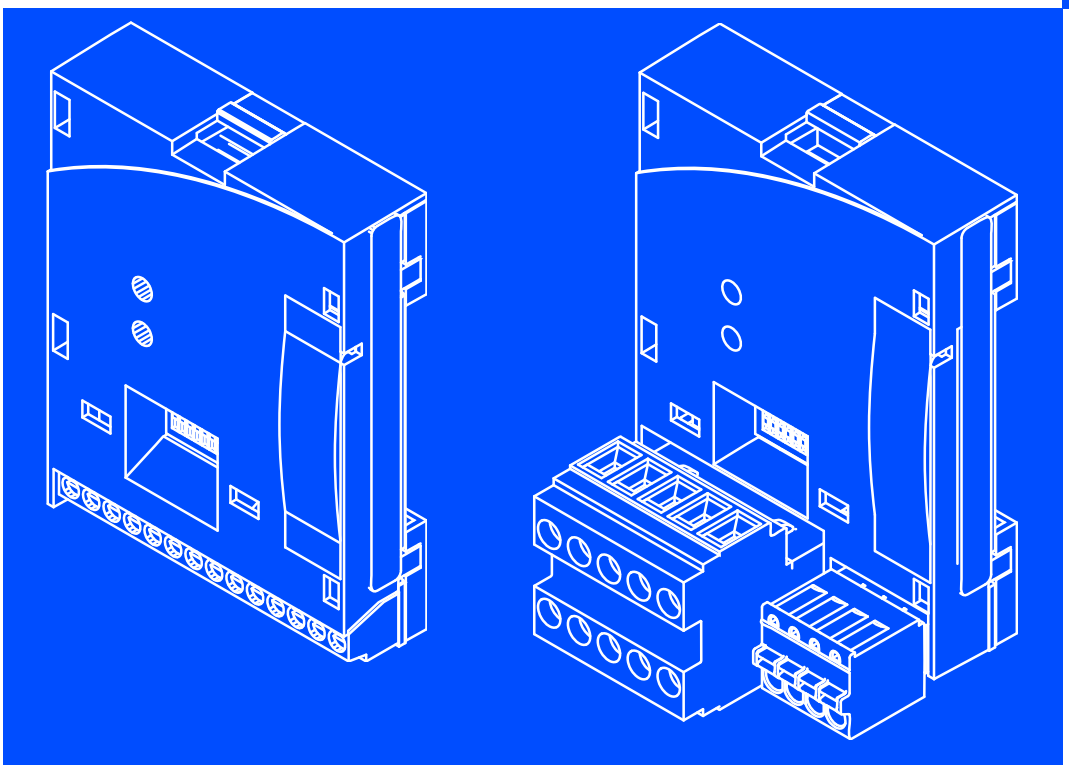
EDS82ZAFVCxxx
13403796

L-force Communication

Communication Manual

DeviceNet



E82ZAFVC001 / E82ZAFVC010

Function module

Lenze

1 About this documentation

Contents

This documentation exclusively contains descriptions regarding the E82ZAFVC001 (DeviceNet) and E82ZAFVC010 (DeviceNet PT) function modules.

Note!

This documentation supplements the **mounting instructions** supplied with the function module and the **documentation for the standard devices used**.

The mounting instructions contain safety instructions which must be observed!

- The features and functions of the function module are described in detail.
- Typical applications are explained by means of examples.
- Moreover, this documentation contains the following:
  - Safety instructions which must be observed.
  - The essential technical data of the function module
  - Information on versions of the Lenze standard devices to be used
  - Notes on troubleshooting and fault elimination

The theoretical concepts are only explained to the level of detail required to understand the function of the function module.

Depending on the software version of the controller and the version of the »Engineer« software installed, the screenshots in this documentation may deviate from the »Engineer« representation.

This documentation does not describe any software provided by other manufacturers. No liability can be accepted for corresponding data provided in this documentation. For information on how to use the software, please refer to the host system (master) documents.

All brand names mentioned in this documentation are trademarks of their respective owners.

Validity information

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

Function module	Type designation	from hardware version	from software version
DeviceNet	E82ZAFVC001	Vx	0x
DeviceNet PT	E82ZAFVC010	Vx	0x

Target group

This documentation is intended for all persons who plan, install, commission and maintain the networking and remote service of a machine.

Tip!

Information and auxiliary devices related to the Lenze products can be found in the download area at

http://www.Lenze.com

1.1 Document history

Material no.	Version			Description
-	1.0	06/2004	TD06	First edition
13403796	4.0	03/2012	TD29	General revision

Your opinion is important to us!

These instructions were created to the best of our knowledge and belief to give you the best possible support for handling our product.

If you have suggestions for improvement, please e-mail us to:

feedback-docu@Lenze.de

Thank you for your support.

Your Lenze documentation team

1.2 Conventions used

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

Type of information	Identification	Examples/notes
Spelling of numbers		
Decimal separator	Point	In general, the decimal point is used. For instance: 1234.56
Decimal	Standard notation	For example: 1234
Hexadecimal	0x[0 ... 9, A ... F]	For example: 0x60F4
Binary ● Nibble	In quotation marks Point	For example: '100' For example: '0110.0100'
Text		
Program name	» «	PC software For example: »Engineer«, »Global Drive Control« (GDC)
Icons		
Page reference	🕮	Reference to another page with additional information For instance: 🕮 16 = see page 16

1.3 Terminology used

Term	Meaning
PROFIBUS	The term stands for the **PROFIBUS-DP** variant according to IEC 61158/IEC 61784. A different PROFIBUS variant is not described in this manual.
Standard device	Lenze controllers/frequency inverters for which the function module can be used. 🕮 10
Controller	
Frequency inverter	
Master	PROFIBUS station which takes over the master function in the fieldbus system.
Slave	PROFIBUS station which acts as a slave in the fieldbus system.
Code	"Container" for one or more parameters which can be used to parameterise or monitor the controller.
Subcode	If a code contains more than one parameter, these parameters are stored in "subcodes". In this documentation, a slash "/" is used as a separator when specifying a code and its subcode (e.g. "C00118/3").
POW	Process output data word
PIW	Process input data word

1.4 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

2 Safety instructions

Note!

It is absolutely vital that the stated safety measures are implemented in order to prevent serious injury to persons and damage to material assets.

Always keep this documentation to hand in the vicinity of the product during operation.

2.1 General safety information

Danger!

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

- Lenze drive and automation components ...

  ... must only be used for the intended purpose.

  ... must never be operated if damaged.

  ... must never be subjected to technical modifications.

  ... must never be operated unless completely assembled.

  ... must never be operated without the covers/guards.

  ... can - depending on their degree of protection - have live, movable or rotating parts during or after operation. Surfaces can be hot.

- All specifications of the corresponding enclosed documentation must be observed.

  This is vital for a safe and trouble-free operation and for achieving the specified product features.

  The procedural notes and circuit details provided in this document are proposals which the user must check for suitability for his application. The manufacturer does not accept any liability for the suitability of the specified procedures and circuit proposals.

- Only qualified skilled personnel are permitted to work with or on Lenze drive and automation components.

  According to IEC 60364 or CENELEC HD 384, these are persons ...

  ... who are familiar with the installation, assembly, commissioning and operation of the product,

  ... possess the appropriate qualifications for their work,

  ... and are acquainted with and can apply all the accident prevent regulations, directives and laws applicable at the place of use.

2.2 Device- and application-specific safety instructions

- During operation, the function module must be firmly connected to the standard device.
- With external voltage supply, always use a separate power supply unit, safely separated to EN 61800-5-1 (”SELV”/”PELV”), in every control cabinet.
- Only use cables corresponding to the given specifications (📖 21).

Documentation for the standard device, control system, system/machine

All other measures prescribed in this documentation must also be implemented. Observe the safety instructions and application notes stated in the documentation.

2.3 Residual hazards

Protection of persons

- If the 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. (See chapter ”4.3”, 📖 16)

Device protection

- The module contains electronic components that can be damaged or destroyed by electrostatic discharge.

3 Product description

3.1 Application as directed

The E82ZAFVC001 function module ...

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

Product range	Device designation	from hardware version
Frequency inverter	8200 vector	Vx14
	8200 motec	Vx14
Motor starter	starttec	Vx1x

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

Any other use shall be deemed inappropriate!

The E82ZAFVC010 function module ...

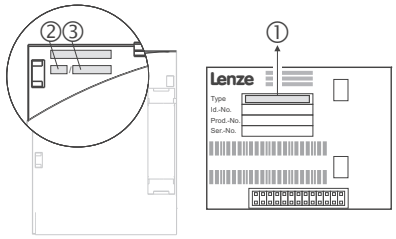
► is an accessory module for use in conjunction with the following Lenze standard devices:

Product range	Device designation	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!

3.2 Identification



E82ZAFX005

①			②	③	
E82ZAF	**V**	**C**	**0xx**	**Vx**	**0x**

Product range
DeviceNet
Generation
Variant:
001: Coated design
010: PT design
Hardware version
Software version

3.3 Product features

The E82ZAFVC0xx function module (DeviceNet / DeviceNet PT) connects the basic device to the serial communication system DeviceNet.

Basic devices can be retrofitted.

The function module adds functions to the controller, e.g.

- Parameter selection/remote parameter setting
- Connection to external controls and hosts

The function module is provided with a DIP switch. This DIP switch serves to set the following:

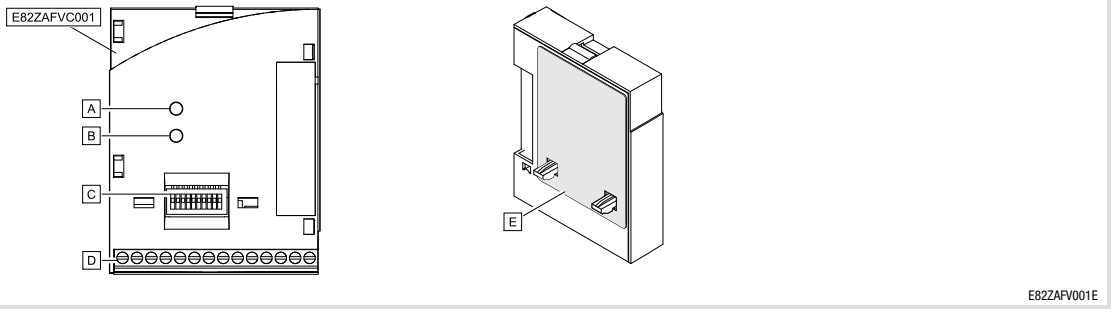
- Address
- Baud rate
- Compatibility to the Lenze E82ZAFD000Vx04 function module

Besides using the DIP switch, the device address and baud rate can also be set via software. In this mode, the function module can either automatically or manually detect the baud rate.

The function module must always be supplied externally.

