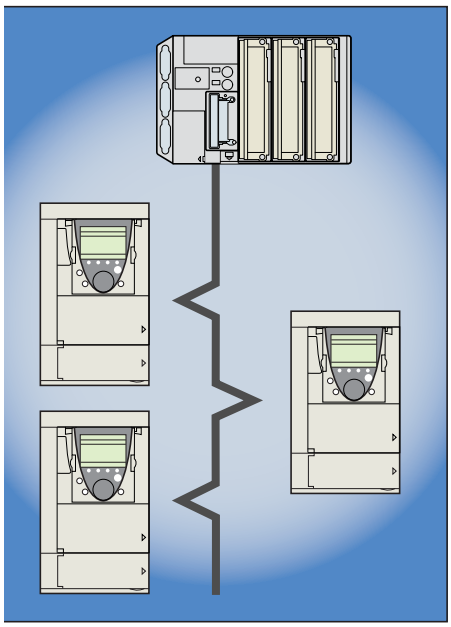
Altivar 71

Modbus Plus card

User's manual

VW3 A3 302

11/2010



1755869

www.schneider-electric.com

Schneider Electric

Contents

1. Before you begin 3
2. Documentation structure 4
3. Introduction 5
   3. 1. Presentation 5
   3. 2. Notation 5
4. Hardware setup 6
   4. 1. Receipt 6
   4. 2. Hardware description 6
   4. 3. Installing the card in the drive 6
   4. 4. Configuring the switches 7
5. Connecting to the network 8
   5. 1. Connector pinout 8
   5. 2. Connection accessories 8
   5. 3. Modbus Plus wiring system 9
6. Modbus Plus menu 11
   6. 1. Access via graphic display terminal 11
   6. 2. Access via the integrated display terminal 11
   6. 3. Modbus Plus parameters 12
7. Configuration 13
   7. 1. Communication parameters 13
   7. 2. Control - Signaling 14
   7. 3. Communication scanner 17
   7. 4. Communication faults 19
   7. 5. Monitored parameters 20
8. Diagnostics 21
   8. 1. Checking the address 21
   8. 2. LEDs 21
   8. 3. Control - Signaling 22
   8. 4. Communication scanner 23
   8. 5. Communication fault 24
8. 6. Card fault 24

NOTE

While every precaution has been taken in the preparation of this document, Schneider Electric SA assumes no liability for any omissions or errors it may contain, nor for any damages resulting from the application or use of the information herein.

The products and options 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 boards, 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 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 display terminal (integrated display terminal and graphic display terminal)

■ 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 display terminal or the graphic display terminal
- 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 Modbus Plus communication card (catalog number VW3 A3 302) is used to connect an Altivar 71 drive to a Modbus Plus network.

The data exchanges permit full drive functionality:

- PeerCop control and adjustment
- Monitoring using the Global Data service
- Configuration, adjustment and diagnostics using the Modbus message handling service

If the Peer Cop service is not used for control, the drive can be controlled using the Modbus message handling service.

The card has a 9-way female SUB-D connector for connection to the Modbus Plus network.

The address of the drive is configured using the switches on the card.

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

The cable and accessories for connection to the Modbus Plus network must be ordered separately.

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

In this manual:
- Hexadecimal values are written as follows: 16#
- Binary values are written as follows: 2#

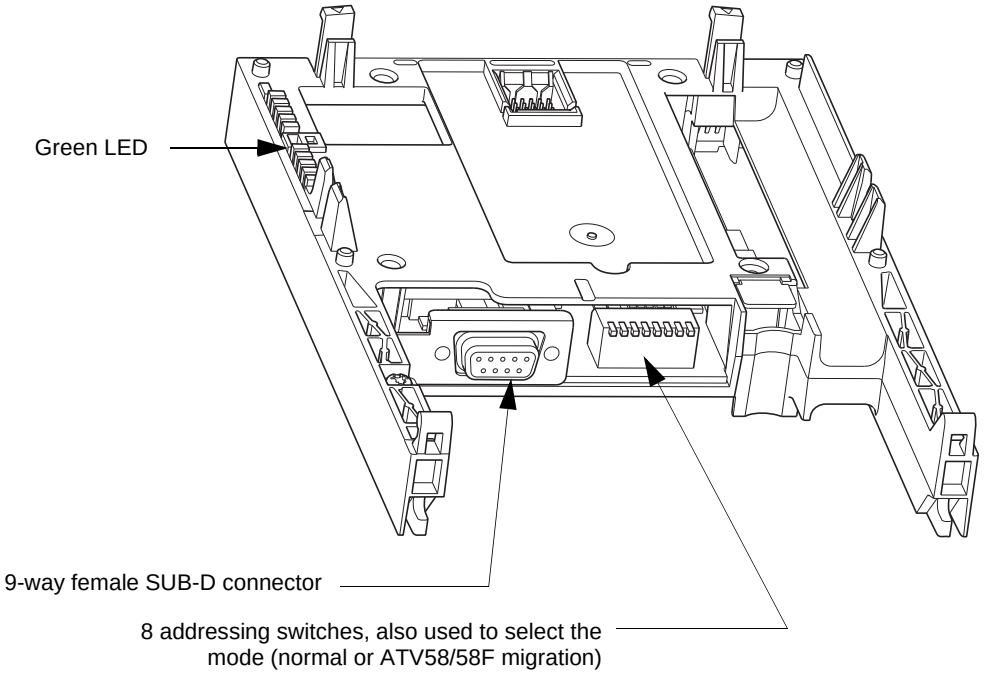
4. Hardware setup

4. 1. Receipt

Check that the card catalog number marked 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.

