

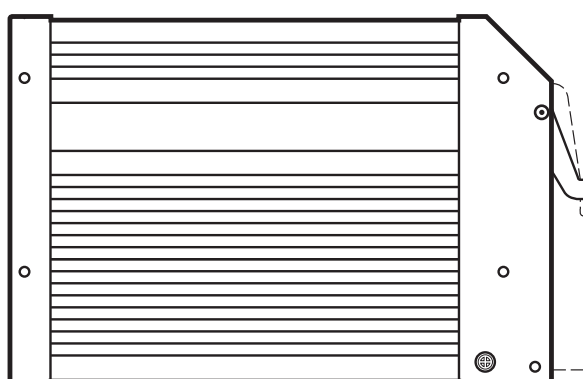


Device manual
Input/output module
SmartModule

UK

CR2520

7390941 / 00 01 / 2018



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1 Preliminary note

This document applies to devices of the type "SmartModule" (art. no.: CR2520). It is deemed as a part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

1.1 Symbols used

- ▶ Instructions
- > Reaction, result
- [...] Designation of pushbuttons, buttons or indications
- Cross-reference
-  Important note
Non-compliance can result in malfunction or interference.
-  Information
Supplementary note

1.2 Warning signs used

WARNING

Warning of serious personal injury.
Death or serious irreversible injuries may result.

CAUTION

Warning of personal injury.
Slight reversible injuries may result.

NOTE

Warning of damage to property.

2 Safety instructions

2.1 General

These instructions are part of the device. They contain information and illustrations about the correct handling of the device and must be read before installation or use.

Observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can seriously affect the safety of operators and machinery.

UK

2.2 Target group

These instructions are intended for authorised persons according to the EMC and low-voltage directives. The device must only be installed, connected and put into operation by a qualified electrician.

2.3 Electrical connection

Disconnect the device externally before handling it. If necessary, also disconnect any independently supplied output load circuits.

If the device is not supplied by the mobile on-board system (12/24 V battery operation), it must be ensured that the external voltage is generated and supplied according to the criteria for safety extra-low voltage (SELV) as this voltage is supplied without further measures to the connected controller, the sensors and the actuators.

The wiring of all signals in connection with the SELV circuit of the device must also comply with the SELV criteria (safety extra-low voltage, safe electrical isolation from other electric circuits).

If the supplied SELV voltage is externally grounded (SELV becomes PELV), the responsibility lies with the user and the respective national installation regulations must be complied with. All statements in this document refer to the device the SELV voltage of which is not grounded.

The connection terminals may only be supplied with the signals indicated in the technical data and/or on the device label and only the approved accessories of ifm electronic may be connected.

2.4 Housing temperature

According to the technical specifications below the device can be operated in a wide ambient temperature range. Because of the additional internal heating the housing walls can have high perceptible temperatures when touched in hot environments.

2.5 Tampering with the device

In case of malfunctions or uncertainties please contact the manufacturer. Tampering with the device can seriously affect the safety of operators and machinery. It is not permitted and leads to the exclusion of any liability and warranty claims.

2.6 Electromagnetic compatibility

This is a class A product. It can cause radio interference in domestic areas. In this case the operator is requested to take appropriate measures.

2.7 Electrical welding on vehicles and plants

Welding work on the chassis frame must only be carried out by qualified persons.

Remove and cover the plus and minus terminals of the batteries.

Disconnect all contacts of the device from the on-board system prior to welding on the vehicle or plant. Connect the earth terminal of the welding device directly to the part to be welded.

Do not touch the device or electric cables with the welding electrode or the earth terminal of the welding device.

Protect the device against weld slag.

3 Functions and features

The CR2520 I/O module enables decentralised evaluation of sensor signals and decentralised triggering of actuators and DC motors.

- The module supports binary/analogue inputs/outputs and is therefore classified in the device class "I/O module" to CiA DS 401.
- As regards the input/output functions, the module can be configured and it supports the following functions:
 - analogue inputs (0...10V/32V; 0...20mA, ratiometric, binary)
 - binary inputs
 - binary outputs
 - half bridges (push-pull outputs)
 - full bridges with/without PWM
- There are 1 server SDO and 8 default PDOs according to CiA DS 401. The PDO mapping cannot be changed (static PDO mapping). The default identifiers are assigned according to the "predefined connection set".
- The COB IDs of the PDOs as well as the transmission type (synch/asynch) of the individual PDOs can be configured.
- The module expects a sync object. The CAN identifier of the sync object can be configured.
- The module supports "node guarding" and "heartbeat". The "guard time", the "life time factor" and the "heartbeat time" can be configured.
- The module generates an emergency object. The COB ID of the EMCY object can be configured.
- The module stores the last 4 errors. The error code of the corresponding emergency object is stored.
- The module supports a reset function, i.e. assignment of the parameters to the factory default values* upon request.

WARNING

The device is not approved for safety-related tasks in the field of operator protection.