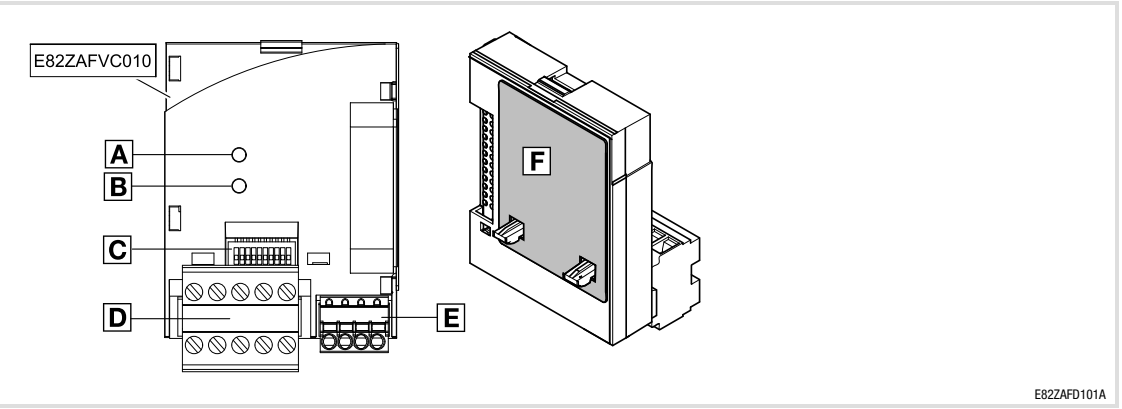
3.4 Connections and interfaces

Function module E82ZAFVC001



Pos.	Description	Detailed information
A	Status display (two-colour green / red), connection to the standard device	34
B	Status display (two-colour green / red), connection to the bus	
C	DIP switches for setting ● Node address (”Address”) ● Baud rate (”Bd”) ● Compatibility with Lenze function module E82ZAFD (DeviceNet)	31
D	Terminal strip X3, connections for ● DeviceNet ● Controller inhibit (CINH) ● External voltage supply (via DeviceNet cable)	25
E	Nameplate	11

Function module E82ZAFVC010



Pos.	Description	Detailed information
A	Status display (two-colour green / red), connection to the standard device	📖 34
B	Status display (two-colour green / red), connection to the bus	
C	DIP switches for setting ● Node address (”Address”) ● Baud rate (”Bd”) ● Compatibility with Lenze function module E82ZAFD (DeviceNet)	📖 31
D	Plug connector with double screw connection X3.1, connections for ● DeviceNet ● External voltage supply (via DeviceNet cable)	📖 27
E	Plug connector with spring connection X3.2, connections for ● Controller inhibit (CINH)	
F	Nameplate	📖 11

4 Technical data

4.1 General data

Field	Values
Communication profile	DeviceNet
Communication medium	DIN ISO 11898
Network topology	Line terminated at both ends (R = 120 Ohms)
Max. number of devices	63
DeviceNet device	Slave
Baud rate [kbit/s]	125, 250, 500
Achievable bus cable length	Depending on the cable used, see 📖 28
External voltage supply	See 📖 24

4.2 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)	

4.3 Protective insulation

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.

E82ZAFVC001 function module

Protective insulation between bus and ...	**Type of insulation** (acc. to EN 61800-5-1)
● reference earth / PE (X3/SH)	Functional insulation
● external supply (X3/V+)	No electrical isolation
● supply for CINH (X3/20)	No electrical isolation
● controller inhibit, CINH (X3/28)	Functional insulation
● power section	
– 8200 vector	Reinforced insulation
– 8200 motec	Reinforced insulation
– starttec	Reinforced insulation
● control terminals	
– 8200 vector	Functional insulation
– 8200 motec	Functional insulation

E82ZAFVC010 function module

Protective insulation between bus and ...	**Type of insulation**
● Reference earth / PE (X3.1/SH)	Functional insulation
● External supply (X3.1/V+)	No functional insulation
● Supply for CINH (X3.2/20)	No functional insulation
● Controller inhibit, CINH (X3.2/28)	Functional insulation
● 8200 vectorpower unit	Double insulation
● 8200 vector control terminals	Functional insulation

4.4 Connection terminals

E82ZAFVC001 function module

X3/	
V+	External DC voltage supply of the function module: +24 V DC ±10 %, max. 80 mA
	The current flowing via terminal V+ during looping through of the supply voltage to other devices, is to amount to a maximum of 3 A.
7	Reference potential 1
39	Reference potential 2 of the controller inhibit (CINH) at X3/28
28	Controller inhibit ● Start = HIGH (+12 V ... +30 V) ● Stop = LOW (0 V ... +3 V) Input resistance: 3.3 kΩ
20	+ 20 V internal for CINH, reference potential 1, load capacity: I_{max} = 30 mA

E82ZAFVC010 function module

X3.1/	
V+	External DC voltage supply of the function module: +24 V DC ±10 %, max. 80 mA
	The current flowing via terminal V+ during looping through of the supply voltage to other devices, is to amount to a maximum of 3 A.
X3.2/	
7	Reference potential 1
39	Reference potential 2 of controller inhibit (CINH) at X3.2/28
28	Controller inhibit ● Start = HIGH (+12 V ... +30 V) ● Stop = LOW (0 V ... +3 V) Input resistance: 3.3 kΩ
20	+ 20 V internal for CINH, reference potential 1, load capacity: I_{max} = 30 mA

4.5 Communication time

The communication time is the time between the start of a request and the arrival of the corresponding response.

The communication times depend on ...

- the processing time in the controller
- the transmission delay time
  – the baud rate
  – the telegram length

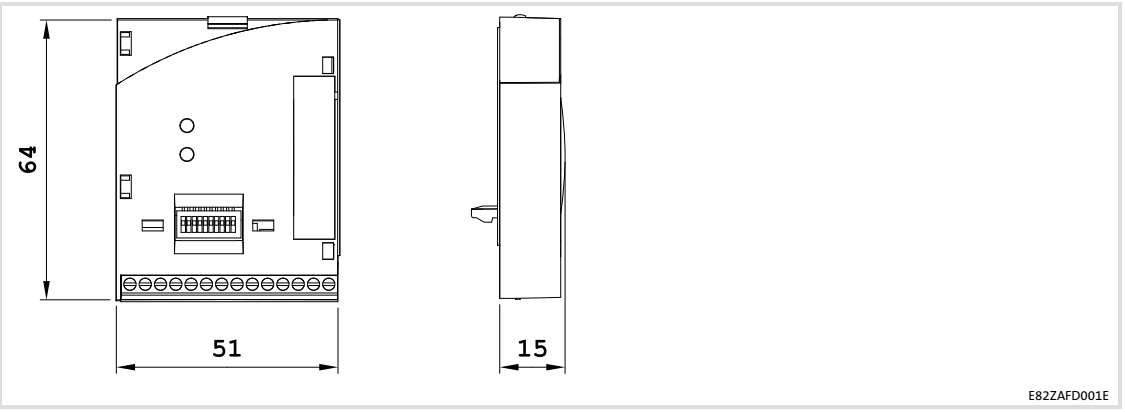
The communication time is the time between the start of a request and the arrival of the corresponding response.

The CAN bus communication times depend on ...

- the processing time in the controller (see documentation of the controller)
- Telegram runtime
  – baud rate
  – telegram length
- the data priority
- the bus load

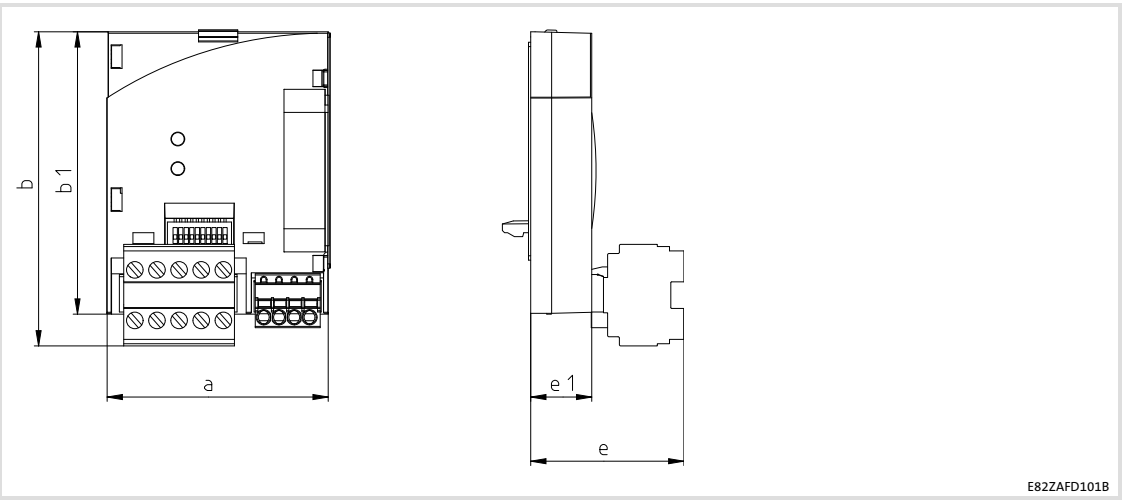
4.6 Dimensions

E82ZAFVC001 function module



a	51 mm
b	64 mm
c	15 mm

E82ZAFVC010 function module



a	51 mm
b	72 mm
b1	64 mm
e	30 mm
E1	15 mm

5 Installation

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!

The device contains components that can be destroyed by electrostatic discharge!

Before working on the device, the personnel must ensure that they are free of electrostatic charge by using appropriate measures.

5.1 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 to avoid damage provide tips to avoid damage through improper handling.
- describe the obligatory order of installation steps.

5.2 Electrical installation

5.2.1 Wiring according to EMC (CE-typical drive system)

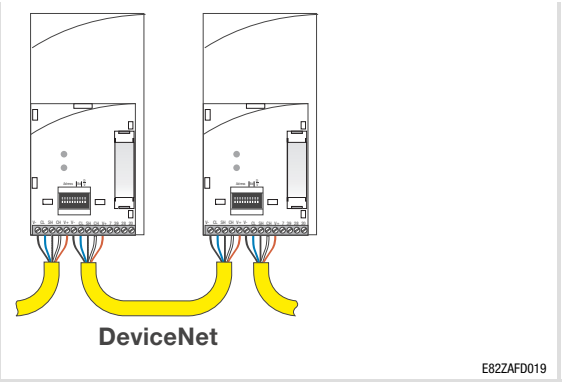
For wiring according to EMC requirements observe the following points:

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.

5.2.2 Wiring with a host (master)

The following figure shows the cable routing for the function module:



For integrating the function modules a PC with installed configuration software is used.

Specification of the transmission cable

The nodes on the bus system have to be wired with a fieldbus cable (DeviceNet thick or thin cable) complying with the DeviceNet specification (DeviceNet Adaption of CIP, Edition 1.1, Volume Three).

Manufacturers of DeviceNet thick and thin cables for example are Belden Inc., Lapp Group, C&M Corp., and Madison Cable Corp.

