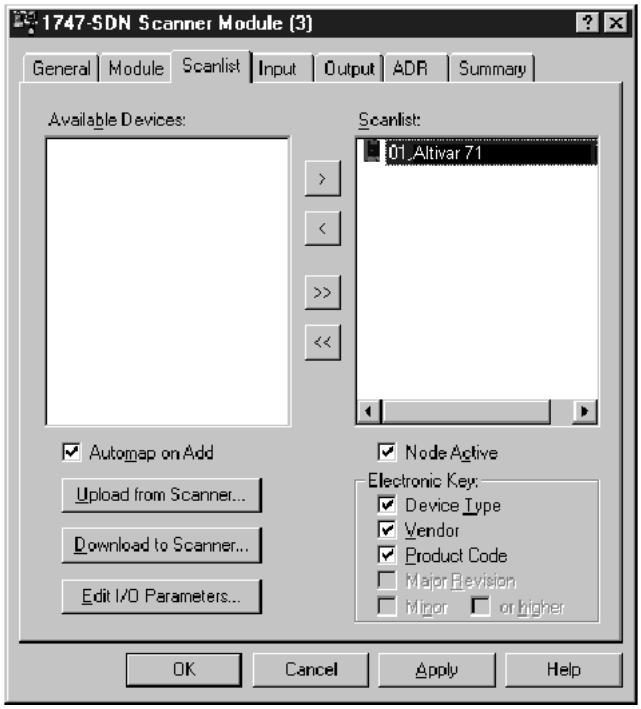
1 Go online with RSNetWorx for DeviceNet. The devices on the network are displayed in the configuration view.



2 Right-click the DeviceNet scanner (node 00) and select **Properties**. The Scanner Module dialog box appears.
Important: If your scanner is an unrecognized device, you must create an EDS file for it and then configure the scanner. Configure the scanner using the General and Module tabs. If you need more information, click **Help** or refer to your scanner documentation.

3 Click the **Scanlist** tab. A message box prompts you to upload.

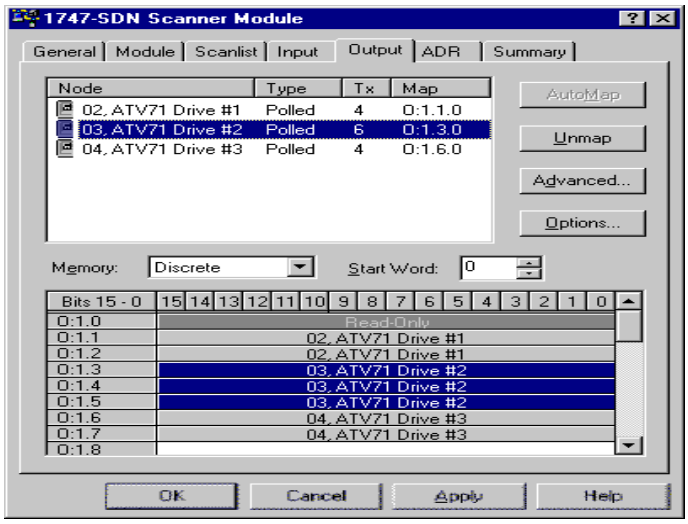
4 Click **Upload**. Data is uploaded from the scanner, and then the Scanlist page appears.



5 Select the **Automap on Add** box (a check mark will appear).

6 Under **Available Devices**, select the drive, and then click **>** (Right Arrow) to add it to the scanlist.

7 Under Scanlist, select the drive, and then click **Edit I/O Parameters**.
The Edit I/O Parameters dialog box appears.



8 Select the type(s) of data exchange (Polled, Change of State, and /or Cyclic). In our example, we selected Polled.
The type supported by the DeviceNet card for Altivar are:

	Polled	COS	Cyclic	Strobe
Input (Rx, produced)	●	●	●	No
Output (Tx, consummed)	●	No	No	No

9 Type the number of bytes that are required for your I/O in the Rx Size and Tx Size boxes. The size will depend on the assembly you have selected for your application:

Assembly attribute	Assembly name	Rx size
70	ODVA Basic speed control input	4 bytes
71	ODVA Extended speed control input	4 bytes
72	ODVA Speed and torque control input	6 bytes
73	ODVA Extended speed and torque control input	6 bytes
101	Communication scanner input	8 bytes
104	Allen-Bradley® drive input	4 bytes
105	Allen-Bradley® drive input with parameters	8 bytes

Assembly attribute	Assembly name	Tx size
20	ODVA Basic speed control output	4 bytes
21	ODVA Extended speed control output	4 bytes
22	ODVA Speed and torque control output	6 bytes
23	ODVA Extended speed and torque control output	6 bytes
100	Communication scanner output	8 bytes
103	Allen-Bradley® drive output	4 bytes

10 Set the scan rate. (Click **Help** for more information.)

Data Exchange	Rate to set
Polled	Polled Rate
Change of State	Heartbeat Rate
Cyclic	Send Rate

11 Click **OK**.
If you changed any settings, a Scanner Applet asks if it is OK to unmap the I/O. Click **Yes** to continue. The Edit I/O Parameters dialog box closes and then the Scanner Module dialog box reappears.
You will map the I/O in the next section in this chapter.

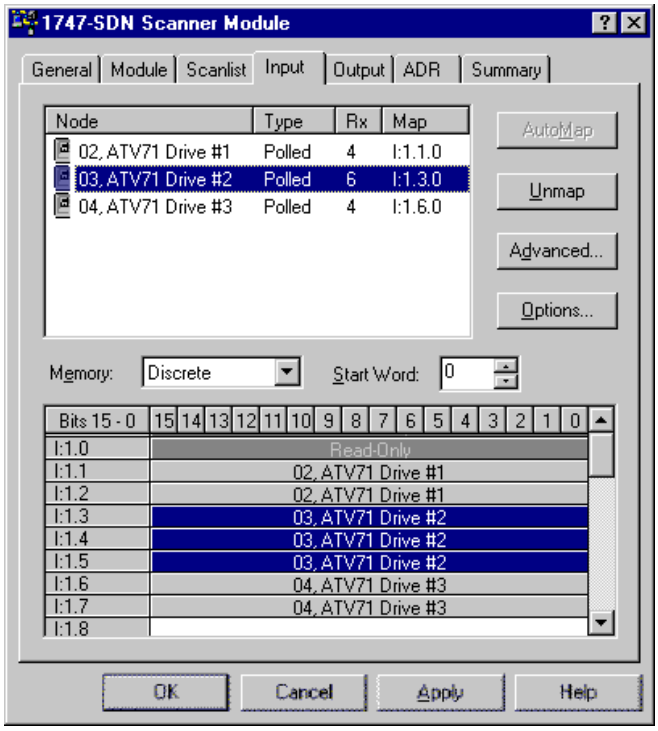
■ Mapping the drive data in the scanner

Data from I/O messages must be mapped in the scanner. This mapping determines where a PLC program can find data that is passed over the network. You must map both the Input I/O and the Output I/O.

❑ Mapping the inputs

1 In the Scanner Module dialog box, click the **Input** tab. (If necessary, right-click the scanner in the configuration view to display this dialog box.)

The figure below is an example for assembly 73 (ODVA Extended speed and torque control input).



If you selected the **Automap on Add** box in the Scanlist page, RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

2 In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 - 57

In our example, we are using a 1747-SDN and selected Discrete.

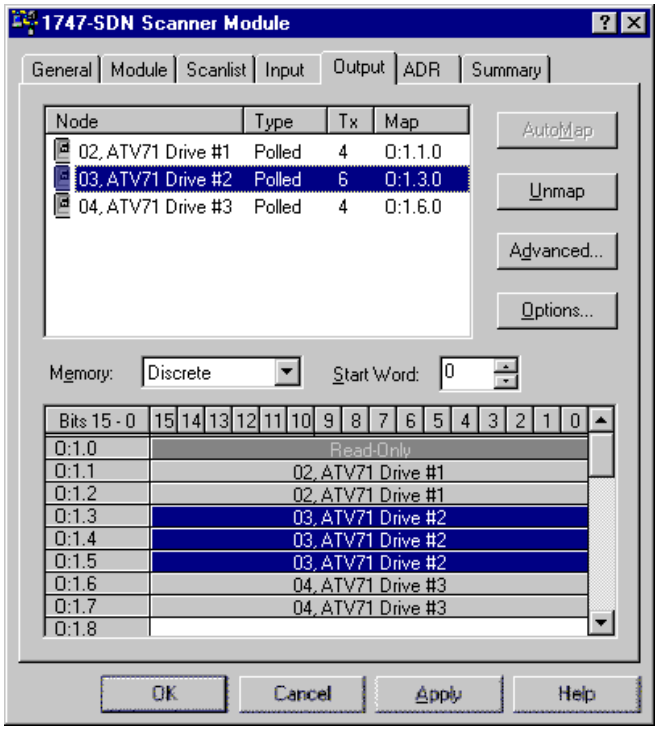
3 In the **Start Word** box, select the word in memory at which the data should start.
In our example, we selected 3. The drive parameters will be mapped:

Input	Parameter of the drive
I:1.3	Status word
I:1.4	Actual speed
I:1.5	Actual torque

❑ Mapping the outputs

1 In the Scanner Module dialog box, click the **Output** tab. To display this dialog box, right-click the scanner in the configuration view.

The figure below is an example for assembly 23 (ODVA Extended speed and torque control output).



If you selected the **Automap on Add** box in the Scanlist page, RSNetWorx has already mapped the I/O. If it is not mapped, click **Automap** to map it. If you need to change the mapping, click **Advanced** and change the settings. Click **Help** for assistance.

2 In the Memory box, select a location in scanner memory.

Scanner	Memory Locations
1747-SDN	Discrete or M-File
1756-DNB	Assembly Data
1771-SDN	Block Xfer 62 - 57

In our example, we are using a 1747-SDN and selected Discrete.

3 In the **Start Word** box, select the word in memory at which the data should start.
In our example, we selected 3. The drive parameters will be mapped:

Input	Parameter of the drive
O:1.3	Control word
O:1.4	Speed setpoint
O:1.5	Torque setpoint

■ Saving the Configuration

After configuring a scanner, you must download the configuration to the scanner. You should also save it to a file on your computer.

1 In the Scanner Module dialog box, click **Apply** to save the configuration to the scanner. A Scanner Configuration Applet appears and asks if it is OK to download the changes.

2 Click **Yes** to download the changes. The changes are downloaded and then the Scanner Module dialog box reappears.

3 Click **OK** to close the Scanner Module dialog box.

4 Select **File > Save**. If this is the first time that you saved the project, the Save As dialog box appears. Navigate to a folder, type a file name, and click **Save** to save the configuration to a file.

■ Auto Device Replacement

Do not activate ADR (Auto Device Replacement).

Parameters download of the Altivar drive needs a specific process:
1 Upload the drive parameters:
- Read drive parameters using explicit messages.
- Store the parameters in a data table of the PLC.

