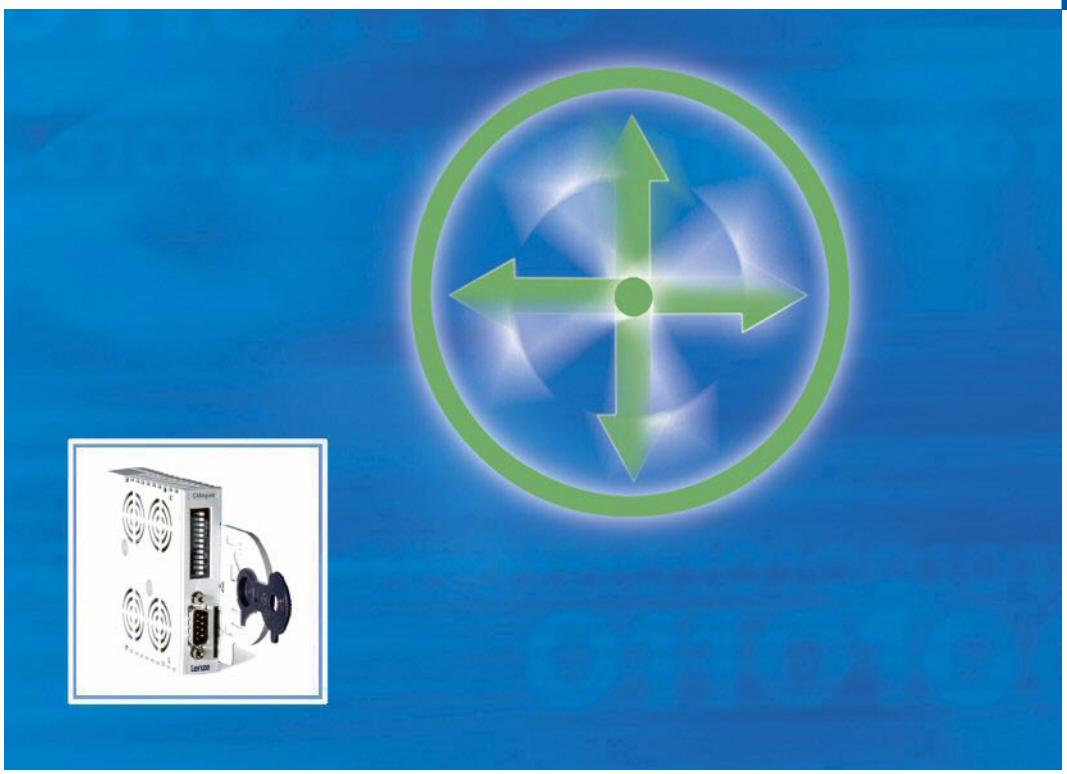
EDS94AYCCA
13411721

L-force Communication

Communication Manual

9400



E94AYCCA

CANopen® communication module

Lenze

Contents

1 About this documentation

Contents

This documentation solely contains descriptions for the E94AYCCA communication module (CANopen®).

Note!

This documentation supplements the **Mounting Instructions** supplied with the communication module and the **"Servo Drives 9400" hardware manual**.

The Mounting Instructions contain safety instructions which must be observed!

The product features and functions of the communication module are described in detail.

Examples illustrate typical applications.

This documentation also contains ...

- safety instructions that must be observed;
- key technical data relating to the communication module;
- information about the 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 communication module.

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

All product names mentioned in this documentation are trademarks of their corresponding owners.

Tip!

Detailed information about the CAN/CANopen bus system can be found on the website of the CAN user organisation CiA® (CAN in Automation):

www.can-cia.org

Screenshots/application examples

All screenshots in this documentation are application examples. Depending on the firmware version of the field devices and the software version of the Engineering tools installed (e.g. »Engineer«), the screenshots in this documentation may deviate from the actual screens shown.

Target group

This documentation is intended for people involved in configuring, installing, commissioning, and maintaining the networking and remote maintenance of a machine.

Tip!

Current documentation and software updates for Lenze products can be found in the ”Download” area at:

www.Lenze.com

Validity information

The information in this documentation applies to the following devices:

Extension module	Type designation	From hardware version	From software version
CANopen communication manual	E94AYCCA	VA	01.00

1.1 Document history

Version			Description
1.0	08/2006	TD17	First edition
2.0	04/2008	TD17	General revision
3.0	02/2011	TD17	General revision
4.0	11/2011	TD17	Assignment of the 9-pin Sub-D plug connector corrected. ▸ System bus (CANopen) connection (📖 26)
5.0	06/2012	TD17	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 different types of information:

Information type	Display	Examples/notes
Spelling of numbers		
Decimal	Standard spelling	Example: 1234
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	In inverted commas Point	Example: '100' Example: '0110.0100'
Decimal separator	Point	The decimal point is generally used. For example: 1234.56
Text		
Program name	» «	PC software Example: Lenze »Engineer«
Control element	**Bold**	The **OK** button... / the **copy** command... / the **Properties** tab... / the **Name** input field...
Sequence of menu commands		If the execution of a command requires several commands in succession, the individual commands are separated by an arrow: Select the **File→Open** command to...
Hyperlink	Underlined	Optically highlighted reference to another subject which is activated with a mouse-click.
Symbols		
Page reference	(📖 9)	Optically highlighted reference to another page which is activated with a mouse-click.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

1.3 Terminology used

Term	Meaning
CAN	CAN (Controller Area Network) is an asynchronous, serial fieldbus system.
CANopen®	CANopen® is a communication protocol based on CAN. CANopen® is a trademark and patented technology, licensed by the CAN user organisation CiA® (CAN in Automation e. V.), www.can-cia.org.
System bus (CAN/CANopen)	The Servo Drives 9400 system bus (CANopen) is an advancement of the 9300 controller series' system bus (CAN). ▸ Features (📖 15)
Standard device Controller	Lenze controller of the "Servo Drives 9400" product series, with which the communication module can be used. ▸ Application as directed (📖 14)
Module Interface module Communication module	Accessories and extension modules such as communication modules, distributed terminals, operator and input devices (HMIs) as well as external controls and control systems
»Engineer« »PLC Designer«	Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.
Code	Parameter by means of which you can parameterise or monitor the controller. In everyday language, the term is also referred to as "index".
Subcode	If a code contains several parameters, they are stored in "subcodes". In the documentation, the slash "/" is used as a separator between the code and the subcode (e.g. "C00118/3"). In everyday language, the term is also referred to as "subindex".
Lenze setting Basic setting	Default settings for the device.
PDO	Process data object (process data communication)
SDO	Service data object (parameter data communication)
HW	Hardware
SW	Software
PLC	Programmable Logic Controller
Host Control	CAN master
Node Bus node	Components of a CAN network (PLC, controller, etc.)
Node address	Unique ID for addressing the individual components of a CAN network
I-1600.20	CANopen index (hexadecimal representation) • In the example: index 0x1600, subindex 0x20

Note!

Some of the terms used derive from the CANopen protocol. These terms are not listed here.

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 the safety instructions:

Pictograph and signal word!

(characterise the type and severity of danger)

Note

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

Pictograph	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	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 and application notes

Danger!

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

- Lenze drive and automation components ...
  - may only be used as directed.
    - Application as directed (📖 14)
  - must never be commissioned if they display any signs of damage.
  - must never be modified technically.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without the required covers.
  - can have live, moving and rotating parts during and after operation, depending on their degree of protection. Surfaces can be hot.
- For Lenze drive components ...
  - only use approved accessories.
  - only use genuine spare parts supplied by the manufacturer of the product.
- Observe all the specifications contained in the enclosed and corresponding documentation.
  - This is a precondition for ensuring safe, trouble-free operation and for making use of the stated product features.
    - Features (📖 15)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.

- All works on and with Lenze drive and automation components may only be carried out by qualified personnel. According to IEC 60364 and CENELEC HD 384 these are persons who ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - have the qualifications necessary for their occupation.
  - know and are able to apply all regulations for the prevention of accidents, directives and laws that apply to the location of use.

2.2 Device and application-specific safety instructions

- During operation, the communication module must be securely connected to the standard device.
- With external voltage supply, always use a separate power supply unit, safely separated in accordance with EN 61800-5-1 in every control cabinet ("SELV"/"PELV").
- Only use cables that meet the given specifications.
  ▸ Specification of the bus cable (📖 27)

Documentation of the standard device, control system, and plant/machine

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

2.3 Residual hazards

Protection of persons

- If Servo Drives 9400 are used on a corner grounded system with a rated mains voltage ≥ 400V, external measures need to be implemented to provide reliable protection against accidental contact.
  ▸ Protective insulation (📖 20)

Device protection

- The communication module contains electronic components that can be damaged or destroyed by electrostatic discharge.
  ▸ Installation (📖 24)

3 Product description

3.1 Application as directed

The communication module ...

- is an accessory module which can be used with the following standard devices:

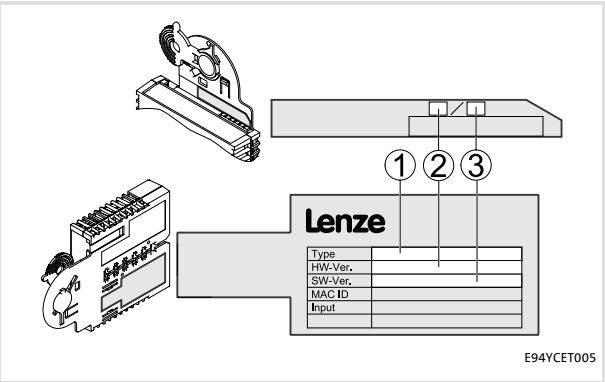
Product series	Type designation	From hardware version	From software version
Servo Drives 9400 HighLine	E94AxHExxx	VA	01.30
Servo Drives 9400 PLC	E94AxPExxxx	VA	01.00
Servo Drives 9400 regenerative power supply module	E94ARNxxxx	VA	01.00

- is an item of equipment intended for use in industrial power systems.
- may only be operated under the operating conditions specified in this documentation.
- may only be used in CAN networks.

Any other use shall be deemed inappropriate!

3.2 Identification

The type designation and the hardware and software version of the communication module are specified on the nameplate:



[3-1] Identification data

1 Type designation (type)
- E94 Product series
- A Version
- Y Module identification: extension module
- C Module type: communication module
- CA CANopen

2 Hardware version (HW)

3 Software version (SW)

3.3 Features

For many years the system bus (CAN) based on the CANopen communication profile has been integrated in Lenze controllers. Due to the lower number of data objects available, the functionality and compatibility of the old system bus are lower as compared with CANopen. For parameter setting, two parameter data channels are always available to the user while CANopen provides only one active parameter data channel (along with the possibility to establish further channels).

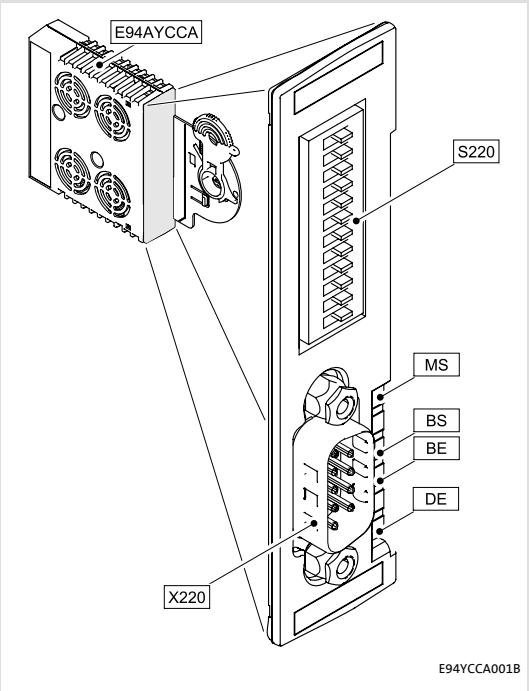
The system bus (CANopen) of the Servo Drives 9400 is an advancement of the 9300 controller series' system bus (CAN).

The communication module E94AYCCA (CANopen) provides the following features:

- Interface module for the system bus (CANopen), connectable to the expansion slots of Servo Drives 9400
- Internal voltage supply of the communication module via the Servo Drive 9400.
- Full compatibility according to CANopen DS301, V4.02
- Support of the NMT master/slave function "node guarding" (DS301,V4.02)
- Support of the NMT slave function "heartbeat" (DS301,V4.02)
- No restrictions regarding the selection of node addresses
- Number of parameterisable server and client SDO channels:
  - max. 10 channels with 1 ... 8 bytes
- Number of parameterisable PDO channels:
  - max. 4 Transmit-PDOs (TPDOs) with 1 ... 8 bytes
  - max. 4 Receive-PDOs (RPDOs) with 1 ... 8 bytes
- All PDO channels are functionally equivalent.
- Monitoring of the RPDOs for data reception
- Telegram counters for SDOs and PDOs
- Bus status diagnostics
- Boot-up telegram generation
- Emergency telegram generation
- Reset node telegram generation (with master configuration)
- Sync telegram generation and response to sync telegrams:
  - Transmit/receive data
  - Synchronisation of the device-internal time base
- Abort codes
- All CAN functions parameterisable via codes
- Object directory (all mandatory functions, optional functions, indexes)

3.4 Terminals and interfaces

- 9-pin Sub-D plug connector for system bus connection (CANopen)
- DIP switches for ...
  - setting the CAN node address
  - setting the baud rate
- Front LEDs for diagnosing the ...
  - voltage supply of the communication module;
  - connection to the standard device;
  - CANopen state machine and error states;
  - physical CAN connection.



[3-2] E94AYCCA communication module (CANopen)

X220 9-pin Sub-D plug connector for the ...
▸ System bus (CANopen) connection (📖 26)

S220 DIP switches for ...
- setting the CAN node address
- setting the baud rate

▸ Possible settings via DIP switches (📖 33)

MS LED status displays for diagnostics
BS
BE
DE
▸ LED status displays (📖 86)

4 Technical data

4.1 General data and operating conditions

Field	Values
Order designation	E94AYCCA
Communication profile	CANopen (DS301, V4.02)
Communication medium	CAN cable according to ISO 11898-2
Network topology	Line terminated on both sides (e.g. termination with Lenze system connector EWZ0046)
Adjustable node addresses	1 ... 127 Adjustable via DIP switches or code C13350 / C14350.
Max. number of nodes	127
Baud rates [kbps]	• 10 • 20 • 50 • 125 • 250 • 500 • 800 • 1000 Adjustable via DIP switches or code C13351 / C14351.
Process data	• max. 4 TPDOs with 1 ... 8 bytes • max. 4 RPDOs with 1 ... 8 bytes
Parameter data	Max. 10 client and server SDO channels with 1 ... 8 bytes
Transfer mode for TPDOs	• With change of data • Time-controlled, 1 to x ms • After the reception of 1 to 240 sync telegrams
Voltage supply	Internal voltage supply of the communication module via the Servo Drive 9400.
Conformities, approvals	• CE • UL

"Servo Drives 9400" hardware manual

Here you can find the **ambient conditions** and data regarding the **electromagnetic compatibility (EMC)** which also apply to the communication module.

4.2 Supported protocols

Category	Protocol
Standard PDO protocols	PDO write PDO read
SDO protocols	SDO download SDO download initiate SDO download segment
	SDO upload SDO upload initiate SDO upload segment
	SDO abort transfer
	SDO block download SDO block download initiate SDO block download end
	SDO block upload SDO block upload initiate SDO block upload end
NMT protocols	Start remote node (master and slave)
	Stop remote node (slave)
	Enter pre-operational (slave)
	Reset node (slave and local device)
	Reset communication (slave)
Monitoring protocols	Node guarding (master and slave)
	Heartbeat (heartbeat producer and heartbeat consumer)

4.3 Communication time

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

The communication times in the CAN network depend on the ...

- processing time in the device;
- telegram runtime (baud rate/telegram length);
- bus load (especially if the bus is loaded with PDOs and SDOs at a low baud rate).

Servo Drives 9400 processing time

There are no interdependencies between parameter data and process data.

- Parameter data:
  - For controller-internal parameters: approx. 30 ms ± 20 ms tolerance (typically)
  - For some codes the processing time can be longer.
- Process data are transported in real time.

4.4 Protective insulation

Danger!

Dangerous electrical voltage

If Servo Drives 9400 are used on a corner grounded system with a rated mains voltage ≥ 400 V, external measures need to be implemented to provide reliable protection against accidental contact.

Possible consequences:

- Death or serious injury

Protective measures:

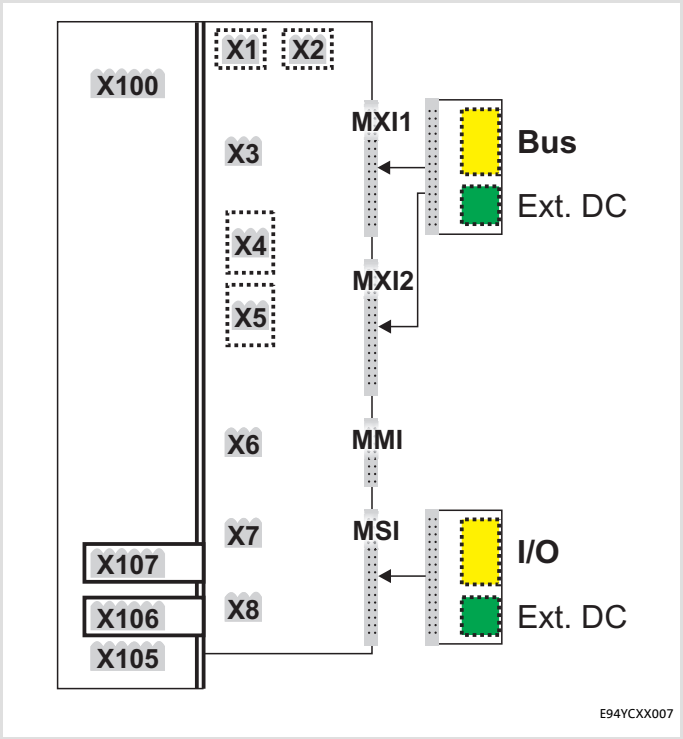
- If protection against accidental contact is required for the control terminals of the controller and the connections of the plugged device modules, ...
  - there must be a double isolating distance.
  - the components to be connected must be provided with a second isolating distance.

Note!

The available protective insulation in Servo Drives 9400 is implemented in accordance with EN 61800-5-1.

The illustration below ...

- shows the arrangement of the terminal strips and the separate potential areas of the controller.
- serves to determine the decisive protective insulation between two terminals located in differently insulated separate potential areas.



[4-1] Protective insulation according to EN61800-5-1

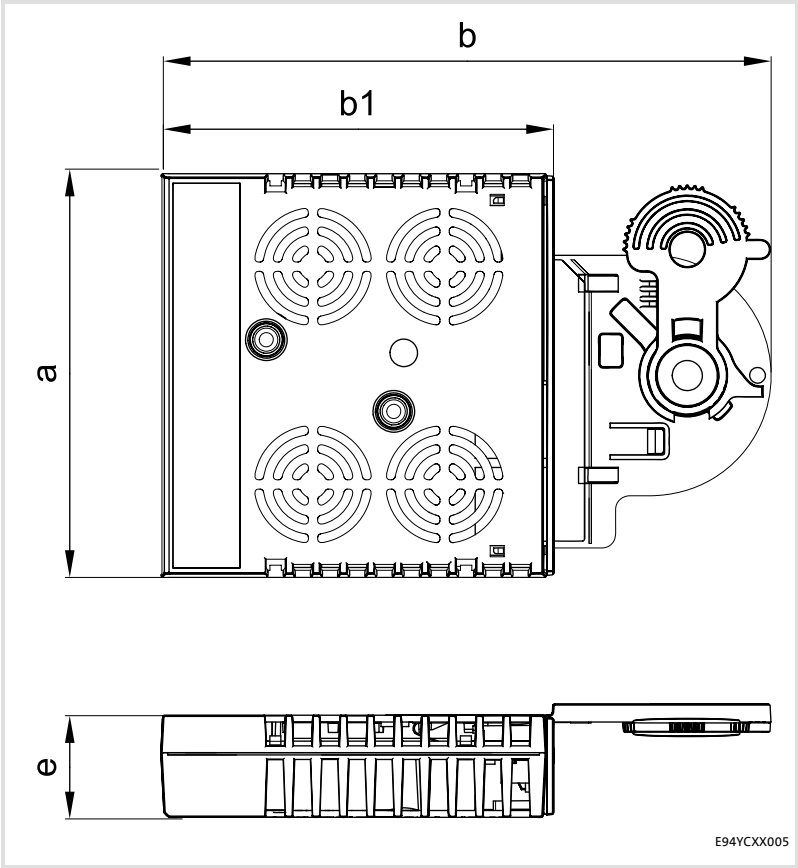
Terminal strip	Connection	Terminal strip	Connection
X100	L1, L2, L3 (only Single Drive)	X1	CAN on board 9400
	+UG, -UG	X2	State bus
X105	U, V, W		24 V (ext.)
	Rb1, Rb2 (Single Drive only)	X3	Analog inputs/outputs
X106	Motor PTC	X4	Digital outputs
X107	Control of the motor holding brake	X5	Digital inputs
		X6	Diagnostics
		X7	Resolver
		X8	Encoder
		MXI1, MXI2	Extension module
		MMI	Memory module
		MSI	Safety module

Example

Which type of protective insulation is used between the bus terminal of the device module in slot MXI1 or MXI2 and the mains terminal X100?

- ▶ The separate potential area with the better protective insulation is decisive.
  - – The separate potential area of the bus terminal of the device module has a "basic insulation".
  - – The separate potential area of the mains terminal has a "reinforced insulation".
- ▶ Result: The insulation between the X100 mains terminal and the bus terminal is of the "reinforced insulation" type.

4.5 Dimensions



a 89 mm
b 134 mm
b1 87 mm
e 23 mm

[4-2] Dimensions

5 Installation

Stop!

Electrostatic discharge

Electronic components in the communication module can be damaged or destroyed by electrostatic discharge.

Possible consequences:

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

Protective measures

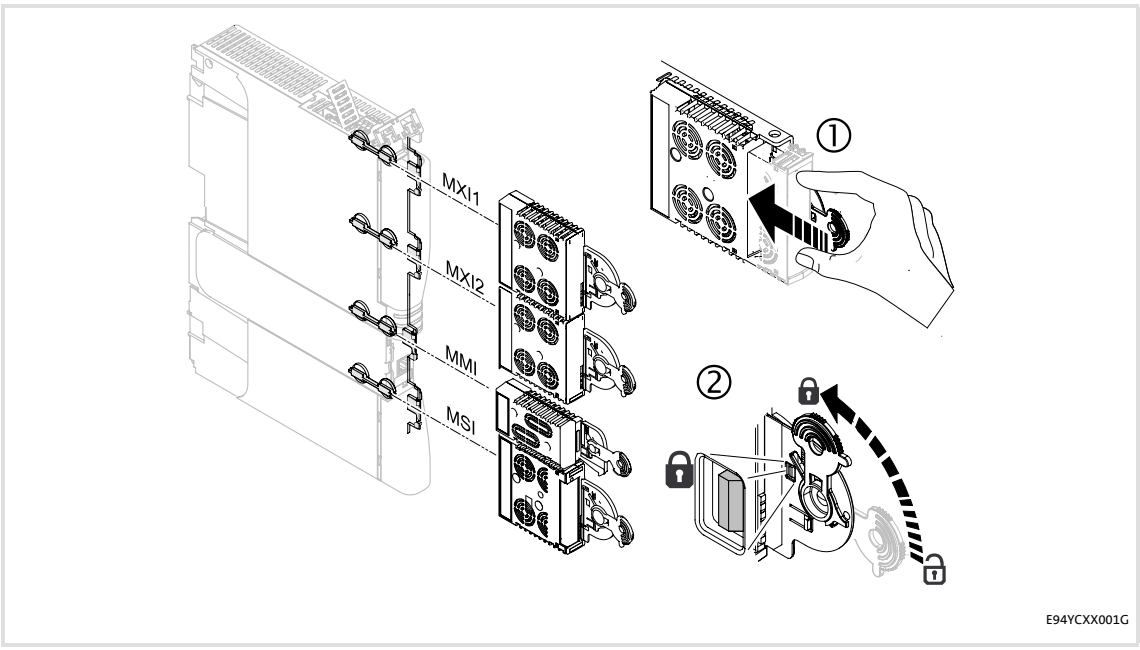
- Before touching the module, make sure that you are free of electrostatic charge.

5.1 Mechanical installation

Note!

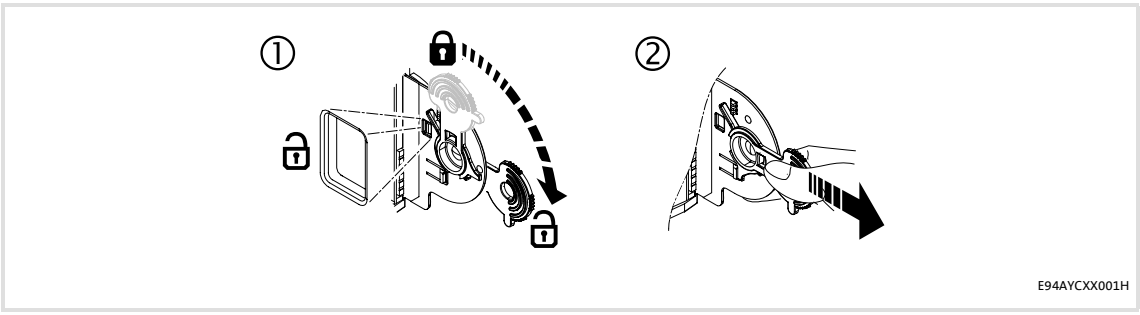
- Only one communication module E94AYCCA (CANopen) may be inserted per Servo Drive 9400.
- The slot used (MX1 or MX2) can be selected freely.

5.1.1 Mounting



[5-1] Mounting

5.1.2 Dismounting



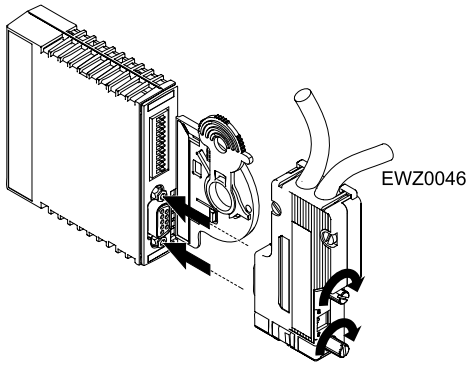
[5-2] Dismounting

5.2 Electrical installation

Documentation of the standard device, control system, and plant/machine

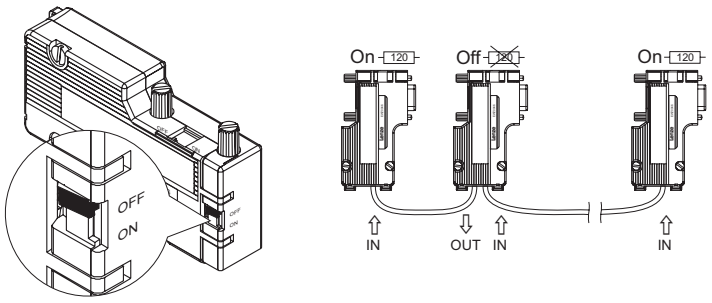
Observe the notes and wiring instructions stated.

5.2.1 System bus (CANopen) connection



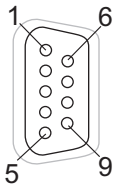
E94YCCA002A

- The system bus (CANopen) must be terminated with resistors (120 Ω) between CAN-low and CAN-high.
- The Lenze system connector EWZ0046 with integrated terminating resistor complies with the DS102-1 recommendation of the CAN user organisation CiA. The system connector is not contained in the scope of supply of the communication module.



2181FEW004

Assignment of the 9-pin Sub-D plug connector

View	Pin	Assignment
	1	-
	2	CAN-LOW
	3	CAN-GND
	4	-
	5	-
	6	-
	7	CAN-HIGH
	8	-
	9	-

5.2.2 Specification of the bus cable

We recommend the use of CAN cables according to ISO 11898-2:

CAN cable according to ISO 11898-2	
Cable type	Twisted in pairs with shield
Impedance	120 Ω (95 ... 140 Ω)
Cable resistance/cross-section Cable length ≤ 300 m: Cable length 301 ... 1000 m:	 ≤ 70 mΩ/m / 0.25 ... 0.34 mm^2 (AWG22) ≤ 40 mΩ/m / 0.5 mm^2 (AWG20)
Signal propagation delay	≤ 5 ns/m

5.2.3 Bus cable length

Note!

- It is absolutely necessary to comply with the permissible cable lengths.
- If the total cable lengths of the CAN nodes differ for the same baud rate, the smaller value must be used to determine the max. cable length.
- Observe the reduction of the total cable length due to the signal delay of the repeater. ▸ Checking the use of repeaters (📖 30)

5.2.3.1 Total cable length

The baud rate also determines the total cable length.

Baud rate [kbps]	Max. bus length [m]
10	8075
20	4012
50	1575
125	600
250	275
500	112
800	38
1000	12

5.2.3.2 Segment cable length

The segment cable length is determined by the cable cross-section used and by the number of nodes. Repeaters divide the total cable length into segments. If no repeaters are used, the segment cable length is identical to the total cable length.

Max. number of nodes per segment	Cable cross-section (can be interpolated)			
	0.25 mm² (AWG 24)	0.50 mm² (AWG 21)	0.75 mm² (AWG 19)	1.00 mm² (AWG 18)
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
100	150 m	270 m	410 m	600 m

Example: selection help

Given	
Total cable length to be implemented	200 m
Number of nodes	63

Results	
Max. possible baud rate	250 kbps (derived from table Total cable length (📖 28))
Cable cross-section required (interpolated)	0.30 mm² (AWG23) (derived from the table Segment cable length (📖 29))
Cable cross-section of standard CAN cable	0.34 mm² (AWG22) ▸ Specification of the bus cable (📖 27)

5.2.3.3 Checking the use of repeaters

Compare the values derived from tables Total cable length (📖 28) and Segment cable length (📖 29).

- If the sum of the segment cable lengths is smaller than the total cable length to be implemented, either repeaters must be used or the cable cross-section must be increased.
- If the use of repeaters reduces the max. possible total cable length so much that it is smaller than the total cable length to be implemented, then the cable cross-section must be increased or less repeaters must be used or the baud rate must be decreased.
- The use of a further repeater is recommended as ...
  - service interface
    Advantage: trouble-free connection during bus operation is possible.
  - calibration interface
    Advantage: the calibration/programming unit remains electrically isolated.

Example

Given	
Total cable length to be implemented	450 m
Number of nodes	32
Cable cross-section	0.50 mm^2 (AWG 20)
Baud rate	125 kbps
Repeater used	Lenze repeater EMF2176IB
Reduction of the max. total cable length per repeater (EMF2176IB)	30 m

Results	
Max. possible total cable length	600 m (see table Total cable length (📖 28))
Max. segment cable length	360 m (see table Segment cable length (📖 29))
Comparison	The max. segment cable length is smaller than the total cable length to be implemented.
Conclusion	A repeater must be installed at the determined max. segment cable length of 360 m.