Colour code for the DeviceNet cable

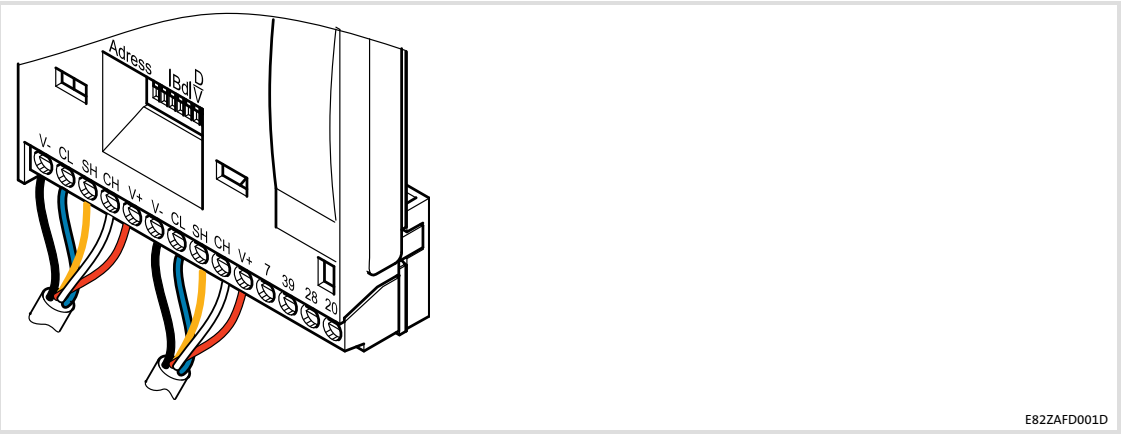


Fig. 5-1 DeviceNet wiring with the E82ZAFVC001 function module

Connection	Name	Colour
V-	Reference potential for external voltage supply	Black
CL	CAN-LOW	Blue
SH	SHIELD	(shining)
CH	CAN-HIGH	White
V+	External supply voltage	Red

Properties of the ”Thick Cable” in accordance with DeviceNet specification

General features	
Structure	Two shielded balanced lines, common axis with drain wire in the centre
Total shielding	65% coverage AWG 36 (at least 0.12 mm) of tin-coated copper braid (individually tinned)
Drain wire	At least copper 18; at least 19 cores (individually tinned)
Outer diameter	10.41 ... 12.45 mm
Concentricity	The radius deviation has to be within 15 % of half the outside diameter.
Cable sheath labelling	Name of vendor, part no., and additional labelling
Spec. DC resistance (braid, wrapping, leakage)	5.74 Ω/km (nom. up to 20 °C)
Certifications (U.S. and Canada)	NEC (UL), CL2/CL3 (min.)
Bend radius	20 x diameter (installation) / 7 x diameter (fixed)
Ambient temperature (operation)	-20 ... +60 °C at 8 amperes; linear current derating to zero at 80 °C
Storage temperature	-40 ... +85 °C
Pull tension	845.5 N_{max}

Features of the data line	
Conductor pair	At least copper 18; at least 19 cores (individually tinned)
Insulation diameter	3.81 mm (nom.)
Colours	Light blue, white
Pair windings / m	Approx. 10
Shielding/conductor pair	2000/1000, Al/Mylar, Al side on the outside, w/shorting fold (for tensile load)
Impedance	120 Ω +/- 10 % at 1 MHz
Capacitance between conductors	39.37 pF/m at 1 kHz (nom.)
Capacitance between one conductor and another which is connected to the shield.	78.74 pF/m at 1 kHz (nom.)
Capacitive assymetry	3937 pF/km at 1 kHz (nom.)
Spec. DC resistance at 20 °C	22.64 Ω/km (max.)
Damping	0.43 dB/100 m at 125 kHz (max.) 0.82 dB/100 m at 500 kHz (max.) 1.31 dB/100 m at 1.00 MHz (max.)

Features of the voltage line	
Conductor pair	At least copper 15; at least 19 cores (individually tinned)
Insulation diameter	2.49 mm (nom.)
Colours	Red / black
Pair windings / m	Approx. 10
Shielding/conductor pair	1000/1000, Al/Mylar, Al side on the outside, with w/shorting fold (for tensile load)
Spec. DC resistance at 20 °C	11.81 Ω/km (max.)

Properties of the ”Thin Cable” in accordance with DeviceNet specification

General features	
Structure	Two shielded balanced lines, common axis with drain wire in the centre
Total shielding	65% coverage AWG 36 (at least 0.12 mm) of tin-coated copper braid (individually tinned)
Drain wire	At least copper 22; at least 19 cores (individually tinned)
Outer diameter	6.096 ... 7.112 mm
Concentricity	The radius deviation has to be within 20 % of half the outside diameter.
Cable sheath labelling	Name of vendor, part no., and additional labelling
Spec. DC resistance (braid, wrapping, leakage)	10.5 Ω/km (nom. at 20 °C)
Certifications (U.S. and Canada)	NEC (UL), CL2 (min.)
Bend radius	20 x diameter (installation) / 7 x diameter (fixed)
Ambient temperature (operation)	-20 ... +70 °C at 1.5 amperes; linear current derating to zero at 80 °C
Storage temperature	-40 ... +85°C
Pull tension	289.23 N_{max}

Features of the data line	
Insulation diameter	1.96 mm (nom.)
Conductor pair	At least copper 24; at least 19 cores (individually tinned)
Colours	Light blue, white
Pair windings / m	Approx. 16
Shielding/conductor pair	1000/1000, Al/Mylar, Al side on the outside, with w/shorting fold (for tensile load)
Impedance	120 Ω +/- 10 % at 1 MHz
Runtime	4.46 ns/m (max.)
Capacitance between conductors	39.37 pF/m at 1 kHz (nom.)
Capacitance between one conductor and another which is connected to the shield.	78.74 pF/m at 1 kHz (nom.)
Capacitive assymetry	3.94 pF/km at 1 kHz (max.)
Spec. DC resistance at 20 °C	91.86 Ω/km (max.)
Damping	0.95 dB/100 m at 125 kHz (max.) 1.64 dB/100 m at 500 kHz (max.) 2.30 dB/100 m at 1.00 MHz (max.)

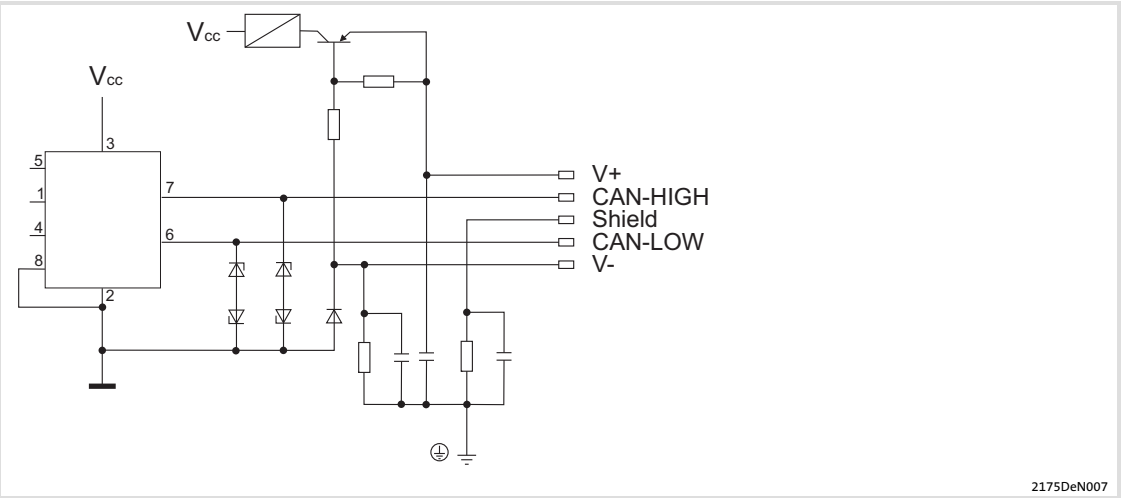
Features of the voltage line	
Conductor pair	At least copper 22; at least 19 cores (individually tinned)
Insulation diameter	1.4 mm (nominal)
Colours	Red, black
Pair windings / m	Approx. 16
Shielding/conductor pair	1000/1000, Al/Mylar, Al side on the outside, with w/shorting fold (for tensile load)
Spec. DC resistance at 20 °C	57.41 Ω/km (max.)

5.2.3 Voltage supply

Note!

DeviceNet communication modules from Lenze are only supplied via the external DeviceNet cable!

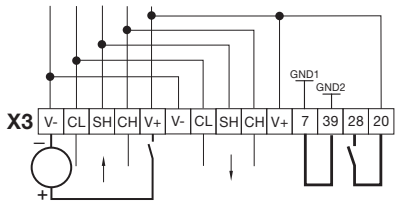
Internal wiring of the bus terminals



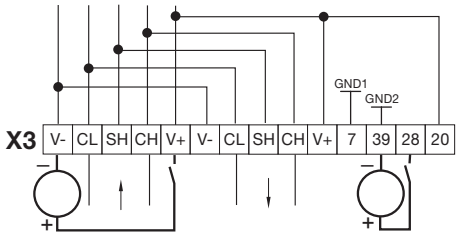
5.2.4 Terminal assignment

Function module E82ZAFVC001

Supply of the controller inhibit (CINH) via the internal voltage source (X3/20)



Supply of the controller inhibit (CINH) via the external voltage source



Min. wiring required for operation

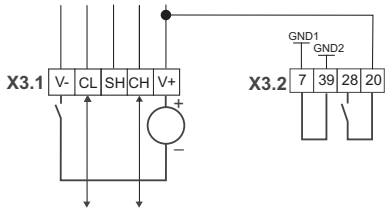
X3/	Name	Function	Level
V-		Reference potential for external voltage supply	
CL	CAN-LOW	CAN data line (LOW)	
SH	SHIELD	Shield	
CH	CAN-HIGH	CAN data line (HIGH)	
V+		External supply voltage	Please observe notes concerning external supply!
7	GND1	Reference potential for X3/20	
39	GND2	Reference potential for controller inhibit (CINH) at X3/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... +3 V)
20		DC voltage supply for internal supply of controller inhibit (CINH)	+20 V (ref.: GND1)

Note!

Use the “Thin” cable to wire the function module 📖 22.

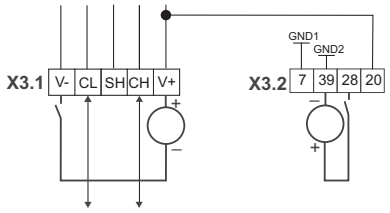
Function module E82ZAFVC010

Controller inhibit (CINH) supply via internal voltage source



E82ZAFD110

Controller inhibit (CINH) supply via external voltage source



E82ZAFD112

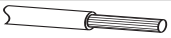
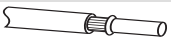
Min. wiring required for operation

X3.1/	Designation	Function	Level
V-		Reference potential for external supplyvoltage	
CL	CAN-LOW	CAN data line (LOW)	
SH	SHIELD	Shield	
CH	CAN-HIGH	CAN data line (HIGH)	
V+		External supply voltage	Please see the notes for external supply voltage!

