Legend for fold-out page		
Pos.	**Description**	**Detailed information**
A	Plug connector X3.1, connection for CAN bus	
B	Plug connector X3.2, connection for • controller inhibit (CINH) • internal supply of the controller inhibit (CINH)	🕮 48
C	Nameplate	🕮 39

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.

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

Target group

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

Validity information

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

- ► System bus (CAN) PT E82ZAFCC010 function modules as of version 3A.

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.

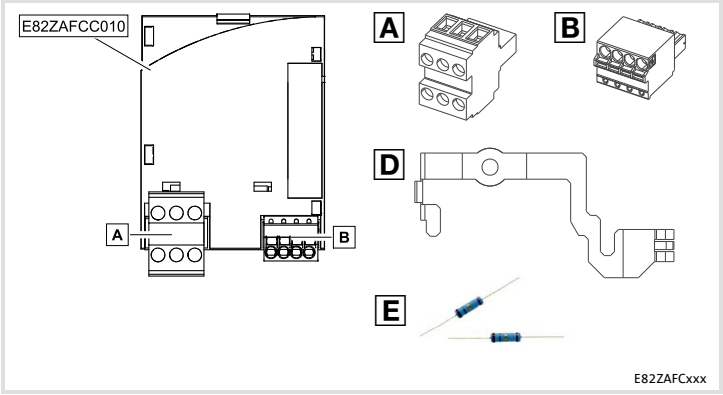
Application as directed

The function module ...

- ► connects the Lenze frequency inverter to the CAN communication system.
- ► is a device to be used in industrial power systems.
- ► is an accessory module which can be used with the following Lenze frequency inverters:

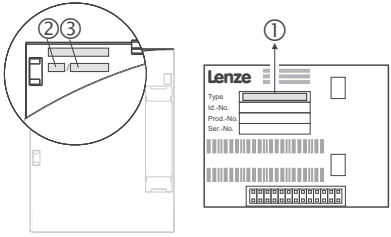
Device series		From version
Frequency inverter	8200 vector	Vx14
Drive PLC	Drive PLC	1x20

Scope of supply



Pos.	Item	Detailed information
	E82ZAFCC010 function module	
A	Plug connector with double screw connection, 3-pole	📖 48
B	Plug connector with spring connection, 4-pole	
D	Mounting clip	Documentation 8200 vector
E	Two bus terminating resistors (120 Ω each)	📖 44
	Mounting Instructions	

Identification



E82ZAFX005

	①			②	③
	E82ZAF	**C**	**C**	**010**	**3A**

Series
System bus (CAN)
Version
Variant: PT design
Hardware version

General Data

Field	Values
Communication profile	Based on CANopen
Communication medium	ISO 11898
Network topology	Line (terminated with 120 Ω) on both sides
Node addresses	Max. 63
Baud rate [kbps]	20, 50, 125, 250, 500

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

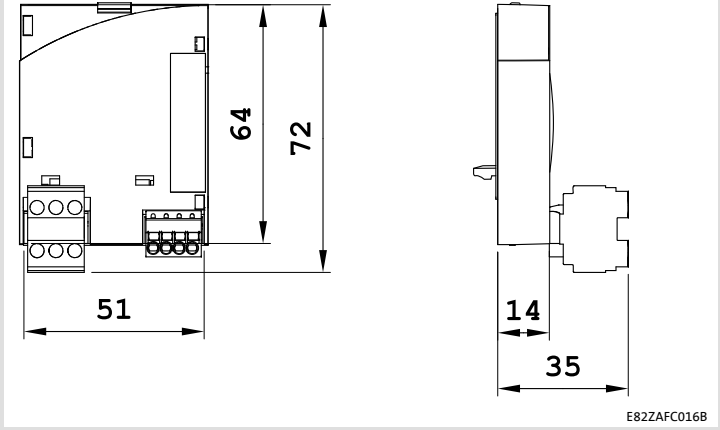
Protective insulation

Protective insulation between bus and ...	**Type of insulation** (in accordance with EN 61800-5-1)
• 8200 vector power stage	Reinforced insulation
• Reference earth/PE	Functional insulation
• Terminal X3.2/20	No functional insulation
• Terminal X3.2/28	Functional insulation

Connection terminals

X3.2/	
7	Reference potential 1
39	Reference potential 2 of the controller inhibit (CINH) at X3.2/28
28	Input resistance: 3.3 kΩ Controller inhibit • Start = HIGH (12 ... 30 V) • Stop = LOW (0 ... 3 V)
20	Load capacity: I_{max}=30 mA

Dimensions



All dimensions in mm

5 Mechanical installation

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.

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.