2 Dowload the drive parameters:
- Disable consistency check (Set bit 15 of the parameter Extended control word (CMI)).
- Write parameters from the data table of the PLC to the drive using explicit messages.
- Enable consistency check (Reset bit 15 of the parameter parameter Extended control word (CMI)).

3 Read and compare the parameters between the drive and the save table.

Extended control word (CMI)

Base	**Class**	**Instance**	**Attribute**
Hexadecimal	16# 8B	16#01	16#69
Decimal	139	1	105

This sequence must be programmed in the PLC.

It is necessary to disable the consistency check before writing parameters.
If the consistency check is not disabled, the drive verifies, at each Set access, if the parameter matches with the others. If it does not match, the drive modifies or rejects the parameter.

8. 5. Editing parameters of the drive

■ Using the Device Parameters editor

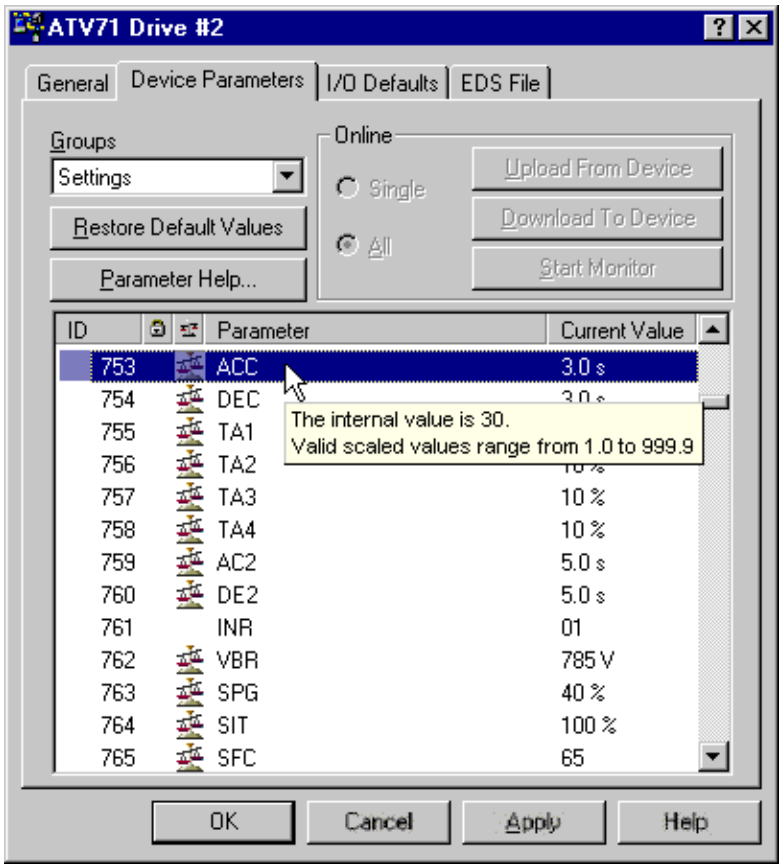
Parameters in the drive and in the DeviceNet card can be edited with Device Parameters editor of RSNetWorx, if they are described in the eds file.

1 After creating an EDS file, right-click on the icon for the Altivar drive and select **Properties**. The Altivar drive dialog box appears.

2 Click the **Device Parameters** tab. If an EDS Editor message appears, click **Upload** to load the parameter values in the drive to the computer.
Parameters are displayed in numerical order under Parameter. You can either scroll through the list or select a specific group of parameters in the **Groups** box. The available groups and the numbers of parameters will vary based on the type of drive.

3 In the **Current Value** column, double-click a value to edit it.

4 Click **Apply** to save changes to the drive.



■ Limitations of the Device Parameters editor

If you use the feature **Download To Device / All**, you may encounter unexpected events:
- If you first **Upload From Device / All** and then **Download To Device / All**, the actual configuration of the drive may be different from the one that you initially saved.
- A fault [External fault com.] (EPF2) may occur.

We do not recommended to used the feature **Download To Device / All**.
You assume full responsibility for all consequences related to the use of this feature.

❑ Additional information for Download To Device / All

The **Download To Device / All** function uses sequential explicit messaging to the parameters described in the eds file.
Each time it receives Set access to a parameter, the drive checks the consistency of this parameter with the others (values already existing in the drive).
If there is an inconsistency, the drive rejects the parameter or modifies it according to internal rules (parameter management).

Example:
A rule of the parameter management is:
[Low speed] (LSP) must be lower or equal to [High speed] (HSP).

Initially [Low speed] (LSP) = 20Hz and [High speed] (HSP) = 30Hz.
The **Download To Device / All** function writes sequentially : [Low speed] (LSP) = 35Hz and then [High speed] (HSP) = 50Hz.

The result in the drive will be [Low speed] (LSP) = 30Hz and [High speed] (HSP) = 50Hz and so the configuration served will be different from the one saved in an **Upload From Device / All.**

❑ Additional information for fault [External fault com.] (EPF2)

When the drive uses assemblies 20, 21, 22, 23, 70, 71, 72, 73, 103, 104 or 105, there are conditions on the values of the parameters (refer to 7.1 Configuring the control):
- [Profile] (CHCF),
- [Ref.1 channel] (Fr1),
- [Ref.1B channel] (Fr1b),
- [Ref.2 channel] (Fr2),
- [Cmd channel 1] (Cd1),
- [Cmd channel 2] (Cd2),
- [Ref 1B switching] (rCb),
- [Ref. 2 switching] (rFC),
- [Cmd switching] (CCS).

If during the **Download To Device / All** operation, the conditions are not fulfilled the fault [External fault com.] (EPF2) occurs.
It may occur also if the problem appears only once during operation, even though at the end the configuration is valid.

■ Configuring the assemblies

The default assemblies are :

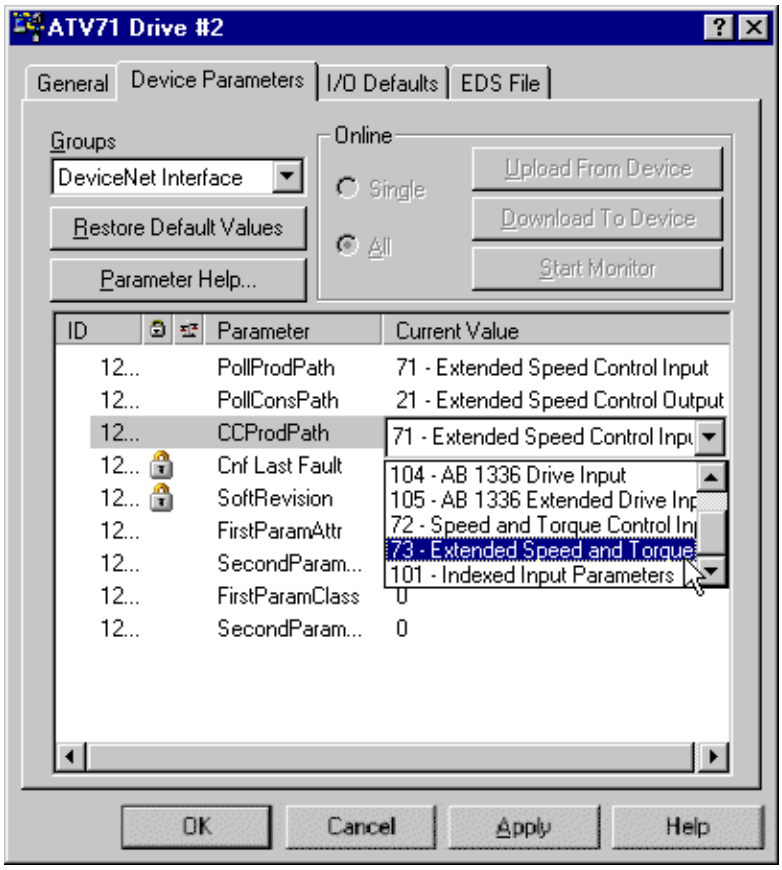
Assembly attribute	Assembly name
100	Communication scanner output
101	Communication scanner input

If you use them, you do not need reading this section.

If you use another assembly, you must configure it in the drive.

❑ Selecting the input assembly

1 In the **Groups** box, select DeviceNet Interface.



2 For the parameter PollProdPath, in the **Current Value** column, select the input assembly that fits to your application.

3 For the parameter PollConsPath, in the **Current Value** column, select the input assembly that fits to your application.

Assembly attribute	Assembly name
70	ODVA Basic speed control input
71	ODVA Extended speed control input
72	ODVA Speed and torque control input
73	ODVA Extended speed and torque control input
101	Communication scanner input
104	Allen-Bradley® drive input
105	Allen-Bradley® drive input with parameters

❑ Selecting the output assembly

1 In the **Groups** box, select DeviceNet Interface.

2 For the parameter CCProdPath, in the **Current Value** column, select the assembly that fits to your application.

Assembly attribute	Assembly name	Tx size
20	ODVA Basic speed control output	4 bytes
21	ODVA Extended speed control output	4 bytes
22	ODVA Speed and torque control output	6 bytes
23	ODVA Extended speed and torque control output	6 bytes
100	Communication scanner output	8 bytes
103	Allen-Bradley® drive output	4 bytes

❑ Selecting additional parameters of assembly 105

If you use assembly 105, apply the procedure below, otherwise skip this section and read below: **Saving changes in the drive**.

1 Select the additional parameters that you need for your application.
Example : [Motor current] (LCr) and [Motor torque] (OTr).

2 Refer to the Communication parameters manual. Write down the class Id and the attribute id of the parameters. Convert the hexadecimal values to decimal values.
Example :

Parameter name	Path	Class Id		Attribute id	
		Hexadécimal	Décimal	Hexadécimal	Décimal
[Motor current] (LCr)	71/01/05	16#71	113	16#05	5
[Motor torque] (OTr)	71/01/06	16#71	113	16#06	6

3 In the **Groups** box, select DeviceNet Interface.

4 For the parameter FirstParamClass, in the **Current Value** column, type the class value in decimal.
Example : 113.

5 For the parameter FirstParamAttr, in the **Current Value** column, type the attribute value in decimal.
Example : 5.

6 If you need a second additional parameter, for the parameter SecondParamClass, in the **Current Value** column, type the class value in decimal.
Example : 113.
If you do not need skip to step **Saving changes in the drive.**

7 For the parameter SecondParamAttr, in the **Current Value** column, type the attribute value in decimal.
Example : 6.

❑ Saving changes in the drive

1 Click **Apply** to save changes to the device.

2 Cycle power off / on the drive.

■ Configuring node address and data rate

If the data rate switches (7 and 8) are set to 1, it is possible to configure node address and data rate by the Device Parameters editor of RSNetWorx.