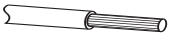
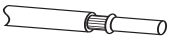
X3.2/	Designation	Function	Level
7	GND1	Reference potential for X3.2/20	
39	GND2	Reference potential for controller inhibit (CINH) at X3.2/28	
28	CINH	Controller inhibit	• Start = HIGH (+12 V ... +30 V) • Stop = LOW (0 ... +3 V)
20		DC voltage source for internal supply of controller inhibit (CINH)	+20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

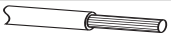
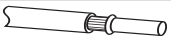
5.2.5 Cable cross-sections and screw-tightening torques

Function module E82ZAFVC001

Range	Values	
Electrical connection	Terminal strip with screw connection	
Possible connections	rigid:	
		1.5 mm² (AWG 16)
	flexible:	
		without wire end ferrule 1.0 mm² (AWG 18)
		with wire end ferrule, without plastic sleeve 0.5 mm² (AWG 20)
		with wire end ferrule, with plastic sleeve 0.5 mm² (AWG 20)
Tightening torque	0.22 ... 0.25 Nm (1.9 ... 2.2 lb-in)	
Bare end	5 mm	

Function module E82ZAFVC010

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	

5.2.6 Bus cable length

Depending on the baud rate and the cable type used (thick cable/thin cable), the following bus cable lengths are possible:

Baud rate [kbps]	Bus cable lengths [m]	
	Thick cable	Thin cable
125	500	100
250	250	
500	100	

If both thick and thin cable types are used, the maximum cable lengths can be defined according to the baud rates as follows:

Baud rate [kbps]	Max. bus cable length
125	500 m = L_{thick} + 5 L_{thin}
250	250 m = L_{thick} + 2.5 L_{thin}
500	100 m = L_{thick} + L_{thin}

L_{thick}: thick cable length

L_{thin} : thin cable length

Note!

Select a baud rate in dependency of the data volume, cycle time and number of nodes just high enough to suit your application.

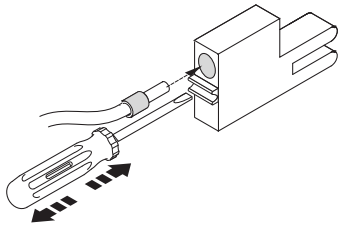
5.2.7 Use of plug connectors

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

6 Commissioning

During commissioning, system-dependent data as e.g. motor parameters, operating parameters, responses and parameters for fieldbus communication are selected for the controller.

In Lenze devices, this is done via codes. The codes are stored in numerically ascending order in the Lenze controllers and in the plugged-in communication/function modules.

In addition to these configuration codes, there are codes for diagnosing and monitoring the bus devices.

6.1 Before switching on

Stop!

Before you switch on the basic device with the function module for the first time, check

- ► the entire wiring for completeness, short circuit and earth fault.
- ► whether the bus system is terminated by terminating resistors at the first and last bus station.

6.2 Commissioning steps

Note!

- ► For software version < 3.5 of the basic devices:
  If you keep to the switch-on sequence decribed in the following table (basic device must be switched on before the function module), a communication error is indicated by the basic device.
  This error message can be
  - – *avoided* by switching on the function module first and then the basic device.
  - – *automatically deleted* by activating the function ”Automatic trip reset” via code C1566 (see chapter ”Code table”).
- ► For software versions ≥ 3.5 of the basic devices:
  Keep to the switch-on sequence described in the commissioning steps (table below).

Step	Procedure	see
1.	If necessary, set the software compatibility	📖 31
2.	Set the node address	
3.	Set the baud rate	
4.	Inhibit the standard device via terminal 28 (CINH). Terminal 28 on LOW potential. The standard device can be inhibited and enabled via the bus	Manual of the standard device
5.	Connect mains voltage	
6.	Connect the separate voltage supply for the function module (Switch on the DeviceNet). **Response of the front LED display:** Directly after the voltage supply for the function module has been connected, both LEDs at the front light up for a short time in the following order: ● The LED “Status of connection with bus” changes its colour from green to red before it goes off. ● The LED ”Status of the connection to the standard device” changes its colour from green to red before it goes off. ● The LED “Connection status to the bus” at the front of the function module is blinking (only visible in case of 8200 vector). ● The green LED “Status of connection with standard device” at the front of the function module is on (only visible in case of 8200 vector). ● Keypad: RDY IMP (if attached)	📖 24 📖 34
7.	Configure the host system for communicating with the function module with configuration software: ● With “explicit messages” all parameters can be read or written from the drive and/or function module. ● Actual values can be read (e.g. status word) or setpoints can be written (e.g. frequency setpoint) via the I/O data. **Response** ● The LED “Status of connection with the bus” at the front of the function module changes from blinking to the constantly ON state.	
8.	Configure process data channel of the standard device (see ”application range”) for operation with the function module. **Recommendation** Set code C0005 = 200 after the Lenze setting has been loaded (C0002). C0005 = 200 preconfigures the device for the operation with a function module. Control and status words are already linked. Continue with step 12.	Manual of the standard device
9.	If required, assign the process output data of the master/scanner via C1511 to the input signals of the standard device.	📖 44
10.	If required, assign the process input words of the master/scanner to the output signals of the standard device via C1510.	📖 41
11.	If the configuration in step 9. or step 10. has been changed: Enable process output data with C1512 = 65535.	📖 47
12.	Enable standard device with terminal 28 (CINH) (terminal 28 on HIGH).	
13.	Send setpoint via a selected process data output word. The drive is now running.	
14.	Inhibit the standard device via the bus (e.g. control word bit 9) or terminal 28 (CINH).	

6.3 Controls and displays

6.3.1 Possible settings using the front switch

Note!

Settings via GDC, operating module or configuration software

The settings of device address and baud rate via GDC, the operating module or the configuration software only become valid when the DIP switches S7 and S8 are in the ”ON” position.

Settings via front switch

The Lenze setting of all switches is OFF.

The device address and baud rate set via DIP switch will only be active after a renewed mains connection.

The switch S9 is ineffective.

The following settings can be easily carried out via the front DIP switch of the function module:

- Software compatibility of E82ZAFVC / E82ZAFD function module with S10
- Device address with S1 - S6
- Baud rate with S7 / S8

Adjustment of software compatibility

Note!

Set the baud rate with S8/S9 if the controller is compatible with the E82ZAFD function module (S10 = ON).

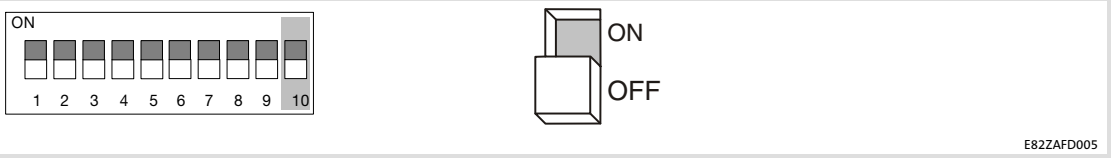


Fig. 6-1 Software compatibility setting

Compatibility	S10
E82ZAFVC0xx	OFF
E82ZAFD For the description of the function module see the E82ZAFD Mounting Instructions	ON

Setting of the device address

Note!

The device address must be set via software, when the switches S7 and S8 are in ON position.

In this case the switches S1 to S6 are ineffective.

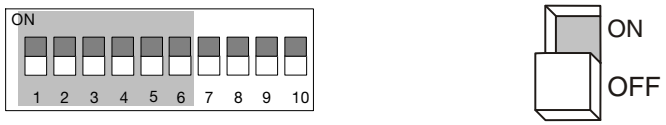


Fig. 6-2 Address assignment via DIP switch

Note!

The addresses of all controllers connected to the network must differ from each other.

The device address (decimal number) is calculated by inserting the positions of the switches S1 ... S6 (’0’ = OFF and ’1’ = ON) into the following equation:

$$\mathbf{Address_{dec} = S6 \cdot 2^0 + S5 \cdot 2^1 + S4 \cdot 2^2 + S3 \cdot 2^3 + S2 \cdot 2^4 + S1 \cdot 2^5}$$

The equation also allows you to calculate the valency of a confirmed switch. The sum of valencies results in the device address to be set:

		Example	
Switch	**Valency**	**Switch position**	**Address**
S1	32	**ON**	32 + 16+ 8 = 56
S2	16	**ON**	
S3	8	**ON**	
S4	4	OFF	
S5	2	OFF	
S6	1	OFF	

Baud rate setting

Note!

The baud rate must be the same for all devices and the scanner.

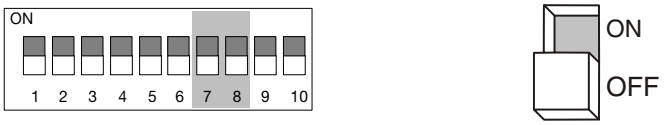


Fig. 6-3 Baud rate setting

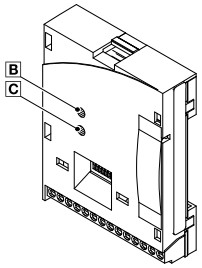
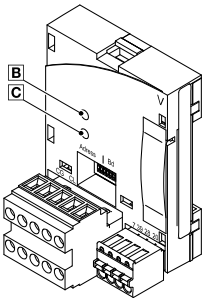
Baud rate	S7	S8
125 kbits/s	OFF	OFF
250 kbits/s	OFF	ON
500 kbits/s	ON	OFF
Setting of baud rate (and node address) via software configuration. The baud rate can be ● set manually via software or ● automatically detected.	ON	ON

Note!

Set the baud rate with S8/S9 if the controller is compatible with the E82ZAFD function module (S10 = ON).

7 Diagnostics

7.1 LED status displays

Function module E82ZAFVC001	Function module E82ZAFVC010
 E82ZAFD001A*	 E82ZAFD101A*

Pos	Colour	Status	Notes
B		off	Function module is not supplied with voltage, external voltage supply is switched off
	green	blinking	Function module is supplied with voltage but not connected to the controller. Reason: Standard device is ● switched off ● is being initialised ● not available
		on	Function module is supplied with voltage and is connected to the standard device
	red	blinking	Internal error, Lenze setting has been loaded
		on	Internal error of the function module
C		off	● No connection to the master ● Function module is not supplied with voltage.
	green	blinking	“Dup_Mac_ID” test phase. Not yet connected to master (scanner).
		on	DeviceNet connection established.
	red	blinking	No communication due to time-out
		on	Critical bus error

Protection against uncontrolled restart

Note!

Establishing communication

If communication is to be established via an externally supplied communication module, initially the standard device must also be switched on.

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

Protection against uncontrolled restart

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 up in a controlled manner by explicit controller enable:
    93XX: Set terminal 28 to HIGH level.
    ECSXX: Set terminals X6/SI1 and X6/SI2 to HIGH level.

► C0142 = 1
  – An uncontrolled restart of the drive is possible.

7.2 Troubleshooting and fault elimination

No communication with the controller.