*) Factory default settings (→ 8 Parameter overview)

4 Installation

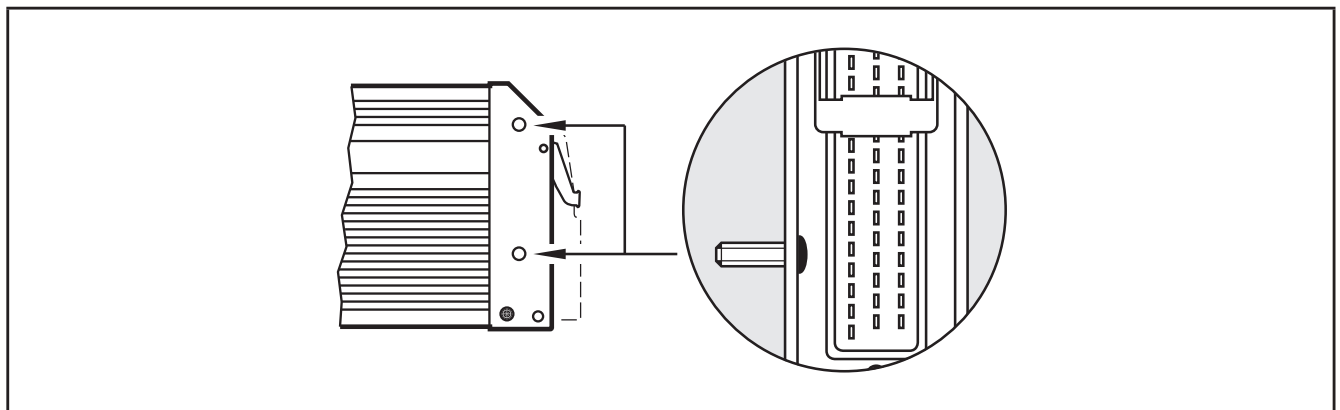
4.1 Fixing

- Fix the device to a flat surface using 4 M5 screws.
Screw material: steel or stainless steel
Tightening torque: 8 $\pm$ 2 Nm

NOTE

Use screws with a low head to avoid that the connector is damaged when placed and locked.

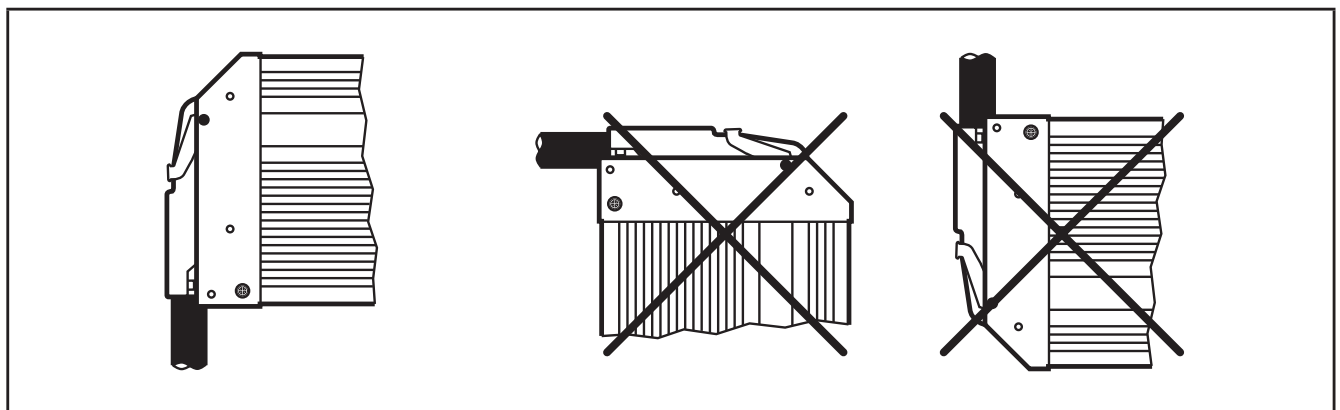
Screws to be used (examples)	Standard
Button head hexagon socket screws (M5 x L)	ISO 7380
Cylinder screws with hexagon socket and low head (M5 x L)	DIN 7984
Cutting screws for metric ISO thread with low head	DIN 7500



Example button head hexagon socket screw

4.2 Installation position

- Align the device in such a way that the cable entry of the connector faces downwards.