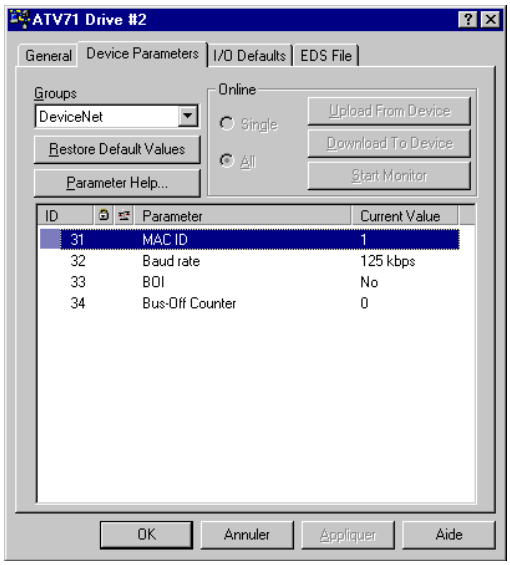
❑ Configuring the node address

1 Connect the drive on the network. The default value of the node address is 63. So you must no connect simultaneously several drives with software configured node address. You must connect and set the address of drives one by one.

2 Go on line with the drive and launch the Device Parameters editor of RSNetWorx.

3 In the **Groups** box, select DeviceNet.

4 For the parameter MAC ID, in the **Current Value** column, type the address value. The new value is immediately applied to the drive and stored in EEPROM (so used at each power-up of the drive).



❑ Configuring the data rate

1 Connect the drive on the network. The default value of the data rate is 125kbit/s. If it does not match the data rate of the DeviceNet network, you must temporarily set the data rate of the network tool 125kbit/s in order to access the drive and modify its data rate.

2 Go on line with the drive and launch the Device Parameters editor of RSNetWorx.

3 In the **Groups** box, select DeviceNet.

4 For the parameter Baud rate, in the **Current Value** column, select the data rate value. The new value will be applied to the drive at next power-up. It is stored in EEPROM (so used at each power-up of the drive).

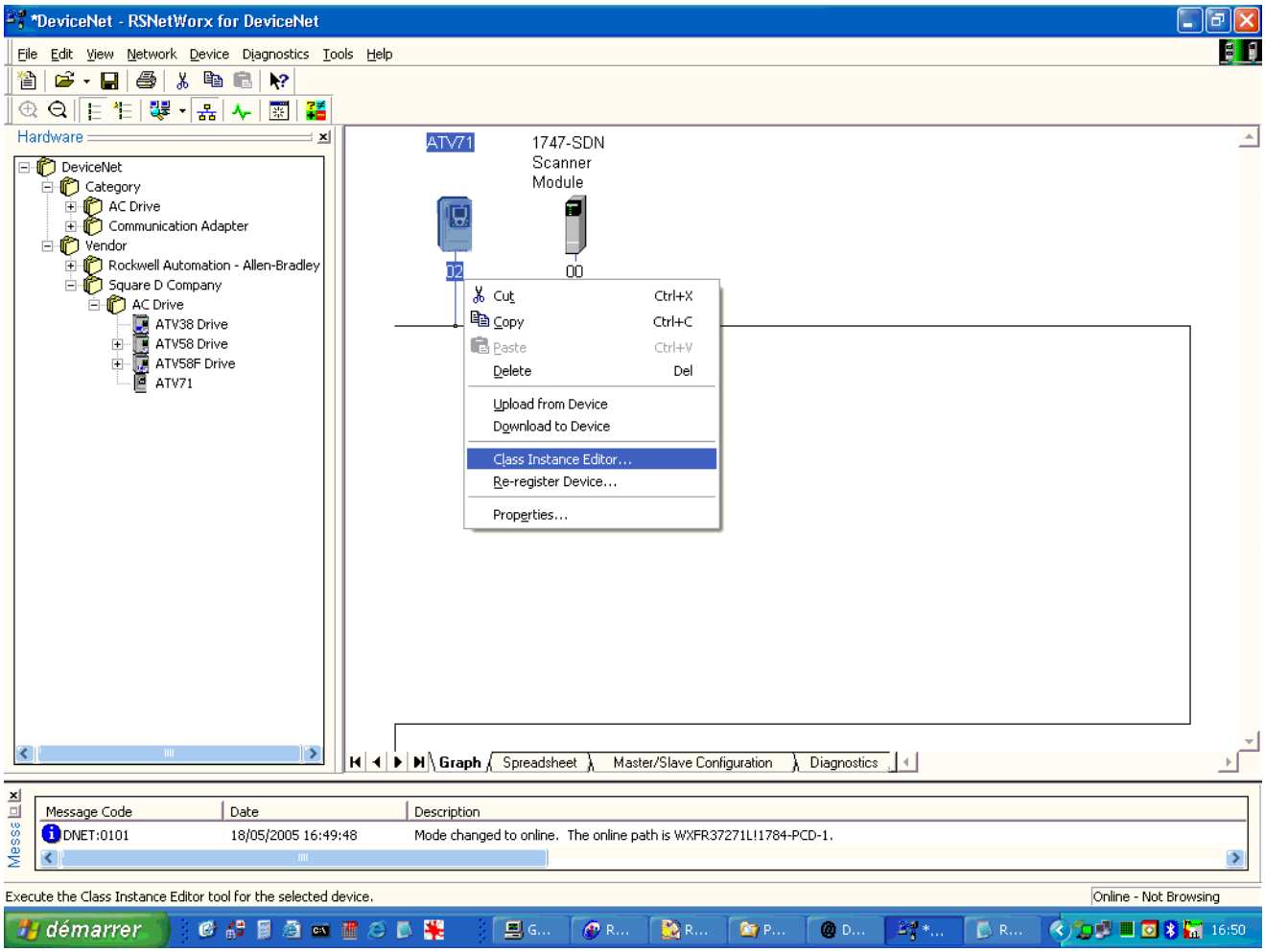
8. 6. Editing objects of the drive

■ Using the Class Instance Editor

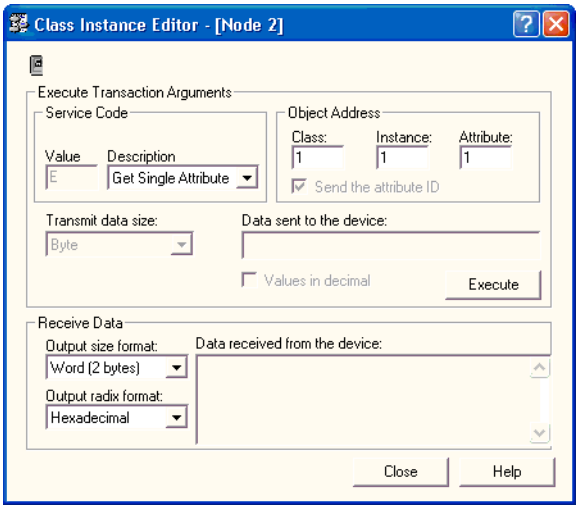
DeviceNet objects of the drive and the DeviceNet card can be edited with the Class Instance Editor of RSNetWorx.

This editor provides direct access to the device using native DeviceNet object addressing.
Using this editor requires a detailed understanding of the capabilities and limitations of the device being configured, as well as the possible impacts that these changes may have on the operation of your system. You assume full responsibility for all consequences related to the use of this editor.

1 Go online with RSNetWorx for DeviceNet. The devices on the network are displayed in the configuration view.



2 Right-click on the icon for the Altivar drive and select **Class Instance Editor.** The Altivar drive dialog box appears.



3 In the **Object Address** field, type the path of the parameter in the boxes **Class, Instance, Attribute**.

4 In the **Service Code** field, select the action in the **Description** box.

5 In the boxes **Transmit data size**, **Data sent to the device**, **Values in decimal** type the description of the data that you want to send to the drive.

6 Click **Execute** to exchange the data with the drive. Click **Help** for assistance.

8. Configuring by a network tool

■ Configuring NetRef parameter

Configure NetRef by the Class Instance Editor for testing.

Base	Class	Instance	Attribute
Hexadecimal	16# 2A	16#01	16#04
Decimal	42	1	4

It is possible to provide the speed setpoint with output assembly 20, if the parameter NetRef is set to.

The default value is 0, output assembly 20 controls the drive but the speed target is given by the terminals (AI1).

The default setting applies each time the connection is closed (Power on of the drive, DeviceNet disconnected from the card).

If assembly 20 must be used, the PLC program must set this parameter by explicit messaging.
It may be easier to use another assembly (21).

■ Configuring node address and data rate

If the data rate switches (7 and 8) are set to 1, configure node address and data rate by the Class Instance Editor.

Node address

Base	Class	Instance	Attribute
Hexadecimal	16# 03	16#01	16#01
Decimal	3	1	1

Data rate

Base	Class	Instance	Attribute
Hexadecimal	16# 03	16#01	16#02
Decimal	3	1	2

9. Creating a PLC program

9. 1. Using I/O messaging

I/O messaging is used to transfer real time data between the PLC and the drive :
- Commands,
- Setpoints,
- Settings,
- States,
- Measurements,
- ...

Depending on your application needs and other constraints, select the right assemblies:
- communication scanner assemblies and configure the parameters of the assembly (refer to 8. 4. Configuring the DeviceNet scanner),
- or ODVA AC drive profile,
- or Allen-Bradley® Drive profile (you can select 2 monitoring parameters in assembly 105).

To obtain the best response time in the application choose the adequate exchange method:
- Change of State (COS),
- Cyclic,
- or Polled.

The exchange method is downloaded in the drive by the DeviceNet scanner and must be configured by network tool (refer to 8. 4. Configuring the DeviceNet scanner).

9. 2. Using explicit messaging

I/O messaging is used to transfer data that does not require continuous updates between the PLC and the drive :
- Configuration,
- Settings,
- Fault parameters,
- Log parameters;
- ...

If the PLC program configures the drive using explicit messaging.
The new value of the parameters are not stored in EEPROM and they will be lost at next power off.
To store the values of parameters (whole configuration) in EEPROM, it is necessary to set to 1 the bit 1 of Extended control word (CMI), refer to the Communication parameters manual.

10. Diagnostics by the drive HMI

10. 1. Checking the node address and the data rate

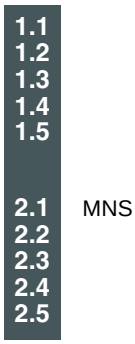
On the graphic or integrated HMI, you can check the node address and the data rate through the menu [1.9 - COMMUNICATION] (C O n -) sub-menu [DeviceNet] (d n t -).

These parameters are both "read only" (i.e. their value cannot be changed with the HMI):

Keypad Display	Range	Remarks
[Address] (A d r C)	[0] (0) ... [63] (6 3)	If data rate switches (7 and 8) are both set to 1 (ON), the default node address of the drive is 63, until it is set by network tool.
[Data rate] (b d r)	[125 kbd] (1 2 5) [250 kbd] (2 5 0) [500 kbd] (5 0 0)	If data rate switches (7 and 8) are both set to 1 (ON), the default data rate of the drive is 125 kbit/s, until it is set by network tool.