4. 2. Hardware description



4. 3. Installing the card in the drive

See the Installation Manual.

4. 4. Configuring the switches

The switches are used to configure the mode (normal or Altivar 58/58F migration) and the address on the network.

The correspondence between the drive and the position of the switch is as follows:
- 0 = OFF = Switch in upper position
- 1 = ON = Switch in lower position

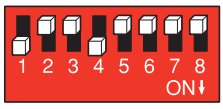
The switch on the right-hand side is used to configure the Modbus Plus card mode:
- 0 = OFF = normal mode
- 1 = ON = Altivar 58/58F migration mode

This manual only describes normal mode.
To find out about Altivar 58 migration mode, refer to the Altivar 58/58F Migration Manual.

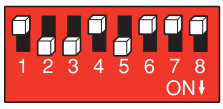
The table below indicates the positions of the switches for all configurable addresses (1 to 64) in normal mode:

Address	Switches	Address	Switches	Address	Switches	Address	Switches
1	0000 0000	17	0000 1000	33	0000 0100	49	0000 1100
2	1000 0000	18	1000 1000	34	1000 0100	50	1000 1100
3	0100 0000	19	0100 1000	35	0100 0100	51	0100 1100
4	1100 0000	20	1100 1000	36	1100 0100	52	1100 1100
5	0010 0000	21	0010 1000	37	0010 0100	53	0010 1100
6	1010 0000	22	1010 1000	38	1010 0100	54	1010 1100
7	0110 0000	23	0110 1000	39	0110 0100	55	0110 1100
8	1110 0000	24	1110 1000	40	1110 0100	56	1110 1100
9	0001 0000	25	0001 1000	41	0001 0100	57	0001 1100
10	1001 0000	26	1001 1000	42	1001 0100	58	1001 1100
11	0101 0000	27	0101 1000	43	0101 0100	59	0101 1100
12	1101 0000	28	1101 1000	44	1101 0100	60	1101 1100
13	0011 0000	29	0011 1000	45	0011 0100	61	0011 1100
14	1011 0000	30	1011 1000	46	1011 0100	62	1011 1100
15	0111 0000	31	0111 1000	47	0111 0100	63	0111 1100
16	1111 0000	32	1111 1000	48	1111 0100	64	1111 1100

Examples:



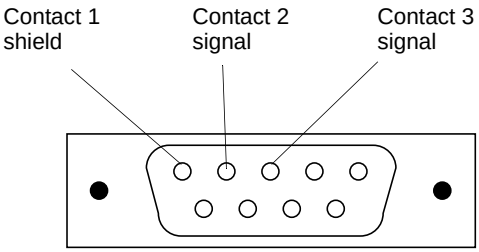
Address 10



Address 23

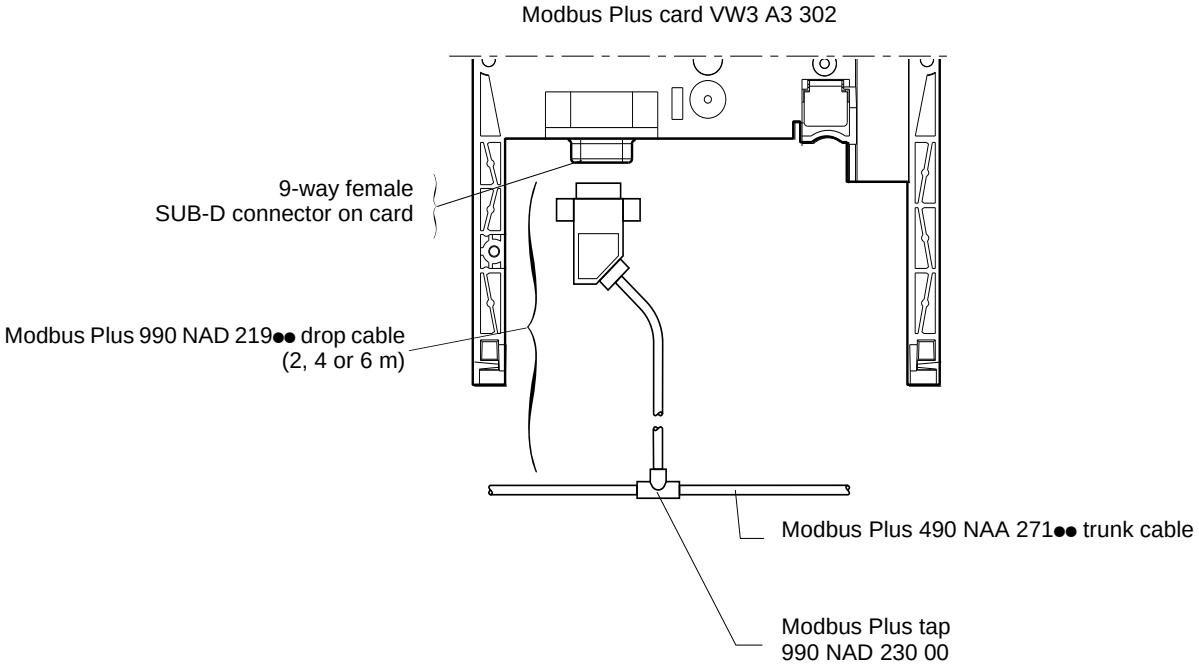
5. Connecting to the network

5. 1. Connector pinout



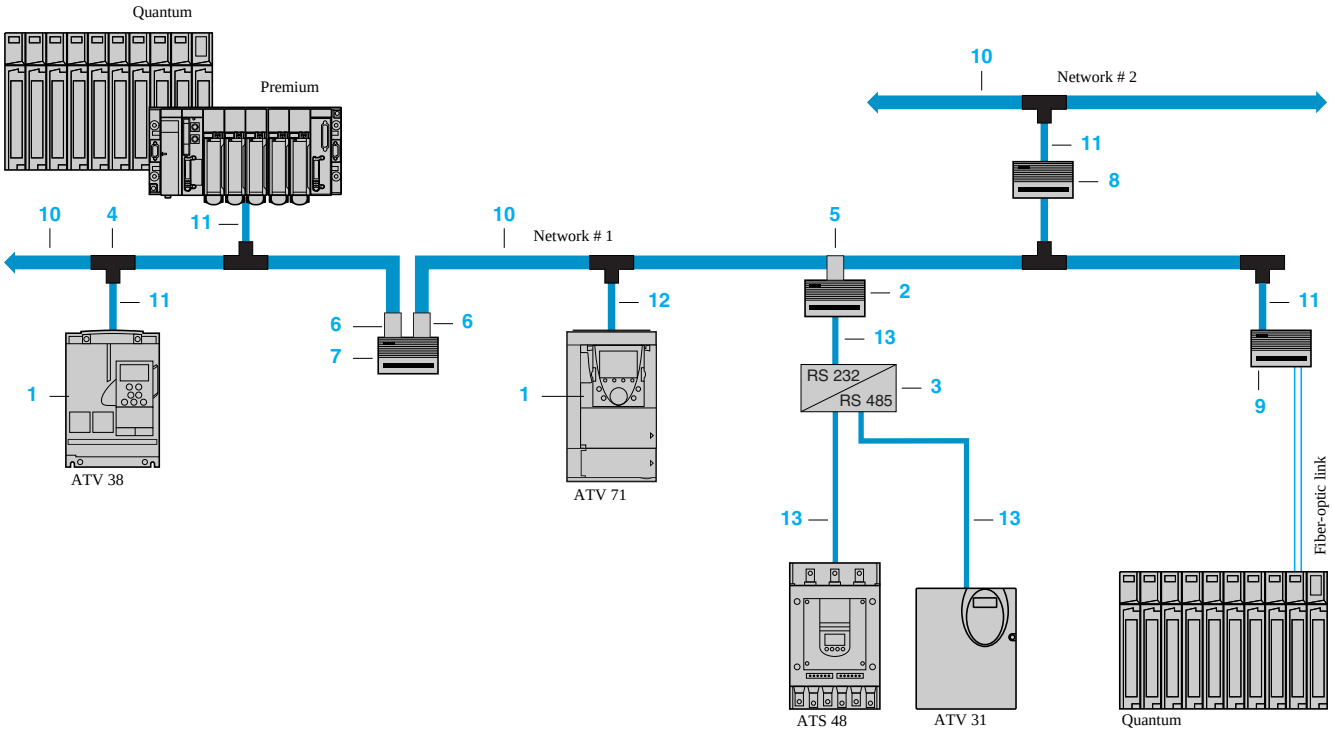
9-way female SUB-D connector

5. 2. Connection accessories



5. Connecting to the network

5. 3. Modbus Plus wiring system



■ Cards and gateways

Description	Used with	Reference number	Catalog number
Communication cards	ATV 38	1	**VW3 A58 302**
	ATV 71	1	**VW3 A3 302**
Modbus Plus/Modbus Gateway 4 x RS 232 ports 115Ö220 V ~ power supply	ATS 48, ATV 31	2	**NW BM85000**
RS 232/RS 485 interface 24 V ⎓, 20 mA power supply (1)	ATS 48, ATV 31	3	**XGS Z24**