Possible causes	Diagnostics	Remedy
Is the controller switched on?	One of the operating status LEDs of the basic device must be on.	Supply controller with voltage.
Is the communication module supplied with voltage?	The LED "Connection status to the basic device" must be lit or blinking green.	Check the external voltage supply. The measured voltage value at the terminals for external voltage supply of the communication module must be in the range of 24 V ± 10 %.
		The communication module has not yet been initialised with the controller. Possibility 1: controller not switched on Possibility 2: check the connection to the controller
Does the controller receive telegrams?	The LED "Connection status to the bus" at the communication module must be blinking green when communicating with the master computer.	Check your wiring (see 📖 20). Check whether your master computer sends telegrams. Check the data assignment in the scan list (I/0 mapping).
		Is the available device address already assigned? Check the setting of the other nodes on the DeviceNet.

8 Codes

How to read the code table

Column	Meaning		
Code	(Lenze) code ● The parameters of a configurable code marked with an asterisk (<Code>*) can only be accessed via the communication module. ● The value of a configurable code marked with a double asterisk (<Code>**) is not transmitted with the parameter set transfer.		
Subcode	Subcode		
Name	Designation of the Lenze code		
Index	Index under which the parameter is addressed.		
Lenze	Lenze setting of the code		
	Disp	Display code Configuration of this code is not possible.	
Values	Fixed values determined by Lenze (selection list) *or* a value range:		
	Minimum value	[Smallest increment/unit]	Maximum value
Access	R = read access (reading permitted) W = write access (writing permitted)		
Data type	● FIX32: 32-bit value with sign; decimal with 4 decimal positions ● U16: 2 bytes bit-coded ● U32: 4 bytes bit-coded ● VS: visible string, character string with defined length		

C0002: Parameter set management

(extract from code table)

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C0002	0	0		FIX32

Parameter set management (selection 0):

Selection		Important
0	Ready	**PAR1 ... PAR4:** ● Parameter sets of the controller ● PAR1 ... PAR4 **FPAR1:** ● Module-specific parameter set of the DeviceNet function module ● FPAR1 is stored in the function module

Restoring the delivery state:

Selection		Important
1	Lenze setting ⇨PAR1	Restoring the delivery state in the selected parameter set
2	Lenze setting ⇨PAR2	
3	Lenze setting ⇨PAR3	
4	Lenze setting ⇨PAR4	
31	Lenze setting ⇨FPAR1	Restoring the delivery state in the function module
61	Lenze setting ⇨PAR1 + FPAR1	Restoring the delivery state in the selected parameter set of the controller and the function module
62	Lenze setting ⇨PAR2 + FPAR1	
63	Lenze setting ⇨PAR3 + FPAR1	
64	Lenze setting ⇨PAR4 + FPAR1	

Transmitting the parameter sets with the keypad:

Selection		Important
Using the keypad, you can transmit the parameter sets to the other controllers. During the transmission the access to the parameters via other channels is inhibited!		
	Keypad ⇨ controller	Overwrite all available parameter sets (PAR1 ... PAR4, or if required FPAR1) with the corresponding keypad data
70	with DeviceNet function module	
10	(other)	
	Keypad ⇨ PAR1 (+ FPAR1)	Overwrite the selected parameter set and, if necessary, FPAR1 with the corresponding keypad data
71	with DeviceNet function module	
11	(other)	
	Keypad ⇨ PAR2 (+ FPAR1)	
72	with DeviceNet function module	
12	(other)	
	Keypad ⇨ PAR3 (+ FPAR1)	
73	with DeviceNet function module	
13	(other)	
	Keypad ⇨ PAR4 (+ FPAR1)	
74	with DeviceNet function module	
14	(other)	
	Controller ⇨ keypad	Copy all available parameter sets (PAR1 ... PAR4, or if required FPAR1) into the keypad
80	with DeviceNet function module	
20	(other)	
	Keypad ⇨ function module	Only overwrite the module-specific parameter set FPAR1 with the keypad data
40	only with DeviceNet function module	
	Function module ⇨ keypad	Only copy the module-specific parameter set FPAR1 into the keypad
50	only with DeviceNet function module	

Save own basic settings:

Selection		Important
9	PAR1 ⇨ own basic setting	You can store an own basic setting for the controller parameters (e. g. the delivery state of your machine): 1. Ensure that parameter set 1 is active 2. Inhibit the controller 3. Set C0003 = 3, confirm with ENTER 4. Set C0002 = 9, confirm with ENTER, the own basic setting is stored 5. Set C0003 = 1, confirm with ENTER 6. Enable the controller
		With this function you can simply copy PAR1 into the parameter sets PAR2 ... PAR4
5	Own basic setting ⇨PAR1	Restoring the own basic setting in the selected parameter set
6	Own basic setting ⇨PAR2	
7	Own basic setting ⇨PAR3	
8	Own basic setting ⇨PAR4	

C1500:
Software product code

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1500	-	Disp	-	VS

The code contains a strings which is 14 bytes long. The product code will be output, e.g. 82SAFV0C_XXXXX.

C1501: Software date

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1501	-	Disp	-	VS

The code contains a string which is 17 bytes long. The date and time the software have been written will be output, e.g. June 21 2000 12:31.

C1502:
Display of the software product code

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1502	1 ... 4	Disp	-	U32

Display of code C1500 in 4 subcodes with 4 digits each.

C1503:
Display of the software date

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1503	1 ... 4	Disp	-	U32

Display of code C1501 in 4 subcodes with 4 digits each.

C1509:
Setting of the node address

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1509	-	63	1	[1]	63	FIX32

Only valid if switches S7 and S8 are in the ON position.

Note!

Switch off and then on again the voltage supply of the function module to activate the changed settings of the node address.

Please observe that the node addresses are not the same when using several networked nodes.

C1510:
Configuration of process input data

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1510				FIX32
	1 (PEW1)	1	See table below	
	2 (PEW2)	3		
	3 (PEW3)	4		
	4 (PEW 4)	5		
	5 (PEW 5)	6		
	6 (PEW 6)	7		
	7 (PEW 7)	8		
	8 (PEW 8)	9		
	9 (PEW 9)	10		
	10 (PEW 10)	11		
	11 (PEW11)	12		
	12 (PEW12)	13		

The assignment of the bit status information or the actual values of the controller to the max. 12 process data input words (PEW) of the master can be freely configured.

Selection		Scaling
1	FIF status word 1 (FIF-STAT1)	16 bits
2	FIF status word 2 (FIF-STAT2)	16 bits
3	Output frequency with slip (MCTRL1-NOUT+SLIP)	±24000 ≡ ±480 Hz
4	Output frequency without slip (MCTRL1-NOUT)	±24000 ≡ ±480 Hz
5	Apparent motor current (MCTRL1-IMOT)	2^{14} ≡ 100 % rated device current
6	Actual process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz
7	Process controller setpoint (PCTRL1-SET)	±24000 ≡ ±480 Hz
8	Process controller output (PCTRL1-OUT)	±24000 ≡ ±480 Hz
9	Controller load (MCTRL1-MOUT)	±2^{14} ≡ ±100 % rated motor torque
10	DC-bus voltage (MCTRL1-DCVOLT)	16383 ≡ 565 VDC at 400 V mains 16383 ≡ 325 VDC at 230 V mains
11	Ramp function generator input (NSET1-RFG1-IN)	±24000 ≡ ±480 Hz
12	Ramp function generator output (NSET1-NOUT)	±24000 ≡ ±480 Hz
13	FIF-OUT.W1	16 bits or 0 ... 65535
14	FIF-OUT.W2	16 bits or 0 ... 65535
15	FIF-OUT.W3	0 ... 65535
16	FIF-OUT.W4	0 ... 65535

Note!

- ► FIF-OUT.W1 is digitally defined in the Lenze setting and assigned with the 16 bits of the controller status word 1 (C0417).
- ► Before you assign an analog signal source (C0421/3 ≠ 255), the digital assignment must be deleted (C0417/x = 255)! Otherwise the output signal would be incorrect.

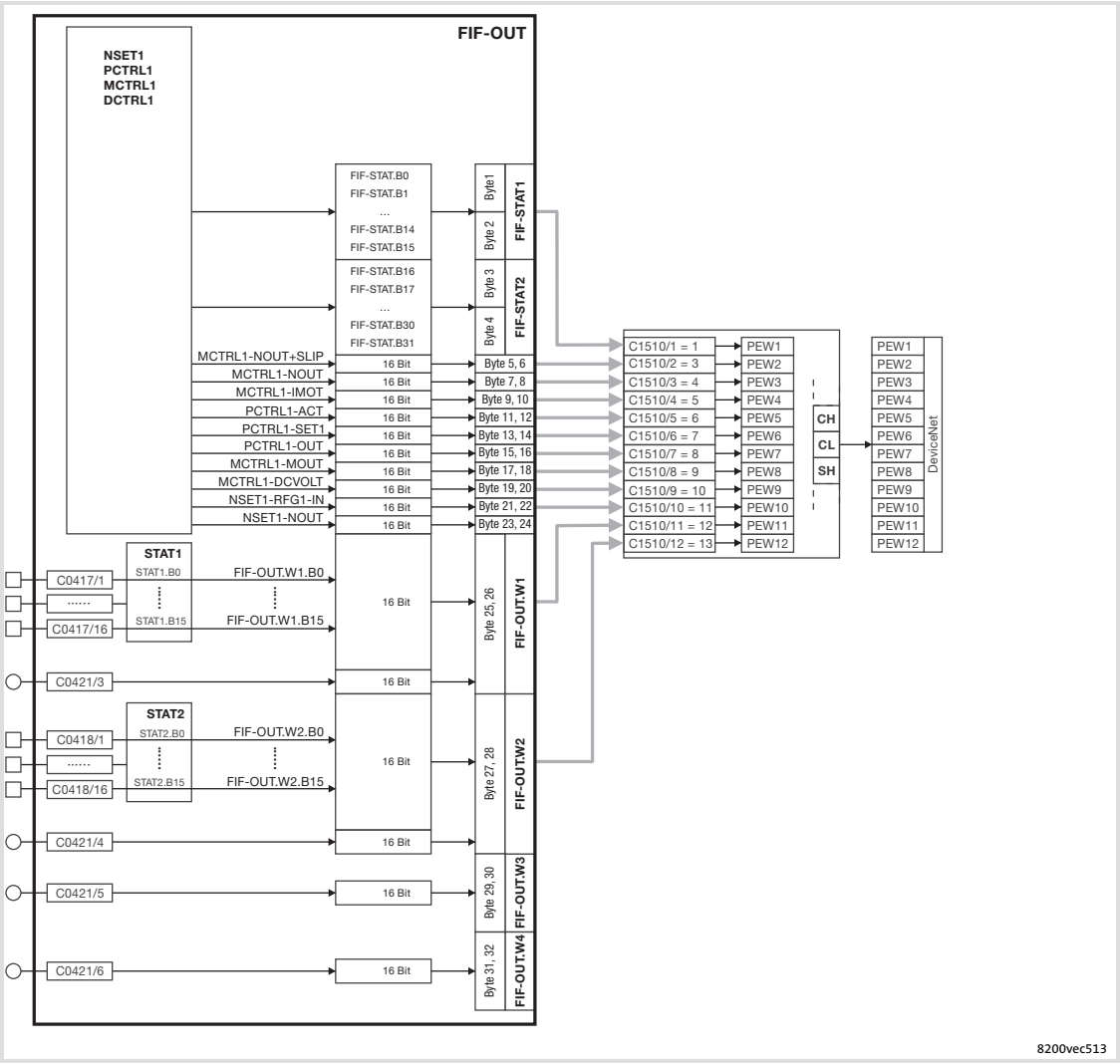


Fig. 8-1 Free configuration of the 12 process input words of the function module with Lenze setting