10. 2. Signalling LED

The DeviceNet card features one combined Module/Network Status LED (MNS) in position 2.1, which is visible through the drive cover:



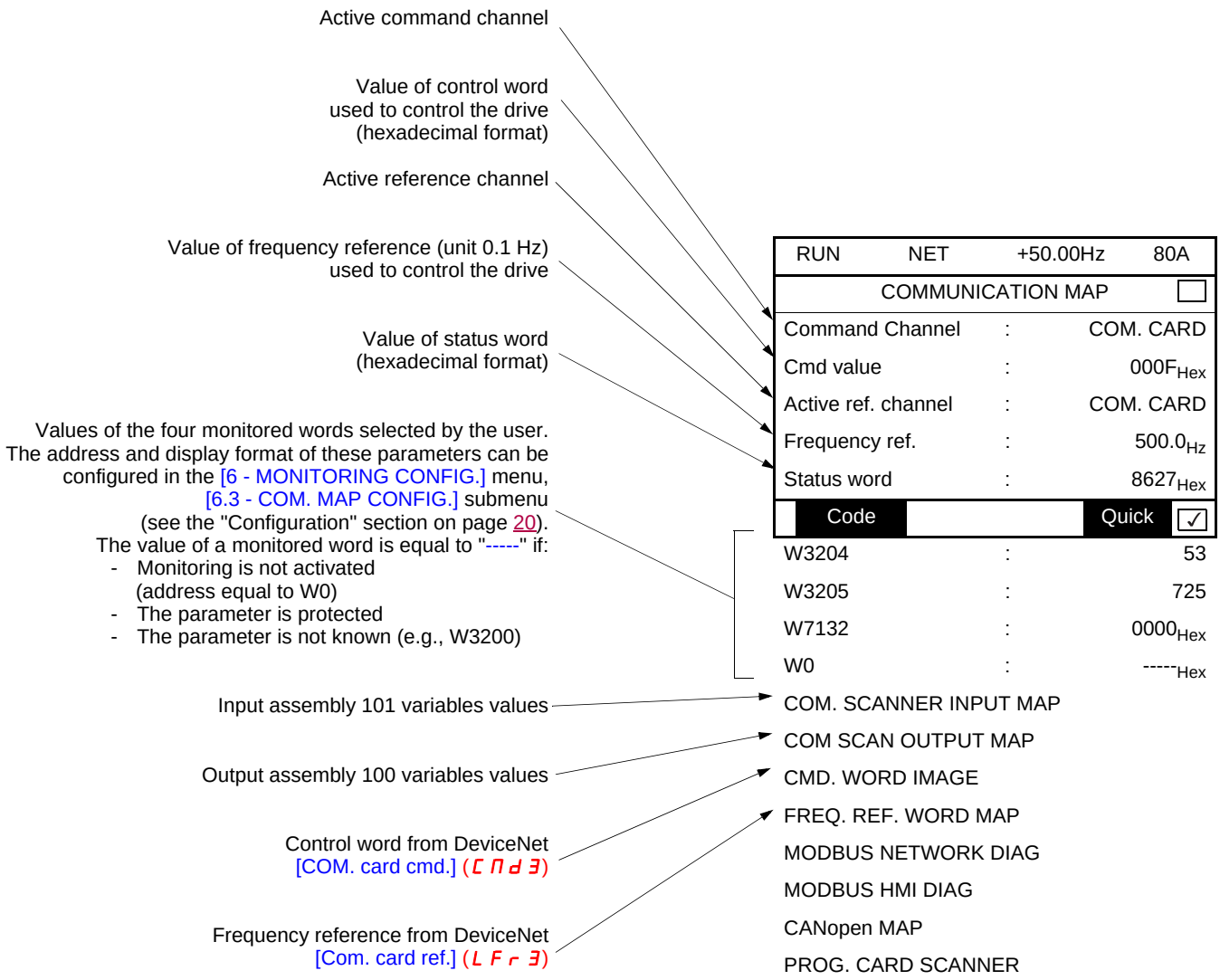
LED status indication

LED state	Drive controller state	Indication
Off	Device is not on line	• The device is not powered. • The device has not completed the duplicate node address test yet.
Flasching green	Device is operational and on line, but not connected OR Device is on line but needs commissioning	The device is on line and operating in a normal condition, but network connections are not established. • The device has passed the duplicate node address test and is on line, but has not established connections to other nodes. • The device is not allocated to a master. • Configuration is missing, incomplete, or incorrect.
Speady green	Device is operational, online, and connected	The device is operating in a normal condition. It is allocated to a master.
Flasching red	Major fault and/or connection time-out	• The device has experienced a major recoverable fault. • One or more I/O connections timed out.
Speady red	Critical fault or critical link failure	• The card has a major unrecoverable fault and may need replacing. • The device has detected an error that has rendered it incapable of communicating on the network (duplicate node address or bus turned off).
Flashing green / red	Communication fault	The device has detected a Network Access error and is in the Communication Faulted state. The device has subsequently received and accepted an Identify Communication Faulted Request—Long Protocol message.

Note: After power on, the MNS LED quickly glows green then red and finally turns off.

10. 3. Monitoring the control

On the graphic display terminal only, the [1.2 - MONITORING] menu ([COMMUNICATION MAP] submenu) can be used to display control-signal diagnostic information between the drive and the DeviceNet PLC:



Note:
The DeviceNet card receives from the network a control word and sends a status word.
The drive has its own drive control word and status word.
The network information and the drive information can match or not:

- If the output assembly 100 and the input assembly 101 are selected
  and
  if drive control word and drive status word are assigned to the assemblies
  then the values displayed in the [COMMUNICATION MAP] submenu represent the values on the DeviceNet network.
  The drive can be in I/O profile or DSP402 / Drivecom profile.

- In the other cases (assemblies 21, 71, 103 ...), the DeviceNet card processes the commands coming from the network (in Allen Bradley ® drive profile or ODVA profile). It calculates a drive control word according to DSP402 / Drivecom profile. This DSP402 / Drivecom control word of drive if displayed and not the network one.

10. 4. Monitoring the communication scanner

You only need to read this chapter if you use the assemblies 100 or 101. These assemblies use the drive communication scanner.

On the graphic display terminal, in the [1.2 - MONITORING] (SUP-) menu ([COMMUNICATION MAP] (COM-) submenu):

- The [COM. SCANNER INPUT MAP] (ISA-) submenu is used to display the value of the variables of the input assembly 101: 4 communication scanner input parameters [Com Scan In● val.] (NM●).
- The [COM SCAN OUTPUT MAP] (OSA-) submenu is used to display the value of the variables of the output assembly 100: 4 communication scanner output parameters [Com Scan Out● val.] (NC●).

Input assembly 101	Scanner parameter
Bytes 0 and 1	[Com Scan In1 val.] (NM1)
Bytes 2 and 3	[Com Scan In2 val.] (NM2)
Bytes 4 and 5	[Com Scan In3 val.] (NM3)
Bytes 6 and 7	[Com Scan In4 val.] (NM4)

Output assembly 100	Scanner parameter
Bytes 0 and 1	[Com Scan Out1 val.] (NC1)
Bytes 2 and 3	[Com Scan Out2 val.] (NC2)
Bytes 4 and 5	[Com Scan Out3 val.] (NC3)
Bytes 6 and 7	[Com Scan Out4 val.] (NC4)

[Com Scan. In5 val.] (NM5) to [Com Scan In8 val.] (NM8) and [Com Scan Out5 val.] (NC5) to [Com Scan Out8 val.] (NC8) are not used by the DeviceNet card.

Configuration of these parameters is described in the "Configuration" section.

Example:

RUN	NET	+50.00Hz	80A
COM. SCANNER INPUT MAP			☐
Com Scan In1 val.	:		34359
Com Scan In2 val.	:		600
Com Scan In3 val.	:		0
Com Scan In4 val.	:		0
Com Scan In5 val.	:		0
Code		Quick	☑
Com Scan In6 val.	:		0
Com Scan In7 val.	:		0
Com Scan In8 val.	:		0

RUN	NET	+50.00Hz	80A
COM SCAN OUTPUT MAP			☐
Com Scan Out1 val.	:		15
Com Scan Out2 val.	:		598
Com Scan Out3 val.	:		0
Com Scan Out4 val.	:		0
Com Scan Out5 val.	:		0
Code		Quick	☑
Com Scan Out6 val.	:		0
Com Scan Out7 val.	:		0
Com Scan Out8 val.	:		0

In this example, only the first two parameters have been configured (default assignment).

[Com Scan In1 val.]	= [34343]	Status word = 34359 = 16#8637	➜	Drivecom state "Operation enabled", reverse operation, speed reached
[Com Scan In2 val.]	= [600]	Output speed = 600	➜	600 rpm
[Com Scan Out1 val.]	= [15]	Control word = 15 = 16#000F	➜	"Enable operation" (Run) command
[Com Scan Out2 val.]	= [598]	Speed reference = 600	➜	598 rpm

10. 5. Troubleshooting the communication fault

DeviceNet faults are indicated by the LED on the DeviceNet card.

In the factory configuration, if DeviceNet is involved in the command or reference, a DeviceNet fault will trigger a resettable drive fault [Com. network.] (CnF) or [External fault com.] (EPF2) and initiate a freewheel stop.

The Communication parameters manual contains a detailed description of how to manage communication faults (see the "Communication monitoring" section).

- Following initialization (power-up), the drive checks that at least one command or reference parameter has been written for the first time by DeviceNet.
- Then, if a communication fault occurs on DeviceNet, the drive will react according to the configuration (fault, maintain, fallback, etc.).

The response of the drive in the event of a DeviceNet communication fault can be changed (see the Configuration section).

- Drive fault [Com. network] (CnF) or [External fault com.] (EPF2) (freewheel stop, stop on ramp, fast stop or DC injection braking stop)
- No drive fault (stop, maintain, fallback)

The [Network fault] (CnF) parameter can be used to obtain more detailed information about the origin of the last [Com. network] (CnF) fault. It can be accessed on the graphic display terminal only, in the [1.10 DIAGNOSTICS] (DGt-) menu, [MORE FAULT INFO] (AFI-) submenu.

This parameter is available in the DeviceNet Interface object (16#64 = 100), attribute 4.

Value	Description of the values of the [Network fault] (CnF) parameter	
0	No fault	
1	Fault triggered by the user This type of fault can be triggered by the parameter "ForceFault/trip" of the Control Supervisor object (16#28 = 41), attribute 17.	
2	Duplicate node address (MAC ID)	
3	CAN FIFO RX error	These events may be caused by loose or broken cables or by noise.
4	CAN FIFO TX error	
5	CAN overrun	
6	CAN transmit error	These events may be caused by loose or broken cables or by noise.
7	CAN bus off	
8	Control time out. COS, cyclic, polling or explicit messaging restart the timer. The time out can be configured in the parameter "Expected_packet_rate" of the Connection object (5), attribute 9.	
9	Acknowledge error, for COS or cyclic only. The error can be configured in the parameters "Acknowledge Timer" and "Retry Limit" of the Acknowledge Handler object, attributes 1 and 2.	
10	The DeviceNet master has been disconnected and reconnected in a shorter time than the time out.	