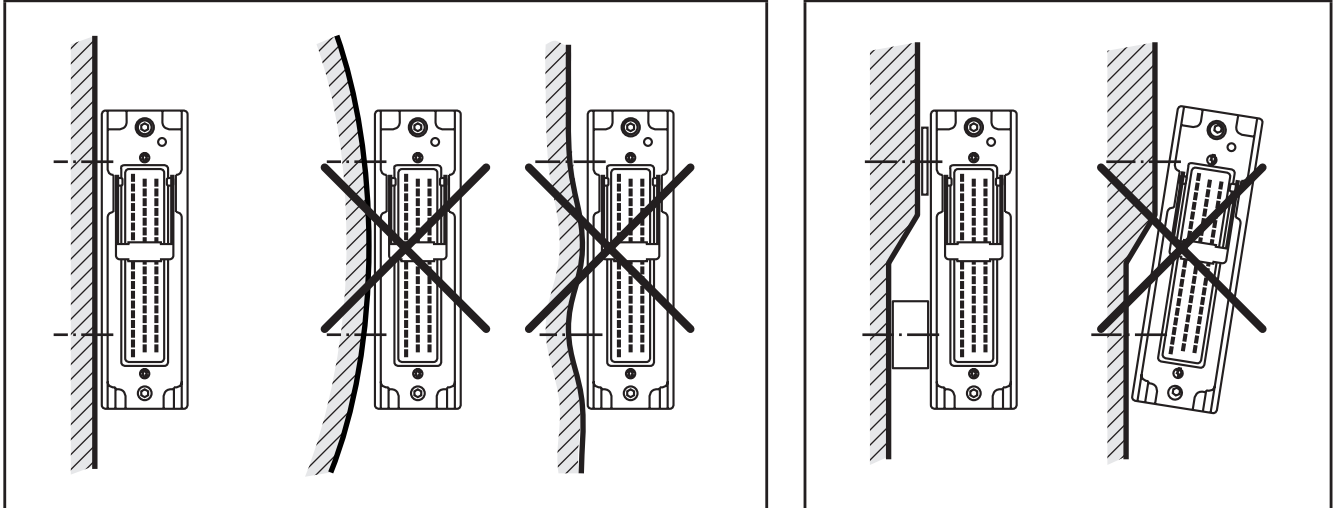
Preferred installation position

4.3 Mounting surface

NOTE

The housing must not be exposed to any torsional forces or mechanical stress.

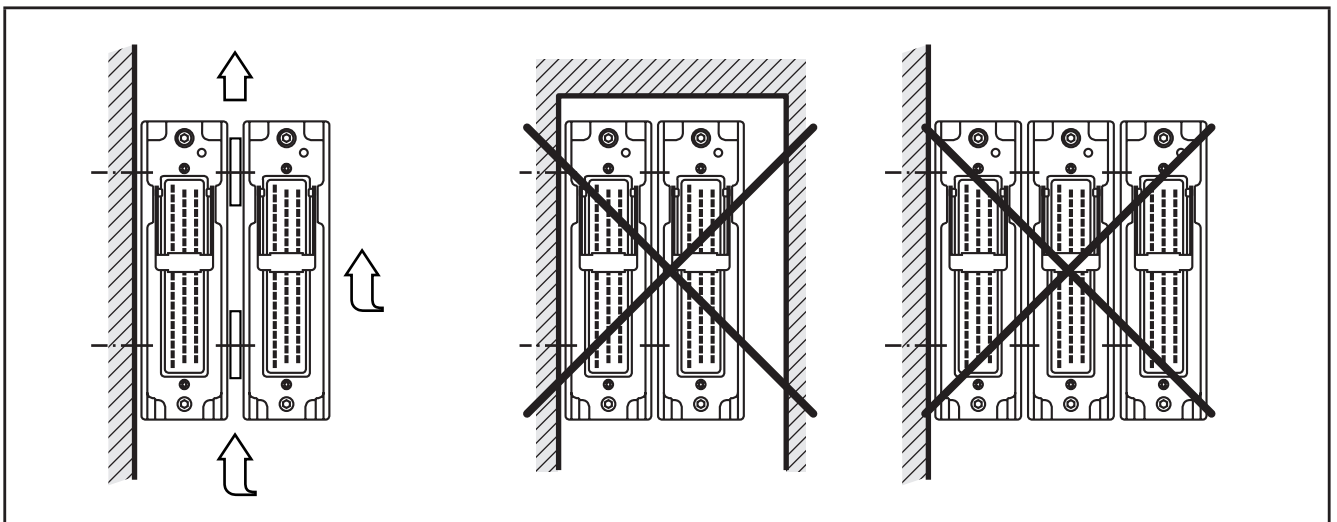
- Use compensating elements if there is no flat mounting surface available.



Mounting surface

4.4 Heat dissipation

- Ensure sufficient heat dissipation as the internal heating of the electronics is conducted away via the housing.
- In case of sandwich mounting of devices use spacers.



Heat dissipation and sandwich mounting

5 Electrical connection

5.1 Wiring

Wiring (→ 7 Technical data)

