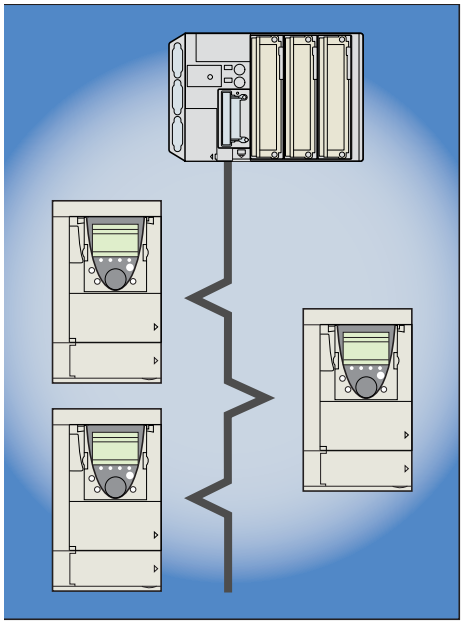
Altivar 71

Communication parameters

User manual

Software V2.7

11/2009



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Contents

Sommaire

Document structure and directions for use

Installation Manual

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

Programming Manual

This manual describes:
- Functions
- Parameters
- How to use the drive's display terminal (integrated display terminal and graphic display terminal)

Communication Parameters Manual

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

It does not include the drive adjustment and configuration parameters, which are contained in the Excel file supplied as an appendix to this manual.

All the parameters are grouped together in an Excel file supplied as an appendix, with the following data:
- Code
- Name
- Addresses: logic, CANopen, INTERBUS, Device Net
- Category
- Read/write access
- Type: signed numerical, unsigned numerical, etc.
- Unit
- Factory setting
- Minimum value
- Maximum value
- Display on the graphic display terminal and the 7-segment integrated display terminal
- Relevant menu

This file offers the option of sorting and arranging the data according to any criterion chosen by the user.

Data relating to operation, interdependences and limits of use are described in the Programming Manual.
The various documents are to be used as follows:
1. For information about the drive and its programming, refer to the Programming Manual.
2. For information about communication and its programming, refer to the Parameters Manual.
3. Use the Parameters file to define any addresses and values of the adjustment and configuration parameters to be modified through communication.

The section entitled "Loading drive parameters" on page 77 describes the recommended procedure for loading parameters through communication.

Modbus, CANopen, Ethernet, Profibus, INTERBUS, Uni-Telway, FIPIO, Modbus Plus and Device Net manuals

These manuals describe:
- Assembly
- Connection to the bus or network
- Diagnostics
- Configuration of the communication-specific parameters via the integrated display terminal or graphic display terminal

They describe the protocol communication services in detail.

"Controller Inside" Manual

This manual describes, for the "Controller Inside" card:
- Assembly
- Connection
- Functions
- Configuration

Documentation structure

Altivar 58/58F Migration Manual

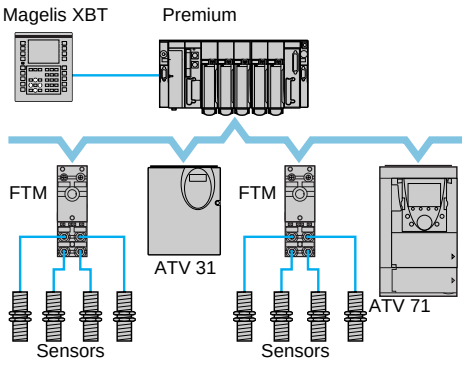
This manual describes the differences between the Altivar 71 and the Altivar 58/58F.
It explains how to replace an Altivar 58 or 58F, including how to replace drives communicating on a bus or network.

Note: This Parameters Manual describes the parameters of the Altivar 71 profiles.
It does not describe the Altivar 58/58F compatibility parameters (SE8 profile).
These are detailed in the Altivar 58/58F Communication Variables Manual and the Migration Manual.

Altivar 78 Migration Manual

This manual describes the differences between the Altivar 71 and the Altivar 78.
It explains how to replace an Altivar 78.

Presentation



Example of configuration on the CANopen bus

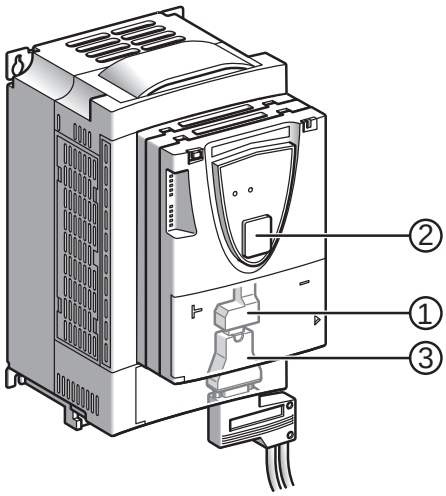
The Altivar 71 drive has been designed to meet all the configuration requirements encountered within the context of industrial communication installations.

It includes Modbus and CANopen communication protocols as standard.

Two integrated communication ports enable direct access to the Modbus protocol:

- One RJ45 Modbus connector port ②, located on the drive front panel, which is used to connect:
  - The remote graphic display terminal
  - A Magelis industrial HMI terminal
  - The PowerSuite software workshop
- One RJ45 Modbus network port ①, located on the drive's control terminals, which is dedicated to control and signaling by a PLC or other type of controller. It can also be used to connect a display terminal or the PowerSuite software workshop.

The CANopen protocol can be accessed from the Modbus network port via the CANopen adapter ③ (1).



The Altivar 71 can also be connected to other networks and industrial communication buses by using one of the communication option cards:

- Ethernet TCP/IP
- Modbus/Uni-Telway. This card provides access to additional functions, which complement those of the integrated ports: Modbus ASCII and 4-wire RS 485
- Fipio
- Modbus Plus
- Profibus DP
- DeviceNet
- INTERBUS
- etc. (Please refer to the catalog)

The control section can be powered separately, thus allowing communication (monitoring, diagnostics) to be maintained even if the power supply section fails.

The main communication functions of Altivar 58 and Altivar 58F drives are compatible with the Altivar 71 (2):
- Connection
- Communication services
- Drive behavior (profile)
- Control and monitoring parameters
- Basic adjustment parameters

The PowerSuite software workshop supports the transfer of configurations from Altivar 58 and Altivar 58F drives to the Altivar 71.

(1) If the CANopen adapter is installed, Modbus will not be available on the network port ①.

(2) Please refer to the ATV 58(F)/ATV 71 Migration Manual supplied on the documentation CD-ROM.

Presentation

All the drive functions are accessible via the network:
- Control
- Monitoring
- Adjustment
- Configuration

If the "Controller Inside" programmable card is installed on the drive, its variables (%MW, etc.) can be accessed via the integrated Modbus ports or the Ethernet option card.

The speed/torque command and reference can come from different sources:
- The I/O terminals
- The communication network
- The "Controller Inside" programmable card
- The remote graphic display terminal
- The PowerSuite software workshop (for commissioning and maintenance)

The Altivar 71 drive's advanced functions can be used to manage switching of these command and reference sources according to application requirements.

The periodic communication variables can be selected via:
- The network configuration software (Sycon, etc.): CANopen, DeviceNet
- The Altivar 71’s communication scanner function: Profibus DP, Fipio, Modbus Plus
- The network's IO Scanner function: Ethernet TCP/IP

With the exception of DeviceNet, regardless of network type, the Altivar 71 can be controlled:
- In accordance with the Drivecom profile (CANopen CiA DSP 402)
- In accordance with the I/O profile, whereby control is as straightforward and flexible as control via the I/O terminals

The DeviceNet card supports the ODVA standard profile.

Communication is monitored according to criteria specific to each protocol. Regardless of protocol type, the reaction of the drive to a communication fault can be configured:
- Drive fault involving: Freewheel stop, stop on ramp, fast stop or braked stop
- Stop without drive fault
- Maintain the last command received
- Fallback position at a predefined speed
- Ignore the fault

A command from the CANopen bus is handled with the same priority as an input from the drive terminals. This enables very good response times to be achieved on the network port via the CANopen adapter.

Software enhancements

Since the Altivar ATV71 was first launched, it has benefited from the addition of several new functions. Software version has now been updated to V2.7. The new version can be substituted to the previous versions without making any changes.
Although this documentation relates to version V2.7, it can still be used with previous versions, as the updates merely involves the addition of new values and parameters. None of the previous versions parameters have been modified or removed.
The software version is indicated on the nameplate attached to the body of the drive.

Enhancements made to version V1.2 in comparison to V1.1

Factory setting

Note 1: In version V1.1, the analog input was 0 ± 10 V. For safety reasons, this input is configured as 0 + 10 V in the new version.
Note 2: In version V1.1, the analog output AO1 was assigned to the motor frequency. In the new version, this output is not assigned.

Except for these two parameters, the factory setting of version V1.1 is retained in the new version. The new functions are inactive in the factory setting.

Motor frequency range

The maximum output frequency range is extended from 1000 to 1600 Hz (depending on rating and selected control profile).

New parameters and functions

[1.2 MONITORING] (SUP-) menu

Addition of states and internal values relating to the new functions described below.

[1.3 SETTINGS] (SEt-) menu

- [High torque thd.] (ttH)
- [Low torque thd.] (ttL)
- [Pulse warning thd.] (FqL)
- [Freewheel stop Thd] (FFt)

[1.4 MOTOR CONTROL] (drC-) menu

- [rpm increment] (InSP)
- Extension to all drive ratings of the following configurations, formerly limited to 45 kW for ATV71●●●M3X and 75 kW for ATV71●●●N4: synchronous motor [Sync. mot.] (SYn), sinus filter [Sinus filter] (OFI), noise reduction [Noise reduction] (nrd), braking balance [Braking balance] (bbA).

[1.5 INPUTS / OUTPUTS CFG] (I-O-) menu

- Input AI1 becomes configurable as 0 + 10 V or 0 ± 10 V using [AI1 Type] (AI1t).
- [AI net. channel] (AIC1)
- New options for assigning relays and logic outputs: rope slack, torque greater than high threshold, torque less than low threshold, motor rotating in forward direction, motor rotating in reverse, measured speed threshold attained, and load variation detection.
- Analog output AO1 becomes usable as a logic output and can be assigned to the relay and logic output functions.
- New option of modifying the scaling of the analog outputs using the parameters [Scaling AOx min] (ASLx) and [Scaling AOx max] (ASHx).
- New options for assigning analog outputs: signed motor torque and measured motor speed.
- New options for assigning alarm groups: rope slack, torque greater than high threshold, torque less than low threshold, measured speed threshold attained, and load variation detection.

Software enhancements

[1.7 APPLICATION FUNCT.] (Fun-) menu

- The summing, subtraction and multiplier reference functions become assignable to the network analog input [Network AI] (AIU1)
- New parameter [Freewheel stop Thd] (FFt) used to adjust a threshold for switching to freewheel at the end of a stop on ramp or fast stop.
- New parameter: Brake engage at controlled zero speed [Brake engage at 0] (bECd).
- The weight sensor [Weight sensor ass.] (PES) becomes assignable to the network analog input [Network AI] (AIU1).
- New "rope slack" function, with the parameters [Rope slack config.] (rSd) and [Rope slack trq level] (rStL).
- Use of the ramp [Acceleration 2] (AC2) during PID function starts and wake-ups.
- Torque limitation [TORQUE LIMITATION] (tOL-) becomes configurable as a % or 0.1% using [Torque increment] (IntP) and can be assigned to the network analog input [Network AI] (AIU1).
- New "stop at calculated distance after end of slowdown travel" function, with the parameters [Stop distance] (Std), [Rated linear speed] (nLS) and [Stop corrector] (SFd).
- Positioning by sensor or limit switch [POSITIONING BY SENSORS] (LPO-) becomes configurable as positive or negative logic using [Stop limit config.] (SAL) and [Slowdown limit cfg.] (dAL).
- Parameter switching [PARAM.] (MLP-) becomes assignable to attained frequency thresholds [Freq. Th. attain.] (FtA) and [Freq. Th. 2 attain.] (F2A).
- New half floor function: [HALF FLOOR] (HFF-) menu.

[1.8 FAULT MANAGEMENT] (FLt-) menu

- Option of reinitializing the drive without switching it off, using [Product reset] (rP).
- Option of reinitializing the drive using a logic input without switching it off, using [Product reset assig.] (rPA).
- Option of configuring the "output phase loss" fault [Output Phase Loss] (OPL) to [Output cut] (OAC) is extended to all drive ratings (formerly limited to 45 kW for ATV71●●●M3X and 75 kW for ATV71●●●N4).
- The external fault [EXTERNAL FAULT] (EtF-) becomes configurable as positive or negative logic using [External fault config] (LEt).
- New monitoring function by speed measurement via the "Pulse input", using the [FREQUENCY METER] (FqF-) menu.
- New load variation detection function, using the [DYNAMIC LOAD DETECT.] (dLd-) menu.
- The braking unit short-circuit fault becomes configurable using [Brake res. fault Mgt] bUb).

[7 DISPLAY CONFIG.] menu

- Addition in [7.4 TERMINAL ADJUSTMENT] of the [CONTRAST] and [STANDBY] parameters for adjusting the contrast of the graphic display unit and setting it to standby.

Enhancements made to version V1.6 in comparison to V1.2

Extension of the range with addition of the drives ATV71●●●Y for network 500 to 690 V.
There are no new parameters, but the ranges of adjustment and factory settings of some parameters are adapted to the new voltage.

[1.5 INPUTS / OUTPUTS CFG] (I-O-) menu

Increase in adjustment range of delay parameters for relays and logic outputs : 0 to 60000 ms instead of 0 to 9999 ms.

Enhancements made to version V2.5 in comparison to V1.6

[1.3 SETTINGS] (SEt-) menu

- New parameters [Skip Frequency] (JPF), [Skip Frequency 2] (JF2) and [3rd Skip Frequency] (JF3) allow to avoid critical speed which generate resonances.
- New parameter [Skip.Freq.Hysteresis] (JFH) to adjust the range of skip frequency.
- Possibility to adjust the parameter [Torque ratio] (trt) (visible too in [TORQUE CONTROL] (tOr-) menu).

Important :
For V2.5 version, the behaviour of the following functions is different from the previous when type of stop "freewheel" is selected (factory value):

- [LIMIT SWITCHES] (LSt-) function,
- [POSITIONING BY SENSORS] (LPO-) function,
- "shutdown" command by communication (see CiA402 state chart in communication parameters manual).

Actually, on previous versions, type of stop "freewheel" was not well done.

Enhancements made to version V2.7 in comparison to V2.5

[7 DISPLAY CONFIG.] menu

Addition in [7.4 KEYPAD PARAMETERS] of [Power up menu]. This parameter allows to choose the menu which displays on the drive on power up.

[1.3 SETTINGS] (SEt-) menu

The adjustment range of [Time to restart] (ttr) can now be configured between 0.00 and 15.00 seconds.

Notations

Description of parameters

Identification

A parameter is defined by means of various character strings:

- Code: 4 characters max. The code makes it possible to identify the parameter on the integrated 7-segment display terminal (Examples: brt, tLIG)
- Name: Description in plain text (used by the PowerSuite software workshop)
- Terminal name: Character string in square brackets for the graphic display terminal **[Gen. torque lim]**

Addresses

There are 4 formats for specifying parameter addresses:

- Logic address: Address for the Modbus messaging (RS485 and Ethernet TCI/IP) and the PKW indexed periodic variables (Fipio, Profibus DP), in decimal and hexadecimal (preceded by 16#).
  To optimize Modbus messaging performance, two addresses are given for the control word and the status word. The addresses annotated "speed" are for use in rpm; the addresses annotated "frequency" are for use in Hz.
- CANopen index: CANopen index/subindex in hexadecimal format, to be used for variable assignment of PDOs and SDO messaging
- INTERBUS index: Index/subindex in hexadecimal for PCP messaging
- DeviceNet path: Class/instance/attribute in hexadecimal

Read/write

- R: Read only
- R/W: Read and write
- R/WS: Read and write, but write only possible when motor is at standstill

Type

- WORD (bit register): Word where each bit represents an item of command, monitoring or configuration information
- WORD (listing): Word where each value represents a possible choice for a configuration or state
- INT: Signed integer
- UINT: Unsigned integer
- DINT: Signed double integer
- UDINT: Unsigned double integer

Format

Hexadecimal values are written as follows: 16#●●●●

Drive terminal displays

The menus that appear on the graphic display terminal are shown in square brackets.
Example: **[1.9 COMMUNICATION]**.
The menus that appear on the integrated 7-segment display terminal always end with a dash and appear between round brackets.
Example: (COM-).

Parameter names are displayed on the remote graphic display terminal in square brackets.
Example: **[Fallback speed]**.
The parameter codes displayed on the integrated 7-segment display terminal are shown in round brackets.
Example: (LFF).

Profiles

What is a profile?

There are three types of profile:
- Communication profiles
- Functional profiles
- Application profiles

Communication profiles

A communication profile describes the characteristics of the bus or network:
- Cables
- Connectors
- Electrical characteristics
- Access protocol
- Addressing system
- Periodic exchange service
- Messaging service
- ...

A communication profile is unique to a type of network (Fipio, Profibus DP, etc.) and is used by various different types of device.

Functional profiles

A functional profile describes the behavior of a type of device. It defines:
- Functions
- Parameters (name, format, unit, type, etc.)
- Periodic I/O variables
- State chart(s)
- ...

A functional profile is common to all members of a device family (variable speed drives, encoders, I/O modules, displays, etc.).
Ideally, functional profiles should be network-independent, but in reality they are not. They can feature common or similar parts. The standardized (IEC 61800-7) functional profiles of variable speed drives are:
- CiA402
- PROFIDRIVE
- CIP

DRIVECOM has been available since 1991.
CiA402 "Device profile for drives and motion control" represents the next stage of this standard’s development and is maintained by Can In Automation.
Some protocols also support the ODVA (Open DeviceNet Vendor Association) profile.

Application profiles

Application profiles define in their entirety the services to be provided by the devices on a machine. For example, "CiA DSP 417-2 V 1.01 part 2: CANopen application profile for lift control systems - virtual device definitions".

Interchangeability

The aim of communication and functional profiles is to achieve interchangeability of the devices connected via the network.
Although this aim is not always achieved, the profiles facilitate free competition.

Functional profiles supported by the Altivar 71

I/O profile

Using the I/O profile simplifies PLC programming.

When controlling via the terminals or the display terminal, the I/O profile is used without knowing it.
With an Altivar 71, the I/O profile can also be used when controlling via a network.

The drive starts up as soon as the run command is sent.
The 16 bits of the control word can be assigned to a function or a terminal input.

This profile can be developed for simultaneous control of the drive via:

- The terminals
- The Modbus control word
- The CANopen control word
- The network card control word
- The "Controller Inside" control word

The I/O profile is supported by the drive itself and therefore in turn by all the communication ports (integrated Modbus, CANopen and the Ethernet, Fipio, ModbusPlus, Modbus, Uni-Telway, Profibus DP, DeviceNet, and INTERBUS communication cards).

CiA402 profile

The drive only starts up following a command sequence.
The control word is standardized.
5 bits of the control word (bits 11 to 15) can be assigned to a function or a terminal input.

The CiA402 profile is supported by the drive itself and therefore in turn by all the communication ports (integrated Modbus, CANopen and the Ethernet, Fipio, ModbusPlus, Modbus, Uni-Telway, Profibus DP, DeviceNet, and INTERBUS communication cards).

The Altivar 71 supports the CiA402 profile's "Velocity mode".

In the CiA402 profile, there are two modes that are specific to the Altivar 71 and characterize command and reference management (see section “Command/reference switching”, page 37):

- Separate mode **[Separate]** (SEP)
- Not separate mode **[Not separ.]** (SIM)

ODVA profile

The drive starts up as soon as the run command is sent.
The control word is standardized.

The ODVA profile is supported by the DeviceNet communication card.

I/O profile

Definition

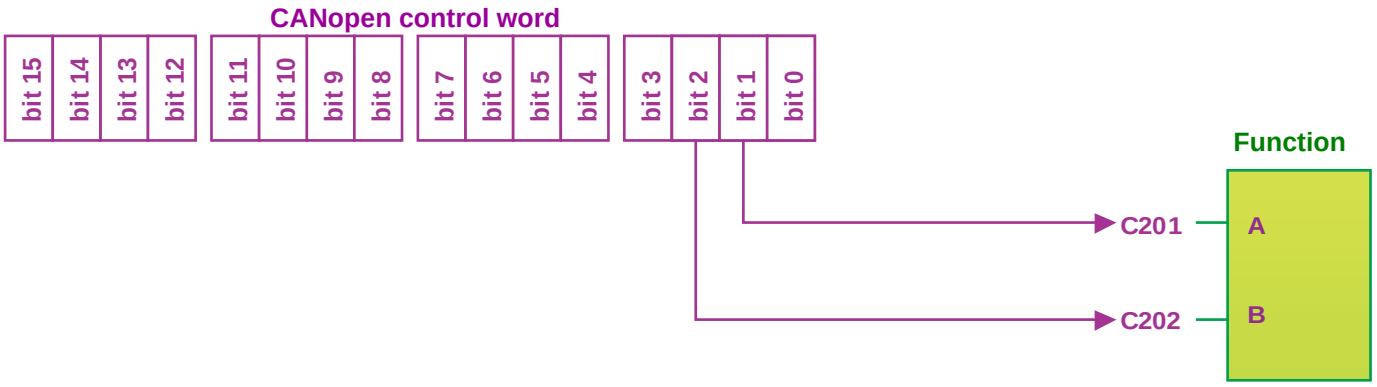
The behavior of the drive is identical whether via the network or via the terminals.
The I/O profile is achieved via the following configuration:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[I/O profile]** (IO)

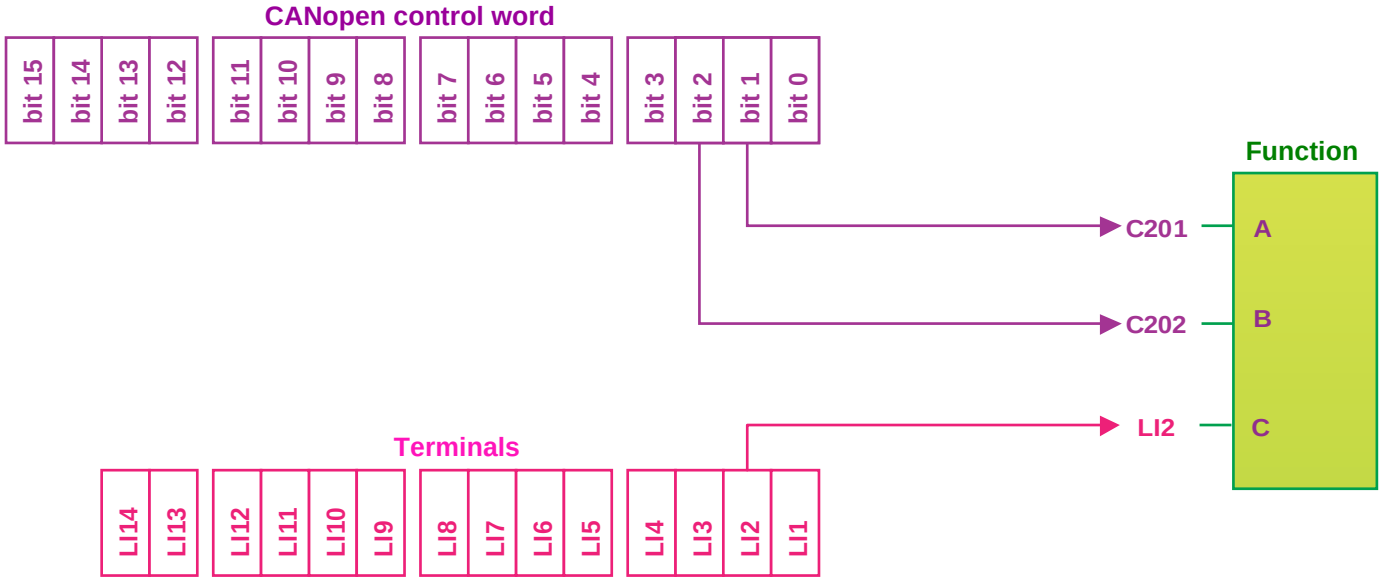
As well as to logic inputs of the terminals, drive functions can be assigned to control word bits.
A function input can be assigned to:

- A terminal input (LI2 to LI14)
- A Modbus control word bit (C101 to C115)
- A CANopen control word bit (C201 to C215)
- A network card control word bit (C301 to C315)
- A Controller Inside control word bit (C401 to C415)
- A switched bit (Cd00 to Cd15): See "Command/reference switching" section.

Schematic diagrams:
Fixed assignment on CANopen:

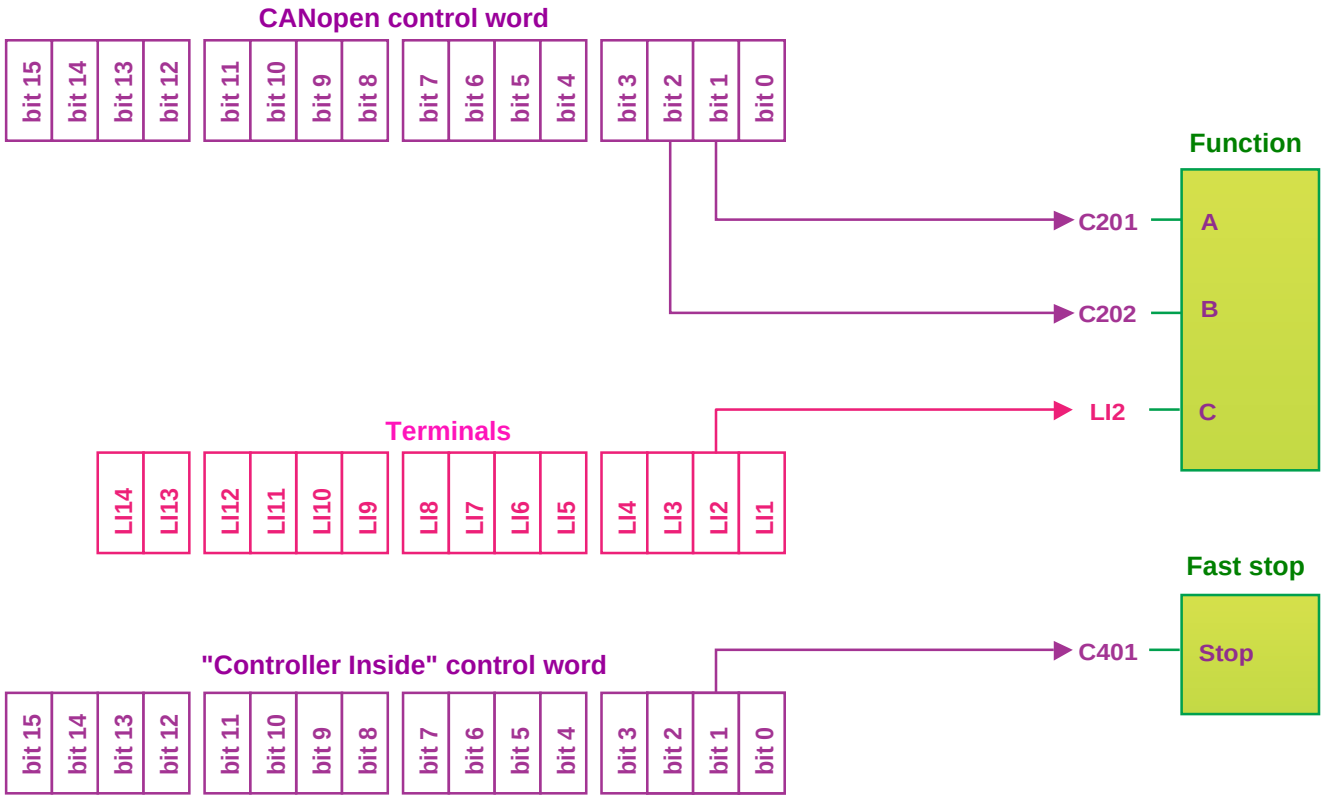


Fixed assignment to terminals and on CANopen: :

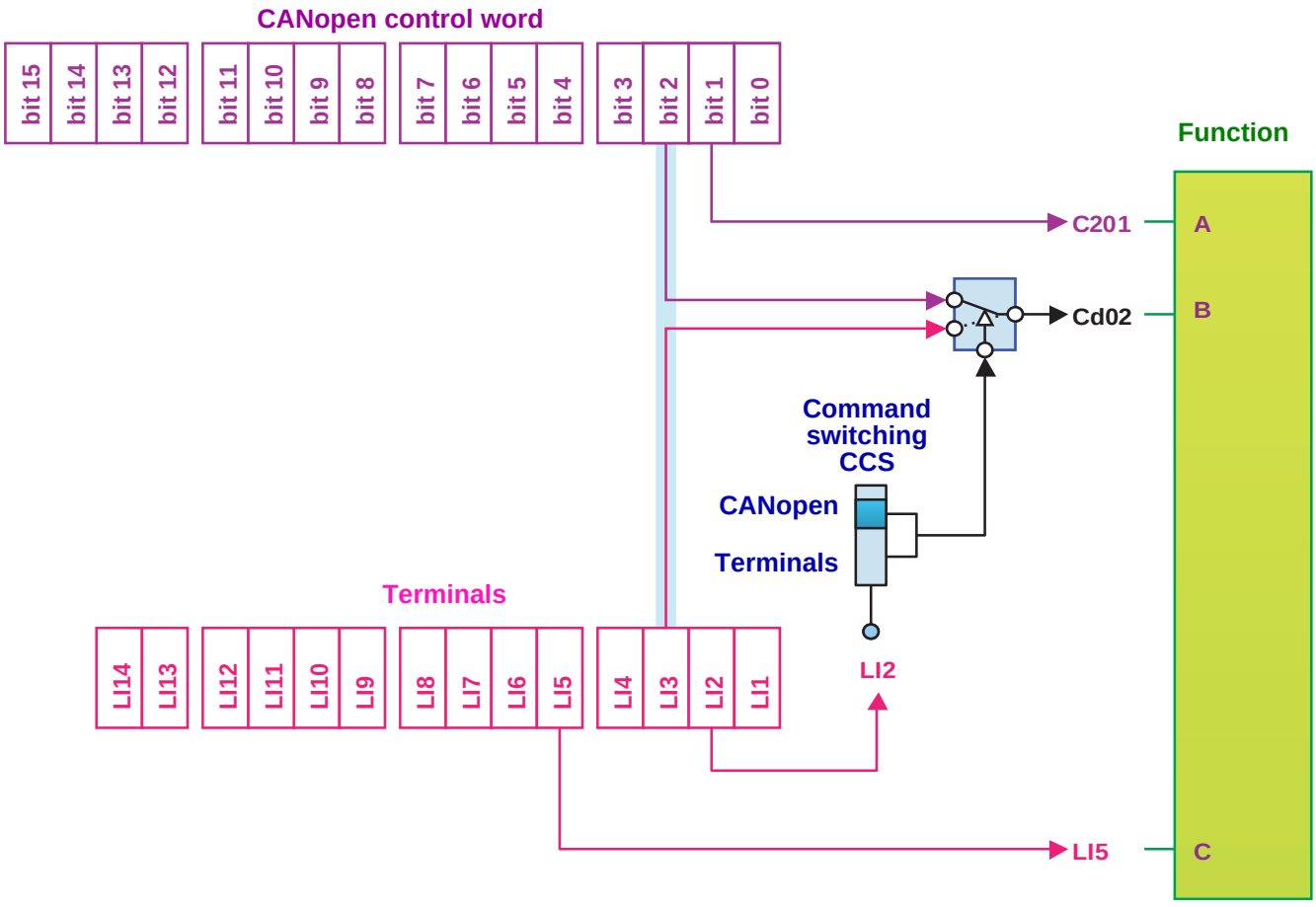


I/O profile

Fixed assignment to terminals, on CANopen and on "Controller Inside" card:



Fixed assignment to terminals and on CANopen with command switching **:**



Control word - run on state [2 wire] (2C)

Please refer to the **[1.5 INPUTS / OUTPUTS CFG]** (I-O-) section of the Programming Manual.

The forward run command is automatically assigned to input LI1 and to bit 0 of the various control words.
This assignment cannot be modified.
The run command is active on state 1:

- Of input LI1, if the terminals are active
- Of bit 0 of the control word, if the network is active

Bits 1 to 15 of the control words can be assigned to drive functions.

bit 7	bit 6	bit 5	bit 4
Configurable	Configurable	Configurable	Configurable

bit 3	bit 2	bit 1	bit 0
Configurable	Configurable	Configurable	Forward

bit 15	bit 14	bit 13	bit 12
Configurable	Configurable	Configurable	Configurable

bit 11	bit 10	bit 9	bit 8
Configurable	Configurable	Configurable	Configurable

In the case of a **[2 wire]** (2C) run on state command and I/O profile, fixed assignment of a function input is possible using the following codes:

Bit	Fixed assignments						
	Drive terminals	Logic I/O card	Extended I/O card	Modbus	CANopen	Network card	"Controller Inside" card
bit 0	Forward						
bit 1	LI2	-	-	C101	C201	C301	C401
bit 2	LI3	-	-	C102	C202	C302	C402
bit 3	LI4	-	-	C103	C203	C303	C403
bit 4	LI5	-	-	C104	C204	C304	C404
bit 5	LI6	-	-	C105	C205	C305	C405
bit 6	-	LI7	-	C106	C206	C306	C406
bit 7	-	LI8	-	C107	C207	C307	C407
bit 8	-	LI9	-	C108	C208	C308	C408
bit 9	-	LI10	-	C109	C209	C309	C409
bit 10	-	-	LI11	C110	C210	C310	C410
bit 11	-	-	LI12	C111	C211	C311	C411
bit 12	-	-	LI13	C112	C212	C312	C412
bit 13	-	-	LI14	C113	C213	C313	C413
bit 14	-	-	-	C114	C214	C314	C414
bit 15	-	-	-	C115	C215	C315	C415

For example, to assign the operating direction command to bit 1 of CANopen, simply configure the **[Reverse assign.]** (rrS) parameter with the value **[C201]** (C201).

Control word - run on edge [3 wire] (3C)

Please refer to the **[1.5 INPUTS / OUTPUTS CFG]** (I-O-) section of the Programming Manual.

The stop command is automatically assigned to input LI1 and to bit 0 of the control words.
This assignment cannot be modified.
This command enables running on state 1:

- Of input LI1, if the terminals are active
- Of bit 0 of the control word, if the network is active

The forward run command is automatically assigned to input LI2 and to bit 1 of the control words.
This assignment cannot be modified.
The forward run command is active if the stop command is at 1 and on a rising edge (0 ➡ 1):

- Of input LI2, if the terminals are active
- Of bit 1 of the control word, if the network is active

Bits 2 to 15 of the control words can be assigned to drive functions.

bit 7	bit 6	bit 5	bit 4
Configurable	Configurable	Configurable	Configurable

bit 3	bit 2	bit 1	bit 0
Configurable	Configurable	Forward	Stop

bit 15	bit 14	bit 13	bit 12
Configurable	Configurable	Configurable	Configurable

bit 11	bit 10	bit 9	bit 8
Configurable	Configurable	Configurable	Configurable

In the case of a **[3 wire]** (3C) run on state command and I/O profile, fixed assignment of a function input is possible using the following codes:

Bit	Fixed assignments						
	Drive terminals	Logic I/O card	Extended I/O card	Modbus	CANopen	Network card	"Controller Inside" card
bit 0	Authorization to run (Stop)						
bit 1	Forward						
bit 2	LI3	-	-	C102	C202	C302	C402
bit 3	LI4	-	-	C103	C203	C303	C403
bit 4	LI5	-	-	C104	C204	C304	C404
bit 5	LI6	-	-	C105	C205	C305	C405
bit 6	-	LI7	-	C106	C206	C306	C406
bit 7	-	LI8	-	C107	C207	C307	C407
bit 8	-	LI9	-	C108	C208	C308	C408
bit 9	-	LI10	-	C109	C209	C309	C409
bit 10	-	-	LI11	C110	C210	C310	C410
bit 11	-	-	LI12	C111	C211	C311	C411
bit 12	-	-	LI13	C112	C212	C312	C412
bit 13	-	-	LI14	C113	C213	C313	C413
bit 14	-	-	-	C114	C214	C314	C414
bit 15	-	-	-	C115	C215	C315	C415

For example, to assign the operating direction command to bit 2 of CANopen, simply configure the **[Reverse assign.]** (rrS) parameter with the value **[C202]** (C202).

Status word (ETA)

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
Alarm	Reserved (= 0 or 1)	Reserved (=1)	Power section line supply present	Fault	Running	Ready	Reserved (= 0 or 1)

bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
Direction of rotation	Stop via STOP key	Reserved (=0)	Reserved (=0)	Reference outside limits	Reference reached	Command or reference via network	Reserved (=0)

The status word is identical in the I/O profile and the CiA402 profile. For more information, see section “CiA402 profile”, page 21.

Example: I/O profile with positioning by sensors function

Please refer to the **[1.7 APPLICATION FUNCT.]** (FUn-) section of the Programming Manual, under "Positioning by sensors".

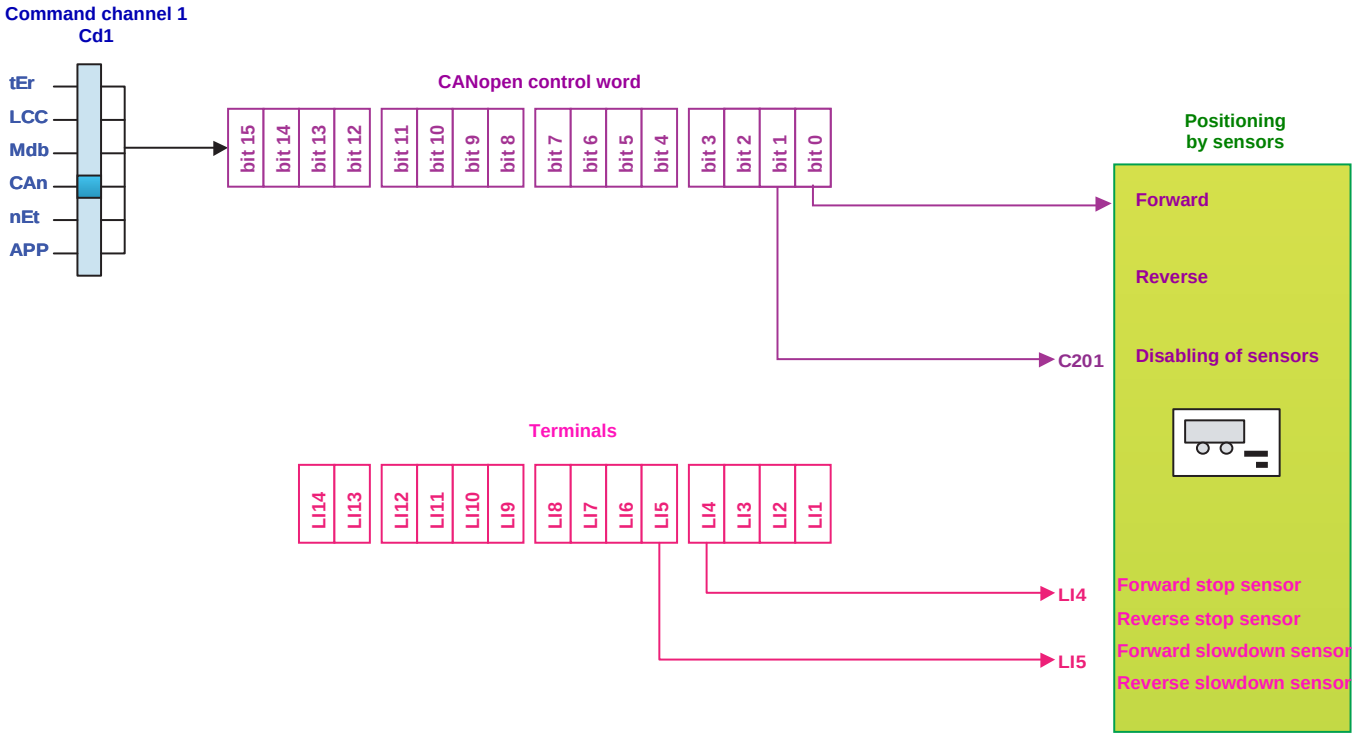
In this example, a PLC is used to control the transfer of parts on a conveyor composed of transfer tables. Each table is controlled by a variable speed drive. The PLC and the drives are connected via a CANopen network.

The PLC controls the operation of the installation via the CANopen bus.

The drive uses the stop sensor to inhibit transfer of the part if the next table is unavailable. In this case, the PLC enables the sensors.
If the next table is free, the drive transfers the part without stopping. In this case, the PLC disables the sensors.

The stop sensor is directly connected to the drive terminals.
The slowdown sensor, which is also directly connected (to the drive) enables a more precise stop.

Configuration schematic diagram:



I/O profile

Configure the following parameters:

Parameter	Value	Comment
Type of command	On state (2 wire)	The run command is obtained via bit 0 of the CANopen control word.
Profile	I/O profile	
Reference 1 configuration	CANopen	The reference comes from the CANopen card.
Command 1 configuration	CANopen	The command comes from the CANopen card.
Assignment of stop sensor	Input LI4	
Assignment of slowdown sensor	Input LI5	
Assignment of sensor disable command	Bit 1 of CANopen control word	

Configuration via the remote graphic display terminal:

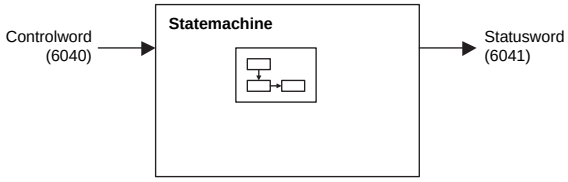
Menu	Parameter	Value
[1.5 INPUTS / OUTPUTS CFG] **(I-O-)**	**[2/3 wire control]** (tCC)	**[2 wire]** (2C)
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[I/O profile]** (IO)
	[Ref. 1 channel] (Fr1)	**[CANopen]** (CAn)
	[Cmd channel 1] (Cd1)	**[CANopen]** (CAn)
[1.7 APPLICATION FUNCT.] (FUn-) **[POSITIONING BY SENSORS]** (LPO-)	**[Stop FW limit sw.]** (SAF)	**[LI4]** (LI4)
	[Slowdown forward] (dAF)	**[LI5]** (LI5)
	[Disable limit sw.] (CLS)	**[C201]** (C201)

Note: On a **[2 wire]** (2C) state command, the forward command is automatically assigned to bit 0 of the CANopen control word.