■ Connection accessories

Description	Used with	Reference number	Catalog number
Modbus Plus tap (IP 20)	For connecting via a tap junction	4	**990 NAD 230 00**
Modbus Plus in-line connector	Gateway, bridge and repeater	5	**AS MBKT 085**
Connector with Modbus Plus terminator (sold in lots of 2)	Bridge and repeater	6	**AS MBKT 185**
Modbus Plus electrical repeater extension for 64 subscribers	Extension beyond 450 m	7	**NW RR85 001**
Modbus Plus bridge with 4 ports	Connection of 4 networks maximum	8	**NW BP85 002**
Line/station fiber-optic repeater	–	9	**490 NRP 254 00**
Point-to-point fiber-optic repeater	Used to connect an electrical segment to the fiber-optic segment (3000 m maximum)	_	**NW NRP 253 00**
Wiring tool	Mounting trunk and drop cables in a 990 NAD 230 00 tap	–	**043 509 383**

(1) Please consult our specialist “Interfaces, I/O splitter boxes and power supplies” catalog.

5. Connecting to the network

■ Cables

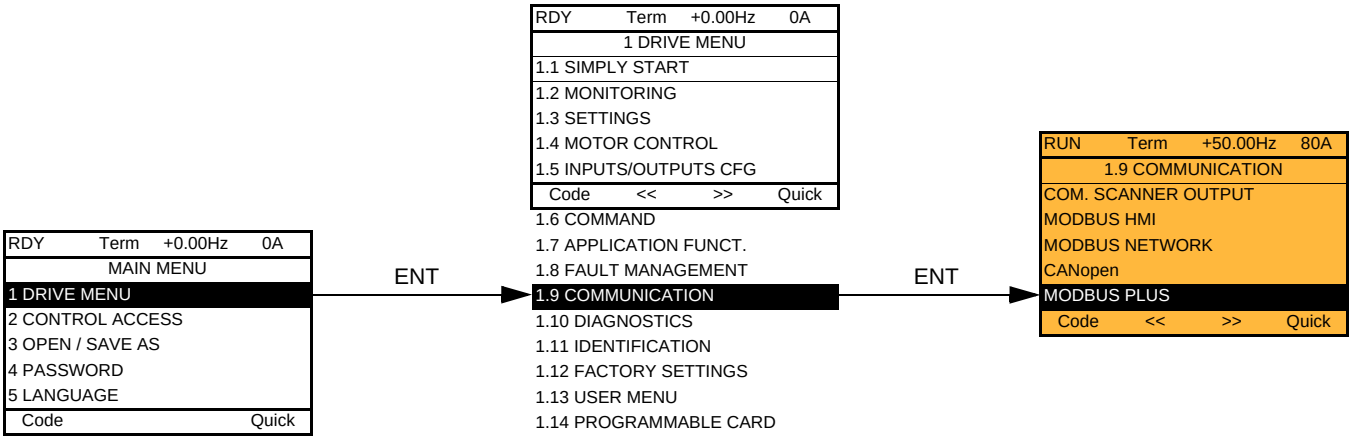
Description	Used with		Reference number	Length m	Catalog number
	From	To			
Modbus Plus trunk cables	Modbus Plus tap 990 NAD 230 00	Modbus Plus tap 990 NAD 230 00, Modbus Plus in-line connector AS MBKT 085, connector with Modbus Plus terminator AS MBKT 185	10	30.5	490 NAA 271 01
				152.5	490 NAA 271 02
				305	490 NAA 271 03
				457	490 NAA 271 04
				1525	490 NAA 271 06
Drop cables 1 x 9-way female SUB-D connector and 1 x stripped end	ATV 38 (+ VW3 A58 302 communication card), Premium/ Quantum PLCs, NW BP85 002 Modbus Plus bridge with 4 ports, 490 NRP 253 00 line/station fiber-optic repeater	Modbus Plus tap 990 NAD 230 00	11	2.4	990 NAD 211 10
				6	990 NAD 211 30
	ATV 71 (+ VW3 A3 302 communication card)	Modbus Plus tap 990 NAD 230 00	12	2.4	990 NAD 219 10
				6	990 NAD 219 30
Cable for Modbus 1 x RJ45 contact and 1 x stripped end	ATS 48, ATV 31, NW BM85000 Modbus Plus/Modbus gateway	RS 232/RS 485 interface	13	3	VW3 A8 306 D30

To order other connection elements, please consult our specialist "Automation platform Modicon Premium and Unity - PL7 software" and "Automation platform Modicon Quantum" catalogs.