10. 6. Troubleshooting the card fault

The [internal com. link] (ILF) fault appears when the following serious problems occur:
- Hardware fault on the DeviceNet card
- Dialog fault between the DeviceNet card and the drive

The response of the drive in the event of an [internal com. link] (ILF) fault cannot be configured, and the drive trips with a freewheel stop. This fault cannot be reset.

Two diagnostic parameters can be used to obtain more detailed information about the origin of the [internal com. link] (ILF) fault:
- [Internal link fault 1] (ILF 1) if the fault has occurred on option card no. 1 (installed directly on the drive)
- [Internal link fault 2] (ILF2) if the fault has occurred on option card no. 2 (installed on option card no. 1)

The DeviceNet card can be in position 1 or 2.

The [Internal link fault 1] (ILF 1) and [Internal link fault 2] (ILF2) parameters can only be accessed on the graphic display terminal in the [1.10 DIAGNOSTICS] (dGt -) menu, [MORE FAULT INFO] (AF 1-) submenu.

Value	**Description of the values of the** [Internal link fault 1] **(ILF 1) and** [Internal link fault 2] **(ILF2) parameters**
0	No fault
1	Loss of internal communication with the drive
2	Hardware fault detected
3	Error in the EEPROM checksum
4	Faulty EEPROM
5	Faulty Flash memory
6	Faulty RAM memory
7	Faulty NVRAM memory
8	Faulty analog input
9	Faulty analog output
10	Faulty logic input
11	Faulty logic output
101	Unknown card
102	Exchange problem on the drive internal bus
103	Time out on the drive internal bus (500 ms)

11. DeviceNet objects

11. 1. Supported classes

Object class	Class ID		Need for ODVA conformance	No. of instances	Effect on behavior	Interface
	Hex.	Dec.				
Identity	16#01	1	Required	1	Supports the reset service	Message router
Message router	16#02	2	Optional	1		Explicit message connection
DeviceNet	16#03	3	Required	1	Configures node attributes	Message router
Assembly	16#04	4	Required	13	Defines I/O data format	Message router, assembly, or parameter object
DeviceNet connection	16#05	5	Required	3	Logical ports into or out of the device	I/O connection or message router
Motor data	16#28	40	Required	1	Defines motor data for the motor connected to this device	Message router or parameter object
Control supervisor	16#29	41	Required	1	Manages drive functions, operational states, and control	Message router, assembly, or parameter object
AC/DC drive	16#2A	42	Required	1	Provides drive configuration	Message router, assembly, or parameter object
Acknowledge handler	16#2B	43	Optional	1		I/O connection or message router
Application	16#70 - A8	112-424	Optional		Vendor specific object	Message router or parameter object
DeviceNet interface	16#64	100	Optional	1		

11. DeviceNet objects

11. 2. Identity object

The Identity object provides identification and status information about the drive.

Class code

Hexadecimal	Decimal
16#01	1

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max Instances	Opt.	UINT	1	1 defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details

1	Get	Vendor ID	Req.	UINT	243	Schneider Automation, Inc [243]
						if (ATV71) if [Profile] (CHCF) = [Not separ.] (SIM) or [Separate] (SEP) or [I/O] (IO)
						Square D Company [95]
						if (ATV58) if [Profile] (CHCF) = [8 serie] (SE8)

2	Get	Device type	Req.	UINT	16#02	AC/DC drive profile
3	Get	Product code	Req.	UINT	1 or 5	1: (ATV58) if [Profile] (CHCF) = [8 serie] (SE8) 5: (ATV71) if [Profile] (CHCF) = [Not separ.] (SIM) or [Separate] (SEP) or [I/O] (IO).
4	Get	Revision	Req.	Struct of: USINT USINT	—	Product revision of the drive (1)
5	Get	Status	Req.	WORD	—	See definition in the table below
6	Get	Serial number	Req.	UDINT	—	Serial number of the drive
7	Get	Product name	Req.	Struct of: USINT STRING	—	11 (product name length) "ATV61 Drive" or “ATV71 Drive”
8	Get	State (see Figure on page 45)	Opt.	USINT	—	0: Non existent 1: Device self-testing 2: Standby 3: Operational 4: Major recoverable fault 5: Major unrecoverable fault
10	Get/Set	Heartbeat interval (2)	Opt.	USINT	0–255	Interval in seconds between two heartbeat messages. 0: No message.

(1) Mapped in a word: MSB minor revision (second USINT), LSB major revision (first USINT).
Example: 517 = 16#0205 means revision V5.2.

(2) The heartbeat message broadcasts the current state of the device.

Attribute 5–status

Bit	Definition
0	Owned by master (predefined master/slave connection)
2	Configured (not used)
8	Minor recoverable fault (not used)
9	Minor unrecoverable fault (not used)
10	Major recoverable fault
11	Major unrecoverable fault
Others	Reserved 0 (reset to 0)

Class service

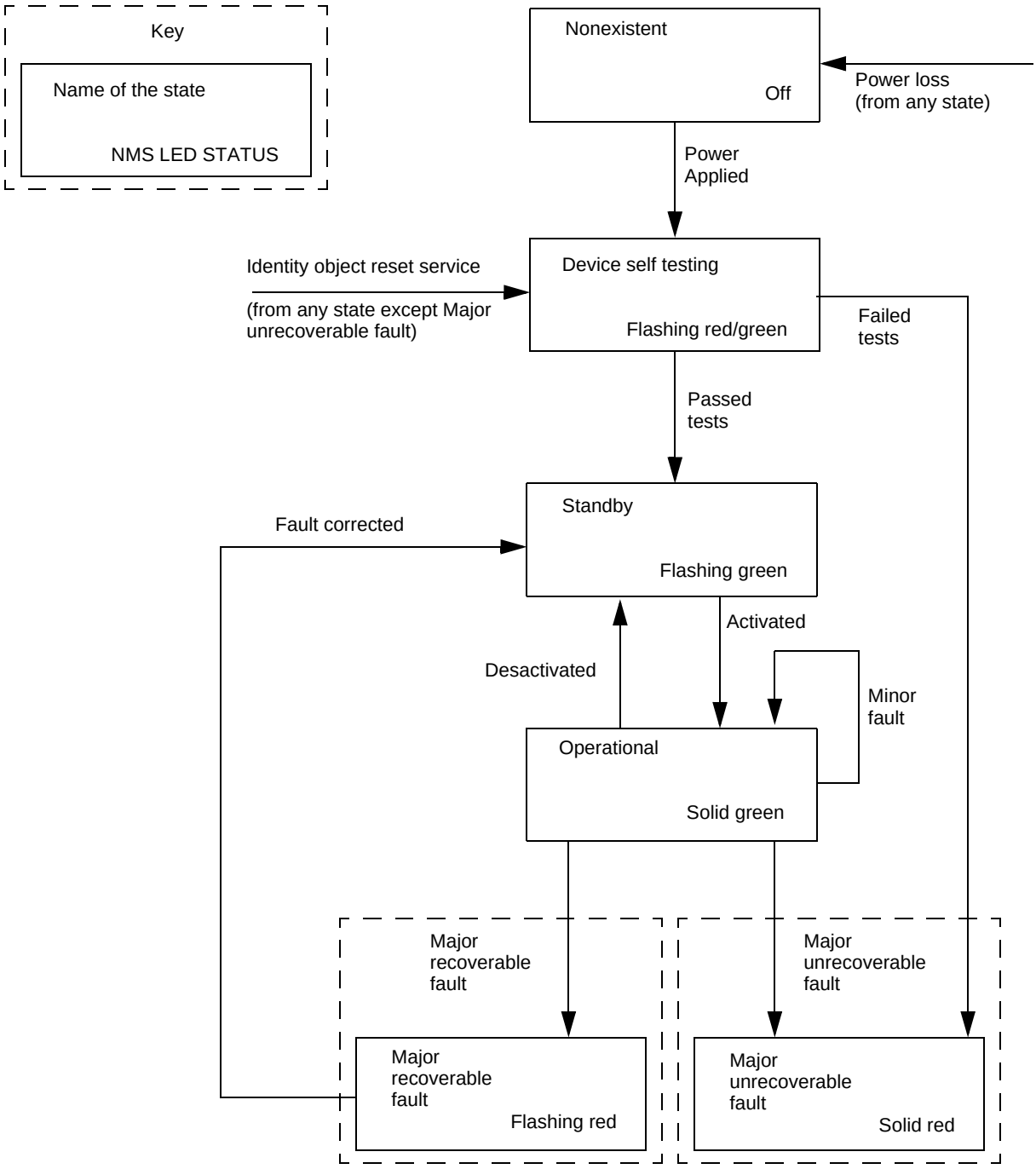
Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	(1)	Write an attribute
16#05	Reset	Req.	Reset DeviceNet module

(1) Required if the heartbeat interval must be defined.

State diagram for the Identity object



11. 3. Message router object

The Message router object is the element through which all the "Explicit messages" objects pass in order to be directed towards the objects they are truly destined to.

Class code

Hexadecimal	Decimal
16#02	2

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	-
2	Get	Max instances	Opt.	UNT	1	1 Defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Object list: Number classes	Opt.	Struct of: UINT UINT [ ]	20 (codes)	List of supported objects; the first UINT is the number of supported classes; the remaining UINTs are the codes of these classes.
2	Get	Number available	Opt.	UINT	1	Maximum number of simultaneous connections
3	Get	Number active	Opt.	UINT	1	Number of active connections
4	Get	Active connections	Opt.	UINT [ ]	1	List of active connections (referred to with their respective Connection instance ID)

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

11. 4. DeviceNet object

The DeviceNet object provides the status and configuration of a DeviceNet node.

Class code

Hexadecimal	Decimal
16#03	3

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max Instances	Opt.	UINT	1	1 Defined instance

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get/Set (1)	Node address	Req.	USINT	0–63	See below
2	Get/Set (1)	Data rate	Opt.	USINT	0–2	0 = 125 kbit/s; 1 = 250 kbit/s; 2 = 500 kbit/s See below
3	Get/Set	BOI (BusOff interrupt)	Opt.	BOOL	—	Upon BusOff event: 0: CAN component remains in BusOff 1: Component is reset and communication resumes
4	Get/Set	BusOff counter	Opt.	USINT	0–255	Number of occurrences of BusOff state. Set access is used to reset this counter.
5	Get	Allocation information	Opt.	BYTE USINT	— 0–63	Allocation choice Master address (255 not allocated)

(1) Use Set access only if data rate switches (7 and 8) are both set to 1 (ON).

11. DeviceNet objects

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Opt.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute
16#4B	Allocate Master/Slave Connection Set	Opt.	Allocation connection master/slave
16#4C	Release Master/Slave Connection Set	Opt.	Release connection master/slave

11. 5. Assembly object

The Assembly object binds together the attributes of multiple objects so that information to or from each object can be communicated over a single connection.

Assembly objects are static.

The assemblies in use can be modified through the parameter access of the network configuration tool (RSNetWorx).