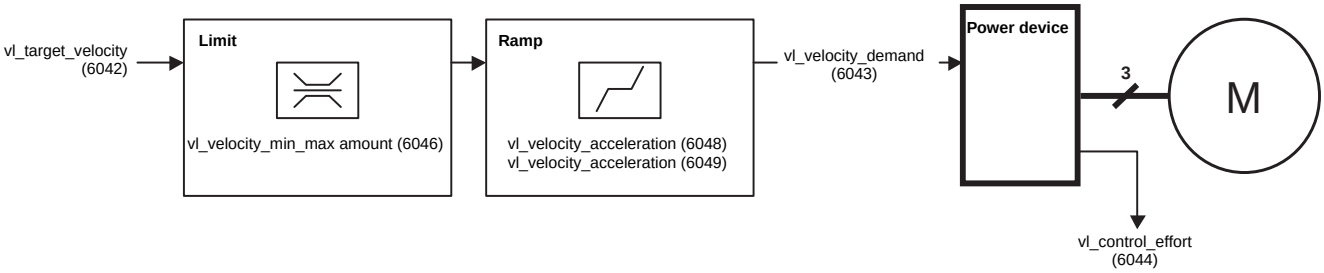
Functional description

■ Drive operation involves two main functions, which are illustrated in the two diagrams below (the values in brackets are the CANopen addresses of the parameters):

- Control diagram:



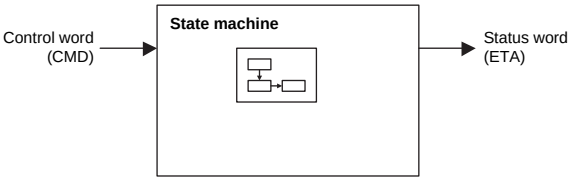
- Simplified diagram of speed control in "Velocity" mode:



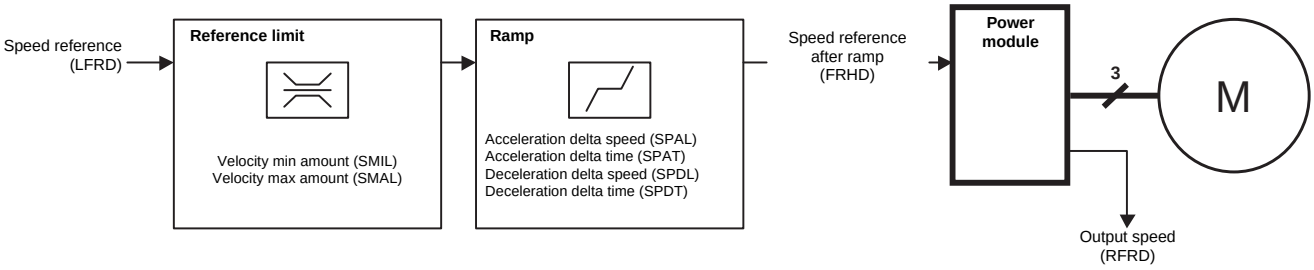
■ The main parameters are shown with their CiA402 name and their CiA402/Drivecom index (the values in brackets are the parameter codes).

These diagrams translate as follows for the Altivar system:

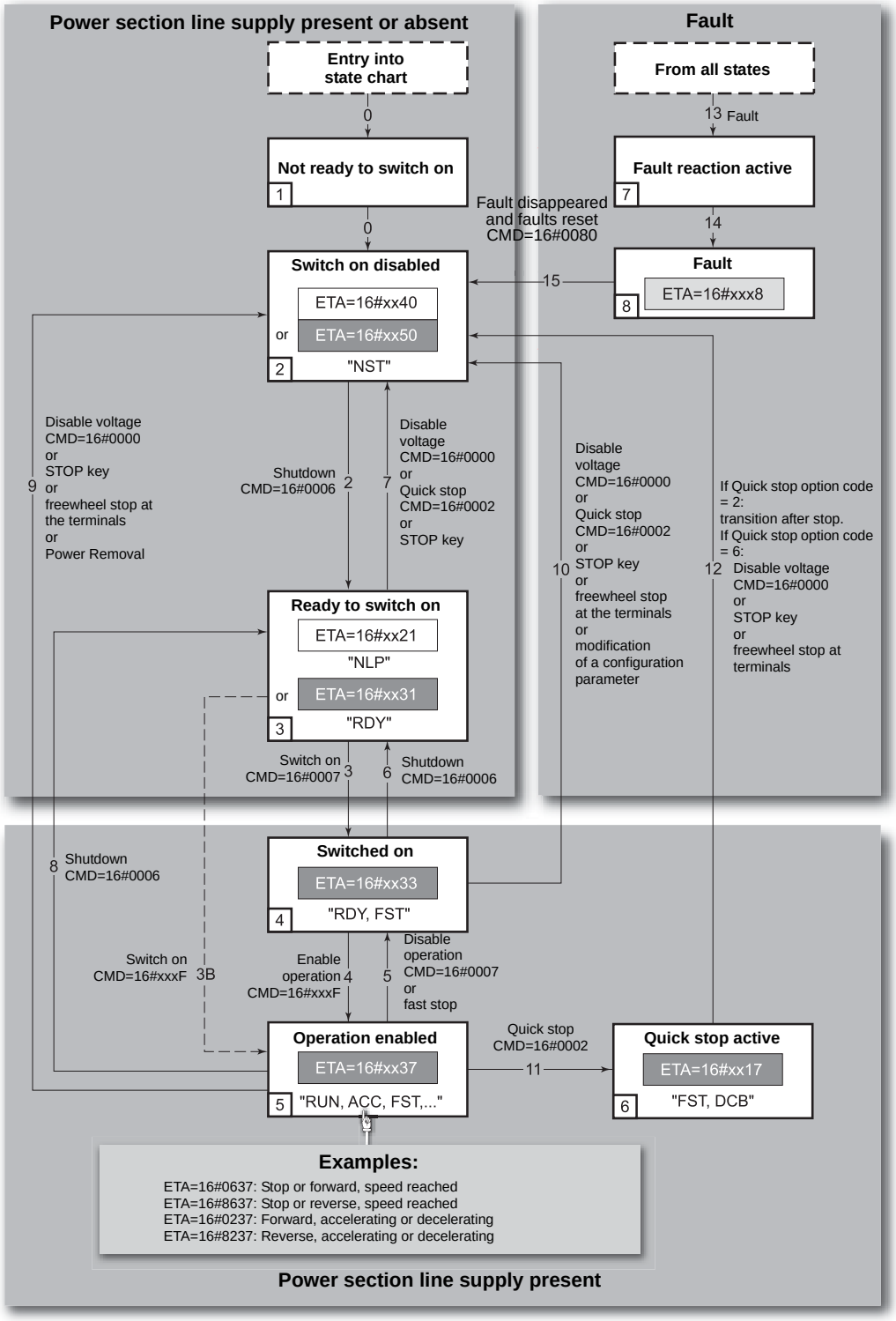
- Control diagram:



- Simplified diagram of speed regulation in "Velocity" mode:



CiA402 state chart



Description of states

Each state represents an internal reaction by the drive.
This chart will change depending on whether the control word is sent (CMD) or an event occurs (a fault, for example).
The drive state can be identified by the value of the status word (ETA).

1 - Not ready to switch on

Initialization starts. This is a transient state invisible to the communication network.

2 - Switch on disabled

The drive is inactive.
The drive is locked, no power is supplied to the motor.
For a separate control section, it is not necessary to supply AC power to the power section.
For a separate control section with line contactor, the contactor is not controlled.

The configuration and adjustment parameters can be modified.

3 - Ready to switch on

Awaiting power section line supply.
For a separate control section, it is not necessary to supply AC power to the power section, but the system will expect it in order to change to state "4 - Switched on".
For a separate control section with line contactor, the contactor is not controlled.

The drive is locked, no power is supplied to the motor.

The configuration and adjustment parameters can be modified.

4 - Switched on

The drive is supplied with AC power but is stationary.
For a separate control section, the power section line supply must be present.
For a separate control section with line contactor, the contactor is controlled.

The drive is locked, no power is supplied to the motor.
The power stage of the drive is ready to operate, but voltage has not yet been applied to the output.

The adjustment parameters can be modified.
Modification of a configuration parameter returns the drive to state "2 - Switch on disabled".

5 - Operation enabled

The drive is running.
For a separate control section, the power section line supply must be present.
For a separate control section with line contactor, the contactor is controlled.

The drive is unlocked, power is supplied to the motor.
The drive functions are activated and voltage is applied to the motor terminals.
However, in the case of an open-loop drive, if the reference is zero or the "Halt" command is applied, no power is supplied to the motor and no torque is applied.
Auto-tuning (tUn) requires an injection of current into the motor. The drive must therefore be in state "5 - Operation enabled" for this command.

The adjustment parameters can be modified.
The configuration parameters cannot be modified.

Note: The command "4 - Enable operation" must be taken into consideration only if the channel is valid (see Communication monitoring page 56). In particular, if the channel is involved in the command and the reference, transition 4 will take place only after the reference has been received for the first time.

The reaction of the drive to a "Disable operation" command depends on the value of the "Disable operation option code" (DOTD) parameter:

- If the "Disable operation option code" parameter has the value 0, the drive changes to "4 - Switched on" and stops in freewheel stop.
- If the "Disable operation option code" parameter has the value 1, the drive stops on ramp and then changes to "4 - Switched on".

6 - Quick stop active

Emergency stop

The drive performs a fast stop, after which restarting will only be possible once the drive has changed to the "Switch on disabled" state.
During fast stop, the drive is unlocked and power is supplied to the motor.
The configuration parameters cannot be modified.

The condition for transition 12 to state "2 - Switch on disabled" depends on the value of the parameter "Quick stop option code" (QSTD):

- If the "Quick stop option code" parameter has the value 2, the drive stops according to the fast stop ramp and then changes to state "2 - Switch on disabled".
- If the "Quick stop option code" parameter has the value 6, the drive stops according to the fast stop ramp and then remains in state "6 - Quick stop active" until:
  - A "Disable voltage" command is received
  - Or the STOP key is pressed
  - Or there is a freewheel stop command via the terminals

7 - Fault reaction active

Transient state during which the drive performs an action appropriate to the type of fault.

The drive function is activated or deactivated according to the type of reaction configured in the fault management parameters.

8 - Fault

Drive faulty.

The drive is locked, no power is supplied to the motor.

Summary

State	Power section line supply for separate control section	Power supplied to motor	Modification of configuration parameters
1 - Not ready to switch on	Not required	No	Yes
2 - Switch on disabled	Not required	No	Yes
3 - Ready to switch on	Not required	No	Yes
4 - Switched on	Required	No	Yes, return to "**2 - Switch on disabled**" state
5 - Operation enabled	Required	Yes, apart from an open-loop drive with a zero reference or in the event of a "Halt" command for an open-loop drive.	No
6 - Quick stop active	Required	Yes, during fast stop	No
7 - Fault reaction active	Depends on fault management configuration	Depends on fault management configuration	-
8 - Fault	Not required	No	Yes

Control word (CMD)

bit 7	bit 6	bit 5	bit 4
Fault reset	Reserved (=0)	Reserved (=0)	Reserved (=0)
Ack. fault			

bit 3	bit 2	bit 1	bit 0
Enable operation	Quick stop	Enable voltage	Switch on
Run command	Emergency stop	Authorization to supply AC power	Contactor control

bit 15	bit 14	bit 13	bit 12
Assignable	Assignable	Assignable	Assignable

bit 11	bit 10	bit 9	bit 8
By default, direction of rotation command.	Reserved (=0)	Reserved (=0)	Halt
			Halt

Command	Transition address	Final state	bit 7	bit 3	bit 2	bit 1	bit 0	Example value
			Fault reset	Enable operation	Quick stop	Enable voltage	Switch on	
Shutdown	2, 6, 8	3 - Ready to switch on	x	x	1	1	0	16#0006
Switch on	3	4 - Switched on	x	x	1	1	1	16#0007
Enable operation	4	5 - Operation enabled	x	1	1	1	1	16#000F
Disable operation	5	4 - Switched on	x	0	1	1	1	16#0007
Disable voltage	7, 9, 10, 12	2 - Switch on disabled	x	x	x	0	x	16#0000
Quick stop	11	6 - Quick stop active	x	x	0	1	x	16#0002
	7, 10	2 - Switch on disabled						
Fault reset	15	2 - Switch on disabled	0 ➞ 1	x	x	x	x	16#0080

x: Value is of no significance for this command.

0 ➞ 1: Command on rising edge.

Stop commands:

The "Halt" command enables movement to be interrupted without having to leave the "5 - Operation enabled" state. The stop is performed in accordance with the **[Type of stop]** (Stt) parameter.

In the case of an open-loop drive, if the "Halt" command is active, no power is supplied to the motor and no torque is applied.
In the case of a closed-loop drive, if the "Halt" command is active, power continues to be supplied to the motor and torque is applied during stopping.

Regardless of the assignment of the **[Type of stop]** (Stt) parameter ([Fast stop] (FSt), [Ramp stop] (rMP), [Freewheel] (nSt), or [DC injection] (dCI)), the drive remains in the "5 - Operation enabled" state.

A Fast Stop command at the terminals or using a bit of the control word assigned to Fast Stop causes a change to the "4 - Switched on" state. A "Halt" command does not cause this transition.
A Freewheel Stop command at the terminals or using a bit of the control word assigned to Freewheel Stop causes a change to the "2 - Switch on disabled" state.

⚠ WARNING

RISK OF EQUIPMENT DAMAGE

When the braking loop is configured, it is necessary to use the "Halt" command (bit 8 of CMD command word) to stop.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Assigning control word bits

In the CiA402 profile, fixed assignment of a function input is possible using the following codes:

Bit	Integrated Modbus	CANopen	Network card	"Controller Inside" card
bit 11	C111	C211	C311	C411
bit 12	C112	C212	C312	C412
bit 13	C113	C213	C313	C413
bit 14	C114	C214	C314	C414
bit 15	C115	C215	C315	C415

For example, to assign the DC injection braking to bit 13 of CANopen, simply configure the **[DC injection assign.]** (dCI) parameter with the **[C213]** (C213) value.

Bit 11 is assigned by default to the operating direction command **[Reverse assign.]** (rrS).

Status word (ETA)

bit 7	bit 6	bit 5	bit 4
Warning	Switch on disabled	Quick stop	Voltage enabled
Alarm	Power section line supply disabled	Emergency stop	Power section line supply present

bit 3	bit 2	bit 1	bit 0
Fault	Operation enabled	Switched on	Ready to switch on
Fault	Running	Ready	Awaiting power section line supply

bit 15	bit 14	bit 13	bit 12
Direction of rotation	Stop via STOP key	Reserved (=0)	Reserved (=0)

bit 11	bit 10	bit 9	bit 8
Internal limit active	Target reached	Remote	Reserved (=0)
Reference outside limits	Reference reached	Command or reference via network	

Status	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0	ETA masked by 16#006F (1)
	Switch on disabled	Quick stop	Voltage enabled	Fault	Operation enabled	Switched on	Ready to switch on	
1 - Not ready to switch on	0	x	x	0	0	0	0	-
2 - Switch on disabled	1	x	x	0	0	0	0	16#0040
3 - Ready to switch on	0	1	x	0	0	0	1	16#0021
4 - Switched on	0	1	1	0	0	1	1	16#0023
5 - Operation enabled	0	1	1	0	1	1	1	16#0027
6 - Quick stop active	0	0	1	0	1	1	1	16#0007
7 - Fault reaction active	0	x	x	1	1	1	1	-
8 - Fault	0	x	x	1	0	0	0	16#0008 (2) or 16#0028

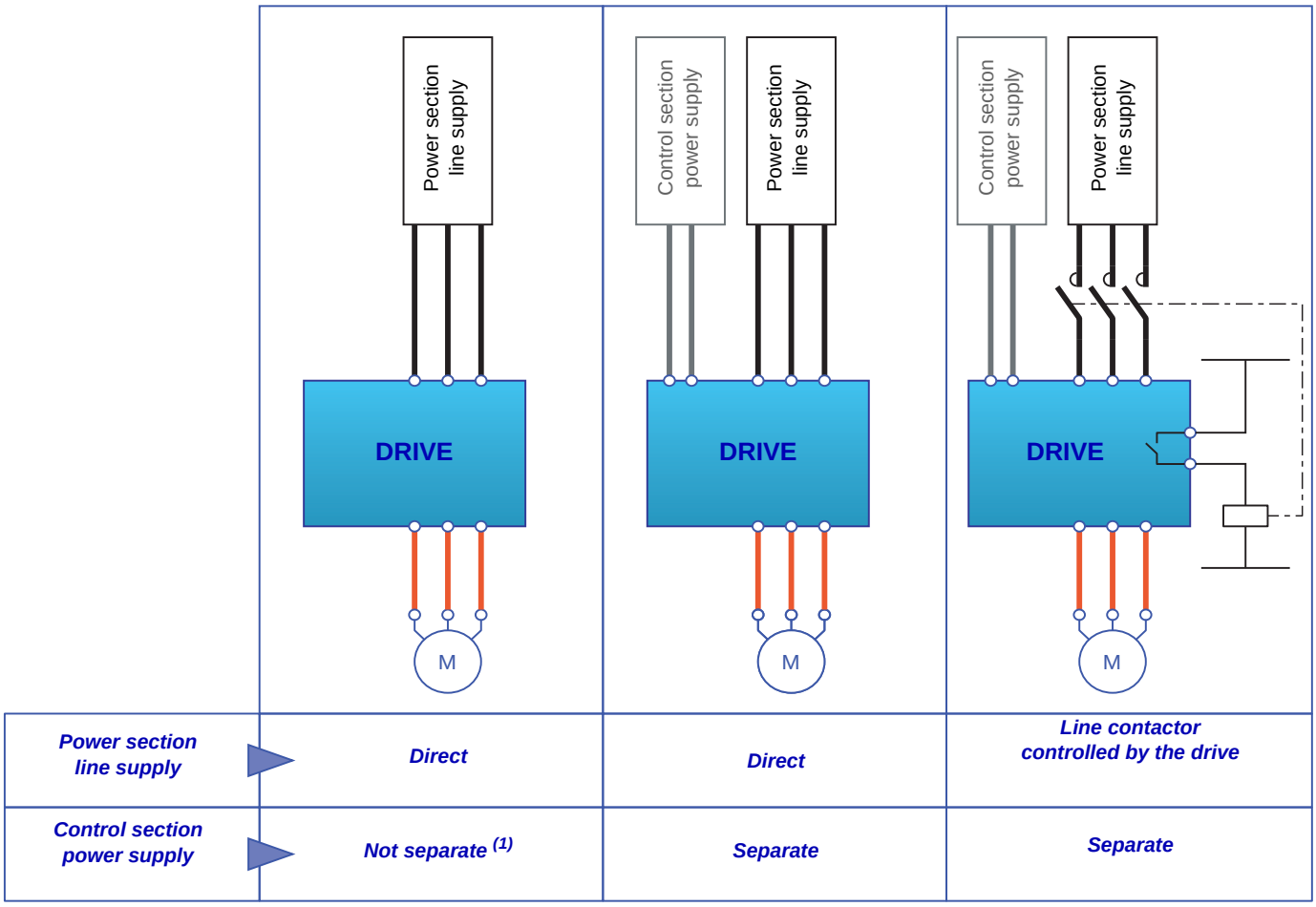
x: In this state, the value of the bit can be 0 or 1.

(1) This mask can be used by the PLC program to test the chart state.

(2) Fault following state "6 - Quick stop active".

Starting sequence

The command sequence in the state chart depends on how power is being supplied to the drive.
There are three possible scenarios:

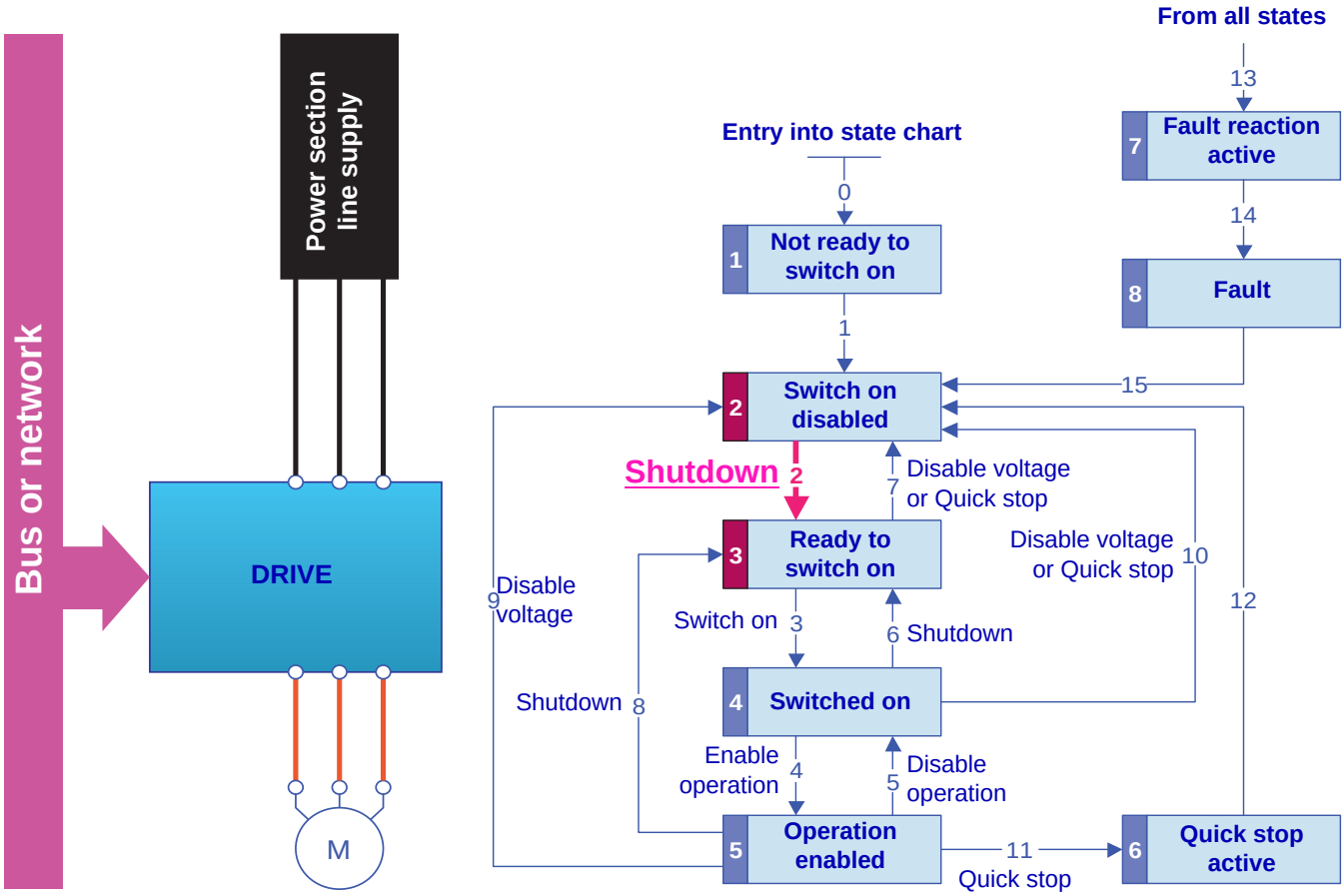


(1) The power section supplies the control section.

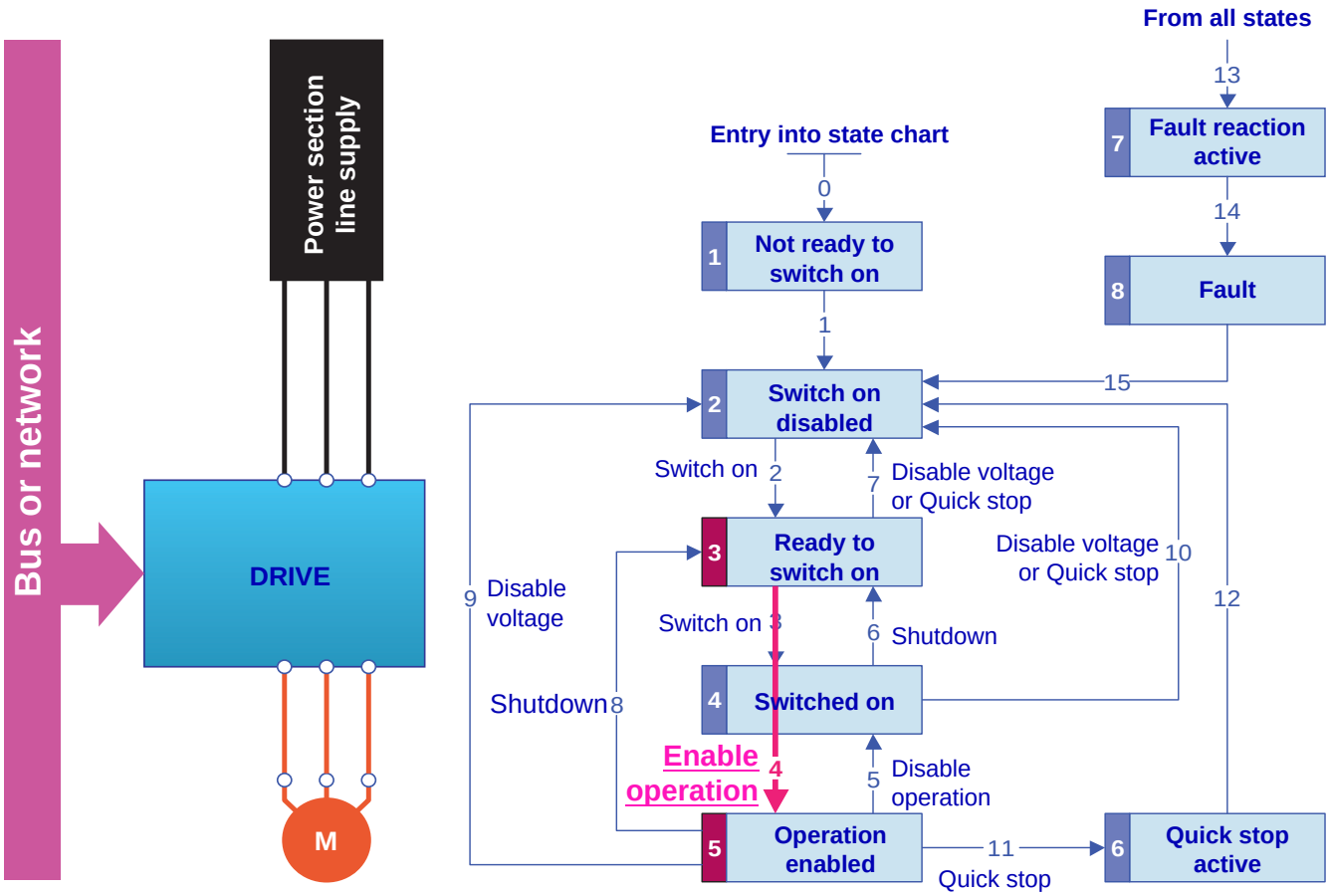
Sequence for a drive powered by the power section line supply

Both the power and control sections are powered by the power section line supply.
If power is supplied to the control section, it has to be supplied to the power section as well.
The following sequence must be applied:

- Step 1
  - Send the "2 - Shutdown" command



■ Step 2
- Check that the drive is in the "3 - Ready to switch on" state.
- Then send the "4 - Enable operation" command.
- The motor can be controlled (send a reference not equal to zero).

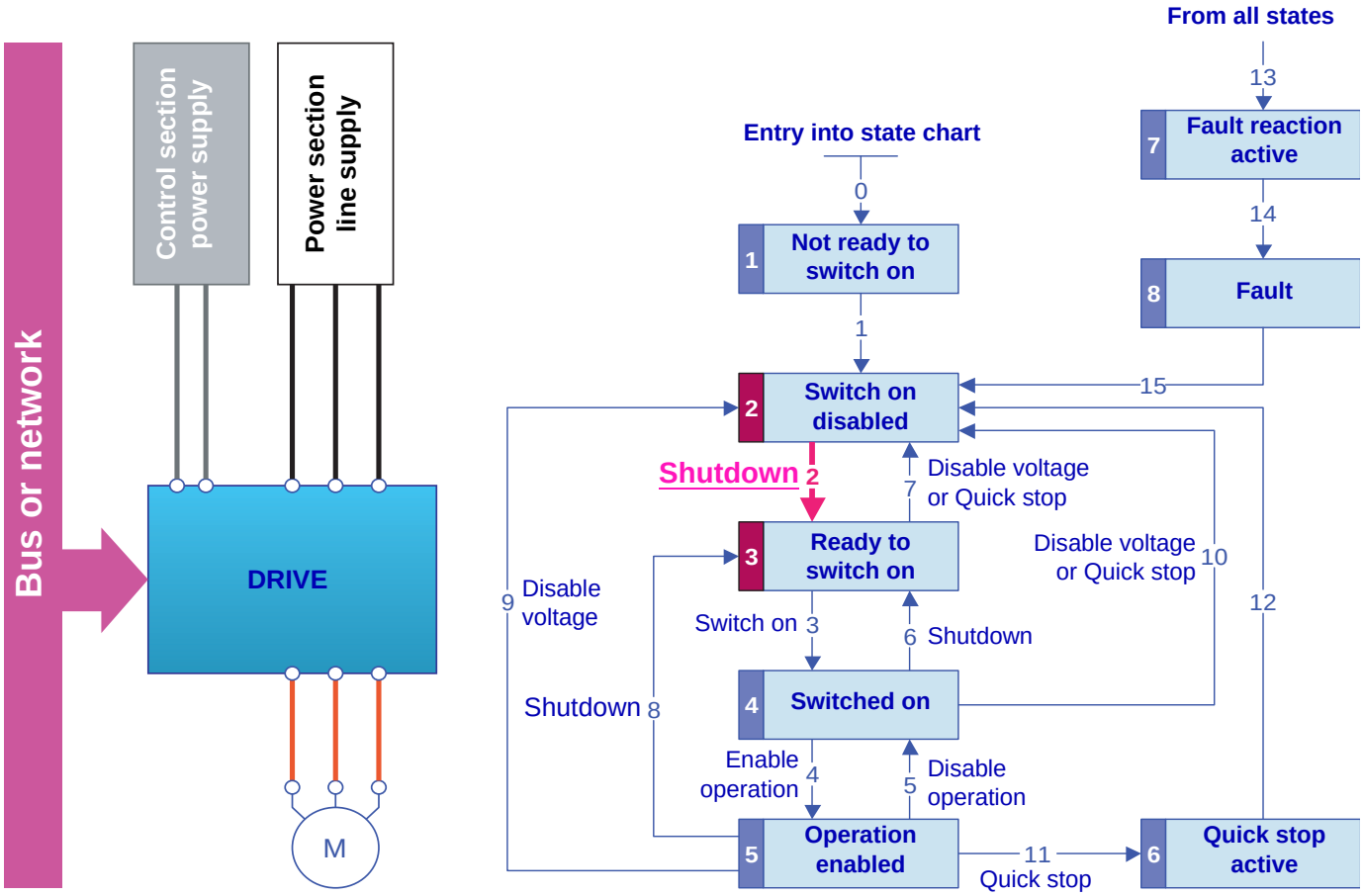


Note: It is possible, but not necessary, to send the "3 - Switch on" command followed by the "4 - Enable Operation" command to switch successively into the states "3 - Ready to Switch on", "4 - Switched on" and then "5 - Operation Enabled".
The "4 - Enable operation" command is sufficient.

Sequence for a drive with separate control section

Power is supplied separately to the power and control sections.
If power is supplied to the control section, it does not have to be supplied to the power section as well.
The following sequence must be applied:

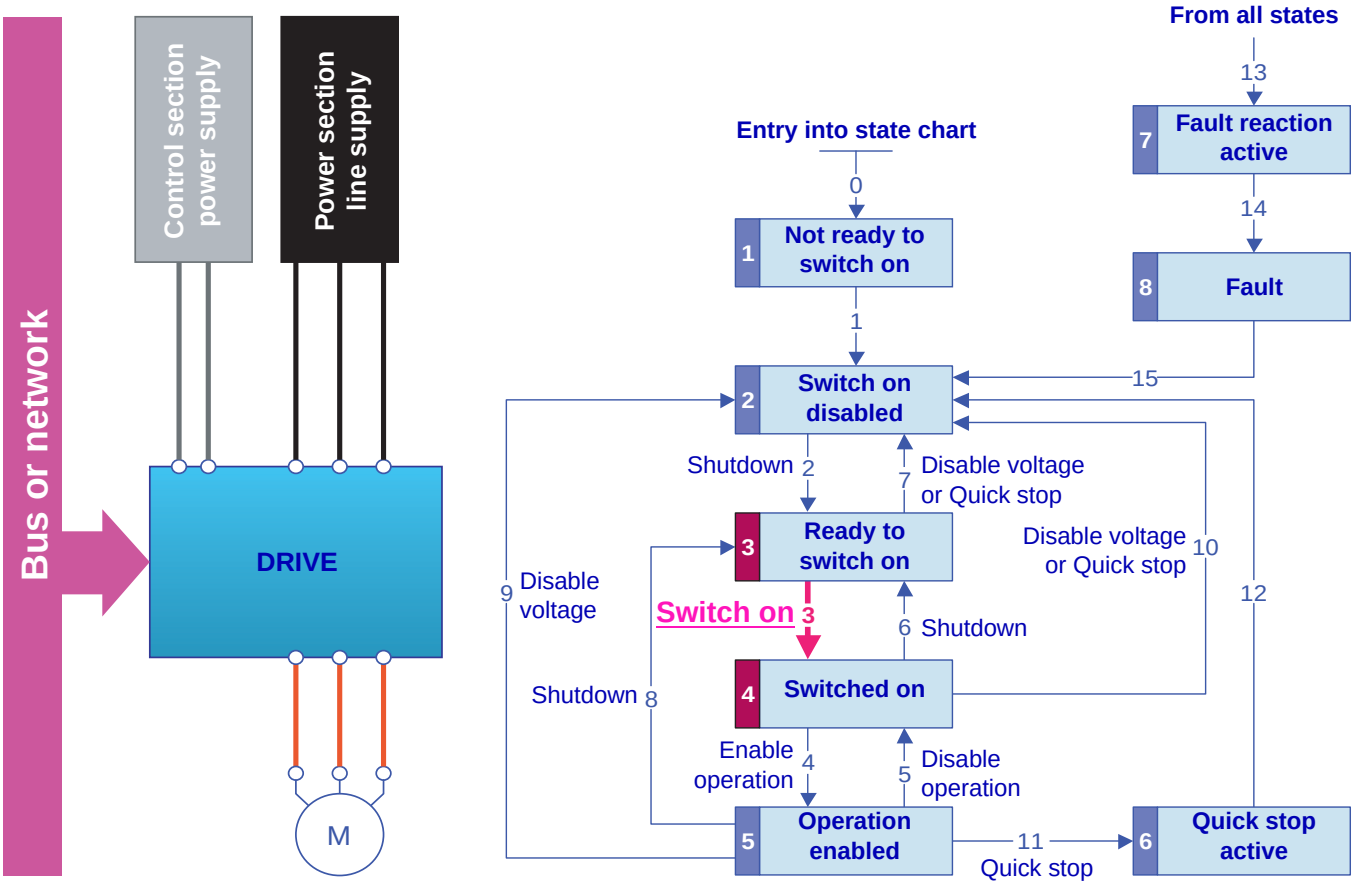
- Step 1
  - The power section line supply is not necessarily present.
  - Send the "2 - Shutdown" command



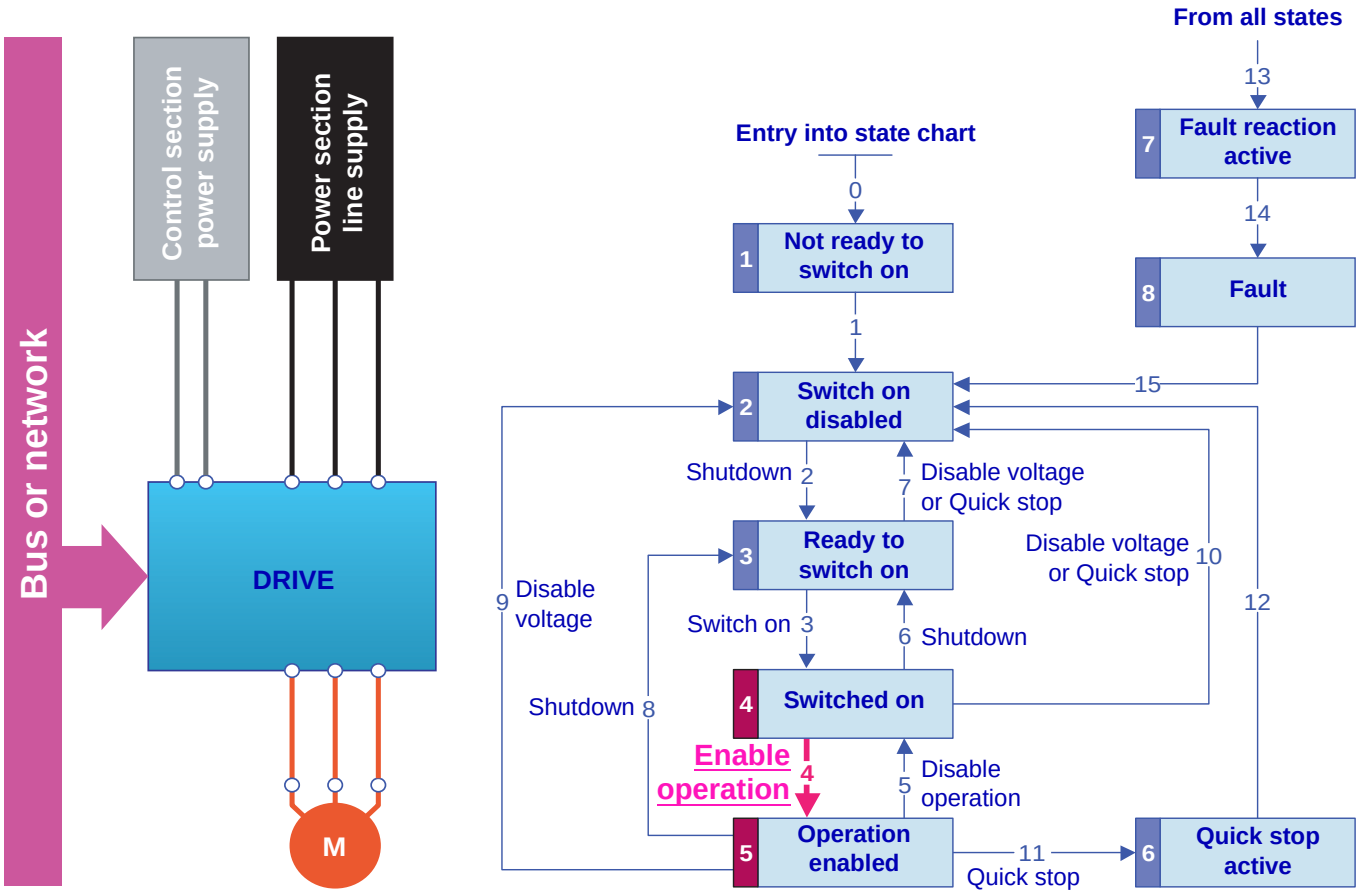
■ Step 2
- Check that the drive is in the "3 - Ready to switch on" state.
- Check that the power section line supply is present ("Voltage enabled" of the status word).

Power section line supply	Terminal display	Status word
Absent	nLP	16#●●21
Present	rdY	16#●●31

- Send the "3 - Switch on" command



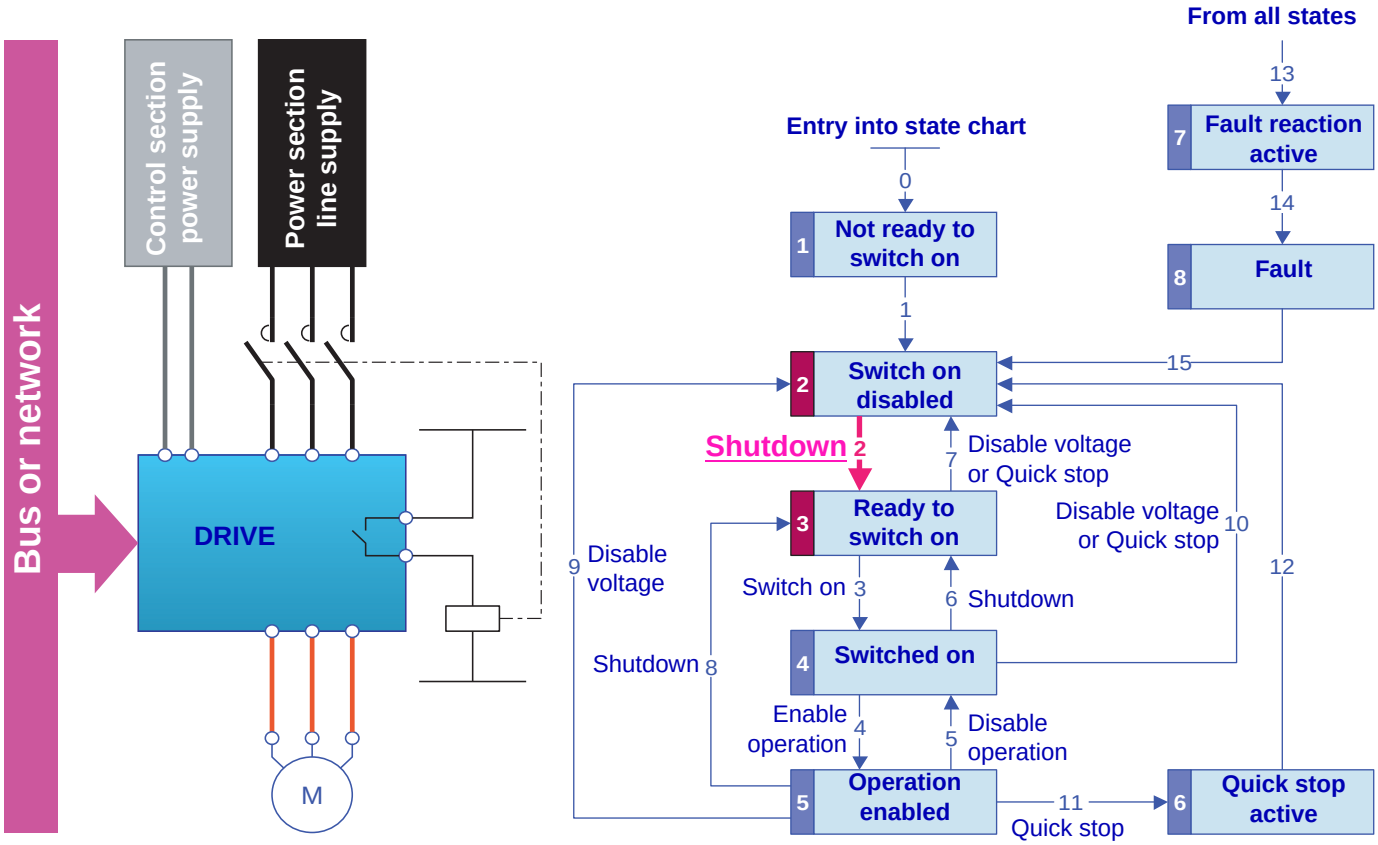
■ Step 3
- Check that the drive is in the "4 - Switched on" state.
- Then send the "4 - Enable operation" command.
- The motor can be controlled (send a reference not equal to zero).
- If the power section line supply is still not present in the "4 - Switched on" state after a time delay **[Mains V. time out]** (LCt), the drive will switch to fault mode (LCF).



