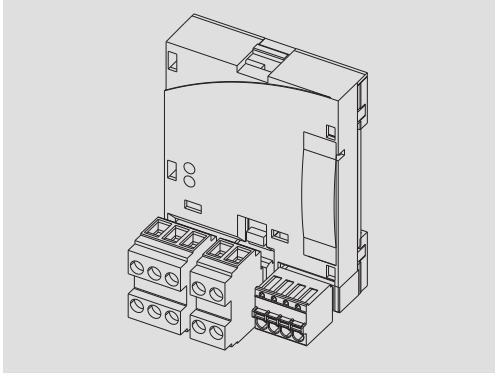
EDK82ZAFPC-010
13340356

Montageanleitung

Mounting Instructions

Instructions de montage

PROFIBUS PT



E82ZAFPC010

Funktionsmodul
Function module
Module de fonction

Lenze

Legend for fold-out page		
Pos.	**Description**	**Detailed information**
A	DIP switch for activating the bus terminating resistor	📖 68
B	Status of PROFIBUS communication (yellow LED)	📖 70
C	Connection status to the standard device (green LED)	
D	Plug connector X3.1, connection for PROFIBUS	📖 61
E	Plug connector X3.2, connection for external voltage supply	
F	Plug connector X3.3, connection for controller inhibit (CINH)	
G	Nameplate	📖 47

1 About this documentation

Contents

This documentation includes ...

- ► Safety instructions which you must observe in any case;
- ► Data about the versions of Lenze basic devices to be used;
- ► Information about the mechanical and electrical installation of the function module;
- ► Information about the commissioning of the function module;
- ► Technical data.

Validity information

The information given in this documentation is valid for the following devices:

Function module	Type designation	From hardware version	From software version
PROFIBUS PT	E82ZAFPC010	3A	10

Target group

This documentation is intended for persons who install and commission the described product according to the project requirements.

Tip!

Documentation and software updates for further Lenze products can be found on the Internet in the "Services & Downloads" area under

http://www.Lenze.com

Conventions used

This documentation uses the following conventions to distinguish between different types of information:

Type of information	Identification	Examples/notes
Numbers		
Decimal separator	Point	The decimal point is used throughout this documentation. Example: 1234.56
Symbols		
Page reference	🕮	Reference to another page with additional information Example: 🕮 16 = see page 16

Notes used

The following pictographs and signal words are used in this documentation to indicate dangers and important information:

Safety instructions

Structure of safety instructions:

Danger!

(characterises the type and severity of danger)

Note

(describes the danger and gives information about how to prevent dangerous situations)

Pictograph and signal word	Meaning
 **Danger!**	**Danger of personal injury through dangerous electrical voltage.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Danger!**	**Danger of personal injury through a general source of danger.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
 **Stop!**	**Danger of property damage.** Reference to a possible danger that may result in property damage if the corresponding measures are not taken.

Application notes

Pictograph and signal word	Meaning
 **Note!**	Important note to ensure troublefree operation
 **Tip!**	Useful tip for simple handling
	Reference to another documentation

Danger!

Inappropriate handling of the function module and the standard device can cause serious injuries to persons and damage to material assets.

Observe the safety instructions and residual hazards included in the documentation of the standard device.

Stop!

Electrostatic discharge

Electronic components within the function module can be damaged or destroyed by electrostatic discharge.

Possible consequences:

- ► The function module is defective.
- ► Fieldbus communication is not possible or faulty.

Protective measures

- ► Free yourself from any electrostatic charge before you touch the module.

Function

The function module connects Lenze frequency inverters to the serial PROFIBUS communication system.

Application as directed

The function module ...

► is an accessory module for use in conjunction with the following Lenze standard devices:

Product range	Device identification	From hardware version
Frequency inverter	8200 vector	Vx14

► is a device intended for use in industrial power systems.

Any other use shall be deemed inappropriate!