6. Modbus Plus menu

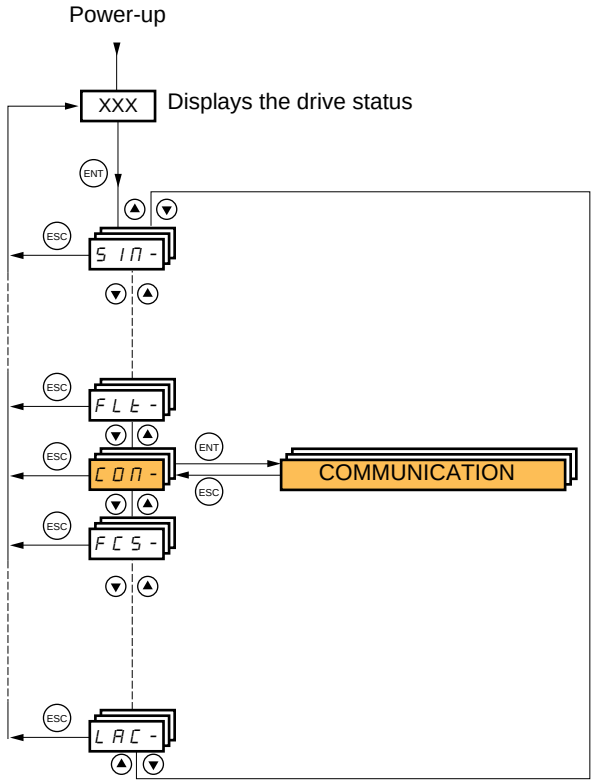
6. 1. Access via graphic display terminal

The [MODBUS PLUS] submenu is used to configure and display the parameters of the Modbus Plus card and can be accessed via the [1.9 - COMMUNICATION] menu.



6. 2. Access via the integrated display terminal

The (nbP-) submenu is used to configure and display the Modbus Plus card parameters and can be accessed via the (COM-) menu.



6. Modbus Plus menu

6. 3. Modbus Plus parameters

Code	Description
(AdrC)	❑ **[Address]** **Modbus Plus address** Type: Display (read-only) Possible values: 1 ... 64 This parameter can be used solely to read back the value coded on the switches on the Modbus Plus card.
(tLP)	❑ **[Network time out]** **Communication monitoring time out** Type: Configuration (read and write) Possible values: 0.1 ... 60 s Default value: 10 s Unit: 0.1 s The value of this parameter must be greater than: • The maximum time that elapses without a token being received • The maximum time between two Peer Cop receptions
(PrC)	❑ **[Peer Cop]** **Enable Peer Cop service** Type: Configuration (read and write) Possible values: • [No] (nO) : Peer Cop service disabled • [Yes] (YES) : Peer Cop service enabled Default value: [No] (nO)
(rEG)	❑ **[Number of registers]** **Number of registers for the Peer Cop service** Type: Configuration (read and write) Possible values: 0 ... 32 In normal mode, values between 9 and 32 are meaningless. Default value: 0
(GLb)	❑ **[Global Tx]** **Number of registers for the Global Data service** Type: Configuration (read and write) Possible values: 0 ... 32 In normal mode, values between 9 and 32 are meaningless. Default value: 0
(Cdn)	❑ **[Command station]** **Address of the Modbus Plus station authorized to control the drive** Type: Configuration (read and write) Possible values: • 0: The drive will ignore Peer Cop services. • 1 ... 64: Address of the Modbus Plus station authorized to control the drive using Peer Cop. Default value: 0

7. Configuration

7. 1. Communication parameters

■ Peer Cop

Peer Cop parameters are used as periodic output variables on the PLC controlling the drive.

To configure Peer Cop parameters, you must first know the number of periodic control and adjustment variables required for the application (maximum: 8).

Configure the following parameters in the [1.9 - COMMUNICATION] (COM-) menu, [MODBUS PLUS] (MbP-) submenu:

[Peer Cop] (PrC)	: [Yes] (YES)
[Number of registers] (rEG)	: Number of Peer Cop control and adjustment variables
[Command station] (Cdn)	: PLC's Modbus Plus address

If only the drive is monitored, [Peer Cop] (PrC) will be set to the factory value [No] (nO).

■ Global Data

Global Data parameters are used as periodic input variables on the PLC controlling the drive.

To configure Global Data parameters, you must first know the number of periodic monitoring variables required for the application (maximum: 8).

Configure the following parameters in the [1.9 - COMMUNICATION] (COM-) menu, [MODBUS PLUS] (MbP-) submenu:

[Global Tx] (GLb)	: Number of Global Data monitoring variables

Note: These configurations are taken into account immediately by the drive (the power supply does not have to be disconnected).

7. Configuration

7. 2. Control - Signaling

Numerous configurations are possible. For more information, refer to the Programming Manual and the Parameters Manual.
The following configurations are just some of the possibilities available.

■ Control via Modbus Plus in I/O profile

The command and reference come from Modbus Plus.
The command is in I/O profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	I/O profile	The run command is obtained simply by bit 0 of the control word.
Reference 1 configuration	Network card	The reference comes from Modbus Plus.
Command 1 configuration	Network card	The command comes from Modbus Plus.

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 Modbus Plus or the terminals in I/O profile

Both the command and reference come from Modbus Plus or the terminals. Input LI5 at the terminals is used to switch between Modbus Plus and the terminals.
The command is in I/O profile.