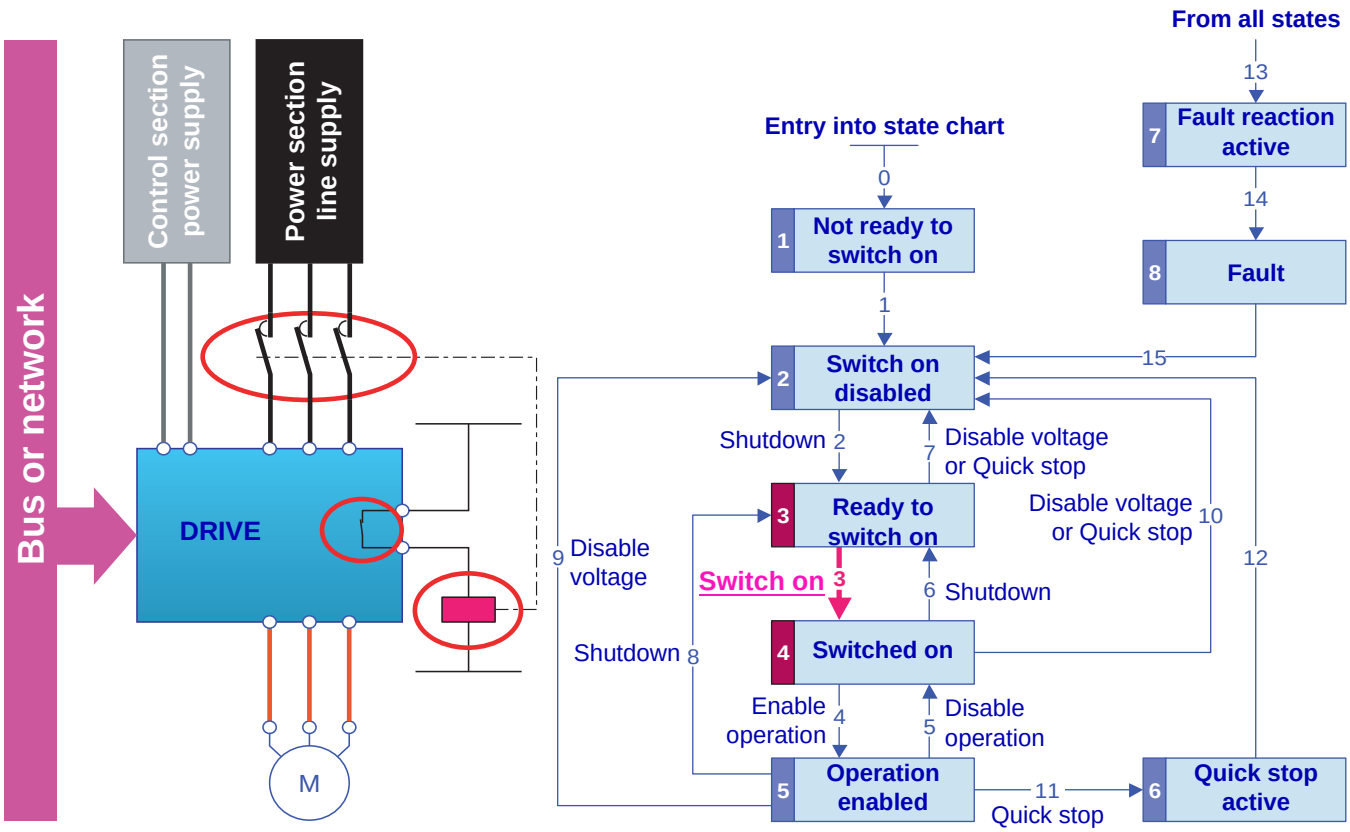
Sequence for a drive with line contactor control

Power is supplied separately to the power and control sections.
If power is supplied to the control section, it does not have to be supplied to the power section as well. The drive controls the line contactor.
The following sequence must be applied:

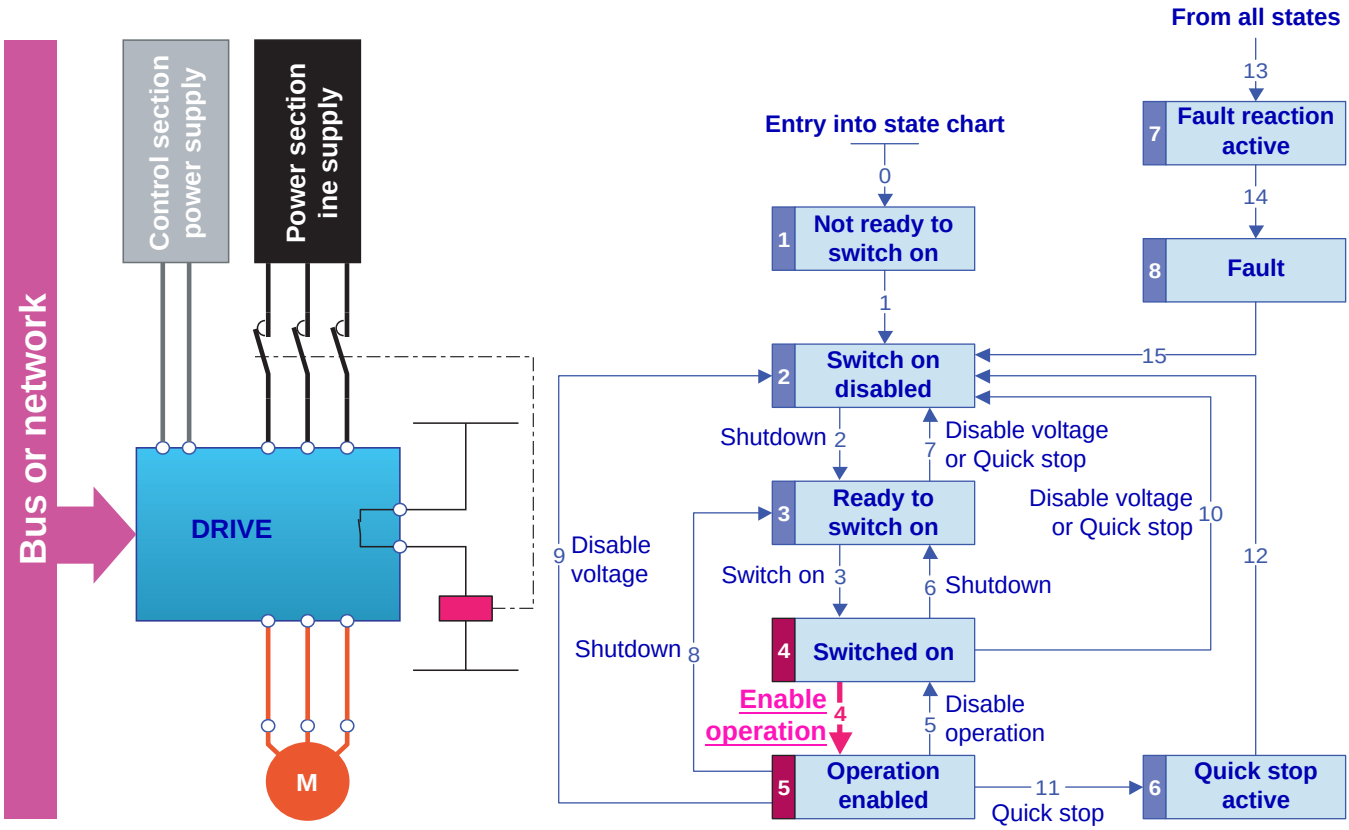
- Step 1
  - The power section line supply is not present as the line contactor is not being controlled.
  - Send the "2 - Shutdown" command



■ Step 2
- Check that the drive is in the "3 - Ready to switch on" state.
- Send the "3 - Switch on" command, which will close the line contactor and switch on the power section line supply.



■ Step 3
- Check that the drive is in the "4 - Switched on" state.
- Then send the "4 - Enable operation" command.
- The motor can be controlled (send a reference not equal to zero).
- If the power section line supply is still not present in the "4 - Switched on" state after a time delay **[Mains V. time out]** (LCt), the drive will switch to fault mode (LCF).



Command/reference switching

Channels

A channel is the name given to the source of a command or reference.

The 6 Altivar 71 channels are:
- The terminals
- The graphic display terminal
- The integrated Modbus ports
- The integrated CANopen port
- A network card
- The "Controller Inside" card

The Altivar 71 has 2 integrated Modbus ports. These 2 ports are physically independent of one another but together constitute a single logic channel.
The drive does not distinguish between commands and references that come from the Modbus network port and those that come from the Modbus HMI port.

With the Altivar 71 drive, it is possible to select the active command channel and the active reference channel:
- Via configuration
- Via switching at the terminals or via a communication network

Channel commands and references

All the drive's command and reference parameters are managed on a channel-by-channel basis.
Only the control word (CMd), speed reference (LFrd) and frequency reference (LFr) are switched.

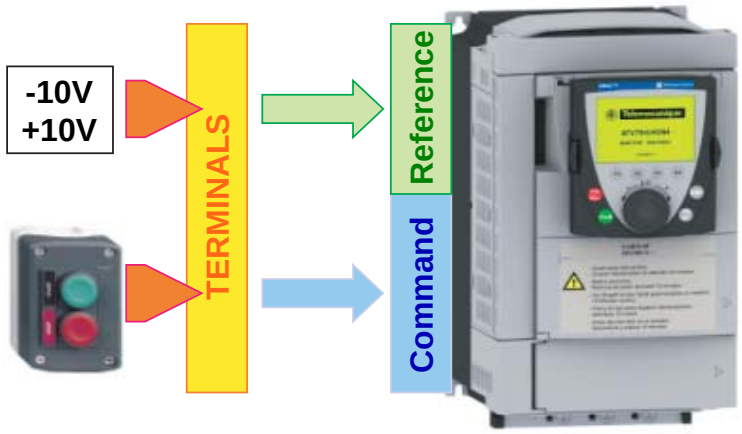
It is possible to identify the last value written for each channel and each command or reference parameter:

Parameter name	Parameter code				
	Taken into account by the drive	Modbus	CANopen	Communication card	Controller inside
Control word	CMd	CMd1	CMd2	CMd3	CMd4
Extended control word	CMI	CMI1	CMI2	CMI3	CMI4
Speed setpoint (rpm)	LFrd	LFd1	LFd2	LFd3	LFd4
Frequency setpoint (0.1 Hz)	LFr	LFr1	LFr2	LFr3	LFr4
Torque setpoint	Ltr	Ltr1	Ltr2	Ltr3	Ltr4
PID regulator setpoint	PISP	PIr1	PIr2	PIr3	PIr4
Multiplying coefficient	MFr	MFr1	MFr2	MFr3	MFr4

Command/reference switching

Not separate mode

Command and reference come from the same channel.

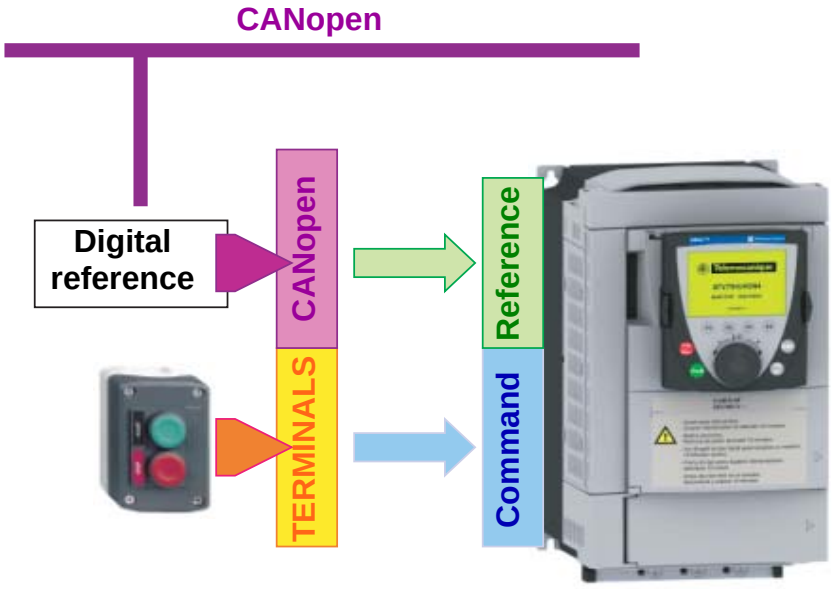


In CiA402 profile, not separate mode is configured via the terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[Not separ.]** (SIM)

Separate mode

Command and reference may come from different channels.



In CiA402 profile, separate mode is achieved via configuration with the terminal:

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[Separate]** (SEP)

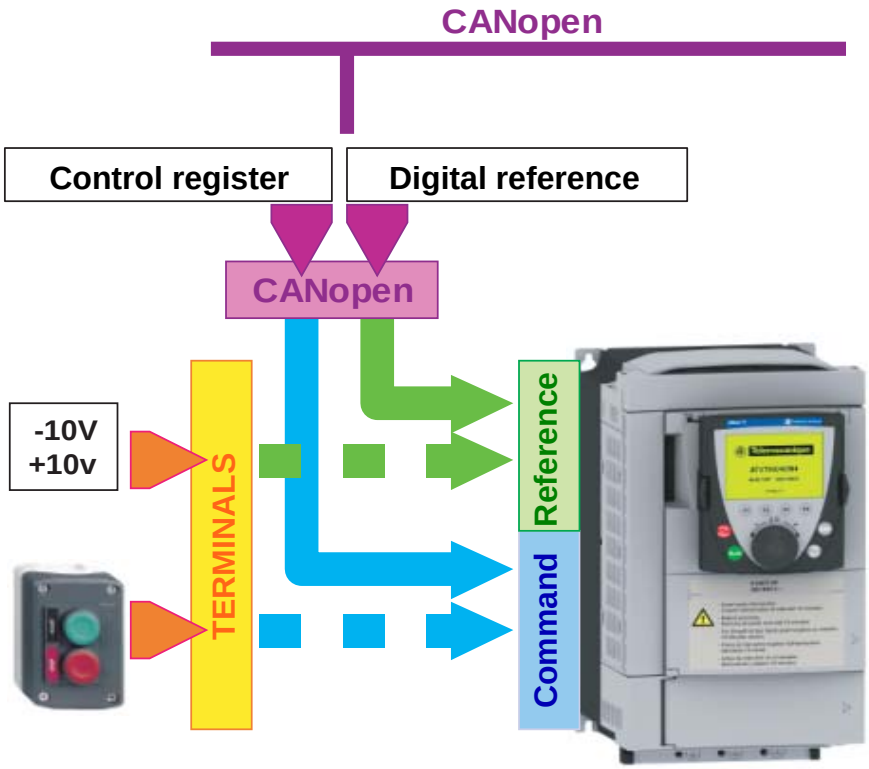
In I/O profile, the drive is automatically in separate mode.

Menu	Parameter	Value
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[I/O profile]** (IO)

Command/reference switching

Switching in not separate mode

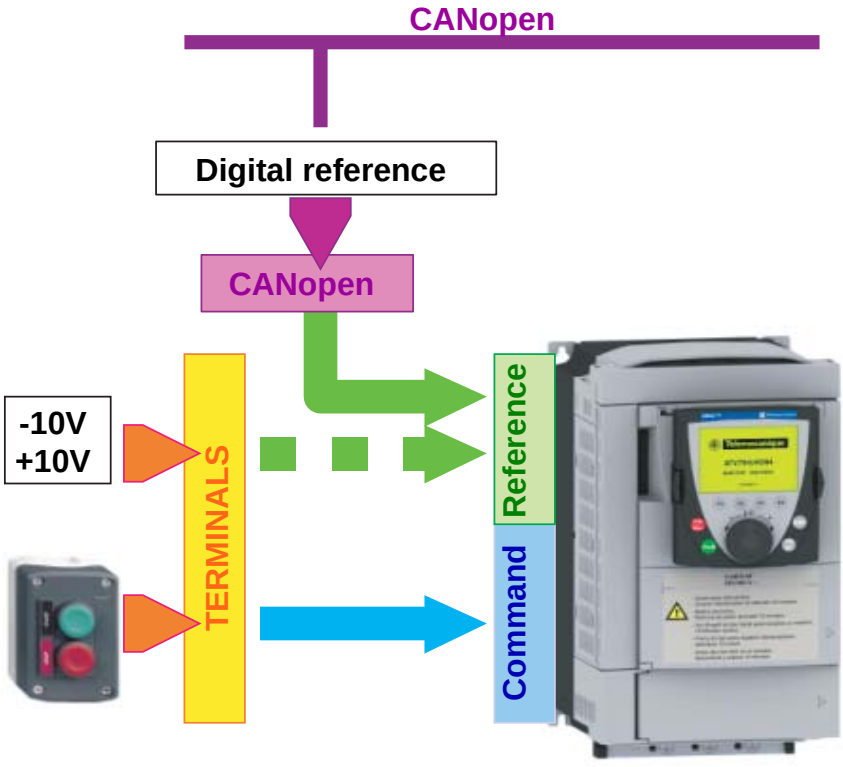
Switching takes place between 2 channels simultaneously for both reference and command.



In this example, the command and reference come either from CANopen or from the terminals.

Switching in separate mode

Switching can take place between 2 channels independently for the reference and command.



In this example, the command always comes from the terminals; the reference can come either from CANopen or from the terminals.

Channel switching

Reference channel configuration

Reference channel configuration enables reference sources to be predefined, which can be modified or switched subsequently via a command.

There are 3 predefined reference channels:
- Reference channel 1
- Reference channel 1B
- Reference channel 2

Reference channels 1 and 1B are used for drive application functions.
Reference channel 2 is connected directly to the reference limiting function, bypassing the application functions.

The predefined reference channels are assigned via the **[Ref. 1 channel]** (Fr1), **[Ref. 1B channel]** (Fr1b) and **[Ref. 2 channel]** (Fr2) configuration parameters, which can have the following values:
- **[No]** (nO): Not assigned
- **[AI1]** (AI1): Analog input AI1
- **[AI2]** (AI2): Analog input AI2
- **[AI3]** (AI3): Analog input AI3 (if extension card present)
- **[AI4]** (AI4): Analog input AI4 (if extension card inserted)
- **[HMI]** (LCC): Graphic display terminal
- **[Modbus]** (Mdb): Integrated Modbus
- **[CANopen]** (CAn): Integrated CANopen
- **[Com. card]** (nEt): Communication card (if inserted)
- **[C.Insid. card]** (APP): Controller Inside card (if inserted)
- **[RP]** (PI): Frequency input, (if card inserted)
- **[Encoder]** (PG): Encoder input (if card inserted)

Note: The "+speed/-speed" function is on reference channel 2. See the Programming Manual for more information.

Command channel configuration

Command channel configuration enables command sources to be predefined, which can be modified or switched subsequently via a command.

There are 2 predefined command channels:
- Command channel 1
- Command channel 2

The predefined command channels are assigned via the **[Cmd channel 1]** (Cd1) and **[Cmd channel 2]** (Cd2) configuration parameters, which can have the following values:
- **[Terminals]** (tEr): Terminals
- **[HMI]** (LCC): Graphic display terminal
- **[Modbus]** (Mdb): Integrated Modbus
- **[CANopen]** (CAn): Integrated CANopen
- **[Com. card]**(nEt): Communication card (if inserted)
- **[C.Insid. card]** (APP): Controller Inside card (if inserted)

Command/reference switching

Switches

A channel switch is used to select predefined channels.

It can be:

- Defined via configuration
- Actuated either by an input (terminals) or a control word bit (network)
- Written via a network during operation (modification of a configuration parameter)

The possible switch values are:

	Function reference switching **[Ref 1B switching]** (rCb)	Direct reference switching **[Ref. 2 switching]** (rFC)	Command switching **[Cmd switching]** (CCS)
Channel 1	Fr1	Fr1	Cd1
Channel 1B	Fr1b	-	-
Channel 2	-	Fr2	Cd2
Drive input	LI1 ... LI6		
Logic I/O card input	LI7 ... LI10		
Extended I/O card input	LI11 ... LI14		
Modbus command bit	bit 0 = C100 ... bit 15 = C115		
CANopen command bit	bit 0 = C200 ... bit 15 = C215		
Network command bit	bit 0 = C300 ... bit 15 = C315		
Controller Inside command bit	bit 0 = C400 ... bit 15 = C415		

The values Fr1, Fr1b, Fr2, Cd1 and Cd2 are either configured or written via the network during operation.

In I/O and CiA402 (separate mode) profiles, independent switching is possible:

Type	Channel 1		Channel 2	Switching
Reference	Function reference 1 **[Ref. 1 channel]** (Fr1)	↔	Function reference 1B **[Ref. 1B channel]** (Fr1b)	Function reference switching **[Ref 1B switching]** (rCb)
	Function reference 1 or 1B **[Ref. 1 channel]** (Fr1) **[Ref. 1B channel]** (Fr1b)	↔	Direct reference 2 **[Ref. 2 channel]** (Fr2)	Direct reference switching **[Ref. 2 switching]** (rFC)
Command	Command 1 **[Cmd channel 1]** (Cd1)	↔	Command 2 **[Cmd channel 2]** (Cd2)	Command switching **[Cmd switching]** (CCS)

In CiA402 profile (not separate mode) switching is simultaneous:

Type	Channel 1		Channel 2	Switching
Reference and Command	Function reference 1 or 1B **[Ref. 1 channel]** (Fr1) **[Ref. 1B channel]** (Fr1b)	↔	Direct reference 2 **[Ref. 2 channel]** (Fr2)	Direct reference switching **[Ref. 2 switching]** (rFC)
	Command 1 **[Cmd channel 1]** (Cd1)	↔	Command 2 **[Cmd channel 2]** (Cd2)	

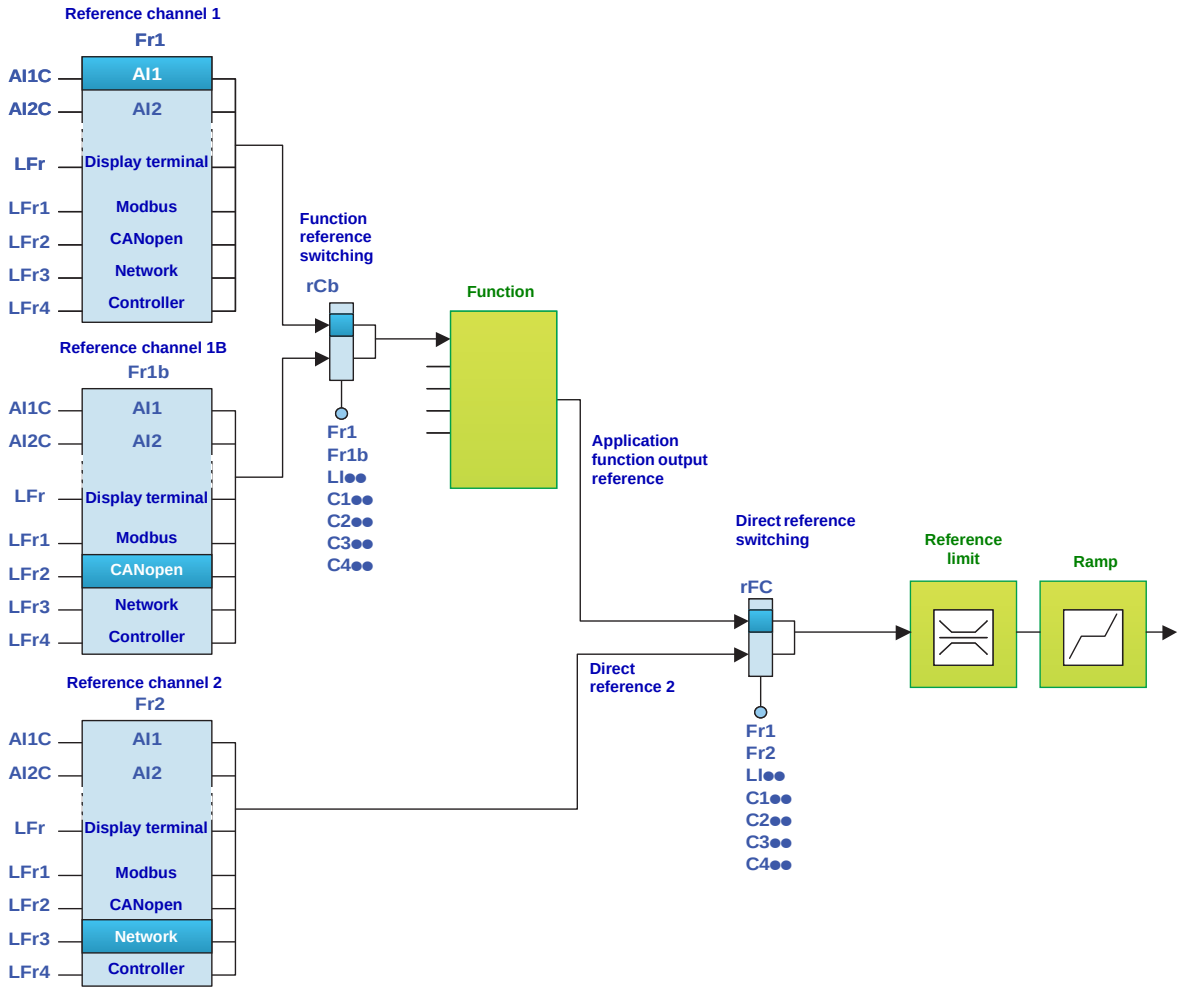
Command/reference switching

Reference switching principle

A detailed description is given in the Programming Manual.

This diagram shows reference switching as applicable to all the following modes:

- I/O profile
- CiA402 profile and separate mode
- CiA402 profile and not separate mode

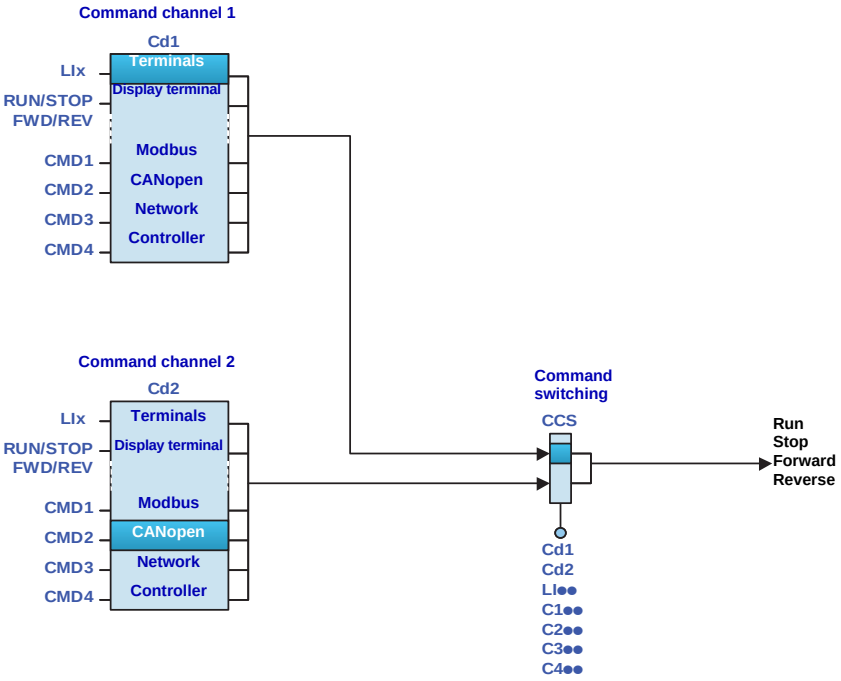


Command/reference switching

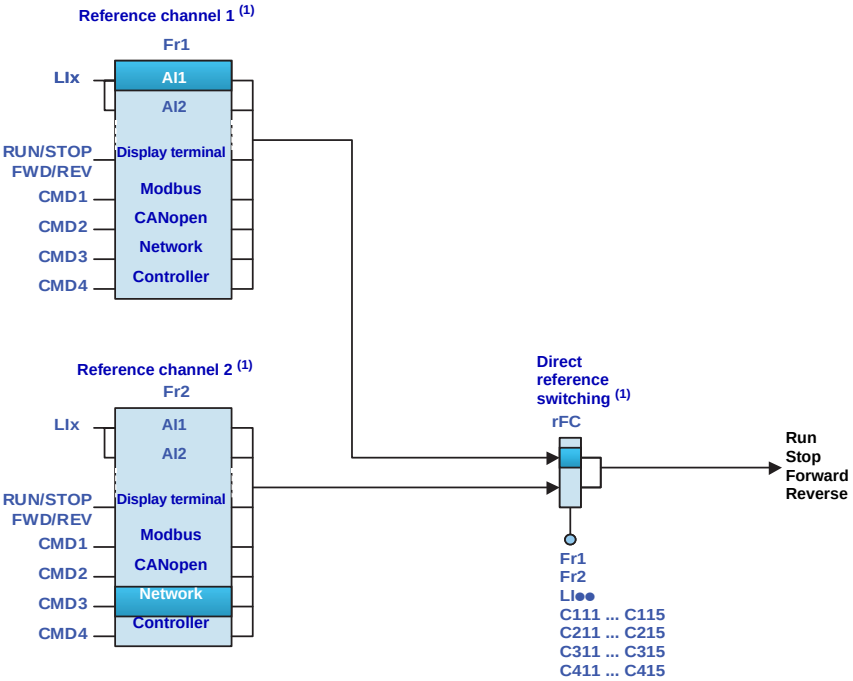
Command switching principle

A detailed description is given in the Programming Manual.

I/O profile or CiA402 profile (separate mode)



CiA402 profile (not separate mode)



(1) In not separate mode, command switching follows reference switching. It is therefore reference switching that switches the command.

Assigning control word bits

I/O profile

The I/O profile is extremely flexible in terms of assigning and switching the 16 control word bits.

To switch a control word bit using:
- an input from the terminals
- or a control word bit from another communication channel

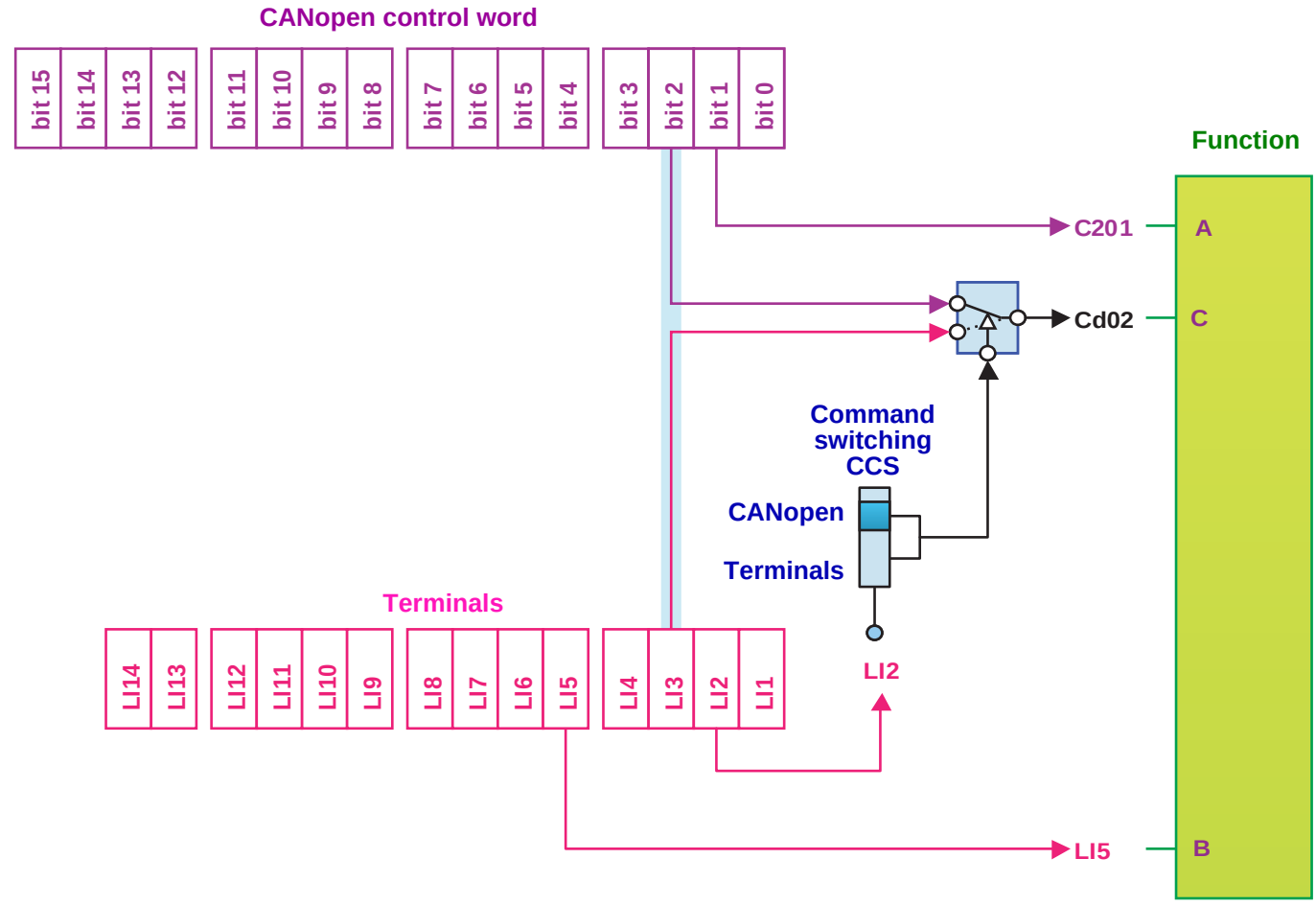
simply configure a switched assignment for the function input (CD●●), instead of a fixed assignment (C●●●).

Inputs and bits of the same order are switched.
Inputs LI1 to LI6 of the drive terminals can be used to switch control word bits 0 to 5.
With a logic I/O card using inputs LI7 to LI10, control word bits 6 to 9 can also be switched.
With an extended I/O card using inputs LI11 to LI14, control word bits 10 to 13 can also be switched.

Once a bit has been assigned to a switchable assignment, it can no longer be assigned to a fixed assignment, and vice versa. Example: Once a function input has been assigned to CD04, it cannot be assigned to LI5, C104, C204, C304 or C404.

Example

Function input A is always controlled by bit 1 of the CANopen control word.
Function input B is always controlled by input LI5 on the terminals.
Depending on the value of LI2, function input C is controlled:
- Either by input LI3 on the terminals
- Or by bit 2 of the CANopen control word



Command/reference switching

The tables below show assignments on the basis of input or bit.

Run on state command [2 wire] (2C):
In all macro configurations, bit 1 is assigned by default to the operating direction command **[Reverse assign.] (rrS)**.

Bit	Switched assignment	Fixed assignments						
		Drive terminals	Logic I/O card	Extended I/O card	Integrated Modbus	CANopen	Network card	"Controller Inside" card
bit 0	Forward							
bit 1	Cd01	LI2	-	-	C101	C201	C301	C401
bit 2	Cd02	LI3	-	-	C102	C202	C302	C402
bit 3	Cd03	LI4	-	-	C103	C203	C303	C403
bit 4	Cd04	LI5	-	-	C104	C204	C304	C404
bit 5	Cd05	LI6	-	-	C105	C205	C305	C405
bit 6	Cd06	-	LI7	-	C106	C206	C306	C406
bit 7	Cd07	-	LI8	-	C107	C207	C307	C407
bit 8	Cd08	-	LI9	-	C108	C208	C308	C408
bit 9	Cd09	-	LI10	-	C109	C209	C309	C409
bit 10	Cd10	-	-	LI11	C110	C210	C310	C410
bit 11	Cd11	-	-	LI12	C111	C211	C311	C411
bit 12	Cd12	-	-	LI13	C112	C212	C312	C412
bit 13	Cd13	-	-	LI14	C113	C213	C313	C413
bit 14	Cd14	-	-	-	C114	C214	C314	C414
bit 15	Cd15	-	-	-	C115	C215	C315	C415

Run on edge command [3 wire] (3C):
In all macro configurations, bit 2 is assigned by default to the operating direction command **[Reverse assign.] (rrS)**.

Bit	Switched assignment	Fixed assignments						
		Drive terminals	Logic I/O card	Extended I/O card	Integrated Modbus	CANopen	Network card	"Controller Inside" card
bit 0	Run authorization							
bit 1	Forward							
bit 2	Cd02	LI3	-	-	C102	C202	C302	C402
bit 3	Cd03	LI4	-	-	C103	C203	C303	C403
bit 4	Cd04	LI5	-	-	C104	C204	C304	C404
bit 5	Cd05	LI6	-	-	C105	C205	C305	C405
bit 6	Cd06	-	LI7	-	C106	C206	C306	C406
bit 7	Cd07	-	LI8	-	C107	C207	C307	C407
bit 8	Cd08	-	LI9	-	C108	C208	C308	C408
bit 9	Cd09	-	LI10	-	C109	C209	C309	C409
bit 10	Cd10	-	-	LI11	C110	C210	C310	C410
bit 11	Cd11	-	-	LI12	C111	C211	C311	C411
bit 12	Cd12	-	-	LI13	C112	C212	C312	C412
bit 13	Cd13	-	-	LI14	C113	C213	C313	C413
bit 14	Cd14	-	-	-	C114	C214	C314	C414
bit 15	Cd15	-	-	-	C115	C215	C315	C415

CiA402 profile

Control word bits of the same order are switched if the function inputs are assigned to switchable bits.
Switching may be possible using LI12, LI13 or LI14 on an extended I/O card.

Once a bit has been assigned to a switchable assignment, it can no longer be assigned to a fixed assignment, and vice versa.
Example: Once a function input has been assigned to Cd04, it cannot be assigned to LI5, C104, C204, C304 or C404.

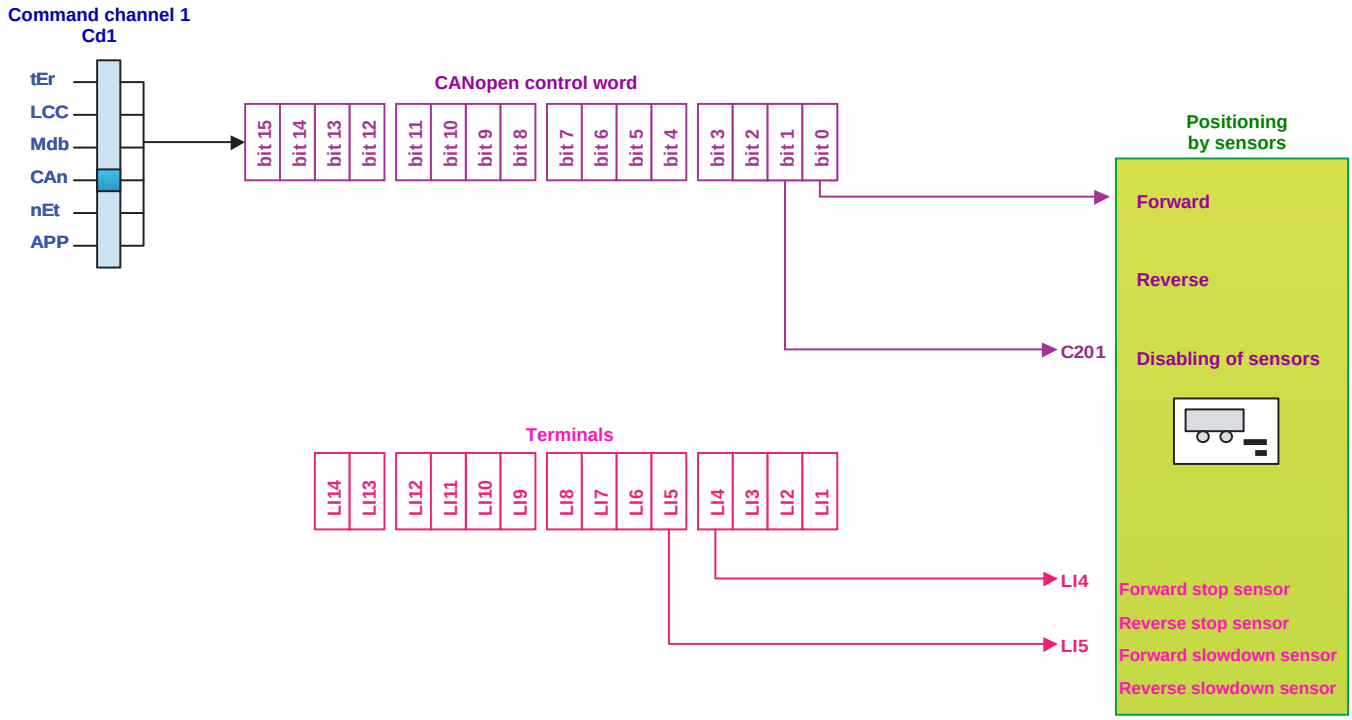
The table below shows assignments on the basis of input or bit.