The drive needs a power off to take into account a new assembly assignment.

Class code

Hexadecimal	Decimal
16#04	4

Class attribute

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max instance	Opt.	UINT	105	13 defined instances

Instances supported

Instance	Name	Data size
20	ODVA Basic speed control output	4 bytes
21	ODVA Extended speed control output	4 bytes
22	ODVA Speed and torque control output	6 bytes
23	ODVA Extended speed and torque control output	6 bytes
100	Communication scanner output	8 bytes
103	Allen-Bradley® drive output	4 bytes
70	ODVA Basic speed control input	4 bytes
71	ODVA Extended speed control input	4 bytes
72	ODVA Speed and torque control input	6 bytes
73	ODVA Extended speed and torque control input	6 bytes
101	Communication scanner input	8 bytes
104	Allen-Bradley® drive input	4 bytes
105	Allen-Bradley® drive input with parameters	8 bytes

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
3	Get/Set (1)	Data	Req.			

(1) Set access is restricted to output instances only (instances 20, 21, 22, 23, 100 and 103).

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute

11. DeviceNet objects

■ Output assembly 100

Bytes 0 and 1

1st Scanner out parameter [Val Com Scan Out1] (NC1)

Bytes 2 and 3

2nd Scanner out parameter [Val Com Scan Out2] (NC2)

Bytes 4 and 5

3rd Scanner out parameter [Val Com Scan Out3] (NC3)

Bytes 6 and 7

4th Scanner out parameter [Val Com Scan Out4] (NC4)

■ Input assembly 101

Bytes 0 and 1

1st Scanner in parameter [Val Com Scan In1] (NM1)

Bytes 2 and 3

2nd Scanner in parameter [Val Com Scan In2] (NM2)

Bytes 4 and 5

3rd Scanner in parameter [Val Com Scan In3] (NM3)

Bytes 6 and 7

4th Scanner in parameter [Val Com Scan In4] (NM4)

Note:

- For the assignment of the scanner parameters by the drive HMI, refer to chapter 7. Configuring by the drive HMI.
- For monitoring of the scanner parameters by the drive HMI, refer to chapter 10. Diagnostics by the drive HMI.
- For the assignment and monitoring of the scanner parameters by the network configuration software (RSNetWorx ...) , refer to chapter 8. Configuring by a network tool.

11. DeviceNet objects

■ Output assembly 20

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	not used	not used	not used	Fault reset (active at 1)	not used	Run forward 0 = Stop 1 = Run

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Speed setpoint (RPM)

Notes:

- Stop mode is configurable by the parameter [Type of stop] (StT):
  - drive HMI menu [1.7 - APPLICATION FUNCT.] (FUn-), sub-menu [STOP CONFIGURATION] (StC-),
  - path 16#99/01/02.
- Output assembly 20 controls the drive if the parameter NetCtrl is set to 1 (attribute 5 of Control Supervisor object; path 16#29/01/05, the default setting is 1).
- Output assembly 20 gives the speed setpoint to drive if the parameter NetRef is set to 1 (attribute 4 of AC/DC Drive object, path 16#2A/01/04, the default setting is 0).

In default setting, output assembly 20 controls the drive but the speed setpoint is via terminals (AI1 or AI2).

The default setting applies each time the connection is closed (Power on of the drive, DeviceNet disconnected from the card).

■ Input assembly 70

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	not used	not used	not used	Running 0 = Stopped 1 = Running	not used	Faulted 0 = No fault 1 = Faulted

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Actual speed (RPM)

■ Output assembly 21

Byte 0

<table>
<tr><th>Bit 7</th><th>Bit 6</th><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td rowspan="5">not used</td><td>Network reference</td><td>Network control</td><td rowspan="5">not used</td><td rowspan="5">not used</td><td rowspan="5">Fault Reset (active at 1)</td><td>Run reverse</td><td>Run forward</td></tr>
<tr><td>0</td><td>0</td><td colspan="2">Control and reference by terminals</td><td>0</td><td>0</td><td colspan="2">Stop</td></tr>
<tr><td>0</td><td>1</td><td colspan="2">Control by network
Reference by terminals</td><td>0</td><td>1</td><td colspan="2">Run forward</td></tr>
<tr><td>1</td><td>0</td><td colspan="2">Control by terminals
Reference by network</td><td>1</td><td>0</td><td colspan="2">Run reverse</td></tr>
<tr><td>1</td><td>1</td><td colspan="2">Control and
Reference by network</td><td>1</td><td>1</td><td colspan="2">Run in previous direction</td></tr>
</table>

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Speed setpoint (RPM)

Notes:
- Stop mode is configurable by the parameter [Type of stop] (StT):
  - drive HMI menu [1.7 - APPLICATION FUNCT.] (FUn-), sub-menu [STOP CONFIGURATION] (StT-),
  - path 16#99/01/02.

■ Input assembly 71

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
At reference	Reference from network	Control from network	Ready	Running reverse	Running forward	Warning	Faulted
0 Speed reference not reached	0	0 Control and reference by terminals	0 Not ready	0	0 Stopped	0 No warning	0 Not faulted
	0	1 Control by network Reference by terminals	1 Ready	0	1 Running forward	1 Warning	1 Faulted
1 Speed reference reached	1	0 Control by terminals Reference by network		1	0 Running reverse		
	1	1 Control and reference from network		1	1 Stopped		

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Drive state (see Control supervisor state transition diagramm, page 66) (0 = Vendor Specific, 1 = Startup, 2 = Not_Ready, 3 = Ready, 4 = Enabled, 5 = Stopping, 6 = Fault_Stop, 7 = Faulted)							

Bytes 2 and 3

Actual speed (RPM)

11. DeviceNet objects

■ Output assembly 22

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	not used	not used	not used	Fault reset (active at 1)	not used	Run forward 0 = Stop 1 = Run

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Speed setpoint (RPM)

Bytes 4 and 5

Torque setpoint (Nm)

Notes:
- Stop mode is configurable by the parameter [Type of stop] (StT):
  - drive HMI menu [1.7 - APPLICATION FUNCT.] (FUn-), sub-menu [STOP CONFIGURATION] (StT-),
  - path 16#99/01/02.
- Output assembly 22 controls the drive if the parameter NetCtrl is set to 1 (attribute 5 of Control Supervisor object; path 16#29/01/05, the default setting is 1).
- Output assembly 22 gives the speed setpoint to drive if the parameter NetRef is set to 1 (attribute 4 of AC/DC Drive object, path 16#2A/01/04, the default setting is 0).

In default setting, output assembly 22 controls the drive but the speed setpoint is via terminals (AI1 or AI2).

The default setting applies each time the connection is closed (Power on of the drive, DeviceNet disconnected from the card).

■ Input assembly 72

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	not used	not used	not used	Running 0 = Stopped 1 = Running	not used	Faulted 0 = No fault 1 = Faulted

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Actual speed (RPM)

Bytes 4 and 5

Actual torque (Nm)

■ Output assembly 23

Byte 0

<table>
<tr><th>Bit 7</th><th>Bit 6</th><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td rowspan="5">not used</td><td>Network reference</td><td>Network control</td><td rowspan="5">not used</td><td rowspan="5">not used</td><td rowspan="5">Fault reset (active at 1)</td><td>Run reverse</td><td>Run forward</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">Control and reference by terminals</td><td colspan="2">Stop</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td colspan="2">Control by network
Reference by terminals</td><td colspan="2">Run forward</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td colspan="2">Control by terminals
Reference by network</td><td colspan="2">Run reverse</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td colspan="2">Control and reference by network</td><td colspan="2">Run in previous direction</td></tr>
</table>

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	not used	not used	not used	not used	not used	not used	not used

Bytes 2 and 3

Speed setpoint (RPM)

Bytes 4 and 5

Torque setpoint (Nm)

Notes:

- Stop mode is configurable by the parameter [Type of stop] (StT):
  - drive HMI menu [1.7 - APPLICATION FUNCT.] (FUn-), sub-menu [STOP CONFIGURATION] (StC-),
  - path 16#99/01/02.

■ Input assembly 73

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
At reference	Reference from network	Control from network	Ready	Running reverse	Running forward	Warning	Faulted
0 Speed reference not reached	0	0	0	0	0	0	0
	Control and reference from terminals		Not ready	Stopped		No warning	Not faulted
	0	1	1	0	1	1	1
	Control from network Reference from terminals		Ready	Running forward		Warning	Faulted
1 Speed reference reached	1	0		1	0		
	Control from terminals Reference from network			Running reverse			
	1	1		1	1		
	Control and reference from network			Stopped			

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Drive state (see figure Control supervisor state transition diagram, page 66) (0 = Vendor Specific, 1 = Startup, 2 = Not_Ready, 3 = Ready, 4 = Enabled, 5 = Stopping, 6 = Fault_Stop, 7 = Faulted)							

Bytes 2 and 3

Actual speed (RPM)

Bytes 4 and 5

Actual torque (Nm)

■ Output assembly 103

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
not used	not used	Direction		Clear faults (active at 1)	not used	Start Active on rising edge (0 to 1)	Stop Active on level (at 1)
		0	0 Hold direction				
		0	1 Forward command				
		1	0 Reverse command				
		1	1 Hold direction				

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
not used	Reference select			not used	not used	not used	not used
	0	0	0 Hold reference select				
	0	0	1 Reference by terminals (AI1 or AI2)				
	0	1	0 Reference by network (DeviceNet)				
	0	1	1 Preset speed 3 (SP3)				
	1	0	0 Preset speed 4 (SP4)				
	1	0	1 Preset speed 5 (SP5)				
	1	1	0 Preset speed 6 (SP6)				
	1	1	1 Preset speed 7 (SP7)				

Bytes 2 and 3

Scaled speed setpoint Unsigned, 0 to 32 767. 32 767= parameter [High speed] (HSP), path 16#70/01/69

Notes:

- Stop mode is configurable by the parameter [Type of stop] (Stt):
  - drive HMI menu [1.7 - APPLICATION FUNCT.] (FUn-), sub-menu [STOP CONFIGURATION] (Stt-),
  - path 16#99/01/02.
- Output assembly 22 controls the drive if the parameter NetCtrl is set to 1 (attribute 5 of Control Supervisor object; path 16#29/01/05, the default setting is 1).
- Output assembly 22 gives the speed setpoint to drive if the parameter NetRef is set to 1 (attribute 4 of AC/DC Drive object, path 16#2A/01/04, the default setting is 0).

In default setting, output assembly 22 controls the drive but the speed setpoint is via terminals (AI1 or AI2).

The default setting applies each time the connection is closed (Power on of the drive, DeviceNet disconnected from the card).