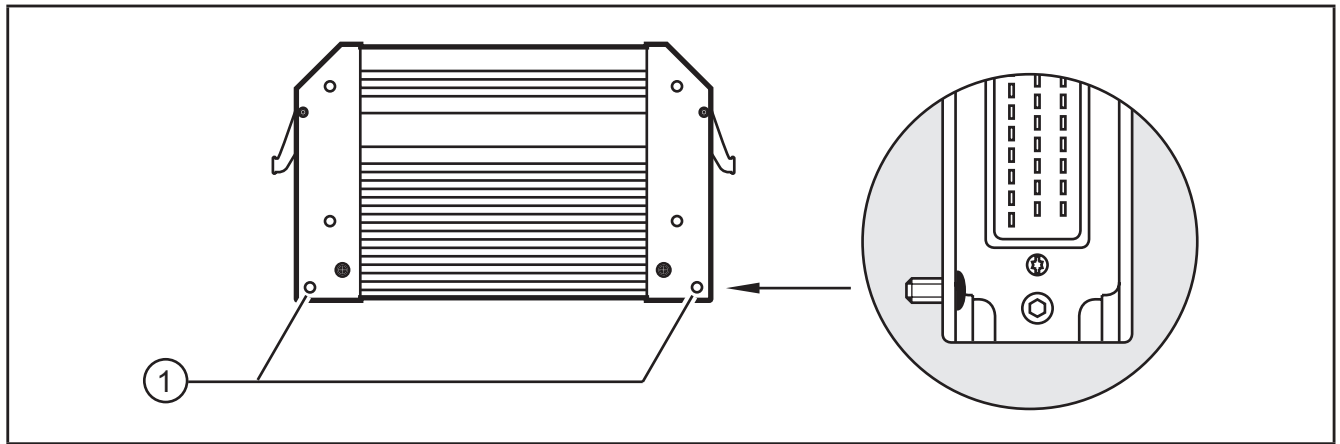


Only connect the connector pins as shown in the pin layout.
Unspecified connector pins remain unconnected.

- ▶ Connect all indicated supply cables and GND terminals.

5.2 Ground connection

- ▶ To ensure the protection of the device against electrical interference, the housing must be connected to GND (e.g. to the ground of the vehicle).



1: Drill holes for ground connection

- ▶ Establish a connection between the device and the ground of the vehicle using M5 screws.
Screws to be used (→ 4.1 Fixing)

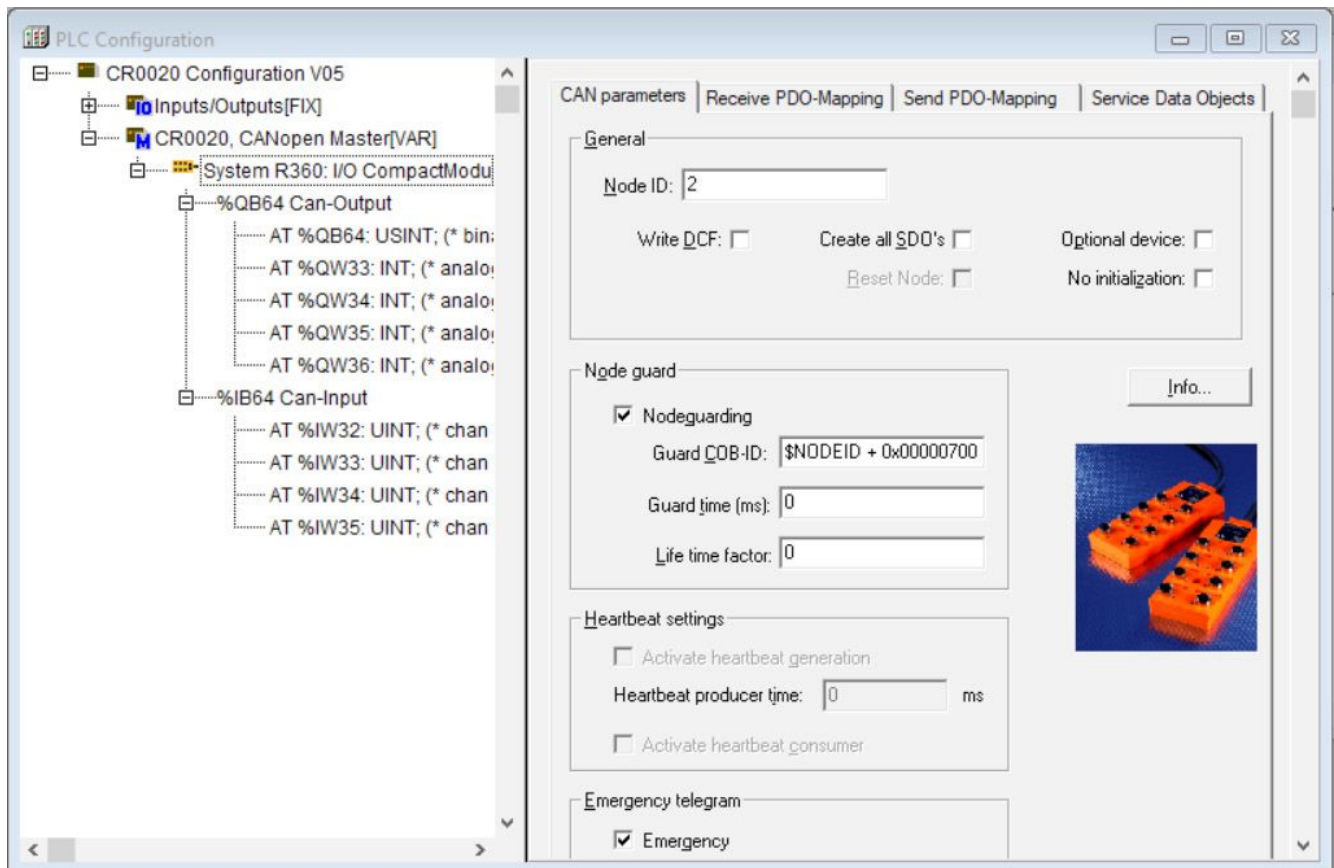
5.3 Fuses

- ▶ To protect the whole system (wiring and module) the individual electric circuits must be protected with max. 15 A.