Bit	**Switched assignment**	**Fixed assignments**						
		Drive terminals	Logic I/O card	Extended I/O card	Integrated Modbus	CANopen	Network card	"Controller Inside" card
bit 0	-	LI1	-	-	-	-	-	-
bit 1	-	LI2	-	-	-	-	-	-
bit 2	-	LI3	-	-	-	-	-	-
bit 3	-	LI4	-	-	-	-	-	-
bit 4	-	LI5	-	-	-	-	-	-
bit 5	-	LI6	-	-	-	-	-	-
bit 6	-	-	LI7	-	-	-	-	-
bit 7	-	-	LI8	-	-	-	-	-
bit 8	-	-	LI9	-	-	-	-	-
bit 9	-	-	LI10	-	-	-	-	-
bit 10	-	-	-	LI11	-	-	-	-
bit 11	Cd11	-	-	LI12	C111	C211	C311	C411
bit 12	Cd12	-	-	LI13	C112	C212	C312	C412
bit 13	Cd13	-	-	LI14	C113	C213	C313	C413
bit 14	Cd14	-	-	-	C114	C214	C314	C414
bit 15	Cd15	-	-	-	C115	C215	C315	C415

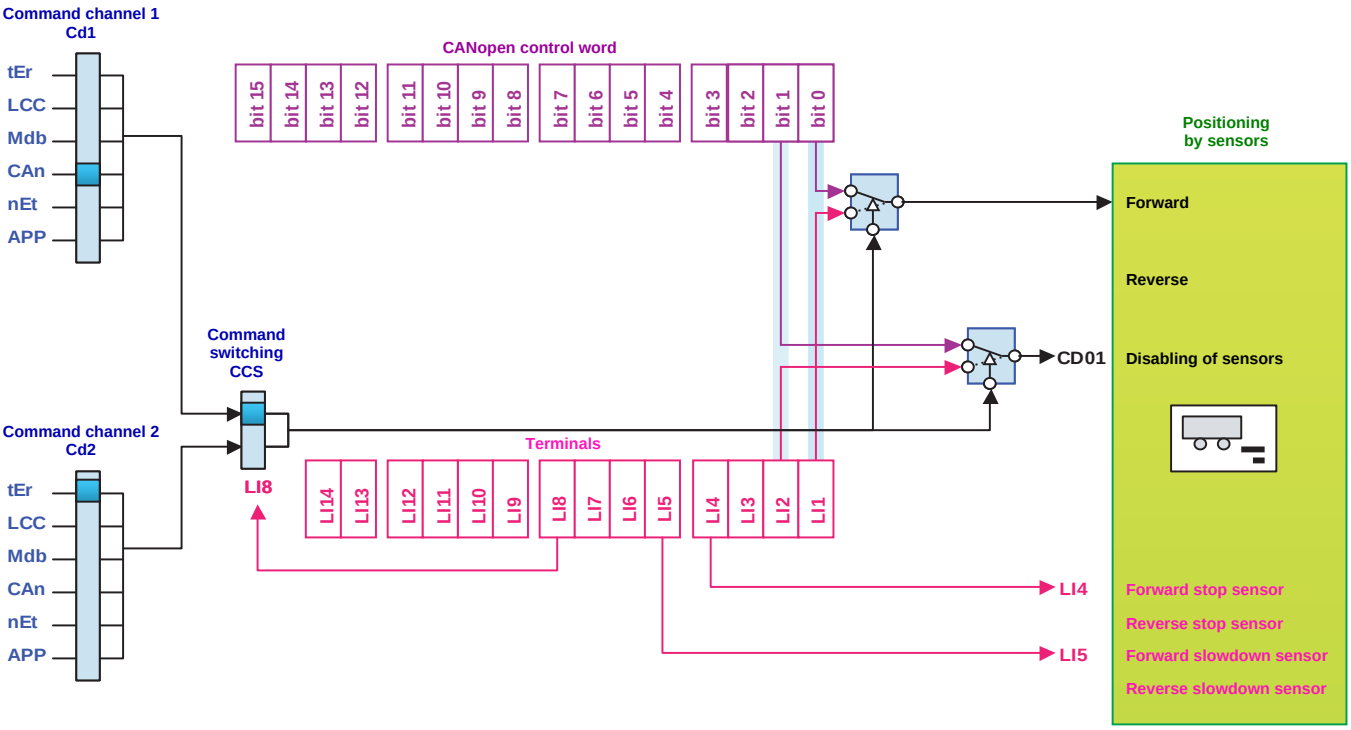
Example: I/O profile with positioning by sensors function

Let us return to the example given in the "I/O profile" section.

In the diagram below, the command comes from CANopen alone:



For a different application, provision must be made to enable the switching of the run commands and the disabling of the sensors and the reference at the terminals.
The new diagram will look like this:



Command/reference switching

Configure the following parameters:

Parameter	Value	Comment
Type of command	On state (2 wire)	The run command is obtained via bit 0 of the CANopen control word.
Profile	IO profile	
Reference 1 configuration	CANopen	Reference 1 comes from the CANopen card.
Command 1 configuration	CANopen	Command 1 comes from the CANopen card.
Reference 1B configuration	AI1	Reference 1B comes from analog input 1. Reference 1B has to be taken rather than reference 2, as use is to be made of the positioning function.
Command 2 configuration	Terminals	Command 2 comes from the terminals.
Assignment of stop sensor	Input LI4	The sensor inputs are not switched.
Assignment of slowdown sensor	Input LI5	
Assignment of sensor disable command	Bit 1 switched.	
Assignment of command switch	Input LI8	The LI8 inputs enable the command and reference to be switched.
Assignment of application reference switch 1/1B	Input LI8	

Configuration via the graphic display terminal:

Menu/submenu	Parameter	Value
[1.5 INPUTS / OUTPUTS CFG] (I-O-)	**[2/3 wire control]** (tCC)	**[2 wire]** (2C)
[1.6 - COMMAND] (CtL-)	**[Profile]** (CHCF)	**[I/O profile]** (IO)
	[Ref. 1 channel] (Fr1)	**[CANopen]** (CAn)
	[Cmd channel 1] (Cd1)	**[CANopen]** (CAn)
	[Cmd channel 2] (Cd2)	**[Terminals]** (tEr)
	[Cmd switching] (CCS)	**[LI8]** (LI8)
[1.7 APPLICATION FUNCT.] (FUn-) **[POSITIONING BY SENSORS]** (LPO-)	**[Stop FW limit sw.]** (SAF)	**[LI4]** (LI4)
	[Slowdown forward] (dAF)	**[LI5]** (LI5)
	[Disable limit sw.] (CLS)	**[Cd01]** (Cd01)
	[Ref. 1B channel] (Fr1b)	**[Ref. AI1]** (AI1)
	[Ref 1B switching] (rCb)	**[LI8]** (LI8)

Copy on switching

When switching channels, it is possible to copy the reference or command from function channel 1 to direct channel 2.

Menu	Submenu
[1.6 COMMAND] (CtL-)	

Parameter	Possible values
[Copy channel 1 --> 2]	No copy. **[No]** (nO) Copy reference **[Reference]** (SP) Copy command **[Command]** (Cd) Copy command and reference **[Cmd + ref.]** (ALL)

If a copy is not made, the drive stops according to the configured stop type **[Type of stop]** (Stt) until the first command and reference are received.

The reference before ramp (FrH) is copied unless the direct channel 2 reference is via +/- speed.
If the direct channel 2 reference is via +/- speed, the after ramp (rFr) reference is copied.

If the direct channel 2 command is via the terminals, the function channel 1 command is not copied even in pulse control (3-wire) **[3 wire]** (3C).

If the direct channel 2 reference is via AI1, AI2, AI3, AI4, the encoder input or frequency input, the function channel 1 reference is not copied.

Forced local

Definition

Forced local mode supports switching to the terminals or display terminal.
This function complements channel switching and makes it possible to make use of an existing function from the Altivar 58 range.

Forced local mode is only available in CiA402 profile, not in I/O profile.

All other communication takes priority over forced local mode.

Forced local mode can be configured via the display terminal:

Menu	Submenu
[1.9 COMMUNICATION] (COM-)	**[FORCED LOCAL]** (LCF-)

Parameter	Possible values
Forced local switch **[Forced local assign.]** (FLO)	Function inactive: **[No]** (nO) Assignment to a logic input LI1 ... LI14: **[LI1]** (LI1) ... **[LI14]** (LI14) Forced local mode is active when the input is at state 1.
Forced local channel **[Forced local Ref.]** (FLOC)	Forced local on stop **[No]** (nO) Assignment of the command to the terminals and of the reference to one of the analog inputs AI1 ... A14 **[AI2 ref.]** (AI2), **[AI3 ref.]** (AI3), **[AI4 ref.]** (AI4) Assignment of the command to the terminals and of the reference to the frequency input (if card present) **[Pulse Input]** (PI) Assignment of the reference **[HMI Frequency ref.]** (LFr) and of the command (RUN/STOP/FWD/REV buttons) to the graphic display terminal **[HMI]** (LCC)

In "forced local" state:
- Any attempts to write the parameter via one of these channels is rejected (applies to command, reference and adjustment parameters).
- However, the parameters can be read.
- The drive does not register a communication fault.

On exiting "forced local" mode:
- The drive copies the run commands, the direction and the forced local reference to the active channel (maintained).
- Monitoring of the active command and reference channels resumes following a time delay **[Time-out forc. local]** (FLOt).
- Drive control only takes effect once the drive has received the reference **and** the command.

The time delay **[Time-out forc. local]** (FLOt) (default value = 10 s) can be configured via the remote graphic display terminal:

Menu	Submenu	Parameter
[1.9 COMMUNICATION] (COM-)	**[FORCED LOCAL]** (LCF-)	**[Time-out forc. local]** (FLOt)

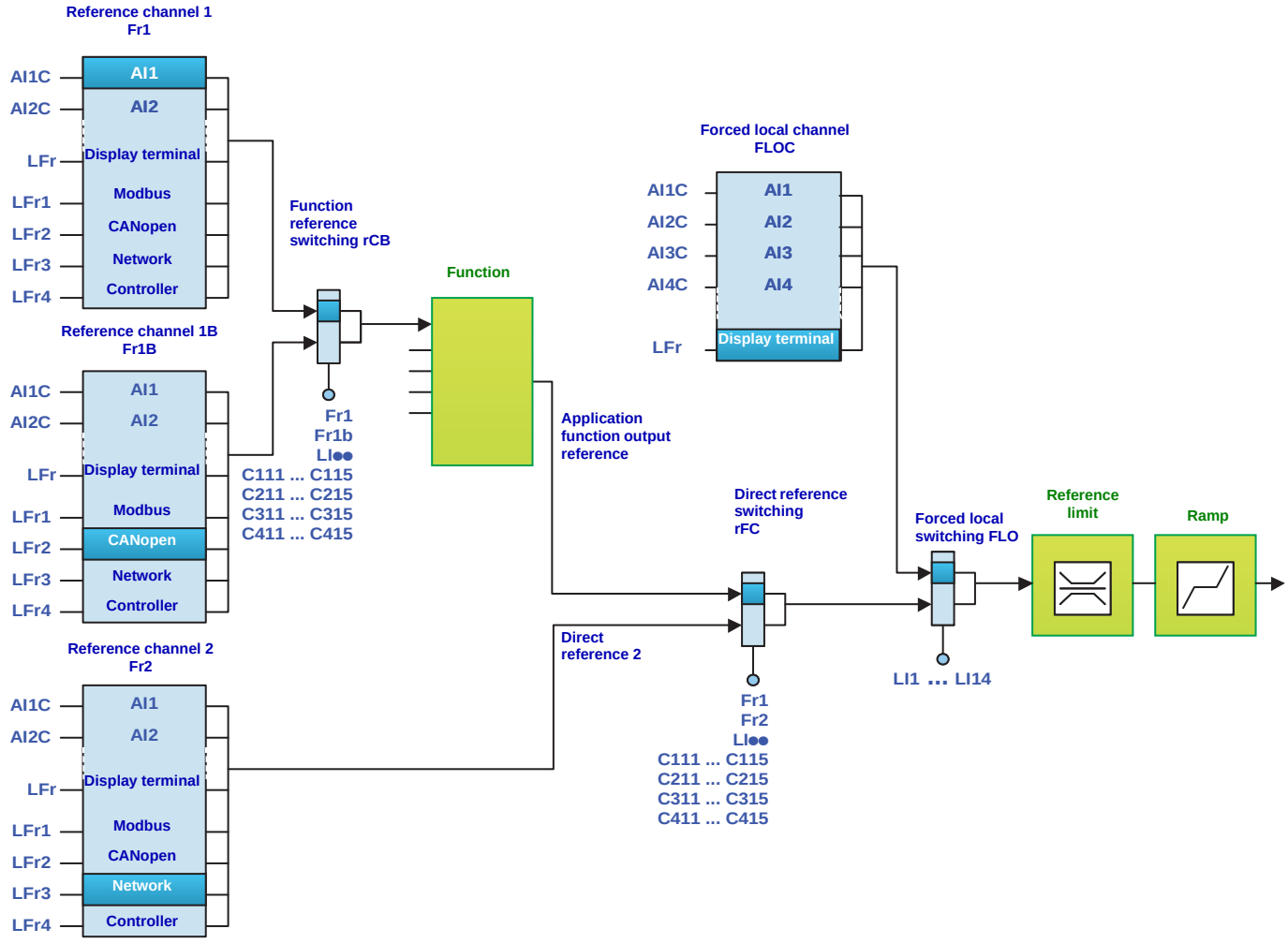
Forced local

Forced local mode and reference switching

A detailed description is given in the Programming Manual.

This diagram shows reference switching as applicable to the following modes:

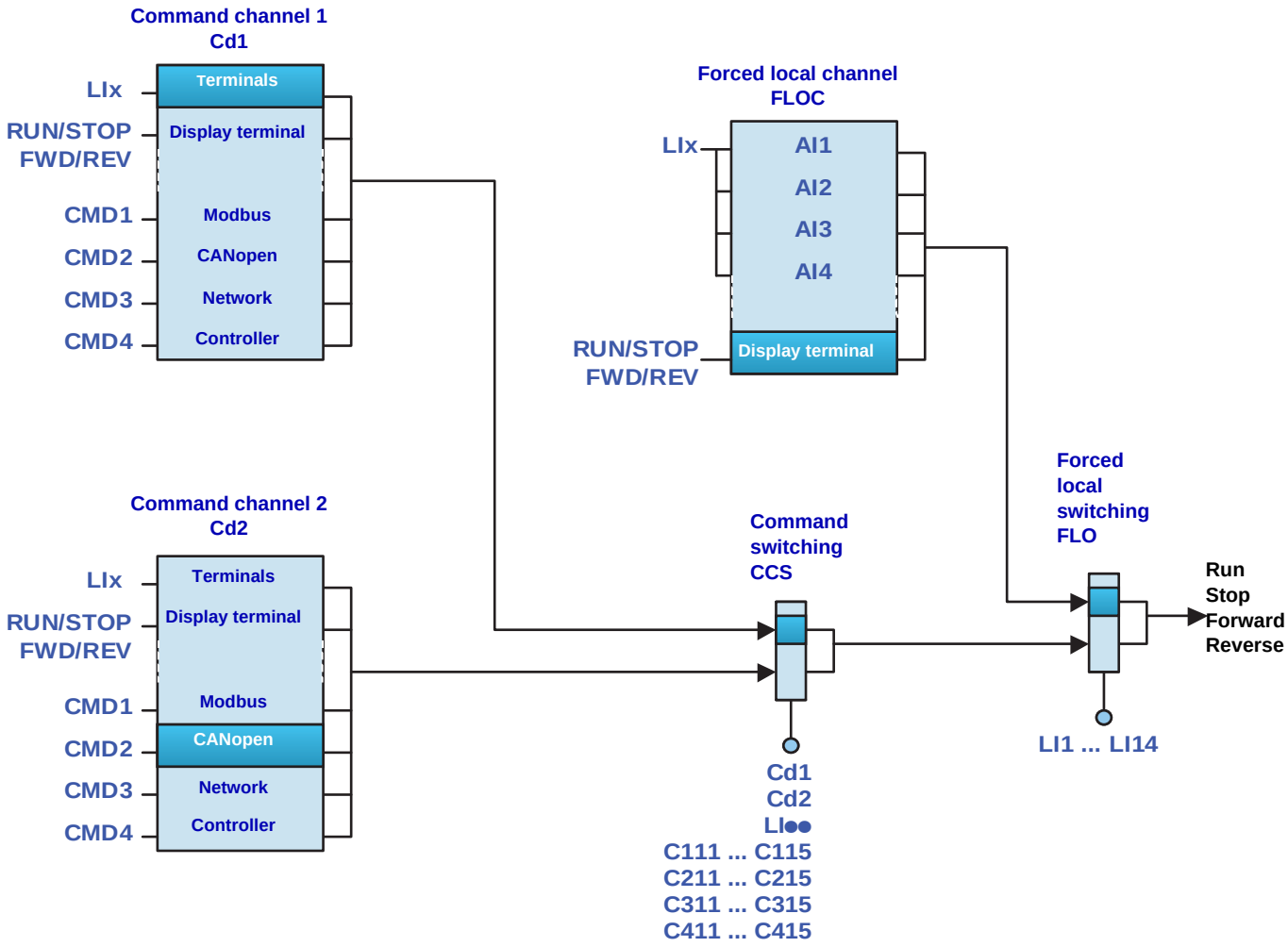
- CiA402 profile and separate mode
- CiA402 profile and not separate mode



Forced local mode and command switching

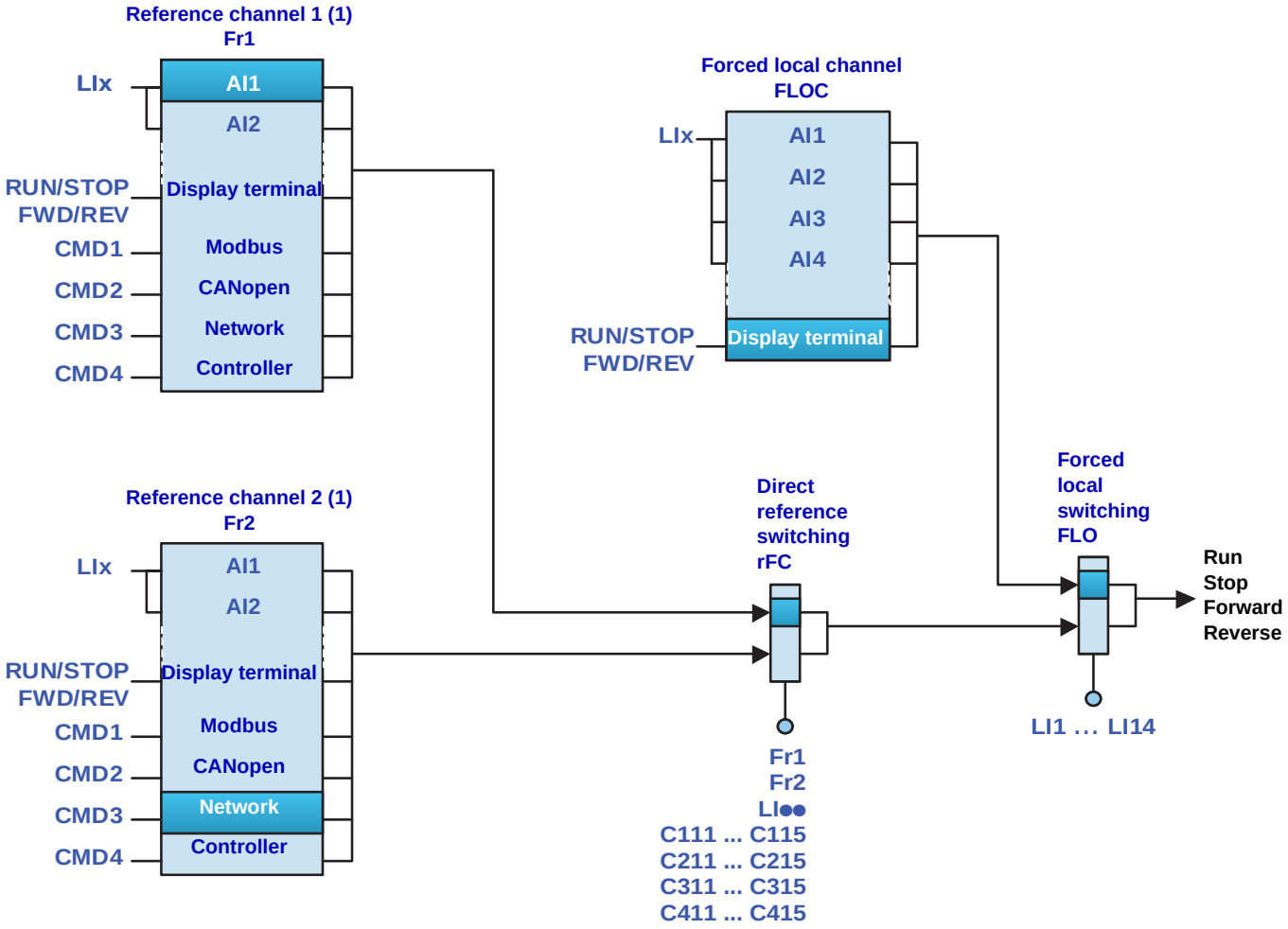
A detailed description is given in the Programming Manual.

CiA402 profile (separate mode)



Forced local

CiA402 profile (not separate mode)



(1) In not separate mode, command switching follows reference switching. It is therefore reference switching that switches the command.

Priority stops

Priority stops on the graphic display terminal

If the graphic display terminal is not the active command channel, pressing the STOP key on the graphic display terminal causes a freewheel stop if:

- The **[Stop Key priority]** (PSt) parameter in the **[1.6 - COMMAND]** (CtL-) menu is configured as **[Yes]** (YES) (factory setting).

If the graphic display terminal is the active command channel, the STOP key causes a stop according to the type of stop configured in the **[Type of stop]** (Stt) parameter, regardless of the value of the **[Stop Key priority]** (PSt) parameter.

The effect of the graphic display terminal is not dependent on the profile.

Priority stops via the terminals or the network

I/O profile

In the I/O profile:

Stop and fault commands, configured as fixed assignments (LI●●, C1●●, C2●●, C3●●, C4●●), on terminal inputs or control word bits, have priority even if the channel is not active.

Commands, configured as switched assignments (Cd00 ... Cd15), are active if and only if the channel is active.

Fixed assignments are configured using the following values:

Channel	Run on state command **[2 wire] (2C)**	Run on edge command **[3 wire] (3C)**
Drive terminals	LI2 ... LI6	LI3 ... LI6
Logic I/O card	LI7 ... LI10	
Extended I/O card	LI11 ... LI14	
Integrated Modbus	C101 ... C115	C102 ... C115
CANopen	C201 ... C215	C202 ... C215
Communication card	C301 ... C315	C302 ... C315
"Controller Inside" card	C401 ... C415	C402 ... C415

Command	Configuration	= 0	= 1	Value for starting(1)
Freewheel stop	**[Freewheel stop ass.]** (nSt)	Stop	No stop	1
Fast stop	**[Fast stop assign.]** (FSt)	Stop	No stop	1
DC injection braking	**[DC injection assign.]** (dCI)	No braking	Braking	0
External fault	**[External fault ass.]** (EtF)	No fault	Fault	0

(1) If the assignment is fixed, this is the value necessary for starting, even if another channel is active.

In the case of a run on edge command, configured via **[3 wire]** (3C) :
The stop command (run enable) is assigned by factory default to switched order 0 (equivalent to Cd00):

- It is active at the terminals (LI1) only if the terminals are active.
- It is active via the network (bit 0) only if the network is active.

Priority stops

CiA402 profile

In the CiA402 profile, separate or not separate mode:

External stop and fault commands, configured as fixed assignments (LI●●, C1●●, C2●●, C3●●, C4●●), on terminal inputs or control word bits, have priority even if the channel is not active.

Commands, configured as switched assignments (Cd11 ... Cd15), are active if, and only if, the channel is active.

Fixed assignments are configured using the following values:

Channel	Run on state command [2 wire] (2C)	Run on edge command [3 wire] (3C)
Drive terminals	LI2 ... LI6	LI3 ... LI6
Logic I/O card	LI7 ... LI10	
Extended I/O card	LI11 ... LI14	
Integrated Modbus	C111 ... C115	
CANopen	C211 ... C215	
Communication card	C311 ... C315	
"Controller Inside" card	C411 ... C415	

C●11 is assigned by default to the reverse direction command **[Reverse assign.]** (rrS).

At the terminals:

Command	Configuration	= 0	= 1	Value for starting(1)	State reached since 5-Operation enabled
Freewheel stop	**[Freewheel stop ass.]** (nSt)	Stop	No stop	1	2-Switch on disabled
Fast stop	**[Fast stop assign.]** (FSt)	Stop	No stop	1	4-Switched on
DC injection braking	**[DC injection assign.]** (dCI)	No braking	Braking	0	5-Operation enabled
External fault	**[External fault ass.]** (EtF)	No fault	Fault	0	8-Fault

(1) If the assignment is fixed, this is the value necessary for starting, even if another channel is active.

In run on edge command, configured by **[3 wire]** (3C), the stop command (run enable) is assigned by factory default to LI1. This command is active even if the terminals are not the active channel.

Via the network:

Command	Configuration	= 0	= 1	Value for starting(1)	State reached since 5-Operation enabled
Fast stop	**[Fast stop assign.]** (FSt)	No stop	Stop	0	4-Switched on
DC injection braking	**[DC injection assign.]** (dCI)	No braking	Braking	0	5-Operation enabled
External fault	**[External fault ass.]** (EtF)	No fault	Fault	0	8-Fault

(1) If the assignment is fixed, this is the value necessary for starting, even if another channel is active.

In the CiA402 profile, the freewheel stop command **[Freewheel stop ass.]** (nSt) cannot be assigned to the control word. Freewheel stop is obtained using the "5-Disable operation" or "Halt" commands with the type of stop **[Type of stop]** (Stt) parameter configured as **[Freewheel]** (nSt).

Communication monitoring

The Altivar 71 drive incorporates communication monitoring mechanisms.

Principle

Following initialization (power-up), the drive waits until at least one command or reference parameter has been written for the first time by the network.

Then, the network is monitored and, if a network fault occurs, the drive reacts according to the configuration (ignore fault, stop on drive fault, maintain speed, fallback speed, or stop without fault).

The drive can start only once all the command and reference parameters of the active network have been written.

Network monitoring criteria

The network is monitored in accordance with protocol-specific criteria, which are summarized in the table below and specified in the corresponding protocol manual.

Protocol	Network problem	Related drive fault (1)
Integrated Modbus ports	• Adjustable time-out for received requests destined for the drive	**[Modbus com.]** (SLF1)
Integrated CANopen port	• Bus Off • Life Guarding • CANoverrun • Heartbeat • NMT state machine transition	**[CANopen com.]** (COF)
Modbus TCP/IP Ethernet card	Network management fault: • FDR fault • IP address duplication fault	**[External fault com.]** (EPF2)
	Communication fault: • Adjustable time-out for received control word (I/O scanning or messaging) • Network overload	**[Com. network]** (CnF)
Fipio card	• Non-adjustable time-out for received periodic variables destined for the drive	

Modbus Plus card	• Adjustable time-out:
	  • Either for received periodic variables (Peer cop) destined for the drive
	  • Or for Modbus messages destined for the drive, if no periodic variables (Peer cop) configured	

Modbus card	• Fixed time-out (10 s) for received requests destined for the drive	
Uni-Telway card	• Fixed time-out (10 s) for master polling	
Profibus DP card	• Adjustable time-out (via the network configuration software) for received periodic variables (PZD and PKW) destined for the drive	
INTERBUS card	• Time-out for received periodic variables destined for the drive	

DeviceNet card	Communication fault:
	• Adjustable time-out:
	  • Either for received periodic variables (Polling and COS) destined for the drive
	  • Or for network activity, if no periodic variables configured	

	Configuration fault: • The drive configuration is not compatible with the selected assembly	**[External fault com.]** (EPF2)

(1) If the drive is configured to trip on a fault in the event of a network fault

If an anomaly is detected, the port or network card indicates a network fault.

Behavior in the event of a network fault

In the event of a network fault (on a monitored channel), the drive reacts as specified in the **[1.8 - FAULT MANAGEMENT]** (FLt-) menu (**[COM. FAULT MANAGEMENT]** (CLL-) submenu) by the following parameters:

- **[Modbus fault mgt]** (SLL) for integrated Modbus
- **[CANopen fault mgt]** (COL) for CANopen
- **[Network fault mgt]** (CLL) for a network card

The Modbus TCP/IP Ethernet card can also trigger an external fault (in the event of an FDR fault or IP address duplication fault), to which the drive reacts as specified in the **[1.8 – FAULT MANAGEMENT]** (FLt-) menu (**[EXTERNAL FAULT]** (EtF-) submenu) by the **[External fault mgt]** (EPL) parameter.

The drive can react in five possible ways:

1. Drive fault

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

The fault displayed will depend on the source of the communication fault:

- **[Modbus com.]** (SLF1) for integrated Modbus
- **[CANopen com.]** (COF) for CANopen
- **[Com. network]** (CNF) for a network card
- **[External fault com.]** (EPF2) for Ethernet card FRD and IP faults

The CiA402 state chart changes to "7 - Fault reaction active" and then to "8 - fault".

2. Stop without fault

[Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt).

There is no drive fault.

If the CiA402 state chart is in "5-Operation enabled", it changes to "4-Switched on" after stopping.

3. Ignore fault

[Ignore] (nO): Fault ignored

4. Maintain speed

[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.

There is no drive fault.

If the CiA402 state chart is in "5-Operation enabled", it remains there.

5. Fallback speed

[Fallback spd] (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed.

There is no drive fault.

If the CiA402 state chart is in "5-Operation enabled", it remains there.

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

Note: The drive will not start up immediately at the fallback speed. If there is a loss of communication, the drive will only run at the fallback speed if the run command was present when the communication fault occurred.
In the event of a control system being used to ensure switchover to an active safe state if there is a loss of communication, drives that have been stopped must always be left in the run state (5 - Operation enabled) with zero reference to ensure that they change to the fallback speed.

Detailed operation

Monitoring of communication channels

- The drive monitors all its communication channels.

- Communication problems are indicated on the LEDs on the card or drive or on the graphic display terminal. However, a problem does not always trigger a network fault or a drive fault.
  - **Example:**
    If a drive is controlled via the I/O and only monitored via an Ethernet network, an Ethernet communication problem does not cause a fault.

- As soon as a command or reference parameter has been written for the first time on a communication channel, this channel is said to be connected.

- A channel is said to be participant if it transmits a command or reference parameter necessary for controlling the drive (see list in the table below).

Channel state	Parameter	Assignment
If the channel is the active command channel	Control word (CMd)	**[Cmd channel 1]** (Cd1) or **[Cmd channel 2]** (Cd2)
If the channel is the active reference channel	Frequency reference (LFr) or Speed reference (LFrd)	**[Ref. 1 channel]** (Fr1) or **[Ref. 1B channel]**(Fr1b) or **[Ref. 2 channel]**(Fr2)
Whatever the channel state	Control word (CMd) containing a command or reference switch	**[Cmd switching]** (CCS) or **[Ref 1B switching]** (rCb) or **[Ref. 2 switching]** (rFC)
	Frequency reference (LFr) or Speed reference (LFrd), either summing or subtracting	**[Summing ref. 2]** (SA2) or **[Summing ref. 3]** (SA3) or **[Subtract ref. 2]** (dA2) or **[Subtract ref. 3]** (dA3)
	Torque reference (Ltr)	**[Torque ref. channel]** (Tr1)
	PID regulator reference (PISP)	**[Ref. 1 channel]** (Fr1)
	Network analog input **[Network AI]** (AIU1)	**[PID feedback ass.]** (PIF) or **[AI net. channel]** (AIC1)
	Reference multiplication coefficient (MFr)	**[Multiplier ref. 2]** (MA2) or **[Multiplier ref. 3]** (MA3)

  - **Example:**
    If the operation on reference function **[REF. OPERATIONS]** (OAI-) is active and a summing reference **[Summing ref. 2]** (SA2) has been assigned to **[Modbus]** (Mdb), the Modbus reference plays a part in control.

- If a communication problem occurs on a connected participant channel, then the drive triggers a network fault.
  The drive reacts according to the network fault configuration (drive fault, stop without fault, ignore fault, maintain speed or fallback speed).

- If a communication problem occurs on a non-participant or disconnected channel, the drive does not trigger a network fault or a drive fault. This avoids, in particular, the occurrence of spurious faults when installations are powered up.
  - **Example:**
    A drive is controlled via CANopen and is powered up.
    The PLC is powered up but is not in RUN mode. The network is operational but no parameter has been sent to the drive yet. If the drive is disconnected from the CANopen network, a communication problem occurs, but no fault.

- The channel disconnects in the event of a communication problem.

Note: A control word (CMd) of a channel other than the active channel with fixed bit assignments, other than channel switches (fast stop, preset speeds, etc.) is not considered to be participant. A communication problem will not cause a network fault.

- **Example:**
  A drive is equipped with a "Controller Inside" card and an Ethernet card.
  The "Controller Inside" card controls the drive (command and reference).
  One bit of the Ethernet control word is assigned to "fast stop".
  If the drive is disconnected from the Ethernet network, the drive can no longer be stopped via Ethernet (however, a drive fault is not triggered).

Communication monitoring

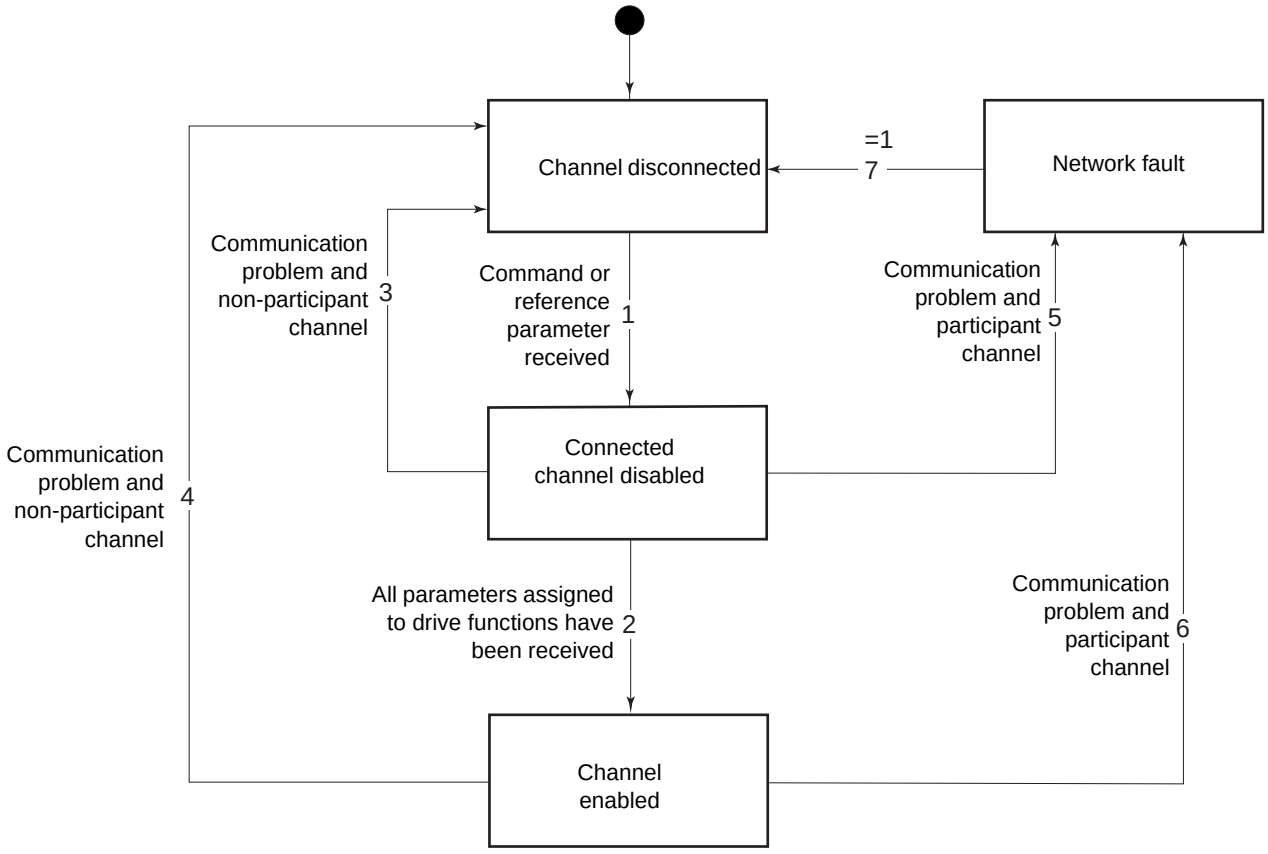
Enabling of communication channels

- A communication channel is enabled if all its parameters assigned to drive functions have been received.
  - **Example:**
    A drive is in I/O profile with speed control. Modbus constitutes both the command and reference channel.
    The Modbus channel will be enabled as soon as the control word and speed reference have been received.

- The drive is only able to start if all participant channels are enabled.
  - **Example 1:**
    A drive in CiA402 profile is connected to Modbus, which is the active channel.
    Unless the reference has been written at least once, it will not be possible to proceed to the "5-Operation enabled" state, even if the "4-Enable operation" command is sent.
  - **Example 2:**
    A drive is connected to Modbus.
    The terminals are both the reference and command channel.
    The operation on reference function **[REF. OPERATIONS]** (OAI-) is active and summing input 2 is assigned to Modbus.
    The drive will not start until the reference has been supplied by Modbus.
  - **Example 3:**
    A drive is configured for switching between the terminals and CANopen.
    If the command switch is assigned to the Ethernet card, startup will only be possible once the Ethernet channel is enabled.

- A communication problem disables a communication channel.

- When switching from an enabled channel to a disabled channel, the drive immediately triggers a network fault.



Special case involving Ethernet Modbus TCP/IP card

- The Ethernet card can generate two types of network fault: a network management fault and a communication fault.
- If a network management fault (FDR or IP address duplication fault) occurs, a drive fault is generated regardless of the state (active, participant, etc.) of this channel.

Assignment of setpoints from a network

Setpoint parameters

The Altivar 71 supports a number of setpoint parameters, which must be selected according to the functions used in the drive.