Results with 1 repeater	
Max. possible total cable length	570 m (Reduction of the Total cable length (📖 28) by 30 m)
Sum of the segment cable lengths	720 m
Comparison	Both the possible total cable length and the segment cable lengths are larger than the total cable length to be implemented.
Conclusion	1 repeater is sufficient to implement the total cable length of 450 m.

5.2.4 Voltage supply

- The communication module is only internally supplied with voltage via the standard device.
- If the standard device fails, data transfer between the communication module and other CAN nodes is interrupted.

6 Commissioning

During commissioning, the controller receives system-specific data, e.g. motor parameters, operating parameters, responses, and parameters for the fieldbus communication. In case of Lenze devices, this is done via codes.

The codes for the controller and for the communication are saved as a non-volatile data set in the memory module.

In addition to codes for the configuration, there are codes for diagnosing and monitoring the nodes.

Note!

When parameterising the communication module, please note that the code number depends on the slot of the Servo Drive 9400 which the communication module is plugged into.

The first two digits of the code number indicate the slot:

- C**13**nnn for slot MXI1
  ▸ Parameters of the communication module for slot MXI1 (📖 107)
- C**14**nnn for slot MXI2
  ▸ Parameters of the communication module for slot MXI2 (📖 128)

Furthermore, the Communication-relevant parameters of the standard device (📖 101) must be set.

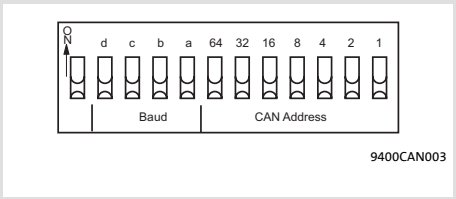
6.1 Before initial switch-on

Stop!

Before switching on the controller for the first time, check ...

- the entire wiring with regard to completeness, earth fault and short circuit.
- whether the bus system is terminated by a bus terminating resistor at the physically first and last node.
  ▸ System bus (CANopen) connection (📖 26)

6.2 Possible settings via DIP switches



[6-1] DIP switch

The front DIP switches can be used to set:

- address (switches 1 ... 64)
- baud rate (switches a ... d)

Lenze setting: all switches OFF

6.2.1 Setting the node address

- If several CAN nodes are interconnected, their node addresses must differ from each other.
- The node address can be set with the DIP switches **1 ... 64** or via the »Engineer« (code C13350 / C14350).
- Valid address range: 1 ... 127

	Node address determined by ...	
	DIP switch	**C13350 / 14350**
Prerequisite	At least one switch **1 ... 64 = ON**	Switches **1 ... 64 = OFF**

The labelling on the package corresponds to the values of the individual DIP switches for determining the node address.

DIP switch	**64**	**32**	**16**	**8**	**4**	**2**	**1**
Switch position	OFF	OFF	**ON**	OFF	**ON**	**ON**	**ON**
Value	0	0	16	0	4	2	1
Node address	**= Sum of the values = 16 + 4 + 2 + 1 = 23** ▸ DIP switch positions for setting the CAN node address (📖 178)						

Note!

Switch the voltage supply of the communication module off and then on again to activate altered settings.

Tip!

The node address resulting from the DIP switch setting applied at last mains power-up is indicated under C13349/1 / C14349/1.

6.2.2 Setting the baud rate

- The baud rate can be set with the DIP switches **a** ... **d** or via the »Engineer« (code C13351 / C14351).
- If several CAN nodes are interconnected, their baud rates must be identical.

Switch positions				Baud rate
d	c	b	a	
OFF	**ON**	**ON**	OFF	10 kbps
OFF	**ON**	OFF	**ON**	20 kbps
OFF	OFF	**ON**	**ON**	50 kbps
OFF	OFF	**ON**	OFF	125 kbps
OFF	OFF	OFF	**ON**	250 kbps
OFF	OFF	OFF	OFF	500 kbps
ON	**ON**	**ON**	OFF	800 kbps
OFF	**ON**	OFF	OFF	1000 kbps
OFF	**ON**	**ON**	**ON**	Automatic detection

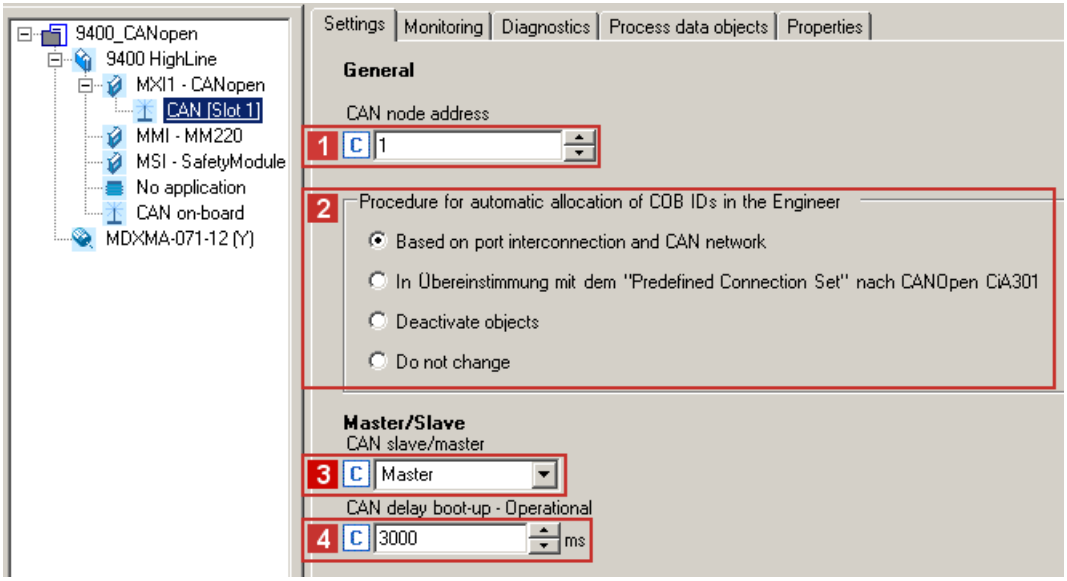
Note!

Switch the voltage supply of the standard device off and then on again to activate altered settings.

Tip!

The baud rate resulting from the DIP switch setting applied at last mains power-up is indicated under C13349/2 / C14349/2.

6.3 Settings in the »Engineer«



Go to the **Settings** tab to ...

- set the 1 node address (C13350 / C14350).
  - Setting the node address (📖 33)
- select the 2 procedure for automatic allocation of the COB-IDs in the »Engineer«.
- configure the CAN node as a 3 master or slave (C13352 / C14352).
- display 4 the time that must elapse after mains power-up before the CAN NMT master transmits the "Start remote node" telegram via the system bus (CANopen) (C13378 / C14378).

6.4 Initial switch-on

Documentation of Servo Drive 9400

Observe the safety instructions and residual hazards stated.

Note!

Establishing communication

When the communication module is externally supplied, the standard device must also be switched on for establishing communication.

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

Activating changed settings

In order to activate changed settings ...

- execute device command "11: Save start parameters" via standard device code **C00002** and ...
- then execute a "CAN reset node" on the node using **C00002 = 92** or switch off and on again the voltage supply of the communication module.

Protection against uncontrolled restart

After a fault (e.g. short-term mains failure), it is sometimes not wanted or even impermissible that the drive restarts.

In the Lenze setting of the Servo Drives 9400, the restart protection is activated.

Via the standard device code **C00142** ("Auto restart after mains connection") you can set the restart behaviour of the controller:

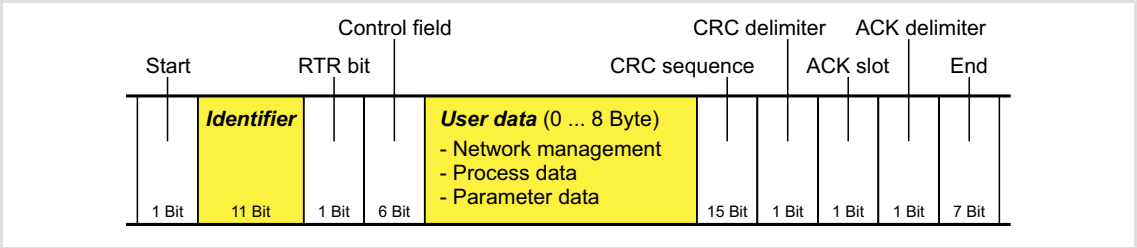
- **C00142 = "0: Inhibited"** (Lenze setting)
  - The controller remains inhibited (even if the fault is no longer active).
  - The drive starts up in a controlled manner by explicit controller enable: LOW-HIGH edge at digital input X5/RFR.
- **C00142 = "1: Enabled"**
  - An uncontrolled restart of the drive is possible.

7 Data transfer

Via the CANopen interface, process data and parameter values can be exchanged between the CAN nodes. In addition, the interface enables the connection of further modules such as distributed terminals, operator and input devices (HMIs), or external controls and control systems.

The interface transfers CAN objects following the CANopen communication profile (DS301, V4.02)) developed by the umbrella organisation of CiA (CAN in Automation) in conformity with the CAL (CAN Application Layer).

7.1 Structure of the CAN data telegram



[7-1] Basic structure of the CAN telegram

The identifier and the user data are described in detail in the following subchapters. The other signals refer to the transfer characteristics of the CAN telegram that are not described in this documentation.

Tip!

For further information please refer to the website of the CiA (CAN in Automation) user organisation:

www.can-cia.org

7.1.1 Identifier

The principle of the CAN communication is based on a message-oriented data exchange between a transmitter and many receivers. All nodes can transmit and receive quasi-simultaneously.

The identifier, also called "COB-ID" (Communication Object Identifier), is used to control which node is to receive a transmitted message. In addition to the addressing, the identifier contains information on the priority of the message and the type of the user data.

The identifier consists of a basic identifier and the node address of the node to be addressed:

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

Exception: For process data, heartbeat and emergency objects as well as network management and sync telegrams, the identifier can be assigned freely by the user (either manually or automatically by a network configurator) or is firmly allocated.

Node address (node ID)

For the purpose of unique identification, a node address, also referred to as node ID, in the valid address range (1 ... 127) is to be assigned to each node within the CAN network.

- A node address may not be assigned more than once within a network.
- The node address can be configured with the DIP switches of the communication module or with code C13350 / C14350.
  - Setting the node address (📖 33)

Identifier assignment

The system bus (CANopen) is message-oriented and not node-oriented. Each message has a unique identification, the identifier. In the case of CANopen, a node-orientation is achieved by the fact that for each message there is only one sender.

- The basic identifiers for network management (NMT) and sync as well as the basic SDO channel (SDO1) are specified in the CANopen protocol and cannot be changed.
- In the Lenze setting, the basic identifiers of the PDOs are preset according to the "Predefined Connection Set" of DS301, V4.02. They can be changed via parameters/ indexes if required.
  - Identifiers of the process data objects (📖 46)

Object		Direction		Basic identifier	
		from the device	to the device	dec	hex
Network management (NMT)				0	0
Sync				128	80
Emergency		●		128	80
PDO1 (Process data channel 1)	TPDO1	●		384	180
	RPDO1		●	512	200
PDO2 (Process data channel 2)	TPDO2	●		640	280
	RPDO2		●	768	300
PDO3 (Process data channel 3)	TPDO3	●		896	380
	RPDO3		●	1024	400
PDO4 (Process data channel 4)	TPDO4	●		1152	480
	RPDO4		●	1280	500
SDO1 (Basic SDO channel)		●		1408	580
			●	1536	600
SDO2 ... SDO10 (Parameter data channel 2 ... 10)		●		1472	5C0
			●	1600	640
Node guarding, heartbeat		●		1792	700

7.1.2 User data

All nodes communicate with each other by exchanging data telegrams via the system bus (CANopen). The user data area of the CAN telegram contains network management data, parameter data or process data:

Network management data

(NMT data)

- Control information on start, stop, reset, etc. of communication to certain or all nodes of the CAN network.

Process data

(PDOs – Process Data Objects)

- Process data are transferred via the process data channel.
- The controller can be controlled using process data.
- Process data are not saved in the controller.
- Process data are transferred between the host and the nodes to ensure a continuous exchange of current input and output data.
- Process data usually are unscaled/scalable raw data
- Process data are, for instance, setpoints and actual values.

Parameter data

(SDOs – Service Data Objects)

- Parameter data are the CANopen indexes or, in the case of Lenze devices, the codes.
- The parameters are, for instance, set for the initial system set-up during commissioning or when material is changed on the production machine.
- Parameter data are transmitted as SDOs via the parameter data channel. They are acknowledged by the receiver, i.e. the sender receives a feedback about the transmission being successful or not.
- The parameter data channel enables access to all Lenze parameters (codes) and CANopen indexes.
- Parameter changes are automatically saved in the controller until the mains is switched.
- In general, the parameter transfer is not time-critical.
- Parameter data are, for instance, operating parameters, diagnostic information and motor data.

7.2 Communication phases / network management

Regarding communication via the system bus (CANopen), the drive distinguishes between the following states:

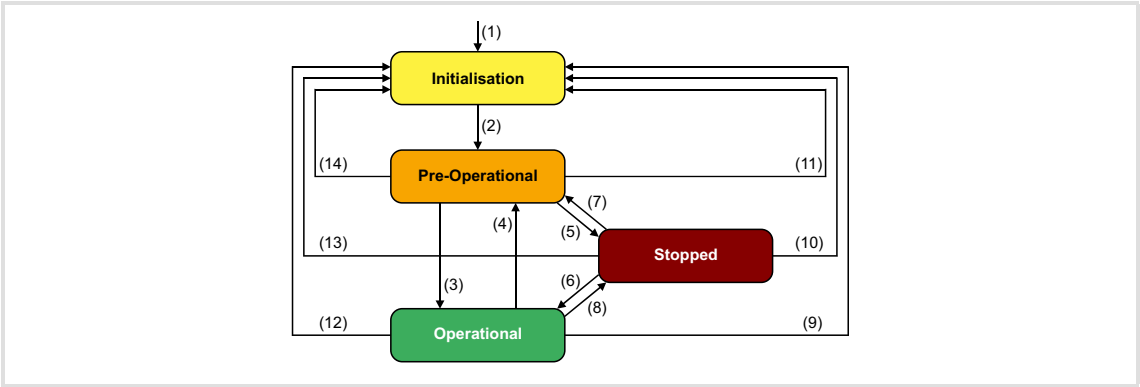
Status	Explanation
"Initialisation" (Initialisation)	After power-up, initialisation is executed. • During this phase, the controller does not take part in the data transfer on the system bus (CANopen). • All CAN-relevant parameters are written with their standard values again. • After initialisation has been completed, the controller is automatically set to the "pre-operational" status.
"Pre-operational" (before being ready for operation)	Parameter data can be received, process data is ignored.
"Operational" (ready for operation)	Parameter data and process data can be received!
"Stopped" (Stopped)	Only network management telegrams can be received.

Communication object	Initialisation	Pre-operational	Operational	Stopped
PDO			●	
SDO		●	●	
Sync		●	●	
Emergency		●	●	
Boot-up	●			
Network management (NMT)		●	●	●

Tip!

In every state, the initialisation can be re-executed partly or completely by transmitting appropriate network management telegrams.

7.2.1 State transitions

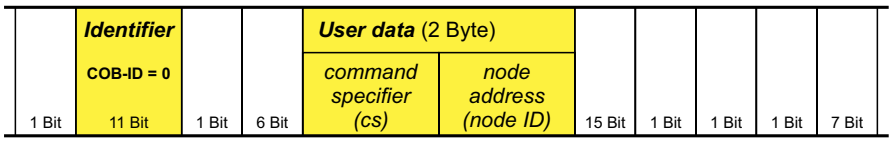


[7-2] NMT state transitions in the CAN network

Transition	NMT command	State after change	Effect on process and parameter data after state change
(1)	-	Initialisation	Initialisation starts automatically when the mains is switched on. • During initialisation, the controller does not take part in the data transfer. • After initialisation has been completed, the node sends a boot-up message with an individual identifier and automatically changes to the "pre-operational" status.
(2)	-	Pre-operational	In this phase, the master determines the way in which the node(s) takes/take part in the communication.
	From here, the states are changed over by the master for the entire network. • A target address contained in the NMT command specifies the receiver(s). • If the 9400 controller has been configured as a CAN master, the state automatically changes to "operational" after a waiting time (C13378 / C14378) has expired, and the NMT command 0x0100 ("Start remote node") is sent to all nodes. • Data can only be exchanged via process data objects if the state is "Operational".		
(3), (6)	0x01 xx Start Remote Node	Operational	Network management, sync and emergency telegrams as well as process data (PDO) and parameter data (SDO) are active. Optional: When the state is changed, event and time-controlled process data (PDOs) will be sent once.
(4), (7)	0x80 xx Enter Pre-Operational	Pre-operational	Network management, sync and emergency telegrams as well as parameter data (SDO) are active.
(5), (8)	0x02 xx Stop Remote Node	Stopped	Only network management telegrams can be received.
(9), (10), (11)	0x81 xx Reset node	Initialisation	Initialisation of all CAN-relevant parameters (DS301, V4.02) with the stored values.
(12), (13), (14)	0x82 xx Reset communication		Initialisation of all CAN-relevant parameters (DS301, V4.02) with the stored values.
	Meaning of the node address in the NMT command: • xx = 0x00: With this assignment, all nodes are addressed by the telegram (broadcast telegram). The state can be changed for all nodes at the same time. • xx = Node-ID: If a node address is indicated, the state will only be changed for the node addressed.		

7.2.2 Network management telegram (NMT)

The telegram for the network management contains the identifier "0" and the command included in the user data, which consists of the command byte and the node address.



[7-3] Network management telegram for changing the communication phases

Command specifier (cs)		NMT command
dec	hex	
1	0x01	Start Remote Node
2	0x02	Stop Remote Node
128	0x80	Enter Pre-Operational
129	0x81	Reset node
130	0x82	Reset communication

The changeover of the communication phases is carried out by one node, the CAN master, for the entire network. The role of the CAN master can also assumed by the drive controller.

▸ Parameterising the controller as a CAN master (📖 44)

Example:

Data can only be exchanged via the process data objects in the "Operational" state. To change all nodes on the bus from "Pre-Operational" to "Operational" via the CAN master, the following identifiers and user data must be set as follows in the transmit telegram:

- Identifier: 0x00 (network management)
- User data: 0x0100 (NMT command "Start Remote Node" to all nodes)

7.2.3 Parameterising the controller as a CAN master

If the initialisation of the system bus (CANopen) and the state change from "pre-operational" to" operational" is not carried out by a higher-level control system, the controller can be defined to be a "quasi" master to take over this task.

The controller can be configured to be a CAN master in C13352 / C14352.

- As a CAN master, the controller sets all nodes connected to the bus (broadcast telegram) to the "operational" communication state using the "Start remote node" NMT telegram. Only this communication state enables a data exchange via the process data objects.
- In C13378 / C14378, a delay time can be set. This delay time must elapse after mains switching before the controller transmits the "Start remote node" NMT telegram on the system bus (CANopen).

Parameter	Information	Lenze setting	
		Value	Unit
C13352 / C14352	CAN slave/master	Slave	
C13378 / C14378	CAN delay boot-up - Operational	3000	ms

Note!

Changing the master/slave operation in C13352 / C14352 will only be effective

- after switching the mains power of the controller off and then on again

or

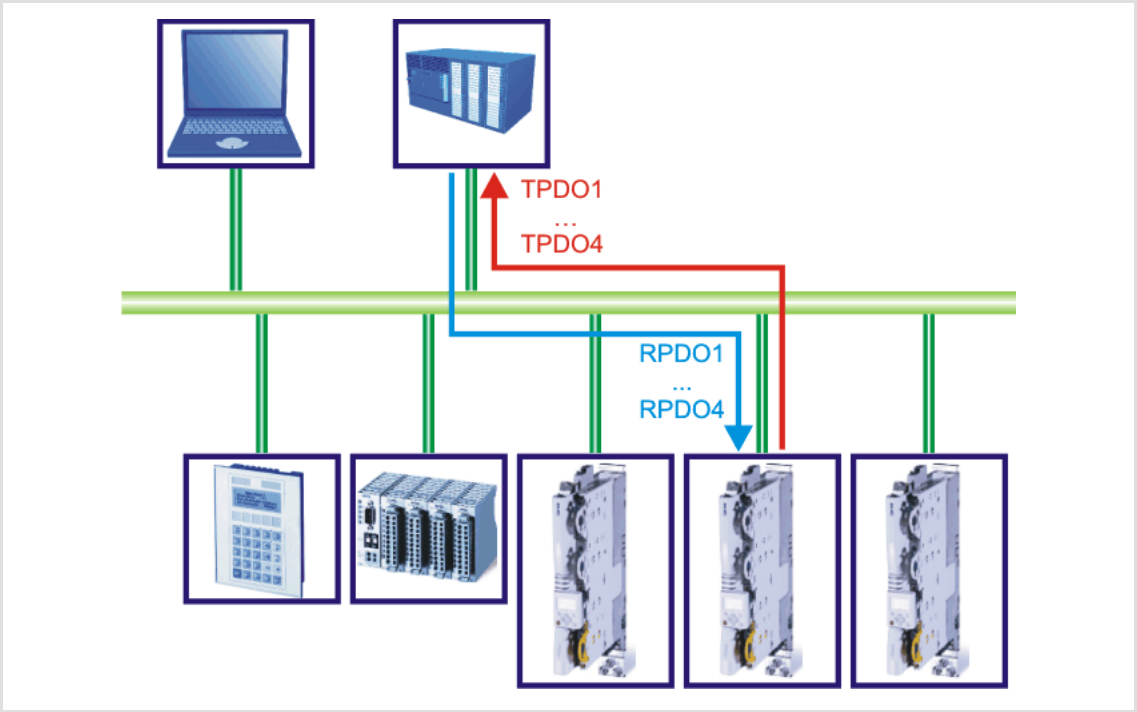
- by sending the NMT telegram "Reset Node" or "Reset Communication" to the controller.

As an alternative to the "Reset node" NMT telegram, the device command **C00002 = "92: CAN module: reset node"** can be used to reinitialise the CAN-specific device parameters.

Tip!

The master functionality is only required for the initialisation phase of the drive system.

8 Process data transfer



[8-1] PDO data transfer from / to the higher-level host system

For the transfer of process data, four separated process data channels (PDO1 ... PDO4) are available.

Definitions

- Process data telegrams between the host and the devices are distinguished as follows:
  - Process data telegrams to the device (RPDO)
  - Process data telegrams from the device (TPDO)
- The CANopen process data objects are designated as seen from the node's view:
  - Receive PDO (RPDOx): process data object received by a node
  - Transmit PDO (TPDOx): process data object transmitted by a node

Note!

Data can only be exchanged via the process data objects if the state is "Operational".

▸ Communication phases / network management (📖 41)

8.1 Identifiers of the process data objects

In the Lenze setting, the identifier for the process data objects PDO1 ... PDO4 results from a basic identifier and the node address set in C13350 / C14350:

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

- In the Lenze setting, the basic identifiers of the PDOs are preset according to the "Predefined Connection Set" of DS301, V4.02.
- The identifiers for the PDOs can be set individually via the Lenze codes and CANopen indexes listed in the following table. Thus, you can also set an identifier independently of the node address for certain PDOs.

Process data object		Basic identifier		Individual setting	
		dec	hex	Lenze code	CANopen index
PDO1	RPDO1	512	0x200	C13321/1 C14321/1	I-1400/1
	TPDO1	384	0x180	C13320/1 C14320/1	I-1800/1
PDO2	RPDO2	768	0x300	C13321/2 C14321/2	I-1401/1
	TPDO2	640	0x280	C13320/2 C14320/2	I-1801/1
PDO3	RPDO3	1024	0x400	C13321/3 C14321/3	I-1402/1
	TPDO3	896	0x380	C13320/3 C14320/3	I-1802/1
PDO4	RPDO4	1280	0x500	C13321/4 C14321/4	I-1403/1
	TPDO4	1152	0x480	C13320/4 C14320/4	I-1803/1

Note!

When the node address has been changed (C13350 / C14350) and then "Reset node" (C00002 = 92) has been executed, the subcodes of C13320 / C14320 and C13321 / C14321 are automatically reset to the identifiers resulting from the respective basic identifier and the node address set.

Tip!

The "Predefined Connection Set" can be re-established anytime using the following device commands of **C00002**:

- "93: CAN on board: Pred.Connect.Set" for CAN on board
- "94: CAN module: Pred.Connect.Set" for communication module E94AYCCA

8.2 Transmission type

The process data objects are transmitted in an event-controlled or time-controlled way.

- **Event-controlled:** The PDO is sent if a special device-internal event has occurred, for instance, when the data contents of the TPDO have changed or when a transmission cycle time has elapsed.
- **Synchronous:** A TPDO (or RPDO) is transmitted (or received) after the device has received a sync telegram (with identifier 0x80).
- **Cyclically:** The PDOs are transmitted in fixed time intervals after the transmission cycle time has elapsed.

The table shows that combinations of logic operations (AND, OR) are also possible between the different transmission modes:

Transmission type	PDO transmission			Logic operation
	cyclic	synchronous	event-controlled	
0		●	●	AND
1 ... 240		●		-
254, 255	●		●	OR

Transmission type	Description
0	The PDO is transmitted at every sync in an event-controlled manner (e. g. by means of a bit change within the PDO).
1 ... 240	**SYNC (with response)** • Selection n = 1: The PDO is transmitted with every sync. • Selection 1 < n ≤ 240: The PDO is transmitted with every n-th sync.
254, 255	**Event-controlled (with mask) with cyclic overlay** If this value is entered, the PDO transmission is event-controlled or cyclic. (Note: The values "254" and "255" have the same meaning). For cyclic overlay, a cycle time must be set for the respective PDO. In this case, cyclic transmission takes place in addition to event-controlled transmission (e.g. through a bit change in the PDO).

The communication parameters (as e.g. transmission mode and cycle time) can be freely adjusted for any PDO and independent of the settings of other PDOs:

Parameter	Information	Lenze setting	
		Value	Unit
C13322/1...4 C14322/1...4	CAN TPDOx Tx mode	254	
C13323/1...4 C14323/1...4	CAN RPDOx Rx mode	254	
C13324/1...4 C14324/1...4	CAN TPDOx delay time	0	1/10 ms
C13356/1...4 C14356/1...4	CAN TPDOx cycle time	0	ms

Tip!

The setting can also be made via the following CANopen objects:

- I-1400 ... I-1403: Communication parameters for RPDO1 ... RPDO4
- I-1800 ... I-1803: Communication parameters for TPDO1 ... TPDO4

8.3 Masking of the TPDOs for event control

For TPDO1 ... TPDO4, a mask can be parameterised for every byte. In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.

- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

Short overview: Parameters for masking the TPDOs

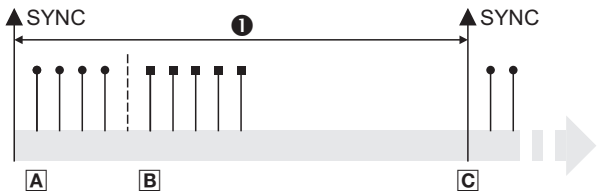
Parameter	Information	Lenze setting
C13311/1...8 C14311/1...8	CAN TPDO1 mask byte x	0x00
C13312/1...8 C14312/1...8	CAN TPDO2 mask byte x	0x00
C13313/1...8 C14313/1...8	CAN TPDO3 mask byte x	0x00
C13314/1...8 C14314/1...8	CAN TPDO4 mask byte x	0x00

8.4 Synchronisation of PDOs via sync telegram

In case of cyclic transmission, one or several PDOs are transmitted or received at fixed time intervals. For synchronising the cyclic process data, an additional special telegram, the sync telegram, is used.

- The sync telegram is the trigger point for the transmission of process data from the frequency inverters to the master and for the acceptance of process data from the master by the slaves.
- For sync-controlled process data processing, the sync telegram must be generated accordingly.
- The response to a sync telegram is determined by the transmission type selected.
  - Transmission type (📖 47)

General procedure



1 Sync cycle time (C01121)

[8-2] Sync telegram

A. After the sync telegram has been received, the slaves send the synchronous process data to the master (TPDOs). The master reads them as process input data.

B. When the sending process has been completed, the slaves (RPDOs) receive the process output data (from the master).
   – All other telegrams (e.g. parameters or the event-controlled process data) are accepted acyclically by the slaves after the transmission has been completed successfully.
   – The acyclic data are not shown in figure [8-2] They must be considered when the cycle time is dimensioned.

C. The data in the slave is accepted with the next sync telegram if the Rx mode is set to 1 ... 240. When the Rx mode is set to 254 or 255 the data is accepted in the next device cycle independent of the sync telegram.

8.4.1 Parameter setting

Short overview: Parameters for synchronisation via sync telegram

Parameter	Information	Lenze setting		Assignment	
		Value	Unit	Sync Master	Sync Slave
C13367 C14367	CAN SYNC Rx identifier	128			●
C13368 C14368	CAN SYNC Tx identifier	128		●	
C00369/1	CAN SYNC transmit cycle time	0	ms	●	
C01120	Sync source	Off			●
C01121	Sync cycle time	1000	µs		●
C01122	Sync phase position	400	µs		●
C01123	Sync tolerance	0	µs		●
C01124	Sync-PLL increment	109	ns		●
C01130	Sync application cycle	1000	µs		●

Sync source

C01120 is used to select the source of the synchronisation signals. Basically, only one source can synchronise the node.

Sync cycle time

Time with which the internal phase-locking loop (PLL) expects the synchronisation signals. The time must be set in C01121 in accordance with the cycle of the synchronisation source selected in C01120.

Note!

For synchronisation via the system bus (CANopen), only integer multiples of 1000 µs should be set in C01121.

Example: For the system bus (CANopen), the interval between two synchronisation signals has been set to 2 ms. If the system bus (CANopen) is to be used as synchronisation source, a sync cycle time of 2000 µs must be set in C01121.

Sync phase position

The phase position defines the zero point of time for the application relating to the synchronisation signal (bus cycle). Since PDO processing is integrated in the system part of the application, the instant of the PDO acceptance also changes if the phase position is changed.

- If 0 is set, the application is started together with the synchronisation signal.
- If a value > 0 is set, the application starts by the set time interval before the synchronisation signal arrives (the phase position acts negatively).

Example: If the phase position is set to 400 µs, the system part of the application starts 400 µs before the synchronisation signal arrives.

Note!

From Servo Drive 9400 software version V3.0:

The effect of the sync phase position can be influenced by the application cycle set in C01130. For the Lenze setting of C01130, the behaviour remains as before.