6 Set-up

6.1 PLC configuration in CODESYS 2.3

Parameter setting of the device functions and of the CAN interface is directly done from the application programmed with CODESYS 2.3. To do so, the "Electronic Data Sheet" (EDS) is integrated via the CODESYS PLC configuration.



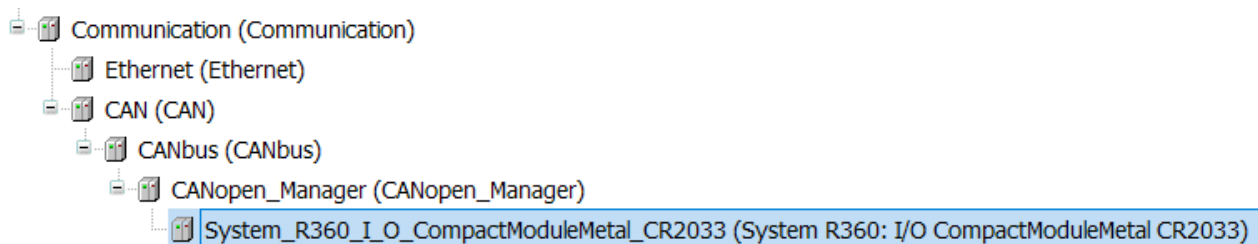
CODESYS dialogue "PLC configuration" (example)

For a description of the setting and application of the "PLC configuration" dialogue see the CODESYS manual and the CODESYS online help.

6.2 PLC configuration in CODESYS 3.5

The "Electronic Data Sheet" (EDS) is installed in the [Device Repository]. Proceed as follows in the main menu:

- ▶ Click on [Tools] / [Device Repository].
 - ▶ Select [Fieldbuses] / [CiA CANopen] / [CiA Remote Device] and click on [Install].
 - ▶ Select EDS file and click on [Open].
- > In CODESYS 3.5 the devices are integrated as CiA remote devices in the device tree under a [CANopen_Manager] element.



The CANopen communication is configured via the CODESYS configuration editor.

6.2.1 Heartbeat configuration

The function [Reset Node] must be activated on the tab [General] so that the device applies the parameters set for heartbeat monitoring of the CANopen Manager.

General

Node ID: SDO Channels (1/1 active)

☒ Enable Expert Settings ☐ Optional Device

☐ Enable Sync Producing ☐ No Initialisation ☐ Reset Node:

▲ **Nodeguarding**

☐ Enable Nodeguarding ☒ Enable Heartbeat Producing

Guard Time (ms): Producer Time (ms):

Life Time Factor: Heartbeat Consuming (1/1 active)

▲ **Emergency**

☒ Enable Emergency

COB-ID:

▲ **TIME**

☐ Enable TIME Producing

COB-ID (Hex): 16#

☐ Enable TIME Consuming

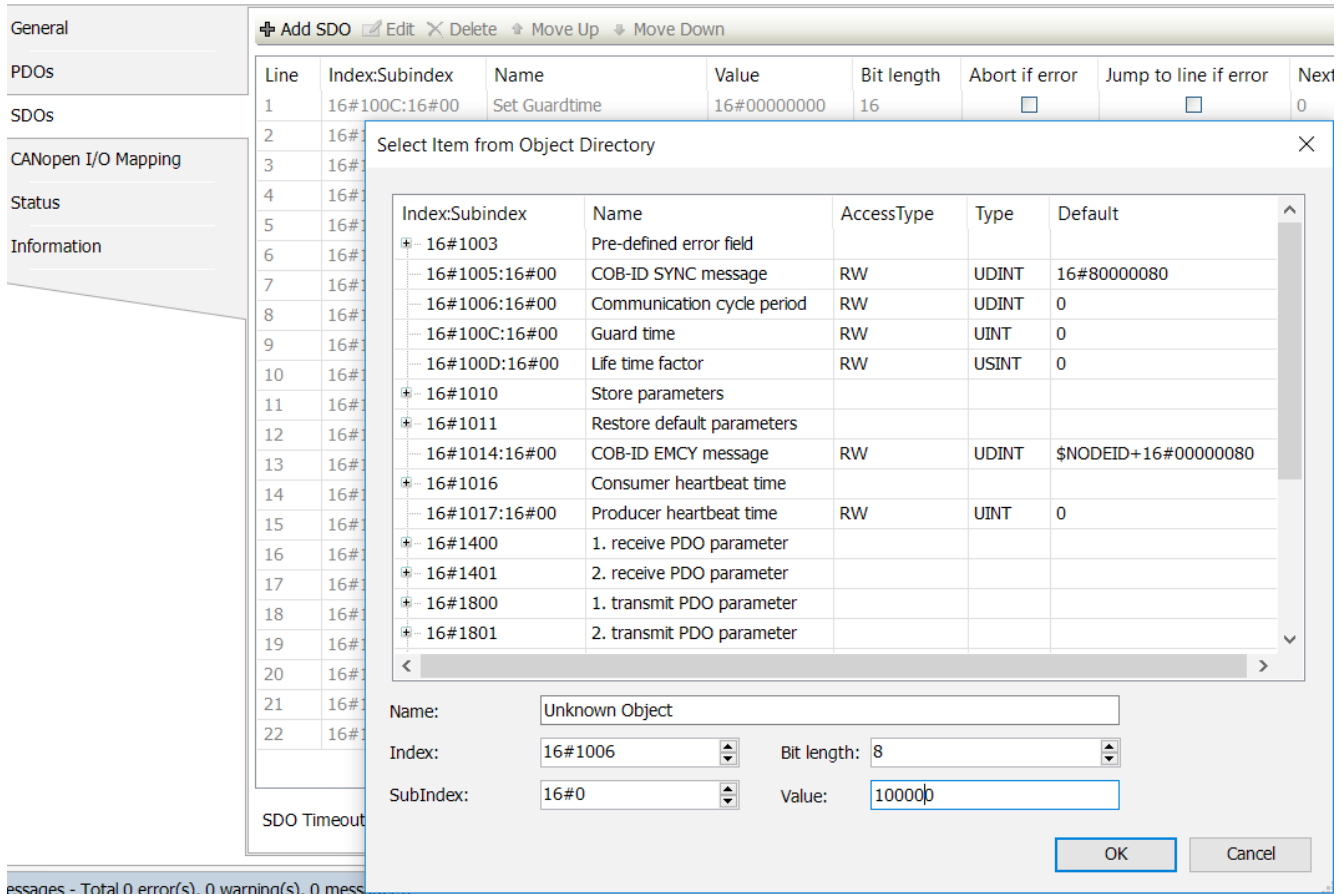
▲ **Checks at Startup**

☒ Check Vendor ID ☐ Check Product Number ☐ Check Revision Number

6.2.2 SyncMonitoring

To activate the device-internal monitoring of the Sync cycle, the monitoring time has to be written into the object directory entry 0x1006. This is possible by supplementing the SDO list in the CANopen configurator or during the operating time via the function block COP_SDOWrite.

The monitoring time is indicated in microseconds [μ s].



The screenshot shows the CANopen configurator interface. On the left, the 'General' tab is selected, and the 'SDOs' section is expanded. The main window displays a table of SDOs. A dialog box titled 'Select Item from Object Directory' is open, showing a list of objects. The object 16#1006:16#00, 'Communication cycle period', is selected. Below the list, the 'Name' field is set to 'Unknown Object', the 'Index' is 16#1006, the 'SubIndex' is 16#0, and the 'Value' is 10000. The 'Bit length' is set to 8. The 'OK' button is highlighted.

Line	Index:Subindex	Name	Value	Bit length	Abort if error	Jump to line if error	Next
1	16#100C:16#00	Set Guardtime	16#00000000	16	☐	☐	0
2	16#100D:16#00	Life time factor	0	16	☐	☐	0
3	16#100E:16#00	Store parameters		16	☐	☐	0
4	16#100F:16#00	Restore default parameters		16	☐	☐	0
5	16#1010:16#00	COB-ID SYNC message	16#80000080	16	☐	☐	0
6	16#1011:16#00	Communication cycle period	0	16	☐	☐	0
7	16#1012:16#00	Guard time	0	16	☐	☐	0
8	16#1013:16#00	Life time factor	0	16	☐	☐	0
9	16#1014:16#00	Store parameters		16	☐	☐	0
10	16#1015:16#00	Restore default parameters		16	☐	☐	0
11	16#1016:16#00	COB-ID EMCY message	\$NODEID+16#00000080	16	☐	☐	0
12	16#1017:16#00	Consumer heartbeat time	0	16	☐	☐	0
13	16#1018:16#00	Producer heartbeat time	0	16	☐	☐	0
14	16#1019:16#00	1. receive PDO parameter		16	☐	☐	0
15	16#1020:16#00	2. receive PDO parameter		16	☐	☐	0
16	16#1021:16#00	1. transmit PDO parameter		16	☐	☐	0
17	16#1022:16#00	2. transmit PDO parameter		16	☐	☐	0
18	16#1023:16#00			16	☐	☐	0
19	16#1024:16#00			16	☐	☐	0
20	16#1025:16#00			16	☐	☐	0
21	16#1026:16#00			16	☐	☐	0
22	16#1027:16#00			16	☐	☐	0

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6.3 Electronic Data Sheet

The EDS contains the description of all parameters and I/O data of the device in a format defined by CANopen. The EDS files are provided for all CANopen slaves by ifm electronic.

The EDS files are available at www.ifm.com.