Function used	Input to be assigned	Value	Setpoint to be sent via the network
Speed reference (rpm)	**[Ref.1 channel]** (Fr1) **[Ref.2 channel]** (Fr2) **[Ref.1B channel]** (Fr1b)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt)	Speed reference (LFRD)
Frequency reference (0.1 Hz or high resolution)	**[Ref.1 channel]** (Fr1) **[Ref.2 channel]** (Fr2) **[Ref.1B channel]** (Fr1b)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt)	Frequency reference (LFR)
Sum	**[Summing ref. 2]** (SA2) **[Summing ref. 3]** (SA3)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt) or **[Network AI]** (AIU1)	Speed reference (LFRD) or Frequency reference (LFR)
Subtraction	**[Subtract. ref. 2]** (dA2) **[Subtract. ref. 3]** (dA3)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt) or **[Network AI]** (AIU1)	Speed reference (LFRD) or Frequency reference (LFR)
Multiplication	**[Multiplier ref. 2]** (MA2) **[Multiplier ref. 3]** (MA3)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt) or **[Network AI]** (AIU1)	**[Multiplying coeff.]** (MFr)
PID regulator	**[Ref.1 channel]** (Fr1) **[Ref.1B channel]** (Fr1b)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt)	PID regulator reference (PISP)
	[PID feedback ass.] (PIF)	**[Network AI]** (AIU1)	PID regulator feedback (AIU1)
	[AI net. channel] (AIC1)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt)	
Torque control	**[Torque ref. channel]** (Tr1)	**[Modbus]** (Mdb) or **[CANopen]** (CAn) or **[Com. card]** (nEt)	Torque reference (LTR)

Example 1:
The drive is to be controlled by sending the speed reference to the PID regulator via CANopen. No application function is used.
The following must be assigned: **[Ref.1 channel]** (Fr1) = **[CANopen]** (CAn)
The following must be sent: Speed reference (LFRD)

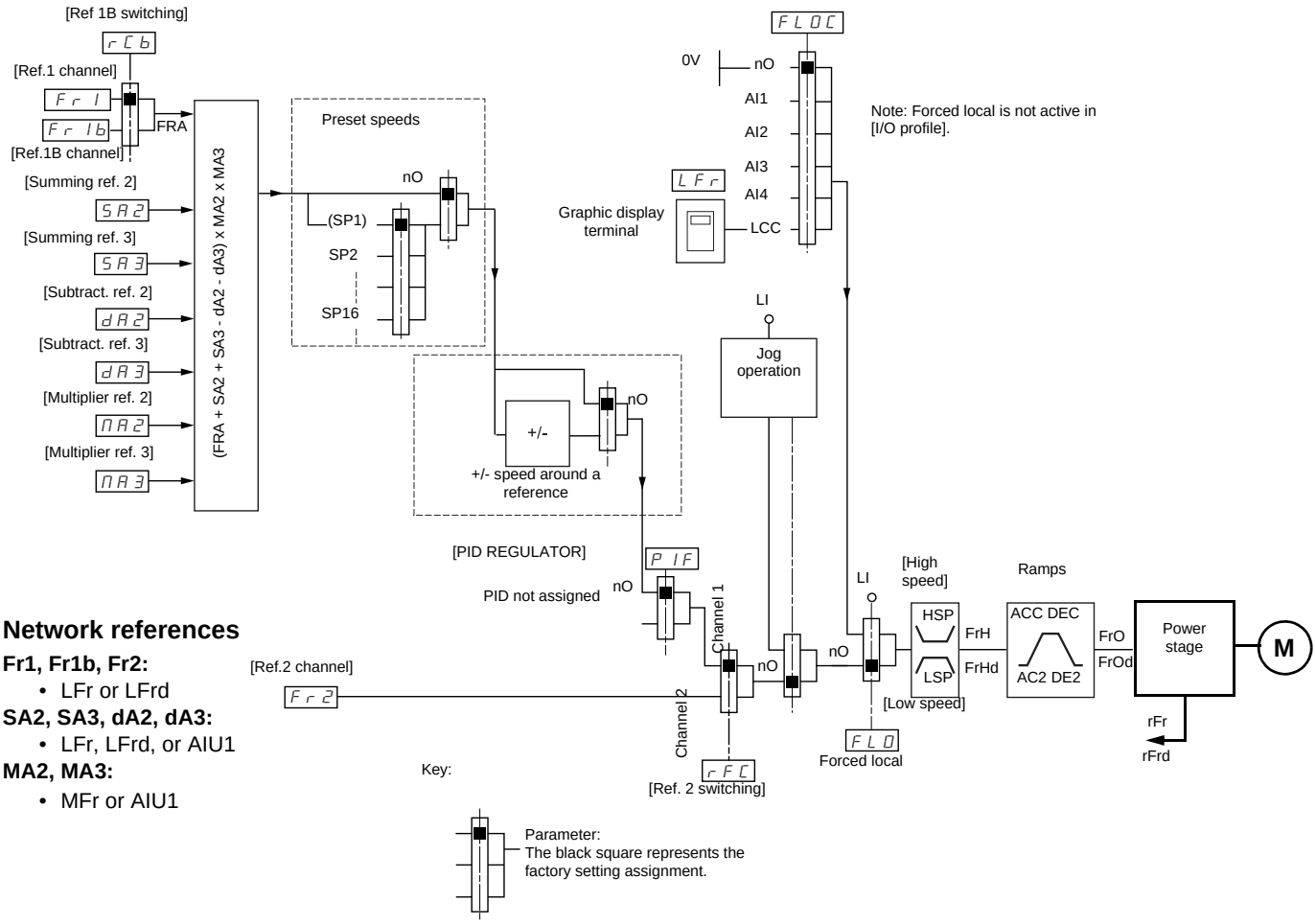
Example 2:
The drive is to be controlled by sending the PID regulator reference via Modbus.
The following must be assigned: **[Ref.1 channel]** (Fr1) = **[Modbus]** (Mdb)
The following must be sent: PID regulator reference (PISP)

Example 3:
The drive is to be controlled by sending the PID regulator reference and the feedback via the Ethernet card.
The following must be assigned:
- **[Ref.1 channel]** (Fr1) = **[Com. card]** (nEt)
- **[PID feedback ass.]** (PIF) = **[Network AI]** (AIU1)
- **[AI net. channel]** (AIC1) = **[Com. card]** (nEt)

The following must be sent:
- PID regulator reference (PISP)
- PID regulator feedback (AIU1)

Assignment of setpoints from a network

Without PID regulator



Network references

Fr1, Fr1b, Fr2:

- LFr or LFrd

SA2, SA3, dA2, dA3:

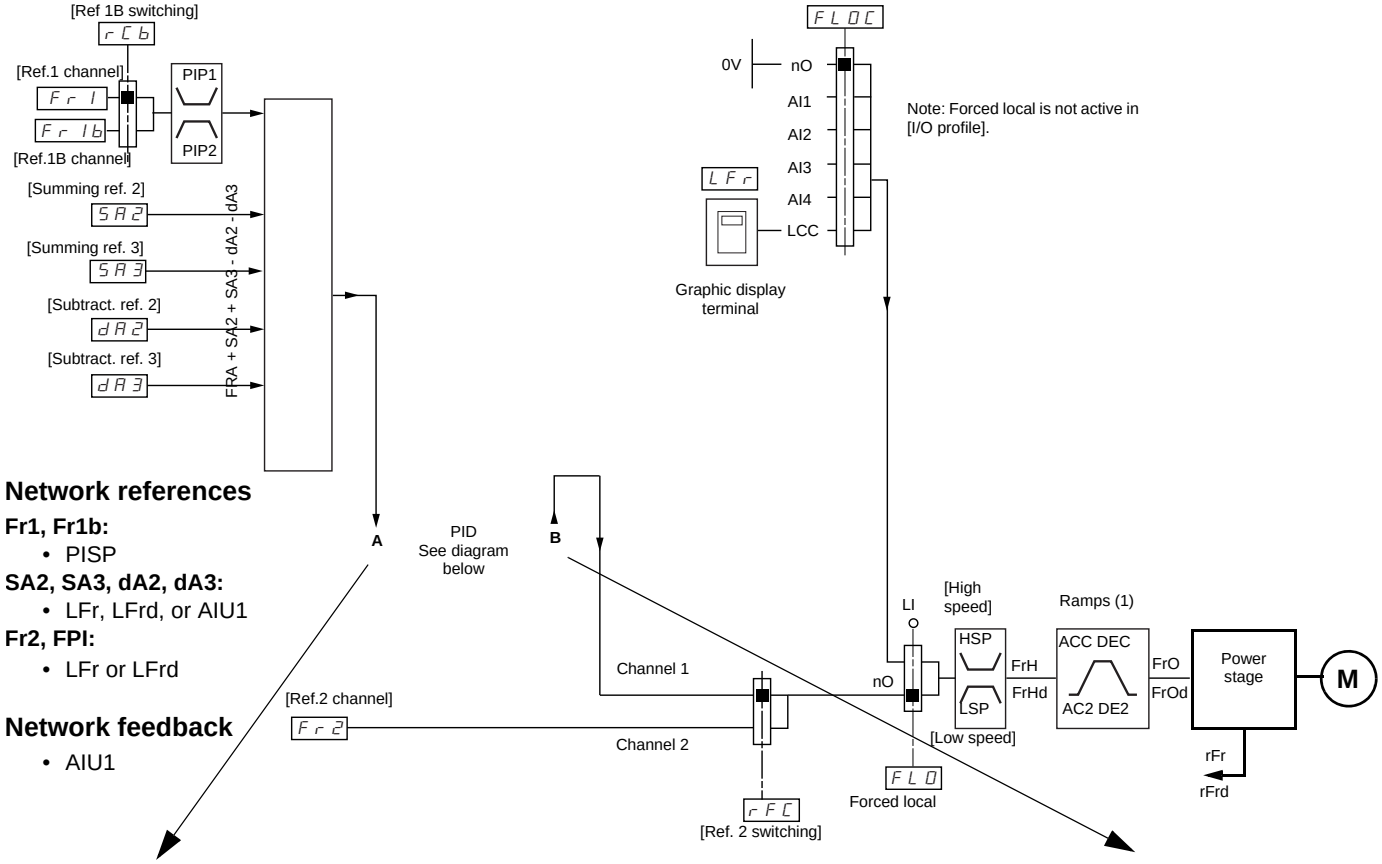
- LFr, LFrd, or AIU1

MA2, MA3:

- MFr or AIU1

Assignment of setpoints from a network

With PID regulator



Network references

Fr1, Fr1b:

- PISP

SA2, SA3, dA2, dA3:

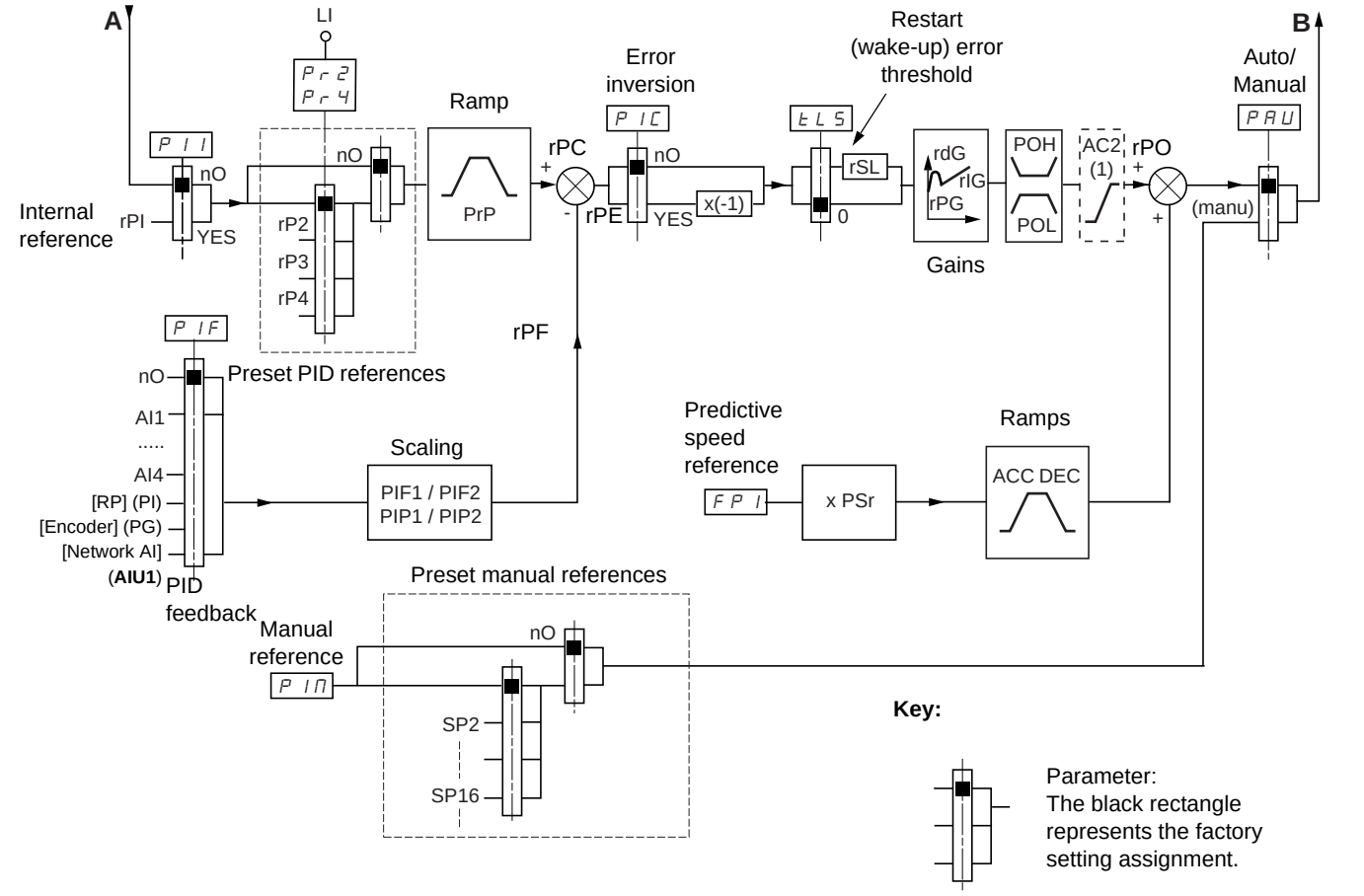
- LFr, LFrd, or AIU1

Fr2, FPI:

- LFr or LFrd

Network feedback

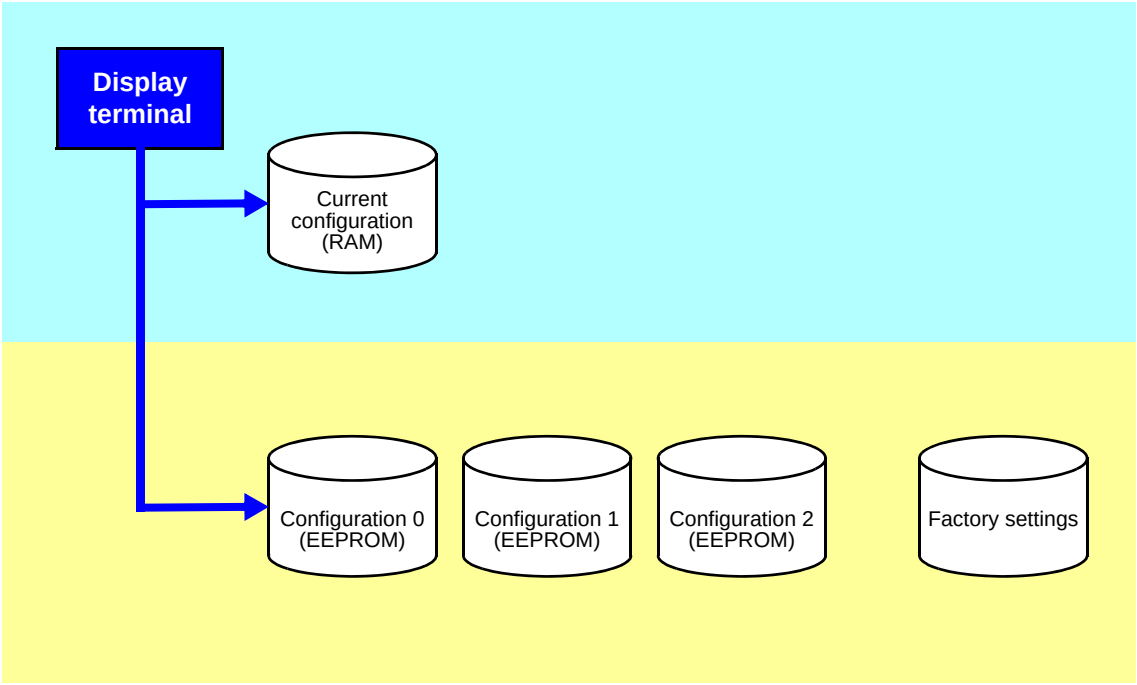
- AIU1



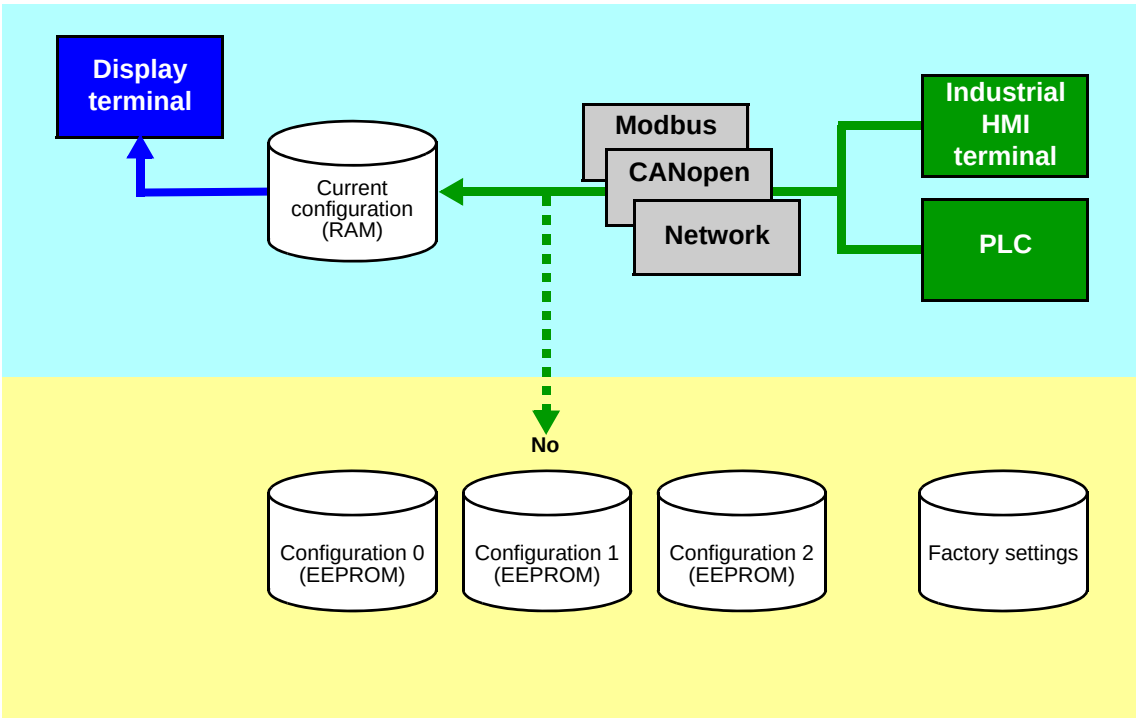
(1) Ramp AC2 is only active at startup of the PID function and during PID "wake-ups".

Saving the configuration

When a parameter is modified via the drive's integrated display terminal or graphic display terminal, this parameter is automatically saved to the EEPROM non-volatile memory.

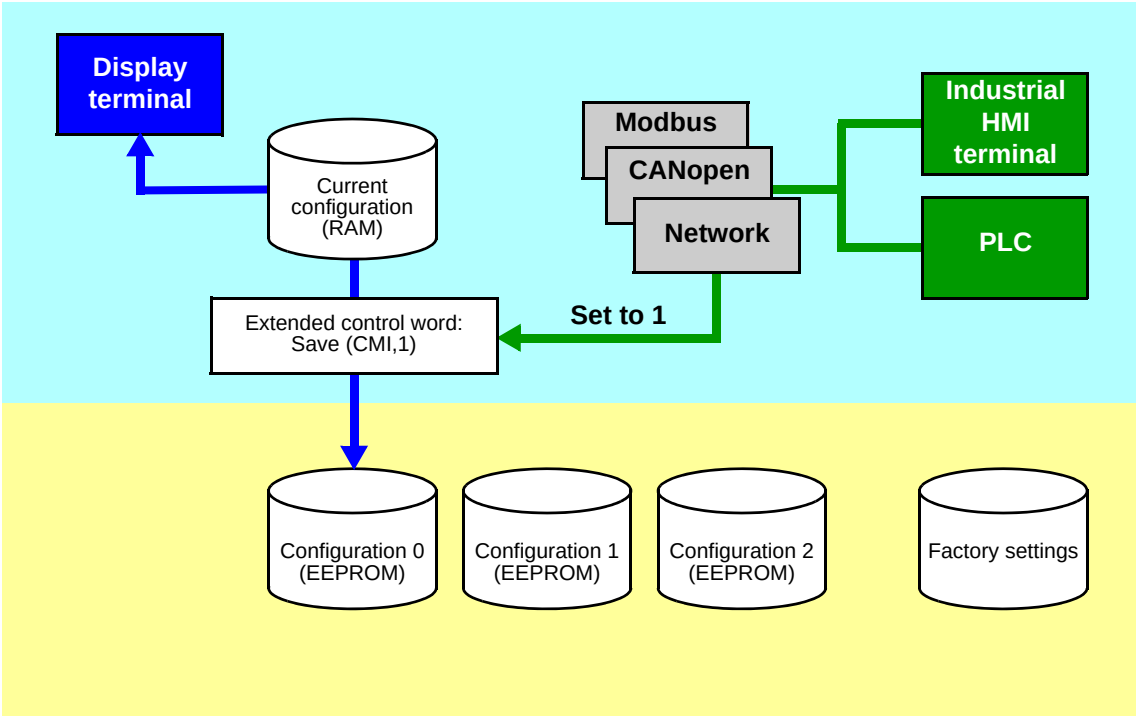


When a parameter is modified using a PLC or an HMI terminal via a network (Modbus, CANopen or a network card), this parameter is written to the current configuration in the RAM volatile memory. It is not saved to the EEPROM non-volatile memory. If the drive control voltage is disconnected, when it is reconnected, the parameter reverts to the initial value and the setting is lost.



Configuration saving and switching

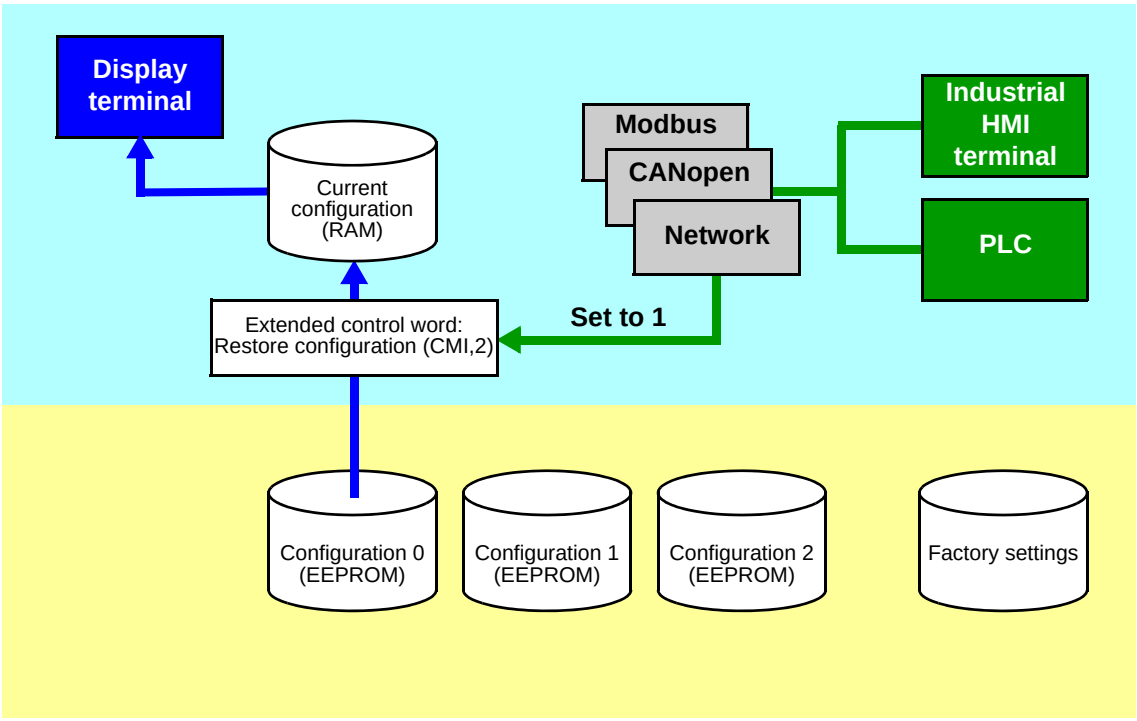
To save the parameter, a save command must be executed using bit 1 of the extended control word (CMI).



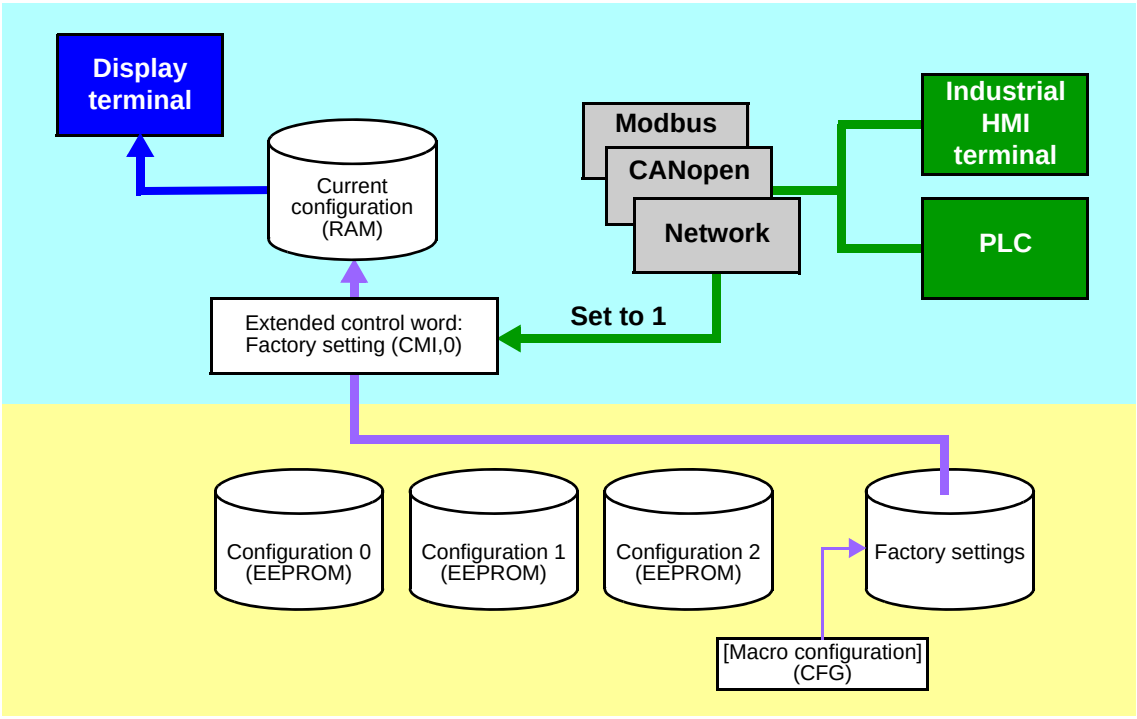
The save command is only active if the drive is stopped and not in "5-Operation enabled" state.

Restore configuration

The restore configuration command is executed using bit 2 of the extended control word (CMI).



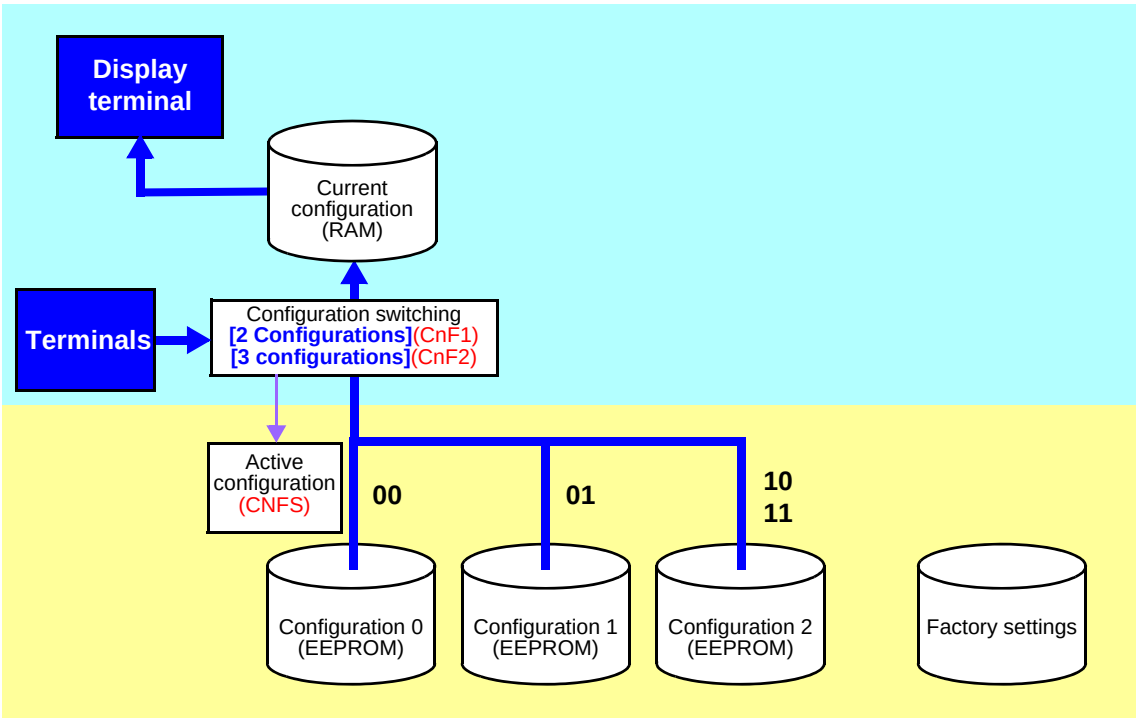
The return to factory settings command is executed using bit 0 of the extended control word (CMI). The type of setting is determined by the active macro configuration parameter **[Macro configuration]** (CFG) and by the **[PARAMETER GROUP LIST]** (FrY) parameter which defines the parameter groups concerned.



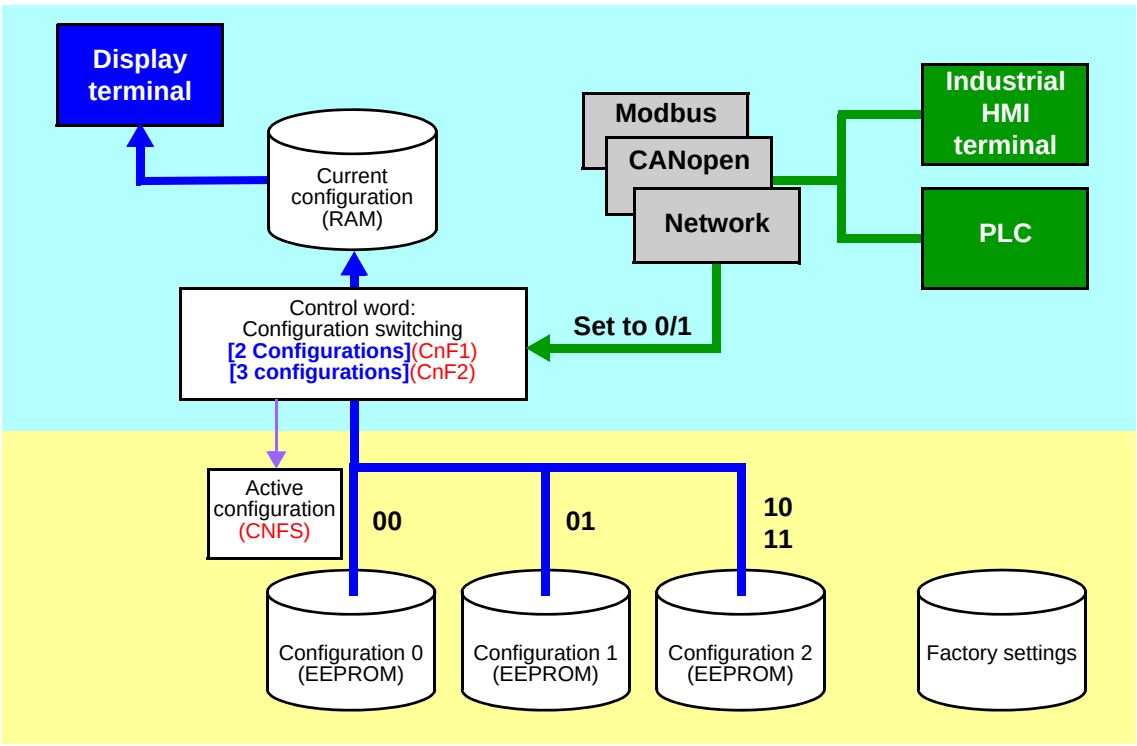
The restore command is only active if the drive is stopped and not in "5-Operation enabled" state.

Configuration switching via control word

The configuration or motor switching function (see the Programming Manual) can be used via the network or via the terminals.

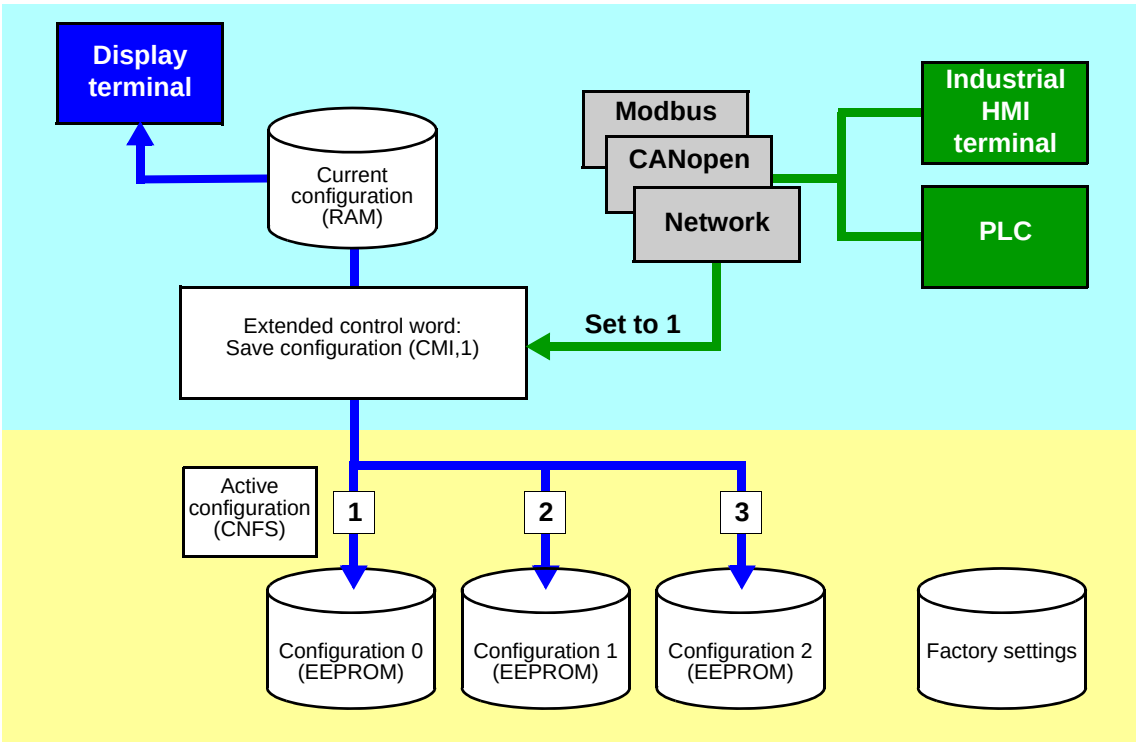


To use this function via a network, simply assign one or two bits of the control word to the motor or configuration switching command via the **[2 Configurations]** (CnF1) and **[3 Configurations]** (CnF2) parameters.
The active configuration can be read in the **[Config. active]** (CNFS) parameter.

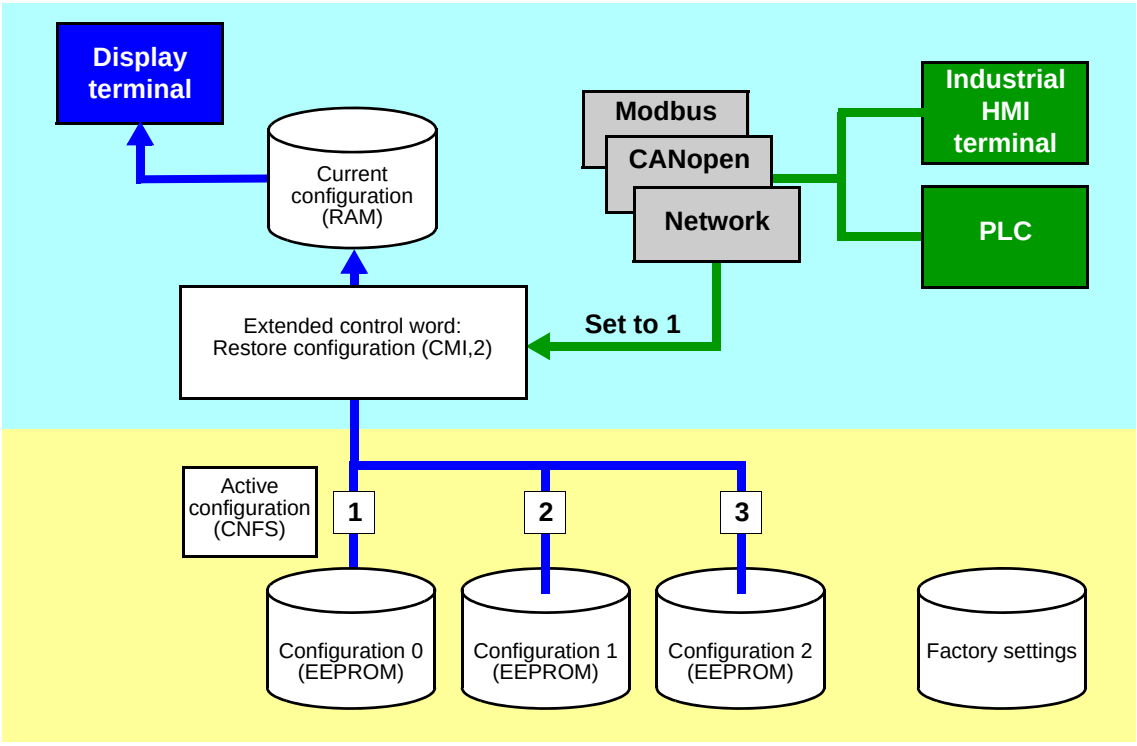


Configuration saving and switching

When the configuration or motor switching function is configured on inputs or on control word bits, to save a configuration that is already active, set bit 1 of the extended control word (CMI) to 1.



When the configuration or motor switching function is configured on inputs or on control word bits, bit 2 of the extended control word (CMI) must be set to 1.



The configuration switching commands are only active if the drive is stopped and not in "5-Operation enabled" state.

Function parameters

Code	Description			
CNF1	Parameter name:	**Assignment for 2 configurations**		
	Terminal display:	**[2 Configurations]**		
	Logic address:	8021 = 16#1F55	Type:	WORD (listing)
	CANopen index:	2032/16	Read/write:	R/WS
	INTERBUS index:	5FBC/9C	Factory setting:	0
	DeviceNet path:	9C/01/9C		
	See next page.			
CNF2	Parameter name:	**Assignment for 3 configurations**		
	Terminal display:	**[3 Configurations]**		
	Logic address:	8022 = 16#1F56	Type:	WORD (listing)
	CANopen index:	2032/17	Read/write:	R/WS
	INTERBUS index:	5FBC/9D	Factory setting:	0
	DeviceNet path:	9C/01/9D		
	See next page.			
CNFS	Parameter name:	**Active configuration**		
	Terminal display:	**[Config. active]**		
	Logic address:	8020 = 16#1F54	Type:	WORD (listing)
	CANopen index:	2032/15	Read/write:	R
	INTERBUS index:	5FB9/CD		
	DeviceNet path:	89/01/15		
	0 = The parameter set switching function is not configured 1 = (CNF0): Configuration no. 0 active 2 = (CNF1): Configuration no. 1 active 3 = (CNF2): Configuration no. 2 active			

Value of the control bit assigned by **[2 Configurations]** (CnF1)	0	1	0	1
Value of the control bit assigned by **[3 Configurations]** (CnF2)	0	0	1	1
Value of **[Config. active]** (CnFS)	1	2	3	3
Active configuration	0	1	2	2

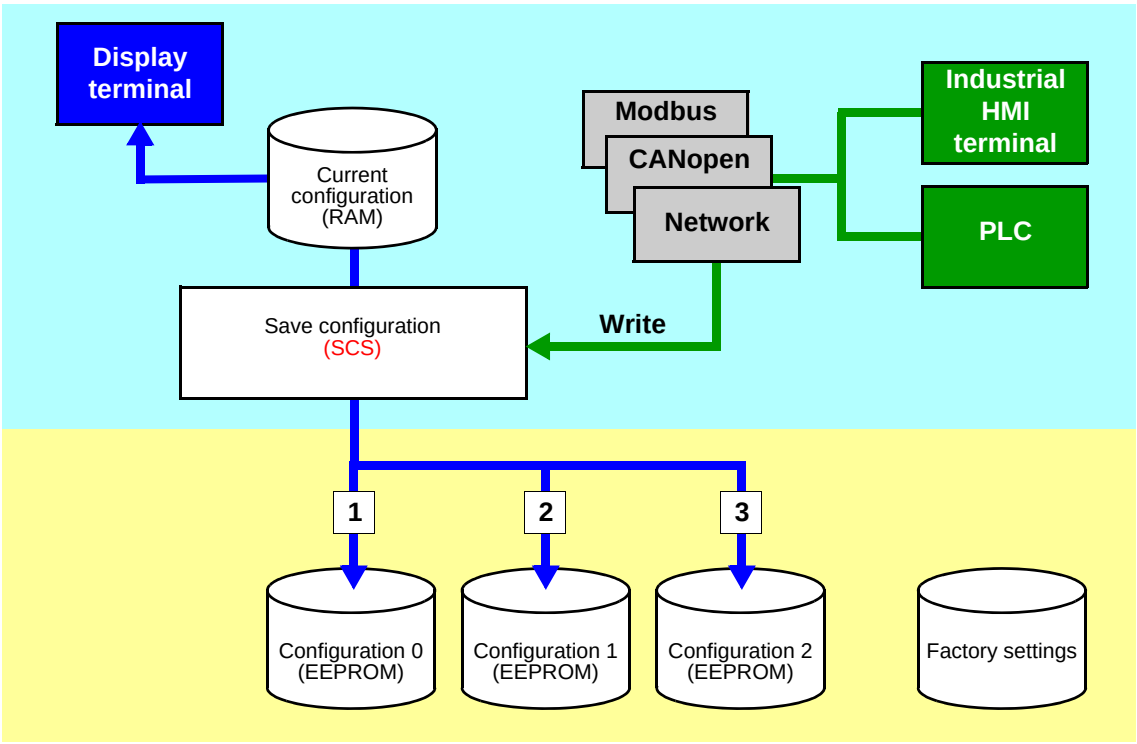
Assignment of logic inputs and control bits for CNF1 and CNF2

Value	Assignment	Description/Condition
0	Not assigned	
129 to 134	[LI1] (LI1) to [LI6] (LI6)	Logic inputs Drive with or without option
135 to 138	[LI7] (LI7) to [LI10] (LI10)	Logic inputs With VW3A3201 logic I/O card
139 to 142	[LI11] (LI11) to [LI14] (LI14)	Logic inputs With VW3A3202 extended I/O card
187 to 191	[C111] (C111) to [C115] (C115)	Control bit With integrated Modbus regardless of profile
203 to 207	[C211] (C211) to [C215] (C215)	Control bit With integrated CANopen regardless of profile
219 to 223	[C311] (C311) to [C315] (C315)	Control bit With a communication card regardless of profile
235 to 239	[C411] (C411) to [C415] (C415)	Control bit With Controller Inside card regardless of profile

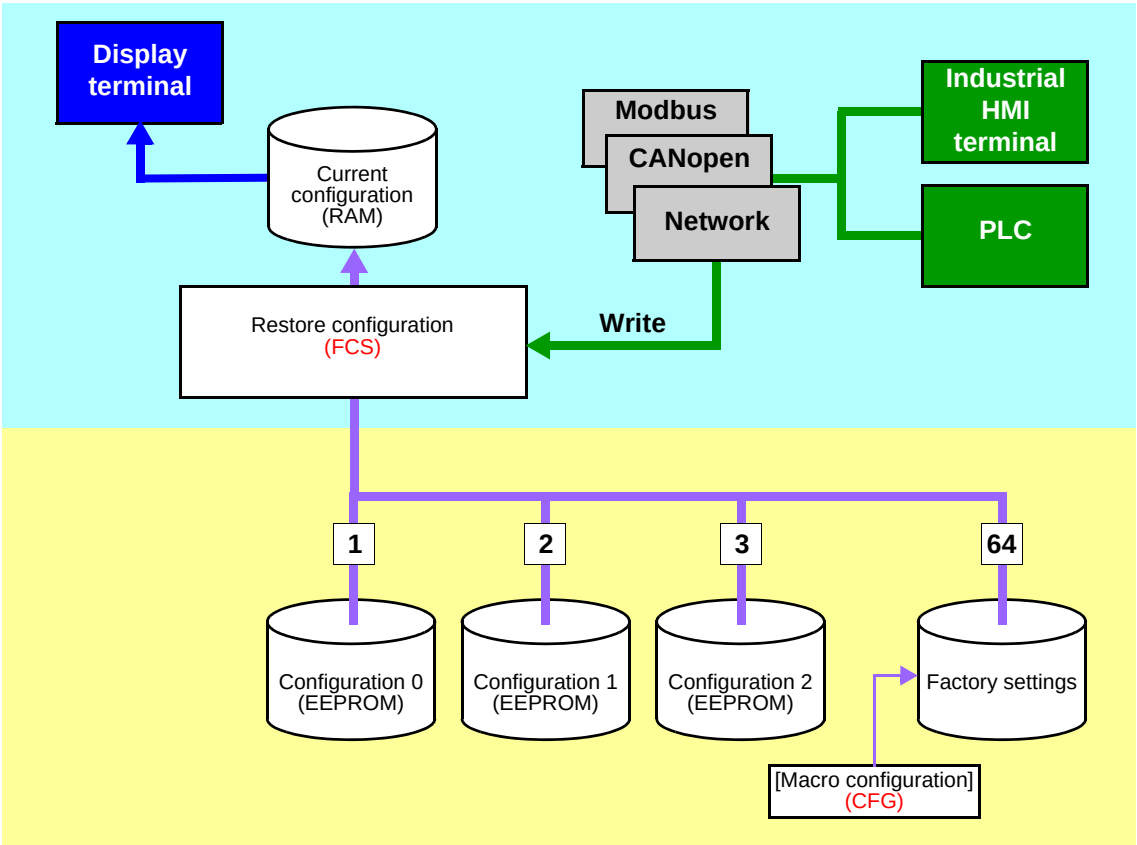
Note: In [I/O profile] (IO), LI1 cannot be accessed and if [2/3 wire control] (tCC) = [3 wire] (3C), LI2 cannot be accessed either.