Sync tolerance

Time slot for monitoring the synchronisation signal via the **LS_SyncInput** system block.

- If the last synchronisation signal has been within this time slot around the expected value, the *SYNC_bSyncInsideWindow* output of the **LS_SyncInput** system block is set to TRUE.
- This setting does not affect the synchronisation process.

Sync-PLL increment

If the cycle times of the synchronisation signal and the phase-locking loop (PLL) differ from each other, the setting in C01124 defines the increment with which the phase-locking loop can be readjusted.

- If the system bus (CANopen) is used as synchronisation source, the recommended time increment for deviations is 109 ns (Lenze setting).

Sync application cycle

This parameter influences the effect of the sync phase position (C01122) with regard to the instant of acceptance of the synchronous PDOs by the application or the instant of transmission of the synchronous PDOs to the system bus (CANopen).

For Servo Drive 9400 software versions lower than V3.0 the following applies:

- The sync application cycle is permanently set to 1000 µs.
- The resulting PDO delay can be calculated with the following formula taking into consideration an internal processing time of 150 s:
  PDO delay= (sync cycle time - sync phase position + 150 µs) modulo 1000

From Servo Drive 9400 software version V3.0 the following applies:

- The sync application cycle can be set in C01130. The value set is automatically rounded down to full 1000 µs.
- The resulting PDO delay can be calculated with the following formula, taking an internal processing time of 150 s into consideration:
  PDO delay= (sync cycle time - sync phase position + 150 µs) modulo C01130

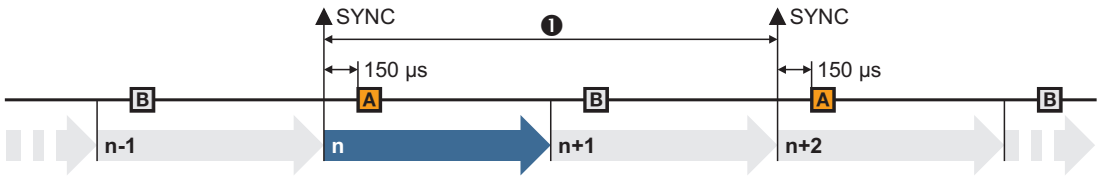
Note!

If the sync application cycle in C01130 is set higher than the sync cycle time (C01121), the response is undefined. The same applies if the sync phase position (C01122) is set higher than the sync cycle time (C01121).

In these cases, usually no synchronous PDOs are transmitted via the system bus (CANopen) anymore.

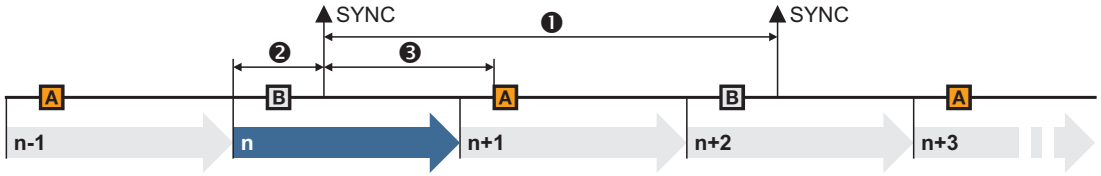
8.4.2 Effect of C01130 on the sync phase position

Example 1:



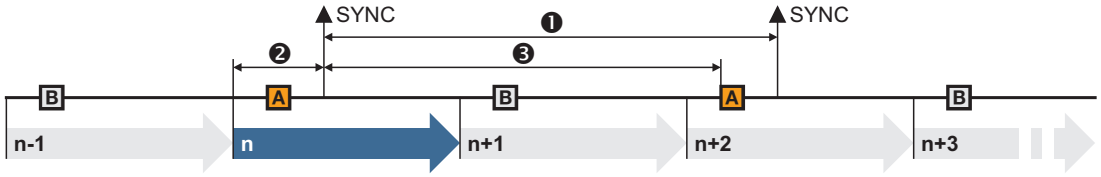
1	Sync cycle time (C01121)	= 2000 µs
	Sync phase position (C01122)	= 0 µs
	Sync application cycle (C01130)	= 1000 µs
A	Instant of acceptance/transmission of synchronous PDOs	
B	Inactive instant of acceptance	
n	Device cycle	

Example 2:



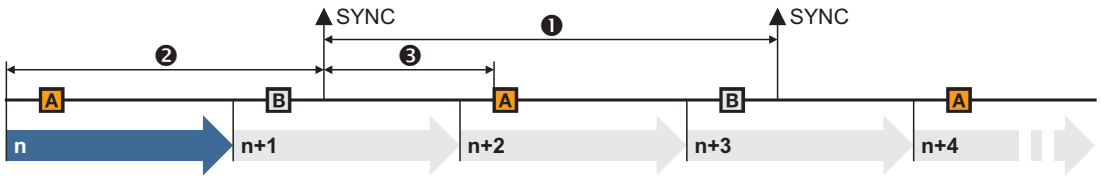
1	Sync cycle time (C01121)	= 2000 µs
2	Sync phase position (C01122)	= 400 µs
	Sync application cycle (C01130)	= 1000 µs
3	PDO delay	= (C01121 - C01122 + 150 µs) modulo C01130 = 750 µs
A	Instant of acceptance/transmission of synchronous PDOs	
B	Inactive instant of acceptance	
n	Device cycle	

Example 3:



1	Sync cycle time (C01121)	= 2000 µs
2	Sync phase position (C01122)	= 400 µs
	Sync application cycle (C01130)	= 2000 µs
3	PDO delay	= (C01121 - C01122 + 150 µs) modulo C01130 = 1750 µs
A	Instant of acceptance/transmission of synchronous PDOs	
B	Inactive instant of acceptance	
n	Device cycle	

Example 4:



1	Sync cycle time (C01121)	= 2000 µs
2	Sync phase position (C01122)	= 1400 µs
	Sync application cycle (C01130)	= 1000 µs
3	PDO delay	= (C01121 - C01122 + 150 µs) modulo C01130 = 750 µs
A	Instant of acceptance/transmission of synchronous PDOs	
B	Inactive instant of acceptance	
n	Device cycle	

8.5 PDO mapping

With Servo Drives 9400 HighLine, you can map the process data individually. For this purpose, the »Engineer« provides a port configurator.

Note!

The port mapping is no configuration that can be carried out online for the Servo Drive 9400. For this purpose, an update of the »Engineer« project and a subsequent download of the application is always required.

The »Engineer« screenshots illustrated in the following are only examples of the setting sequence and the resulting screens displayed.

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

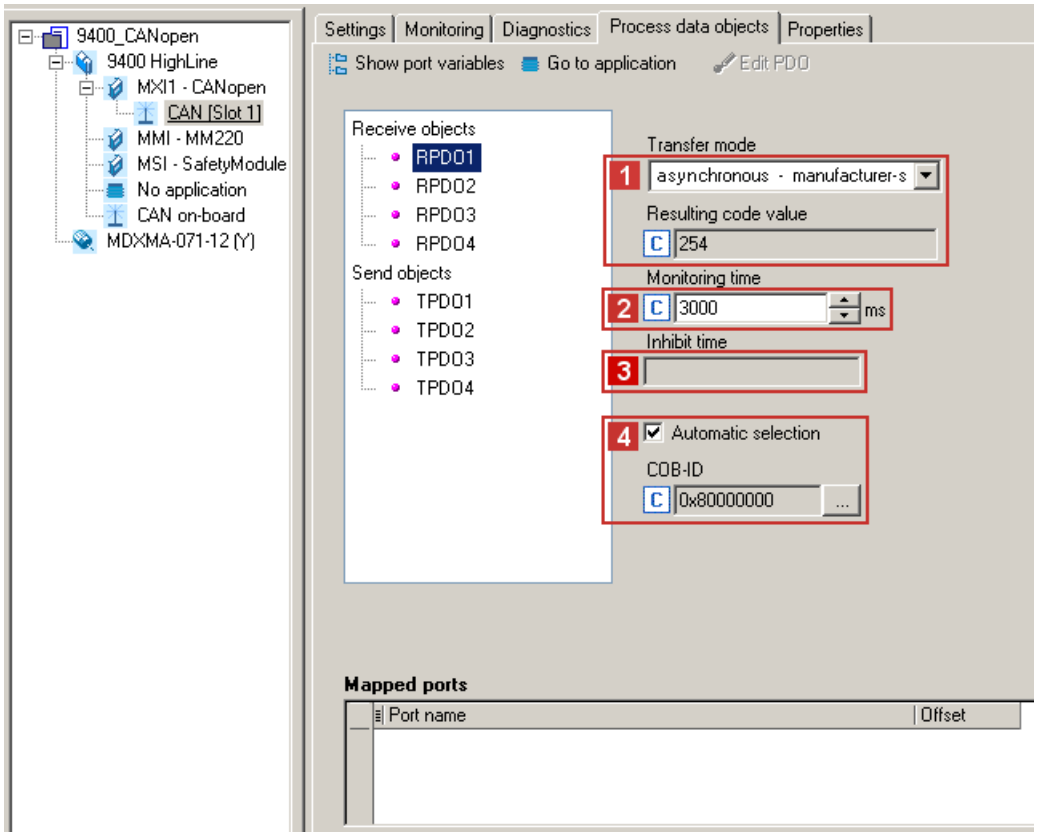
Implementing PDO mapping with the »Engineer«

Example

A project to be created in the »Engineer« consists of a master drive (master) and a slave drive (slave). Among other things, for instance PDOs are to be exchanged between the two drives via the system bus (CANopen). In the following, the parameterisation of the master drive is described.

1. On the **Process data objects** tab, the parameters for the receive objects (RPDO1 ... RPDO4) and transmit objects (TPDO1 ... TPDO4) can be set.

Settings for receive objects (RPDO1 ... RPDO4)



1 Transfer mode of RPDOx (C13323/1...4 / C14323/1...4)

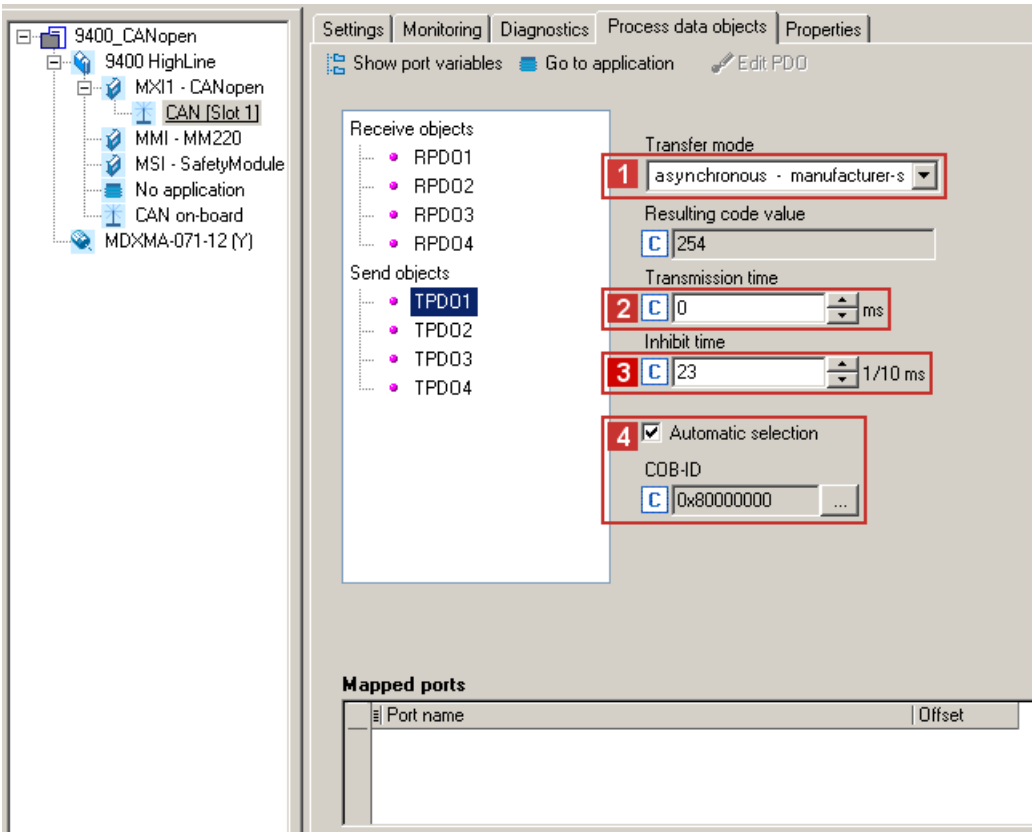
2 Monitoring time for RPDOx (C13357/1...4 / C14357/1...4)

- If a different value than "0" is entered, the RPDO is expected after the time set has elapsed.
- If the RPDO is not received within the monitoring time, an error response parameterised under C13591/1...4 / C14591/1...4 is initiated.

3 The inhibit time is not relevant for receive objects.

4 Display/setting of the RPDOx COB-ID (C13321/1...4 / C14321/1...4)

Settings for transmit objects (TPDO1 ... TPDO4)



1 Transfer mode of TPDOx (C13322/1...4 / C14322/1...4)

2 Transfer time of TPDOx (C13356/1...4 / C14356/1...4)

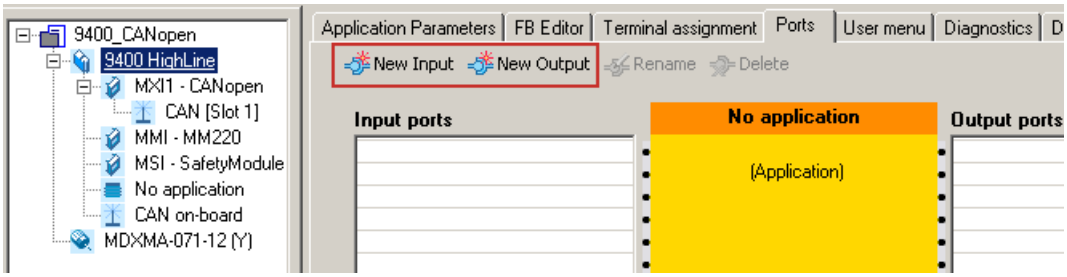
- If a different value than "0" is entered, the TPDO is transmitted without further consideration of the transport type after the time set has elapsed.

3 Inhibit time/delay time for TPDOx (C13324/1...4 / C14324/1...4)

- Minimum time between the transmission of two identical TPDOs.

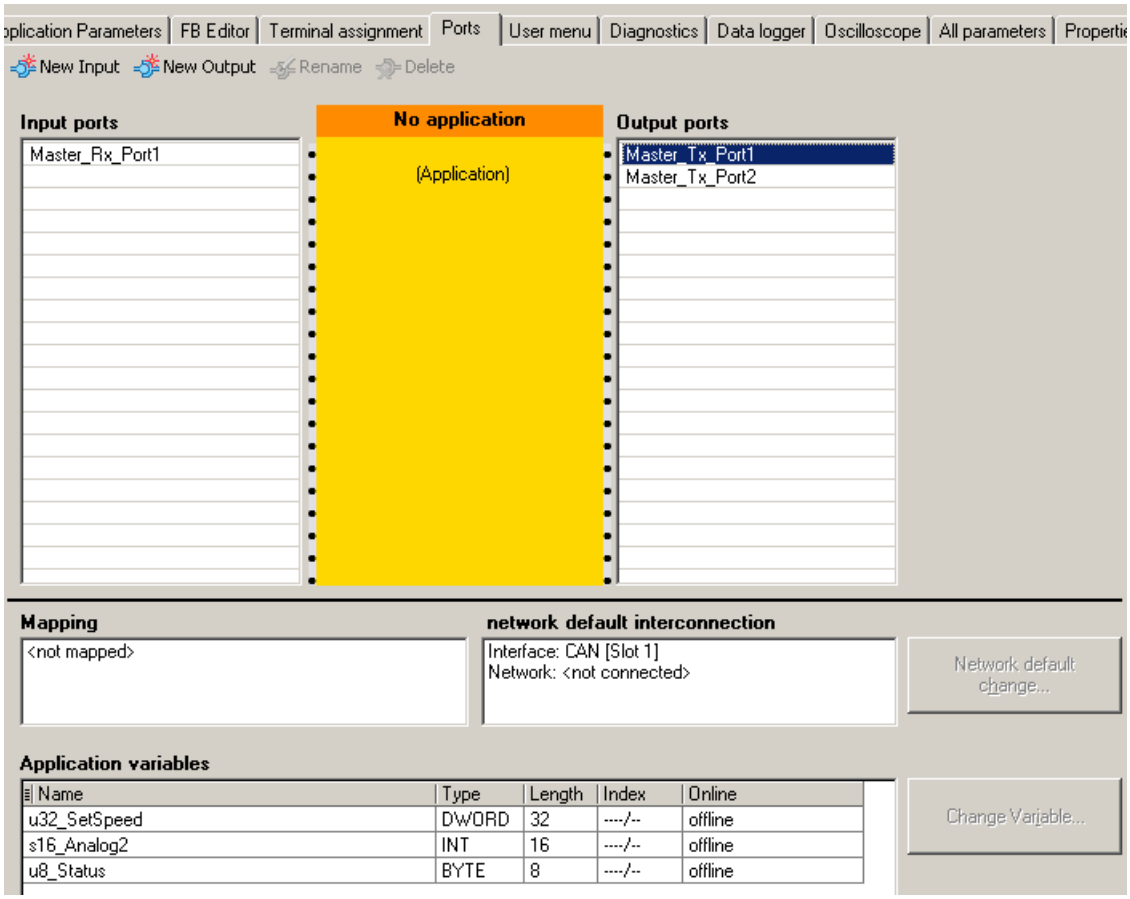
4 Display/setting of the TPDOx COB-ID (C13320/1...4 / C14320/1...4)

2. On the **Ports** tab, *input ports* and *output ports* can be created using the **New Input** and **New Output** buttons.



In the example, two *output ports* and one *input port* have been created for the master drive (master).

- A port exactly corresponds to a PDO object.
- For each port, *element variables* have been defined.



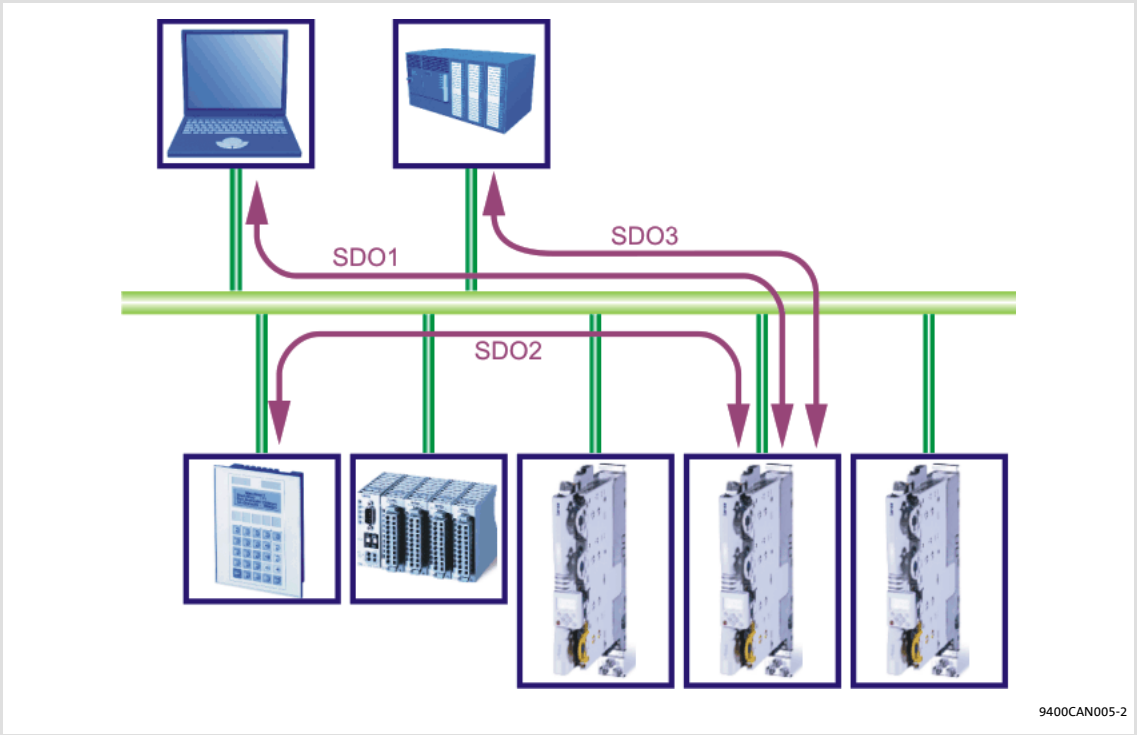
The following *element variables* are transmitted via TPDO1 (*Master_Tx_Port1*):

- u32_SetSpeed, type DWORD, 32 bits
- s16_Analog2, type INTEGER, 16 bits
- u8_Status, type BYTE, 8 bits

3. The application can be downloaded to the Servo Drive 9400 with the menu command **Online→Transfer application to device**.

   When all PDOs have been programmed and the application has been completed, it can be downloaded to the Servo Drive 9400. All CAN parameters will be transferred according to the settings made in the »Engineer« project.

9 Parameter data transfer



[9-1] Parameter data transfer via available parameter data channels

Parameters are values stored in codes on Lenze controllers.

Ten separate parameter data channels are available for parameter setting, enabling the simultaneous connection of several devices for configuration.

Parameter data are transmitted via the system bus (CANopen) as SDOs ("Service Data Objects") and acknowledged by the receiver. The SDO enables read and write access to the object directory. Indexes (e.g. I-1000) ensure access to device parameters and functions included in the object directory. To transfer SDOs, the information contained in the user data must comply with the CAN-SDO protocol.

9.1 Identifiers of the parameter data objects

In the Lenze setting, the identifier for the parameter data objects SDO1 ... SDO10 results from a basic identifier and the node address set in C13350 / C14350:

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

▶ In the Lenze setting, the basic identifiers of the SDOs are preset according to the "Predefined Connection Set" of DS301, V4.02:

Parameter data object	Direction		Basic identifier	
	from the device	to the device	dec	hex
SDO1 (Parameter data channel 1)	●		1408	580
		●	1536	600
SDO2 ... 10 (Parameter data channel 2 ... 10)	●	●	Deactivated	
Node guarding, heartbeat	●		1792	700
Boot-up	●		1792	700

Note!

Please observe that the parameter data channels 2 ... 10 are deactivated in the Lenze setting.

The procedure for activating these parameter data channels is explained in the description for parameters C13372 / C14372 to C13374 / C14374 or in the description for the implemented CANopen object I-120x.

▸ Example (📖 166)

9.2 User data

Structure of the user data of the parameter data telegram

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

Note!

User data are displayed in the Motorola format.

▸ Examples for a parameter data telegram (📖 69)

The following subchapters describe the user data in detail.

9.2.1 Command

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

The following commands can be transmitted or received for writing and reading the parameters:

Command	1st byte		Data length	Information
	hex	dec		
Write request	0x23	35	4 bytes	Writing a parameter to the controller.
	0x2B	43	2 bytes	
	0x2F	47	1 byte	
	0x21	33	Block	
Write response	0x60	96	4 bytes	Acknowledgement by the controller regarding a write request.
Read request	0x40	64	4 bytes	Reading a parameter from the controller.
Read response	0x43	67	4 bytes	Response from the controller to a read request with the current parameter value.
	0x4B	75	2 bytes	
	0x4F	79	1 byte	
	0x41	65	Block	
Error response	0x80	128	4 bytes	Response from the controller when the read/write request could not be executed correctly. ▸ Error messages (📖 67)

In detail, the command byte contains the following information:

Command	1st byte							
	Command specifier (cs)			Toggle (t)	Length*		e	s
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Write request	0	0	1	0	0/1	0/1	1	1
Write response	0	1	1	0	0	0	0	0
Read request	0	1	0	0	0	0	0	0
Read response	0	1	0	0	0/1	0/1	1	1
Error response	1	0	0	0	0	0	0	0

*Bit coding of the length: 00 = 4 bytes, 01 = 3 bytes, 10 = 2 bytes, 11 = 1 bytes
e: expedited (shortened block service)
s: segmented (normal block service)

Tip!

Further commands are defined in the CANopen specification DS301, V4.02 (e.g. segmented transfer).

9.2.2 Addressing through index and subindex

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

A parameter (Lenze code) is addressed according to the following formula:
Index = 24575 - (Lenze code number)

Example

The parameter **C00011** (motor reference speed) is to be addressed.

Calculation:

- Index:
  - Decimal: 24575 - 11 = 24564
  - Hexadecimal: 0x5FFF - 0xB = 0x5FF4
- Subindex: 0x00 (subindex 0, since the parameter has no subcodes.)

Entries:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
	0xF4	0x5F	0x00				

9.2.3 Data 1 ... data 4

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

A maximum of 4 bytes is available for parameter value entries. The bytes are assigned as follows, depending on the data format:

5th byte	6th byte	7th byte	8th byte
Parameter value (1 byte)	0x00	0x00	0x00
Parameter value (2 bytes)		0x00	0x00
Low byte	High byte		
Parameter value (4 bytes)			
Low word		High word	
Low byte	High byte	Low byte	High byte

Note!

The Table of attributes (📖 149) contains a scaling factor for Lenze parameters in the "factor" column. The scaling factor is important for the transfer of parameter values which are represented with one or several decimal positions in the parameter list.

When the scaling factor is > 1, the value must be multiplied by the scaling factor before being transmitted to be able to transmit the value as an integer. On the SDO client side, the integer must by divided by the scaling factor again to obtain the original value with decimal positions.

Example

For a code with the scaling factor "100" and the data format U32 the value "123.45" is to be transmitted.

Calculation:

- Value to be transmitted = scaling factor x value
- Data $_{(1 \ldots 4)}$ = 100 x 123.45 = 12345 (0x00 00 30 39)

Entries:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
				0x39	0x30	0x00	0x00

9.2.4 Error messages

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Error code			
0x80 (128)	Low byte	High byte		Low word		High word	
				Low byte	High byte	Low byte	High byte

In case of an error, the addressed node generates a telegram with the "Error Response" (0x80) command.

- The telegram contains the index and subindex of the code in which an error has occurred.
- Bytes 5 ... 8 contain the error code.
  - The error codes are standardised in accordance with DS301, V4.02.
  - The representation of the error codes is reversed to the read direction (see the following example).

Example

The representation of the error code "0x06040041" in bytes 5 ... 8:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Error code			
				0x41	0x00	0x04	0x06

Error codes

Error code	Explanation
0x0503 0000	Toggle bit not changed.
0x0504 0000	SDO protocol expired.
0x0504 0001	Invalid or unknown client/server command specifier.
0x0504 0002	Invalid block size (block mode only).
0x0504 0003	Invalid processing number (block mode only).
0x0504 0004	CRC error (block mode only).
0x0504 0005	Memory does not suffice.
0x0601 0000	Object access not supported.
0x0601 0001	Attempted read access to a writable only object.
0x0601 0002	Attempted write access to a readable only object.
0x0602 0000	Object not listed in object directory.
0x0604 0041	Object not mapped to PDO.
0x0604 0042	Number and length of objects to be transferred longer than PDO length.
0x0604 0043	General parameter incompatibility.
0x0604 0047	General internal device incompatibility.
0x0606 0000	Access denied because of hardware error.
0x0607 0010	Unsuitable data type (unsuitable service parameter length).
0x0607 0012	Unsuitable data type (service parameter length exceeded).
0x0607 0013	Unsuitable data type (service parameter length too short).
0x0609 0011	Subindex does not exist.
0x0609 0030	Parameter value range exceeded.
0x0609 0031	Parameter values too high.
0x0609 0032	Parameter values too low.
0x0609 0036	Maximum value falls below minimum value.
0x0800 0000	General error.
0x0800 0020	Data cannot be transferred/stored for application.
0x0800 0021	Data cannot be transferred/stored for application due to local control.
0x0800 0022	Data cannot be transferred/stored for application due to current device status.
0x0800 0023	Dynamic generation of object directory not successful or no object directory available (e.g. object directory generated from file, generation not possible because of a file error).

9.3 Examples for a parameter data telegram

9.3.1 Reading parameters

Task: The heatsink temperature of 43 °C (code **C00061**, data format INTEGER32, scaling factor 1) is to be read from the controller with node address "5".

Telegram to drive

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0605	0x40	0xC2	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations of the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 5 = 1541 = 0x0605 (1536 = basic identifier SDO1 to the controller)
Command	= 0x40 = "Read Request" (read request of a parameter from the controller)
Index	= 24575 - code number = 24575 - 61 = 24514 = 0x5FC2
Subindex	= 0 (code **C00061** has no subcodes)

Response telegram from drive (if data have been transmitted correctly)

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0585	0x43	0xC2	0x5F	0x00	0x2B	0x00	0x00	0x00

Explanations of the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 5 = 1413 = 0x0585 (1408 = basic identifier SDO1 from the controller)
Command	= 0x43 = "Read Response" (response to read request with current value)
Index	as in telegram to the drive
Subindex	
Data 1 ... 4	= 0x0000002B = 43 [°C]

9.3.2 Writing parameters

Task: The rated current of the connected motor with I_{rated} = 10.2 A (code **C00088**) is to be entered in the controller with node address "2".

Telegram to drive

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0602	0x23	0xA7	0x5F	0x00	0x66	0x00	0x00	0x00

Explanations of the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 2 = 1538 = 0x0602 (1536 = basic identifier SDO1 to the controller)
Command	= 0x23 = "Write Request" (write request of a parameter to the controller)
Index	= 24575 - code number = 24575 - 88 = 24487 = 0x5FA7
Subindex	= 0 (code **C00088** has no subcodes)
Data 1 ... 4	= 10.2 x 10 = 102 = 0x00000066 (Value for motor current, data type U32; display factor 1/10)

Response telegram from drive (if data have been transmitted correctly)

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x0582	0x60	0xA7	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations of the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 2 = 1410 = 0x0582 (1408 = basic identifier SDO1 from the controller)
Command	= 0x60 = "Write Response" (acknowledgement of the write access from the controller)
Index	as in telegram to the drive
Subindex	

9.3.3 Reading block parameters

Task: The firmware version (code **C00099**) is to be read from the parameter set of the controller with node address "12". The firmware version has a length of 11 ASCII characters and is transmitted as a block parameter. In each block, the data width from the 2nd to the 8th byte within the user data is occupied.