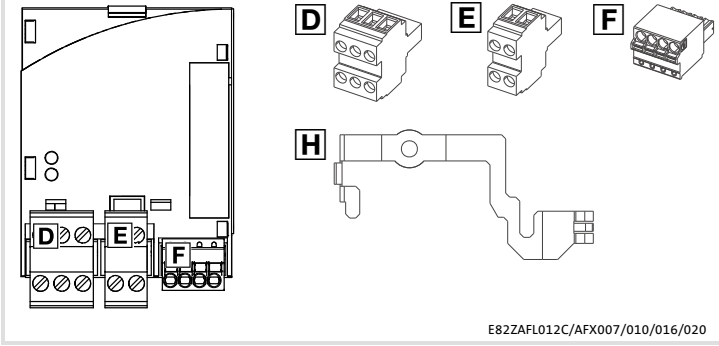
Tip!

More information about this function module is available in the corresponding communication manual.

The PDF file can be downloaded from the Internet in the "Services & Downloads" area at

http://www.Lenze.com

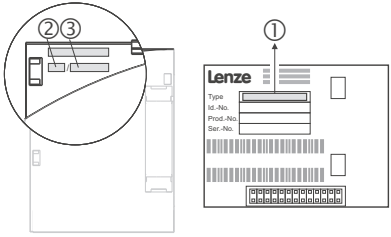
Scope of supply



E82ZAFL012C/AFX007/010/016/020

Pos.	Scope of supply
	E82ZAFPC010 function module
	Mounting Instructions
D	Plug connector with double screw connection, 3-pole
E	Plug connector with double screw connection, 2-pole
F	Plug connector with spring connection, 4-pole
H	Mounting clip

Identification



E82ZAFX005

①			②	③	
E82ZAF	P	C	010	3A	10

- Product series
- PROFIBUS
- Version
- Variant: PT (Plug Terminal) with spring and screw connection
- Hardware version
- Software version

General Data

Field	Values
Order designation	E82ZAFPC010
PUO ID number	$0x00DA_{hex}$
Communication profile (DIN 19245 part 1 and part 3)	PROFIBUS-DP
Communication medium	RS485
Drive profile	DRIVECOM profile "Power Transmission 20", can be switched off
Network topology	• Without repeater: line • With repeater: line or tree
PROFIBUS node	Slave
Baud rate [kbps]	9.6 ... 12000 (automatic detection)
Process data words	1 word ... 10 words (16 bits per word)
DP user data length	4 parameter data words + 1 ... 10 process data words
Max. number of nodes	• Standard: 32 (= 1 bus segment) • With repeater: 125
Max. cable length per bus segment	1000 m (depending on the baud rate and cable type used)
Communication time	• Sum of the cycle time and the processing time in the fieldbus nodes. The times are independent of each other. • Processing time in the controller: – Parameter data: approx. 30 ms + 20 ms tolerance – Process data: approx. 3 ms + 2 ms tolerance
External DC voltage supply	+24 V DC ±10 %, max. 80 mA

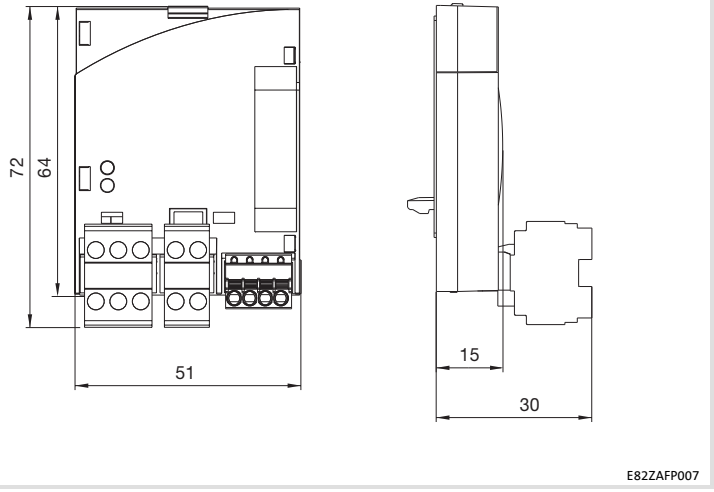
Operating conditions

Ambient conditions		
Climate		
Storage	IEC/EN 60721-3-1	1K3 (-25 to +60 °C)
Transport	IEC/EN 60721-3-2	2K3 (-25 to +70 °C)
Operation	Corresponding to the data of the Lenze standard device used (see documentation of the standard device).	
Pollution	EN 61800-5-1	Degree of pollution 2
Degree of protection	IP20 (protection against accidental contact according to NEMA 250 type 1)	

Protective insulation

Protective insulation between bus and ...	**Type of insulation** (acc. to EN 61800-5-1)
• 8200 vector power stage	Reinforced insulation
• Reference earth / PE (X3.2/7, X3.3/7)	Functional insulation
• External supply (X3.2/59)	Functional insulation
• Supply for CINH (X3.3/20)	Functional insulation
• Controller inhibit, CINH (X3.3/28)	Functional insulation

Dimensions



Follow the notes given in the Mounting Instructions for the standard device for the mechanical installation of the function module.