Configuration switching by selection

The current configuration can be saved in one of the 3 non-volatile configurations in EEPROM using the "Save configuration" (SCS) parameter. In this case, it is not necessary to assign a function in the control word.



One of the 3 non-volatile configurations in EEPROM can be restored to the current configuration using the "Restore configuration" (FCS) parameter.
Note: Value 64 controls the return to factory settings.



The configuration switching commands are only active if the drive is stopped and not in "5-Operation enabled" state.

Function parameters

Code	Description			
SCS	Parameter name:	**Save configuration**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	8001 = 16#1F41 2032/2 5FBC/9A 9C/01/9A	Type: Read/write:	WORD (listing) R/WS
	0 = No save 1 = Save to configuration no. 0 2 = Save to configuration no. 1 3 = Save to configuration no. 2			
FCS	Parameter name:	**Restore configuration**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	8002 = 16#1F42 2032/3 5FBC/9B 9C/01/9B	Type: Read/write:	WORD (listing) R/WS
	0 = No restore 1 = Restore configuration no. 0 2 = Restore configuration no. 1 3 = Restore configuration no. 2 64 = Factory setting			
FrY	Parameter name: Terminal display:	**Parameter group list** **[PARAMETER GROUP LIST]**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3022 = 16#OBCE 2000/17 5FBC/06 70/01/17	Type: Read/write: Factory setting:	WORD (bit register) R/WS 0
	Selection of menus to be loaded Bit 0: = 1: **[All]** (ALL) : All parameters Bit 1: = 1: **[Drive menu]** (drM): The [1 DRIVE MENU] menu without [1.9 COMMUNICATION] and [1.14 CONTROL INSIDE MENU]. In the [7 DISPLAY CONFIG.] menu, [Return std name] returns to [No]. Bit 2: = 1: **[Settings]** (SEt): The [1.3 SETTINGS] menu without the [IR compensation] (UFr), [Slip compensation] (SLP) and [Mot. therm. current] (ItH) parameters. Bit 3: = 1: **[Motor param]** (MOt): Motor parameters: [Rated motor power] (nPr) - [Rated motor volt.] (UnS) - [Rated mot. current] (nCr) - [Rated motor freq.] (FrS) - [Rated motor speed] (nSP) - [Auto tuning] (tUn) - [Auto tuning state] (tUS) - [U0] (U0) to [U5] (U5) - [Freq pt 1on 5pt V/F] (F1) to [F5] (F5) - [V. constant power] (UCP) - [Freq. Const Power] (FCP) - [Nominal I sync.] (nCrS) - [Nom motor spdsync] (nSPS) - [Pole pairs] (PPnS) - [Syn. EMF constant] (PHS) - [Autotune L d-axis] (LdS) - [Autotune L q-axis] (LqS) - [Cust. stator R syn] (rSAS) - [IR compensation] (UFr) - [Slip compensation] (SLP) - the motor parameters that can be accessed in [Expert] mode. The following selections can only be accessed if [Config. Source] (FCSI) = [Macro-Conf] (InI): Bit 4: = 1: **[Comm. menu]** (COM): The [1.9 COMMUNICATION] menu without either [Scan. IN1 address] (nMA1) to [Scan. IN8 address] (nMA8) or [Scan.Out1 address] (nCA1) to [Scan.Out8 address] (nCA8). Bit 5: = 1: **[Control Inside menu]** (PLC): The [1.14 CONTROL INSIDE MENU] menu Bit 6: = 1: **[Monitor config.]** (MOn): The [6 MONITORING CONFIG.] menu Bit 7: = 1: **[Display config.]** (dIS): The [7 DISPLAY CONFIG.] menu Bits 8 to 15: Reserved (= 0 or 1)			

Parameter set switching

The parameter set switching function (see the Programming Manual) can be used via the network or via the terminals.

To use this function via a network, simply assign one or two bits of the control word to parameter set switching via the **[2 Parameter sets]** (CHA1) and **[3 Parameter sets]** (CHA2) parameters.

The active set can be read in the "Active parameter set" (CFPS) parameter.

The parameter sets can be written via a network.

The parameter sets can be switched with the motor running.

Function parameters

Code	Description			
CHA1	Parameter name:	**Assignment for 2 sets**		
	Terminal display:	**[2 Parameter sets]**		
	Logic address:	12902 = 16#3266	Type:	WORD (listing)
	CANopen index:	2063/3	Read/write:	R/WS
	INTERBUS index:	5FBD/54	Factory setting:	0
	DeviceNet path:	A1/01/67		
	See next page.			
CHA2	Parameter name:	**Assignment for 3 sets**		
	Terminal display:	**[3 Parameter sets]**		
	Logic address:	12903 = 16#3267	Type:	WORD (listing)
	CANopen index:	2063/4	Read/write:	R/WS
	INTERBUS index:	5FBD/55	Factory setting:	0
	DeviceNet path:	A1/01/68		
	See next page.			
CFPS	Parameter name:	**Active parameter set**		
	Logic address:	12900 = 16#3264	Type:	WORD (listing)
	CANopen index:	2063/1	Read/write:	R
	INTERBUS index:	5FB9/EC		
	DeviceNet path:	A1/01/65		
	0 = The parameter set switching function is not configured 1 = **[Set 1 active]** (CFP1): Parameter set no. 1 active 2 = **[Set 2 active]** (CFP2): Parameter set no. 2 active 3 = **[Set 3 active]** (CFP3): Parameter set no. 3 active			

Value of the control bit assigned by **[2 Parameter sets]** (CHA1)	0	1	0	1
Value of the control bit assigned by **[3 Parameter sets]** (CHA2)	0	0	1	1
Value of "Active parameter set" (CFPS)	1	2	3	3
Active parameter set	1	2	3	3

CHA1 and CHA2 assignment values

Value	Assignment	Description/Condition
0	[No] (nO)	Not assigned
4	[Freq. Th. attain.] (FtA)	Switching via [Freq. threshold] (Ftd)
13	[Freq. Th. 2 attain.] (F2A)	Switching via [Freq. threshold 2] (F2d)
129 to 134	[LI1] (LI1) to [LI6] (LI6)	Logic inputs Drive with or without option
135 to 138	[LI7] (LI7) to [LI10] (LI10)	Logic inputs With VW3A3201 logic I/O card
139 to 142	[LI11] (LI11) to [LI14] (LI14)	Logic inputs With VW3A3202 extended I/O card
160 to 170	[CD00] (Cd00) to [CD10] (Cd10)	Switchable bit In [I/O profile] (IO)
171 to 175	[CD11] (Cd11) to [CD15] (Cd15)	Switchable bit Regardless of profile
177 to 186	[C101] (C101) to [C110] (C110)	Control bit With integrated Modbus in [I/O profile] (IO)
187 to 191	[C111] (C111) to [C115] (C115)	Control bit With integrated Modbus regardless of profile
193 to 202	[C201] (C201) to [C210] (C210)	Control bit With integrated CANopen in [I/O profile] (IO)
203 to 207	[C211] (C211) to [C215] (C215)	Control bit With integrated CANopen regardless of profile
209 to 218	[C301] (C301) to [C310] (C310)	Control bit With a communication card in [I/O profile] (IO)
219 to 223	[C311] (C311) to [C315] (C315)	Control bit With a communication card regardless of profile
225 to 234	[C401] (C401) to [C410] (C410)	Control bit With Controller Inside card in [I/O profile] (IO)
235 to 239	[C411] (C411) to [C415] (C415)	Control bit With Controller Inside card regardless of profile

Note: In [I/O profile] (IO), LI1 cannot be accessed and if [2/3 wire control] (tCC) = [3 wire] (3C), LI2, C101, C201, C301 and C401 cannot be accessed either.

Parameter set switching

Parameter sets can be loaded via the following parameters:

Address table:

No.	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
1	AD01	12911 = 16#326F	2063/C	5FBF/8C	9F/01/8C
2	AD02	12912 = 16#3270	2063/D	5FBF/8D	9F/01/8D
3	AD03	12913 = 16#3271	2063/E	5FBF/8E	9F/01/8E
4	AD04	12914 = 16#3272	2063/F	5FBF/8F	9F/01/8F
5	AD05	12915 = 16#3273	2063/10	5FBF/90	9F/01/90
6	AD06	12916 = 16#3274	2063/11	5FBF/91	9F/01/91
7	AD07	12917 = 16#3275	2063/12	5FBF/92	9F/01/92
8	AD08	12918 = 16#3276	2063/13	5FBF/93	9F/01/93
9	AD09	12919 = 16#3277	2063/14	5FBF/94	9F/01/94
10	AD10	12920 = 16#3278	2063/15	5FBF/95	9F/01/95
11	AD11	12921 = 16#3279	2063/16	5FBF/96	9F/01/96
12	AD12	12922 = 16#327A	2063/17	5FBF/97	9F/01/97
13	AD13	12923 = 16#327B	2063/18	5FBF/98	9F/01/98
14	AD14	12924 = 16#327C	2063/19	5FBF/99	9F/01/99
15	AD15	12925 = 16#327D	2063/1A	5FBF/9A	9F/01/9A

Table of values for set no. 1:

No.	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
1	S101	12931 = 16#3283	2063/20	5FBF/9B	9F/01/9B
2	S102	12932 = 16#3284	2063/21	5FBF/9C	9F/01/9C
3	S103	12933 = 16#3285	2063/22	5FBF/9D	9F/01/9D
4	S104	12934 = 16#3286	2063/23	5FBF/9E	9F/01/9E
5	S105	12935 = 16#3287	2063/24	5FBF/9F	9F/01/9F
6	S106	12936 = 16#3288	2063/25	5FBF/A0	9F/01/A0
7	S107	12937 = 16#3289	2063/26	5FBF/A1	9F/01/A1
8	S108	12938 = 16#328A	2063/27	5FBF/A2	9F/01/A2
9	S109	12939 = 16#328B	2063/28	5FBF/A3	9F/01/A3
10	S110	12940 = 16#328C	2063/29	5FBF/A4	9F/01/A4
11	S111	12941 = 16#328D	2063/2A	5FBF/A5	9F/01/A5
12	S112	12942 = 16#328E	2063/2B	5FBF/A6	9F/01/A6
13	S113	12943 = 16#328F	2063/2C	5FBF/A7	9F/01/A7
14	S114	12944 = 16#3290	2063/2D	5FBF/A8	9F/01/A8
15	S115	12945 = 16#3291	2063/2E	5FBF/A9	9F/01/A9

Parameter set switching

Table of values for parameter set no. 2:

No.	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
1	S201	12951 = 16#3297	2063/34	5FBF/AA	9F/01/AA
2	S202	12952 = 16#3298	2063/35	5FBF/AB	9F/01/AB
3	S203	12953 = 16#3299	2063/36	5FBF/AC	9F/01/AC
4	S204	12954 = 16#329A	2063/37	5FBF/AD	9F/01/AD
5	S205	12955 = 16#329B	2063/38	5FBF/AE	9F/01/AE
6	S206	12956 = 16#329C	2063/39	5FBF/AF	9F/01/AF
7	S207	12957 = 16#329D	2063/3A	5FBF/B0	9F/01/B0
8	S208	12958 = 16#329E	2063/3B	5FBF/B1	9F/01/B1
9	S209	12959 = 16#329F	2063/3C	5FBF/B2	9F/01/B2
10	S210	12960 = 16#32A0	2063/3D	5FBF/B3	9F/01/B3
11	S211	12961 = 16#32A1	2063/3E	5FBF/B4	9F/01/B4
12	S212	12962 = 16#32A2	2063/3F	5FBF/B5	9F/01/B5
13	S213	12963 = 16#32A3	2063/40	5FBF/B6	9F/01/B6
14	S214	12964 = 16#32A4	2063/41	5FBF/B7	9F/01/B7
15	S215	12965 = 16#32A5	2063/42	5FBF/B8	9F/01/B8

Table of values for set no. 3:

No.	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
1	S301	12971 = 16#32AB	2063/48	5FBF/B9	9F/01/B9
2	S302	12972 = 16#32AC	2063/49	5FBF/BA	9F/01/BA
3	S303	12973 = 16#32AD	2063/4A	5FBF/BB	9F/01/BB
4	S304	12974 = 16#32AE	2063/4B	5FBF/BC	9F/01/BC
5	S305	12975 = 16#32AF	2063/4C	5FBF/BD	9F/01/BD
6	S306	12976 = 16#32B0	2063/4D	5FBF/BE	9F/01/BE
7	S307	12977 = 16#32B1	2063/4E	5FBF/BF	9F/01/BF
8	S308	12978 = 16#32B2	2063/4F	5FBF/C0	9F/01/C0
9	S309	12979 = 16#32B3	2063/50	5FBF/C1	9F/01/C1
10	S310	12980 = 16#32B4	2063/51	5FBF/C2	9F/01/C2
11	S311	12981 = 16#32B5	2063/52	5FBF/C3	9F/01/C3
12	S312	12982 = 16#32B6	2063/53	5FBF/C4	9F/01/C4
13	S313	12983 = 16#32B7	2063/54	5FBF/C5	9F/01/C5
14	S314	12984 = 16#32B8	2063/55	5FBF/C6	9F/01/C6
15	S315	12985 = 16#32B9	2063/56	5FBF/C7	9F/01/C7

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">VAL</td><td>Parameter name:</td><td colspan="3">Load parameter set command</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>12901 = 16#3265
2063/02

A1/01/66</td><td>Type:
Read/write:</td><td>WORD (listing)
R/W</td></tr>
<tr><td colspan="4">0 = Function not used or a new set of parameters has been taken into account
1 = Request to write a new set of parameters
2 = A new set of parameters is being written

Procedure:
• Write the addresses and values of the sets.
• Set VAL to 1.
• Once the new sets have been taken into account, the drive resets (VAL) to 0.</td></tr>
</table>

Loading drive parameters

Requirement

Certain applications require parameters to be downloaded:
- When the installation starts up
- When the manufacturing range is changed
- When a faulty device is replaced

Neither the integrated ports nor the network cards of the drive provide a parameter file loading procedure (except for the faulty device replacement (FDR) mechanism of the VW3 A3 310 Modbus Ethernet TCP/IP card).

Parameter loading is therefore based on write requests that have to be programmed in the controller (PLC, etc.).

If the controller is limited to writing parameters sequentially, the final configuration risks not being identical to the one desired.
The differences between the configuration to be loaded and the real configuration result from consistency checking of the drive parameters.
The drive checks relationships between the parameters, and if they are not correct:
- It automatically modifies a parameter which is offered for writing (pedestal, deadband) or
- Writing of the parameter is rejected

Examples illustrating this problem are given on page 78.

The controller must therefore follow a procedure that includes a phase of disabling the consistency check function.

Procedure

All the operations described below must be carried out with the motor stopped, with no run command to the drive.

Saving the reference configuration

1. Identify the parameters of the reference drive that differ from the factory setting. These parameters can be identified easily using the PowerSuite software (which displays the list of parameters).

2. Reserve a parameter map table in the controller (PLC, etc.). This map table is a series of addresses and values. The last parameter to be loaded is identified by an address equal to -1.

3. Enter the addresses of the modified parameters into the controller's map table by copying the list given by the PowerSuite software.

4. Initialize the values in the map table. There are two possible methods:
   - Enter the values manually.
   - Program an automatic read function in the controller. Connect the controller to the reference drive. Save the reference configuration in the map table.

Loading the configuration

The program in the controller (PLC, etc.) must perform the following operations:
1. Command a drive factory setting:
   Write the value 16#0001 to the extended control word (8504-CMI).

2. Disable the parameter consistency check function:
   Write the value 16#8000 to the extended control word (8504-CMI).

3. Load the configuration:
   Write the parameters one after another using the map table.

4. Enable the parameter consistency check function:
   Write the value 16#0000 to the extended control word (8504-CMI).

5. Check the drive configuration:
   Read and compare the parameters one after another against the map table.

Inconsistency examples

The two adjustment parameters [Low speed] (3105-LSP) and [High speed] (3104-HSP) comply with the consistency rule:
0 ⩽ [Low speed] (3105-LSP) ⩽ [High speed] (3104-HSP) ⩽ 16000.

Example 1

Initial configuration ➞ Configuration to be loaded:
[High speed] (3104-HSP) = 30 Hz ➞ [High speed] (3104-HSP) = 60 Hz
[Low speed] (3105-LSP) = 20 Hz ➞ [Low speed] (3105-LSP) = 40 Hz

- "Request n: Request to write [Low speed] (3105-LSP) to 40 Hz
- "Consistency check: The consistency rule [Low speed] (3105-LSP) ⩽ [High speed] (3104-HSP) has not been observed:
  - The [Low speed] (3105-LSP) parameter actually written into the drive is 30 Hz.

- "Request n+1: Request to write [High speed] (3104-HSP) = 60 Hz
- "Consistency check: The consistency rules have been observed:
  - The [High speed] (3104-HSP) parameter is correctly written as 60 Hz in the drive.

The loaded configuration differs from the configuration to be loaded:
[Low speed] (3105-LSP) = 30 Hz instead of [Low speed] (3105-LSP) = 40 Hz
The drive can operate between 30 Hz and 40 Hz, which is not desired.

Example 2

Initial configuration ➞ Configuration to be loaded:
[High speed] (3104-HSP) = 60 Hz ➞ [High speed] (3104-HSP) = 30 Hz
[Low speed] (3105-LSP) = 40 Hz ➞ [Low speed] (3105-LSP) = 0 Hz

- "Request n: Request to write [High speed] (3104-HSP) to 30 Hz
- "Consistency check: The consistency rule [Low speed] (3105-LSP) ⩽ [High speed] (3104-HSP) has not been observed:
  - The [High speed] (3104-HSP) parameter actually written into the drive is 40 Hz.

- "Request n+1: Request to write [Low speed] (3105-LSP) = 0 Hz
- "Consistency check: The consistency rules have been observed:
  - The [Low speed] (3104-HSP) parameter is correctly written as 0 Hz in the drive.

The loaded configuration differs from the configuration to be loaded:
[High speed] (3104-HSP) = 40 Hz instead of [High speed] (3104-HSP) = 30 Hz
The drive can operate between 30 Hz and 40 Hz, which is not desired.

<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>CMd</td><td>
<table>
<tr><td>Parameter name:</td><td colspan="3">Control word</td></tr>
<tr><td>Terminal display:</td><td colspan="3">[Cmd value]</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">controlword</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Control word</td></tr>
<tr><td>Logic address:</td><td>8601 = 16#2199
or 8501 = 16#2135 (1)</td><td>Type:</td><td>WORD (bit register)</td></tr>
<tr><td>CANopen index:</td><td>6040/0</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6040/0</td><td></td><td></td></tr>
<tr><td>DeviceNet path:</td><td>B7/01/01</td><td></td><td></td></tr>
</table>
(1) Note: This parameter is available at two logic addresses to optimize exchanges via Modbus messaging (Modbus function 16 = 16#10 Write Multiple Registers):
- If the drive has to be controlled in terms of speed, it is preferable to use address 8601, since the speed reference is at address 8602.
- If the drive has to be controlled in terms of frequency, it is preferable to use address 8501, since the frequency reference is at address 8502.
Parameter conforming to CiA402 profile
Possible values in the IO profile
<table>
<tr><td>On state command [2 wire] (2C)
bit 0: Forward (on state) command
= 0: No forward command
= 1: Forward command</td><td>On edge command [3 wire] (3C)
bit 0: Stop (run authorization)
= 0: Stop
= 1: Run is authorized on a forward or reverse command
bit 1: Forward (on 0 ➜ 1 rising edge) command</td></tr>
<tr><td>The assignment of bit 0 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bit 0 (Cd00) is only active if the channel of this control word is active.</td><td>The assignment of bits 0 and 1 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bits 0 (Cd00) and 1 (Cd01) are only active if the channel of this control word is active.</td></tr>
<tr><td>Bits 1 to 15 can be assigned to commands.</td><td>Bits 2 to 15 can be assigned to commands.</td></tr>
</table>
For example, to change the direction of operation using bit 2 of the control word of the active channel, simply configure the [Reverse assign.] (rrS) parameter:
• To the value [C102] (C102) ... [C402] (C402) for a fixed assignment
• To the value [CD02] (Cd02) for a switched assignment

The stop commands:
• Freewheel stop [Freewheel stop ass.] (nSt)
• Fast stop [Fast stop assign.] (FSt) are active at value 0, in the same way as on the terminals.
= 0: Stop
= 1: No stop command

DC injection braking [DC injection assign.] (dCI) is active at value 1, in the same way as on the terminals.
= 0: No braking command
= 1: Braking

If a fixed assignment is made [C101] (C101) to [C115] (C115) ... [C401] (C401) to [C415] (C415), the freewheel stop, fast stop and DC injection braking commands are always active, even if the channel is not active. If these commands are configured as fixed assignments, the following settings must be made in order to start, even if another channel is active:
• Freewheel stop = 1
• Fast stop = 1
• DC injection braking = 0

If a switched assignment is made [CD00] (Cd00) to [Cd15] (Cd15) the freewheel stop, fast stop and DC injection braking commands are only active if the channel is active.
</td></tr>
</table>

Code	Description
	Possible values in CiA402 profile, separate or not separate mode bit 0: "Switch on"/Contactor command bit 1: "Disable voltage"/Authorization to supply AC power bit 2: "Quick stop"/Emergency stop bit 3: "Enable operation"/Run command bit 4: Reserved (set to 0) bit 5: Reserved (set to 0) bit 6: Reserved (set to 0) bit 7: "Fault reset"/Fault acknowledgment active on 0 ➡ 1 rising edge bit 8: Halt Stop according to the **[Type of stop]** (Stt) parameter without leaving the 5 - Operation enabled state bit 9: Reserved (set to 0) bit 10: Reserved (set to 0) bit 11: Direction of rotation command Default assignment; this bit can be assigned to another command. = 0: Forward rotation = 1: Reverse rotation bit 12: Can be assigned to a command bit 13: Can be assigned to a command bit 14: Can be assigned to a command bit 15: Can be assigned to a command For the description of bits 0, 1, 2, 3, 7 and 8, see the "CiA402 profile" section. The CiA402 standard enables the drive manufacturer to use bits 11 to 15 in a specific way. On the Altivar 71, they can be assigned to function commands. Bit 11 is assigned by default to control the direction of rotation, although it can be assigned to another command. A new assignment deletes the assignment to the direction of rotation command. Bits 12 to 15 have no default assignment. For example, to control DC injection braking using bit 12 of the Modbus control word, simply set the **[DC injection assign.]** (dCI)) parameter to value **[C212]** (C212). The fast stop command configured by **[Fast stop assign.]** (FSt) is active at 1: = 0: No stop command = 1: Stop The DC injection braking command configured by **[DC injection assign.]** (dCI) is active at 1: = 0: No braking command = 1: Braking With a fixed assignment (**[C1●●]**, **[C2●●]**, **[C3●●]** or **[C4●●]**), the fast stop and DC injection braking commands are priority stops, even if the channel is not active. If these commands are configured as fixed assignments, the following settings must be made in order to start, even if another channel is active: • Fast stop command = 0 • DC injection braking command = 0 With a switched assignment (**[Cd●●]**), the fast stop and DC injection braking commands are only operational if the channel is active. The freewheel stop **[Freewheel stop ass.]** (nSt) command cannot be assigned in CiA402 profile.

Command parameters

Code	Description			
CMI	Parameter name:	**Extended control word**		
	Logic address:	8504 = 16#2138	Type:	WORD (bit register)
	CANopen index:	2037/5	Read/write:	R/W
	INTERBUS index:	5FB6/1E		
	DeviceNet path:	8B/01/69		

bit 0: RAM factory setting command according to the **[PARAMETER GROUP LIST]** (FrY) parameter (active at 1). If you also wish to return the EEPROM to the factory setting, bit 1 must also be set to 1 (both commands can be executed simultaneously).

bit 1: Save configuration to EEPROM non-volatile memory command (active at 1).
This bit automatically changes to 0 after the request is taken into account. The command is only active if the drive is stopped, and not in "5-Operation enabled" state.
Note: If CMI is a periodic network variable, the PLC program must write it to 0 after the first request is taken into account. The life of the EEPROM memory is limited to 100,000 write operations.
Note: If the motor or configuration switching function is active, the configuration in the RAM is saved to the EEPROM in the configuration designated by **[Config. Active]** (CnFS).

bit 2: Restore configuration to EEPROM non-volatile memory command (active on 0 to 1 rising edge).
This bit automatically changes to 0 after the request is taken into account.
The command is only active if the drive is stopped, and not in "5-Operation enabled" state.
Note: If CMI is a periodic network variable, the PLC program must write it to 0 after the first request is taken into account.
This does not adversely affect the life of the EEPROM memory, but permanently copies the configuration in the memory to the current configuration.
Note: If the motor or configuration switching function is active, the configuration in the EEPROM designated by **[Config. Active]** (CnFS) is copied to the RAM.

bit 3: Reserved (= 0)

bit 4: Reserved (= 0)
bit 5: Reserved (= 0)
bit 6: Reserved (= 0)
bit 7: Reserved (= 0)

bit 8: Reserved (= 0)
bit 9: Definition of the frequency reference (LFr) and output frequency (rFr) unit:
=0: 0.1 Hz
=1: Standardized value 16 signed bits based on the maximum frequency. The value 32767 corresponds to **[Max frequency]** (tFr). The default value of **[Max frequency]** (tFr) is 60 Hz, and the resolution is then approximately 0.0018 Hz.
This function has no effect on the speed reference (LFrd) or the output speed (rFrd).
bit 10: Fast stop command (active at 1)
bit 11: DC injection braking command (active at 1). This command must no be used if **[Motor control type]** (Ctt) = **[Sync. mot.]** (SYn).

bit 12: Direction of rotation command
= 0: Forward
= 1: Reverse
bit 13: Reserved (= 0)
bit 14: Reserved (= 0)
bit 15: Parameter consistency check
= 0: The check is activated. Each time a parameter is written, the drive checks the relationship between the written parameter and the configuration in the drive. For example, the **[High speed]** (HSP) parameter must be less than the **[Max frequency]** (tFr) parameter. If an attempt is made to write a value greater than the **[Max frequency]** (tFr) parameter to the **[High speed]** (HSP) parameter, the write operation is accepted, but the value is limited to that of **[Max frequency]** (tFr).
= 1: The check is deactivated. The drive is locked in stop mode. In this drive state, the configuration can be written parameter by parameter and the drive does not modify the values that are written.
1→0: The change from 1 to 0 triggers a calculation of the consistency of the configuration. Some parameters can be modified automatically by the drive.

Setpoint parameters

See section “Assignment of setpoints from a network”, page 60

Code	Description			
LFRD	Parameter name:	**Speed setpoint**		
	CiA402 name:	vl target velocity		
	DRIVECOM name:	Speed-Setpoint		
	Logic address:	8602 = 16#219A	Type:	INT
	CANopen index:	6042/0	Read/write:	R/W
	INTERBUS index:	6042/0	Unit:	rpm
	DeviceNet path:	2A/01/08 (1) 8C/01/03 (2)		
	Parameter conforming to CiA402 and ODVA profiles Signed value. This parameter changes the direction of operation according to its sign.			
LFR	Parameter name:	**Frequency reference**		
	Terminal display:	**[Frequency ref.]**		
	Logic address:	8502 = 16#2136	Type:	INT
	CANopen index:	2037/3	Read/write:	R/W
	INTERBUS index:	5FB6/1C	Unit:	0.1 Hz or standardized 16 signed bits based on the maximum frequency (TFR)
	DeviceNet path:	8B/01/67		
	Signed value. The unit depends on the value of bit 9 of the extended control word (CMI): = 0: 0.1 Hz = 1: High resolution: Standardized value at maximum frequency in 16 signed bits. The value 32767 = 16 # 7FFF corresponds to **[Max frequency]** (tFr). The default value of **[Max frequency]** (tFr) is 60 Hz, and the resolution is then approximately 0.0018 Hz.			
LTR	Parameter name:	**Torque reference**		
	Terminal display:	**[HMI torque ref.]**		
	CiA402 name:	Target torque		
	DRIVECOM name:	Torque-Setpoint-External		
	Logic address:	8505 = 16#2139	Type:	INT
	CANopen index:	6071/0	Read/write:	R/W
	INTERBUS index:	5FB6/1F	Unit:	0.001 "Nominal motor torque"
	DeviceNet path:	8B/01/6A		
	Parameter conforming to CiA402 profile Signed value. The "Nominal motor torque" is not accessible as a drive parameter. It is the result of a calculation on the other characteristics.			

(1) ODVA standard path. It can be used for explicit messaging. Do not use it for configuring an assembly.
(2) Altivar path. Avoid using it for explicit messaging, to ensure better interchangeability. This is the path that must be used for configuring an assembly.

Setpoint parameters

Code	Description			
Int	Parameter name:	**Torque unit**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	9260 = 16#242C 203E/3D 5FBF/35 8F/01/3D	Type: Read/write: Factory setting:	WORD (listing) R/WS According to drive rating
	0 = 0.01 Nm 1 = 0.1 Nm 2 = 1 Nm 3 = 10 Nm This parameter is only used and can only be configured with DeviceNet. It sets the unit for the LTCR and OTRN parameters.			
LtCr	Parameter name:	**Torque setpoint (Nm)**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	9261 = 16#242D 203E/3E 5FB6/3D 2A/01/0C	Type: Read/write: Unit:	INT R/W 0.01 - 0.1 - 1 - 10 Nm According to Int page 83
PISP	Parameter name:	**PID regulator setpoint**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	8503 = 16#2137 2037/4 5FB6/1D 8B/01/68	Type: Read/write: Unit:	INT R/W 1
	Signed value. If the PID regulator is to be controlled via a network, this reference must be written, in accordance with the protocol: • Either via messaging • Or by assigning this parameter in the periodic variables			
AIU1	Parameter name: Terminal display:	**Network analog input** **[Network AI]**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	5281 = 16 #14A1 2016/52 5FB9/40 7B/01/52	Type: Read/write: Unit:	INT R/W 1
MFr	Parameter name: Terminal display:	**Multiplying coefficient** **[Multiplying coeff.]**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	11831 = 16#2E37 2058/20 5FB6/3E 9C/01/20	Type: Read/write: Unit:	UINT R/W 1%

Status parameters

Code	Description			
ETA	Parameter name:	**Status word**		
	CiA402 name:	Statusword		
	DRIVECOM name:	Statusword		
	Logic address:	8603 = 16#219B or 3201 = 16#0C81 (1)	Type:	WORD (bit register)
	CANopen index:	6041/0	Read/write:	R
	INTERBUS index:	6041/0		
	DeviceNet path:	71/01/02		
	(1) **Note:** This parameter is available at two logic addresses to optimize exchanges via Modbus messaging (Modbus function 4 = 16#04 Read Input Registers): - If the drive has to be monitored in terms of speed, it is preferable to use address 8603, since the output speed is at address 8604. - If the drive has to be monitored in terms of frequency, it is preferable to use address 3201, since the output frequency is at address 3202.			
	Parameter conforming to CiA402 profile			
	Possible values in the IO profile **Note:** The value is identical in the CiA402 profile and the I/O profile. In the I/O profile, the description of the values is simplified and does not refer to the CiA402 (Drivecom) state chart. bit 0: Reserved (= 0 or 1) bit 1: Ready = 0: Not ready, = 1: Ready bit 2: Running = 0: The drive will not start if a reference other than zero is applied. = 1: Running, if a reference other than zero is applied, the drive can start. bit 3: Fault = 0: No fault, = 1: Fault bit 4: Power section line supply present = 0: Power section line supply absent, = 1: Power section line supply present bit 5: Reserved (= 1) bit 6: Reserved (= 0 or 1) bit 7: Alarm = 0: No alarm, = 1: Alarm bit 8: Reserved (= 0) bit 9: Command via a network = 0: Command via the terminals or the graphic display terminal, = 1: Command via a network **Note:** The network can be integrated Modbus, CANopen, a communication card or the Controller Inside card. This is not necessarily the network via which the status word is read. Therefore, if the command comes from CANopen (CANopen command channel active) and the status word (ETA) is read via an Ethernet card, the data item "Control via a network" = 1. This does not mean that control can be carried out via the Ethernet card. For more information, see the "Active command channel" (CCC) and "Active reference channel" (CRC) parameters. bit 10: Reference reached = 0: The reference is not reached, = 1: The reference has been reached bit 11: Reference outside limits = 0: The reference is within the limits, = 1: The reference is not within the limits When the drive is in speed mode, the limits are defined by the "Low speed (LSP)" and "High speed (HSP)" parameters. When the torque function is activated, refer to the description of this function (see the Programming Manual). bits 12 and 13: Reserved (= 0) bit 14: Stop via STOP key = 0: STOP key not pressed, = 1: Stop triggered by the STOP key on the graphic display terminal bit 15: Direction of rotation = 0: Forward rotation at output, = 1: Reverse rotation at output			

Code	Description
	Possible values in CiA402 profile bit 0: "Ready to switch on", awaiting power section line supply bit 1: "Switched on", ready bit 2: "Operation enabled", running bit 3: "Fault" = 0: No fault, = 1: Fault bit 4: "Voltage enabled", power section line supply present = 0: Power section line supply absent = 1: Power section line supply present When the drive is powered by the power section only, this bit is always at 1. bit 5: Quick stop/Emergency stop bit 6: "Switched on disabled", power section line supply locked bit 7: Warning alarm = 0: No alarm = 1: Alarm bit 8: Reserved (= 0) bit 9: Remote: command or reference via the network = 0: Command or reference via the terminals = 1: Command or reference via the network bit 10: Target reference reached = 0: The reference is not reached = 1: The reference has been reached When the drive is in speed mode, this is the speed reference. When the torque function is activated, refer to the description of this function (see the Programming Manual). When the drive stops, the reference has been reached. bit 11: "Internal limit active", reference outside limits = 0: The reference is within the limits = 1: The reference is not within the limits When the drive is in speed mode, the limits are defined by the "Low speed (LSP)" and "High speed (HSP)" parameters. When the torque function is activated, refer to the description of this function (see the Programming Manual). bit 12: Reserved (= 0) bit 13: Reserved (= 0) bit 14: "Stop key", STOP via stop key = 0: STOP key not pressed = 1: Stop triggered by the STOP key on the graphic display terminal bit 15:"Direction", direction of rotation = 0: Forward rotation at output = 1: Reverse rotation at output The combination of bits 0, 1, 2, 4, 5 and 6 defines the state in the DSP 402 state chart (see the CiA402 profile section).