Telegram 1 to the drive: read request

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x060C	0x40	0x9C	0x5F	0x00	0x00	0x00	0x00	0x00

Explanations of the telegram to the drive	
Identifier	= 1536 + node address = 1536 + 12 = 1548 = 0x060C (1536 = basic identifier SDO1 to the controller)
Command	= 0x40 = "Read Request" (read request of a parameter from the controller)
Index	= 24575 - code number = 24575 - 99 = 24476 = 0x5F9C
Subindex	= 0 (code **C00099** has no subcodes)

Response telegram 1 from the drive: Data of the block length (11 characters)

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x058C	0x41	0x9C	0x5F	0x00	0x0B	0x00	0x00	0x00

Explanations of the telegram from the drive	
Identifier	= 1408 + node address = 1408 + 12 = 1420 = 0x058C (1408 = basic identifier SDO1 from the controller)
Command	= 0x41 = "Read Response" (response is a block telegram)
Index	as in telegram to the drive
Subindex	
Data 1 ... 4	= 0x0000000B = data length of 11 characters in ASCI format

Telegram 2 to the drive: Request of the 1st data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x060C	0x60	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Explanations of the telegram to the drive	
Command	= 0x60 = "Read Segment Request" (request: read data block) • Bit 4 = 0 (toggle bit)
	Influence of the toggle bit to the request command The individual blocks are toggled successively, i.e. first the request with command "0x60" is effected (= 011**0***0000_{bin}), then command "0x70" (= 011**1***0000_{bin}), then "0x60" again, etc. * Toggle bit

Response telegram 2 from the drive: Send 1st data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x058C	0x00	0x30	0x31	0x2E	0x30	0x30	0x2E	0x30
		0_{asc}	1_{asc}	$_{\cdot asc}$	0_{asc}	0_{asc}	$_{\cdot asc}$	0_{asc}

Explanations of the telegram to the drive	
Command	= 0x00 = $0000\,0000_{bin}$ • Bit 4 = 0 (toggle bit)
	Influence of the toggle bit to the transmission command • The first response of the controller in the command byte is "0x000**0***0000_{bin}" if bytes 2 ... 8 are completely occupied by data and further telegrams are following. • The second response of the controller in the command byte is "0x000**1***0000_{bin}" if bytes 2 ... 8 are completely occupied by data and further telegrams are following, etc. * Toggle bit
Data 1 ... 7	= "01.00.0" (ASCII representation)

Telegram 3 to the drive: Request of the 2nd data block

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x060C	0x70	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Explanations of the telegram 3 to the drive	
Command	= 0x70 = "Read Segment Request" (request: read data block) • Bit 4 = 1 (toggle bit)

Response telegram 3 from the drive: Send 2nd data block with end identifier

Identifier	User data							
	1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
	Command	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x058C	0x17	0x30	0x2E	0x30	0x30	0x00	0x00	0x00
		0_{asc}	$._{asc}$	0_{asc}	0_{asc}	-	-	-

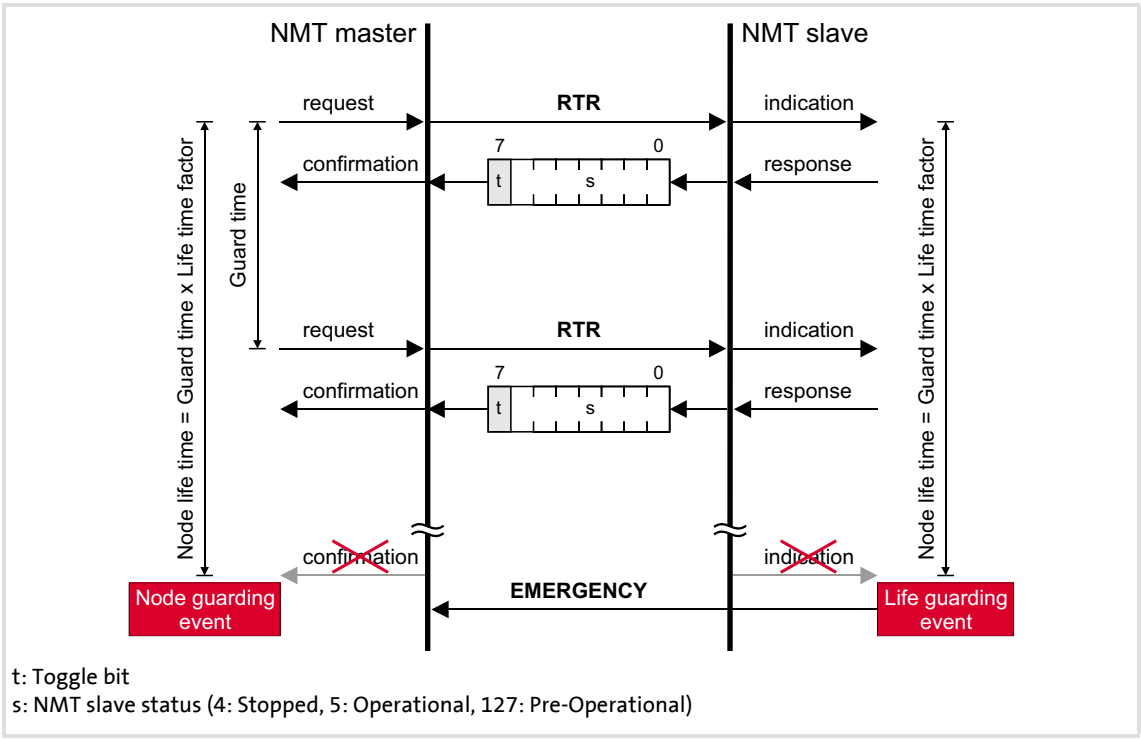
Explanations of the telegram 3 from the drive	
Command	= 0x17 = 00010111_{bin}: • Bit 0 = 1 (end of transmission) • Bit 1 ... bit 3 = 011_{bin} (3 bytes do not contain any data) • Bit 4 = 1 (toggle bit)
	Influence of the end bit and the residual data length on the transmission command • The end of transmission is reported by the set end bit 0. • By means of bit 1 ... 3, the number of bytes which do not contain data anymore is announced. * Toggle bit
Data 1 ... 7	= "0.00" (ASCII representation) The result of the data block transfer is: "01.00.00.00"

10 Monitoring

10.1 Node guarding protocol

In a CAN network, the node guarding protocol serves to monitor the connection between the NMT master and the NMT slave(s). If the controller was parameterised as NMT master, it can monitor up to 32 NMT slaves.

General procedure



t: Toggle bit
s: NMT slave status (4: Stopped, 5: Operational, 127: Pre-Operational)

[10-1] Node guarding protocol

1. The NMT master within cyclic time intervals sends a data telegram to the NMT slave, which is referred to as "Remote Transmission Request" (RTR).
2. The NMT slave then returns a response telegram ("Response") to the NMT master.

10.1.1 Telegram structure

RTR telegram

- The RTR telegram from the NMT master has the following identifiers:
  Identifier (COB-ID) = 1792 + node address of the NMT slave
- The RTR telegram does not contain any user data.
- The RTR bit in the arbitration field of the RTR telegram is set to the valency LOW (dominant level).

Response telegram

- The response telegram from the requested NMT slave has the same identifier as the RTR telegram received by the NMT master.
- The user data (1 byte) contains the NMT slave status and the toggle bit (see the following description).

NMT slave state (s)

NMT slave status		Data							
Communication status	Decimal value (s)	(t)	NMT slave state (s)						
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Stopped	4	0/1	0	0	0	0	1	0	0
Operational	5	0/1	0	0	0	0	1	0	1
Pre-operational	127	0/1	1	1	1	1	1	1	1

Toggle bit (t)

- The toggle bit (t) in the response telegram has the value "0" when the node guarding protocol is activated for the first time.
- The toggle bit (t) must change its value with each response.

Note!

The toggle bit is monitored by the NMT master.

If a telegram is received with a toggle bit value that has not changed compared to the previously received telegram, it will be treated as if it were not received, i.e. the monitoring time is not reset and elapses further.

The toggle bit can only be reset to the value "0" by the "Reset Communication" telegram of the NMT master.

10.1.2 Parameter setting

Short overview of parameters for the "Node Guarding" monitoring function:

Parameter	Information	Lenze setting		Assignment	
		Value	Unit	Master	Slave
C13382 / C14382	CAN guard time	0	ms		●
C13383 / C14383	CAN life time factor	0			●
C13386 / C14386	CAN node guarding	0x00000000		●	
C13387 / C14387	CAN node guarding activity	-		●	
C13388 / C14388	CAN node guarding status	-		●	
C13612 / C14612	Resp. CAN node guarding error	No response		●	
C13614 / C14614	Resp. CAN life guarding error	No response			●
C13625 / C14625	CAN behaviour in the case of error	Pre-operational state		●	●

Highlighted in grey = display parameter

Guard time

The time interval with which the NMT master transmits the RTR telegram is the guard time.

- For each NMT slave to be monitored an individual time interval can be set.
- The RTR telegram prompts the NMT slave to send its current status.

Node life time

The node life time is the product of the guard time and the life time factor:
node life time = guard time x life time factor

- "Life time factor" and "Guard time" have to be known to the NMT master. For this, the values from the NMT slave are read at each reboot, or defined values are sent to the NMT slave at each reboot.
- It is possible to select a different "node life time" for each NMT slave to be monitored.

OK status

The status of the connection is ok (OK status) if within the "Node life time"

- the NMT slave has received an RTR telegram from the NMT master and
- the NMT master has received a correct response from the requested NMT slave.

In the OK status the monitoring times for the NMT master and the NMT slave are reset and the node guarding protocol is continued.

Life guarding event

The "life guarding event" is triggered in the NMT slave if the slave has not received an RTR telegram from the NMT master within the node life time:

- In the Lenze setting, the NMT slave changes from the "Operational" communication status into the "Pre-Operational" communication status.
  - C13625 / C14625 or the I-1029 object can be used to set another status change.
- An emergency telegram with the emergency error code 0x8130 is transmitted to the NMT master.
- The response parameterised in C13614 / C14614 is executed (Lenze setting: "No response").

Note!

The "Life Guarding Event" can only be triggered in the NMT slave if at least one RTR telegram has been received successfully from the NMT master.

Node guarding event

The "node guarding event" is triggered in the NMT master if the master has not received any response to its RTR telegram from the requested NMT slave within the node life time or if the toggle bit in the response telegram has not changed within the node life time.

- In the Lenze setting, the NMT master changes from the "Operational" communication status into the "Pre-Operational" communication status.
  - C13625 / C14625 or the I-1029 object can be used to set another status change.
- The response parameterised in C13612/1...32 / C14612/1...32 is executed (Lenze setting: "No response"). For each monitored node, an individual NMT master response can be set.

Note!

The "Node Guarding Event" can only be triggered in the NMT master if at least one response has been received successfully from the requested NMT slave.

10.1.3 Commissioning example

Task

A Servo Drive 9400 configured as NMT master (node 1) is to monitor another Servo Drive 9400 (node 2).

- The node guarding telegram is to be transmitted from the NMT master to the NMT slave in intervals of 1 s:
  - Guard time = 1000 ms
- The node life time is to amount to 5 seconds:
  - Node life time = guard time (1000 ms) x life time factor (5)
- If an error occurs, an error response is to be activated both in the NMT master and the NMT slave.

Parameter setting of the NMT master (node 1)

1. Set heartbeat producer time (C13381 / C14381) to 0 ms to deactivate the heartbeat monitoring (node guarding and heartbeat must not be used simultaneously on a CANopen device).
2. Configure controller as NMT master: Set C13352 / C14352 = "1: Master".
3. Set guard time (C13382 / C14382) to 0 ms (slave parameter).
4. Set life time factor (C13383 / C14383) to 0 (slave parameter).
5. Configure monitoring for node guarding in C13386 / C14386.
   - The value to be entered into a free subcode (1 ... 32) is "0x050203E8".
     It consists of the following:

Bit 31 ... bit 24 **Life time factor**	Bit 23 ... bit 16 **Node address of slave**	Bit 15 ... bit 0 **Guard time**
0x05	**0x02**	**1000 [ms] = 0x03E8**

6. Go to C13612/1...32 / C14612/1...32 and set the respective response required for the monitoring functions parameterised under C13386/1...32 / C14386/1...32. This response will be executed if a node guarding event occurs in the NMT master.

Tip!

- C13387 / C14387 displays the activity of each monitoring function parameterised under C13386/1...32 / C14386/1...32 in a bit-coded manner.
- C13388/1...32 / C14388/1...32 display the node guarding status of the monitored NMT slaves.
- C13625 / C14625 serves to set which state change is to occur in the NMT master in the case of a node guarding event.

Parameterise NMT slave (node 2)

1. Adapt the life time factor and guard time settings of the NMT slave to the settings applied to the NMT master under C13386 / C14386:
   – Set guard time (C13382 / C14382) to 1000 ms.
   – Set life time factor (C13383 / C14383) to 5.
2. Go to C13614 / C14614 and set the response to be executed in the NMT slave in the case of a life guarding event.

Tip!

C13625 / C14625 serves to set which state change is to occur in the NMT slave in the case of a life guarding event.

Node guarding telegrams

- Remote Transmission Request:
  The RTR telegram from the NMT master has the following identifiers:
  Identifier (COB-ID) = 1792 + node address of slave = 1792 + 2 = 1794 = 0x702
- Remote Transmission Response:
  The response telegram from the NMT slave has the same identifier and the "operational" NMT slave state in the user data (s = 5).

Telegram structure (📖 75)

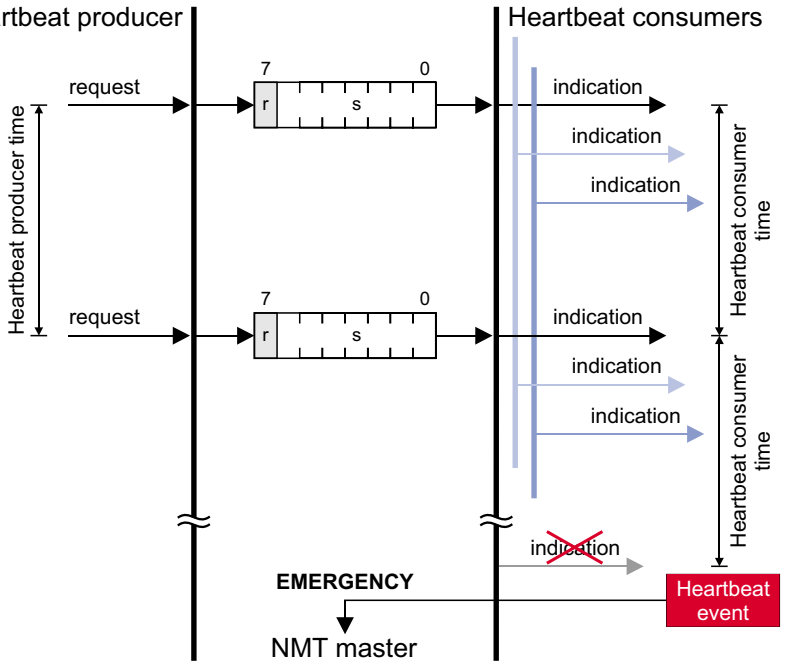
10.2 Heartbeat protocol

The heartbeat protocol can be used as an alternative to the node guarding protocol for monitoring nodes within a CAN network. Unlike node guarding, this monitoring does not require a polling by means of an RTR telegram (Remote Transmission Request) from the NMT master.

Note!

Heartbeat and node guarding protocols must not be used simultaneously on a CANopen device. If the heartbeat producer time is set > 0 ms, the heartbeat protocol is used.

General procedure



r: reserved (always 0)
s: status of the producer (0: Boot-up, 4: Stopped, 5: Operational, 127: Pre-Operational)

[10-2] Heartbeat protocol

1. A heartbeat producer cyclically sends a heartbeat telegram to one or several heartbeat consumers.
2. One or several consumers monitor the regular arrival of the heartbeat telegram.

10.2.1 Telegram structure

- The heartbeat telegram from the producer has the following identifier:
  Identifier (COB-ID) = 1792 + node address of the producer
- The user data (1 byte) contain the status (s) of the producer:

Heartbeat producer status		Data							
Communication status	Decimal value (s)	(r)	Producer status (s)						
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Boot-up	0	0	0	0	0	0	0	0	0
Stopped	4	0	0	0	0	0	1	0	0
Operational	5	0	0	0	0	0	1	0	1
Pre-operational	127	0	1	1	1	1	1	1	1

10.2.2 Parameter setting

Short overview of the parameters for the "Heartbeat" monitoring function:

Parameter	Information	Lenze setting		Assignment	
		Value	Unit	Consumer	Producer
C13346 / C14346	CAN heartbeat activity	-		●	
C13347 / C14347	CAN heartbeat status	-		●	
C13381 / C14381	CAN heartbeat producer time	0	ms		●
C13385 / C14385	CAN heartbeat consumer time	0x00000000		●	
C13613 / C14613	Resp. to CAN heartbeat error	No response		●	
C13625 / C14625	CAN behaviour in the case of error	Pre-operational state		●	●
Highlighted in grey = display parameter					

Heartbeat producer time

Time interval for the transmission of the heartbeat telegram to one or several consumers.

- Can be parameterised in C13381 / C14381 or via the I-1017 object. The parameterised time is rounded down to an integer multiple of 5 ms.
- The heartbeat telegram is automatically transmitted as soon as a time > 0 ms is set.

Note!

Heartbeat and node guarding protocols must not be used simultaneously on a CANopen device. If the heartbeat producer time is set > 0 ms, the heartbeat protocol is used.

Heartbeat consumer time

Monitoring time for the node (producer) to be monitored.

- Can be parameterised in C13385/1...32 / C14385/1...32 or via the I-1016 object.
- The parameterised time is rounded down to an integer multiple of 5 ms and must have a higher value than the heartbeat producer time of the node to be monitored.
- A consumer can monitor up to 32 producers.

Heartbeat event

The "heartbeat event" is triggered in the consumer if the consumer has not received a heartbeat telegram from the producer within the heartbeat consumer time:

- In the Lenze setting, the consumer changes from the "Operational" communication status into the "Pre-Operational" communication status.
  - C13625 / C14625 or the I-1029 object can be used to set another status change.
- An emergency telegram with the emergency error code 0x8130 is transmitted to the NMT master.
- The response parameterised for the respective producer under C13613/1...32 / C14613/1...32 is executed (Lenze setting: "No response").

Note!

The heartbeat monitoring starts when the first heartbeat telegram of a monitored producer has been successfully received and the "pre-operational" NMT status has been assumed.

The boot-up telegram counts as the first heartbeat telegram!

10.2.3 Commissioning example

Task

A Servo Drive 9400 configured as heartbeat consumer (node 2) is to monitor another Servo Drive 9400 (heartbeat producer; node 1).

- The heartbeat producer is to transmit every 10 seconds a heartbeat telegram to the heartbeat consumer.
- The heartbeat consumer monitors the arrival of the heartbeat telegram. In case of an error, a response is to take place.

Parameter setting of the heartbeat producer (node 1)

1. Set heartbeat producer time (C13381 / C14381) to 10 ms.

Parameter setting of the heartbeat consumer (node 2)

1. Configure heartbeat monitoring in C13385 / C14385.
   - Note: The heartbeat consumer time must be higher than the heartbeat producer time set in C13381 / C14381 for the node to be monitored.
   - The value to be entered into a free subcode (1 ... 32) is "0x0001000F". It consists of the following:

Bit 31 ... bit 24 **Reserved**	Bit 23 ... bit 16 **Node address of the producer**	Bit 15 ... bit 0 **Heartbeat consumer time** (integer multiple of 5 ms)
0x00	**0x01**	**15 [ms] = 0x000F**

2. Go to C13613/1...32 / C14613/1...32 and set the respective response required for the monitoring functions parameterised under C13385/1...32 / C14385/1...32. This response will be executed if a heartbeat event occurs in the consumer.

Tip!

- C13346 / C14346 displays the activity of each monitoring function parameterised under C13385/1...32 / C14385/1...32 in a bit-coded manner.
- C13347/1...32 / C14347/1...32 display the heartbeat state of the monitored nodes.
- C13625 / C14625 serves to set which state change is to occur in the case of a heartbeat event.

Heartbeat telegram

The heartbeat telegram from the producer has the following identifier:

Identifier (COB-ID) = 1792 + producer node address = 1792 + 1 = 1793 = 0x701

10.3 Emergency telegram

If the error status changes due to the occurrence or elimination of an internal device error, an emergency telegram with the following structure is sent once to the NMT master:

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Emergency error code		Error register	Manufacturer-specific error message				
Low byte	High byte	I-1001	0x00 (reserved)	Low word		High word	
				Low byte	High byte	Low byte	High byte
See table below			• With emergency error code "0x1000: Lenze error number" (value displayed in **C00168**) • With all other emergency error codes, the value "0" is entered here.				

Emergency error code	Error register	Cause
0x0000	0xxx	One of several errors eliminated
	0x00	Single error eliminated (no more errors)
0x1000	0x01	Generic error • In the standard device, an error has occurred with the error response "Fault", "Trouble", "Quick stop by trouble", "Warning", "Warning locked" or "System fault". • Error message is the Lenze error number (**C00168**). • For error cause see error description (**C00166**).
0x3100	0x01	Supply voltage of standard device faulty or failed
0x8100	0x11	Communication error (warning)
0x8130	0x11	Life guarding error or heartbeat error
0x8150	0x11	Collision of identifiers (COB-IDs): An identifier parameterised for reception is also used for transmission.
0x8210	0x11	PDO length is shorter than the expected PDO length
0x8220	0x11	PDO length is longer than the expected PDO length
0x8700	0x11	Sync telegram monitoring

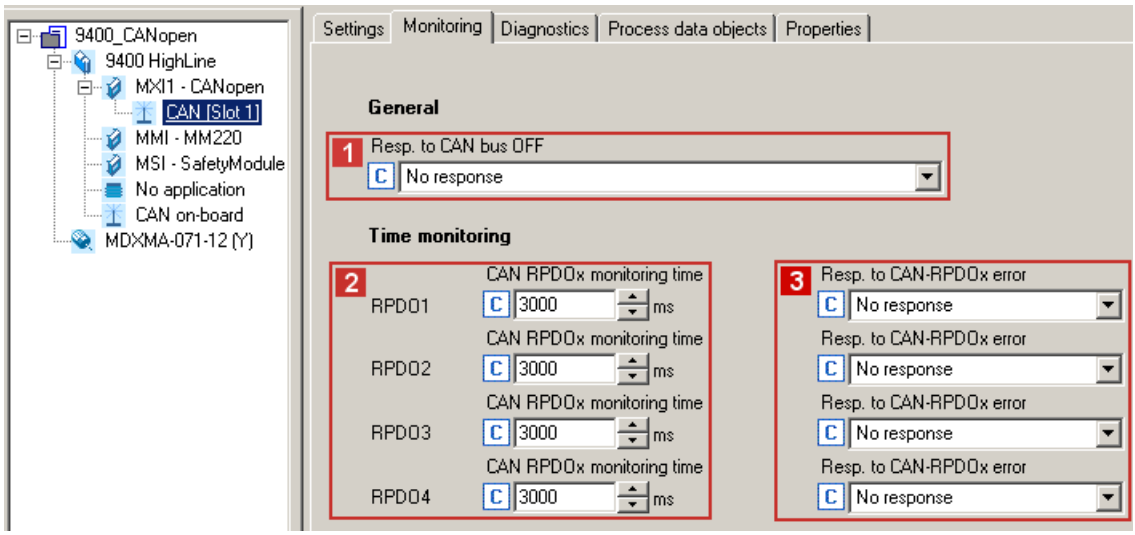
Example

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Emergency error code		Error register	Manufacturer-specific error message				
0x00	0x10	0x01	0x00 (reserved)	0x1B	0x00	0x7B	0x00
Generic error				Lenze error message "0x007B001B: Encoder wire breakage". Corresponding "error-free" message: value "0x00000000"			

Tip!

A detailed description can be gathered from the CANopen specification DS301, V4.02.

10.4 Settings in the »Engineer«



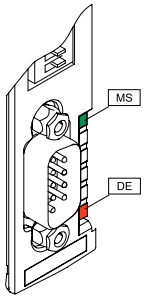
Go to the **Monitoring** tab to ...

- ▶ set the 1 response for the CAN node changing to the "bus OFF" state (C13959 / C14595).
- ▶ set the 2 monitoring time for RPDOx (C13357/1...4 / C14357/1...4).
  - – If a different value than "0" is entered, the RPDO is expected after the time set has elapsed.
  - – If the RPDO is not received within the monitoring time, an error response parameterised under 3 C13591/1...4 / C14591/1...4 is initiated.

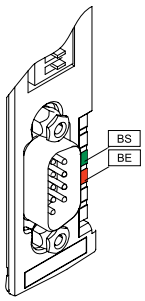
11 Diagnostics

11.1 LED status displays

Status displays MS and DE

LEDs	Status	Description
 E94YCCA001E	MS (green) on	The communication module is supplied with voltage.
	DE (red) on	The communication module is not accepted by the standard device (see notes in the documentation for the standard device).

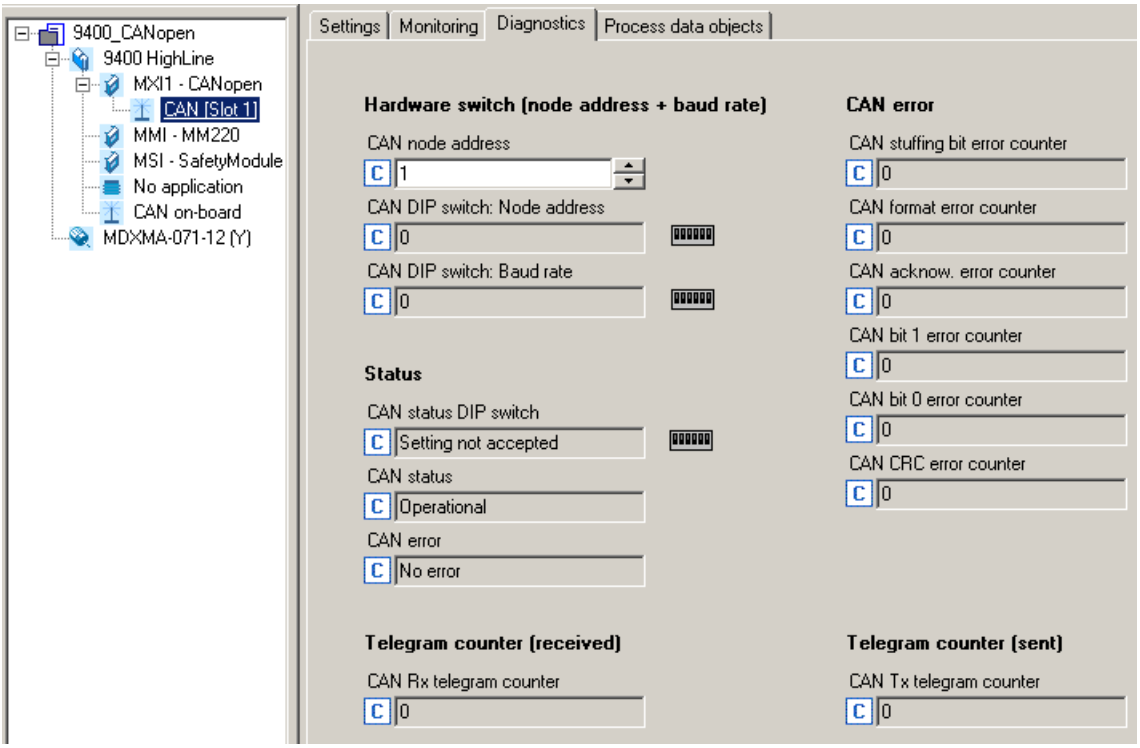
Status displays BS and BE (connection status to the system bus (CANopen))

LEDs	Description	
 E94YCCA001D	BS (green)	CANopen status
	BE (red)	CANopen error

LED status display		Meaning	
BS (green)	**BE** (red)	**CANopen status**	**CANopen error**
BE lit only		-	**Bus off**
BS and **BE** flickering		Automatic detection of the baud rate is active.	
BS blinking every 0.2 s | **BE** is off		**Pre-operational**	-
BS blinking every 0.2 s | **BE** blinking once, 1 s off			**Warning limit reached**
BS blinking every 0.2 s | **BE** blinking twice, 1 s off			**Node guard event**
BS lit only		**Operational**	-
BS lit | **BE** blinking once, 1 s off			**Warning limit reached**
BS lit | **BE** blinking twice, 1 s off			**Node guard event**
BS lit | **BE** blinking three times, 1 s off			**Sync message error**
BS blinking every 1 s | **BE** is off		**Stopped**	-
BS blinking every 1 s | **BE** blinking once, 1 s off			**Warning limit reached**
BS blinking every 1 s | **BE** blinking twice, 1 s off			**Node guard event**

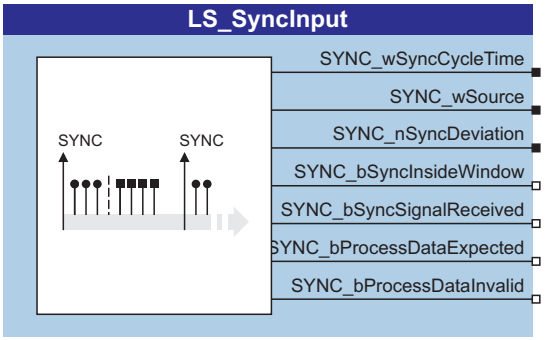
11.2 Diagnostics with the »Engineer«

In the »Engineer«, diagnostic information for CAN is provided on the **Diagnostics** tab.



LS_SyncInput system block

In the »FB Editor«, the **LS_SyncInput** system block provides status information for the received sync telegram.



Software manual/»Engineer« online help for Servo Drive 9400

Here you can find detailed information on the **LS_SyncInput** system block.

12 Error messages

This chapter supplements the error list in the software manual and the »Engineer« online help for the Servo Drive 9400 with the error messages of the communication module.

Software manual/»Engineer« online help for Servo Drive 9400

Here you can find general information on diagnostics & fault analysis and on error messages.

12.1 Short overview of the CANopen error messages

The following table lists all error messages of the communication module in the numerical order of the error numbers. In addition, the preset error response and – where available – the parameter for setting the error response are indicated.

Tip!

When you click the cross-reference in the first column, you will get a detailed description (causes and remedies) of the corresponding error message.