Configure the following parameters:

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

Note: Target 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 channel] (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 channel] (Fr1b)	[Ref. AI1] (AI1)
	[Ref 1B switching] (rCb)	[LI5] (LI5)

■ Control via Modbus Plus in Drivecom profile

The command and reference come from Modbus Plus.
The command is in Drivecom profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	Drivecom profile not separate	The run commands are in Drivecom profile, the command and the reference come from the same channel.
Reference 1 configuration	Network card	The command comes from Modbus Plus.

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

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	[Profile] (CHCF)	[Not separ.] (SIM) (factory setting)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)

■ Control via Modbus Plus or the terminals in Drivecom profile

Both the command and reference come from Modbus Plus or the terminals. Input LI5 at the terminals is used to switch between Modbus Plus and the terminals.
The command is in Drivecom profile.

Configure the following parameters:

Parameter	Value	Comment
Profile	Drivecom profile not separate	The run commands are in Drivecom profile, the command and the reference come from the same channel.
Reference 1 configuration	Network card	Reference 1 comes from Modbus Plus.
Reference 2 configuration	Analog input 1 on the terminals	Reference 2 comes from input AI1 on the terminals.
Reference switching	Input LI5	Input LI5 switches the reference (1 ↔ 2) and the command.

Note: Reference 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)	[Not separ.] (SIM)
	[Ref.1 channel] (Fr1)	[Com. card] (nEt)
	[Ref.2 chan] (Fr2)	[Ref. AI1] (AI1)
	[Ref. 2 switching] (rFC)	[LI5] (LI5)

■ Control in Drivecom profile via Modbus Plus and reference switching at the terminals

The command comes from Modbus.
The reference comes either from Modbus Plus or from the terminals. Input LI5 at the terminals is used to switch the reference between Modbus Plus and the terminals.
The command is in Drivecom profile.

Configure the following parameters:

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

Note: Target 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)	[Separate] (SEP)
	[Ref.1 channel] (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 channel] (Fr1b)	[Ref. AI1] (AI1)
	[Ref 1B switching] (rCb)	[LI5] (LI5)

7. 3. Communication scanner

The variables exchanged by the Peer Cop and Global Data services are selected by configuring the communication scanner.

The 8 Peer Cop periodic output variables are assigned by means of the 8 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 8 Global Data periodic input variables are assigned by means of the 8 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 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 16 assignment parameters are described in the tables below:

Parameter name	Output variable	Default assignment
[Scan. Out1 address] (nCA1)	Peer Cop 1	Control word (CMd)
[Scan. Out2 address] (nCA2)	Peer Cop 2	Speed reference (LFrd)
[Scan. Out3 address] (nCA3)	Peer Cop 3	Not used
[Scan. Out4 address] (nCA4)	Peer Cop 4	Not used
[Scan. Out5 address] (nCA5)	Peer Cop 5	Not used
[Scan. Out6 address] (nCA6)	Peer Cop 6	Not used
[Scan. Out7 address] (nCA7)	Peer Cop 7	Not used
[Scan. Out8 address] (nCA8)	Peer Cop 8	Not used

The number of parameters assigned in the Peer Cop variables must be consistent with the [Number of registers] (rEG) parameter.

Parameter name	Input variable	Default assignment
[Scan. IN1 address] (nMA1)	Global Data 1	Status word (EtA)
[Scan. IN2 address] (nMA2)	Global Data 2	Output speed (rFrd)
[Scan. IN3 address] (nMA3)	Global Data 3	Not used
[Scan. IN4 address] (nMA4)	Global Data 4	Not used
[Scan. IN5 address] (nMA5)	Global Data 5	Not used
[Scan. IN6 address] (nMA6)	Global Data 6	Not used
[Scan. IN7 address] (nMA7)	Global Data 7	Not used
[Scan. IN8 address] (nMA8)	Global Data 8	Not used

The number of parameters assigned in the Global Data variables must be consistent with the [Global Tx] (GLb) parameter.

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.

Example of Peer Cop and Global Data configuration

The following periodic Peer Cop et Global Data variables are to be configured:

Output variable	Parameter assigned
Peer Cop 1	Control word (CMd)
Peer Cop 2	Speed reference (LFrd)
Peer Cop 3	Acceleration (ACC)
Peer Cop 4	Deceleration (dEC)
Peer Cop 5	_
Peer Cop 6	_
Peer Cop 7	_
Peer Cop 8	_

Input variable	Parameter assigned
Global Data 1	Status word (EtA)
Global Data 2	Output speed (rFrd)
Global Data 3	Speed reference before ramp (FrHd)
Global Data 4	Logic input map (IL1r)
Global Data 5	Physical image of analog input 1 (AI1C)
Global Data 6	Physical image of analog input 2 (AI2C)
Global Data 7	_
Global Data 8	_