Status parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">ETI</td><td>Parameter name:</td><td colspan="3">Extended status word</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3206 = 16#0C86
2002/7
5FB9/08
71/01/07</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: = 1: Access to the EEPROM non-volatile memory in progress
bit 1: = 0: No parameter consistency check
= 1: Parameter consistency check
bit 2: = 0: The drive is not in fault state or a fault is present
= 1: The drive is in fault state but the fault is no longer present (not acknowledged)
bit 3: Reserved (= 0)

bit 4: = 1: Drive in speed regulation mode
bit 5: = 1: DC injection braking (identical to LSR4, bit 11)
bit 6: = 0: Drive in steady state
= 1: Drive in transient state
bit 7: = 1: Motor thermal state threshold reached for the active motor

bit 8: = 1: Overbraking (identical to LSR5, bit 1)
bit 9: = 1: Acceleration in progress (identical to LSR4, bit 13)
bit 10: = 1: Deceleration in progress (identical to LSR4, bit 14)
bit 11: = 1: Current or torque limiting in progress

bit 12: = 1: Fast stop in progress (identical to LSR4, bit 15)
bit 13: bit 13 = 0 and bit 14 = 0: Command via the terminals
bit 14: bit 13 = 1 and bit 14 = 0: Command via the graphic display terminal
bit 13 = 0 and bit 14 = 1: Command via Modbus
bit 13 = 1 and bit 14 = 1: Command via CANopen, the network card or the "Controller Inside" card
bit 15: = 0: Forward operation applied before the ramp
= 1: Reverse operation applied before the ramp</td></tr>
<tr><td rowspan="3">LRS1</td><td>Parameter name:</td><td colspan="3">Extended status word 1</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3250 = 16#0CB2
2002/33
5FB9/1C
71/01/33</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: Reserved (= 0)
bit 1: = 1: The drive is in fault state
bit 2: = 0: The drive is locked, the motor is not powered
= 1: The drive is unlocked, power can be supplied to the motor (RUN state)
bit 3: = 1: The output contactor is controlled

bit 4: = 1: Frequency threshold (ftd) reached: [Freq. Th. attained] (FtA)
bit 5: = 1: High speed (HSP) reached: [HSP attained] (FLA)
bit 6: = 1: Current threshold (Ctd) reached: [Current Th. attained] (CtA)
bit 7: = 1: Frequency reference reached: [Frequency ref. att.] (SrA)

bit 8: = 1: Motor 1 thermal state threshold [Motor therm. level] (ttd) reached: [Motor th. state att.] (tSA)
bit 9: = 1: Brake contactor command [Brake assignment] (bLC) active
bit 10: = 1: PID regulator error alarm: [PID error al] (PEE)
bit 11: = 1: PID regulator feedback alarm: [PID fdbk al.] (PFA)

bit 12: = 1: 4-20 mA alarm on analog input AI2: [4-20mA loss (AI2)] (LFF2)
bit 13: = 1: Second frequency threshold (ftd) reached: [Freq. Th. 2 attained] (FA2)
bit 14: = 1: Drive thermal state threshold [Drv therm. state al] (tHA) reached: [Th. drv. att.] (tAd)
bit 15: = 1: The "traverse control" function is active</td></tr>
</table>

Status parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">LRS2</td><td>Parameter name:</td><td colspan="3">Extended status word 2</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3251 = 16#0CB3
2002/34
5FB9/1D
71/01/34</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bits 0 to 10: Reserved (= 0)
bit 11: = 1: Rope slack (see [Rope slack config.] (rSd)) parameter
bit 12: = 1: [High torque alarm] (ttHA): Motor torque greater than the high threshold [High torque thd.] (ttH)
Bit 13: = 1: [Low torque alarm] (ttLA): Motor torque less than the low threshold [Low torque thd.] (ttL)
Bit 14: = 1: [Forward] (MFrd): Motor rotating in the forward direction
Bit 15: = 1: [Reverse] (MrrS): Motor rotating in the reverse direction</td></tr>
<tr><td rowspan="3">LRS3</td><td>Parameter name:</td><td colspan="3">Extended status word 3</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3252 = 16#0CB4
2002/35
5FB9/1E
71/01/35</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: = 0: Reference channel 1 or 1B (Fr1) or (Fr1b) is active
= 1: Reference channel 2 (Fr2) is active
bit 1: = 0: Command channel 1 (Cd1) is active
= 1: Command channel 2 (Cd2) is active
bit 2: = 0: Ramp set 1 (ACC) and (dEC)
= 1: Ramp set 2 (AC2) and (dE2)
bit 3: = 0: Current limit 1 (CLI) is active
= 1: Current limit 2 (CL2) is active

bit 4: Reserved (= 0)
bit 5: = 1: Motor 2 thermal state threshold [Motor2 therm. level] (ttd2) reached: [Th.mot2 att] (tS2)
bit 6: = 1: Motor 3 thermal state threshold [Motor3 therm. level] (ttd3) reached: [Th.mot3 att] (tS3)
bit 7: Reserved (= 0)

bit 8: = 1: 24 VDC external power supply present
bit 9: = 1: Stop on low speed time limit function [Low speed time out] (tLS)
bit 10: Reserved (= 0)
bit 11: Reserved (= 0)

bit 12: Reserved (= 0)
bit 13: Reserved (= 0)
bit 14: Reserved (= 0)
bit 15: = 0: The output torque is positive (forward)
= 1: The output torque is negative (reverse)</td></tr>
</table>

Status parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">LRS4</td><td>Parameter name:</td><td colspan="3">Extended status word 4</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3253 = 16#0CB5
2002/36
5FB9/1F
71/01/36</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: = 1: Configuration 0 is active
bit 1: = 1: Configuration 1 is active [Cnfg.1 act.] (CnF1)
bit 2: = 1: Configuration 2 is active [Cnfg.2 act.] (CnF2)
bit 3: Reserved (= 0)

bit 4: = 1: Parameter set 1 is active: [Set 1 active] (CFP1)
bit 5: = 1: Parameter set 2 is active: [Set 2 active] (CFP2)
bit 6: = 1: Parameter set 3 is active: [Set 3 active] (CFP3)
bit 7: Reserved (= 0)

bit 8: = 0: Power section line supply present
= 1: Power section line supply absent
bit 9: = 1: Motor "fluxing" in progress: [In motor fluxing] (FLX)
bit 10: = 1: The motor is "fluxed"
bit 11: = 1: DC injection braking (identical to ETI, bit 5)

bit 12: = 1: Current limiting in progress
bit 13: = 1: Acceleration in progress (identical to ETI, bit 9)
bit 14: = 1: Deceleration in progress (identical to ETI, bit 10)
bit 15: = 1: Fast stop in progress: [Fast stop in prog.] (FSt) (identical to ETI, bit 12)</td></tr>
<tr><td rowspan="3">LRS5</td><td>Parameter name:</td><td colspan="3">Extended status word 5</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3254 = 16#0CB6
2002/37
5FB9/20
71/01/37</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: = 1: Drive DC bus loading: [DC bus loading] (dbL)
bit 1: = 1: Drive braking [In braking] (brS)
bit 2: = 1: The "Power removal" function is active
bit 3: = 1: Automatic restart attempts in progress: [Auto restart] (AUtO)

bit 4: = 1: "Auto-tuning" in progress: [Auto-tuning] (tUn)
bit 5: = 1: Controlled stop in progress following loss of power section line supply (CTL)
bit 6: = 1: The drive cannot follow the configured deceleration ramp, deceleration automatically adapted (OBR)
bit 7: = 1: Controlled output cut in progress (SOC)

bit 8 : = 1: [Freq. meter Alarm] (FqLA): Measured speed threshold reached: [Pulse warning thd.] (FqL)
bit 9: = 1: The line contactor is active
bit 10: Reserved (= 0 or 1)
bit 11: Reserved (= 0 or 1)

bit 12: Reserved (= 0 or 1)
bit 13: = 1: Current present in the motor (MCP)
bit 14: = 1: If the "limit switch management" [LIMIT SWITCHES] function is activated. The [Stop FW limit sw.] or [Stop RV limit sw.] stops are reached.
bit 15 : = 1: [Dynamic load alarm] (dLdA): Load variation detection (see [DYNAMIC LOAD DETECT.] (dLd-))</td></tr>
</table>

Status parameters

Code	Description			
LRS6	Parameter name:	**Extended status word 6**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3255 = 16#0CB7 2002/38 5FB9/21 71/01/38	Type: Read/write:	WORD (bit register) R
	bit 0: = 1: Alarm group 1 is active bit 1: = 1: Alarm group 2 is active bit 2: = 1: Alarm group 3 is active bit 3: = 1: Probe 1 alarm: **[PTC1 alarm]** (PtC1) bit 4: = 1: Probe 2 alarm: **[PTC2 alarm]** (PtC2) bit 5: = 1: LI6 PTC probe alarm: **[LI6 =PTC alarm]** (PtC3) bit 6: Reserved (= 0) bit 7: = 1: External fault **[External fault alarm]** (EtF) bit 8: = 1: Undervoltage alarm **[Undervoltage]** (USA) bit 9: = 1: The power section line supply loss detection threshold for a controlled stop has been reached (undervoltage warning) bit 10: = 1: Slipping alarm: **[Load slipping]** (AnA) bit 11: = 1: Drive overheat alarm (tHA) bit 12: Reserved (= 0) bit 13: = 1: Speed alarm in the brake control sequence (BSA) bit 14: = 1: Brake contact alarm in the brake control sequence (BCA) bit 15: = 1: Current or torque limit alarm after time-out **[Trq/I limit. time out]** (StO)			
LRS7	Parameter name:	**Extended status word 7**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3256 = 16#0CB8 2002/39 5FB9/22 71/01/39	Type: Read/write:	WORD (bit register) R
	bit 0: = 1: Reference channel 1 or 1B (Fr1) or (Fr1b) is active bit 1: = 1: Reference channel 2 (Fr2) is active. bit 2: = 1: Command channel 1 (Cd1) is active. bit 3: = 1: Command channel 2 (Cd2) is active. bit 4: = 1: Reference channel 1B (Fr1b) is active. bit 5: = 1: Spool end ("traverse control" function) bit 6: = 1: Master-slave synchronization ("traverse control" function) bit 7: = 1: Torque regulation alarm bit 8: = 1: IGBT thermal state alarm bit 9: = 1: Braking resistor overload alarm bit 10: = 1: Alarm sent by the "Controller Inside" card bit 11: = 1: 4-20 mA alarm on analog input AI3: **[4-20mA loss (AI3)]** (LFF3) bit 12: = 1: 4-20 mA alarm on analog input AI4: **[4-20mA loss (AI4)]** (LFF4) bit 13: = 1: DC bus precharging contactor controlled (DC0) bit 14: Reserved (= 0) bit 15: Reserved (= 0)			

Status parameters

Code	Description			
LRS8	Parameter name:	**Extended status word 8**		
	Logic address:	3257 = 16#0CB9	Type:	WORD (bit register)
	CANopen index:	2002/3A	Read/write:	R
	INTERBUS index:	5FB9/23		
	DeviceNet path:	71/01/3A		
	bit 0: Reserved (= 0) bit 1: Reserved (= 0) bit 2: Reserved (= 0) bit 3: Reserved (= 0) bit 4: Reserved (= 0) bit 5: Reserved (= 0) bit 6: Reserved (= 0) bit 7: Reserved (= 0) bit 8: Reserved (= 0) bit 9: Reserved (= 0) bit 10: Reserved (= 0) bit 11: Reserved (= 0) bit 12: Reserved (= 0) bit 13: Reserved (= 0) bit 14: Reserved (= 0) bit 15: = 1: Drive ready(rdY)			
CRC	Parameter name:	**Active reference channel**		
	Logic address:	8441 = 16#20F9	Type:	WORD (bit register)
	CANopen index:	2036/2A	Read/write:	R
	INTERBUS index:	5FB9/CE		
	DeviceNet path:	8B/01/2A		
	bit 0: = 1: The terminals are the active reference channel via an analog input bit 1: Reserved (= 0) bit 2: = 1: The graphic display terminal is the active reference channel bit 3: = 1: Modbus is the active reference channel bit 4: Reserved (= 0) bit 5: Reserved (= 0) bit 6: = 1: CANopen is the active reference channel bit 7: = 1: The terminals are the active reference channel in +/- speed bit 8: = 1: The graphic display terminal is the active reference channel in +/- speed bit 9: = 1: The network card is the active reference channel bit 10: = 1: The "Controller Inside" card is the active reference channel bit 11: Reserved (= 0) bit 12: Reserved (= 0) bit 13: Reserved (= 0) bit 14: Reserved (= 0) bit 15: = 1: The PowerSuite software workshop is the active reference channel			

Status parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">CCC</td><td>Parameter name:</td><td colspan="3">Active command channel</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>8442 = 16#20FA
2036/2B
5FB9/CF
8B/01/2B</td><td>Type:
Read/write:</td><td>WORD (bit register)
R</td></tr>
<tr><td colspan="4">bit 0: = 1: The terminals are the active command channel
bit 1: Reserved (= 0)
bit 2: = 1: The graphic display terminal is the active command channel
bit 3: = 1: Modbus is the active command channel

bit 4: Reserved (= 0)
bit 5: Reserved (= 0)
bit 6: = 1: CANopen is the active command channel
bit 7: = 1: The terminals are the active command channel in +/- speed

bit 8: = 1: The graphic display terminal is the active command channel in +/- speed
bit 10: = 1: The "Controller Inside" card is the active command channel
bit 11: Reserved (= 0)

bit 12: Reserved (= 0)
bit 13: Reserved (= 0)
bit 14: Reserved (= 0)
bit 15: = 1: The PowerSuite software workshop is the active command channel</td></tr>
<tr><td rowspan="3">CFPS</td><td>Parameter name:</td><td colspan="3">Active parameter set</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>12900 = 16#3264
2063/01
5FB9/EC
A1/01/65</td><td>Type:
Read/write:</td><td>WORD (listing)
R</td></tr>
<tr><td colspan="4">0 : The parameter set switching function is not configured
1 = [Set 1 active] (CFP1): Parameter set no. 1 active
2 = [Set 2 active] (CFP2): Parameter set no. 2 active
3 = [Set 3 active] (CFP3): Parameter set no. 3 active</td></tr>
<tr><td rowspan="3">CNFS</td><td>Parameter name:
Terminal display:</td><td colspan="3">Active configuration
[Config. Active]</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>8020 = 16#1F54
2032/15
5FB9/CD
89/01/15</td><td>Type:
Read/write:</td><td>WORD (listing)
R</td></tr>
<tr><td colspan="4">0 : The motor or configuration switching function is not configured
1 = (CNF0): Configuration no. 0 active
2 = (CNF1): Configuration no. 1 active
3 = (CNF2): Configuration no. 2 active</td></tr>
</table>

Output value parameters

Output values (speed)

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">rFrd</td><td>Parameter name:</td><td colspan="3">Output velocity</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl control effort</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Actual-Value</td></tr>
<tr><td colspan="5"><table>
<tr><td>Logic address:</td><td>8604 = 16#219C</td><td>Type:</td><td>INT</td></tr>
<tr><td>CANopen index:</td><td>6044/0</td><td>Read/write:</td><td>R</td></tr>
<tr><td>INTERBUS index:</td><td>6044/0</td><td>Unit:</td><td>rpm</td></tr>
<tr><td>DeviceNet path:</td><td>2A/01/07 (1)
8C/01/05 (2)</td><td></td><td></td></tr>
</table></td></tr>
<tr><td colspan="5">Parameter conforming to CiA402 and ODVA profiles
Signed value.

If the drive is in open-loop mode, the speed value is estimated.
If the drive is in closed-loop mode, the speed value is measured on the sensor.

This parameter is linked to the "Output frequency" (rFr) parameter for which the unit is 0.1 Hz.</td></tr>
<tr><td rowspan="3">rFr</td><td>Parameter name:</td><td colspan="3">Output frequency</td></tr>
<tr><td>Terminal display:</td><td colspan="3">[Output frequency]</td></tr>
<tr><td colspan="5"><table>
<tr><td>Logic address:</td><td>3202 = 16#C82</td><td>Type:</td><td>INT</td></tr>
<tr><td>CANopen index:</td><td>2002/3</td><td>Read/write:</td><td>R</td></tr>
<tr><td>INTERBUS index:</td><td>5FB9/04</td><td>Unit:</td><td>0.1 Hz or standardized 16 signed bits based on the maximum frequency (TFR)</td></tr>
<tr><td>DeviceNet path:</td><td>71/01/03</td><td></td><td></td></tr>
</table></td></tr>
<tr><td colspan="5">Signed value.

The unit depends on the value of bit 9 of the extended control word:
=0: 0.1 Hz
=1: Standardized value on 16 signed bits at maximum frequency. The value 32767 corresponds to [Max frequency] (TFR). The default value of [Max frequency] (TFR) is 60 Hz, and the resolution is then approximately 0.0018 Hz.</td></tr>
</table>

(1) ODVA standard path. It can be used for explicit messaging. Do not use it for configuring an assembly.
(2) Altivar path. Avoid using it for explicit messaging, to ensure better interchangeability. This is the path that must be used for configuring an assembly.

Output value parameters

Output values (torque)

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">Otr</td><td>Parameter name:</td><td colspan="3">Output torque</td></tr>
<tr><td>Terminal display:</td><td colspan="3">[Motor torque]</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">Torque actual value</td></tr>
<tr><td></td><td>DRIVECOM name:</td><td colspan="3">Torque-Actual-Value</td></tr>
<tr><td></td><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>3205 = 16#0C85
6077/0
5FB9/07
71/01/06</td><td>Type:
Read/write:
Unit:</td><td>INT
R
0.001 "Nominal motor torque"</td></tr>
<tr><td></td><td colspan="4">Parameter conforming to CiA402 profile
Signed value.

The "Nominal motor torque" is not accessible as a drive parameter. It is the result of other characteristics.</td></tr>
<tr><td rowspan="2">Otrn</td><td>Parameter name:</td><td colspan="3">Output torque (Nm)</td></tr>
<tr><td></td><td>Logic address:
CANopen index:
INTERBUS index:

DeviceNet path:</td><td>3216 = 16#0C90
2002/11
5FB9/10

2A/01/0B</td><td>Type:
Read/write:
Unit:

</td><td>INT
R
0.01 - 0.1 - 1 - 10 Nm
According to Int page 83</td></tr>
</table>

Output value parameters

Output values (motor)

Code	Description			
LCr	Parameter name:	**Motor current**		
	Terminal display:	**[Motor current]**		
	Logic address:	3204 = 16#0C84	Type:	UINT
	CANopen index:	2002/5	Read/write:	R
	INTERBUS index:	5FB9/06	Unit:	0.1 A
	DeviceNet path:	2A/01/09 (1) 71/01/05 (2)		
	Parameter conforming to ODVA profile			
UOP	Parameter name:	**Motor voltage**		
	Terminal display:	**[Motor voltage]**		
	Logic address:	3208 = 16#0C88	Type:	UINT
	CANopen index:	2002/9	Read/write:	R
	INTERBUS index:	5FB9/0A	Unit:	1 V
	DeviceNet path:	71/01/09		
OPr	Parameter name:	**Motor power**		
	Terminal display:	**[Motor power]**		
	Logic address:	3211 = 16#0C8B	Type:	INT
	CANopen index:	2002/C	Read/write:	R
	INTERBUS index:	5FB9/0C	Unit:	1%
	DeviceNet path:	71/01/0C		
UNT	Parameter name:	**Units of parameters APH, PTH, and RTH**		
	Logic address:	3234 = 16#0CA2	Type:	WORD (bit register)
	CANopen index:	2002/23	Read/write:	R
	INTERBUS index:	5FB9/19		
	DeviceNet path:	71/01/23		
	The unit changes automatically when the value reaches the maximum format of the parameter. bit 0 + bit 1 = unit of APH: 0 = Wh, 1 = kWh, 2 = MWh bit 2 + bit 3 = unit of PTH: 0 = seconds, 1 = minutes, 2 = hours bit 4 + bit 5 = unit of RTH: 0 = seconds, 1 = minutes, 2 = hours bits 6 to 15:Reserved (= 0)			

(1) ODVA standard path. It can be used for explicit messaging. Do not use it for configuring an assembly.
(2) Altivar path. Avoid using it for explicit messaging, to ensure better interchangeability. This is the path that must be used for configuring an assembly.

Output value parameters

Code	Description			
APH	Parameter name:	**Motor energy consumption**		
	Terminal display:	**[Consumption]**		
	Logic address:	3230 = 16#0C9E	Type:	UINT
	CANopen index:	2002/1F	Read/write:	R
	INTERBUS index:	5FB9/15	Unit:	According to the preceding UNT parameter
	DeviceNet path:	71/01/1F		
AUS	Parameter name:	**ENA average speed**		
	Terminal display:	**[ENA avg speed]**		
	Logic address:	12102 = 16#2F46	Type:	INT
	CANopen index:	205B/3	Read/write:	R
	INTERBUS index:	5FB9/EA	Unit:	0.1 Hz
	DeviceNet path:	9D/01/67		

References (speed)

Code	Description			
FrHd	Parameter name:	**Speed reference before ramp**		
	Logic address:	8605 = 16#219D	Type:	INT
	CANopen index:	2038/6	Read/write:	R
	INTERBUS index:	6043/0	Unit:	rpm
	DeviceNet path:	8C/01/06	Factory setting:	
			Adjustment range:	
FrOd	Parameter name:	**Speed reference after ramp**		
	Terminal display:			
	CiA402 name:	vl velocity demand		
	DRIVECOM name:	Speed-Reference-Variable		
	Logic address:	8641 = 16#21C1	Type:	INT
	CANopen index:	6043/0	Read/write:	R
	INTERBUS index:	5FB9/D8	Unit:	rpm
	DeviceNet path:	8C/01/2A	Factory setting:	
			Adjustment range:	
	Parameter conforming to CiA402 profile Signed value. This parameter is linked to the "Frequency after ramp" (FRO) parameter for which the unit is 0.1 Hz.			
FrH	Parameter name:	**Frequency reference before ramp**		
	Terminal display:	**[Frequency ref.]**		
	Logic address:	3203 = 16#0C83	Type:	INT
	CANopen index:	2002/4	Read/write:	R
	INTERBUS index:	5FB9/05	Unit:	0.1 Hz
	DeviceNet path:	71/01/04		
FrO	Parameter name:	**Frequency reference after ramp**		
	Logic address:	9021 = 16#233D	Type:	INT
	CANopen index:	203C/16	Read/write:	R
	INTERBUS index:	5FB9/D9	Unit:	0.1 Hz
	DeviceNet path:	8E/01/16		

References (torque)

Code	Description			
trr	Parameter name:	**Torque reference before ramp**		
	Terminal display:	**[Torque reference]**		
	Logic address:	9231 = 16#240F	Type:	INT
	CANopen index:	203E/20	Read/write:	R
	INTERBUS index:	5FB9/DB	Unit:	0.1%
	DeviceNet path:	8F/01/20		
trO	Parameter name:	**Torque reference after ramp**		
	Torque demand value	Torque demand value		
	Torque-Command-Variable	Torque-Command-Variable		
	Logic address:	9232 = 16#2410	Type:	INT
	CANopen index:	203E/21	Read/write:	R
	INTERBUS index:	5FB9/DC	Unit:	0.001 "Nominal motor torque"
	DeviceNet path:	8F/01/21		
	Parameter conforming to CiA402 profile Signed value. The "Nominal motor torque" is not accessible as a drive parameter. It is the result of other characteristics.			

Reference parameters

Reference (regulator)

See section “Assignment of setpoints from a network”, page 60.

Code	Description			
rPC	Parameter name:	**PID reference after ramp**		
	Terminal display:	**[PID reference]**		
	Logic address:	11982 = 16#2ECE	Type:	UINT
	CANopen index:	2059/53	Read/write:	R
	INTERBUS index:	5FB9/E7	Unit:	1
	DeviceNet path:	9C/01/B7		
rPF	Parameter name:	**PID regulator feedback reference**		
	Terminal display:	**[PID feedback]**		
	Logic address:	11981 = 16#2ECD	Type:	UINT
	CANopen index:	2059/52	Read/write:	R
	INTERBUS index:	5FB9/E6	Unit:	1
	DeviceNet path:	9C/01/B6		
rPE	Parameter name:	**PID regulator discrepancy**		
	Terminal display:	**[PID error]**		
	Logic address:	11980 = 16#2ECC	Type:	INT
	CANopen index:	2059/51	Read/write:	R
	INTERBUS index:	5FB9/E5	Unit:	1
	DeviceNet path:	9C/01/B5		
rPO	Parameter name:	**PID regulator limit output reference**		
	Terminal display:	**[PID Output]**		
	Logic address:	11983 = 16#2ECF	Type:	INT
	CANopen index:	2059/54	Read/write:	R
	INTERBUS index:	5FB9/E8	Unit:	0.1 Hz
	DeviceNet path:	9C/01/B8		

Measurement parameters

Input measurements

Code	Description			
ULn	Parameter name:	**Power supply voltage**		
	Terminal display:	**[Mains voltage]**		
	Logic address:	3207 = 16#0C87	Type:	UINT
	CANopen index:	2002/8	Read/write:	R
	INTERBUS index:	5FB9/09	Unit:	0.1 V
	DeviceNet path:	71/01/08		

Thermal states

Code	Description			
tHd	Parameter name:	**Drive thermal state**		
	Terminal display:	**[Drv. thermal state]**		
	Logic address:	3209 = 16#0C89	Type:	UINT
	CANopen index:	2002/A	Read/write:	R
	INTERBUS index:	5FB9/0B	Unit:	1 %
	DeviceNet path:	71/01/0A		
tHr	Parameter name:	**Motor thermal state**		
	Terminal display:	**[Motor thermal state]**		
	Logic address:	9630 = 16#259E	Type:	UINT
	CANopen index:	2042/1F	Read/write:	R
	INTERBUS index:	5FB9/DE	Unit:	1 %
	DeviceNet path:	91/01/1F		
tHb	Parameter name:	**DBR thermal state**		
	Terminal display:	**[DBR thermal state]**		
	Logic address:	14114 = 16#3722	Type:	UINT
	CANopen index:	206F/F	Read/write:	R
	INTERBUS index:	5FBD/7F	Unit:	1%
	DeviceNet path:	A7/01/73		

Measurement parameters

Time

Code	Description			
rtH	Parameter name:	**Total motor operating time**		
	Terminal display:	**[Run time]**		
	Logic address:	3231 = 16#0C9F	Type:	UINT
	CANopen index:	2002/20	Read/write:	R
	INTERBUS index:	5FB9/16	Unit:	According to UNT parameter (see page 94)
	DeviceNet path:	71/01/20		
PtH	Parameter name:	**Total drive operating time**		
	Terminal display:	**[Power on time]**		
	Logic address:	3233 = 16#0CA1	Type:	UINT
	CANopen index:	2002/22	Read/write:	R
	INTERBUS index:	5FB9/18	Unit:	According to UNT parameter (see page 94)
	DeviceNet path:	71/01/22		
tAC	Parameter name:	**IGBT alarm time**		
	Terminal display:	**[IGBT alarm counter]**		
	Logic address:	3235 = 16#0CA3	Type:	UINT
	CANopen index:	2002/24	Read/write:	R
	INTERBUS index:	5FB9/1A	Unit:	1 s
	DeviceNet path:	71/01/24		
EbOt	Parameter name:	**Current bobbin time**		
	Logic address:	12209 = 16#2FB1	Type:	UINT
	CANopen index:	205C/A	Read/write:	R
	INTERBUS index:	5FB9/EB	Unit:	1 min
	DeviceNet path:	9E/01/0A		

Code	Description			
dAY	Parameter name:	**Date**		
	Logic address:	7391 = 16#1CDF	Type:	UINT
	CANopen index:	202B/5C	Read/write:	R
	INTERBUS index:	5FB9/CE	Unit:	See below
	DeviceNet path:	85/01/C0		
tIME	Parameter name:	**Time**		
	Logic address:	7392 = 16#1CE0	Type:	UINT
	CANopen index:	202B/5D	Read/write:	R
	INTERBUS index:	5FB9/CF	Unit:	See below
	DeviceNet path:	85/01/C1		

Format of "Date" and "Time" parameters

Date and time are binary-coded using the corresponding word bits indicated in the table below.
Note: The value 0 for year corresponds to the year **2000** (2006 = 36, for example).

Bits		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Date	Year	X	X	X	X	X	X	X									
	Month								X	X	X	X					
	Day												X	X	X	X	X
Time	Hours	X	X	X	X	X	X	X	X								
	Minutes									X	X	X	X	X	X	X	X

Logic I/O

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">IL1r</td><td>Parameter name:</td><td colspan="3">Logic inputs states</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>5202 = 16#1452
2016/3
5FB9/28
7B/01/03</td><td>Type:
Read/write:
Unit:</td><td>WORD (bit register)
R
-</td></tr>
<tr><td colspan="4">bit 0: Value of LI1
bit 1: Value of LI2
bit 2: Value of LI3
bit 3: Value of LI4

bit 4: Value of LI5
bit 5: Value of LI6
bit 6: Value of LI7 — If a logic I/O extension card is installed
bit 7: Value of LI8

bit 8: Value of LI9
bit 9: Value of LI10
bit 10: Value of LI11 — If an extended I/O extension card is installed
bit 11: Value of LI12.

bit 12: Value of LI13
bit 13: Value of LI14
bit 14: Reserved (= 0)
bit 15: Reserved (= 0)</td></tr>
<tr><td rowspan="3">OL1r</td><td>Parameter name:</td><td colspan="3">Logic outputs states</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:

DeviceNet path:</td><td>5212 = 16#145C
2016/D
5FB9/2A (reading via PCP)
5FB6/54 (writing via PCP)
7B/01/0D</td><td>Type:
Read/write:
Unit:</td><td>WORD (bit register)
R/W
-</td></tr>
<tr><td colspan="4">bit 0: Value of R1
bit 1: Value of R2
bit 2: Value of R3, if a logic I/O extension card is installed
bit 3: Value of R4, if an extended I/O extension card is installed

bit 4: Reserved (= 0)
bit 5: Reserved (= 0)
bit 6: Reserved (= 0)
bit 7: Reserved (= 0)

bit 8: Value of LO1 — If a logic I/O extension card is installed
bit 9: Value of LO2
bit 10: Value of LO3 — If an extended I/O extension card is installed
bit 11: Value of LO4

bit 12: Reserved (= 0)
bit 13: Reserved (= 0)
bit 14: Reserved (= 0)
bit 15: Reserved (= 0)

The relay or logic outputs can be controlled via the network. Simply write this parameter. The outputs to be controlled must not be assigned to a drive function, otherwise the write operation has no effect.</td></tr>
</table>

Analog inputs

Code	Description			
AI1C	Parameter name:	**Analog input 1 physical value**		
	Logic address:	5242 = 16#147A	Type:	INT
	CANopen index:	2016/2B	Read/write:	R
	INTERBUS index:	5FB9/33	Unit:	0.001 V
	DeviceNet path:	7B/01/2B		
AI1r	Parameter name:	**Analog input 1 standardized value**		
	Logic address:	5232 = 16#1470	Type:	INT
	CANopen index:	2016/21	Read/write:	R
	INTERBUS index:	5FB9/2F	Unit:	1
	DeviceNet path:	7B/01/21		
AI2C	Parameter name:	**Analog input 2 physical value**		
	Logic address:	5243 = 16#147B	Type:	INT
	CANopen index:	2016/2C	Read/write:	R
	INTERBUS index:	5FB9/34	Unit:	0.001 V or 0.001 mA
	DeviceNet path:	7B/01/2C		
	The unit is: • 0.001 V if parameter **[AI2 Type]** (AI2t) is configured as **[Voltage]** (10U) • 0.001 mA if parameter **[AI2 Type]** (AI2t) is configured as **[Current]** (0A)			
AI2r	Parameter name:	**Analog input 2 standardized value**		
	Logic address:	5233 = 16#1471	Type:	INT
	CANopen index:	2016/22	Read/write:	R
	INTERBUS index:	5FB9/30	Unit:	1
	DeviceNet path:	7B/01/22		
AI3C	Parameter name:	**Analog input 3 physical value**		
	Logic address:	5244 = 16#147C	Type:	INT
	CANopen index:	2016/2D	Read/write:	R
	INTERBUS index:	5FB9/35	Unit:	0.001 mA
	DeviceNet path:	7B/01/2D		
AI3r	Parameter name:	**Analog input 3 standardized value**		
	Logic address:	5234 = 16#1472	Type:	INT
	CANopen index:	2016/23	Read/write:	R
	INTERBUS index:	5FB9/31	Unit:	1
	DeviceNet path:	7B/01/23		

Code	Description			
AI4C	Parameter name:	**Analog input 4 physical value**		
	Logic address:	5245 = 16#147D	Type:	INT
	CANopen index:	2016/2E	Read/write:	R
	INTERBUS index:	5FB9/36	Unit:	0.001 V or 0.001 mA
	DeviceNet path:	7B/01/2E		
	The unit is: • 0.001 V if parameter **[AI4 Type]** (AI4t) is configured as **[Voltage]** (10U) • 0.001 mA if parameter **[AI4 Type]** (AI4t) is configured as **[Current]** (0A)			
AI4r	Parameter name:	**Analog input 4 standardized value**		
	Logic address:	5235 = 16#1473	Type:	INT
	CANopen index:	2016/24	Read/write:	R
	INTERBUS index:	5FB9/32	Unit:	1
	DeviceNet path:	7B/01/24		

Analog outputs

The analog outputs can be controlled via the network. Simply write these parameters. The outputs to be controlled must not be assigned to a drive function, otherwise the write operation has no effect.

Code	Description			
AO1C	Parameter name:	**Analog output 1 physical value**		
	Logic address:	5271 = 16#1497	Type:	INT
	CANopen index:	2016/48	Read/write:	R/W
	INTERBUS index:	5FB9/3D (reading via PCP) 5FB6/56 (writing via PCP)	Unit:	0.001 mA or 0.001 V
	DeviceNet path:	7B/01/48		
	The unit is: • 0.001 V if parameter **[AO1 Type]** (AO1t) is configured as **[Voltage]** (10U) • 0.001 mA if parameter **[AO1 Type]** (AO1t) is configured as **[Current]** (0A)			
AO1r	Parameter name:	**Analog output 1 standardized value**		
	Logic address:	5261 = 16#148D	Type:	INT
	CANopen index:	2016/3E	Read/write:	R/W
	INTERBUS index:	5FB9/3A (reading via PCP) 5FB6/55 (writing via PCP)	Unit:	1
	DeviceNet path:	7B/01/3E		
AO2C	Parameter name:	**Analog output 2 physical value**		
	Logic address:	5272 = 16#1498	Type:	INT
	CANopen index:	2016/49	Read/write:	R/W
	INTERBUS index:	5FB9/3E (reading via PCP) 5FB6/58 (writing via PCP)	Unit:	0.001 mA or 0.001 V
	DeviceNet path:	7B/01/49		
	The unit is: • 0.001 V if parameter **[AO2 Type]** (AO2t) is configured as **[Voltage]** (10U) or **[Voltage +/-]** (n10U) • 0.001 mA if parameter **[AO2 Type]** (AO2t) is configured as **[Current]** (0A)			

Code	Description			
AO2r	Parameter name:	**Analog output 2 standardized value**		
	Logic address:	5262 = 16#148E	Type:	INT
	CANopen index:	2016/3F	Read/write:	R/W
	INTERBUS index:	5FB9/3B (reading via PCP) 5FB6/57 (writing via PCP)	Unit:	1
	DeviceNet path:	7B/01/3F		
AO3C	Parameter name:	**Analog output 3 physical value**		
	Logic address:	5273 = 16#1499	Type:	INT
	CANopen index:	2016/4A	Read/write:	R/W
	INTERBUS index:	5FB9/3F (reading via PCP) 5FB6/5A (writing via PCP)	Unit:	0.001 mA or 0.001 V
	DeviceNet path:	7B/01/4A		
	The unit is: • 0.001 V if parameter **[AO3 Type]** (AO3t) is configured as **[Voltage]** (10U) or **[Voltage +/-]** (n10U) • 0.001 mA if parameter **[AO3 Type]** (AO3t)is configured as **[Current]** (0A)			
AO3r	Parameter name:	**Analog output 3 standardized value**		
	Logic address:	5263 = 16#148F	Type:	INT
	CANopen index:	2016/40	Read/write:	R/W
	INTERBUS index:	5FB9/3C (reading via PCP) 5FB6/59 (writing via PCP)	Unit:	1
	DeviceNet path:	7B/01/40		

Encoder

Code	Description			
PUC	Parameter name:	**Encoder counter value**		
	Logic address:	5611 = 16#15EB	Type:	UINT
	CANopen index:	201A/C	Read/write:	R
	INTERBUS index:	5FB9/41	Unit:	1
	DeviceNet path:	7D/01/0C		

Code	Description
Errd	Parameter name: **CiA402 fault code** CiA402 name: Error code DRIVECOM name: Malfunction code

Logic address:	8606 = 16#219E	Type:	WORD (listing)
CANopen index:	603F/0	Read/write:	R
INTERBUS index:	603F/0	Unit:	-
DeviceNet path:	29/01/0D (1) 8C/01/07 (2)		

(1) ODVA standard path. This can be used for explicit messaging. Do not use for assembly configuration.
(2) Altivar path. To ensure optimum interchangeability, do not use this path for explicit messaging. Rather, it should be used for assembly configuration.

Parameter conforming to CiA402 profile
Last fault that occurred. This parameter retains its value after the fault has disappeared and been acknowledged.

16#0000:	(nOF)	No fault
16#1000: **[Precharge]**	(CrF1)	Pre-charge relay control fault or charging resistor damaged
or **[Motor overload]**	(OLF)	Triggered by excessive motor current
or **[Overspeed]**	(SOF)	Instability or driving load too high
or **[DB unit sh. circuit]**	(bUF)	Short-circuit output from braking unit
or **[IGBT desaturation]**	(HdF)	Short-circuit or grounding at the drive output
or **[Internal - CPU]**	(InFE)	Internal microprocessor fault
or **[DBR overload]**	(bOF)	The braking resistor is under excessive stress
16#2230: **[IGBT short circuit]**	(SCF4)	Power component fault
16#2310: **[Overcurrent]**	(OCF)	Parameters in the [1.3 SETTINGS] (SEt-) and [1.4 MOTOR CONTROL] (drC-) menus are not correct, inertia or load is too high, or mechanical locking has occurred
16#2320: **[Motor short circuit]**	(SCF1)	Short-circuit or grounding at the drive output, or significant earth leakage current at the drive output if several motors are connected in parallel
or **[Impedant sh. circuit]**	(SCF2)	Impedant short-circuit
or **[Motor short circuit]**	(SCF5)	Short-circuit at the drive output
16#2330: **[Ground short circuit]**	(SCF3)	Ground short-circuit
16#3110: **[Mains overvoltage]**	(OSF)	Line voltage too high
16#3120: **[Undervoltage]**	(USF)	Line supply too low, transient voltage dip, or charging resistor damaged
16#3130: **[Input phase loss]**	(PHF)	Drive incorrectly supplied, fuse blown, loss of one phase, 3-phase ATV71 used on a single-phase line supply, or unbalanced load. This protection only operates with the drive on load.
16#3310: **[Overbraking]**	(ObF)	Braking too sudden or driving load
or **[1 output phase loss]**	(OPF1)	Loss of one phase at drive output
or **[3 output phase loss]**	(OPF2)	Motor not connected, motor power too slow, output contactor open, or instantaneous instability in the motor current
16#4210: **[Drive overheat]**	(OHF)	Drive temperature too high
or **[IGBT overheat]**	(tJF)	Drive overheated
16#4310: **[PTC1 overheat]**	(OtF1)	Overheating of the PTC1 probes detected
or **[PTC2 overheat]**	(OtF2)	Overheating of the PTC2 probes detected
or **[LI6=PTC overheat]**	(OtFL)	Overheating of PTC probes detected on input LI6
16#5000: **[Internal-hard init.]**	(InF7)	Initialization of the drive is incomplete
or **[Out. contact. stuck]**	(FCF1)	The output contactor remains closed although the opening conditions have been met
or **[Out. contact. open.]**	(FCF2)	The output contactor remains open although the closing conditions have been met
or **[Internal-time meas.]**	(InFC)	Fault on the electronic time measurement component
or **[Thyr. soft charge]**	(CrF2)	DC bus charging fault (thyristors)
or **[input contactor]**	(LCF)	The drive is not turned on even though [Mains V. time out] (LCt) has elapsed
16#5100: **[Internal-ctrl supply]**	(InF8)	The control supply is not correct
16#5210: **[Internal- I measure]**	(InF9)	The current measurements are not correct
or **[Internal-mains circuit]**	(InFA)	The input stage is not operating correctly
or **[Internal- th. sensor]**	(InFb)	The drive temperature sensor is not operating correctly

Fault parameters

Code	Description
(Errd) (continued)	16#5530: **[Control Eeprom]** (EEF1) Internal memory fault, control card or **[Power Eeprom]** (EEF2) Internal memory fault, power card 16#6100: **[Rating error]** (InF1) The power card is not the one stored or **[Incompatible PB]** (InF2) The power card is incompatible with the control card or **[Internal serial link]** (InF3) Communication fault between the internal cards or **[Internal MFG area]** (InF4) Internal data inconsistent or **[Cards pairing]** (HCF) The [CARDS PAIRING] (PPI-) function has been configured and a drive card has been changed 16#6300: **[Incorrect config.]** (CFF) Option card changed or removed, control card replaced by a control card configured on a drive with a different rating, or the current configuration is inconsistent or **[Invalid config.]** (CFI) Invalid configuration. The configuration loaded in the drive via the bus or communication network is inconsistent. 16#7000: **[Internal-option]** (InF6) The option installed in the drive is not recognized 16#7110: **[Brake feedback]** (brF) The brake feedback contact does not match the brake logic control 16#7300: **[AI2 4-20 mA loss]** (LFF2) Loss of the 4-20 mA reference on analog input AI2 or **[PTC1 probe]** (PtF1) PTC1 probes open or short-circuited or **[PTC2 probe]** (PtF2) PTC2 probes open or short-circuited or **[LI6=PTC probe]** (PtFL) PTC probes on input LI6 open or short-circuited or **[AI2 input]** (AI2F) Non-conforming signal on analog input AI2 or **[AI3 4-20mA loss]** (LFF3) Loss of the 4-20 mA reference on analog input AI3 or **[AI4 4-20mA loss]** (LFF4) Loss of the 4-20 mA reference on analog input AI4 16#7310: **[Encoder coupling]** (ECF) Break in the mechanical coupling of the encoder or **[Encoder]** (EnF) Encoder feedback fault or **[Speed fdback loss]** (SPF) Encoder feedback signal missing 16#7510: **[Modbus com.]** (SLF1) Interruption in communication on the Modbus bus or **[HMI com.]** (SLF3) Fault communicating with the graphic display terminal 16#7520: **[internal com. link]** (ILF) Communication fault between option card and drive or **[Com. network]** (CnF) Communication fault on communication card 16#7530: **[PowerSuite com.]** (SLF2) Fault communicating with PowerSuite 16#8100: **[CAN com.]** (COF) Interruption in communication on the CANopen bus 16#9000: **[External flt-LI/Bit]** (EPF1) Fault triggered by an external device, depending on user or **[External fault com.]** (EPF2) Fault triggered by a communication network or **[Application fault]** (APF) "Controller Inside" card fault 16#FF00: **[Auto-tuning]** (tnF) Special motor, motor whose power is not suitable for the drive, or motor not connected to the drive 16#FF01: **[Brake control]** (bLF) Brake release current not reached or brake engage frequency threshold [Brake engage freq] (bEn) not set although brake logic control is assigned 16#FF02: **[Torque/current lim]** (SSF) Switch to torque limitation or **[Torque time-out]** (SrF) Torque control function time-out 16#FF03: **[Power removal]** (PrF) Fault with the drive's "Power removal" safety function 16#FF05: **[Load slipping]** (AnF) The encoder speed feedback does not match the reference 16#FF80: **[Dynamic load fault]** (dLF) Dynamic load fault

Fault parameters

Code	Description			
LFt	Parameter name:	**Altivar fault code**		
	Logic address:	7121 = 16#1BD1	Type:	WORD (listing)
	CANopen index:	2029/16	Read/write:	R
	INTERBUS index:	5FB3/C8	Unit:	-
	DeviceNet path:	84/01/7A		

The **last** fault that occurred remains stored in the "Altivar fault code" (LFt) parameter, even if it disappears, and even after the drive has been turned off and then on again.