Procedure for wiring

1. Observe the bus topology, i.e. do not use stubs.
2. Observe notes and wiring instructions in the documents for the control system.
3. Only use cables corresponding to the listed specifications (📖 44).
4. Observe the permissible bus cable length (📖 49).
5. Connect bus terminating resistors of 120 Ω each (scope of supply):
   – only to the physically first and last node
   – between the terminals CAN-LOW and CAN-HIGH

Wiring to a host

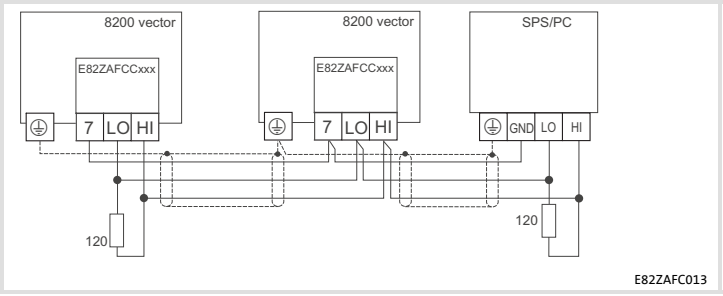


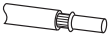
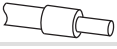
Fig. 1 Basic structure

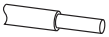
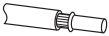
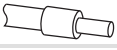
Specification of the transmission cable

We recommend the use of CAN cables in accordance with ISO 11898-2:

CAN cable in accordance with ISO 11898-2	
Cable type	Paired with shielding
Impedance	120 Ω (95 ... 140 Ω)
Cable resistance / cross-section	
Cable length ≤ 300 m	≤ 70 mΩ/m / 0.25 ... 0.34 mm² (AWG22)
Cable length 301 ... 1000 m	≤ 40 mΩ/m / 0.5 mm² (AWG20)
Signal propagation delay	≤ 5 ns/m

Connection terminals

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	

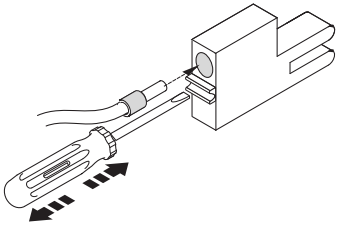
Use of plug connectors

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.

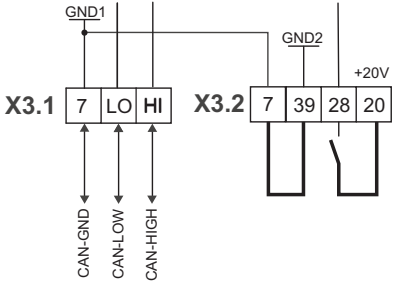
Use of plug connectors with spring connection



E82ZAFX013

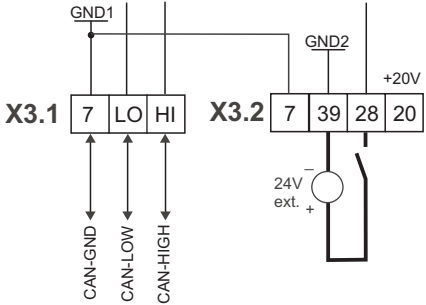
Assignment of the terminals

Controller inhibit (CINH) supply via internal voltage source (X3.2/20)



E82ZAFC015

Controller inhibit (CINH) supply via external voltage source



E82ZAFC011

Minimum wiring required for operation

X3.1/	Designation	Function	Level
7	GND1	Reference potential 1	
LO	CAN-LOW	System bus LOW (data line)	
HI	CAN-HIGH	System bus HIGH (data line)	

X3.2/	Designation	Function	Level
7	GND1	Reference potential 1	
39	GND2	Reference potential 2 of the controller inhibit (CINH) at X3.2/28	
28	CINH	Controller inhibit (CINH)	• Start = HIGH (12 ... 30 V) • Stop = LOW (0 ... 3 V)
20		DC voltage source for internal supply of controller inhibit (CINH)	20 V (Ref: GND1)

Bus cable length

It is absolutely necessary to comply with the permissible cable lengths.

1. Check the compliance with the total cable length in Tab. 1.

The total cable length is defined by the baud rate.

Baud rate [kbps]	**Max. bus length** [m]
20	3900
50	1500
125	590
250	250
500	80

Tab. 1 Total cable length

2. Check the compliance with the segment cable length in Tab. 2.

The segment cable length is defined by the cable cross-section used and the number of nodes. Without any repeaters, the segment cable length corresponds to the total cable length.

	Cable cross-section			
Node	**0.25 mm²**	**0.5 mm²**	**0.75 mm²**	**1.0 mm²**
2	240 m	430 m	650 m	940 m
5	230 m	420 m	640 m	920 m
10	230 m	410 m	620 m	900 m
20	210 m	390 m	580 m	850 m
32	200 m	360 m	550 m	800 m
63	170 m	310 m	470 m	690 m

Tab. 2 Segment cable length

3. Compare both values.

If the value given in Tab. 2 is smaller than the required total cable length given in Tab. 1, repeaters must be used. Repeaters divide the total cable length into segments.

Note!

- Please note the reduction of the total cable length due to the signal delay of the repeater (see example 📖 50).
- There is mixed operation if
  - different node devices are connected to the same mains.
  - the total cable lengths of the nodes are different at the same baud rate, the smaller value must be used to determine the max. cable length.