■ Input assembly 104

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault	not used	Decelerating	Accelerating	Actual direction 1=Forward 0=Reverse	Command direction 1=Forward 0=Reverse	Running	Enabled

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reference source				Control source			At speed
0	0	0	0	0	0	0	
Control from terminals							
0	0	0	1	0	0	1	
Control from network							
0	0	1	0	0	1	0	
not used				0	1	1	
0	0	1	1	1	0	0	
Preset speed 3 (SP3)				1	0	1	
0	1	0	0	1	1	0	
Preset speed 4 (SP4)				1	1	1	
0	1	0	1	not used			
Preset speed 5 (SP5)							
0	1	1	0				
Preset speed 6 (SP6)							
0	1	1	1				
Preset speed 7 (SP7)							
1	0	0	0				
Reference from terminals (AI1 or AI2)							
1	0	0	1				
Reference from network (DeviceNet)							
1	0	1	0				
1	0	1	1				
1	1	0	0				
1	1	0	1				
1	1	1	0				
not used							
1	1	1	1				
No reference source defined							

Bytes 2 and 3

Actual speed scaled Unsigned, 0 to 32 767. 32 767= parameter [High speed] (*H S P*), path 16#70/01/69

Note: When the value of Reference source (bits 12, 13, 14 and 15) is Preset speed ● (SP●) it means that the corresponding commands is given by the assembly 103 via Reference select (bits 12,13 and 14) (not by the terminals).

11. DeviceNet objects

■ Input assembly 105

Byte 0

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Fault	not used	Decelerating	Accelerating	Actual direction 1=Forward 0=Reverse	Command direction 1=Forward 0=Reverse	Running	Enabled

Byte 1

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reference source				Control source			At speed
0	0	0	0	0	0	0	
not used				Control from terminals			
0	0	0	1	0	0	1	
Preset speed 1 (SP1)				Control from network			
0	0	1	0	0	1	0	
Preset speed 2 (SP2)				0	1	1	
0	0	1	1	1	0	0	
Preset speed 3 (SP3)				1	0	1	
0	1	0	0	1	1	0	
Preset speed 4 (SP4)				1	1	1	
0	1	0	1	not used			
Preset speed 5 (SP5)							
0	1	1	0				
Preset speed 6 (SP6)							
0	1	1	1				
Preset speed 7 (SP7)							
1	0	0	0				
Reference from terminals (AI1 or AI2)							
1	0	0	1				
Reference from network (DeviceNet)							
1 1 1 1 1	0 0 1 1 1	1 1 0 0 1	0 1 0 1 0				
not used							
1	1	1	1				
No reference source defined							

Bytes 2 and 3

Actual speed scaled
Unsigned, 0 to 32 767. 32 767= parameter [High speed] (*H S P*), path 16#70/01/69

Bytes 4 and 5

First extended monitoring parameter (see DeviceNet interface object page 70)

Bytes 6 and 7

Second extended monitoring parameter (see DeviceNet interface object page 70)

11. 6. Connection object

Class code

Hexadecimal	Decimal
16#05	5

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max instances	Opt.	UINT	4	3 defined instances (1)

(1) Only instances 1 (explicit message), 2 (polled I/O message), and 4 (change of state/cyclic message) are supported. Instance 3 (bit strobe) is not supported.

Attributes of instance 1—Explicit message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0 : Non-existent 3 : Established 5 : Deferred Delete
2	Get	Instance_type	Req.	USINT	0	Explicit Message
3	Get	TransportClass_trigger	Req.	BYTE	16#83	Class 3 server
4	Get	Produced_connection_id	Req.	UINT	10xxxxxx011	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx100	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16#21	Explicit messaging via Group 2
7	Get	Produced_connection_size	Req.	UINT	36	Produced data maximum size (in bytes)
8	Get	Consumed_connection_size	Req.	UINT	36	Consumed data maximum size (in bytes)
9	Get/Set	Expected_packet_rate	Req.	UINT	2500	2.5 sec. (TimeOut)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	1 or 3	1 : Auto-Delete 3 : Deferred Delete (Default)
13	Get	Produced connection path length	Req.	UINT	0	Length of attribute 14 data
14	Get	Produced connection path	Req.	Array of UINT	Null	Empty
15	Get	Consumed connection path length	Req.	UINT	0	Length of attribute 16 data
16	Get	Consumed connection path	Req.	Array of UINT	Null	Empty

Refer to DeviceNet specification for more information.

Attributes of instance 2—Polled I/O message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0: Non-existent 1: Configuring 3: Established 4: TimeOut
2	Get	Instance_type	Req.	USINT	1	I/O Message
3	Get	TransportClass_trigger	Req.	BYTE	16# 83	Class 3 server
4	Get	Produced_connection_id	Req.	UINT	01111xxxxxx	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx101	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16# 01	Group 1 / Group 2
7	Get	Produced_connection_size	Req.	UINT	4, 6, or 8	Size of data produced
8	Get	Consumed_connection_size	Req.	UINT	4, 6, or 8	Size of data consumed
9	Get/Set	Expected_packet_rate	Req.	UINT	—	Exchange frequency (ms)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	0, 1, or 2 (2)	0: Transition to TimeOut 1: Auto-Delete 2: Auto-Reset
13	Get	Produced_connection_path length	Req.	UINT	8	Default: 8 bytes
14	Get/Set (1)	Produced_connection_path	Req.	Array of UINT	16# 20 04 24 46 30 03 16# 20 04 24 47 30 03 16# 20 04 24 48 30 03 16# 20 04 24 49 30 03 16# 20 04 24 65 30 03 16# 20 04 24 68 30 03 16# 20 04 24 69 30 03	Input assembly (Default : Instance 101, 16# 20 04 24 65 30 03)
15	Get	Consumed_connection_path length	Req.	UINT	8	Default: 8 bytes
16	Get/Set (1)	Consumed_connection_path	Req.	Array of UINT	16# 20 04 24 14 30 03 16# 20 04 24 15 30 03 16# 20 04 24 16 30 03 16# 20 04 24 17 30 03 16# 20 04 24 64 30 03 16# 20 04 24 67 30 03	Output assembly (Default : Instance 100, 16# 20 04 24 64 30 03)
17	Get/Set	Production_inhibit_time	Cond.	UINT	0	Minimum time between 2 data productions. Undefined

(1) Assembly assignment should not be modified in a running application.
If you Set any one of the values displayed in the "Value" column, it will be saved in EEPROM and then used at each power-up.
Any other value will not be saved.

(2) 0 and 1: when the drive is disconnected from the network a DeviceNet fault occurs. In factoring settings the DeviceNet fault triggers a fault [Com. network] (CnF) and a free wheel stop.
2: The DeviceNet fault is automatically reset (drive immediately restarts when RUN command is applied).

Attributes of instance 4—Change of state/cyclic message instance

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	State	Req.	USINT	—	0: Non-existent 1: Configuring 3: Established 4: TimeOut
2	Get	Instance_type	Req.	USINT	1	I/O Message
3	Get	TransportClass_trigger	Req.	BYTE	16# X2	Class 2 Client Cos:16# 12 - Cyclic:16# 02
4	Get	Produced_connection_id	Req.	UINT	01101xxxxxx	xxxxxx = Node address
5	Get	Consumed_connection_id	Req.	UINT	10xxxxxx101	xxxxxx = Node address
6	Get	Initial_comm_characteristics	Req.	BYTE	16# 01	Group 1 / Group 2
7	Get	Produced_connection_size	Req.	UINT	4, 6, or 8	Size of data produced
8	Get	Consumed_connection_size	Req.	UINT	0	Size of data consumed
9	Get/Set	Expected_packet_rate	Req.	UINT	—	Exchange frequency (ms)
12	Get/Set	Watchdog_timeout_action	Req.	USINT	0, 1, or 2 (2)	0: Transition to TimeOut 1: Auto-Delete 2: Auto-Reset
13	Get	Produced_connection_path_length	Req.	UINT	8	Default: 8 bytes
14	Get/Set (1)	Produced_connection_path	Req.	Array of UINT	16# 20 04 24 46 30 03 16# 20 04 24 47 30 03 16# 20 04 24 48 30 03 16# 20 04 24 49 30 03 16# 20 04 24 65 30 03 16# 20 04 24 68 30 03 16# 20 04 24 69 30 03	Input assembly (Default : Instance 101, 16# 20 04 24 65 30 03)
15	Get	Consumed_connection_path_length	Req.	UINT	8	Default: 8 bytes
16	Get/Set (1)	Consumed_connection_path	Req.	Array of UINT	16# 20 2B 24 01 30 03	Output assembly: The first and only one instance of the Acknowledge handler object (Class ID 16#2B)
17	Get/Set	Production_inhibit_time	Cond.	UINT	0	Minimum time between 2 data productions. Undefined

(1) Assembly assignment should not be modified in a running application.
If you Set any one of the values displayed in the "Value" column, it will be saved in EEPROM and then used at each power-up.
Any other value will not be saved.

(2) To ensure a DeviceNet fault (and by default [Network fault] (CnF)) in case of time out, configure "Polled I/O".

11. DeviceNet objects

Class service

Service code	Service name	Need	Description
16#08	Create	Opt.	Instantiation of a connection
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute
16#05	Reset	Opt.	Reset Inactivity/Watchdog timer

11. 7. Motor data object

The Motor data object acts as a motor parameter database.

Class code

Hexadecimal	Decimal
16#28	40

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max instance	Opt.	UINT	1	—
6	Get	Max ID number of class attribute	Opt.	UINT	7	—
7	Get	Max ID number of instance attribute	Opt.	UINT	15	—

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
3	Get/Set	MotorType	Req.	USINT	7	6 = Wound rotor induction motor 7 = Squirrel cage induction motor
6	Get/Set	RatedCurrent	Req.	UINT	Depends on the drive rating	[Rated mot. current] (nCr)
7	Get/Set	RatedVoltage	Req.	UINT	Depends on the drive rating	[Rated mot. volt.] (UnS)
9	Get/Set	RatedFreq	Opt.	UINT	50/60	[Rated motor freq.] (FrS)
15	Get/Set	BaseSpeed	Opt.	UINT	Depends on the drive rating	[Nom motor speed] (nSP)

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute

11. 8. Control supervisor object

The Control supervisor object models the functions for managing all devices within the hierarchy of motor control devices.