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
[Scan. Out5 address] (nCA5)	0
[Scan. Out6 address] (nCA6)	0
[Scan. Out7 address] (nCA7)	0
[Scan. Out8 address] (nCA8)	0

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
[Scan. IN5 address] (nMA5)	5242
[Scan. IN6 address] (nMA6)	5243
[Scan. IN7 address] (nMA7)	0
[Scan. IN8 address] (nMA8)	0

[Peer Cop] (PrC) = [Yes] (YES)

[Number of registers] (rEG) = 4 (5, 6, 7 or 8 are also possible)

[Global Tx] (GLb) = 6 (7 and 8 are also possible)

[Command station] (Cdn) = PLC address

7. 4. Communication faults

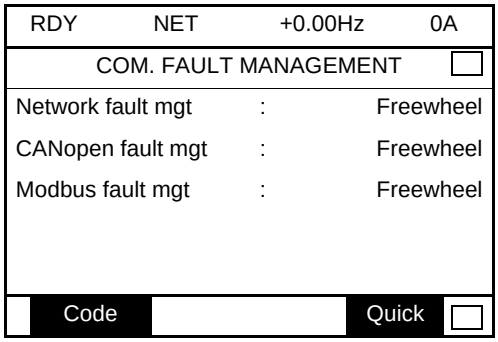
If the drive does not detect any traffic on the network for a predefined period of time (time out), a Modbus Plus fault is triggered.

The card interprets the following as losses of activity:
- No token passing
- No Peer Cop update
- No Modbus messages

The "time out" can be set between 0.1 s and 60 s in the [Network time out] (tLP) parameter in the [1.9 COMMUNICATION] (COM-) menu ([MODBUS PLUS] (MbP-) submenu) on the graphic display terminal or integrated display terminal. The default value is 10 s.

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

Configuration can be performed using the graphic display terminal or integrated display terminal via the [Network fault mgt] (CLL) parameter in the [1.8 – FAULT MANAGEMENT] (FLt-) menu ([COM. FAULT MANAGEMENT] (CLL-) submenu)..



The values of the [Network fault mgt] (CLL) parameter, 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) parameter, 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. 5. 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]

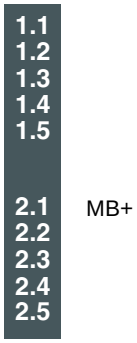
8. Diagnostics

8. 1. Checking the address

On the graphic display terminal or integrated display terminal, check the address using the [Address] (AdrC) parameter in the [1.9 - COMMUNICATION] (COM-) menu, [MODBUS PLUS] (MbP-) submenu.

8. 2. LEDs

The Modbus Plus card features one LED in position 2.1, which is visible through the drive cover.