Error number		Designation	Response (Lenze setting)	Can be set in
hex	dec			
0x008c0017	9175063	MXI1: CAN module is missing or is incompatible	Fault	-
0x008c0018	9175064	MXI2: CAN module is missing or is incompatible	Fault	-
0x009d0000	10289152	CAN module (MXI1): bus-off	Information	C13595
0x009d0001	10289153	CAN module (MXI1): invalid node address 0	Warning	-
0x009d0002	10289154	CAN module (MXI1): basic configuration invalid	Warning locked	-
0x009e0000	10354688	CAN module (MXI1): heartbeat error index 1 ... 32	No response	C13613/1...32
0x009e0020	10354720	CAN module (MXI1): life guarding error	No response	C13614
0x009e0021	10354721	CAN module (MXI1): NMT slave configuration incomplete	Warning locked	-
0x009f0000	10420224	CAN module (MXI1): emergency configuration incomplete	Warning locked	-
0x00a00000	10485760	CAN module (MXI1): node guarding error 1 ... 32	No response	C13612/1...32
0x00a00020	10485792	CAN module (MXI1): NMT master configuration incomplete	Warning locked	-
0x00a10000	10551296	CAN module (MXI1) RPDO1: telegram n. received or faulty	No response	C13591/1
0x00a10001	10551297	CAN module (MXI1) RPDO2: telegram n. received or faulty	No response	C13591/2
0x00a10002	10551298	CAN module (MXI1) RPDO3: telegram n. received or faulty	No response	C13591/3
0x00a10003	10551299	CAN module (MXI1) RPDO4: telegram n. received or faulty	No response	C13591/4
0x00a10004	10551300	CAN module (MXI1) RPDO5: telegram n. received or faulty	No response	C13591/5
0x00a10005	10551301	CAN module (MXI1) RPDO6: telegram n. received or faulty	No response	C13591/6
0x00a10006	10551302	CAN module (MXI1) RPDO7: telegram n. received or faulty	No response	C13591/7
0x00a10007	10551303	CAN module (MXI1) RPDO8: telegram n. received or faulty	No response	C13591/8
0x00a10008	10551304	CAN module (MXI1) PDO manager: configuration incomplete	Warning locked	-
0x00a20000	10616832	CAN module (MXI1) SDO server: configuration incomplete	Warning locked	-
0x00a30000	10682368	CAN module (MXI1) SDO client: configuration incomplete	Warning locked	-
0x00ac0000	11272192	CAN module (MXI2): bus-off	Information	C14595
0x00ac0001	11272193	CAN module (MXI2): invalid node address 0	Warning	-
0x00ac0002	11272194	CAN module (MXI2): basic configuration invalid	Warning locked	-

Error number		Designation	Response (Lenze setting)	Can be set in
hex	dec			
0x00ad0000 ... 0x00ad001F	11337728 ... 11337759	CAN module (MXI2): heartbeat error index 1 ... 32	No response	C14613/1...32
0x00ad0020	11337760	CAN module (MXI2): life guarding error	No response	C14614
0x00ad0021	11337761	CAN module (MXI2): NMT slave configuration incomplete	Warning locked	-
0x00ae0000	11403264	CAN module (MXI2): emergency configuration incomplete	Warning locked	-
0x00af0000 ... 0x00af001f	11468800 ... 11468831	CAN module (MXI2): node guarding error 1 ... 32	No response	C14612/1...32
0x00af0020	11468832	CAN module (MXI2): NMT master configuration incomplete	Warning locked	-
0x00b00000	11534336	CAN module (MXI2) RPDO1: telegram n. received or faulty	No response	C14591/1
0x00b00001	11534337	CAN module (MXI2) RPDO2: telegram n. received or faulty	No response	C14591/2
0x00b00002	11534338	CAN module (MXI2) RPDO3: telegram n. received or faulty	No response	C14591/3
0x00b00003	11534339	CAN module (MXI2) RPDO4: telegram n. received or faulty	No response	C14591/4
0x00b00004	11534340	CAN module (MXI2) RPDO5: telegram n. received or faulty	No response	C14591/5
0x00b00005	11534341	CAN module (MXI2) RPDO6: telegram n. received or faulty	No response	C14591/6
0x00b00006	11534342	CAN module (MXI2) RPDO7: telegram n. received or faulty	No response	C14591/7
0x00b00007	11534343	CAN module (MXI2) RPDO8: telegram n. received or faulty	No response	C14591/8
0x00b00008	11534344	CAN module (MXI2) PDO manager: configuration incomplete	Warning locked	-
0x00b10000	11599872	CAN module (MXI2) SDO server: configuration incomplete	Warning locked	-
0x00b20000	11665408	CAN module (MXI2) SDO client: configuration incomplete	Warning locked	-

12.2 Possible causes and remedies

This chapter includes a list of all error messages of the communication module in numerically ascending order of the error number. Possible causes and remedies as well as responses to error messages are described in detail.

▸ Short overview of the CANopen error messages (📖 89)

MXI1: CAN module is missing or is incompatible [0x008c0017]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ Warning ☐ Information	

Cause	Remedy
The CANopen communication module in module slot MXI1 is incompatible with the application.	Use a communication module supported by the application.

MXI2: CAN module is missing or is incompatible [0x008c0018]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☒ **Fault** ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☐ Warning ☐ Information	

Cause	Remedy
The CANopen communication module in module slot MXI2 is incompatible with the application.	Use a communication module supported by the application.

CAN module (MXI1): bus-off [0x009d0000]

Response (Lenze setting printed in bold)	**Setting:** C13595 (☑ Adjustable response)
☑ None ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☒ **Information**	

Cause	Remedy
CANopen communication module in MXI1: "bus-off" status • Cable defect (e. g. loose contact) • Too many faulty telegrams received. • Two CAN nodes have the same node address.	• Eliminate fault in the ambience (e. g. EMC). • Eliminate loose contact, tighten adapter. • Assign different node addresses. ▸ Setting the node address (📖 33)

CAN module (MXI1): invalid node address 0 [0x009d0001]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☒ **Warning** ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: initialisation error • The hardware allocation of the node address was selected via DIP switches and the DIP switches of the node address are all set to "0". • Instead of the impermissible node address 0, node address 1 is used.	• Set a different node address than "0" and carry out mains switching. ▸ Setting the node address (📖 33)

CAN module (MXI1): basic configuration invalid [0x009d0002]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: configuration error • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1): heartbeat error index 1 ... 32 [0x009e0000 ... 0x009e001f]

Response (Lenze setting printed in bold)	**Setting:** C13613/1...32 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: cyclic node monitoring • The CAN node has not received a heartbeat telegram from node 1 ... 32 within the time defined.	• Reactivate CAN node by mains switching, restart of the controller (C00002 = 11000) or "Reset node" (C00002 = 92). • Parameterise heartbeat producer monitoring time again or switch off monitoring. • Reset possibly active error status. **Tip:** Before switching the mains and restarting the controller, save the current parameter set (C00002 = 11). ▸ Heartbeat protocol (📖 80)

CAN module (MXI1): life guarding error [0x009e0020]

Response (Lenze setting printed in bold)	**Setting:** C13614 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: cyclic node monitoring • Slave response: The maximum time between two node guarding telegrams (RTR) from the master has been exceeded.	Parameterise life guarding monitoring time again or switch it off. ▸ Node guarding protocol (📖 74)

CAN module (MXI1): NMT slave configuration faulty [0x009e0021]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: on the CAN slave a configuration error has occurred in the network management. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Node guarding or heartbeat parameterised incorrectly.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1): emergency configuration faulty [0x009f0000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN emergency configuration is faulty. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1): node guarding error 1 ... 32 [0x00a00000 ... 0x00a0001f]

Response (Lenze setting printed in bold)	**Setting:** C13612/1...32 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: cyclic node monitoring • The CAN master has not received a response to a node guarding telegram (RTR) by the node 1 ... 32 within the time defined.	• Reactivate CAN node by mains switching, restart of the controller (C00002 = 11000) or "Reset node" (C00002 = 92). • Parameterise node guarding monitoring time again or switch off the monitoring. • Reset possibly active error status. **Tip:** Before switching the mains and restarting the controller, save the current parameter set (C00002 = 11). ▸ Node guarding protocol (📖 74)

CAN module (MXI1): NMT master configuration faulty [0x00a00020]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: on the CAN master a configuration error has occurred in the network management. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Node guarding or heartbeat parameterised incorrectly.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1) RPDO1: telegram not received or faulty [0x00a10000]

Response (Lenze setting printed in bold)	**Setting:** C13591/1 / C14591/1 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN1 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO2: telegram not received or faulty [0x00a10001]

Response (Lenze setting printed in bold)	**Setting:** C13591/2 / C14591/2 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN2 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO3: telegram not received or faulty [0x00a10002]

Response (Lenze setting printed in bold)	**Setting:** C13591/3 / C14591/3 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN3 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO4: telegram not received or faulty [0x00a10003]

Response (Lenze setting printed in bold)	**Setting:** C13591/4 / C14591/4 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN4 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO5: telegram not received or faulty [0x00a10004]

Response (Lenze setting printed in bold)	**Setting:** C13591/5 / C14591/5 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN5 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO6: telegram not received or faulty [0x00a10005]

Response (Lenze setting printed in bold)	**Setting:** C13591/6 / C14591/6 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN6 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO7: telegram not received or faulty [0x00a10006]

Response (Lenze setting printed in bold)	**Setting:** C13591/7 / C14591/7 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN7 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) RPDO8: telegram not received or faulty [0x00a10007]

Response (Lenze setting printed in bold)	**Setting:** C13591/8 / C14591/8 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-IN8 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI1) PDO manager: configuration faulty [0x00a10008]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: CAN-PDO configuration error • Erroneous project download. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Mapping variables have incorrect CANopen indexes according to DS405.	• Repeat download. • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1) SDO server: configuration faulty [0x00a20000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: a configuration error has occurred in the CAN-SDO server. • Erroneous project download. • Invalid SDO server settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download. • Correct CAN settings in the project and have project regenerated.

CAN module (MXI1) SDO client: configuration faulty [0x00a30000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI1: a configuration error has occurred in the CAN-SDO client. • Erroneous project download. • Invalid SDO client settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2): bus-off [0x00ac0000]

Response (Lenze setting printed in bold)	**Setting:** C14595 (☑ Adjustable response)
☑ None ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☒ **Information**	

Cause	Remedy
CANopen communication module in MXI2: "bus-off" status • Cable defect (e. g. loose contact) • Too many faulty telegrams received. • Two CAN nodes have the same node address.	• Eliminate fault in the ambience (e. g. EMC). • Eliminate loose contact, tighten adapter. • Assign different node addresses. ▸ Setting the node address (📖 33)

CAN module (MXI2): invalid node address 0 [0x00ac0001]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☐ Warning locked ☒ **Warning** ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: initialisation error • The hardware allocation of the node address was selected via DIP switches and the DIP switches of the node address are all set to "0". • Instead of the impermissible node address 0, node address 1 is used.	• Set a different node address than "0" and carry out mains switching. ▸ Setting the node address (📖 33)

CAN module (MXI2): basic configuration invalid [0x00ac0002]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: configuration error • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2): heartbeat error index 1 ... 32 [0x00ad0000 ... 0x00ad001f]

Response (Lenze setting printed in bold)	**Setting:** C14613/1...32 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: cyclic node monitoring • The CAN node has not received a heartbeat telegram from node 1 ... 32 within the time defined.	• Reactivate CAN node by mains switching, restart of the controller (C00002 = 11000) or "Reset node" (C00002 = 92). • Parameterise heartbeat producer monitoring time again or switch off monitoring. • Reset possibly active error status. **Tip:** Before switching the mains and restarting the controller, save the current parameter set (C00002 = 11). ▸ Heartbeat protocol (📖 80)

CAN module (MXI2): life guarding error [0x00ad0020]

Response (Lenze setting printed in bold)	**Setting:** C14614 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: cyclic node monitoring • Slave response: The maximum time between two node guarding telegrams (RTR) from the master has been exceeded.	Parameterise life guarding monitoring time again or switch it off. ▸ Node guarding protocol (📖 74)

CAN module (MXI2): NMT slave configuration faulty [0x00ad0021]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: on the CAN slave a configuration error has occurred in the network management. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Node guarding or heartbeat parameterised incorrectly.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2): emergency configuration faulty [0x00ae0000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN emergency configuration is faulty. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2): node guarding error 1 ... 32 [0x00af0000 ... 0x00af001f]

Response (Lenze setting printed in bold)	**Setting:** C14612/1...32 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: cyclic node monitoring • The CAN master has not received a response to a node guarding telegram (RTR) by the node 1 ... 32 within the time defined.	• Reactivate CAN node by mains switching, restart of the controller (C00002 = 11000) or "Reset node" (C00002 = 92). • Parameterise node guarding monitoring time again or switch off the monitoring. • Reset possibly active error status. **Tip:** Before switching the mains and restarting the controller, save the current parameter set (C00002 = 11). ▸ Node guarding protocol (📖 74)

CAN module (MXI2): NMT master configuration faulty [0x00af0020]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: on the CAN master a configuration error has occurred in the network management. • Faulty download of an »Engineer« or »PLC Designer« project. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Node guarding or heartbeat parameterised incorrectly.	• Repeat download • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2) RPDO1: telegram not received or faulty [0x00b00000]

Response (Lenze setting printed in bold)	**Setting:** C14591/1 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN1 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO2: telegram not received or faulty [0x00b00001]

Response (Lenze setting printed in bold)	**Setting:** C14591/2 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN2 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO3: telegram not received or faulty [0x00b00002]

Response (Lenze setting printed in bold)	Setting: C14591/3 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN3 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO4: telegram not received or faulty [0x00b00003]

Response (Lenze setting printed in bold)	Setting: C14591/4 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN4 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO5: telegram not received or faulty [0x00b00004]

Response (Lenze setting printed in bold)	Setting: C14591/5 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN5 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO6: telegram not received or faulty [0x00b00005]

Response (Lenze setting printed in bold)	Setting: C14591/6 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN6 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO7: telegram not received or faulty [0x00b00006]

Response (Lenze setting printed in bold)	Setting: C14591/7 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN7 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) RPDO8: telegram not received or faulty [0x00b00007]

Response (Lenze setting printed in bold)	**Setting:** C14591/8 (☑ Adjustable response)
☒ **None** ☐ System fault ☑ Fault ☑ Trouble ☑ Quick stop by trouble ☑ Warning locked ☑ Warning ☑ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-IN8 error • PDO telegram length incorrect. • Error during transmission. • PDO time monitoring has been triggered.	• Set correct telegram length for the CAN master (transmitter). • Eliminate fault in the ambience (e. g. EMC). • Set different time monitoring or switch off time monitoring.

CAN module (MXI2) PDO manager: configuration faulty [0x00b00008]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: CAN-PDO configuration error • Erroneous project download. • Invalid CAN settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project. • Mapping variables have incorrect CANopen indexes according to DS405.	• Repeat download. • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2) SDO server: configuration faulty [0x00b10000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: a configuration error has occurred in the CAN-SDO server. • Erroneous project download. • Invalid SDO server settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download. • Correct CAN settings in the project and have project regenerated.

CAN module (MXI2) SDO client: configuration faulty [0x00b20000]

Response (Lenze setting printed in bold)	**Setting:** not possible
☐ None ☐ System fault ☐ Fault ☐ Trouble ☐ Quick stop by trouble ☒ **Warning locked** ☐ Warning ☐ Information	

Cause	Remedy
CANopen communication module in MXI2: a configuration error has occurred in the CAN-SDO client. • Erroneous project download. • Invalid SDO client settings according to DS301, V4.02 carried out in the »Engineer« or »PLC Designer« project.	• Repeat download • Correct CAN settings in the project and have project regenerated.

13 Parameter reference

This chapter supplements the parameter list and the table of attributes in the software manual and the »Engineer« online help for the Servo Drive 9400 by the parameters of the E94AYCCA communication module (CANopen).

Software manual/»Engineer« online help for Servo Drive 9400

Here you will find general information about parameters.

13.1 Communication-relevant parameters of the standard device

In this chapter communication-relevant parameters of the Servo Drive 9400 are listed in numerically ascending order.

C00369

Parameter | Name:
C00369 | CAN sync transmission cycle time

Data type: UNSIGNED_16
Index: $11206_d = 2BC6_h$

Cycle within which the sync master is to send sync telegrams.
- With "0 ms" (Lenze setting), no sync telegrams are created.
- Mapping of the CANopen object I-1006 (see DS301, V4.02).

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)		
0	ms	65535

Subcodes	Lenze setting	Information
C00369/1	0 ms	Transmission cycle time for CAN on board
C00369/2	0 ms	Transmission cycle time for CAN module in MXI1/MXI2
C00369/3	0 ms	No function

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C00615

Parameter | Name: **C00615 | Resp. to imp. device config.**	Data type: UNSIGNED_32 Index: $23960_d = 5D98_h$

Selection of response to impermissible device configuration

Selection list	
1	Fault
3	Quick stop by trouble
4	Warning locked
6	Information
0	No response

Subcodes	Lenze setting	Information
C00615/1	0: No response	Reserved
C00615/2	1: Fault	Resp. to imperm. module in MXI1
C00615/3	1: Fault	Resp. to imperm. module in MXI2
C00615/4	0: No response	Reserved
C00615/5	0: No response	Reserved

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C00636

Parameter | Name: **C00636 | Resp. to new module in MXI1**	Data type: UNSIGNED_32 Index: $23939_d = 5D83_h$

Selection of the response to a new extension module being inserted into module slot MXI1.

Selection list (Lenze setting printed in bold)	
1	Fault
6	Information
5	Warning
4	**Warning locked**
3	Quick stop by trouble
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C00637

Parameter | Name: **C00637 | Resp. to new module in MXI2**	Data type: UNSIGNED_32 Index: $23939_d = 5D83_h$

Selection of the response to a new extension module being inserted into module slot MXI2.

Selection list (Lenze setting printed in bold)	
1	Fault
6	Information
5	Warning
4	**Warning locked**
3	Quick stop by trouble
0	No response

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01120

Parameter | Name:
C01120 | Sync source

Data type: UNSIGNED_8
Index: $23455_d = 5B9F_h$

Selection of the source for the synchronisation signals.
- The drive can only be synchronised by one source.

Note:
Select "2: CAN module" for the CANopen communication module (E94AYCCA).
▸ Synchronisation of PDOs via sync telegram (📖 50)

Selection list (Lenze setting printed in bold)	
0	**Off**
1	CAN on board
2	CAN module
4	Module in MXI1
5	Module in MXI2
6	Digital input 1
7	Digital input 2
8	Digital input 3
9	Digital input 4
10	Digital input 5
11	Digital input 6
12	Digital input 7
13	Digital input 8

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01121

Parameter | Name:
C01121 | Sync cycle time

Data type: UNSIGNED_32
Index: $23454_d = 5B9E_h$

Time interval at which the phase control loop (PLL) in the controller expects the synchronisation signals.
- The time interval set must correspond to the cycle of the synchronisation source.

Note:
For synchronisation via the system bus (CANopen), only integer multiples of 1000 µs should be set.
Example: For the system bus, the interval between two synchronisation signals is set to 2 ms. If the system bus is to be used as the synchronisation source, a synchronisation cycle of 2000 µs must be set in C01121.
▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
250	µs	20000	**1000 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01122

Parameter | Name:
C01122 | Sync phase position

Data type: UNSIGNED_32
Index: $23453_d = 5B9D_h$

The phase position defines the zero point of time for the application relating to the synchronisation signal (bus cycle). Since PDO processing is integrated in the system part of the application, the instant of the PDO acceptance also changes if the phase position is changed.

- If 0 is set, the application is started together with the synchronisation signal.
- If a value > 0 is set, the application starts by the set time interval before the synchronisation signal arrives (the phase position acts negatively).

Example:
If the phase position is set to 400 µs, the system part of the application starts 400 µs before the synchronisation signal arrives.

From software version V3.0:
The effect of the sync phase position can be influenced by the application cycle set in C01130. For the Lenze setting of C01130, the behaviour remains as before.

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	64000	**400 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01123

Parameter | Name:
C01123 | Sync tolerance

Data type: UNSIGNED_32
Index: $23452_d = 5B9C_h$

Time slot for monitoring the synchronisation signal via the **LS_SyncInput** system block

- If the last synchronisation signal has been within this time slot around the expected value, the *SYNC_bSyncInsideWindow* output of the **LS_SyncInput** system block is set to TRUE.
- This setting does not affect the synchronisation process.

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0	µs	1000	**0 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01124

Parameter | Name:
C01124 | Sync-PLL increment

Data type: UNSIGNED_8
Index: $23451_d = 5B9B_h$

When the cycle times of the synchronisation signal and the phase control loop (PLL) differ, this setting defines the increment to be used to readjust the phase control loop.

- If the system bus (CANopen) is used as synchronisation source, the recommended time increment for deviations is 109 ns.

▸ Synchronisation of PDOs via sync telegram (📖 50)

Selection list (Lenze setting printed in bold)	
1	7 ns
2	15 ns
3	23 ns
4	31 ns
5	39 ns
6	46 ns
7	54 ns
8	62 ns
9	70 ns
10	78 ns
11	85 ns
12	93 ns
13	101 ns
14	**109 ns**
15	117 ns
16	125 ns
17	132 ns
18	140 ns
19	148 ns
20	156 ns
21	164 ns
22	171 ns
23	179 ns
24	187 ns
25	195 ns
26	203 ns
27	210 ns

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C01130

Parameter | Name:
C01130 | CAN SYNC application cycle

Data type: UNSIGNED_16
Index: $23445_d = 5B95_h$

From software version V3.0

This parameter influences the effect of the sync phase position (C01122) with regard to the instant of acceptance of the synchronous PDOs by the application or the instant of transmission of the synchronous PDOs to the system bus (CANopen).

- The resulting PDO delay can be calculated with the following formula, taking an internal processing time of 150 µs into consideration: PDO delay = (C01121 - C01122 + 150 µs) modulo C01130
- For the Lenze setting, the behaviour remains as before; the sync phase position (C01122) is always calculated "modulo 1000".
- The set value is automatically rounded down to multiples of 1000 µs.

▸ Effect of C01130 on the sync phase position (📖 54)

Note: Setting the application cycle to a higher value than the sync cycle time (C01121) results in an undefined response. The same applies if the value set for the sync phase position (C01122) is higher than the sync cycle time (C01121). In this case, the drive usually cannot send synchronous PDOs on the system bus anymore.

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
1000	µs	65000	**1000 µs**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer | Scaling factor: 1

Note!

The standard device codes **C01501** and **C01502** are not effective when using the CANopen communication module.

13.2 Parameters of the communication module for slot MXI1

In this chapter, the parameters of the E94AYCCA communication module (CANopen) for slot MXI1 of the Servo Drive 9400 are listed in numerically ascending order.

C13311

Parameter | Name:
C13311 | CAN TPDO1 mask byte x

Data type: BITFIELD_8
Index: $11264_d = 2C00_h$

For each byte of the TPDO1 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C13311/1	0x00	Mask for byte 1 ... byte 8 of TPDO1
...		
C13311/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13312

Parameter | Name:
C13312 | CAN TPDO2 mask byte x

Data type: BITFIELD_8
Index: $11263_d = 2BFF_h$

For each byte of the TPDO2 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C13312/1	0x00	Mask for byte 1 ... byte 8 of TPDO2
...		
C13312/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13313

Parameter | Name:
C13313 | CAN TPDO3 mask byte x

Data type: BITFIELD_8
Index: $11262_d = 2BFE_h$

For each byte of the TPDO3 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C13313/1	0x00	Mask for byte 1 ... byte 8 of TPDO3
...		
C13313/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13314

Parameter | Name:
C13314 | CAN TPDO4 mask byte x

Data type: BITFIELD_8
Index: $11261_d = 2BFD_h$

For each byte of the TPDO4 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C13314/1	0x00	Mask for byte 1 ... byte 8 of TPDO4
...		
C13314/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13320

Parameter | Name:
C13320 | CAN TPDOx identifier

Data type: BITFIELD_32
Index: $11255_d = 2BF7_h$

Identifier for TPDO1 ... TPDO4
- If bit 31 is set (0x8nnnnnnn), the TPDO is deactivated.
- The basic setting is according to the "Predefined Connection Set".
- Mapping of the CANopen objects I-1800/1 ... I-1803/1 (see DS301, V4.02).

▸ Identifiers of the process data objects (📖 46)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: PDO invalid
...	...	
Bit 31	PDO invalid	

Subcodes	Lenze setting	Information
C13320/1	0x00000181	Identifier TPDO1 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x180 + node address is set by default.
C13320/2	0x00000281	Identifier TPDO2 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x280 + node address is set by default.
C13320/3	0x00000381	Identifier TPDO3 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x380 + node address is set by default.
C13320/4	0x00000481	Identifier TPDO4 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x480 + node address is set by default.

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13321

Parameter | Name:
C13321 | CAN RPDOx identifier

Data type: BITFIELD_32
Index: $11254_d = 2BF6_h$

Identifier for RPDO1 ... RPDO4
- If bit 31 is set (0x8nnnnnnn), the RPDO is deactivated.
- The basic setting is according to the "Predefined Connection Set".
- Mapping of the CANopen objects I-1400/1 ... I-1403/1 (see DS301, V4.02).

▸ Identifiers of the process data objects (📖 46)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: PDO invalid
...	...	
Bit 31	PDO invalid	

Subcodes	Lenze setting	Information
C13321/1	0x00000201	Identifier RPDO1 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x200 + node address is set by default.
C13321/2	0x00000301	Identifier RPDO2 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x300 + node address is set by default.
C13321/3	0x00000401	Identifier RPDO3 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x400 + node address is set by default.
C13321/4	0x00000501	Identifier RPDO4 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x500 + node address is set by default.

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13322

Parameter | Name:
C13322 | CAN TPDOx Tx mode

Data type: UNSIGNED_8
Index: $11253_d = 2BF5_h$

TPDO transmission type according to DS301, V4.02
- The types 0 (acyclic sync), 1-240 (cyclic sync), 254 (event-controlled manufacturer-specific), 255 (event-controlled device-profile-specific) are supported.
- The basic setting for all PDOs is the event-controlled setting "254".
- Mapping of the CANopen objects I-1800/2 ... I-1803/2 (see DS301, V4.02).

▸ Transmission type (📖 47)

Setting range (min. value | unit | max. value)		
0		255

Subcodes	Lenze setting	Information
C13322/1	254	Transmission mode for TPDO1 ... TPDO4
...		
C13322/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13323

Parameter | Name:
C13323 | CAN RPDOx Rx mode

Data type: UNSIGNED_8
Index: $11252_d = 2BF4_h$

RPDO transmission type according to DS301, V4.02
- For the RPDO serves as monitoring setting in the case of sync-controlled PDOs.
- The types 0 (acyclic sync), 1-240 (cyclic sync), 254 (event-controlled manufacturer-specific), 255 (event-controlled device-profile-specific) are supported.
- The basic setting for all PDOs is the event-controlled setting "254".
- Mapping of the CANopen objects I-1400/2 ... I-1403/2 (see DS301, V4.02).

▸ Transmission type (📖 47)

Setting range (min. value | unit | max. value)		
0		255

Subcodes	Lenze setting	Information
C13323/1	254	Transmission mode for RPDO1 ... RPDO4
...		
C13323/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13324

Parameter | Name:
C13324 | CAN TPDOx delay time

Data type: UNSIGNED_16
Index: $11251_d = 2BF3_h$

TPDO inhibit time according to DS301, V4.02
- Minimum time between the transmission of two identical TPDOs.
- The time is entered in 1/10 ms and automatically rounded to full milliseconds by the code.
- Mapping of the CANopen objects I-1800/3 ... I-1803/3 (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
0	1/10 ms	65535

Subcodes	Lenze setting	Information
C13324/1	0 1/10 ms	Delay time for TPDO1 ... TPDO4
...		
C13324/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13343

Parameter | Name:
C13343 | CAN TPDO counter

Data type: UNSIGNED_32
Index: $11232_d = 2BE0_h$

Counter for TPDO1 ... TPDO4

Display range (min. value | unit | max. value)		
0		4294967295

Subcodes	Information
C13343/1	
...	
C13343/4	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13344

Parameter | Name: **C13344 | CAN RPDO counter**			Data type: UNSIGNED_32 Index: $11231_d = 2BDF_h$
Counter for RPDO1 ... RPDO4			
Display range (min. value | unit | max. value)			
0		4294967295	
Subcodes			**Information**
C13344/1			
...			
C13344/4			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C13345

Parameter | Name: **C13345 | CAN error**		Data type: UNSIGNED_8 Index: $11230_d = 2BDE_h$
Display of the active CAN network error		
Selection list (read only)		
0	No error	
1	Guard Event	
2	Warning	
3	Bus off	
4	Sync telegram error	
6	CAN controller overflow	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer		Scaling factor: 1

C13346

Parameter | Name: **C13346 | CAN heartbeat activity**			Data type: BITFIELD_32 Index: $11229_d = 2BDD_h$
▸ Heartbeat protocol (📖 80)			
Display range			
0x00000000		0xFFFFFFFF	
Value is bit-coded:			
Bit 0	Heartbeat node 1		
...	...		
Bit 31	Heartbeat node 32		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C13347

Parameter | Name: **C13347 | CAN heartbeat status**	Data type: UNSIGNED_8 Index: $11228_d = 2BDC_h$

Status of node 1 ... 32

▸ Heartbeat protocol (📖 80)

Selection list (read only)	
0	Unknown
4	Stopped
5	Operational
127	Pre-operational

Subcodes	Information
C13347/1	
...	
C13347/32	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13348

Parameter | Name: **C13348 | CAN status DIP switch**	Data type: UNSIGNED_8 Index: $11227_d = 2BDB_h$

- The value "1" means that the CAN DIP switches have been recognised during power-on and a valid baud rate and node address have been set.
- The value "0" means that either no CAN DIP switch or no valid setting has been recognised or that the setting has been overwritten by code C13350 or C13351.

Selection list (read only)		Information
0	Setting not accepted	
1	Setting accepted	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13349

Parameter | Name: **C13349 | CAN setting of DIP switch**	Data type: UNSIGNED_8 Index: $11226_d = 2BDA_h$

CAN DIP switch setting during last power-on

▸ Possible settings via DIP switches (📖 33)

Display range (min. value | unit | max. value)		
0		255

Subcodes	Information
C13349/1	Node address
C13349/2	Baud rate: 0: 500 kbps 1: 250 kbps 2: 125 kbps 3: 50 kbps 4: 1 Mbps 5: 20 kbps 6: 10 kbit/s 14: 800 kbps 255: Automatic detection

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13350

Parameter | Name:
C13350 | CAN node address

Data type: UNSIGNED_8
Index: $11225_d = 2BD9_h$

- A change in the node address is only effective after a "Reset node" (C00002 = 92).
- The basic server channel RX/TX is automatically provided by the node address (C13372 and C13373; both subcode 1).

▸ Setting the node address (📖 33)

Setting range (min. value | unit | max. value)			Lenze setting
1		127	**1**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13351

Parameter | Name:
C13351 | CAN baud rate

Data type: UNSIGNED_8
Index: $11224_d = 2BD8_h$

A change in the baud rate is only effective after a "Reset node" (C00002 = 92).

▸ Setting the baud rate (📖 34)

Selection list (Lenze setting printed in bold)	
0	**500 kbps**
1	250 kbps
2	125 kbps
3	50 kbps
4	1 Mbps
5	20 kbps
6	10 kbps
8	Reserved
9	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Reserved
14	800 kbps
15	Reserved
255	Automatic detection

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13352

Parameter | Name:
C13352 | CAN slave/master

Data type: UNSIGNED_8
Index: $11223_d = 2BD7_h$

If "1" is entered and saved, the drive will start as a CAN master after mains switching.