Symbol	Meaning
	Combination of signals in the Lenze setting
	Fixed signal connection
	Analog input (can be freely connected with an analog output which has the same labelling)
	Analog output
	Digital input (can be freely connected with a digital output which has the same labelling)
	Digital output

FIF status word 1 (FIF-STAT1)	
Bit	**Assignment**
0	**Current parameter set bit 0** (DCTRL1-PAR-B0)
0	Parameter set 1 or 3 active
1	Parameter set 2 or 4 active
1	**Pulse inhibit** (DCTRL1-IMP)
0	Power outputs enabled
1	Power outputs inhibited
2	**I_{max} limit** (MCTRL1-IMAX) (If C0014 = 5: Torque setpoint)
0	Not reached
1	Reached
3	**Output frequency = frequency setpoint** (DCTRL1-RFG1=NOUT)
0	False
1	True
4	**Ramp function generator input 1 = ramp function generator output 1** (NSET1-RFG1-I=O)
0	False
1	True
5	**Q_{min} threshold** (PCTRL1-QMIN)
0	Not reached
1	Reached
6	**Output frequency = 0** (DCTRL1-NOUT=0)
0	False
1	True
7	**Controller inhibit** (DCTRL1-CINH)
0	Controller enabled
1	Controller inhibited
11...8	**Device status** (DCTRL1-STAT*1 ... STAT*8)

Bit	11	10	9	8	
	0	0	0	0	Controller initialisation
	0	0	1	0	Switch-on inhibit
	0	0	1	1	Operation inhibited
	0	1	0	0	Flying-restart circuit active
	0	1	0	1	DC-injection brake active
	0	1	1	0	Operation enabled
	0	1	1	1	Message active
	1	0	0	0	Fault active
	1	1	1	1	Communication with basic device not possible

12	**Overtemperature warning** (DCTRL1-OH-WARN)
0	No warning
1	ϑ_{max} - 10 °C reached
13	**DC-bus overvoltage** (DCTRL1-OV)
0	No overvoltage
1	Overvoltage
14	**Direction of rotation** (DCTRL1-CCW)
0	CW rotation
1	CCW rotation
15	**Ready for operation** (DCTRL1-RDY)
0	Not ready for operation (fault)
1	Ready for operation (no fault)

FIF status word 2 (FIF-STAT2)	
Bit	**Assignment**
0	**Current parameter set bit 1** (DCTRL1-PAR-B1)
0	Parameter set 1 or 2 active
1	Parameter set 3 or 4 active
1	**TRIP, Q_{min} or pulse inhibit active** (DCTRL1-TRIP-QMIN-IMP)
0	False
1	True
2	**PTC warning active** (DCTRL1-PTC-WARN)
0	False
1	True
3	Reserved **Do not write to this bit!**
4	**C0054 < C0156 and Q_{min} threshold reached** (DCTRL1-(IMOT<ILIM)-QMIN)
0	False
1	True
5	**C0054 < C0156 and NSET1-RFG1-I=O** (DCTRL1-(IMOT<ILIM)-RFG-I=O)
0	False
1	True
6	**LP1 warning (fault in motor phase) active** (DCTRL1-LP1-WARN)
0	False
1	True
7	**f < f_{min}** (NSET1-C0010 ... C0011)
0	False
1	True
8	**TRIP active** (DCTRL1-TRIP)
0	False
1	True
9	**Motor is running** (DCTRL1-RUN)
0	False
1	True
10	**Motor is running clockwise** (DCTRL1-RUN-CW)
0	False
1	True
11	**Motor is running counter-clockwise** (DCTRL1-RUN-CCW)
0	False
1	True
12	Reserved
13	Reserved
14	**C0054 > C0156 and NSET1-RFG1-I=0** (DCTRL1-(IMOT>ILIM)-RFG-I=O)
0	False
1	True
15	Reserved

Tab. 8-1 Parameter structure FIF status word (FIF-STATx)

C1511:
Configuration of process output data

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1511				FIX32
	1 (PAW1)	1	See table below	
	2 (PAW2)	3		
	3 (PAW3)	4		
	4 (PAW 4)	5		
	5 (PAW 5)	6		
	6 (PAW 6)	7		
	7 (PAW 7)	8		
	8 (PAW 8)	9		
	9 (PAW 9)	10		
	10 (PAW 10)	11		
	11 (PAW11)	13		
	12 (PAW12)	14		

The assignment of the process data output words (PAW) of the master to bit control commands or setpoints of the controller can be freely configured with C1511.

Selection		Scaling
1	FIF control word 1 (FIF-CTRL1)	16 bits
2	FIF control word 2 (FIF-CTRL2)	16 bits
3	Setpoint 1 (NSET1-N1)	±24000 ≡ ±480 Hz
4	Setpoint 2 (NSET1-N2)	±24000 ≡ ±480 Hz
5	Additional setpoint (PCTRL1-NADD)	±24000 ≡ ±480 Hz
6	Actual process controller value (PCTRL1-ACT)	±24000 ≡ ±480 Hz
7	Process controller setpoint (PCTRL1-SET1)	±24000 ≡ ±480 Hz
8	reserved	
9	Torque setpoint / limit value (MCTRL1-MSET)	2^{14} ≡ 100 % rated motor torque
10	PWM voltage(MCTRL1-VOLT-ADD)	STOP Only for special applications. Please contact Lenze!
11	PWM angle (MCTRL1-PHI-ADD)	
12	reserved	
13	FIF-IN.W1	16 bits or 0 ... 65535
14	FIF-IN.W2	16 bits or 0 ... 65535
15	FIF-IN.W3	0 ... 65535
16	FIF-IN.W4	0 ... 65535

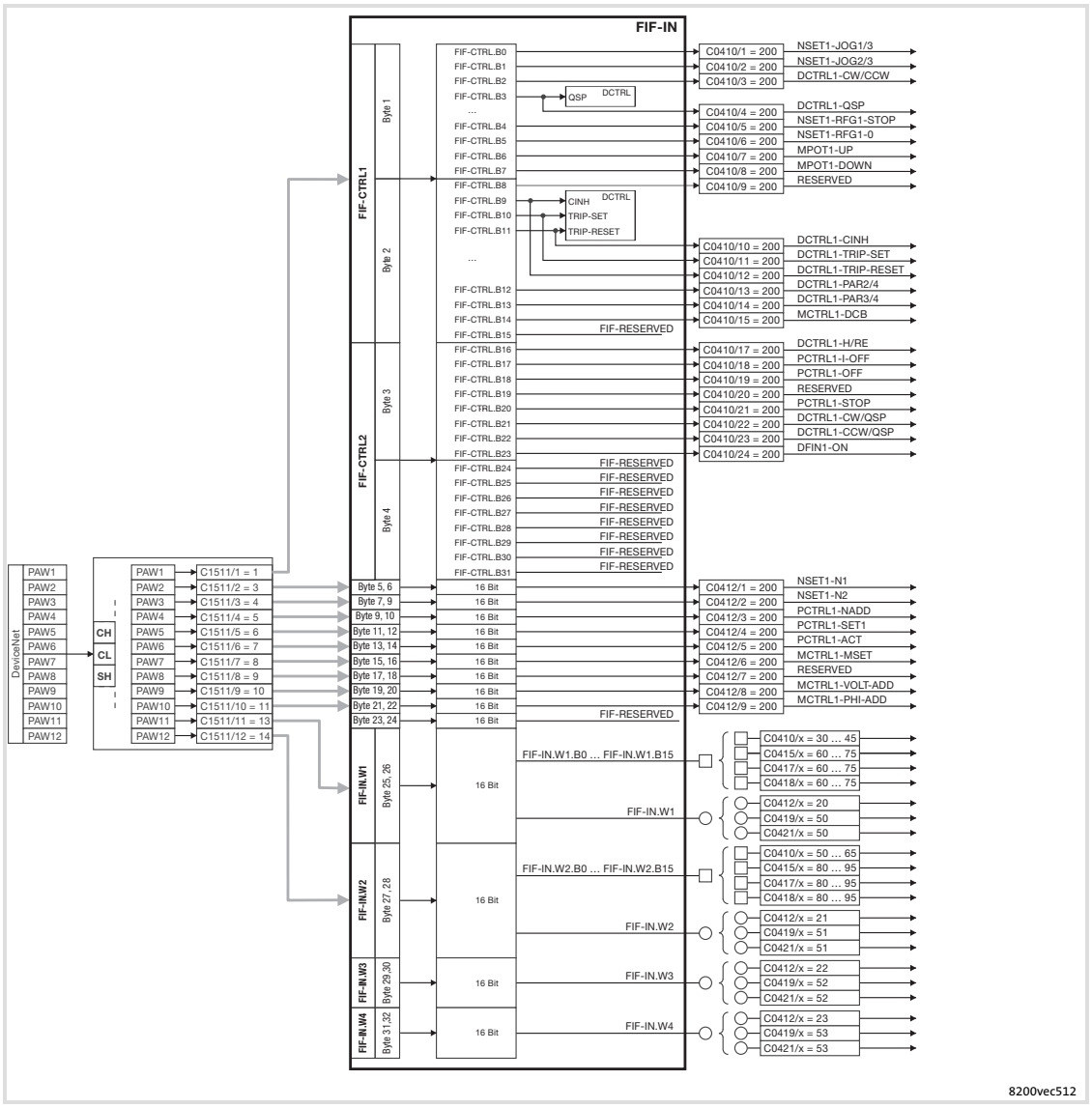


Fig. 8-2 Free configuration of the 12 process output words of the function module with Lenze setting

Symbol	Meaning
	Combination of signals in the Lenze setting
	Fixed signal connection
	Analog input (can be freely connected with an analog output which has the same labelling)
	Analog output
	Digital input (can be freely connected with a digital output which has the same labelling)
	Digital output