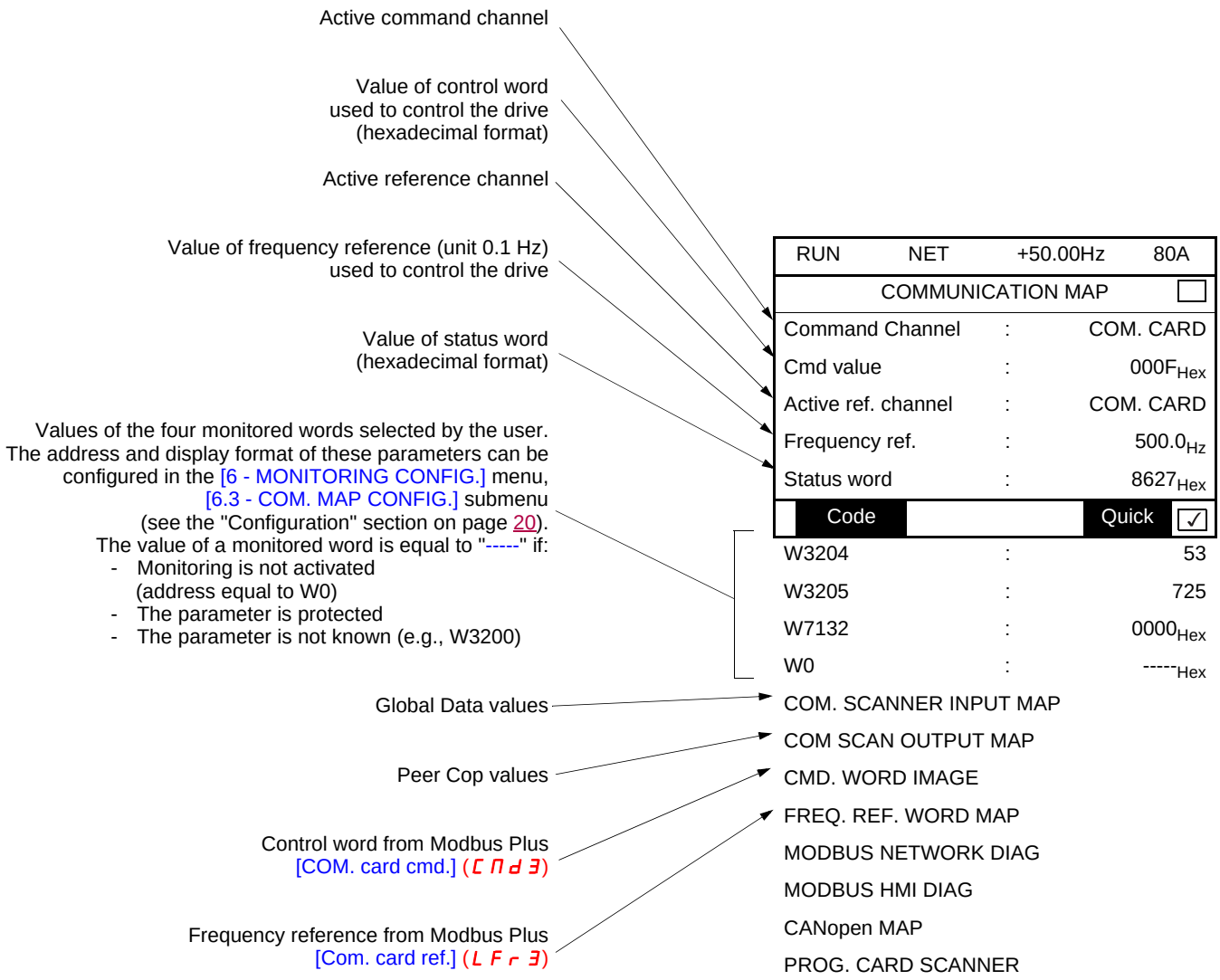


The following table gives the meaning of the various states of the LED:

State of LED 2.1	Meaning
Off	Internal problem on the Modbus Plus card triggering an [internal com. link] (ILF) fault.
Flashing slowly (1 flash/second)	**MONITOR LINK** On power-up or on exiting "4 flashes followed by a pause" mode, the card monitors the network and builds a table of nodes that are active and in receipt of a token. After 8 seconds, the card will try to switch to normal mode state (indicated by 6 flashes/second).
Flashing quickly (6 flashes/second)	**TOKEN OK** The token is circulating normally and the card is receiving it once per rotation.
2 flashes followed by a pause	**NEVER GETTING TOKEN** The token is being circulated via other nodes without ever being received by the card.
3 flashes followed by a pause	**SOLE STATION** The network only comprises one node or the link has been lost.
4 flashes followed by a pause	**DUPLICATE STATION** Another node is using the card's address. This node is waiting to be reconfigured or waiting for the other node to be disconnected from the network.

8. 3. Control - Signaling

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 Modbus Plus PLC:



8. 4. 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 Global Data parameters: 8 communication scanner input parameters [Com Scan In● val.] (NM●).
- The [COM SCAN OUTPUT MAP] (OSA -) submenu is used to display the value of the Peer Cop parameters: 8 communication scanner output parameters [Com Scan Out● val.] (NC●).

Input variable	Scanner parameter
Global Data 1	[Com Scan In1 val.] (NM1)
Global Data 2	[Com Scan In2 val.] (NM2)
Global Data 3	[Com Scan In3 val.] (NM3)
Global Data 4	[Com Scan In4 val.] (NM4)
Global Data 5	[Com Scan In5 val.] (NM5)
Global Data 6	[Com Scan In6 val.] (NM6)
Global Data 7	[Com Scan In7 val.] (NM7)
Global Data 8	[Com Scan In8 val.] (NM8)

Output variable	Scanner parameter
Peer Cop 1	[Com Scan Out1 val.] (NC1)
Peer Cop 2	[Com Scan Out2 val.] (NC2)
Peer Cop 3	[Com Scan Out3 val.] (NC3)
Peer Cop 4	[Com Scan Out4 val.] (NC4)
Peer Cop 5	[Com Scan Out5 val.] (NC5)
Peer Cop 6	[Com Scan Out6 val.] (NC6)
Peer Cop 7	[Com Scan Out7 val.] (NC7)
Peer Cop 8	[Com Scan Out8 val.] (NC8)

Configuration of these periodic 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

8. 5. Communication fault

Modbus Plus faults are indicated by the LED on the Modbus Plus card.

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

The 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 Modbus Plus.
- Then, if a communication fault occurs on Modbus Plus, the drive will react according to the configuration (fault, maintain, fallback, etc.).

The response of the drive in the event of a Modbus Plus 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] (AF1-) submenu.

Value	Description of the values of the [Network fault] (CnF) parameter
0	No fault
1	Peer Cop time out
2	Change from run to stop for a PLC sending Peer Cop data
3	Modbus message handling time out

8. 6. Card fault

The [internal com. link] (ILF) fault appears when the following serious problems occur:
- Hardware fault on the Modbus Plus card
- Dialog fault between the Modbus Plus 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] (ILF1) 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 Modbus Plus card can be in position 1 or 2.

The [Internal link fault 1] (ILF1) 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] (AF1-) submenu.

Value	Description of the values of the [Internal link fault 1] (ILF1) 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)