Class code

Hexadecimal	Decimal
16#29	41

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	2	—
2	Get	Max instance	Opt.	UINT	1	—
6	Get	Max ID number of class attribute	Opt.	UINT	7	—
7	Get	Max ID number of instance attribute	Opt.	UINT	17	—

Instance attributes

Attribute ID	Access	Name	Need	Data type	Details
3	Get/Set	Run Fwd	Req.	BOOL	On an edge (0 ➞1)
4	Get/Set	Run Rev	Opt.	BOOL	On an edge (0 ➞1)
5	Get/Set	NetCtrl	Opt.	BOOL	0: Local Control (Channel 1) 1: Network Control (default)
6	Get	State	Opt.	USINT	0 = Vendor Specific, 1 = Startup, 2 = Not_Ready, 3 = Ready, 4 = Enabled, 5 = Stopping, 6 = Fault_Stop, 7 = Faulted
7	Get	Running Fwd	Req.	BOOL	
8	Get	Running Rev	Opt.	BOOL	
9	Get	Ready	Opt.	BOOL	
10	Get	Faulted	Req.	BOOL	
12	Get/Set	FaultRst	Req.	BOOL	Fault reset (0 ➞1)
13	Get	FaultCode	Opt.	UINT	Refer to the Communication parameters manual: DSP402 fault code (Errd)
15	Get	CtrlFromNet	Opt.	BOOL	0 = Local Control; 1 = Network Control
16	Get/Set	DNFaultMode	Opt.	USINT	Action on loss of DeviceNet command: 0 = DeviceNet fault; 1 = Ignored
17	Get/Set	ForceFault/Trip	Opt.	BOOL	Force a DeviceNet fault (0 ➞1)

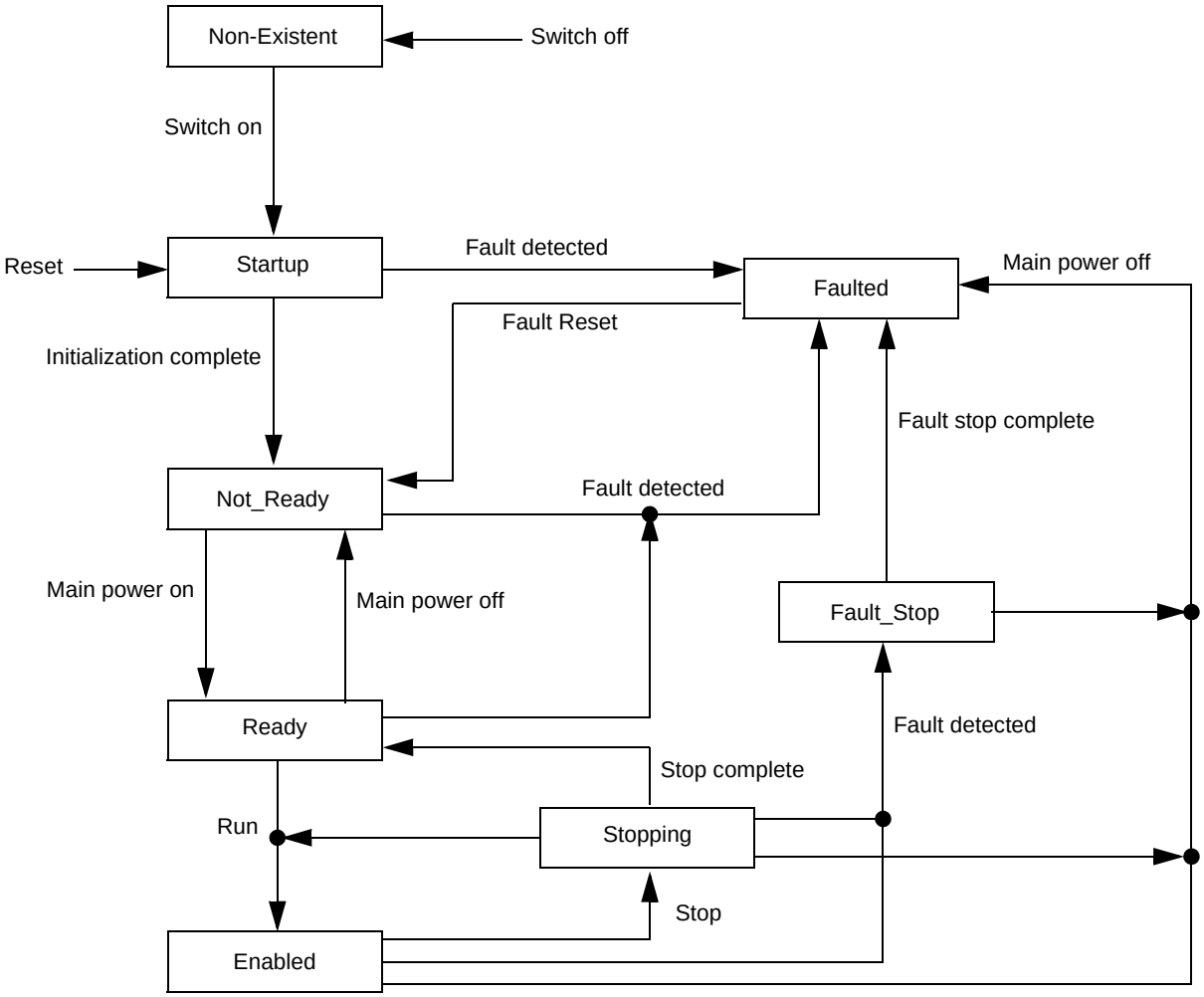
Class service

Service Code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service Code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Req.	Write an attribute
16#05	Reset	Req.	Drive reset

Control supervisor state transition diagram



11. 9. AC/DC Drive Object

The AC/DC Drive object models the functions (such as torque control and speed ramp) that are specific to drives.

Class code

Hexadecimal	Decimal
16#2A	42

Class attributes

Attribute ID	Access	Name	Need	Data Type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max instance	Opt.	UINT	1	—
6	Get	Max ID number of class attribute	Opt.	UINT	7	—
7	Get	Max ID number of instance attribute	Opt.	UINT	21	—

Instance attributes

Attribute ID	Access	Name	Need	Data type	Details
3	Get	AtReference	Opt.	BOOL	
4	Get/Set	NetRef (1)	Req.	BOOL	0: Local speed setpoint (AI1 or AI2) 1: Speed setpoint via the network
5	Get/Set	NetProc	Opt.	BOOL	Not handled
6	Get/Set	Drive mode	Req.	USINT	1: Open loop 2: Closed loop (FVC)
7	Get	SpeedActual	Req.	INT	Output speed (rFrd)
8	Get/Set	SpeedRef	Req.	INT	Speed setpoint (LFrd)
9	Get	CurrentActual	Opt.	INT	Motor current (LCr)
10	Get/Set	CurrentLimit	Opt.	INT	[Mot. therm. current] (ItH)
11	Get	TorqueActual	Opt.	INT	Output torque (Otrn)
12	Get/Set	TorqueRef	Opt.	INT	Torque setpoint (LtCr)
18	Get/Set	AccelTime	Opt.	UINT	Acceleration time (ACCd)
19	Get/Set	DecelTime	Opt.	UINT	Deceleration time (dECd)
20	Get/Set	LowSpdLimit	Opt.	UINT	Parameter [Low speed] (LSP) converted in RPM
21	Get/Set	HighSpdLimit	Opt.	UINT	Parameter [High speed] (HSP) converted in RPM

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute

11. 10. Acknowledge handler object

The acknowledge handler object directs the acknowledgment of messages received.

Class code

Hexadecimal	Decimal
16#2B	43

Class attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get	Revision	Opt.	UINT	1	—
2	Get	Max instance	Opt.	UINT	1	—

Instance attributes

Attribute ID	Access	Name	Need	Data type	Value	Details
1	Get/Set	Acknowledge timer	Req.	UINT	16	Default: 16 ms
2	Get/Set	Retry limit	Req.	USINT	1	—
3	Get/Set	COS producing connection instance	Req.	UINT	4	Assembly

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Req.	Write an attribute

11. 11. Application objects

Class code

Hexadecimal	Decimal
16#70 to 16#A8	112 to 424

Altivar parameters path

The Altivar parameters are grouped in classes.
Each application class has only 1 instance.
Each instance groups 200 parameters.
Each attribute in an instance relates to a parameter.

The first parameter registered in the first application class (class code: 16#70 = 112) has the logical address 3000.

Examples:

Logical address	Path Hexadecimal	Path decimal
3 000	16# 70 / 01 / 01	112 / 1 / 1
3 100	16# 70 / 01 / 65	112 / 1 / 101
3 200	16# 71 / 01 / 01	113 / 1 / 1
64 318	16# A2 / 1 / 77	418 / 1 / 119

Refer to the Communication parameters manual.

Class attributes

Attribute ID	Access	Name	Need	Data type	Value
1	Get	Revision	Opt.	UINT	1
2	Get	Max instance	Opt.	UINT	1
6	Get	Max ID number of class attribute	Opt.	UINT	7
7	Get	Max ID number of instance attribute	Opt.	UINT	X

Instance attributes

Attribute ID	Access	Name	Data type	Value
1	Get/Set	First parameter of the class	UINT / USINT	Value returned by the drive
...	...	...	...	...
X	Get/Set	Last parameter of the class	UINT / USINT	Value returned by the drive

Note: Depending on the parameter, write access may be prohibited. Refer to the Communication parameters manual for more information.

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instances service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
116#0	Set_Attribute_Single	Opt.	Write an attribute

11. DeviceNet objects

11. 12. DeviceNet interface object

Class code

Hexadecimal	Decimal
16#64	100

Class attributes

Attribute ID	Access	Name	Need	Data type	Value
1	Get	Revision	Opt.	UINT	1
2	Get	Max instance	Opt.	UINT	1
6	Get	Max ID number of class attribute	Opt.	UINT	7
7	Get	Max ID number of instance attribute	Opt.	UINT	9

Instances attributes

Attribue ID	Access	Name	Data type	Details
1	Get/Set (1)	Polling production instance assembly	USINT	0 : instance 70 1 : instance 71 2 : instance 104 3 : instance 105 4 : instance 72 5 : instance 73 6 : instance 101 (default)
2	Get/Set (1)	Polling consumption instance assembly	USINT	0 : instance 20 1 : instance 21 2 : instance 103 3 : instance 22 4 : instance 23 5 : instance 100 (default)
3	Get/Set (1)	Change of state/Cyclic production instance assembly	USINT	0 : instance 70 1 : instance 71 2 : instance 104 3 : instance 105 4 : instance 72 5 : instance 73 6 : instance 101 (default)
4	Get	[Network fault] (CnF)	USINT	0 : no fault 1 : user forced fault 2 : duplicate Node Address 3 : CAN FIFO RX Error 4 : CAN FIFO TX Error 5 : CAN OverRun 6 : CAN send Error 7 : CAN Bus Off 8 : Control Time Out 9 : Acknowledge Error 10 : see page 40
5	Get	Software revision of the DeviceNet card	UINT	Ex : 16# 1109 = V1.1ie09
6	Get/Set	Attribute of first extended monitoring parameter (input assembly 105)	USINT	0 : not configured
7	Get/Set	Attibute of second extended monitoring parameter (input assembly 105)	USINT	
8	Get/Set	Class of first extended monitoring parameter (input assembly 105)	USINT	0 : not configured
9	Get/Set	Class of second extended monitoring parameter (input assembly 105)	USINT	

(1) Any Set access to one of these parameters triggers the save in EEPROM for future use. In addition, the new value is immediately applied to the drive if the corresponding Connection Object (Polled I/O Message or Change of State/Cyclic Message, i.e. Class ID 16#80 Instance #2 or #4) is not in "Established" state. Otherwise, the drive must be restarted to apply the new value.

11. DeviceNet objects

Class service

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute

Instance services

Service code	Service name	Need	Description
16#0E	Get_Attribute_Single	Req.	Read an attribute
16#10	Set_Attribute_Single	Opt.	Write an attribute