FIF control word 1 (FIF-CTRL1)		FIF control word 2 (FIF-CTRL2)	
Bit	**Assignment**	**Bit**	**Assignment**
0 / 1	**JOG values** (NSET1-JOG2/3 | NSET1-JOG1/3) Bit 1 0 0 0 C0046 active 0 1 JOG1 (C0037) active 1 0 JOG2 (C0038) active 1 1 JOG3 (C0039) active	**0**	**Manual/remote changeover** (DCTRL1-H/Re) 0 Not active 1 Active
		1	**Switch off I-component of process controller** (PCTRL1-I-OFF) 0 Not active 1 Active
2	**Current direction of rotation** (DCTRL1-CW/CCW) 0 Not inverted 1 Inverted	**2**	**Switch off process controller** (PCTRL1-OFF) 0 Not active 1 Active
3	**Quick stop (QSP)** (FIF-CTRL1-QSP) 0 Not active 1 Active (deceleration via QSP ramp C0105)	**3**	Reserved **Do not write to this bit!**
4	**Stop ramp function generator** (NSET1-RFG1-STOP) 0 Not active 1 Active	**4**	**Stop process controller** (PCTRL1-STOP) 0 Not active 1 Active
5	**Ramp function generator input = 0** (NSET1-RFG1-0) 0 Not active 1 Active (deceleration via C0013)	**5**	**CW rotation/quick stop (QSP)** (DCTRL1-CW/QSP) 0 Not active 1 Active
6	**UP function of motor potentiometer** (MPOT1-UP) 0 Not active 1 Active	**6**	**CCW rotation/quick stop (QSP)** (DCTRL1-CCW/QSP) 0 Not active 1 Active
7	**DOWN function of motor potentiometer** (MPOT1-DOWN) 0 Not active 1 Active	**7**	**X3/E1 is digital frequency input** (DFIN1-ON) 0 Not active 1 Active
8	Reserved	**8**	Reserved
9	**Controller inhibit** (FIF-CTRL1-CINH) 0 Controller enabled 1 Controller inhibited	**9**	Reserved
10	**External fault** (FIF-CTRL1-TRIP-SET)	**10**	Reserved
11 0 ⇒ 1	**Reset fault** (FIF-CTRL1-TRIP-RESET) Bit change resets TRIP	**11**	Reserved
12 / 13	**Parameter set changeover** (DCTRL1-PAR3/4 | DCTRL1-PAR2/4) Bit 13 12 0 0 PAR1 0 1 PAR2 1 0 PAR3 1 1 PAR4	**12**	Reserved
		13	Reserved
14	**DC injection brake** (MTCRL1-DCB) 0 Not active 1 Active	**14**	Reserved
15	Reserved	**15**	Reserved

Tab. 8-2 Parameter structure of FIF control word (FIF-CTRLx)

Note!

Use of bit 5 and bit 6 in FIF control word 2

Set codes **C0410/22** (DCTRL1-CW/QSP) and **C0410/23** (DCTRL1-CCW/QSP) to ”200”.

C1512:
I/O data enable

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1512 **	-	65535	0	[1]	65535	FIX32

If C1511 is changed, the process output data is automatically inhibited to ensure data consistency.

Use the decimal value in code C1512 to enable some or all process output words (PAW) again:

- 0 = Inhibit PAW
- 1 = Enable PAW

Bit 15 ... 12	Bit 11	Bit 10	...	Bit 1	Bit 0
reserved	PAW12	PAW 11	...	POW2	PAW 1

The bit settings 0 to 11 are each assigned to a process data word. The bit settings 12 to 15 are reserved.

Use the value 65535 ($FFFF_{hex}$) in code C1512 to release *all* process output data.

Note!

- The release is required if the process output data configuration has been changed.

C1516:
Baud rate setting

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1516		0	see below	FIX32

Selection	Baud rate
0	125 kbits/s
1	250 kbits/s
2	500 kbits/s
255	Auto baud (automatic baud rate recognition)

Only valid if switches S7 and S8 are in the ON position.

Note!

Switch off the voltage supply of the function module and then on again to activate changed settings of the baud rate.

C1518:
I/O data length

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1518	-	4	1	[1]	12	FIX32

This code determines the number of words (I/O input data and I/O output data) being currently exchanged with the scanner.

A change of the I/O data length must be sent to the scanner via the configuration program.

C1519:
Behaviour in idle state/in case of an error

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1519	/1 ... /3	0	0	[1]	3	FIX32

Subcode	Meaning
1	Setting of the reaction in the event of idle running of the DeviceNet communication.
2	Setting of the reaction if the communication is interrupted (time out)
3	Setting of the reaction if a bus error occurs (duplicate MAC-ID, Bus-Off).

Selection	Baud rate
0	No action
1	Fault (TRIP)
2	Controller inhibit
3	Quick stop

C1520:
Display of all words to scanner

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1520	/1 ... /12	Disp	0	[1]	65535	U16

Display of the process data input words PEW1 to PEW12 in the corresponding subcodes.

C1521:
Display of all words from scanner

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1521	/1 ... /12	Disp	0	[1]	65535	U16

Display of the process data output words 1 ... 12 of the scanner in the corresponding subcodes.

C1522:
Display of all process data words to the basic device

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1522	1...16	Disp	0	[1]	65535	U16

Display of the process data words 1 ... 16, which are transferred from the function module to the basic device:

Subcode	Process data word
1	FIF control word 1 (FIF-CTRL1)
2	FIF control word 2 (FIF-CTRL2)
3	Setpoint 1 (NSET1-N1)
4	Setpoint 2 (NSET1-N2)
5	Additional setpoint (PCTRL1-NADD)
6	Actual process controller value (PCTRL1-ACT)
7	Process controller setpoint (PCTRL1-SET1)
8	Reserved
9	Torque setpoint or torque limit value (MCTRL1-MSET)
10	PWM voltage(MCTRL1-VOLT-ADD)
11	PWM angle (MCTRL1-PHI-ADD)
12	Reserved
13	FIF-IN.W1
14	FIF-IN.W2
15	FIF-IN.W3
16	FIF-IN.W4

C1523:
Display of all process data words from the basic device

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1523	1...16	Disp	0	[1]	65535	U16

Display of the process data words 1 ... 16, which are transferred from the basic device to the function module:

Subcode	Process data word
1	FIF status word 1 (FIF-STAT1)
2	FIF status word 2 (FIF-STAT2)
3	Output frequency with slip (MCTRL1-NOUT+SLIP)
4	Output frequency without slip (MCTRL1-NOUT)
5	Apparent motor current (MCTRL1-IMOT)
6	Actual process controller value (PCTRL1-ACT)
7	Process controller setpoint (PCTRL1-SET)
8	Process controller output (PCTRL1-OUT)
9	Controller load (MCTRL1-MOUT)
10	DC bus voltage (MCTRL1-DCVOLT)
11	Ramp function generator input (NSET1-RFG1-IN)
12	Ramp function generator output (NSET1-NOUT)
13	FIF-OUT.W1
14	FIF-OUT.W2
15	FIF-OUT.W3
16	FIF-OUT.W4

C1524:
Display of the currently used baud rate

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1524	-	Disp	0 0 = 125 kbits/s 1 = 250 kbits/s 2 = 500 kbits/s	[1]	2	FIX32

C1525:
Display of current DIP switch setting

Code	Subcode	Possible settings				Data type
		Lenze	Selection			
C1525	1	Disp	0	[1]	63	FIX32
	2		0	[1]	3	
	3		0	[1]	1	

This code reflects the switch position being set at the moment.

Subcode 1, node address:

Switch	S1	S2	S3	S4	S5	S6
Valency	32	16	8	4	2	1

Subcode 2, baud rate:

Switch	S7	S8	
Valency	2	1	

Subcode 3, compatibility with E82ZAFD:

Switch	S10	
Valency	1	

C1528:
Display of interruption in communication

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1528	-	Disp	1: Time out during communication	FIX32

C1529:
Idle mode display)

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1529	-	Disp	1: Communication is in idle mode.	FIX32

C1566:
Automatic trip reset communication error

Code	Subcode	Possible settings		Data type
		Lenze	Selection	
C1566	-	0	0 / 1	FIX32

Selection	Meaning
0	No trip reset
1	One-time trip reset of communication monitoring to the basic device

The recommended switch-on sequence is as follows:

1. Switch on DeviceNet
2. Switch on the basic device

If the order is reversed, a communication error is indicated.

With code C1566 = 1, this message is always automatically reset once after switching on the DeviceNet supply voltage.

Note!

If the software is compatible with the E82ZAFD function module (DIP switch S10), this function is not active.

9 Appendix

9.1 Data transfer

Note!

When using the DeviceNet communication profile, the corresponding specified terminology must be considered. Note that translation into German is not always permissible.

In these instructions, the following terms are used with the same meaning:

- I/O data ↔Process data
  - Input data is process data to the scanner
  - Output data is process data from the scanner
- Explicit Messages ↔Parameter data
- Scanner ↔ DeviceNet master

Two different telegram types are transferred between master computer and controller(s):

- I/O data
- Explicit messages

As indicated in the table, these telegram types are subdivided into communication channels according to their time-critical response:

Communication channel	Telegram type
→ Parameter data channel ● Enables the access to all Lenze codes. ● Automatic storage after a change of frequency inverter parameters: – 8200 vector – 8200 motec	→ Explicit messages Explicit messages are used for configuration and parameter setting of the devices connected to the DeviceNet. The relationship between two devices is a client-server relationship. The client sends the request and the server accepts the order and tries to settle it. The server reacts as follows ● the required data in case of a positive response or ● a fault message in case of a negative response.
→ Process data channel – You can control the controller using the I/O data. – The master computer can directly access the I/O data. The data is directly stored into the I/O area of the PLC. – I/O data is not stored in the controller, they are cyclically transferred between the host and the controllers (continuous exchange of input and output data).	→ I/O data I/O Data (process data) is transmitted/received according to the producer/consumer principle, i. e. there is one transmitter and no or an arbitrary number of receivers. The following transmission modes are supported: ● I/O polled messages (polled) – The Poll command being transmitted from the master, includes output data for the slave. The slave then transmits its input data to the master. ● Cyclic I/O – With cyclic I/O, master and slave create data independently of each other which are sent according to the settings of a timer. The user must set the timer. ● Change of State (COS) – This type of I/O message is a special cyclic message. COS nodes send their data when the data status is changed.

Note!

The default message service for the E82ZAFVC function module is the I/O polled message. Other services can be released by means of a DeviceNet Manager tool.

9.1.1 Overview of the implemented objects for the function module

A device connected to the DeviceNet is a conglomeration of objects. Every individual object is described by its class, instances and attributes. These objects can be used with different services such as reading or writing.