Selection list (Lenze setting printed in bold)	
0	**Slave**
1	Master

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13356

Parameter | Name:
C13356 | CAN TPDOx cycle time

Data type: UNSIGNED_16
Index: $11219_d = 2BD3_h$

TPDO event time according to DS301, V4.02
- If a different value than "0" is entered, the TPDO is transmitted without further consideration of the transport type after the time set has elapsed.
- Mapping of the CANopen objects I-1800/5 ... I-1803/5 (see DS301, 4.02).

Setting range (min. value | unit | max. value)		
0	ms	65535

Subcodes	Lenze setting	Information
C13356/1	0 ms	Cycle time for TPDO1 ... TPDO4
...		
C13356/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13357

Parameter | Name:
C13357 | CAN RPDOx monitoring time

Data type: UNSIGNED_16
Index: $11218_d = 2BD2_h$

Mapping of the RPDO event time (see DS301, V4.02)
- If a different value than "0" is entered, the RPDO is expected after the time set has elapsed.
- If the RPDO is not received within the expected time, an error message parameterisable under C13591/1...4 can be triggered.

Setting range (min. value | unit | max. value)		
0	ms	65535

Subcodes	Lenze setting	Information
C13357/1	3000 ms	Monitoring time for RPDO1 ... RPDO4
...		
C13357/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13359

Parameter | Name:
C13359 | CAN status

Data type: UNSIGNED_8
Index: $11216_d = 2BD0_h$

Display of the current CAN network status

Selection list (read only)	
0	Operational
1	Pre-operational
4	Boot-up
5	Stopped
7	Reset
8	Initialisation
9	Unknown
10	Baud rate autom. detected

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13360

Parameter | Name:
C13360 | CAN telegram and error counter

Data type: UNSIGNED_16
Index: $11215_d = 2BCF_h$

- After mains connection, all counters start with "0".
- After the maximum value has been reached, it is started with "0" again.

Display range (min. value | unit | max. value)		
0		65535

Subcodes	Information
C13360/1	Stuffing bit error counter • More than five identical bits have been detected.
C13360/2	Format error counter • CAN frame has not been observed.
C13360/3	Acknowledge error counter • No node has confirmed the telegram.
C13360/4	Bit1 error counter • "1" should be sent after bus arbitration, but "0" was read.
C13360/5	Bit0 error counter • "0" should be sent after bus arbitration, but "1" was read.
C13360/6	CRC error counter • Checksum check has indicated an error.
C13360/7	Tx telegram counter • Telegrams received without errors.
C13360/8	Rx telegram counter • Telegrams sent without errors.

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13361

Parameter | Name:
C13361 | CAN bus load

Data type: UNSIGNED_32
Index: $11214_d = 2BCE_h$

The display of the node peak load (subcodes 4 ... 6) can be reset by mains switching or via a "Reset node" command (C00002 = 92).

Display range (min. value | unit | max. value)		
0	%	100

Subcodes	Information
C13361/1	Current node load in Tx direction
C13361/2	Current node load in Rx direction
C13361/3	Current node load by faulty telegrams
C13361/4	Node peak load in Tx direction
C13361/5	Node peak load in Rx direction
C13361/6	Node peak load by faulty telegrams

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13367

Parameter | Name:
C13367 | CAN sync Rx identifier

Data type: UNSIGNED_32
Index: $11208_d = 2BC8_h$

Identifier with which the sync slave is to receive sync telegrams.
- Mapping of the CANopen object I-1005 (see DS301, V4.02).

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0		2047	**128**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13368

Parameter | Name:
C13368 | CAN sync Tx identifier

Data type: UNSIGNED_32
Index: $11207_d = 2BC7_h$

Identifier with which the sync master is to send sync telegrams.
- Mapping of the CANopen object I-1005 (see DS301, V4.02).

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0		2047	**128**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13372

Parameter | Name:
C13372 | CAN SDO server Rx identifier

Data type: BITFIELD_32
Index: $11203_d = 2BC3_h$

Identifier with which the corresponding SDO server can be reached.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO server is deactivated.
- Mapping of the CANopen objects I-1200/1 ... I-1209/1 (see DS301, V4.02).

▸ Identifiers of the parameter data objects (📖 62)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C13372/1	0x00000601	SDO server channel 1 RX • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it can neither be changed nor deactivated. Writing this subcode has no effect. • The value in subcode 1 results from the node address (C13350) + 0x600.
C13372/2	0x80000000	SDO server channel 2 RX
...	...	...
C13372/10	0x80000000	SDO server channel 10 RX

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C13373

Parameter | Name:
C13373 | CAN SDO server Tx identifier

Data type: BITFIELD_32
Index: $11202_d = 2BC2_h$

Identifier with which the corresponding SDO server can carry out transmissions.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO server is deactivated.
- Mapping of the CANopen objects I-1200/2 ... I-1209/2 (see DS301, V4.02).

▸ Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C13373/1	0x00000581	SDO server channel 1 TX • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it can neither be changed nor deactivated. Writing this subcode has no effect. • The value in subcode 1 results from the node address (C13350) + 0x580.
C13373/2	0x80000000	SDO server channel 2 TX
...	...	...
C13373/10	0x80000000	SDO server channel 10 TX

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13374

Parameter | Name:
C13374 | CAN SDO client node address

Data type: UNSIGNED_8
Index: $11201_d = 2BC1_h$

Node address of the client assigned to this server (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
1		127

Subcodes	Lenze setting	Information
C13374/1	1	SDO server channel 1 remote client node address • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it does not have this entry. Writing this subcode has no effect. • The value of subindex 1 is 0.
C13374/2	1	SDO server channel 2 remote client node address
...	...	...
C13374/10	1	SDO server channel 10 remote client node address

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13375

Parameter | Name:
C13375 | CAN SDO client Rx identifier

Data type: BITFIELD_32
Index: $11200_d = 2BC0_h$

Identifier with which the corresponding SDO client can be reached.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO client channel is deactivated (see DS301, V4.02).
- The client channels need not be parameterised right now. Their functionality will only be required when using the gateway services.

▸ Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C13375/1	0x80000000	SDO client channel 1 RX ... 10 RX
...		
C13375/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13376

Parameter | Name:
C13376 | CAN SDO client Tx identifier

Data type: BITFIELD_32
Index: $11199_d = 2BBF_h$

Identifier with which the corresponding SDO client can carry out transmissions.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO client channel is deactivated (see DS301, V4.02).
- The client channels need not be parameterised right now. Their functionality will only be required when using the gateway services.

▸ Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C13376/1	0x80000000	SDO client channel 1 TX ... 10 TX
...		
C13376/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13377

Parameter | Name:
C13377 | CAN SDO server node address

Data type: UNSIGNED_8
Index: $11198_d = 2BBE_h$

Node address of the server with which this client communicates via the client channel selected.
- An activation of the client functionality is not required.
- An entry is required so that the CAN-SDO client channel can be activated (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
1		127

Subcodes	Lenze setting	Information
C13377/1	1	Remote server node address for SDO client channel 1 ... 10
...		
C13377/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13378

Parameter | Name:
C13378 | CAN delay boot-up - Operational

Data type: UNSIGNED_16
Index: $11197_d = 2BBD_h$

Time that has to elapse after mains switching before the CAN NMT master transmits the "Start remote node" telegram on the bus.
- This time is only used after mains switching if the master bit is activated (C13352).

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**3000 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13381

Parameter | Name:
C13381 | CAN Heartbeat Producer Time

Data type: UNSIGNED_16
Index: $11194_d = 2BBA_h$

Time interval for the transmission of the heartbeat telegram to one or several consumers.
- The parameterised time is rounded down to an integer multiple of 5 ms.
- The heartbeat telegram is transmitted automatically as soon as a time > 0 ms is set. The monitoring function "Node Guarding" is deactivated in this case.
- Mapping of the CANopen object I-1017 (see DS301, V4.02).

▸ Heartbeat protocol (📖 80)

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**0 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13382

Parameter | Name:
C13382 | CAN Guard Time

Data type: UNSIGNED_16
Index: $11193_d = 2BB9_h$

- After the guard time (set here) multiplied with the life time factor (C13383), a node guarding telegram must have arrived.
- Mapping of the CANopen object I-100C (see DS301, V4.02).

▸ Node guarding protocol (📖 74)

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**0 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13383

Parameter | Name:
C13383 | CAN Life Time Factor

Data type: UNSIGNED_8
Index: $11192_d = 2BB8_h$

- The life time factor multiplied with the guard time (C13382) is the time within which a node guarding telegram must have arrived.
- Mapping of the CANopen object I-100D (see DS301, V4.02).

▸ Node guarding protocol (📖 74)

Setting range (min. value | unit | max. value)			Lenze setting
0		255	**0**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13385

Parameter | Name:
C13385 | CAN Heartbeat Consumer Time

Data type: BITFIELD_32
Index: $11190_d = 2BB6_h$

The 32 subcodes represent the nodes which are to be monitored via heartbeat.

- Each bit-coded subcode entry contains the expected heartbeat time and the node ID (node address) from which the heartbeat telegram is expected.
- The parameterised time is rounded down to an integer multiple of 5 ms and must have a higher value than the heartbeat producer time (C13381) of the node to be monitored.
- The response to a missing heartbeat telegram can be parameterised in C13613.
- Mapping of the CANopen object I-1016 (see DS301, V4.02).

▸ Heartbeat protocol (📖 80)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	Heartbeat time bit 0	• Bit 0 ... 15: Heartbeat time • Bit 16 ... 23: Node address • Bit 24 ... 31: Reserved
...	...	
Bit 31	Reserved	

Subcodes	Lenze setting	Information
C13385/1	0x00000000	Monitoring entry 1 ... 32
...		
C13385/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13386

Parameter | Name:
C13386 | CAN Node Guarding

Data type: BITFIELD_32
Index: $11189_d = 2BB5_h$

These 32 subcodes represent the nodes which are to be monitored by the master via node guarding.

- Each bit-coded subcode entry contains the guard time (C13382), the life time factor (C13383) and the node address (C13350) from which the node guarding telegram is expected.
- The response to a missing node guarding response can be parameterised in C13612.

▸ Node guarding protocol (📖 74)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	Guard time bit 0	• Bit 0 ... 15: Guard time • Bit 16 ... 23: Node address • Bit 24 ... 31: Life time factor
...	...	
Bit 31	Lifetime factor bit 7	

Subcodes	Lenze setting	Information
C13386/1	0x00000000	Monitoring entry 1 ... 32
...		
C13386/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13387

Parameter | Name:
C13387 | CAN Node Guarding Activity

Data type: BITFIELD_32
Index: $11188_d = 2BB4_h$

▸ Node guarding protocol (📖 74)

Display range		
0x00000000		0xFFFFFFFF

Value is bit-coded:	
Bit 0	Node guarding of node 1
...	...
Bit 31	Node guarding of node 32

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13388

Parameter | Name:
C13388 | CAN node guarding status

Data type: UNSIGNED_8
Index: $11187_d = 2BB3_h$

Node guarding status of node 1 ... 32

▸ Node guarding protocol (📖 74)

Selection list (read only)	
0	Unknown
4	Stopped
5	Operational
127	Pre-operational

Subcodes	Information
C13388/1	
...	
C13388/32	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13390

Parameter | Name: **C13390 | CAN Error Register (DS301V402)**			Data type: BITFIELD_8 Index: $11185_d = 2BB1_h$
Mapping of the CANopen object I-1001 (see DS301, V4.02)			
Display range			
0x00		0xFF	
Value is bit-coded:			**Information**
Bit 0	Generic error		Currently only bits 0 and 4 contain the corresponding information.
Bit 1	Current error (not used)		
Bit 2	Voltage error (not used)		
Bit 3	Temperature error (not used)		
Bit 4	Communication error		
Bit 5	Dev. prof. spec. err (not used)		
Bit 6	Reserved		
Bit 7	Manuf. spec. error (not used)		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C13391

Parameter | Name: **C13391 | CAN Emergency Object**			Data type: BITFIELD_32 Index: $11184_d = 2BB0_h$
Identifier of the emergency telegram • If bit 31 of this code is set (0x8nnnnnnn), the generation of emergency telegrams is deactivated. • Mapping of the CANopen object I-1014 (see DS301, V4.02). ▸ Emergency telegram (📖 84)			
Setting range			**Lenze setting**
0x00000000		0xFFFFFFFF	**0x00000081** (decimal: 129)
Value is bit-coded: (☑ = bit set)			**Information**
Bit 0 ☑	COB-ID bit 0		
Bit 1 ☐	COB-ID bit 1		
Bit 2 ☐	COB-ID bit 2		
Bit 3 ☐	COB-ID bit 3		
Bit 4 ☐	COB-ID bit 4		
Bit 5 ☐	COB-ID bit 5		
Bit 6 ☐	COB-ID bit 6		
Bit 7 ☑	COB-ID bit 7		
Bit 8 ☐	COB-ID bit 8		
Bit 9 ☐	COB-ID bit 9		
Bit 10 ☐	COB-ID bit 10		
Bit 11 ☐	Reserved		
...	...		
Bit 30 ☐	Reserved		
Bit 31 ☐	Emergency inactive/active		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C13392

Parameter | Name:
C13392 | CAN emergency delay time

Data type: UNSIGNED_16
Index: $11183_d = 2BAF_h$

Minimum time that has to elapse between two successive emergency telegrams.
- If "0" is set, checking of the inhibit time is deactivated.
- The time is entered in 1/10 ms. The code automatically rounds the entries down to the preceding full millisecond.
- Mapping of the CANopen object I-1015 (see DS301, V4.02).

▸ Emergency telegram (📖 84)

Setting range (min. value | unit | max. value)			Lenze setting
0		65535	**0**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13393

Parameter | Name:
C13393 | CAN result - bus scan

Data type: UNSIGNED_8
Index: $11182_d = 2BAE_h$

Result of a CAN bus scan previously carried out (C00002 = 96).
- The subcode number 1 ... 128 corresponds to the node address 1 ... 128.

Display range (min. value | unit | max. value)		
0		1

Subcodes	Information
C13393/1	Result of the CAN bus scan for node address 1 ... 128 • The value "1" means that a device with the corresponding node address has been found.
...	
C13393/128	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13394

Parameter | Name:
C13394 | CAN predefined error field (DS301V402)

Data type: UNSIGNED_32
Index: $24181_d = 5E75_h$

Predefined error field according to DS301, V4.02

Display range (min. value | unit | max. value)		
0		4294967295

Subcodes	Information
C13394/1	
...	
C13394/10	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13591

Parameter | Name:
C13591 | Resp. to CAN-RPDOx error

Data type: UNSIGNED_8
Index: $10984_d = 2AE8_h$

Response if the corresponding CAN RPDO has not been received within the configured time (C13357/1...4 / C14357/1...4) or with the configured sync.

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C13591/1	0: No response	Response to the absence of RPDO1 ... RPDO4
...		
C13591/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13595

Parameter | Name:
C13595 | Resp. to CAN bus OFF

Data type: UNSIGNED_8
Index: $10980_d = 2AE4_h$

Response if CAN node switches to the bus-off state.

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	**No response**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13612

Parameter | Name:
C13612 | Resp. to CAN node guarding error

Data type: UNSIGNED_8
Index: $10963_d = 2AD3_h$

Response of master if the corresponding node guarding response is missing.
▸ Node guarding protocol (📖 74)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C13612/1	0: No response	Response to the absence of the node guarding response for monitoring entry 1 ... 32
...		
C13612/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13613

Parameter | Name:
C13613 | Resp. to CAN heartbeat error

Data type: UNSIGNED_8
Index: $10962_d = 2AD2_h$

Response if the corresponding heartbeat telegram is missing.
▸ Heartbeat protocol (📖 80)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C13613/1	0: No response	Response to the absence of the heartbeat telegram for monitoring entry 1 ... 32
...		
C13613/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13614

Parameter | Name:
C13614 | Resp. to CAN life guarding error

Data type: UNSIGNED_8
Index: $10961_d = 2AD1_h$

Response of slave if node guarding request is missing.
▸ Node guarding protocol (📖 74)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	**No response**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C13625

Parameter | Name:
C13625 | CAN behaviour in case of fault

Data type: UNSIGNED_8
Index: $10950_d = 2AC6_h$

Mapping of the CANopen object I-1029 (see DS301, V4.02)

Selection list (Lenze setting printed in bold)	
0	**Pre-operational state**
1	No state change
2	Stopped state

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

13.3 Parameters of the communication module for slot MXI2

In this chapter, the parameters of the E94AYCCA communication module (CANopen) for slot MXI2 of the Servo Drive 9400 are listed in numerically ascending order.

C14311

Parameter | Name:
C14311 | CAN TPDO1 mask byte x

Data type: BITFIELD_8
Index: $11264_d = 2C00_h$

For each byte of the TPDO1 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

▸ Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C14311/1	0x00	Mask for byte 1 ... byte 8 of TPDO1
...		
C14311/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14312

Parameter | Name:
C14312 | CAN TPDO2 mask byte x

Data type: BITFIELD_8
Index: $11263_d = 2BFF_h$

For each byte of the TPDO2 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

▸ Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C14312/1	0x00	Mask for byte 1 ... byte 8 of TPDO2
...		
C14312/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14313

Parameter | Name:
C14313 | CAN TPDO3 mask byte x

Data type: BITFIELD_8
Index: $11262_d = 2BFE_h$

For each byte of the TPDO3 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

▸ Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C14313/1	0x00	Mask for byte 1 ... byte 8 of TPDO3
...		
C14313/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14314

Parameter | Name:
C14314 | CAN TPDO4 mask byte x

Data type: BITFIELD_8
Index: $11261_d = 2BFD_h$

For each byte of the TPDO4 a mask can be parameterised in the corresponding subcode.
- In case of event-controlled transmission of a PDO, only the masked bits are used for the event control.
- Mask "0x0" means that no bit of the corresponding byte triggers the transmission.
- Mask "0xff" means that each bit of the corresponding byte can trigger the transmission.

▸ Masking of the TPDOs for event control (📖 49)

Setting range		
0x00		0xFF

Value is bit-coded:	
Bit 0	Mask bit 0
...	...
Bit 7	Mask bit 7

Subcodes	Lenze setting	Information
C14314/1	0x00	Mask for byte 1 ... byte 8 of TPDO4
...		
C14314/8		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14320

Parameter | Name: **C14320 | CAN TPDOx identifier**			Data type: BITFIELD_32 Index: $11255_d = 2BF7_h$

Identifier for TPDO1 ... TPDO4
- If bit 31 is set (0x8nnnnnnn), the TPDO is deactivated.
- The basic setting is according to the "Predefined Connection Set".
- Mapping of the CANopen objects I-1800/1 ... I-1803/1 (see DS301, V4.02).

▸ Identifiers of the process data objects (📖 46)

Setting range			
0x00000000		0xFFFFFFFF	
Value is bit-coded:			**Information**
Bit 0	COB-ID bit 0		• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: PDO invalid
...	...		
Bit 31	PDO invalid		

Subcodes	**Lenze setting**	**Information**
C14320/1	0x00000181	Identifier TPDO1 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x180 + node address is set by default.
C14320/2	0x00000281	Identifier TPDO2 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x280 + node address is set by default.
C14320/3	0x00000381	Identifier TPDO3 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x380 + node address is set by default.
C14320/4	0x00000481	Identifier TPDO4 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x480 + node address is set by default.

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14321

Parameter | Name: **C14321 | CAN RPDOx identifier**			Data type: BITFIELD_32 Index: $11254_d = 2BF6_h$
Identifier for RPDO1 ... RPDO4 • If bit 31 is set (0x8nnnnnnn), the RPDO is deactivated. • The basic setting is according to the "Predefined Connection Set". • Mapping of the CANopen objects I-1400/1 ... I-1403/1 (see DS301, V4.02). ▸ Identifiers of the process data objects (📖 46)			
Setting range			
0x00000000		0xFFFFFFFF	
Value is bit-coded:			**Information**
Bit 0	COB-ID bit 0		• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: PDO invalid
...	...		
Bit 31	PDO invalid		
Subcodes	**Lenze setting**		**Information**
C14321/1	0x00000201		Identifier RPDO1 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x200 + node address is set by default.
C14321/2	0x00000301		Identifier RPDO2 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x300 + node address is set by default.
C14321/3	0x00000401		Identifier RPDO3 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x400 + node address is set by default.
C14321/4	0x00000501		Identifier RPDO4 • After changing the node address and executing "Reset node" (C00002 = 92), here the value 0x500 + node address is set by default.
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14322

Parameter | Name: **C14322 | CAN TPDOx Tx mode**			Data type: UNSIGNED_8 Index: $11253_d = 2BF5_h$
TPDO transmission type according to DS301, V4.02 • Types 0 (acyclic sync), 1-240 (cyclic sync), 254 (event-controlled manufacturer-specific), 255 (event-controlled device-profile-specific) are supported. • The basic PDO setting is "254" (event-controlled). • Mapping of the CANopen objects I-1800/2 ... I-1803/2 (see DS301, V4.02). ▸ Transmission type (📖 47)			
Setting range (min. value | unit | max. value)			
0		255	
Subcodes	**Lenze setting**		**Information**
C14322/1	254		Transmission mode for TPDO1 ... TPDO4
...			
C14322/4			
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14323

Parameter | Name:
C14323 | CAN RPDOx Rx mode

Data type: UNSIGNED_8
Index: $11252_d = 2BF4_h$

RPDO transmission type according to DS301, V4.02
- For the RPDO serves as monitoring setting in the case of sync-controlled PDOs.
- Types 0 (acyclic sync), 1-240 (cyclic sync), 254 (event-controlled manufacturer-specific), 255 (event-controlled device-profile-specific) are supported.
- The basic PDO setting is "254" (event-controlled).
- Mapping of the CANopen objects I-1400/2 ... I-1403/2 (see DS301, V4.02).

▸ Transmission type (📖 47)

Setting range (min. value | unit | max. value)		
0		255

Subcodes	Lenze setting	Information
C14323/1	254	Transmission mode for RPDO1 ... RPDO4
...		
C14323/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14324

Parameter | Name:
C14324 | CAN TPDOx delay time

Data type: UNSIGNED_16
Index: $11251_d = 2BF3_h$

TPDO inhibit time according to DS301, V4.02
- Minimum time between the transmission of two identical TPDOs.
- The time is entered in 1/10 ms and automatically rounded to full milliseconds by the code.
- Mapping of the CANopen objects I-1800/3 ... I-1803/3 (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
0	1/10 ms	65535

Subcodes	Lenze setting	Information
C14324/1	0 1/10 ms	Delay time for TPDO1 ... TPDO4
...		
C14324/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14343

Parameter | Name:
C14343 | CAN TPDO counter

Data type: UNSIGNED_32
Index: $11232_d = 2BE0_h$

Counter for TPDO1 ... TPDO4

Display range (min. value | unit | max. value)		
0		4294967295

Subcodes	Information
C14343/1	
...	
C14343/4	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14344

Parameter | Name: **C14344 | CAN RPDO counter**			Data type: UNSIGNED_32 Index: $11231_d = 2BDF_h$
Counter for RPDO1 ... RPDO4			
Display range (min. value | unit | max. value)			
0		4294967295	
Subcodes			**Information**
C14344/1			
...			
C14344/4			
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14345

Parameter | Name: **C14345 | CAN error**		Data type: UNSIGNED_8 Index: $11230_d = 2BDE_h$
Display of the active CAN network error		
Selection list (read only)		
0	No error	
1	Guard Event	
2	Warning	
3	Bus off	
4	Sync telegram error	
6	CAN controller overflow	
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer		Scaling factor: 1

C14346

Parameter | Name: **C14346 | CAN heartbeat activity**			Data type: BITFIELD_32 Index: $11229_d = 2BDD_h$
▸ Heartbeat protocol (📖 80)			
Display range			
0x00000000		0xFFFFFFFF	
Value is bit-coded:			
Bit 0	Heartbeat node 1		
...	...		
Bit 31	Heartbeat node 32		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14347

Parameter | Name: **C14347 | CAN heartbeat status**	Data type: UNSIGNED_8 Index: $11228_d = 2BDC_h$

Status of node 1 ... 32

▸ Heartbeat protocol (📖 80)

Selection list (read only)	
0	Unknown
4	Stopped
5	Operational
127	Pre-operational

Subcodes	Information
C14347/1	
...	
C14347/32	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14348

Parameter | Name: **C14348 | CAN status DIP switch**	Data type: UNSIGNED_8 Index: $11227_d = 2BDB_h$

- The value "1" means that the CAN DIP switches have been recognised during power-on and a valid baud rate and node address have been set.
- The value "0" means that either no CAN DIP switch or no valid setting has been recognised or that the setting has been overwritten by code C14350 or C14351.

Selection list (read only)		Information
0	Setting not accepted	
1	Setting accepted	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14349

Parameter | Name: **C14349 | CAN setting of DIP switch**	Data type: UNSIGNED_8 Index: $11226_d = 2BDA_h$

CAN DIP switch setting during last power-on

▸ Possible settings via DIP switches (📖 33)

Display range (min. value | unit | max. value)		
0		255

Subcodes	Information
C14349/1	Node address
C14349/2	Baud rate: 0: 500 kbps 1: 250 kbps 2: 125 kbps 3: 50 kbps 4: 1 Mbps 5: 20 kbps 6: 10 kbit/s 14: 800 kbps 255: Automatic detection

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14350

Parameter | Name:
C14350 | CAN node address

Data type: UNSIGNED_8
Index: $11225_d = 2BD9_h$

- A change in the node address is only effective after a "Reset node" (C00002 = 92).
- The basic server channel RX/TX is automatically provided by the node address (C14372 and C14373; both subcode 1).

▸ Setting the node address (📖 33)

Setting range (min. value | unit | max. value)			Lenze setting
1		127	**1**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14351

Parameter | Name:
C14351 | CAN baud rate

Data type: UNSIGNED_8
Index: $11224_d = 2BD8_h$

A change in the baud rate is only effective after a "Reset node" (C00002 = 92).

▸ Setting the baud rate (📖 34)

Selection list (Lenze setting printed in bold)	
0	**500 kbps**
1	250 kbps
2	125 kbps
3	50 kbps
4	1 Mbps
5	20 kbps
6	10 kbps
8	Reserved
9	Reserved
10	Reserved
11	Reserved
12	Reserved
13	Reserved
14	800 kbps
15	Reserved
255	Automatic detection

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14352

Parameter | Name:
C14352 | CAN slave/master

Data type: UNSIGNED_8
Index: $11223_d = 2BD7_h$

If "1" is entered and saved, the drive will start as a CAN master after mains switching.

Selection list (Lenze setting printed in bold)	
0	**Slave**
1	Master

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14356

Parameter | Name:
C14356 | CAN TPDOx cycle time

Data type: UNSIGNED_16
Index: $11219_d = 2BD3_h$

TPDO event time according to DS301, V4.02
- If a different value than "0" is entered, the TPDO is transmitted without further consideration of the transport type after the time set has elapsed.
- Mapping of the CANopen objects I-1800/5 ... I-1803/5 (see DS301, 4.02).

Setting range (min. value | unit | max. value)		
0	ms	65535

Subcodes	Lenze setting	Information
C14356/1	0 ms	Cycle time for TPDO1 ... TPDO4
...		
C14356/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14357

Parameter | Name:
C14357 | CAN RPDOx monitoring time

Data type: UNSIGNED_16
Index: $11218_d = 2BD2_h$

Mapping of the RPDO event time (see DS301, V4.02)
- If a different value than "0" is entered, the RPDO is expected after the time set has elapsed.
- If the RPDO is not received within the expected time, an error message parameterisable under C14591/1...4 can be triggered.

Setting range (min. value | unit | max. value)		
0	ms	65535

Subcodes	Lenze setting	Information
C14357/1	3000 ms	Monitoring time for RPDO1 ... RPDO4
...		
C14357/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14359

Parameter | Name:
C14359 | CAN status

Data type: UNSIGNED_8
Index: $11216_d = 2BD0_h$

Display of the current CAN network status

Selection list (read only)	
0	Operational
1	Pre-operational
4	Boot-up
5	Stopped
7	Reset
8	Initialisation
9	Unknown
10	Baud rate autom. detected

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14360

Parameter | Name:
C14360 | CAN telegram and error counter

Data type: UNSIGNED_16
Index: $11215_d = 2BCF_h$

- After mains connection, all counters start with "0".
- After the maximum value has been reached, it is started with "0" again.

Display range (min. value | unit | max. value)		
0		65535

Subcodes	Information
C14360/1	Stuffing bit error counter • More than five identical bits have been detected.
C14360/2	Format error counter • CAN frame has not been observed.
C14360/3	Acknowledge error counter • No node has confirmed the telegram.
C14360/4	Bit1 error counter • "1" should be sent after bus arbitration, but "0" was read.
C14360/5	Bit0 error counter • "0" should be sent after bus arbitration, but "1" was read.
C14360/6	CRC error counter • Checksum check has indicated an error.
C14360/7	Tx telegram counter • Telegrams received without errors.
C14360/8	Rx telegram counter • Telegrams sent without errors.

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14361

Parameter | Name:
C14361 | CAN bus load

Data type: UNSIGNED_32
Index: $11214_d = 2BCE_h$

The display of the node peak load (subcodes 4 ... 6) can be reset by mains switching or via a "Reset node" command (C00002 = 92).

Display range (min. value | unit | max. value)		
0	%	100

Subcodes	Information
C14361/1	Current node load in Tx direction
C14361/2	Current node load in Rx direction
C14361/3	Current node load by faulty telegrams
C14361/4	Node peak load in Tx direction
C14361/5	Node peak load in Rx direction
C14361/6	Node peak load by faulty telegrams

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14367

Parameter | Name:
C14367 | CAN SYNC Rx identifier

Data type: UNSIGNED_32
Index: $11208_d = 2BC8_h$

Identifier with which the sync slave is to receive sync telegrams.
- Mapping of the CANopen object I-1005 (see DS301, V4.02).

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0		2047	**128**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14368

Parameter | Name:
C14368 | CAN SYNC Tx identifier

Data type: UNSIGNED_32
Index: $11207_d = 2BC7_h$

Identifier with which the sync master is to send sync telegrams.
- Mapping of the CANopen object I-1005 (see DS301, V4.02).

▸ Synchronisation of PDOs via sync telegram (📖 50)

Setting range (min. value | unit | max. value)			Lenze setting
0		2047	**128**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14372

Parameter | Name:
C14372 | CAN SDO server Rx identifier

Data type: BITFIELD_32
Index: $11203_d = 2BC3_h$

Identifier with which the corresponding SDO server can be reached.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO server is deactivated.
- Mapping of the CANopen objects I-1200/1 ... I-1209/1 (see DS301, V4.02).

▸ Identifiers of the parameter data objects (📖 62)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C14372/1	0x00000601	SDO server channel 1 RX • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it can neither be changed nor deactivated. Writing this subcode has no effect. • The value in subcode 1 results from the node address (C14350) + 0x600.
C14372/2	0x80000000	SDO server channel 2 RX
...	...	...
C14372/10	0x80000000	SDO server channel 10 RX

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer — Scaling factor: 1

C14373

Parameter | Name:
C14373 | CAN SDO server Tx identifier

Data type: BITFIELD_32
Index: $11202_d = 2BC2_h$

Identifier with which the corresponding SDO server can carry out transmissions.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO server is deactivated.
- Mapping of the CANopen objects I-1200/2 ... I-1209/2 (see DS301, V4.02).

Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C14373/1	0x00000581	SDO server channel 1 TX • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it can neither be changed nor deactivated. Writing this subcode has no effect. • The value in subcode 1 results from the node address (C14350) + 0x580.
C14373/2	0x80000000	SDO server channel 2 TX
...	...	...
C14373/10	0x80000000	SDO server channel 10 TX

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14374

Parameter | Name:
C14374 | CAN SDO client node address

Data type: UNSIGNED_8
Index: $11201_d = 2BC1_h$

Node address of the client assigned to this server (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
1		127

Subcodes	Lenze setting	Information
C14374/1	1	SDO server channel 1 remote client node address • Subcode 1 contains the basic SDO channel. According to DS301, V4.02 it does not have this entry. Writing this subcode has no effect. • The value of subindex 1 is 0.
C14374/2	1	SDO server channel 2 remote client node address
...	...	...
C14374/10	1	SDO server channel 10 remote client node address

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14375

Parameter | Name:
C14375 | CAN SDO client Rx identifier

Data type: BITFIELD_32
Index: $11200_d = 2BC0_h$

Identifier with which the corresponding SDO client can be reached.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO client channel is deactivated (see DS301, V4.02).
- The client channels need not be parameterised right now. Their functionality will only be required when using the gateway services.

Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C14375/1	0x80000000	SDO client channel 1 RX ... 10 RX
...		
C14375/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14376

Parameter | Name:
C14376 | CAN SDO client Tx identifier

Data type: BITFIELD_32
Index: $11199_d = 2BBF_h$

Identifier with which the corresponding SDO client can carry out transmissions.
- If bit 31 is set (0x8nnnnnnn), the corresponding SDO client channel is deactivated (see DS301, V4.02).
- The client channels need not be parameterised right now. Their functionality will only be required when using the gateway services.

Identifiers of the parameter data objects (📖 62)

Setting range		
0x00000000		0xFFFFFFFF

Value is bit-coded:		Information
Bit 0	COB-ID bit 0	• Bit 0 ... 10: COB-ID • Bit 11 ... 30: Reserved • Bit 31: SDO invalid
...	...	
Bit 31	SDO invalid	

Subcodes	Lenze setting	Information
C14376/1	0x80000000	SDO client channel 1 TX ... 10 TX
...		
C14376/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14377

Parameter | Name:
C14377 | CAN SDO server node address

Data type: UNSIGNED_8
Index: $11198_d = 2BBE_h$

Node address of the server with which this client communicates via the client channel selected.
- An activation of the client functionality is not required.
- An entry is required so that the CAN-SDO client channel can be activated (see DS301, V4.02).

Setting range (min. value | unit | max. value)		
1		127

Subcodes	Lenze setting	Information
C14377/1	1	Remote server node address for SDO client channel 1 ... 10
...		
C14377/10		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14378

Parameter | Name:
C14378 | CAN delay boot-up - Operational

Data type: UNSIGNED_16
Index: $11197_d = 2BBD_h$

Time that has to elapse after mains switching before the CAN NMT master transmits the "Start remote node" telegram on the bus.
- This time is only used after mains switching if the master bit is activated (C14352).

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**3000 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14381

Parameter | Name:
C14381 | CAN Heartbeat Producer Time

Data type: UNSIGNED_16
Index: $11194_d = 2BBA_h$

Time interval for the transmission of the heartbeat telegram to one or several consumers.
- The parameterised time is rounded down to an integer multiple of 5 ms.
- The heartbeat telegram is transmitted automatically as soon as a time > 0 ms is set. The monitoring function "Node Guarding" is deactivated in this case.
- Mapping of the CANopen object I-1017 (see DS301, V4.02).

▸ Heartbeat protocol (📖 80)

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**0 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14382

Parameter | Name:
C14382 | CAN Guard Time

Data type: UNSIGNED_16
Index: $11193_d = 2BB9_h$

- After the guard time (set here) multiplied with the life time factor (C14383), a node guarding telegram must have arrived.
- Mapping of the CANopen object I-100C (see DS301, V4.02).

▸ Node guarding protocol (📖 74)

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**0 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14383

Parameter | Name:
C14383 | CAN Life Time Factor

Data type: UNSIGNED_8
Index: $11192_d = 2BB8_h$

- The life time factor multiplied with the guard time (C14382) is the time within which a node guarding telegram must have arrived.
- Mapping of the CANopen object I-100D (see DS301, V4.02).

▸ Node guarding protocol (📖 74)

Setting range (min. value | unit | max. value)			Lenze setting
0		255	**0**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14385

Parameter | Name:
C14385 | CAN Heartbeat Consumer Time

Data type: BITFIELD_32
Index: $11190_d = 2BB6_h$

The 32 subcodes represent the nodes which are to be monitored via heartbeat.

- Each bit-coded subcode entry contains the expected heartbeat time and the node ID (node address) from which the heartbeat telegram is expected.
- The parameterised time is rounded down to an integer multiple of 5 ms and must have a higher value than the heartbeat producer time (C14381) of the node to be monitored.
- The response to a missing heartbeat telegram can be parameterised in C14613.
- Mapping of the CANopen object I-1016 (see DS301, V4.02).

▸ Heartbeat protocol (📖 80)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	Heartbeat time bit 0	• Bit 0 ... 15: Heartbeat time • Bit 16 ... 23: Node address • Bit 24 ... 31: Reserved
...	...	
Bit 31	Reserved	

Subcodes	Lenze setting	Information
C14385/1	0x00000000	Monitoring entry 1 ... 32
...		
C14385/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14386

Parameter | Name:
C14386 | CAN Node Guarding

Data type: BITFIELD_32
Index: $11189_d = 2BB5_h$

These 32 subcodes represent the nodes which are to be monitored by the master via node guarding.

- Each bit-coded subcode entry contains the guard time (C14382), the life time factor (C14383), and the node address (C14350) from which the node guarding telegram is expected.
- The response to a missing node guarding response can be parameterised in C14612.

▸ Node guarding protocol (📖 74)

Setting range			
0x00000000		0xFFFFFFFF	

Value is bit-coded:		Information
Bit 0	Guard time bit 0	• Bit 0 ... 15: Guard time • Bit 16 ... 23: Node address • Bit 24 ... 31: Life time factor
...	...	
Bit 31	Lifetime factor bit 7	

Subcodes	Lenze setting	Information
C14386/1	0x00000000	Monitoring entry 1 ... 32
...		
C14386/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14387

Parameter | Name:
C14387 | CAN Node Guarding Activity

Data type: BITFIELD_32
Index: $11188_d = 2BB4_h$

▸ Node guarding protocol (📖 74)

Display range		
0x00000000		0xFFFFFFFF

Value is bit-coded:	
Bit 0	Node guarding of node 1
...	...
Bit 31	Node guarding of node 32

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14388

Parameter | Name:
C14388 | CAN node guarding status

Data type: UNSIGNED_8
Index: $11187_d = 2BB3_h$

Node guarding status of node 1 ... 32

▸ Node guarding protocol (📖 74)

Selection list (read only)	
0	Unknown
4	Stopped
5	Operational
127	Pre-operational

Subcodes	Information
C14388/1	
...	
C14388/32	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14390

Parameter | Name: **C14390 | CAN Error Register (DS301V402)**			Data type: BITFIELD_8 Index: $11185_d = 2BB1_h$
Mapping of the CANopen object I-1001 (see DS301, V4.02)			
Display range			
0x00		0xFF	
Value is bit-coded:			**Information**
Bit 0	Generic error		Currently only bits 0 and 4 contain the corresponding information.
Bit 1	Current error (not used)		
Bit 2	Voltage error (not used)		
Bit 3	Temperature error (not used)		
Bit 4	Communication error		
Bit 5	Dev. prof. spec. err (not used)		
Bit 6	Reserved		
Bit 7	Manuf. spec. error (not used)		
☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14391

Parameter | Name: **C14391 | CAN Emergency Object**			Data type: BITFIELD_32 Index: $11184_d = 2BB0_h$
Identifier of the emergency telegram • If bit 31 of this code is set (0x8nnnnnnn), the generation of emergency telegrams is deactivated. • Mapping of the CANopen object I-1014 (see DS301, V4.02). ▸ Emergency telegram (📖 84)			
Setting range			**Lenze setting**
0x00000000		0xFFFFFFFF	**0x00000081** (decimal: 129)
Value is bit-coded: (☑ = bit set)			**Information**
Bit 0 ☑	COB-ID bit 0		
Bit 1 ☐	COB-ID bit 1		
Bit 2 ☐	COB-ID bit 2		
Bit 3 ☐	COB-ID bit 3		
Bit 4 ☐	COB-ID bit 4		
Bit 5 ☐	COB-ID bit 5		
Bit 6 ☐	COB-ID bit 6		
Bit 7 ☑	COB-ID bit 7		
Bit 8 ☐	COB-ID bit 8		
Bit 9 ☐	COB-ID bit 9		
Bit 10 ☐	COB-ID bit 10		
Bit 11 ☐	Reserved		
...	...		
Bit 30 ☐	Reserved		
Bit 31 ☐	Emergency inactive/active		
☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer			Scaling factor: 1

C14392

Parameter | Name:
C14392 | CAN emergency delay time

Data type: UNSIGNED_16
Index: $11183_d = 2BAF_h$

Minimum time that has to elapse between two successive emergency telegrams.
- If "0" is set, checking of the inhibit time is deactivated.
- The time is entered in 1/10 ms. The code automatically rounds the entries down to the preceding full millisecond.
- Mapping of the CANopen object I-1015 (see DS301, V4.02).

▸ Emergency telegram (📖 84)

Setting range (min. value | unit | max. value)			Lenze setting
0		65535	**0**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14393

Parameter | Name:
C14393 | CAN result - bus scan

Data type: UNSIGNED_8
Index: $11182_d = 2BAE_h$

Result of a CAN bus scan previously carried out (C00002 = 96).
- The subcode number 1 ... 128 corresponds to the node address 1 ... 128.

Display range (min. value | unit | max. value)		
0		1

Subcodes	Information
C14393/1	Result of the CAN bus scan for node address 1 ... 128 • The value "1" means that a device with the corresponding node address has been found.
...	
C14393/128	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14394

Parameter | Name:
C14394 | CAN predefined error field (DS301V402)

Data type: UNSIGNED_32
Index: $24181_d = 5E75_h$

Predefined error field according to DS301, V4.02

Display range (min. value | unit | max. value)		
0		4294967295

Subcodes	Information
C14394/1	
...	
C14394/10	

☑ Read access ☐ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14591

Parameter | Name: **C14591 | Resp. to CAN-RPDOx error**	Data type: UNSIGNED_8 Index: $10984_d = 2AE8_h$

Response if the corresponding CAN RPDO has not been received within the configured time (C13357/1...4 / C14357/1...4) or with the configured sync.

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C14591/1	0: No response	Response to the absence of RPDO1 ... RPDO4
...		
C14591/4		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14595

Parameter | Name: **C14595 | Resp. to CAN bus OFF**	Data type: UNSIGNED_8 Index: $10980_d = 2AE4_h$

Response if CAN node switches to the bus-off state.

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	**No response**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14612

Parameter | Name:
C14612 | Resp. to CAN node guarding error

Data type: UNSIGNED_8
Index: $10963_d = 2AD3_h$

Response of master if the corresponding node guarding response is missing.
▸ Node guarding protocol (📖 74)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C14612/1	0: No response	Response to the absence of the node guarding response for monitoring entry 1 ... 32
...		
C14612/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14613

Parameter | Name:
C14613 | Resp. to CAN heartbeat error

Data type: UNSIGNED_8
Index: $10962_d = 2AD2_h$

Response if the corresponding heartbeat telegram is missing.
▸ Heartbeat protocol (📖 80)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	No response

Subcodes	Lenze setting	Information
C14613/1	0: No response	Response to the absence of the heartbeat telegram for monitoring entry 1 ... 32
...		
C14613/32		

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14614

Parameter | Name: **C14614 | Resp. to CAN life guarding error**	Data type: UNSIGNED_8 Index: $10961_d = 2AD1_h$

Response of slave if node guarding request is missing.
▸ Node guarding protocol (📖 74)

Selection list (Lenze setting printed in bold)	
1	Fault
2	Trouble
3	Quick stop by trouble
4	Warning locked
5	Warning
6	Information
0	**No response**

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

C14625

Parameter | Name: **C14625 | CAN behaviour in case of fault**	Data type: UNSIGNED_8 Index: $10950_d = 2AC6_h$

Mapping of the CANopen object I-1029 (see DS301, V4.02)

Selection list (Lenze setting printed in bold)	
0	**Pre-operational state**
1	No state change
2	Stopped state

☑ Read access ☑ Write access ☐ CINH ☐ PLC STOP ☐ No transfer Scaling factor: 1

13.4 Table of attributes

The table of attributes contains information required for communicating with the controller via parameters.

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter designation	Cxxxxx	
Name		Parameter short text (display text)	*Text*	
Index	dec	Index by which the parameter is addressed. The subindex of array variables corresponds to the Lenze subcode number.	24575 - Lenze code number	Only required for access via a bus system.
	hex		$5FFF_h$ - Lenze code number	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	*Number*	
	DT	Data type	BITFIELD_8	1 byte, bit-coded
			BITFIELD_16	2 bytes, bit-coded
			BITFIELD_32	4 bytes, bit-coded
			INTEGER_8	1 byte, with sign
			INTEGER_16	2 bytes, with sign
			INTEGER_32	4 bytes, with sign
			UNSIGNED_8	1 byte, without sign
			UNSIGNED_16	2 bytes, without sign
			UNSIGNED_32	4 bytes, without sign
			VISIBLE_STRING	ASCII string
			OCTET_STRING	
	Factor	Factor for data transmission via a bus system, depending on the number of decimal positions	*Factor*	1 = no decimal positions 10 = 1 decimal position 100 = 2 decimal positions 1000 = 3 decimal positions
Access	R	Read access	☑ Reading permitted	
	W	Write access	☑ Writing permitted	
	CINH	Controller inhibit (CINH) required	☑ Writing possible in the case of controller inhibit (CINH) only	

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C13311	CAN TPDO1 mask byte x	24264	5EC8	A	8	BITFIELD_8	1	☑	☑	
C13312	CAN TPDO2 mask byte x	24263	5EC7	A	8	BITFIELD_8	1	☑	☑	
C13313	CAN TPDO3 mask byte x	24262	5EC6	A	8	BITFIELD_8	1	☑	☑	
C13314	CAN TPDO4 mask byte x	24261	5EC5	A	8	BITFIELD_8	1	☑	☑	
C13320	CAN TPDOx identifier	24255	5EBF	A	4	BITFIELD_32	1	☑	☑	
C13321	CAN RPDOx identifier	24254	5EBE	A	4	BITFIELD_32	1	☑	☑	
C13322	CAN TPDOx Tx mode	24253	5EBD	A	4	UNSIGNED_8	1	☑	☑	
C13323	CAN RPDOx Rx mode	24252	5EBC	A	4	UNSIGNED_8	1	☑	☑	
C13324	CAN TPDOx delay time	24251	5EBB	A	4	UNSIGNED_16	1	☑	☑	
C13343	CAN TPDO counter	24232	5EA8	A	4	UNSIGNED_32	1	☑		
C13344	CAN RPDO counter	24231	5EA7	A	4	UNSIGNED_32	1	☑		
C13345	CAN error	24230	5EA6	E	1	UNSIGNED_8	1	☑		
C13346	CAN heartbeat activity	24229	5EA5	E	1	BITFIELD_32	1	☑		
C13347	CAN heartbeat status	24228	5EA4	A	32	UNSIGNED_8	1	☑		
C13348	CAN status DIP switch	24227	5EA3	E	1	UNSIGNED_8	1	☑		
C13349	CAN setting of DIP switch	24226	5EA2	A	2	UNSIGNED_8	1	☑		
C13350	CAN node address	24225	5EA1	E	1	UNSIGNED_8	1	☑	☑	
C13351	CAN baud rate	24224	5EA0	E	1	UNSIGNED_8	1	☑	☑	
C13352	CAN slave/master	24223	5E9F	E	1	UNSIGNED_8	1	☑	☑	
C13356	CAN TPDOx cycle time	24219	5E9B	A	4	UNSIGNED_16	1	☑	☑	
C13357	CAN RPDOx monitoring time	24218	5E9A	A	4	UNSIGNED_16	1	☑	☑	
C13359	CAN status	24216	5E98	E	1	UNSIGNED_8	1	☑		
C13360	CAN telegram and error counter	24215	5E97	A	8	UNSIGNED_16	1	☑		
C13361	CAN bus load	24214	5E96	A	6	UNSIGNED_32	1	☑		
C13367	CAN SYNC Rx identifier	24208	5E90	E	1	UNSIGNED_32	1	☑	☑	
C13368	CAN SYNC Tx identifier	24207	5E8F	E	1	UNSIGNED_32	1	☑	☑	
C13372	CAN SDO server Rx identifier	24203	5E8B	A	10	BITFIELD_32	1	☑	☑	
C13373	CAN SDO server Tx identifier	24202	5E8A	A	10	BITFIELD_32	1	☑	☑	
C13374	CAN SDO client node address	24201	5E89	A	10	UNSIGNED_8	1	☑	☑	
C13375	CAN SDO client Rx identifier	24200	5E88	A	10	BITFIELD_32	1	☑	☑	
C13376	CAN SDO client Tx identifier	24199	5E87	A	10	BITFIELD_32	1	☑	☑	
C13377	CAN SDO server node address	24198	5E86	A	10	UNSIGNED_8	1	☑	☑	
C13378	CAN delay boot-up - Operational	24197	5E85	E	1	UNSIGNED_16	1	☑	☑	
C13381	CAN heartbeat producer time	24194	5E82	E	1	UNSIGNED_16	1	☑	☑	
C13382	CAN guard time	24193	5E81	E	1	UNSIGNED_16	1	☑	☑	
C13383	CAN life time factor	24192	5E80	E	1	UNSIGNED_8	1	☑	☑	
C13385	CAN heartbeat consumer time	24190	5E7E	A	32	BITFIELD_32	1	☑	☑	
C13386	CAN node guarding	24189	5E7D	A	32	BITFIELD_32	1	☑	☑	
C13387	CAN node guarding activity	24188	5E7C	E	1	BITFIELD_32	1	☑		
C13388	CAN node guarding status	24187	5E7B	A	32	UNSIGNED_8	1	☑		
C13390	CAN Error Register (DS301V402)	24185	5E79	E	1	BITFIELD_8	1	☑		
C13391	CAN emergency object	24184	5E78	E	1	BITFIELD_32	1	☑	☑	
C13392	CAN emergency delay time	24183	5E77	E	1	UNSIGNED_16	1	☑	☑	
C13393	CAN bus scan result	24182	5E76	A	128	UNSIGNED_8	1	☑		
C13394	CAN predefined error field (DS301V402)	24181	5E75	A	10	UNSIGNED_32	1	☑		
C13591	Resp. CAN RPDOx error	23984	5DB0	A	4	UNSIGNED_8	1	☑	☑	
C13595	Resp. to CAN bus OFF	23980	5DAC	E	1	UNSIGNED_8	1	☑	☑	
C13612	Resp. CAN node guarding error	23963	5D9B	A	32	UNSIGNED_8	1	☑	☑	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C13613	Resp. to CAN heartbeat error	23962	5D9A	A	32	UNSIGNED_8	1	☑	☑	
C13614	Resp. to CAN life guarding error	23961	5D99	E	1	UNSIGNED_8	1	☑	☑	
C13625	CAN behaviour in the case of error	23950	5D8E	E	1	UNSIGNED_8	1	☑	☑	
C14311	CAN TPDO1 mask byte x	24264	5EC8	A	8	BITFIELD_8	1	☑	☑	
C14312	CAN TPDO2 mask byte x	24263	5EC7	A	8	BITFIELD_8	1	☑	☑	
C14313	CAN TPDO3 mask byte x	24262	5EC6	A	8	BITFIELD_8	1	☑	☑	
C14314	CAN TPDO4 mask byte x	24261	5EC5	A	8	BITFIELD_8	1	☑	☑	
C14320	CAN TPDOx identifier	24255	5EBF	A	4	BITFIELD_32	1	☑	☑	
C14321	CAN RPDOx identifier	24254	5EBE	A	4	BITFIELD_32	1	☑	☑	
C14322	CAN TPDOx Tx mode	24253	5EBD	A	4	UNSIGNED_8	1	☑	☑	
C14323	CAN RPDOx Rx mode	24252	5EBC	A	4	UNSIGNED_8	1	☑	☑	
C14324	CAN TPDOx delay time	24251	5EBB	A	4	UNSIGNED_16	1	☑	☑	
C14343	CAN TPDO counter	24232	5EA8	A	4	UNSIGNED_32	1	☑		
C14344	CAN RPDO counter	24231	5EA7	A	4	UNSIGNED_32	1	☑		
C14345	CAN error	24230	5EA6	E	1	UNSIGNED_8	1	☑		
C14346	CAN heartbeat activity	24229	5EA5	E	1	BITFIELD_32	1	☑		
C14347	CAN heartbeat status	24228	5EA4	A	32	UNSIGNED_8	1	☑		
C14348	CAN status DIP switch	24227	5EA3	E	1	UNSIGNED_8	1	☑		
C14349	CAN setting of DIP switch	24226	5EA2	A	2	UNSIGNED_8	1	☑		
C14350	CAN node address	24225	5EA1	E	1	UNSIGNED_8	1	☑	☑	
C14351	CAN baud rate	24224	5EA0	E	1	UNSIGNED_8	1	☑	☑	
C14352	CAN slave/master	24223	5E9F	E	1	UNSIGNED_8	1	☑	☑	
C14356	CAN TPDOx cycle time	24219	5E9B	A	4	UNSIGNED_16	1	☑	☑	
C14357	CAN RPDOx monitoring time	24218	5E9A	A	4	UNSIGNED_16	1	☑	☑	
C14359	CAN status	24216	5E98	E	1	UNSIGNED_8	1	☑		
C14360	CAN telegram and error counter	24215	5E97	A	8	UNSIGNED_16	1	☑		
C14361	CAN bus load	24214	5E96	A	6	UNSIGNED_32	1	☑		
C14367	CAN SYNC Rx identifier	24208	5E90	E	1	UNSIGNED_32	1	☑	☑	
C14368	CAN SYNC Tx identifier	24207	5E8F	E	1	UNSIGNED_32	1	☑	☑	
C14372	CAN SDO server Rx identifier	24203	5E8B	A	10	BITFIELD_32	1	☑	☑	
C14373	CAN SDO server Tx identifier	24202	5E8A	A	10	BITFIELD_32	1	☑	☑	
C14374	CAN SDO client node address	24201	5E89	A	10	UNSIGNED_8	1	☑	☑	
C14375	CAN SDO client Rx identifier	24200	5E88	A	10	BITFIELD_32	1	☑	☑	
C14376	CAN SDO client Tx identifier	24199	5E87	A	10	BITFIELD_32	1	☑	☑	
C14377	CAN SDO server node address	24198	5E86	A	10	UNSIGNED_8	1	☑	☑	
C14378	CAN delay boot-up - Operational	24197	5E85	E	1	UNSIGNED_16	1	☑	☑	
C14381	CAN heartbeat producer time	24194	5E82	E	1	UNSIGNED_16	1	☑	☑	
C14382	CAN guard time	24193	5E81	E	1	UNSIGNED_16	1	☑	☑	
C14383	CAN life time factor	24192	5E80	E	1	UNSIGNED_8	1	☑	☑	
C14385	CAN heartbeat consumer time	24190	5E7E	A	32	BITFIELD_32	1	☑	☑	
C14386	CAN node guarding	24189	5E7D	A	32	BITFIELD_32	1	☑	☑	
C14387	CAN node guarding activity	24188	5E7C	E	1	BITFIELD_32	1	☑		
C14388	CAN node guarding status	24187	5E7B	A	32	UNSIGNED_8	1	☑		
C14390	CAN Error Register (DS301V402)	24185	5E79	E	1	BITFIELD_8	1	☑		
C14391	CAN emergency object	24184	5E78	E	1	BITFIELD_32	1	☑	☑	
C14392	CAN emergency delay time	24183	5E77	E	1	UNSIGNED_16	1	☑	☑	
C14393	CAN bus scan result	24182	5E76	A	128	UNSIGNED_8	1	☑		
C14394	CAN predefined error field (DS301V402)	24181	5E75	A	10	UNSIGNED_32	1	☑		
C14591	Resp. CAN RPDOx error	23984	5DB0	A	4	UNSIGNED_8	1	☑	☑	
C14595	Resp. to CAN bus OFF	23980	5DAC	E	1	UNSIGNED_8	1	☑	☑	

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	DT	Factor	R	W	CINH
C14612	Resp. CAN node guarding error	23963	5D9B	A	32	UNSIGNED_8	1	☑	☑	
C14613	Resp. to CAN heartbeat error	23962	5D9A	A	32	UNSIGNED_8	1	☑	☑	
C14614	Resp. to CAN life guarding error	23961	5D99	E	1	UNSIGNED_8	1	☑	☑	
C14625	CAN behaviour in the case of error	23950	5D8E	E	1	UNSIGNED_8	1	☑	☑	

14 Implemented CANopen objects

Lenze devices can be parameterised with Lenze codes and with manufacturer-independent "CANopen objects". For a completely CANopen-conform communication only the CANopen objects may be used for parameter setting. The CANopen objects described in this chapter are defined in the CANopen specification DS301, V4.02.

Many CANopen objects can be mapped to Lenze codes. In the following table, the related Lenze codes are listed in the column "Relationship to Lenze code".

Note!

Some of the terms used here derive from the CANopen protocol.

Overview of the CANopen indexes and their relationship to Lenze codes

CANopen object			Relationship to Lenze code
Index	Subindex	Name	
I-1000	0	Device type	-
I-1001	0	Error register	C13390 / C14390
I-1003	Pre-defined error field		
	0	Number of errors	-
	1 ... 10	Standard error field	-
I-1005	0	COB-ID SYNC message	C13367 / C14367
			C13368 / C13368
I-1006	0	Communication cycle period	C00369
I-100C	0	Guard time	C13382 / C14382
I-100D	0	Life time factor	C13383 / C14383
I-1010	Store parameters		
	0	Highest subindex supported	-
	1	Save all parameters	-
I-1011	Restore default parameters		
	0	Highest subindex supported	-
	1	restore all default parameters	-
I-1014	0	COB-ID EMCY	C13391 / C14391
I-1015	0	Inhibit time EMCY	C13392 / C14392
I-1016	Consumer heartbeat time		
	0	Highest subindex supported	-
	1 ... 32	Consumer heartbeat time	C13385/1...32 / C14385/1...32
I-1017	0	Producer heartbeat time	C13381 / C14381
I-1018	Identity object		
	0	Highest subindex supported	-
	1	Vendor ID	-
	2	Product code	-
	3	Revision number	-
	4	Serial number	-

CANopen object			Relationship to Lenze code
Index	Subindex	Name	
I-1029	Error behaviour		
	0	Highest subindex supported	-
	1	Communication error	C13625 / C14625
I-1200	SDO1 server parameter		
	0	Highest subindex supported	-
	1	COB-ID client –> server (rx)	C13372/1 / C14372/1
	2	COB-ID server –> client (tx)	C13373/1 / C14373/1
I-1201 ... I-1209	SDO2 ... SDO10 server parameter		
	0	Highest subindex supported	-
	1	COB-ID client –> server (rx)	C13372/2...10 / C14372/2...10
	2	COB-ID server –> client (tx)	C13373/2...10 / C14373/2...10
	3	Node-ID of the SDO client	-
I-1400 ... I-1403	RPDO1 ... RPDO4 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by RPDO	C13321/1...4 / C14321/1...4
	2	Transmission type	C13323/1...4 / C14323/1...4
	3	Inhibit time	-
	4	Compatibility entry	-
	5	Event timer	-
I-1600 ... I-1603	RPDO1 ... RPDO4 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 8	Application object 1 ... 8	-
I-1800 ... I-1803	TPDO1 ... TDDO4 communication parameter		
	0	Highest subindex supported	-
	1	COB-ID used by TPDO	C13320/1...4 / C14320/1...4
	2	Transmission type	C13322/1...4 / C14322/1...4
	3	Inhibit time	C13324/1...4 / C14324/1...4
	4	Reserved	-
	5	Event timer	C13356/1...4 / C14356/1...4
I-1A00 ... I-1A03	TPDO1 ... TDDO4 mapping parameter		
	0	Number of mapped application objects in PDO	-
	1 ... 8	Application object 1 ... 8	-

I-1000 - Device type

Index **I-1000**	Name: **Device type**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Device type	0	0		4294967295	ro	U32

This object specifies the profile for this device. Furthermore, additional information defined in the device profile itself can be stored here.

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
High word		Low word	
High byte	Low byte	High byte	Low byte
Additional information		**Device profile number**	

[14-1] Data telegram assignment

I-1001 - Error register

Index: **I-1001**	Name: **Error register**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: Error register	-	0		255	ro	U8

Error register

- This object is related to the Lenze code C13390 / C14390.
- The error status in the data byte (U8) is bit coded (see the following table). Currently only bit 0 and bit 4 in the data byte contain the corresponding information.

Bit	Meaning if bit is set:
Bit 0	Generic error
Bit 1	Current error (not used)
Bit 2	Voltage error (not used)
Bit 3	Temperature error (not used)
Bit 4	Communication error
Bit 5	Device profile spec. error (not used)
Bit 6	Reserved
Bit 7	Manufacturer-specific error (not used)

I-1003 - Pre-defined error field

Index: I-1003	Name: Pre-defined error field					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Number of errors	0	0		255	rw	U8
1 ... 10: Standard error field	-	0		4294967295	ro	U32

Error history

This object indicates that an error has occurred in the communication module and in the standard device.

Subindex	Meaning
0	Number of the error messages stored
1 ... 10	Display of the error list The error messages (U32) consist of a 16-bit error code and a 16-bit manufacturer-specific information field.

Note!

The values in the "standard error field" under subindexes 1 ... 10 will be deleted if the subindex "number of recorded errors" is overwritten with the value "0".