0:		(nOF)	No fault
1:			Reserved
2:	**[Control EEprom]**	(EEF1)	Internal memory fault, control card
3:	**[Incorrect config.]**	(CFF)	Option card changed or removed Control card replaced by a control card configured on a drive with a different rating The current configuration is inconsistent
4:	**[Invalid config.]**	(CFI)	Invalid configuration. The configuration loaded in the drive via the bus or communication network is inconsistent
5:	**[Modbus com.]**	(SLF1)	Interruption in communication on the Modbus bus
6:	**[internal com. link]**	(ILF)	Communication fault between option card and drive
7:	**[Com. network]**	(CnF)	Communication fault on communication card
8:	**[External flt-LI/Bit]**	(EPF1)	Fault triggered by an external device, depending on user
9:	**[Overcurrent]**	(OCF)	Parameters in the **[SETTINGS]** (SEt-) and **[1.4 MOTOR CONTROL]** (drC-) menus are not correct Inertia or load too high Mechanical locking
10:	**[Precharge]**	(CrF1)	Pre-charge relay control fault or charging resistor damaged
11:	**[Speed fdback loss]**	(SPF)	Encoder feedback signal missing
12:	**[Load slipping]**	(AnF)	The encoder speed feedback does not match the reference
13:	**[AI2 4-20 mA loss]**	(LFF2)	Loss of the 4-20 mA reference on analog input AI2
14:	**[PTC1 probe]**	(PtF1)	PTC1 probes open or short-circuited
15:	**[PTC1 overheat]**	(OtF1)	Overheating of the PTC1 probes detected
16:	**[Drive overheat]**	(OHF)	Drive temperature too high
17:	**[Motor overload]**	(OLF)	Triggered by excessive motor current
18:	**[Overbraking]**	(ObF)	Braking too sudden or driving load
19:	**[Mains overvoltage]**	(OSF)	Line voltage too high Disturbed line supply
20:	**[1 motor phase loss]**	(OPF1)	Loss of one phase at drive output
21:	**[Input phase loss]**	(PHF)	Drive incorrectly supplied or a fuse blown Loss of one phase 3-phase ATV71 used on a single-phase line supply Unbalanced load This protection only operates with the drive on load
22:	**[Undervoltage]**	(USF)	Line supply too low Transient voltage dip Damaged precharge resistor
23:	**[Motor short-circuit]**	(SCF1)	Short-circuit or grounding at the drive output Significant earth leakage current at the drive output if several motors are connected in parallel
24:	**[Overspeed]**	(SOF)	Instability or driving load too high
25:	**[Auto-tuning]**	(tnF)	Special motor or motor whose power is not suitable for the drive Motor not connected to the drive
26:	**[Rating error]**	(InF1)	The power card is not the one stored
27:	**[Incompatible PB]**	(InF2)	The power card is incompatible with the control card
28:	**[Internal serial link]**	(InF3)	Communication fault between the internal cards
29:	**[Internal MFG area]**	(InF4)	Inconsistent internal data
30:	**[Power EEprom]**	(EEF2)	Internal memory fault, power card
31:	**[Impedant sh. circuit]**	(SCF2)	Impedant short-circuit
32:	**[Ground short circuit]**	(SCF3)	Ground short-circuit
33:	**[3 output phase loss]**	(OPF2)	Motor not connected or motor power too low Output contactor open Instantaneous instability in the motor current
34:	**[CANopen com.]**	(COF)	Interruption in communication on the CANopen bus

Fault parameters

Code	Description
((LFT), continued)	35: **[Brake control]** (bLF) Brake release current not reached Brake engage frequency threshold **[Brake engage freq]** (bEn) not set when brake control is assigned 36: Reserved 37: **[Internal - hard init.]** (InF7) Initialization of the drive is incomplete 38: **[External fault com.]** (EPF2) Fault triggered by a communication network 39: **[Application fault]** (APF) "Controller Inside" card fault 40: **[Internal-ctrl supply]** (InF8) The control supply is not correct 41: **[Brake feedback]** (brF) The brake feedback contact does not match the brake logic control 42: **[PowerSuite com.]** (SLF2) Fault communicating with PowerSuite 43: **[Encoder coupling]** (ECF) Break in the mechanical coupling of the encoder 44: **[Torque/current lim]** (SSF) Switch to torque limitation 45: **[HMI com.]** (SLF3) Fault communicating with the graphic display terminal 46: **[Power removal]** (PrF) Fault with the drive's "Power removal" safety function 47: **[PTC2 probe]** (PtF2) PTC2 probes open or short-circuited 48: **[PTC2 overheat]** (OtF2) Overheating of the PTC2 probes detected 49: **[LI6=PTC probe]** (PtFL) PTC probes on input LI6 open or short-circuited 50: **[LI6=PTC overheat]** (OtFL) Overheating of PTC probes detected on input LI6 51: **[Internal- I measure]** (InF9) The current measurements are not correct 52: **[Internal-mains circuit]** (InFA) The input stage is not operating correctly 53: **[Internal-th. sensor]** (InFb) The drive temperature sensor is not operating correctly 54: **[IGBT overheat]** (tJF) Drive overheated 55: **[IGBT short circuit]** (SCF4) Power component fault 56: **[Motor short circuit]** (SCF5) Short-circuit at the drive output 57: **[Torque time-out]** (SrF) Torque control function time-out 58: **[Out. contact. stuck]** (FCF1) The output contactor remains closed although the opening conditions have been met 59: **[Out. contact. open]** (FCF2) The output contactor remains open although the closing conditions have been met 60: **[Internal-time meas.]** (InFC) Fault on the electronic time measurement component 61: **[AI2 input]** (AI2F) Non-conforming signal on analog input AI2 62: **[Encoder]** (EnF) Encoder feedback fault 63: **[Thyr. soft charge]** (CrF2) DC bus charging fault (thyristors) 64: **[input contactor]** (LCF) The drive is not turned on even though **[Mains V. time out]** (LCt) has elapsed 65: **[DB unit sh. circuit]** (bUF) Short-circuit output from braking unit 66: Reserved 67: **[IGBT desaturation]** (HdF) Short-circuit or grounding at the drive output 68: **[Internal-option]** (InF6) The option installed in the drive is not recognized 69: **[Internal- CPU]** (InFE) Internal microprocessor fault 70: **[DBR overload]** (bOF) The braking resistor is under excessive stress 71: **[AI3 4-20 mA loss]** (LFF3) Loss of the 4-20 mA reference on analog input AI3 72: **[AI4 4-20 mA loss]** (LFF4) Loss of the 4-20 mA reference on analog input AI3 73: **[Cards pairing]** (HCF) The **[CARDS PAIRING]** (PPI-) function has been configured and a drive card has been changed 76: **[Dynamic load fault]** (dLF) Dynamic load fault 99: Reserved 103: Reserved

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">CIC</td><td>Parameter name:</td><td colspan="3">Incorrect configuration</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>7130 = 16#1BDA
2029/1F
5FB6/1A
84/01/83</td><td>Type:
Read/write:
Unit:</td><td>WORD (bit register)
R
-</td></tr>
<tr><td colspan="4">bit 0: =1: Change of rating
bit 1: Reserved (= 0 or 1)
bit 2: =1: The network card has been removed
bit 3: =1: Saving to the EEPROM non-volatile memory is inconsistent with power on

bit 4: =1: The network card has been changed
bit 5: Reserved (= 0 or 1)
bit 6: =1: The (Controller Inside) card has been removed
bit 7: =1: The (Controller Inside) card has been changed

bit 8: Reserved (= 0 or 1)
bit 9: =1: An I/O card has been removed
bit 10: =1: The I/O card has been changed
bit 11: Reserved (= 0 or 1)

bit 12: =1: An encoder card has been removed
bit 13: =1: The encoder card has been changed
bit 14: Reserved (= 0 or 1)
bit 15: Reserved (= 0 or 1)

If one of these events occurs, the drive switches to [Incorrect config.] (CFF) fault mode and then automatically applies a factory setting.</td></tr>
<tr><td rowspan="3">APF</td><td>Parameter name:</td><td colspan="3">"Controller Inside" card fault code</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>7133 = 16#1BDD
2029/22
5FB0/97
84/01/86</td><td>Type:
Read/write:
Unit:</td><td>UINT
R
1</td></tr>
<tr><td colspan="4">The fault remains saved in the parameter, even if it disappears.
The parameter is reset after the drive is disconnected and then reconnected.

Consult the "Controller Inside" card manual.</td></tr>
<tr><td rowspan="3">CnF</td><td>Parameter name:</td><td colspan="3">Network card fault code</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>7132 = 16#1BDC
2029/21
5FB0/96
84/01/85</td><td>Type:
Read/write:
Unit:</td><td>UINT
R
1</td></tr>
<tr><td colspan="4">The fault remains saved in the parameter, even if it disappears.
The parameter is reset after the drive is disconnected and then reconnected.

The possible values of this parameter depend on the network card protocol. Consult the manual for the corresponding card.</td></tr>
</table>

Fault parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">ILF1</td><td>Parameter name:</td><td colspan="3">Option card 1 fault code</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>7134 = 16#1BDE
2029/23
5FB0/98
84/01/87</td><td>Type:
Read/write:
Unit:
Factory setting:</td><td>UINT
R
1</td></tr>
<tr><td colspan="4">The fault remains saved in the parameter, even if it disappears.
The parameter is reset after the drive is disconnected and then reconnected.

0 = No fault
1 = Loss of internal communication with the drive
2 = Hardware fault detected
3 = Error in the EEPROM non-volatile memory checksum
4 = Faulty EEPROM non-volatile memory
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)</td></tr>
<tr><td rowspan="3">ILF2</td><td>Parameter name:</td><td colspan="3">Option card 2 fault code</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>7135 = 16#1BDF
2029/24
5FB0/99
84/01/88</td><td>Type:
Read/write:
Unit:</td><td>UINT
R
1</td></tr>
<tr><td colspan="4">The fault remains saved in the parameter, even if it disappears.
The parameter is reset after the drive is disconnected and then reconnected.

Same values as ILF1.</td></tr>
<tr><td rowspan="3">Fdrd</td><td>Parameter name:
Terminal display:</td><td colspan="3">Ethernet fault code
[FDR fault]</td></tr>
<tr><td>Logic address:
CANopen index:
INTERBUS index:
DeviceNet path:</td><td>64233 = 16#FAE9
2264/22
-
-</td><td>Type:
Read/write:
Unit:</td><td>UINT
R
-</td></tr>
<tr><td colspan="4">When an Ethernet fault is present, this parameter is used to ascertain the cause of the fault.
The fault code remains saved after the disappearance of the fault.
2: The FDR configuration file is not compatible with the type of drive (e.g. incorrect drive rating)
3: Error reading the FDR configuration file on the server
4: Error writing the FDR configuration file to the server
5: Error writing the FDR configuration file to the drive (e.g. the drive is in forced local mode)
7: Time-out for receipt of the FDR configuration file from the server
9: Duplication of IP address
12: The FDR configuration file is missing</td></tr>
</table>

Fault parameters

Code	Description			
Fnb	Parameter name:	**Fault counter**		
	Logic address:	7393 = 16#1CE1	Type:	UINT
	CANopen index:	202B/5E	Read/write:	R
	INTERBUS index:	5FB9/CC	Unit:	-
	DeviceNet path:	99/01/CC		

Log parameters

Description of last fault log

Code	Description			
dP0	Parameter name:	**Fault code on last fault**		
	Logic address:	7200 = 16#1C20	Type:	WORD (listing)
	CANopen index:	202A/1	Read/write:	R
	INTERBUS index:	5FB9/55	Unit:	-
	DeviceNet path:	85/01/01		
	Value of the "Altivar fault code" (LFt) parameter, written to memory when the last fault occurred. See the possible values of the "Altivar fault code" (LFt) parameter.			
ULP0	Parameter name:	**Power supply voltage on last fault**		
	Logic address:	7270 = 16#1C66	Type:	UINT
	CANopen index:	202A/47	Read/write:	R
	INTERBUS index:	5FB9/94	Unit:	0.1 V
	DeviceNet path:	85/01/47		
	Value of the "Power supply voltage" (ULn) parameter, written to memory when the last fault occurred.			
LCP0	Parameter name:	**Motor current on last fault**		
	Logic address:	7240 = 16#1C48	Type:	INT
	CANopen index:	202A/29	Read/write:	R
	INTERBUS index:	5FB9/79	Unit:	0.1 A
	DeviceNet path:	85/01/29		
	Value of the "Motor current" (LCr) parameter, written to memory when the last fault occurred.			
rFP0	Parameter name:	**Output frequency on last fault**		
	Logic address:	7250 = 16#1C52	Type:	INT
	CANopen index:	202A/33	Read/write:	R
	INTERBUS index:	5FB9/82	Unit:	0.1 Hz
	DeviceNet path:	85/01/33		
	Value of the "Output frequency" (rFr) parameter, written to memory when the last fault occurred.			
tHP0	Parameter name:	**Motor thermal state on last fault**		
	Logic address:	7280 = 16#1C70	Type:	UINT
	CANopen index:	202A/51	Read/write:	R
	INTERBUS index:	5FB9/9D	Unit:	1
	DeviceNet path:	85/01/51		
EP0	Parameter name:	**Status word on last fault**		
	Logic address:	7210 = 16#1C2A	Type:	WORD (bit register)
	CANopen index:	202A/B	Read/write:	R
	INTERBUS index:	5FB9/5E	Unit:	-
	DeviceNet path:	85/01/0B		
	Value of the "Status word" (EtA) parameter, written to memory when the last fault occurred. See the possible values of the "Status word" (EtA) parameter.			

Log parameters

Code	Description			
IP0	Parameter name:	**Extended status word 0 on last fault**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	7220 = 16#1C34 202A/15 5FB9/67 85/01/15	Type: Read/write: Unit:	WORD (bit register) R -
	Value of the "Extended status word 0" (EtI) parameter, written to memory when the last fault occurred. See the possible values of the "Extended status word 0" (EtI) parameter.			
CMP0	Parameter name:	**Command word on last fault**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	7230 = 16#1C3E 202A/1F 5FB9/70 85/01/1F	Type: Read/write: Unit:	WORD (bit register) R -
	Value of the "Command word" (CMd) parameter, written to memory when the last fault occurred. See the possible values of the "Command word" (CMd) parameter.			
dCCO	Parameter name:	**Command channel active on last fault**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	64300 = 16#FB2C 2265/1 5FBA/08 9A/01/08	Type: Read/write: Unit:	WORD (listing) R -
	0: Terminals 2: Graphic display terminal 3: Modbus 6: CANopen 9: Network card 10: "Controller Inside" card 15: PowerSuite			
drC0	Parameter name:	**Reference channel active on last fault**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	64310 = 16#FB36 2265/B 5FBA/11 9A/01/11	Type: Read/write: Unit:	WORD (listing) R -
	0: Analog input terminals 2: Graphic display terminal 3: Modbus 6: CANopen 7: +/- speed terminals 9: Network card 10: "Controller Inside" card 15: PowerSuite			

Log parameters

Code	Description			
CrPO	Parameter name:	**Channels active on last fault**		
	Logic address:	7290 = 16#1C7A	Type:	WORD
	CANopen index:	202A/5B	Read/write:	R
	INTERBUS index:	5FB9/A6	Unit:	-
	DeviceNet path:	85/01/5B		
	Command channel: Low order byte: 0: Terminals 2: Graphic display terminal 3: Modbus 6: CANopen 9: Network card 10: "Controller Inside" card 15: PowerSuite Reference channel: High order byte: 0: Analog input terminals 2: Graphic display terminal 3: Modbus 6: CANopen 7: +/- speed terminals 9: Network card 10: "Controller Inside" card 15: PowerSuite			
rtP0	Parameter name:	**Motor operating time on last fault**		
	Logic address:	7260 = 16#1C5C	Type:	UINT
	CANopen index:	202A/3D	Read/write:	R
	INTERBUS index:	5FB9/8B	Unit:	1 hour
	DeviceNet path:	85/01/3D		
Md0	Parameter name:	**Date on last fault**		
	Logic address:	7300 = 16#1C84	Type:	UINT
	CANopen index:	202B/1	Read/write:	R
	INTERBUS index:	5FB9/AF	Unit:	1
	DeviceNet path:	85/01/65		
	This parameter is only significant if a "Controller Inside" card is installed in the drive.			
dM0	Parameter name:	**Time on last fault**		
	Logic address:	7310 = 16#1C8E	Type:	UINT
	CANopen index:	202B/B	Read/write:	R
	INTERBUS index:	5FB9/B8	Unit:	1
	DeviceNet path:	85/01/6F		
	This parameter is only significant if a "Controller Inside" card is installed in the drive.			

Format of "Date" and "Time" parameters

Date and time are binary-coded using the corresponding word bits indicated in the table below.
Note: The value 0 for year corresponds to the year **2000** (2006 = 36, for example).

Bits		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Date	Year	X	X	X	X	X	X	X									
	Month								X	X	X	X					
	Day												X	X	X	X	X
Time	Hours	X	X	X	X	X	X	X	X								
	Minutes									X	X	X	X	X	X	X	X

Log parameters

Log of the following faults

The log shown for the first fault can be used to review the last 8 faults. All codes and addresses are summarized in the tables below.

Fault n-1

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP1**	7201 = 16#1C21	202A/2	5FB9/5A	85/01/02
Supply voltage	**ULP1**	7271 = 16#1C67	202A/48	5FB9/99	85/01/48
Motor current	**LCP1**	7241 = 16#1C49	202A/2A	5FB9/7E	85/01/2A
Output frequency	**rFP1**	7251 = 16#1C53	202A/34	5FB9/87	85/01/34
Motor thermal state	**tHP1**	7281 = 16#1C71	202A/52	5FB9/A2	85/01/52
Status word	**EP1**	7211 = 16#1C2B	202A/C	5FB9/63	85/01/0C
Extended status word	**IP1**	7221 = 16#1C35	202A/16	5FB9/6C	85/01/16
Command word	**CMP1**	7231 = 16#1C3F	202A/20	5FB9/75	85/01/20
Active command channel	**dCC1**	64301 = 16#FB2D		5FBA/22	
Active reference channel	**drC1**	64311 = 16#FB37		5FBA/2B	
Active channels	**CrP1**	7291 = 16#1C7B	202A/5C	5FB9/AB	85/01/5C
Motor operating time	**rtP1**	7261 = 16#1C5D	202A/3E	5FB9/90	85/01/3E
Date	**Md1**	7301 = 16#1C85	202B/2	5FB9/B4	85/01/66
Time	**dM1**	7311 = 16#1C8F	202B/C	5FB9/BD	85/01/70

Fault n-2

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP2**	7202 = 16#1C22	202A/3	5FB9/5B	85/01/03
Supply voltage	**ULP2**	7272 = 16#1C68	202A/49	5FB9/9A	85/01/49
Motor current	**LCP2**	7242 = 16#1C4A	202A/2B	5FB9/7F	85/01/2B
Output frequency	**rFP2**	7252 = 16#1C54	202A/35	5FB9/88	85/01/35
Motor thermal state	**tHP2**	7282 = 16#1C72	202A/53	5FB9/A3	85/01/53
Status word	**EP2**	7212 = 16#1C2C	202A/D	5FB9/64	85/01/0D
Extended status word	**IP2**	7222 = 16#1C36	202A/17	5FB9/6D	85/01/17
Command word	**CMP2**	7232 = 16#1C40	202A/21	5FB9/76	85/01/21
Active command channel	**dCC2**	64302 = 16#FB2E		5FBA/23	
Active reference channel	**drC2**	64312 = 16#FB38		5FBA/2C	
Active channels	**CrP2**	7292 = 16#1C7C	202A/5D	5FB9/AC	85/01/5D
Motor operating time	**rtP2**	7262 = 16#1C5E	202A/3F	5FB9/91	85/01/3F
Date	**Md2**	7302 = 16#1C86	202B/3	5FB9/B5	85/01/67
Time	**dM2**	7312 = 16#1C90	202B/D	5FB9/BE	85/01/71

Log parameters

Fault n-3

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP3**	7203 = 16#1C23	202A/4	5FB9/5C	85/01/04
Supply voltage	**ULP3**	7273 = 16#1C69	202A/4A	5FB9/9B	85/01/4A
Motor current	**LCP3**	7243 = 16#1C4B	202A/2C	5FB9/80	85/01/2C
Output frequency	**rFP3**	7253 = 16#1C55	202A/36	5FB9/89	85/01/36
Motor thermal state	**tHP3**	7283 = 16#1C73	202A/54	5FB9/A4	85/01/54
Status word	**EP3**	7213 = 16#1C2D	202A/E	5FB9/65	85/01/0E
Extended status word	**IP3**	7223 = 16#1C37	202A/18	5FB9/6E	85/01/18
Command word	**CMP3**	7233 = 16#1C41	202A/22	5FB9/77	85/01/22
Active command channel	**dCC3**	64303 = 16#FB2F		5FBA/24	
Active reference channel	**drC3**	64313 = 16#FB39		5FBA/2D	
Active channels	**CrP3**	7293 = 16#1C7D	202A/5E	5FB9/AD	85/01/5E
Motor operating time	**rtP3**	7263 = 16#1C5F	202A/40	5FB9/92	85/01/40
Date	**Md3**	7303 = 16#1C87	202B/4	5FB9/B6	85/01/68
Time	**dM3**	7313 = 16#1C91	202B/E	5FB9/BF	85/01/72

Fault n-4

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP4**	7204 = 16#1C24	202A/5	5FB9/5D	85/01/05
Supply voltage	**ULP4**	7274 = 16#1C6A	202A/4B	5FB9/9C	85/01/4B
Motor current	**LCP4**	7244 = 16#1C4C	202A/2D	5FB9/81	85/01/2D
Output frequency	**rFP4**	7254 = 16#1C56	202A/37	5FB9/8A	85/01/37
Motor thermal state	**tHP4**	7284 = 16#1C74	202A/55	5FB9/A5	85/01/55
Status word	**EP4**	7214 = 16#1C2E	202A/F	5FB9/66	85/01/0F
Extended status word	**IP4**	7224 = 16#1C38	202A/19	5FB9/6F	85/01/19
Command word	**CMP4**	7234 = 16#1C42	202A/23	5FB9/78	85/01/23
Active command channel	**dCC4**	64304 = 16#FB30		5FBA/25	
Active reference channel	**drC4**	64314 = 16#FB3A		5FBA/2E	
Active channels	**CrP4**	7294 = 16#1C7E	202A/5F	5FB9/AE	85/01/5F
Motor operating time	**rtP4**	7264 = 16#1C60	202A/41	5FB9/93	85/01/41
Date	**Md4**	7304 = 16#1C88	202B/5	5FB9/B7	85/01/69
Time	**dM4**	7314 = 16#1C92	202B/F	5FB9/C0	85/01/73

Log parameters

Fault n-5

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP5**	7205 = 16#1C25	202A/6	5FB9/5E	85/01/06
Supply voltage	**ULP5**	7275 = 16#1C6B	202A/4C	5FB9/9D	85/01/4C
Motor current	**LCP5**	7245 = 16#1C4D	202A/2E	5FB9/82	85/01/2E
Output frequency	**rFP5**	7255 = 16#1C57	202A/38	5FB9/8B	85/01/38
Motor thermal state	**tHP5**	7285 = 16#1C75	202A/56	5FB9/A6	85/01/56
Status word	**EP5**	7215 = 16#1C2F	202A/10	5FB9/67	85/01/10
Extended status word	**IP5**	7225 = 16#1C39	202A/1A	5FB9/70	85/01/1A
Command word	**CMP5**	7235 = 16#1C43	202A/24	5FB9/79	85/01/24
Active command channel	**dCC5**	64305 = 16#FB31		5FBA/26	
Active reference channel	**drC5**	64315 = 16#FB3B		5FBA/2F	
Active channels	**CrP5**	7295 = 16#1C7F	202A/60	5FB9/AF	85/01/60
Motor operating time	**rtP5**	7265 = 16#1C61	202A/42	5FB9/94	85/01/42
Date	**Md5**	7305 = 16#1C89	202B/6	5FB9/B8	85/01/6A
Time	**dM5**	7315 = 16#1C93	202B/10	5FB9/C1	85/01/74

Fault n-6

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP6**	7206 = 16#1C26	202A/7	5FB9/5F	85/01/07
Supply voltage	**ULP6**	7276 = 16#1C6C	202A/4D	5FB9/9E	85/01/4D
Motor current	**LCP6**	7246 = 16#1C4E	202A/2F	5FB9/83	85/01/2F
Output frequency	**rFP6**	7256 = 16#1C58	202A/39	5FB9/8C	85/01/39
Motor thermal state	**tHP6**	7286 = 16#1C76	202A/57	5FB9/A7	85/01/57
Status word	**EP6**	7216 = 16#1C30	202A/11	5FB9/68	85/01/11
Extended status word	**IP6**	7226 = 16#1C3A	202A/1B	5FB9/71	85/01/1B
Command word	**CMP6**	7236 = 16#1C44	202A/25	5FB9/7A	85/01/25
Active command channel	**dCC6**	64306 = 16#FB32		5FBA/27	
Active reference channel	**drC6**	64316 = 16#FB3C		5FBA/30	
Active channels	**CrP6**	7296 = 16#1C80	202A/61	5FB9/B0	85/01/61
Motor operating time	**rtP6**	7266 = 16#1C62	202A/43	5FB9/95	85/01/43
Date	**Md6**	7306 = 16#1C8A	202B/7	5FB9/B9	85/01/6B
Time	**dM6**	7316 = 16#1C94	202B/11	5FB9/C2	85/01/75

Log parameters

Fault n-7

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP7**	7207 = 16#1C27	202A/8	5FB9/60	85/01/08
Supply voltage	**ULP7**	7277 = 16#1C6D	202A/4E	5FB9/9F	85/01/4E
Motor current	**LCP7**	7247 = 16#1C4F	202A/30	5FB9/84	85/01/30
Output frequency	**rFP7**	7257 = 16#1C59	202A/3A	5FB9/8D	85/01/3A
Motor thermal state	**tHP7**	7287 = 16#1C77	202A/58	5FB9/A8	85/01/58
Status word	**EP7**	7217 = 16#1C31	202A/12	5FB9/69	85/01/12
Extended status word	**IP7**	7227 = 16#1C3B	202A/1C	5FB9/72	85/01/1C
Command word	**CMP7**	7237 = 16#1C45	202A/26	5FB9/7B	85/01/26
Active command channel	**dCC7**	64307 = 16#FB33		5FBA/28	
Active reference channel	**drC7**	64317 = 16#FB3D		5FBA/31	
Active channels	**CrP7**	7297 = 16#1C81	202A/62	5FB9/B1	85/01/62
Motor operating time	**rtP7**	7267 = 16#1C63	202A/44	5FB9/96	85/01/44
Date	**Md7**	7307 = 16#1C8B	202B/8	5FB9/BA	85/01/6C
Time	**dM7**	7317 = 16#1C95	202B/12	5FB9/C3	85/01/76

Fault n-8

Log	Code	Logic address:	CANopen index:	INTERBUS index:	DeviceNet path:
Fault code	**dP8**	7208 = 16#1C28	202A/9	5FB9/61	85/01/09
Supply voltage	**ULP8**	7278 = 16#1C6E	202A/4F	5FB9/A0	85/01/4F
Motor current	**LCP8**	7248 = 16#1C50	202A/31	5FB9/85	85/01/31
Output frequency	**rFP8**	7258 = 16#1C5A	202A/3B	5FB9/8E	85/01/3B
Motor thermal state	**tHP8**	7288 = 16#1C78	202A/59	5FB9/A9	85/01/59
Status word	**EP8**	7218 = 16#1C32	202A/13	5FB9/6A	85/01/13
Extended status word	**IP8**	7228 = 16#1C3C	202A/1D	5FB9/73	85/01/1D
Command word	**CMP8**	7238 = 16#1C46	202A/27	5FB9/7C	85/01/27
Active command channel	**dCC8**	64308 = 16#FB34		5FBA/29	
Active reference channel	**drC8**	64318 = 16#FB3E		5FBA/32	
Active channels	**CrP8**	7298 = 16#1C82	202A/63	5FB9/B2	85/01/63
Motor operating time	**rtP8**	7268 = 16#1C64	202A/45	5FB9/97	85/01/45
Date	**Md8**	7308 = 16#1C8C	202B/9	5FB9/BB	85/01/6D
Time	**dM8**	7318 = 16#1C96	202B/13	5FB9/C4	85/01/77

Identification parameters

Code	Description			
nCV	Parameter name:	**Drive nominal rating**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3011 = 16#0BC3 2000/C 5FB0/02 70/01/0C	Type: Read/write: Unit:	WORD (listing) R -
	0 = nO (Unknown rating) 4 = 037 (0.37 kW / 0.5 HP) 6 = 075 (0.75 kW / 1 HP) 9 = U15 (1.5 kW / 2 HP) 11 = U22 (2.2 kW / 3 HP) 12 = U30 (3 kW) 14 = U40 (4 kW / 5 HP) 15 = U55 (5.5 kW / 7.5 HP) 16 = U75 (7.5 kW / 10 HP) 18 = D11 (11 kW / 15 HP) 19 = D15 (15 kW / 20 HP) 20 = D18 (18.5 kW / 25 HP) 21 = D22 (22 kW / 30 HP) 22 = D30 (30 kW / 40 HP) 23 = D37 (37 kW / 50 HP) 24 = D45 (45 kW / 60 HP)		25 = D55 (55 kW / 75 HP) 26 = D75 (75 kW / 100 HP) 27 = D90 (90 kW / 125 HP) 28 = C11 (110 kW / 150 HP) 29 = C13 (132 kW / 200 HP) 30 = C16 (160 kW / 250 HP) 31 = C20 (200 kW / 300 HP) 32 = C22 (220 kW / 350 HP) 33 = C25 (250 kW / 400 HP) 34 = C28 (280 kW / 450 HP) 35 = C31 (315 kW / 500 HP) 37 = C40 (400 kW / 600 HP) 39 = C50 (500 kW / 700 HP) 40 = C56 (560 kW) 41 = C63 (630 kW) 42 = C71 (710 kW) 43 = C80 (800 kW) 44 = C90 (900 kW) 45 = M12 (1200 kW)	
UCAL	Parameter name:	**Drive line voltage**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3012 = 16#0BC4 2000/D 5FB0/03 70/01/0D	Type: Read/write: Unit:	WORD (listing) R -
	3 = 220 V single-phase (M2) 4 = 220 V three-phase (M3) 6 = 480 V three-phase (N4) 8 = 690 V three-phase (S6)			
InV	Parameter name:	**Rated drive current**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3017 = 16#0BC9 2000/12 5FB0/07 70/01/12	Type: Read/write: Unit:	UINT R 0.1 A
UdP	Parameter name:	**Drive software version**		
	Logic address: CANopen index: INTERBUS index: DeviceNet path:	3302 = 16#0CE6 2003/3 5FB0/0D 71/01/67	Type: Read/write: Unit:	UINT R 1

Identification parameters

Code	Description			
PAn0	Parameter name:	**Device name (char 1 and 2)**		
	Logic address:	3340 = 16#0D0C	Type:	UINT
	CANopen index:	2003/29	Read/write:	R/W
	INTERBUS index:	5FB0/25	Unit:	
	DeviceNet path:	71/01/8D		
	This parameter can be modified by the graphic display terminal in the [7.1 USER PARAMETERS] menu. If the device is called "Ventilateur 1234", the values of the "device name" parameters are: PAn0 = 16#5665 = "Ve" PAn1 = 16#6E74 = "nt" PAn2 = 16#696C = "il" PAn3 = 16#6174 = "at" PAn4 = 16#6575 = "eu" PAn5 = 16#7220 = "r " PAn6 = 16#3132 = "12" PAn7 = 16#3334 = "34"			
PAn1	Parameter name:	**Device name (char 3 and 4)**		
	Logic address:	3341 = 16#0D0D	Type:	UINT
	CANopen index:	2003/2A	Read/write:	R/W
	INTERBUS index:	5FB0/26	Unit:	
	DeviceNet path:	71/01/8E		
PAn2	Parameter name:	**Device name (char 5 and 6)**		
	Logic address:	3342 = 16#0D0E	Type:	UINT
	CANopen index:	2003/2B	Read/write:	R/W
	INTERBUS index:	5FB0/27	Unit:	
	DeviceNet path:	71/01/8F		
PAn3	Parameter name:	**Device name (char 7 and 8)**		
	Logic address:	3343 = 16#0D0F	Type:	UINT
	CANopen index:	2003/2C	Read/write:	R/W
	INTERBUS index:	5FB0/28	Unit:	
	DeviceNet path:	71/01/90		
PAn4	Parameter name:	**Device name (char 9 and 10)**		
	Logic address:	3344 = 16#0D10	Type:	UINT
	CANopen index:	2003/2D	Read/write:	R/W
	INTERBUS index:	5FB0/29	Unit:	
	DeviceNet path:	71/01/91		
PAn5	Parameter name:	**Device name (char 11 and 12)**		
	Logic address:	3345 = 16#0D11	Type:	UINT
	CANopen index:	2003/2E	Read/write:	R/W
	INTERBUS index:	5FB0/2A	Unit:	
	DeviceNet path:	71/01/92		

Identification parameters

Code	Description			
PAn6	Parameter name:	**Device name (char 13 and 14)**		
	Logic address:	3346 = 16#0D12	Type:	UINT
	CANopen index:	2003/2F	Read/write:	R/W
	INTERBUS index:	5FB0/2B	Unit:	
	DeviceNet path:	71/01/93		
PAn7	Parameter name:	**Device name (char 15 and 16)**		
	Logic address:	3347 = 16#0D13	Type:	UINT
	CANopen index:	2003/30	Read/write:	R/W
	INTERBUS index:	5FB0/2C	Unit:	
	DeviceNet path:	71/01/94		

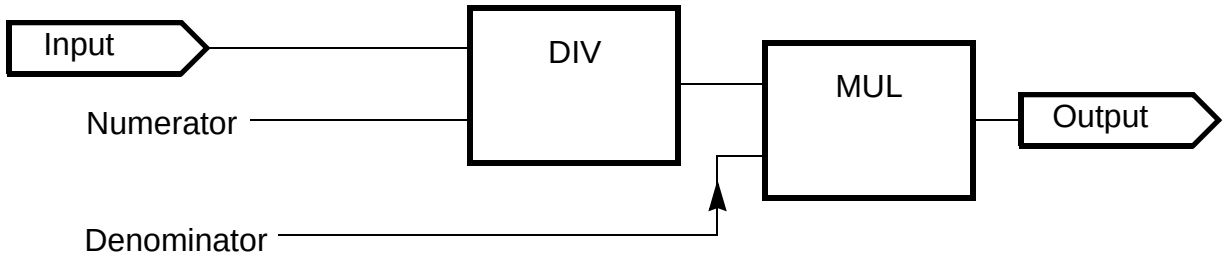
<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="4">SMIL</td><td>Parameter name:</td><td colspan="3">Velocity min amount</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity min speed</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Min-Amount</td></tr>
<tr><td colspan="4"><table>
<tr><td>Logic address:</td><td>8607 = 16#219F
and 8608 = 16#21A0</td><td>Type:</td><td>UDINT</td></tr>
<tr><td>CANopen index:</td><td>6046/1</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6046/1</td><td>Unit:</td><td>rpm</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/08</td><td></td><td></td></tr>
</table></td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
32-bit word (low order: 8607, high order: 8608). High orders always = 0.
Writing this parameter also modifies:
• [Low speed] (LSP)
• ODVA low speed limit (LSPd)</td></tr>
<tr><td rowspan="4">SMAL</td><td>Parameter name:</td><td colspan="3">Velocity max amount</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity max speed</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Max-Amount</td></tr>
<tr><td colspan="4"><table>
<tr><td>Logic address:</td><td>8609 = 16#21A1
and 8610 = 16#21A2</td><td>Type:</td><td>UDINT</td></tr>
<tr><td>CANopen index:</td><td>6046/2</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6046/2</td><td>Unit:</td><td>rpm</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/0A</td><td></td><td></td></tr>
</table></td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
32-bit word (low order: 8609, high order: 8610). High orders always = 0.
Writing this parameter also modifies:
• [High speed] (HSP)
• ODVA high speed limit (HSPd)</td></tr>
<tr><td rowspan="4">SPAL</td><td>Parameter name:</td><td colspan="3">Acceleration delta speed</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity acceleration/delta speed</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Acceleration/Delta speed</td></tr>
<tr><td colspan="4"><table>
<tr><td>Logic address:</td><td>8611 = 16#21A3
and 8612 = 16#21A4</td><td>Type:</td><td>UDINT</td></tr>
<tr><td>CANopen index:</td><td>6048/1</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6048/1</td><td>Unit:</td><td>rpm</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/0C</td><td></td><td></td></tr>
</table></td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
Speed for calculation of acceleration ramp.
32-bit word (low order: 8611, high order: 8612).
If writing registers 8611 and 8612 in succession, write register 8611 first, then register 8612.
Writing this parameter also modifies:
• [Acceleration] (ACC)
• ODVA acceleration time</td></tr>
</table>

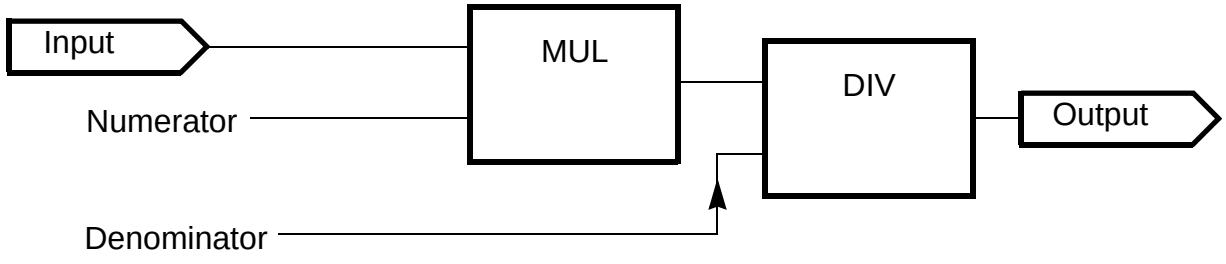
CiA402 standard configuration and adjustment parameters

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="4">SPAt</td><td>Parameter name:</td><td colspan="3">Acceleration delta time</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity acceleration/delta time</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Acceleration/Delta time</td></tr>
<tr><td colspan="4">
<table>
<tr><td>Logic address:</td><td>8613 = 16#21A5</td><td>Type:</td><td>UINT</td></tr>
<tr><td>CANopen index:</td><td>6048/2</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6048/2</td><td>Unit:</td><td>1 s</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/0E</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
Time for calculation of acceleration ramp (time to go from 0 to delta speed).
Writing this parameter also modifies:
• [Acceleration] (ACC)
• ODVA acceleration time</td></tr>
<tr><td rowspan="4">SPdL</td><td>Parameter name:</td><td colspan="3">Deceleration delta speed</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity deceleration/delta speed</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed-Deceleration/Delta speed</td></tr>
<tr><td colspan="4">
<table>
<tr><td>Logic address:</td><td>8614 = 16#21A6
and 8615 = 16#21A7</td><td>Type:</td><td>UDINT</td></tr>
<tr><td>CANopen index:</td><td>6049/1</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6049/1</td><td>Unit:</td><td>rpm</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/0F</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
Speed for calculation of deceleration ramp.
32-bit word (low order: 8614, high order: 8615).
If writing registers 8614 and 8615 in succession, write register 8614 first, then register 8615.
Writing this parameter also modifies:
• [Deceleration] (DEC)
• ODVA deceleration time</td></tr>
<tr><td rowspan="4">SPdt</td><td>Parameter name:</td><td colspan="3">Deceleration delta time</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl velocity deceleration/delta time</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Speed- Deceleration/Delta time</td></tr>
<tr><td colspan="4">
<table>
<tr><td>Logic address:</td><td>8616 = 16#21A8</td><td>Type:</td><td>UINT</td></tr>
<tr><td>CANopen index:</td><td>6049/2</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>6049/2</td><td>Unit:</td><td>1 s</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/11</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td colspan="4">Parameter conforming to CiA402 profile
Time for calculation of deceleration ramp (time to go from 0 to delta speed).
Writing this parameter also modifies:
• [Deceleration] (DEC)
• ODVA deceleration time</td></tr>
</table>

<table>
<tr><th>Code</th><th colspan="4">Description</th></tr>
<tr><td rowspan="3">SPFn</td><td>Parameter name:</td><td colspan="3">Setpoint factor numerator</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl setpoint factor numerator</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Setpoint-Factor-Numerator</td></tr>
<tr><td></td><td>Logic address:</td><td>8642 = 16#21C2</td><td>Type:</td><td>INT</td></tr>
<tr><td></td><td>CANopen index:</td><td>604B/1</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td></td><td>INTERBUS index:</td><td>604B/1</td><td>Unit:</td><td>-</td></tr>
<tr><td></td><td>DeviceNet path:</td><td>8C/01/2B</td><td>Factory setting:</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td>Adjustment range</td><td>-32768 ... -1; 1 ... 32767</td></tr>
<tr><td></td><td colspan="4">Parameter conforming to CiA402 profile</td></tr>
<tr><td rowspan="5">SPFd</td><td>Parameter name:</td><td colspan="3">Setpoint factor denominator</td></tr>
<tr><td>CiA402 name:</td><td colspan="3">vl setpoint factor denominator</td></tr>
<tr><td>DRIVECOM name:</td><td colspan="3">Setpoint-Factor-Denominator</td></tr>
<tr><td>Logic address:</td><td>8643 = 16#21C3</td><td>Type:</td><td>INT</td></tr>
<tr><td>CANopen index:</td><td>604B/2</td><td>Read/write:</td><td>R/W</td></tr>
<tr><td>INTERBUS index:</td><td>604B/2</td><td>Unit:</td><td>-</td></tr>
<tr><td>DeviceNet path:</td><td>8C/01/2C</td><td>Factory setting:</td><td>1</td></tr>
<tr><td></td><td></td><td>Adjustment range</td><td>-32768 ... -1; 1 ... 32767</td></tr>
<tr><td></td><td colspan="4">Parameter conforming to CiA402 profile
The speed setpoint factor is obtained by the Divisor and Multiplier parameters.
These parameters have no unit and can take a value from -32768 to 32767, excluding value 0.

The factor is used to modify the resolution or the direction of the setpoint. It is applied to the setpoint, and the references and output values of the speed function only.

Setpoint:
 

References and output values:
 
</td></tr>
</table>

Code	Description			
DOTD	Parameter name:	**Disable operation option code**		
	CiA402 name:	Disable operation option code		
	DRIVECOM name:			
	Logic address:	8652 = 16#21CC	Type:	WORD (listing)
	CANopen index:	605C/0	Read/write:	R/WS
	INTERBUS index:		Factory setting:	0
	DeviceNet path:	8C/01/35		
	Parameter conforming to CiA402 profile 0 = Freewheel stop 1 = Stop on ramp			
QSTD	Parameter name:	**Quick stop option code**		
	CiA402 name:	Quick stop option code		
	DRIVECOM name:			
	Logic address:	8651 = 16#21CB	Type:	WORD (listing)
	CANopen index:	605A / 0	Read/write:	R/WS
	INTERBUS index:		Factory setting:	6
	DeviceNet path:	8C/01/34		
	Parameter conforming to CiA402 profile 2 = Fast stop then transition to "2 - Switch on disabled" state 6 = Fast stop and remaining in "6 - Quick stop active" state			

ODVA standard configuration and adjustment parameters

Code	Description			
ACCd	Parameter name:	**ODVA acceleration time**		
	ODVA name:	AccelTime		
	Logic address:	-	Type:	UINT
	CANopen index:	-	Read/write:	R/W
	INTERBUS index:	-	Unit:	ms
	DeviceNet path:	2A/01/12		
	Parameter conforming to ODVA profile Speed for calculation of acceleration ramp. Writing this parameter also modifies: • **[Acceleration]** (ACC) • CiA402 "vl velocity acceleration/delta speed" (SPAL) and "vl velocity acceleration/delta time" (SPAt) Parameter only accessible via DeviceNet.			
dECd	Parameter name:	**ODVA deceleration time**		
	ODVA name:	DecelTime		
	Logic address:	-	Type:	UINT
	CANopen index:	-	Read/write:	R/W
	INTERBUS index:	-	Unit:	ms
	DeviceNet path:	2A/01/13		
	Parameter conforming to ODVA profile Speed for calculation of deceleration ramp. Writing this parameter also modifies: • **[Deceleration]** (dEC) • CiA402 "vl velocity deceleration/delta speed" (SPdL) and "vl velocity deceleration/delta time" (SPDt) Parameter only accessible via DeviceNet.			
LSPd	Parameter name:	**Low speed limit**		
	ODVA name:	LowSpdLimit		
	Logic address:	-	Type:	UINT
	CANopen index:	-	Read/write:	R/W
	INTERBUS index:	-	Unit:	rpm
	DeviceNet path:	2A/01/14		
	Parameter conforming to ODVA profile Parameter only accessible via DeviceNet.			
HSPd	Parameter name:	**High speed limit**		
	ODVA name:	HighSpdLimit		
	Logic address:	-	Type:	UINT
	CANopen index:	-	Read/write:	R/W
	INTERBUS index:	-	Unit:	rpm
	DeviceNet path:	2A/01/15		
	Parameter conforming to ODVA profile Parameter only accessible via DeviceNet.			

Index of parameter codes

Index of parameter codes

Index of parameter codes

Index of parameter codes

Index of parameter codes

Index of parameter codes

Index of parameter codes

Index of parameter codes