The Mounting Instructions for the standard device ...

- ► are part of the scope of supply and are enclosed with each device.
- ► provide tips for avoiding damage through improper handling.
- ► describe the obligatory order of installation steps.

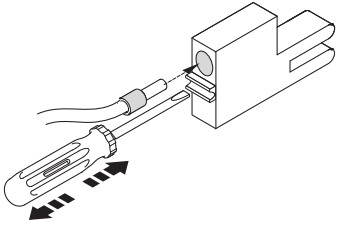
Use of plug connectors

Stop!

Observe the following to prevent any damage to plug connectors and contacts:

- Only pug in / unplug the plug connectors when the controller is disconnected from the mains.
- Wire the plug connectors before plugging them in.
- Unused plug connectors must also be plugged in.

Use of plug connectors with spring connection



E82ZAFX013

Wiring according to EMC

For wiring according to EMC requirements observe the following points:

Note!

- Separate control cables/data lines from motor cables.
- Connect the shields of control cables/data lines *at both ends* in the case of digital signals.
- Use an equalizing conductor with a cross-section of at least 16 mm^2 (reference: PE) to avoid potential differences between the bus nodes.
- Observe the other notes concerning EMC-compliant wiring given in the documentation for the standard device.

Wiring procedure

1. Observe the bus topology, do not use any stubs.
2. Observe the notes and wiring instructions given in the documents for the control system.
3. Only use cables corresponding to the listed specifications (📖 56).
4. Observe the notes for the voltage supply of the module (📖 58).
5. Activate the bus terminating resistors on the first and last physical bus device (📖 68).

Wiring to a host

Danger!

Dangerous electrical voltage

If Lenze controllers are used on a phase earthed mains with a rated mains voltage ≥ 400 V, protection against accidental contact is not ensured without implementing external measures.

Possible consequences:

► Death or serious injury

Protective measures:

► If protection against accidental contact is required for the control terminals of the controller and the connections of the plugged device modules, ...
  – a double isolating distance must exist.
  – the components to be connected must be provided with the second isolating distance.

The connection of the PROFIBUS bus system is shown in the general layout drawing.

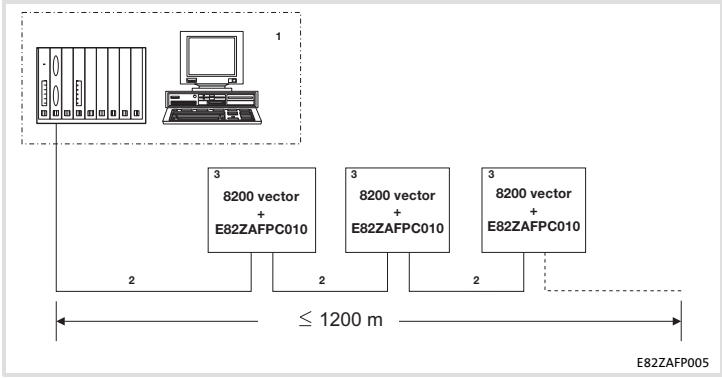


Fig. 1 Example: PROFIBUS with RS485 wiring (without repeater)

No.	Element	Note
1	Host	E.g. PC or PLC with PROFIBUS master interface module
2	Bus cable	Connects the PROFIBUS master interface module to the function modules. • The baud rate depends on the length of the bus cable (📖 57).
3	PROFIBUS slave	Applicable standard device (📖 45)with function module • Activate bus terminating resistors at the first and last physical node (📖 68).

Note!

When using a repeater, max. 125 nodes can communicate via the PROFIBUS.

Specification of the transmission cable

Note!

Only use cables complying with the listed specifications of the PROFIBUS user organisation.