7 Technical data

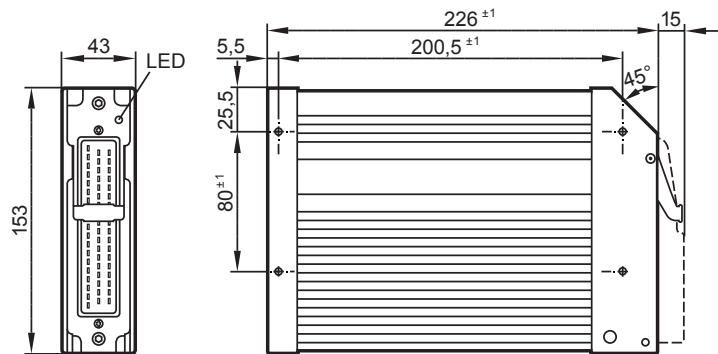
7.1 Mechanical and electric data

CR2520

SmartModule
I/O module
digital and analogue
for R360 system
30 inputs/outputs
CANopen interface
10...32V DC

CE

E1



Technical data

Mechanical data

Housing

Dimensions (H x W x D)

Installation

Connection

Weight

Housing temperature

Storage temperature

Protection rating

Electrical data

Input/output channels (total)

Inputs

Configurations

Outputs

Configurations

Operating voltage

Reverse polarity protection

Current consumption

CAN interface

Baud rate

Communication profile

Node ID (CANopen)

I/O module as black-box system to implement a central or decentralised system design

closed, screened metal housing with flange fastening

153 x 226 x 43 mm

screw connection by means of 4 M5 x L screws to DIN 7500 or DIN 7984
mounting position horizontal or vertical to the mounting wall1 55-pin connector, latched, protected against reverse polarity, type AMP or
Framatome
AMP junior timer contacts, crimp connection 0.5/2.5 mm²

1.2 kg

- 40...85 °C (depending on the load)

- 40...85 °C

IP 67 (for inserted connector with individually sealed cores, e.g. EC2084)

max. 30

15

- 4 analogue (0...10/32 V, 0...20 mA, ratiometric for potentiometric transducers)
or 4 digital negative switching
- 9 digital positive switching (50 Hz)
- 2 digital positive switching (1 kHz)

max. 15

- 5 digital, positive switching (2 A), of which 3 PWM outputs
- 2 digital, positive switching (5 A)
- 2 full H-bridges (5 A), alternatively 4 half H-bridges or 4 digital positive/negative switching
- 2 full H-bridges (10/15 A), alternatively 4 half H-bridges or 4 digital positive/negative switching

10...32 V DC

yes

≤ 100 mA (without external load at 24 V DC)

CAN interface 2.0 A/B, ISO 11898
50 Kbits/s...1 Mbit/s (default 125 Kbits/s)
CANopen, CiA DS 301 version 4, CiA DS 401 version 2.1hex 20 (= dec 32)
adjustable via CANopen object directory