Overview of the implemented objects:

Object	Class	Notes
Identity	01_{hex}	-
DeviceNet	03_{hex}	-
Assembly	04_{hex}	-
Connection	05_{hex}	-
Acknowledge handler	$2B_{hex}$	-
Lenze	65_{hex}	Response to idle mode, communication interruption and bus error
	66_{hex}	Changing the I/O data length
	67_{hex}	I/O image of the transmitted data
	68_{hex}	I/O image of the received data
	$6E_{hex}$	Access to Lenze codes

Identity class (01_{hex})

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET	Vendor ID	UINT	445 ($01BD_{hex}$)
2	GET	Device type	UINT	0 (generic)
3	GET	Product code	UINT	768 (0300_{hex})
4	GET	Revision	Struct of	
		Major revision	USINT	1 (01_{hex})
		Minor revision	USINT	1 (01_{hex})
5	GET	Status	WORD	Dependent on the current module state
6	GET	Serial number	UDINT	Individual for the respective module
7	GET	Product name	SHORT_STRING	e.g. “E82ZAFVC”

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
05_{hex}	Reset	Reset of the communication module

DeviceNet Class (03_{hex})

Instance 0:

Attribute	Service(s)	Description	Data type	Value
1	GET	Revision	UINT	0002_{hex}

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET	MAC ID	USINT	0 - 63
2	GET	Baud rate	USINT	0 - 2
3	GET / SET	BOI	BOOL	0/1
4	GET	Bus-off counter	USINT	0 - 255
5	GET	Allocation information	Struct of	
		Allocation choice byte	BYTE	0 – 63
		Master's MAC ID	USINT	0 – 63

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading of an attribute
10_{hex}	Set_Attribute_Single	Writing of an attribute
$4B_{hex}$	Allocate_Master/Slave_Connection_ Set	Demands the application of "Predefined Master/Slave Connection Set"
$4C_{hex}$	Release_Group_2_Identifier_Set	Connections via "Predefined Master/Slave Connection Set" are deleted

Assembly class (04_{hex})

Instance 101 ... 112:

Attribute	Service(s)	Description	Data type	Instance / value
3	GET / SET	Data	Array of BYTE	Instance 101: 1 word (= 2 byte) from master
				Instance 102: 2 words (= 4 byte) from master
				Instance 103: 3 words (= 6 byte) from master
				Instance 104: 4 words (= 8 byte) from master
				Instance 105: 5 words (= 10 byte) from master
				Instance 106: 6 words (= 12 byte) from master
				Instance 107: 7 words (= 14 byte) from master
				Instance 108: 8 words (= 16 byte) from master
				Instance 109: 9 words (= 18 byte) from master
				Instance 110: 10 words (= 20 byte) from master
				Instance 111: 11 words (= 22 byte) from master
				Instance 112: 12 words (= 24 byte) from master

Instance 114 ... 125:

Attribute	Service(s)	Description	Data type	Entity / value
3	GET / SET	Data	Array of BYTE	Instance 114: 1 word (= 2 byte) from master
				Instance 115: 2 words (= 4 byte) from master
				Instance 116: 3 words (= 6 byte) from master
				Instance 117: 4 words (= 8 byte) from master
				Instance 118: 5 words (= 10 byte) from master
				Instance 119: 6 words (= 12 byte) from master
				Instance 120: 7 words (= 14 byte) from master
				Instance 121: 8 words (= 16 byte) from master
				Instance 122: 9 words (= 18 byte) from master
				Instance 123: 10 words (= 20 byte) from master
				Instance 124: 11 words (= 22 byte) from master
				Instance 125: 12 words (= 24 byte) from master

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
10_{hex}	Set_Attribute_Single	Writing an attribute

Connection Class (05_{hex})

Instance 1 (explicit messages):

Attribute	Service(s)	Description	Data type	Value
1	GET	state	USINT	Status of the object
2	GET	instance_type	USINT	0
3	GET	transportClass_ trigger	BYTE	131 (83_{hex})
4	GET	produced_ connection_id	UINT	Send CAN identifier
5	GET	consumed_ connection_id	UINT	Reception of CAN identifier
6	GET	initial_comm_ characteristics	BYTE	33 (21_{hex})
7	GET	produced_ connection_size	UINT	64 (40_{hex})
8	GET	consumed_ connection_size	UINT	64 (40_{hex})
9	GET / SET	expected_ packet_rate	UINT	Connection-dependent
10/11		Not used		No longer defined
12	GET / SET	watchdog_ timeout_action	USINT	Defined reaction to timeout ● 1 = Auto Delete ● 3 = Deferred Delete
13	GET	produced_ connection_ path_length	UINT	0
14	GET	produced_ connection_path	EPATH	---
15	GET	consumed_ connection_ path_length	UINT	0
16	GET	consumed_ connection_path	EPATH	---
17	GET	production_ inhibit_time	UINT	0

Instance 2 (polled I/O data):

Attribute	Service(s)	Description	Data type	Value
1	GET	state	USINT	Status of the object
2	GET	instance_type	USINT	1
3	GET	transportClass_ trigger	BYTE	128/130 (80_{hex}/82_{hex})
4	GET	produced_ connection_id	UINT	Send CAN identifier
5	GET	consumed_ connection_id	UINT	Reception of CAN identifier
6	GET	initial_comm_ characteristics	BYTE	1 (01_{hex})
7	GET	produced_ connection_size	UINT	Dependent on the number of I/O data words
8	GET	consumed_ connection_size	UINT	Dependent on the number of I/O data words
9	GET / SET	expected_ packet_rate	UINT	Connection-dependent
10/11		Not used		No longer defined
12	GET	watchdog_ time-out_action	USINT	Defines time-outs
13	GET	produced_ connection_ path_length	UINT	4
14	GET	produced_ connection_path	EPATH	[20_{hex}, 67_{hex}, 24_{hex}, 01]
15	GET	consumed_ connection_ path_length	UINT	4
16	GET	consumed_ connection_path	EPATH	[20_{hex}, 68_{hex}, 24_{hex}, 01_{hex}]
17	GET	production_ inhibit_time	UINT	0

Instance 4 (COS I/O):

Attribute	Service(s)	Description	Data type	Value
1	GET	state	USINT	Status of the object
2	GET	instance_type	USINT	1
3	GET	transportClass_ trigger	BYTE	128/130 (80_{hex}/82_{hex})
4	GET	produced_ connection_id	UINT	Send CAN identifier
5	GET	consumed_ connection_id	UINT	Reception of CAN identifier
6	GET	initial_comm_ characteristics	BYTE	1 (01_{hex})
7	GET	produced_ connection_size	UINT	Dependent on the number of I/O data words
8	GET	consumed_ connection_size	UINT	Dependent on the number of I/O data words
9	GET / SET	expected_ packet_rate	UINT	Connection-dependent
10/11		Not used		No longer defined
12	GET	watchdog_ timeout_action	USINT	Defines time-outs
13	GET	produced_conne ction_path_ length	UINT	4
14	GET	produced_ connection_path	EPATH	[20_{hex}, 67_{hex}, 24_{hex}, 01_{hex}]
15	GET	consumed_ connection_ path_length	UINT	4
16	GET	consumed_ connection_path	EPATH	[20_{hex}, 68_{hex}, 24_{hex}, 01_{hex}]
17	GET / SET	production_ inhibit_time	UINT	0

Services:

Service code	Name	Description
05_{hex}	Reset_Request	Reset effect: • Reset of the watchdog timer • Communication between scanner and slave in established status.
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
10_{hex}	Set_Attribute_Single	Writing an attribute

Acknowledge Handler Class ($2B_{hex}$)

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET / SET	Acknowledge Timer	UINT	2 – 65534 ms (0002_{hex} –$FFFE_{hex}$), default 16 ms (0010_{hex})
2	GET	Retry Limit	USINT	0 – 255 ms (00_{hex} – FF_{hex}), default 1 ms
3	GET	COS Producing Connection Instance	UINT	4 (0004_{hex})

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
10_{hex}	Set_Attribute_Single	Writing an attribute

Manufacturer-specific class 100 (64_{hex}): Access to Lenze codes

Note!
We recommend the use of class 110 (📖 65).

Instance 0:

Attribute	Service(s)	Description	Data type	Value
1	GET	Revision	UINT	0001_{hex}

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET/SET	Explicit Message Lenze Codes	See table below	Dependent on order

Data type instance 1		
Byte	**Request**	**Response**
1	Code Low	Code Low
2	Code High	Code High
3	Subcode	Subcode
4	Reserve	Status ● Value of byte = 0: The message does not contain any faults. ● Value of the byte ≠0: Message is faulty. The value of the byte indicates the fault number (for explanation see the following table).
5	Data_1 Low	Data_1 Low
	Data_1 High	Data_1 High
	..	..
	..	..
	Data_22 Low	Data_22 Low
	Data_22 High	Data_22 High

Explanation of the fault number:

Error code	Explanation
03_{hex}	Invalid data type
04_{hex}	Subcode no. not accepted
05_{hex}	Code no. not accepted
07_{hex}	No right to access due to operating state
08_{hex}	No right to access due to operating mode
09_{hex}	No right to access as parameters are only readable
$0A_{hex}$	No general right to access
$0B_{hex}$	Data block too long
$0C_{hex}$	Collisions with other value ranges
$0D_{hex}$	Quit value range
$0E_{hex}$	Fault - general value range
$2X_{hex}$	Fault - AIF interface
FF_{hex}	General fault

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
10_{hex}	Set_Attribute_Single	Writing of an attribute

Manufacturer-specific class 102 (66_{hex})

Instance 0:

Attribute	Service(s)	Description	Data type	Value
1	GET	Revision	UINT	0001_{hex}

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET / SET	I/O data length in words	UINT	$1 – 12$ ($0000_{hex} – 000C_{hex}$), Default: 4, (saved in EEPROM)

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading an attribute
10_{hex}	Set_Attribute_Single	Writing an attribute

Note!

- ► A change of the I/O data length is reported to the scanner (produced/consumed data size).
- ► If the I/O data length is reduced, it must be checked before, if the intended data length is sufficient for the application.
- ► If the function modules have to be replaced, the machine manufacturer must provide an application-specific configuration for the end customer that differs from the Lenze default setting. A parameterisation that deviates from the Lenze default setting cannot be executed via Lenze engineering tools.

Manufacturer-specific class 103 (67_{hex})

Instance 0:

Attribute	Service(s)	Description	Data type	Value
1	GET	Revision	UINT	0001_{hex}

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET	I/O image of the transmitted data (input data of the scanner)	Array of UINT	Value according to the words set

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading of an attribute

Manufacturer-specific class 104 (68_{hex})

Instance 0:

Attribute	Service(s)	Description	Data type	Value
1	GET	Revision	UINT	0001_{hex}

Instance 1:

Attribute	Service(s)	Description	Data type	Value
1	GET/SET	I/O image of the received data (output data of the scanner)	Array of UINT	Value according to the words set

Services:

Service code	Name	Description
$0E_{hex}$	Get_Attribute_Single	Reading of an attribute
10_{hex}	Set_Attribute_Single	Writing of an attribute

Manufacturer-specific class 110 ($6E_{hex}$): access to Lenze codes

Instance (Lenze code):

Attribute	Service(s)	Description	Data type	Value
Lenze subcode	GET / SET	Access to Lenze code ($6E_{hex}$)	Data type of the Lenze code	Value of the Lenze code/subcode

Note!

- If the corresponding Lenze code does not have a subcode, the value ”1” must be entered into the attribute.
- The display code cannot be configured by the ”SET” service.

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