Field	Values
Specific resistance	135 ... 165 Ω/km, (f = 3 ... 20 MHz)
Capacitance per unit length	≤ 30 nF/km
Loop resistance	< 110 Ω/km
Core diameter	> 0.64 mm
Core cross-section	> 0.34 mm^2
Cores	Twisted double, insulated and shielded

Bus cable length

The length of the bus cable depends on the baud rate used:

Baud rate [kbps]	Length [m]
9.6 ... 93.75	1200
187.5	1000
500	400
1500	200
3000 ... 12000	100

Note!

The baud rate depending on the data volume, cycle time, and number of nodes should only be selected as high as required for the application.

Tip!

For high baud rates we recommend to consider the use of optical fibres.

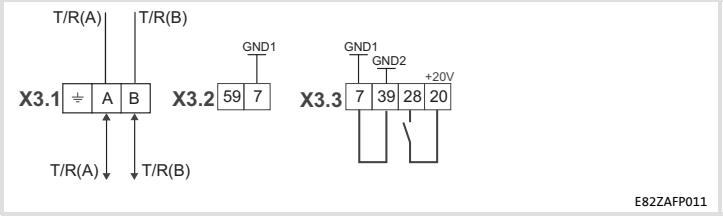
Advantages of optical fibres:

- On the transmission path external electromagnetic interference remains ineffective.
- Bus lengths of several kilometres are also possible with higher baud rates. The bus length
  - is irrespective of the baud rate.
  - depends on the optical fibre used.

Voltage supply

Internal DC voltage supply

The internal voltage is provided at terminal X3.3/20. It serves to supply the controller inhibit (CINH).



The min. wiring requirements for operation

External voltage supply

Note!

Always use a separate power supply unit in every control cabinet and safely separate it according to EN 61800-5-1 (”SELV”/”PELV”) in the case of external voltage supply and larger distances between the control cabinets.

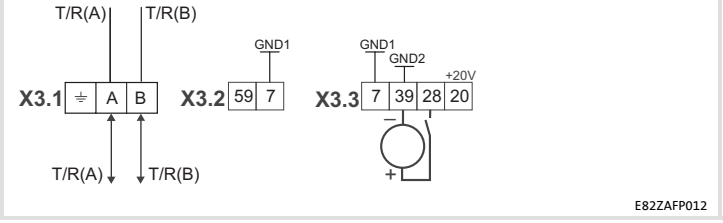
External voltage supply of the communication module is required if communication via the fieldbus is to be maintained even when the power supply of the standard device fails.

Note!

With external voltage supply of the function module, the active bus terminating resistor is fed independently of the operation of the standard device. In this way, the bus system remains active even when the standard device is switched off or fails.

External voltage supply with **one** voltage source for

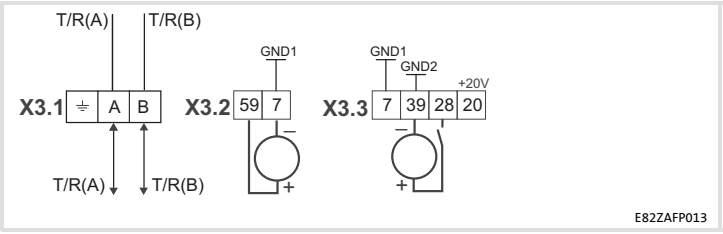
► X3.3/28 (controller inhibit (CINH))



The min. wiring requirements for operation

External voltage supply with **two** voltage sources for

1. X3.3/28 (controller inhibit (CINH))
2. X3.2/59 (function module)



The min. wiring requirements for operation

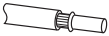
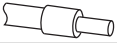
Assignment of the terminals

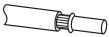
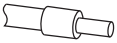
Terminal X3.1/	Designation	Function / level
⏚	PES	Additional HF shield termination
A	T/R(A)	RS485 data line A
B	T/R(B)	RS485 data line B

Terminal X3.2/	Designation	Function / level
59		External DC voltage supply for the function module ● +24 V DC ± 10% (reference: GND1) ● Current consumption on 24 V DC: 80 mA The current for looping through the supply voltage to other nodes via terminal 59 must be max. 3 A.
7	GND1	Reference potential for X3.3/20