Example: Selection help

Given:	
• Cable cross-section:	0.5 mm² (according to cable specification 📖 44)
• Number of nodes:	63
• Repeater:	Lenze repeater, type 2176 (cable reduction: 30 m)

At maximum number of nodes (63) the following cable lengths/number of repeaters must be complied with:

Baud rate [kbps]	**20**	**50**	**125**	**250**	**500**
Max. cable length [m]	3900	1500	590	250	80
Segment cable length [m]	310	310	310	250	80
Number of repeaters	13	5	1	-	-

Check repeater application

Given:	
• Baud rate:	125 kbps
• Cable cross-section:	0.5 mm²
• Number of nodes:	28
• Cable length:	450 m

Test sequence	Cable length	See
1. Total cable length at 125 kbps:	590 m	From Tab. 1
2. Segment cable length for 28 nodes and a cable cross-section of 0.5 mm^2:	360 m	From Tab. 2
3. Comparison: The value under item 2 is smaller than the required cable length of 450 m.		

Conclusion

- It is not possible to use a cable length of 450 m without a repeater.
- After 360 m (item 2.), a repeater must be installed.

Result

- The Lenze repeater type 2176 is used (cable reduction: 30 m)
- Calculation of the maximum cable length:
  First segment: 360 m
  Second segment: 360 m (according to Tab. 1) *minus* 30 m (cable reduction when a repeater is used)

→ Maximum possible cable length with repeater: 690 m.
→ Thus it is possible to use the required cable length.

Note!

The use of another repeater is recommended as

- ► Service interface
  Advantage: Trouble-free connection during running bus operation is possible.
- ► Calibration interface
  Advantage: calibration/programming unit remains electrically isolated.

Before switching on

Stop!

Please check the following before you switch on the controller together with the function module connected to the CAN system bus network:

- Completeness of the wiring, earth fault and short circuit.
- Whether the bus system is terminated at the physically first and last node through the bus terminating resistor.

Initial switch-on

Note!

- Code C0356/x serves to set the times for **cyclic** transmission.
- The CAN master can access the Lenze codes saved to the controller via the index.
  Index = 24575 – Lenze code number (Cxxxx)
- The controller is only ready for operation if a HIGH level is applied to terminal 28 of the function module (controller enable via terminal).
  - Please observe that the controller can be inhibited through various sources. All sources act like a series connection of switches.
  - If the drive does not start in spite of the controller enable via terminal 28, check whether the controller is still inhibited via another source such as the STOP key of the keypad.

Step	Description
1.	Configure master system (CAN master) for communication with the function module.
2.	Inhibit standard device via terminal 28 (CINH). ● Set terminal 28 to LOW level. ● The standard device can be inhibited and enabled via the bus subsequently.
3.	Switch on the mains voltage. ● The standard device will be ready for operation after approx. 1 second. ● The controller inhibit is active. **Response of standard device** ● The green LED is blinking. ● Keypad: RDY IMP (if plugged-in)
4.	A Set node address via ... – C0350 or – DIP switch (if available). (Lenze setting: 500 kbps) **A node address in a CAN network must not be used more than once.**
	B Set baud rate via ... – C0351 or – DIP switch (if available). (Lenze setting: 1) **All CAN nodes must have an identical baud rate.**
	Changes will not be accepted until a "Reset node" command (C0358 = 1) has been executed.

Step	Description
5.	Communication with the standard device is now possible, i.e. all codes can be read and all writable codes can be adapted to your application.
6.	Configure setpoint source. ● C0412/1 = 20 ... 23: The setpoint source is a word of process data channel 1 (CAN1). ● e.g. C0412/1 = 21: the setpoint source is CAN-IN1.W2
7.	The master sets the system bus (CAN) to the "Operational" state.
8.	Select setpoint. ● Transmit the setpoint via the selected CAN word (e.g. CAN-IN1.W2).
9.	Transmit sync telegram. ● The sync telegram is only received by the CAN node if C0360 = 1. ● Lenze setting: sync control
10.	Enable standard device via terminal 28 (CINH). ● Set terminal 28 to HIGH level.
11.	Now the drive starts.

Basic identifiers of the CAN objects

The CAN bus system is message-oriented. Each message has an unambiguous identifier. With CANopen, there is only one sender for each message for device-orientation.

Except for the network management and the sync telegram, the identifier contains the node address of the controller:

Identifier (COB-ID) = basic identifier + adjustable node address (node ID)

The identifier assignment is specified in the CANopen protocol.

The basic identifier in accordance with the CANopen specification ex works is preset to the following values:

Object			Direction		Basic identifier	
			From the controller	To the controller	Dec	Hex
NMT					0	0
Sync					128	80
PDO1	TPDO 1 (CAN-OUT1)	sync-controlled	X		384	180
		time-controlled			769	301
	RPDO1 (CAN-IN1)	sync-controlled		X	512	200
		time-controlled			768	300
PDO2	TPDO2 (CAN-OUT2)	time-controlled	X		641	281
	RPDO2 (CAN-IN2)	time-controlled		X	640	280
SDO1			X		1408	580
				X	1536	600
SDO2			X		1472	5C0
				X	1600	640

Configuration of PDO (sync-controlled or time-controlled) via C0360