Emergency error code	Cause	Entry in the error register (I-1001)
0x0000	One of several errors eliminated	0xxx
	Elimination of an individual error (afterwards error-free state)	0x00
0x1000	Standard device is in error status (error response "Trouble", "Message", "Warning", "Fault", "Quick stop by trouble" or "System fault")	0x01
0x3100	Supply voltage of standard device faulty or failed	0x01
0x8100	Communication error (warning)	0x11
0x8130	Life guard error or heartbeat error	0x11
0x8150	Collision of COB-IDs: an ID parameterised for reception also is used for transmission.	0x11
0x8210	PDO length is shorter than the expected PDO length	0x11
0x8220	PDO length is longer than the expected PDO length	0x11
0x8700	Sync telegram monitoring	0x11

I-1005 - COB-ID SYNC message

Index:	Name:					
I-1005	**COB-ID SYNC message**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: COB-ID SYNC message	0x0000 0080 or 0x8000 0080	0		4294967295	rw	U32

This object serves to activate the creation of sync telegrams and write the value of the identifier.

- This object is related to the Lenze codes C13367 / C14367 and C13368 / C14368.

Creating sync telegrams

To create sync telegrams, bit 30 (see below) must be set to "1". The interval of the sync telegrams can be set with the object I-1006.

Writing identifiers

For the reception of PDOs, the value 0x80 is entered in the 11-bit identifier in the Lenze setting (and according to DS301, V4.02). This means that all modules are by default set to the same sync telegram.

- If sync telegrams are only to be received by specific communication modules, their identifiers can be entered with a value of up to and including 0x07FF.
- The identifier may only be changed if the communication module does not transmit a sync telegram (bit 30 = "0").
- How to change the identifier:
  - Deactivate identifier (set bit 30 to "0").
  - Change identifier.
  - Activate identifier (set bit 30 to "1").

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
x	**0/1**	**Extended identifier***		**11-bit identifier**
* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".				

[14-2] Data telegram assignment

I-1006 - Communication cycle period

Index: I-1006	Name: Communication cycle period					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Communication cycle period	0 µs	0	µs	65535000	rw	U32

Setting the sync telegram cycle time.

- A cycle time can be defined with the entry "1000" or an integer multiple of it.
- With "0 µs" (Lenze setting), no sync telegrams are created.
- This object is related to the Lenze code C00369.

I-100C - Guard time

Index: I-100C	Name: Guard time					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Guard time	0 ms	0	ms	65535	rw	U16

Monitoring time for node guarding. ▸ Node guarding protocol (📖 74)

- Time within the NMT slave expects the RTRs from the NMTmaster.
- The node life time is the product of the guard time and the life time factor:
  Node Life Time = Guard Time (I-100C) **x Life Time Factor** (I-100D)
- The "life guarding event" occurs in the NMT slave if the slave has not been triggered by the NMT master through an RTR within the node life time.
- With "0 ms" (Lenze setting), monitoring is not supported by the slave.
- This object is related to the Lenze code C13382 / C14382.

I-100D

Index: I-100D	Name: Life time factor					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Life time factor	0	0		255	rw	U8

Life Time Factor for node guarding. ▸ Node guarding protocol (📖 74)

- The node life time is the product of the guard time and the life time factor:
  Node Life Time = Guard Time (I-100C) **x Life Time Factor** (I-100D)
- The "life guarding event" occurs in the NMT slave if the slave has not been triggered by the NMT master through an RTR within the node life time.
- With "0" (Lenze setting), monitoring is not supported by the slave.
- This object is related to the Lenze code C13383 / C14383.

I-1010 - Store parameters

Index: **I-1010**	Name: **Store parameters**				
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	1	- (only read access)			ro	U32
1: Save all parameters	-	0		4294967295	rw	U32

Save parameters with mains failure protection.

- Corresponds to the device command **C00002 = "11: Save start parameters"**.
- This command serves to save the current parameter settings of the active application with mains failure protection in the memory module of the controller.

Subindex	Meaning	
	Read	**Write**
0	Max. supported subindex: 1	- (A write attempt triggers the error message 0x06010002.)
1	Reading memory functions of all parameters.	Save parameters with mains failure protection.

Read subindex 1

8th byte	7th byte	6th byte	5th byte	
Data 4	**Data 3**	**Data 2**	**Data 1**	
Bit 31 ... bit 2			Bit 1	Bit 0
0			**0**/1	0/**1**

[14-3] Assignment of the data telegram (read access)

Bit	Meaning	
Bit 0	0	No saving of parameters on command.
	1	Saving of parameters on command (Lenze).
Bit 1	0	No automatic saving of parameters (Lenze).
	1	Automatic saving of parameters.

Write subindex 1

In addition to the index and subindex, the telegram data must also include the "save" signature (ASCII characters; ISO 8859) so that the parameters are stored.

- Writing with a wrong identifier causes a response according to CANopen specification DS301, V4.02.

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
"e" = 0x65	**"v" = 0x76**	**"a" = 0x61**	**"s" = 0x73**

[14-4] Assignment of the data telegram (write access)

I-1011 - Restore default parameters

Index: I-1011	Name: Restore default parameters					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	1	- (only read access)			ro	U32
1: restore all default parameters	-	0		4294967295	rw	U32

Load Lenze setting.

- Corresponds to the device command **C00002 = "0: Load Lenze setting"**.
- This command serves to reset the parameters of the active application to the Lenze setting which is stored in the firmware.

Subindex	Meaning	
	Read	Write
0	Max. supported subindex: 1	- (A write attempt triggers the error message 0x06010002.)
1	Loading of all parameters possible.	Load Lenze setting.

Read subindex 1

8th byte	7th byte	6th byte	5th byte	
Data 4	Data 3	Data 2	Data 1	
Bit 31 ... bit 1				Bit 0
0				0/**1**

[14-5] Assignment of the data telegram (read)

Bit	Setting	
Bit 0	0	Parameters cannot be loaded.
	1	Parameters can be loaded (Lenze).

Write subindex 1

In addition to the index and subindex, the telegram data must include the "load" signature (ASCII characters; ISO 8859) so that the Lenze setting can be loaded.

- Writing with a wrong identifier causes a response according to the CANopen specification DS301, V4.02.

8th byte	7th byte	6th byte	5th byte
Data 4	Data 3	Data 2	Data 1
"d" = 0x64	**"a" = 0x61**	**"o" = 0x6F**	**"l" = 0x6C**

[14-6] Assignment of the data telegram (write)

I-1014 - COB-ID EMCY

Index: I-1014	Name: COB-ID EMCY					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: COB-ID EMCY	0x80+Node-ID	0		4294967295	rw	U32

If a communication error or an internal error of the communication module or the controller occurs or is acknowledged (e. g. "trouble"), an error message is sent via the system bus (CANopen). For each error, the telegram is transmitted once. This function can be activated or deactivated by means of bit 31.

▶ This object is related to the Lenze code C13391 / C14391.

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0/1	**0**	**Extended identifier***		**11-bit identifier**
* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".				

[14-7] Data telegram assignment

Bit	Setting	
Bit 31	0	Emergency object valid.
	1	Emergency object invalid.

Note!

The identifier can only be changed in the "Emergency object invalid" status (bit 31 = 1).

I-1015 - Inhibit time EMCY

Index: I-1015	Name: Inhibit time EMCY					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: inhibit time EMCY	0	0	0.1 ms	65535	rw	U32

Time which must elapse after an error message (I-1014) has been transmitted, before further error messages can be sent via the system bus (CANopen).

▶ The entered value multiplied by "0.1" gives the delay time in [ms]. The values are automatically rounded up to whole values in [ms].

▶ This object is related to the Lenze code C13392 / C14392.

I-1016 - Consumer heartbeat time

Index: I-1016	Name: Consumer heartbeat time					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	32	- (only read access)			ro	U32
1 ... 32: consumer heartbeat time	0	0		4294967295	rw	U32

Monitoring time for the nodes 1 ... 32 to be monitored via heartbeat. ▸ Node guarding protocol (📖 74)

▶ The parameterised time is rounded down to an integer multiple of 5 ms and must have a higher value than the heartbeat producer time of the node to be monitored.

Subindex	Meaning	Lenze code
0	Number of nodes to be monitored	
1 ... 32	Node-ID and heartbeat time of the node 1 ... 32 to be monitored	C13385/1...32 C14385/1...32

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 ... bit 24	Bit 23 ... bit 16	Bit 15 ... bit 0	
0 (reserved)	**Node ID**	**Heartbeat time** in [ms]	

[14-8] Data telegram assignment

I-1017 - Producer heartbeat time

Index: I-1017	Name: Producer heartbeat time					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: Producer heartbeat time	0	0	ms	65535	rw	U32

Time interval for the transmission of the heartbeat telegram to one or several consumers. ▸ Node guarding protocol (📖 74)

▶ The parameterised time is rounded down to an integer multiple of 5 ms.

▶ The heartbeat telegram is transmitted automatically as soon as a time > 0 ms is set. In this case, the node guarding monitoring function is deactivated.

▶ This object is related to the Lenze code C13381 / C14381.

I-1018 - Identity object

Index: **I-1018**	Name: **Identity object**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	see below	0		4294967295	ro	U32
1: Vendor ID						
2: Product code						
3: Revision number						
4: Serial number						

Subindex	Meaning	
1	Manufacturer identification number • The identification number allocated to Lenze by the "CAN in Automation e. V." organisation is "0x0000003B".	
2	Product code	
	0x94001	9400 StateLine
	0x94002	9400 HighLine / ServoPLC
	0x94004	9400 regenerative power supply module
3	Main version and subversion of the firmware	
4	Serial number	

I-1029 - Error behaviour

Index: **I-1029**	Name: **Error behaviour**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	1	- (only read access)			ro	U8
1: Communication error	0	0		2	rw	U8

This object serves to set the communication status to which the controller is to change after a bus-off, a node/life guarding event or a heartbeat event.

Subindex	Meaning		Lenze code
1	Status change after bus off, node/life guarding event or heartbeat event:		C13625 / C14625
	0	State change from "Operational" to "Pre-operational"	
	1	No state change	
	2	State change to "Stopped"	

I-1200 - SDO1 server parameter

Index: **I-1200**	Name: **SDO1 server parameter**					
Subindex	Default setting	Display range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	2	2		2	ro	U8
1: COB-ID client -> server (Rx)	Node ID + 0x600	0		4294967295	ro	U32
2: COB-ID server -> client (Tx)	Node ID + 0x580	0		4294967295	ro	U32

Identifier for the SDO server channel 1 (basic SDO channel).

▶ The basic SDO channel can neither be changed nor deactivated according to DS301, V4.02.

Subindex	Meaning
1	Receive identifier specification • For SDO server channel 1: node address (C13350 / C14350) + 0x600
2	Send identifier specification • For SDO server channel 1: node address (C13350 / C14350) + 0x580

8th byte		7th byte	6th byte	5th byte
Data 4		**Data 3**	**Data 2**	**Data 1**
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0	**0**	**Extended identifier***		**11-bit identifier**
* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".				

[14-9] Data telegram assignment

I-1201 - SDO2 server parameter

Index: I-1201	Name: SDO2 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for the SDO server channel 2.

- The server SDO parameter is only valid if the bit 31 is set to "0" for both transmission directions (subindex 1 and 2).
- In the Lenze setting, the SDO server channels 2 ... 10 are deactivated (bit 31 = "1").
- The identifier may only be changed if the SDO is invalid (bit 31 = "1").

Subindex	Meaning
1	Receive identifier specification
2	Send identifier specification
3	Node address of the client

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0/1	**0**	**Extended identifier***		**11-bit identifier**
* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".				

[14-10] Data telegram assignment

Bit	Setting	
Bit 31	0	SDO valid.
	1	SDO invalid.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

Example

The parameter data channel 2 of the controller with the node address 4 is to be activated.

- For this purpose, bit 31 in the subindexes 1 and 2 of the I-1201 object must be set to the value "0" (≡ "SDO valid").
- Both "Write request" commands must be transmitted from the master to the nodes via the basic SDO channel.

Calculation of the identifiers

- Identifier (COB-ID) = basic identifier + node address (node ID)
- Basic identifier SDO2 from the master to the drive: 1600 (0x640)
  → identifier = 0x640 + 0x4 = 0x644
- Basic identifier SDO2 from the drive to the master: 1472 (0x5C0)
  → identifier = 0x5C0 + 0x4 = 0x5C4

Resulting data (data 1 ... data 4)

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0	0	Extended identifier = 0		11-bit identifier = 0x644
0x00		0x00	0x06	0x44

[14-11] Data telegram assignment for subindices 1

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0	0	Extended identifier = 0		11-bit identifier = 0x5C4
0x00		0x00	0x05	0xC4

[14-12] Data telegram assignment for subindices 2

Assignment of the user data

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x23	0x01	0x12	0x01	0x44	0x06	0x00	0x00

[14-13] Assignment of the user data for writing the subindex 1

1st byte	2nd byte	3rd byte	4th byte	5th byte	6th byte	7th byte	8th byte
Command	Index		Subindex	Data 1	Data 2	Data 3	Data 4
0x23	0x01	0x12	0x02	0xC4	0x05	0x00	0x00

[14-14] Assignment of the user data for writing the subindex 2

I-1202 - SDO3 server parameter

Index: I-1202	Name: SDO3 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 3. For description see object I-1201.

I-1203 - SDO4 server parameter

Index: I-1203	Name: SDO4 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 4. For description see object I-1201.

I-1204 - SDO5 server parameter

Index: I-1204	Name: SDO5 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 5. For description see object I-1201.

I-1205 - SDO6 server parameter

Index: I-1205	Name: SDO6 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 6. For description see object I-1201.

I-1206 - SDO7 server parameter

Index: I-1206	Name: SDO7 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 7. For description see object I-1201.

I-1207 - SDO8 server parameter

Index: I-1207	Name: SDO8 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 8. For description see object I-1201.

I-1208 - SDO9 server parameter

Index: I-1208	Name: SDO9 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 9. For description see object I-1201.

I-1209 - SDO10 server parameter

Index: I-1209	Name: SDO10 server parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	3	- (only read access)			ro	U8
1: COB-ID client -> server (Rx)	0x80000000	0		4294967295	rw	U32
2: COB-ID server -> client (Tx)	0x80000000	0		4294967295	rw	U32
3: Node-ID of the SDO client	1 ... 127	- (only read access)			ro	U32

Setting of the identifiers for SDO server channel 10. For description see object I-1201.

I-1400 - RPDO1 communication parameter

Index: I-1400	Name: RPDO1 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by RPDO	0x200 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	-	- (for RPDOs unused)			rw	U16
4: compatibility entry	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	-	- (for RPDOs unused)			rw	U16

Communication parameter for the reception of process data via RPDO1

Subindex	Meaning	Lenze code
1	Identifier RPDO1 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x200 + node ID	C13321/1 / C14321/1
2	RPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13323/1 / C14323/1

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0/1	**0/1**	**Extended identifier***		**11-bit identifier**

* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".

[14-15] Data telegram assignment

Bit	Setting	
Bit 30	0	RTR to this PDO possible (cannot be set).
	1	RTR to this PDO not possible (Lenze).
Bit 31	0	PDO active.
	1	PDO inactive.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

I-1401 - RPDO2 communication parameter

Index: I-1401	Name: RPDO2 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by RPDO	0x300 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	-	- (for RPDOs unused)			rw	U16
4: compatibility entry	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	-	- (for RPDOs unused)			rw	U16

Communication parameter for the reception of process data via RPDO2

Subindex	Meaning	Lenze code
1	Identifier RPDO2 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x300 + node ID	C13321/2 / C14321/2
2	RPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13323/2 / C14323/2

▶ For assignment of the data telegram see object I-1400.

I-1402 - RPDO3 communication parameter

Index: I-1402	Name: RPDO3 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by RPDO	0x400 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	-	- (for RPDOs unused)			rw	U16
4: compatibility entry	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	-	- (for RPDOs unused)			rw	U16

Communication parameter for the reception of process data via RPDO3

Subindex	Meaning	Lenze code
1	Identifier RPDO3 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x400 + node ID	C13321/3 / C14321/3
2	RPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13323/3 / C14323/3

▶ For assignment of the data telegram see object I-1400.

I-1403 - RPDO4 communication parameter

Index: I-1403	Name: RPDO4 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by RPDO	0x500 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	-	- (for RPDOs unused)			rw	U16
4: compatibility entry	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	-	- (for RPDOs unused)			rw	U16

Communication parameter for the reception of process data via RPDO4

Subindex	Meaning	Lenze code
1	Identifier RPDO4 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x500 + node ID	C13321/4 / C14321/4
2	RPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13323/4 / C14323/4

▶ For assignment of the data telegram see object I-1400.

I-1600 - RPDO1 mapping parameter

Index: I-1600	Name: RPDO1 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to receive parameter data as RPDO1.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO1

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 ... bit 16		Bit 15 ... bit 8	Bit 7 ... bit 0
Index		**Subindex**	**Length**

[14-16] Data telegram assignment

IEC 61131 process data words are mapped. Only whole bytes can be mapped (the granularity of the mapping entries is 1 byte).

I-1601 - RPDO2 mapping parameter

Index: I-1601	Name: RPDO2 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to receive parameter data as RPDO2.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO2

▶ For assignment of the data telegram see object I-1600.

I-1602 - RPDO3 mapping parameter

Index: I-1602	Name: RPDO3 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to receive parameter data as RPDO3.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO3

▶ For assignment of the data telegram see object I-1600.

I-1603 - RPDO4 mapping parameter

Index: I-1603	Name: RPDO4 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to receive parameter data as RPDO4.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO4

▶ For assignment of the data telegram see object I-1600.

I-1800 - TPDO1 communication parameter

Index: I-1800	Name: TPDO1 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by TPDO	0x180 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: reserved	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	0 ms	0	ms	65535	rw	U16

Communication parameter for the transmission of process data via TPDO1

Subindex	Meaning	Lenze code
1	Identifier TPDO1 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x180 + node ID	C13320/1 / C14320/1
2	TPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13322/1 / C14322/1
3	Minimum time between the transmission of two identical TPDOs (see DS301, V4.02).	C13324/1 / C14324/1
5	Cycle time with which the PDOs are transmitted with the transmission type "254".	C13356/1 / C14356/1

8th byte		7th byte	6th byte	5th byte
Data 4		Data 3	Data 2	Data 1
Bit 31	Bit 30	Bit 29 ... bit 11		Bit 10 ... bit 0
0/1	**0/1**	**Extended identifier***		**11-bit identifier**

* The extended identifier is not supported - bit 11 ... bit 29 must be set to "0".

[14-17] Data telegram assignment

Bit	Setting	
Bit 30	0	RTR to this PDO possible (Lenze).
	1	RTR to this PDO not possible (cannot be set).
Bit 31	0	PDO active.
	1	PDO inactive.

How to change the identifier:

1. Deactivate identifier (set bit 31 to "1").
2. Change identifier.
3. Activate identifier (set bit 31 to "0").

Subindex 3 - inhibit time

The delay time can only be changed if the PDO is inactive (subindex 1, bit 31 = 1). The entered value multiplied by 0.1 results in the delay time in [ms]. The calculated delay time is always rounded down to an inter value.

Example:

- Value entered: 26
- Calculated time = 26 * 0.1 [ms] = 2.6 [ms] → delay time = 2 [ms}

I-1801 - TPDO2 communication parameter

Index: **I-1801**	Name: **TPDO2 communication parameter**					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by TPDO	0x280 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: reserved	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	0 ms	0	ms	65535	rw	U16

Communication parameter for the transmission of process data via TPDO2

Subindex	Meaning	Lenze code
1	Identifier TPDO2 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x280 + node ID	C13320/2 / C14320/2
2	TPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13322/2 / C14322/2
3	Minimum time between the transmission of two identical TPDOs (see DS301, V4.02).	C13324/2 / C14324/2
5	Cycle time with which the PDOs are transmitted with the transmission type "254".	C13356/2 / C14356/2

- For assignment of the data telegram see object I-1800.

I-1802 - TPDO3 communication parameter

Index: I-1802	Name: TPDO3 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by TPDO	0x380 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: reserved	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	0 ms	0	ms	65535	rw	U16

Communication parameter for the transmission of process data via TPDO3

Subindex	Meaning	Lenze code
1	Identifier TPDO3 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x380 + node ID	C13320/3 / C14320/3
2	TPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13322/3 / C14322/3
3	Minimum time between the transmission of two identical TPDOs (see DS301, V4.02).	C13324/3 / C14324/3
5	Cycle time with which the PDOs are transmitted with the transmission type "254".	C13356/3 / C14356/3

▶ For assignment of the data telegram see object I-1800.

I-1803 - TPDO4 communication parameter

Index: I-1803	Name: TPDO4 communication parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: highest subindex supported	5	- (only read access)			ro	U8
1: COB-ID used by TPDO	0x480 + node ID	0		4294967295	rw	U32
2: transmission type	254	0		255	rw	U8
3: inhibit time	0 ms	0	0.1 ms	65535	rw	U16
4: reserved	-	- (reserved, write or read access results in error message 0x06090011)			rw	U8
5: event timer	0 ms	0	ms	65535	rw	U16

Communication parameter for the transmission of process data via TPDO4

Subindex	Meaning	Lenze code
1	Identifier TPDO4 • The basic setting is according to the "Predefined Connection Set": Identifier = 0x480 + node ID	C13320/4 / C14320/4
2	TPDO transmission type according to DS301, V4.02 ▸ Transmission type (📖 47)	C13322/4 / C14322/4
3	Minimum time between the transmission of two identical TPDOs (see DS301, V4.02).	C13324/4 / C14324/4
5	Cycle time with which the PDOs are transmitted with the transmission type "254".	C13356/4 / C14356/4

▶ For assignment of the data telegram see object I-1800.

I-1A00 - TPDO1 mapping parameter

Index: I-1A00	Name: TPDO1 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to transmit parameter data as TPDO1.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entry 1 ... 8 for TPDO1

8th byte	7th byte	6th byte	5th byte
Data 4	**Data 3**	**Data 2**	**Data 1**
Bit 31 ... bit 16		Bit 15 ... bit 8	Bit 7 ... bit 0
Index		**Subindex**	**Length**

[14-18] Data telegram assignment

IEC 61131 process data words are mapped. Only whole bytes can be mapped (the granularity of the mapping entries is 1 byte).

I-1A01 - TPDO2 mapping parameter

Index: I-1A01	Name: TPDO2 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to transmit parameter data as TPDO2.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO2

▶ For assignment of the data telegram see object I-1A00.

I-1A02 - TPDO3 mapping parameter

Index: I-1A02	Name: TPDO3 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to transmit parameter data as TPDO3.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for RPDO4

▶ For assignment of the data telegram see object I-1A00.

I-1A03 - TPDO4 mapping parameter

Index: I-1A03	Name: TPDO4 mapping parameter					
Subindex	Default setting	Setting range (min. value | unit | max. value)			Access	Data type
0: number of mapped application objects in PDO	0	0		8	rw	U8
1 ... 8: application object 1 ... 8	0	0		4294967295	rw	U32

This object serves to transmit parameter data as TPDO4.

Subindex	Meaning
0	Number of mapped objects
1 ... 8	Mapping entries 1 ... 8 for TPDO4

▶ For assignment of the data telegram see object I-1A00.

15 DIP switch positions for setting the CAN node address

The node address results from the sum of the binary values of switches 1 ... 64.

The following table shows the switch positions for the valid address range of 1 ... 127.

▸ Setting the node address (📖 33)

Node address	DIP switch						
	64	32	16	8	4	2	1
1	OFF	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	OFF	ON	OFF	ON	ON
12	OFF	OFF	OFF	ON	ON	OFF	OFF
13	OFF	OFF	OFF	ON	ON	OFF	ON
14	OFF	OFF	OFF	ON	ON	ON	OFF
15	OFF	OFF	OFF	ON	ON	ON	ON
16	OFF	OFF	ON	OFF	OFF	OFF	OFF
17	OFF	OFF	ON	OFF	OFF	OFF	ON
18	OFF	OFF	ON	OFF	OFF	ON	OFF
19	OFF	OFF	ON	OFF	OFF	ON	ON
20	OFF	OFF	ON	OFF	ON	OFF	OFF
21	OFF	OFF	ON	OFF	ON	OFF	ON
22	OFF	OFF	ON	OFF	ON	ON	OFF
23	OFF	OFF	ON	OFF	ON	ON	ON
24	OFF	OFF	ON	ON	OFF	OFF	OFF
25	OFF	OFF	ON	ON	OFF	OFF	ON
26	OFF	OFF	ON	ON	OFF	ON	OFF
27	OFF	OFF	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON	OFF	OFF
29	OFF	OFF	ON	ON	ON	OFF	ON
30	OFF	OFF	ON	ON	ON	ON	OFF
31	OFF	OFF	ON	ON	ON	ON	ON
32	OFF	ON	OFF	OFF	OFF	OFF	OFF
33	OFF	ON	OFF	OFF	OFF	OFF	ON
34	OFF	ON	OFF	OFF	OFF	ON	OFF
35	OFF	ON	OFF	OFF	OFF	ON	ON
36	OFF	ON	OFF	OFF	ON	OFF	OFF
37	OFF	ON	OFF	OFF	ON	OFF	ON
38	OFF	ON	OFF	OFF	ON	ON	OFF

Node address	DIP switch						
	64	32	16	8	4	2	1
39	OFF	**ON**	OFF	OFF	**ON**	**ON**	**ON**
40	OFF	**ON**	OFF	**ON**	OFF	OFF	OFF
41	OFF	**ON**	OFF	**ON**	OFF	OFF	**ON**
42	OFF	**ON**	OFF	**ON**	OFF	**ON**	OFF
43	OFF	**ON**	OFF	**ON**	OFF	**ON**	**ON**
44	OFF	**ON**	OFF	**ON**	**ON**	OFF	OFF
45	OFF	**ON**	OFF	**ON**	**ON**	OFF	**ON**
46	OFF	**ON**	OFF	**ON**	**ON**	**ON**	OFF
47	OFF	**ON**	OFF	**ON**	**ON**	**ON**	**ON**
48	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF
49	OFF	**ON**	**ON**	OFF	OFF	OFF	**ON**
50	OFF	**ON**	**ON**	OFF	OFF	**ON**	OFF
51	OFF	**ON**	**ON**	OFF	OFF	**ON**	**ON**
52	OFF	**ON**	**ON**	OFF	**ON**	OFF	OFF
53	OFF	**ON**	**ON**	OFF	**ON**	OFF	**ON**
54	OFF	**ON**	**ON**	OFF	**ON**	**ON**	OFF
55	OFF	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
56	OFF	**ON**	**ON**	**ON**	OFF	OFF	OFF
57	OFF	**ON**	**ON**	**ON**	OFF	OFF	**ON**
58	OFF	**ON**	**ON**	**ON**	OFF	**ON**	OFF
59	OFF	**ON**	**ON**	**ON**	OFF	**ON**	**ON**
60	OFF	**ON**	**ON**	**ON**	**ON**	OFF	OFF
61	OFF	**ON**	**ON**	**ON**	**ON**	OFF	**ON**
62	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	OFF
63	OFF	**ON**	**ON**	**ON**	**ON**	**ON**	**ON**
64	**ON**	OFF	OFF	OFF	OFF	OFF	OFF
65	**ON**	OFF	OFF	OFF	OFF	OFF	**ON**
66	**ON**	OFF	OFF	OFF	OFF	**ON**	OFF
67	**ON**	OFF	OFF	OFF	OFF	**ON**	**ON**
68	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF
69	**ON**	OFF	OFF	OFF	**ON**	OFF	**ON**
70	**ON**	OFF	OFF	OFF	**ON**	**ON**	OFF
71	**ON**	OFF	OFF	OFF	**ON**	**ON**	**ON**
72	**ON**	OFF	OFF	**ON**	OFF	OFF	OFF
73	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
74	**ON**	OFF	OFF	**ON**	OFF	**ON**	OFF
75	**ON**	OFF	OFF	**ON**	OFF	**ON**	**ON**
76	**ON**	OFF	OFF	**ON**	**ON**	OFF	OFF
77	**ON**	OFF	OFF	**ON**	**ON**	OFF	**ON**
78	**ON**	OFF	OFF	**ON**	**ON**	**ON**	OFF
79	**ON**	OFF	OFF	**ON**	**ON**	**ON**	**ON**
80	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF
81	**ON**	OFF	**ON**	OFF	OFF	OFF	**ON**

Node address	DIP switch						
	64	32	16	8	4	2	1
82	ON	OFF	ON	OFF	OFF	ON	OFF
83	ON	OFF	ON	OFF	OFF	ON	ON
84	ON	OFF	ON	OFF	ON	OFF	OFF
85	ON	OFF	ON	OFF	ON	OFF	ON
86	ON	OFF	ON	OFF	ON	ON	OFF
87	ON	OFF	ON	OFF	ON	ON	ON
88	ON	OFF	ON	ON	OFF	OFF	OFF
89	ON	OFF	ON	ON	OFF	OFF	ON
90	ON	OFF	ON	ON	OFF	ON	OFF
91	ON	OFF	ON	ON	OFF	ON	ON
92	ON	OFF	ON	ON	ON	OFF	OFF
93	ON	OFF	ON	ON	ON	OFF	ON
94	ON	OFF	ON	ON	ON	ON	OFF
95	ON	OFF	ON	ON	ON	ON	ON
96	ON	ON	OFF	OFF	OFF	OFF	OFF
97	ON	ON	OFF	OFF	OFF	OFF	ON
98	ON	ON	OFF	OFF	OFF	ON	OFF
99	ON	ON	OFF	OFF	OFF	ON	ON
100	ON	ON	OFF	OFF	ON	OFF	OFF
101	ON	ON	OFF	OFF	ON	OFF	ON
102	ON	ON	OFF	OFF	ON	ON	OFF
103	ON	ON	OFF	OFF	ON	ON	ON
104	ON	ON	OFF	ON	OFF	OFF	OFF
105	ON	ON	OFF	ON	OFF	OFF	ON
106	ON	ON	OFF	ON	OFF	ON	OFF
107	ON	ON	OFF	ON	OFF	ON	ON
108	ON	ON	OFF	ON	ON	OFF	OFF
109	ON	ON	OFF	ON	ON	OFF	ON
110	ON	ON	OFF	ON	ON	ON	OFF
111	ON	ON	OFF	ON	ON	ON	ON
112	ON	ON	ON	OFF	OFF	OFF	OFF
113	ON	ON	ON	OFF	OFF	OFF	ON
114	ON	ON	ON	OFF	OFF	ON	OFF
115	ON	ON	ON	OFF	OFF	ON	ON
116	ON	ON	ON	OFF	ON	OFF	OFF
117	ON	ON	ON	OFF	ON	OFF	ON
118	ON	ON	ON	OFF	ON	ON	OFF
119	ON	ON	ON	OFF	ON	ON	ON
120	ON	ON	ON	ON	OFF	OFF	OFF
121	ON	ON	ON	ON	OFF	OFF	ON
122	ON	ON	ON	ON	OFF	ON	OFF
123	ON	ON	ON	ON	OFF	ON	ON
124	ON	ON	ON	ON	ON	OFF	OFF

Node address	DIP switch						
	64	32	16	8	4	2	1
125	ON	ON	ON	ON	ON	OFF	ON
126	ON	ON	ON	ON	ON	ON	OFF
127	ON	ON	ON	ON	ON	ON	ON

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