Terminal X3.3/	Designation	Function / level
7	GND1	Reference potential for X3.3/20
39	GND2	Reference potential for controller inhibit (CINH) at X3.3/28
28	CINH	Controller inhibit ● Input resistance: 3.3 kΩ ● Start = HIGH (+12 ... +30 V) ● Stop = LOW (0 ... +3 V) (reference: GND2)
20		DC voltage source for external supply of controller inhibit (CINH) ● +20 V (reference: GND1) ● I_{max} = 10 mA

Cable cross-sections and screw-tightening torques

Field	Values	
Electrical connection	Plug connector with double screw connection	
Possible connections	rigid:	
		1.5 mm² (AWG 16)
	flexible:	
		without wire end ferrule 1.5 mm² (AWG 16)
		with wire end ferrule, without plastic sleeve 1.5 mm² (AWG 16)
		with wire end ferrule, with plastic sleeve 1.5 mm² (AWG 16)
Tightening torque	0.5 ... 0.6 Nm (4.4 ... 5.3 lb-in)	
Stripping length	10 mm	

Field	Values	
Electrical connection	2-pin plug connector with spring connection	
Possible connections	rigid:	
		1.5 mm² (AWG 16)
	flexible:	
		without wire end ferrule 1.5 mm² (AWG 16)
		with wire end ferrule, without plastic sleeve 1.5 mm² (AWG 16)
		with wire end ferrule, with plastic sleeve 1.5 mm² (AWG 16)
Stripping length	9 mm	

Before switching on

Stop!

Before switching on the standard device with the function module for the first time, check...

- ► the entire wiring for completeness, short circuit, and earth fault.
- ► whether the integrated bus terminating resistor is activated at the first and last physical node (📖 68).

Commissioning steps

Note!

Do not change the setting sequence.

Step-by-step commissioning of the function module with the DRIVECOM device control is described below.

Step	Description	Detailed information
1.	Configure master system (master) for communication with the function module.	📖 67
2.	Inhibit standard device via terminal 28 (CINH). • Set terminal 28 to LOW level. • Later the standard device can be inhibited and enabled via the bus.	Documentation of the standard device
3.	Connect mains voltage and, if available, separate voltage supply of the function module. • The standard device will be ready for operation after approx. 1 second. • Controller inhibit (CINH) is active. **Response** • The green LED "Connection status to the standard device" at the front of the function module is lit (only visible in the case of 8200 vector). • Keypad: RDY IMP (if plugged in)	📖 69 📖 70
4.	Activate bus terminating resistor via DIP switch = ONfor the first and last node. • Lenze setting: OFF	📖 68

Step	Description	Detailed information
5.	A Set node address via ... – C1509 **After a parameter set transfer the address has to be reassigned.** B Switch off the voltage supply of the function module and the standard device and then switch it on again in order to accept changed settings. **The address that is modified via keypad becomes effective immediately.**	Documentation of the standard device
6.	Now you can communicate with the standard device, i. e. you can read all codes and adapt all writable codes to your application. **Response** The yellow LED on the function module is blinking when the PROFIBUS is active.	Documentation of the standard device 📖 70
7.	Select function module as source for control commands and setpoints. ● Set C0005 = 200. – A preconfiguration for operation with the function module is carried out. – Control words and status words are already linked.	
8.	Assign process data output words (POW) of the master to process data input words of the standard device via C1511. **Lenze setting:** POW1: DRIVECOM control word (DRIVECOM CTRL) POW2: Setpoint1 (NSET1-N1) POW3: Setpoint2 (NSET1-N2) POW4: Additional setpoint (PCTRL1-NADD) POW5: Actual process controller value (PCTRL1-ACT) POW6: Process controller setpoint (PCTRL1-SET1) POW7: Reserved (FIF-RESERVED) POW8: Torque setpoint or torque limit (MCTRL1-MSET) POW9: PWM voltage (MCTRL1-VOLT-ADD) POW10: PWM angle (MCTRL1-PHI-ADD)	PROFIBUS communication manual

Step	Description	Detailed information
9.	Assign process data output words of the standard device to the process data input words (PIW) of the master via C1510. **Lenze setting:** PIW1: DRIVECOM status word (DRIVECOM STAT) PIW2: Output frequency with slip (MCTRL1-NOUT+SLIP) PIW3: Output frequency without slip (MCTRL1-NOUT) PIW4: Apparent motor current (MCTRL1-IMOT) PIW5: Actual process controller value (PCTRL1-ACT) PIW6: Process controller setpoint (PCTRL1-SET1) PIW7: Process controller output (PCTRL1-OUT) PIW8: Controller load (MCTRL1-MOUT) PIW9: DC-bus voltage (MCTRL1-DCVOLT) PIW10: Ramp function generator input (NSET1-RFG1-IN)	PROFIBUS communication manual
10.	Enable process output data via C1512 = 65535. ● Only required if C1511 has been changed. ● Deactivate process data words that are not used by setting the respective subcode of code C1511 to 0. ● The value in C1512 is volatile, and all process data are enabled after every switch-on.	
11.	Enable standard device via terminal 28 (CINH). ● Set terminal 28 to HIGH level.	
12.	Enter the setpoint. ● The master transmits the setpoint via the process data output word selected.	
13.	Change to the READY TO START status: ● The master transmits the DRIVECOM control word: 0000 0000 0111 1110_{bin} ($007E_{hex}$).	PROFIBUS communication manual
14.	The standard device is in the READY TO START status. ● The master receives the DRIVECOM status word: xxxx xxxx x01x 0001_{bin}	
15.	Change to the OPERATION ENABLED status. ● The master transmits DRIVECOM control word: 0000 0000 0111 1111_{bin} ($007F_{hex}$).	
16.	Now the drive starts up.	

Configuring the host system

The host must be configured before communication with the communication module is possible.

Master settings

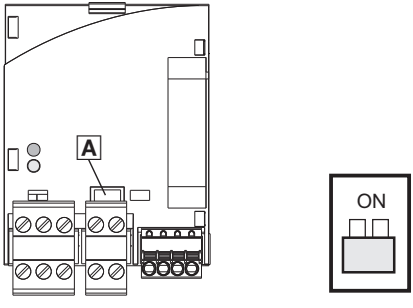
For configuring the PROFIBUS, the device data base file (GSE file) of the communication module has to be imported into the configuring software of the master.

Tip!

The GSE file can be downloaded in the "Services & Downloads" area at www.Lenze.com.

Activating the bus terminating resistor

The integrated bus terminating resistor can be activated with the DIP switch A.



E82ZAFP016 / E82ZAFP010

DIP switches A	
Switch position	**Function**
OFF	Bus terminating resistor not active.
ON	Bus terminating resistor active.

Connecting the mains voltage

Note!

If the external voltage supply of the function module is used, the supply must be switched on as well.

- The standard device will be ready for operation approx. 1 s after switching on the supply voltage.
- Controller inhibit is active.
- The green LED at the front of the function module is lit (only visible in the case of the 8200 vector frequency inverter).

Protection against uncontrolled start-up

Note!

Establishing communication

For establishing communication via an externally supplied function module, the standard device must be switched on as well.

- After communication has been established, the externally supplied module is independent of the power on/off state of the standard device.

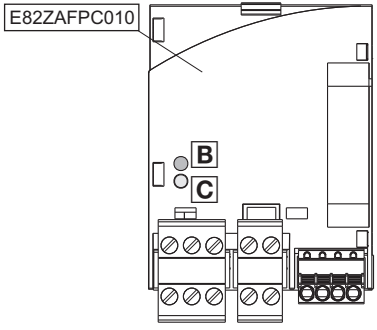
Protection against uncontrolled start-up

After a fault (e.g. short-term mains failure), a restart of the drive is not always wanted and - in some cases - even not allowed.

The restart behaviour of the controller can be set in C0142:

- C0142 = 0 (Lenze setting)
  - The controller remains inhibited (even if the fault is no longer active).
  - The drive starts in a controlled mode by explicitly enabling the controller: LOW-HIGH edge at terminal 28 (CINH)
- C0142 = 1
  - An uncontrolled restart of the drive is possible.

LED status displays



E82ZAFP016

LED			
Pos.	Colour	Condition	Description
B	yellow	off	No communication with the PROFIBUS master.
		blinking	Communication with the PROFIBUS master has been established via the function module.
C	green	off	• The function module is not supplied with voltage. • The standard device and/or the external voltage supply is switched off.
		blinking	The function module is supplied with voltage but is not connected to the standard device. Causes: • The standard device is switched off. • The standard device is in the initialisation phase. • The standard device is not available
		on	The function module is supplied with voltage and is connected to the standard device.
B + C	yellow/ green	blinking	Internal function module error