7.2 Indicators, test standards and regulations

CR2520	Technical data																
Status indication	two-colour LED (red/green)																
Operating states	<table><tr><th>LED colour</th><th>Status</th><th>Description</th></tr><tr><td>–</td><td>off</td><td>no operating voltage</td></tr><tr><td rowspan="3">green</td><td>5 Hz</td><td>device is in the bootloader</td></tr><tr><td>2 Hz</td><td>Run</td></tr><tr><td>on</td><td>Stop</td></tr><tr><td>red</td><td>on</td><td>communication error</td></tr></table>	LED colour	Status	Description	–	off	no operating voltage	green	5 Hz	device is in the bootloader	2 Hz	Run	on	Stop	red	on	communication error
LED colour	Status	Description															
–	off	no operating voltage															
green	5 Hz	device is in the bootloader															
	2 Hz	Run															
	on	Stop															
red	on	communication error															
Test standards and regulations																	
Electrical tests	<table><tr><td>EN 61000-6-2: 2005</td><td>Electromagnetic compatibility (EMC) Noise immunity</td></tr><tr><td>EN 61000-6-4: 2007</td><td>Electromagnetic compatibility (EMC) Noise emission</td></tr><tr><td>EN 61010-1: 2001</td><td>Safety requirements for electrical equipment for measurement, control and laboratory use</td></tr><tr><td>Dir. 2009/19/EC</td><td>Noise emission Immunity with 100 V/m</td></tr><tr><td>ISO 7637-2: 2004</td><td>Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state A Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state A Pulse 5, severity level: III; function state C (data valid for the 24V system)</td></tr></table>	EN 61000-6-2: 2005	Electromagnetic compatibility (EMC) Noise immunity	EN 61000-6-4: 2007	Electromagnetic compatibility (EMC) Noise emission	EN 61010-1: 2001	Safety requirements for electrical equipment for measurement, control and laboratory use	Dir. 2009/19/EC	Noise emission Immunity with 100 V/m	ISO 7637-2: 2004	Pulse 1, severity level: IV; function state C Pulse 2a, severity level: IV; function state A Pulse 2b, severity level: IV; function state C Pulse 3a, severity level: IV; function state A Pulse 3b, severity level: IV; function state A Pulse 4, severity level: IV; function state A Pulse 5, severity level: III; function state C (data valid for the 24V system)						
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Climatic tests	<table><tr><td>EN 60068-2-30: 2006</td><td>Damp heat, cyclic upper temperature 55°C, number of cycles: 6</td></tr><tr><td>EN 60068-2-78: 2002</td><td>Damp heat, steady state Test temperature 40°C / 93% RH, Test duration: 21 days</td></tr><tr><td>EN 60068-2-52: 1996</td><td>Salt spray test Severity level 3 (motor vehicle)</td></tr></table>	EN 60068-2-30: 2006	Damp heat, cyclic upper temperature 55°C, number of cycles: 6	EN 60068-2-78: 2002	Damp heat, steady state Test temperature 40°C / 93% RH, Test duration: 21 days	EN 60068-2-52: 1996	Salt spray test Severity level 3 (motor vehicle)										
EN 60068-2-30: 2006	Damp heat, cyclic upper temperature 55°C, number of cycles: 6																
EN 60068-2-78: 2002	Damp heat, steady state Test temperature 40°C / 93% RH, Test duration: 21 days																
EN 60068-2-52: 1996	Salt spray test Severity level 3 (motor vehicle)																
Mechanical tests	<table><tr><td>ISO 16750-3: 2007</td><td>Test VII; Vibration, random Mounting location: vehicle body</td></tr><tr><td>EN 60068-2-6: 2008</td><td>Vibration, sinusoidal 10...500 Hz; 0.72 mm/10 g; 10 cycles/axis</td></tr><tr><td>ISO 16750-3: 2007</td><td>Bumps 30 g/6 ms; 24,000 shocks</td></tr></table>	ISO 16750-3: 2007	Test VII; Vibration, random Mounting location: vehicle body	EN 60068-2-6: 2008	Vibration, sinusoidal 10...500 Hz; 0.72 mm/10 g; 10 cycles/axis	ISO 16750-3: 2007	Bumps 30 g/6 ms; 24,000 shocks										
ISO 16750-3: 2007	Test VII; Vibration, random Mounting location: vehicle body																
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ISO 16750-3: 2007	Bumps 30 g/6 ms; 24,000 shocks																

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7.3 Input characteristics

CR2520	Input characteristics								
A_IN00...A_IN03									
Current input 0...20 mA (A)	<table> <tr> <td>Input resistance</td><td>400 Ω</td></tr> <tr> <td>Input frequency</td><td>50 Hz</td></tr> <tr> <td>Resolution</td><td>10 bits</td></tr> <tr> <td>Accuracy</td><td>$\pm 1\%$ FS</td></tr> </table>	Input resistance	400 Ω	Input frequency	50 Hz	Resolution	10 bits	Accuracy	$\pm 1\%$ FS
Input resistance	400 Ω								
Input frequency	50 Hz								
Resolution	10 bits								
Accuracy	$\pm 1\%$ FS								
Voltage input 0...10 V (A)	<table> <tr> <td>Input resistance</td><td>50 kΩ</td></tr> <tr> <td>Input frequency</td><td>50 Hz</td></tr> <tr> <td>Resolution</td><td>10 bits</td></tr> <tr> <td>Accuracy</td><td>$\pm 1\%$ FS</td></tr> </table>	Input resistance	50 k Ω	Input frequency	50 Hz	Resolution	10 bits	Accuracy	$\pm 1\%$ FS
Input resistance	50 k Ω								
Input frequency	50 Hz								
Resolution	10 bits								
Accuracy	$\pm 1\%$ FS								
Voltage input 0...32 V (A)	<table> <tr> <td>Input resistance</td><td>30 kΩ</td></tr> <tr> <td>Input frequency</td><td>50 Hz</td></tr> <tr> <td>Resolution</td><td>10 bits</td></tr> <tr> <td>Accuracy</td><td>$\pm 1\%$ FS</td></tr> </table>	Input resistance	30 k Ω	Input frequency	50 Hz	Resolution	10 bits	Accuracy	$\pm 1\%$ FS
Input resistance	30 k Ω								
Input frequency	50 Hz								
Resolution	10 bits								
Accuracy	$\pm 1\%$ FS								
Voltage input ratiometric (A)	<table> <tr> <td>Input resistance</td><td>30 kΩ</td></tr> <tr> <td>Value range</td><td>0...1000 ‰ (referred to U_B)</td></tr> </table>	Input resistance	30 k Ω	Value range	0...1000 ‰ (referred to U_B)				
Input resistance	30 k Ω								
Value range	0...1000 ‰ (referred to U_B)								
Digital input for negative sensor signals (B_H)	<table> <tr> <td>Input resistance</td><td>2.4 kΩ</td></tr> <tr> <td>Input frequency</td><td>50 Hz</td></tr> <tr> <td>Switch-on level</td><td>$> 0.7 U_B$</td></tr> <tr> <td>Switch-off level</td><td>$< 0.4 U_B$</td></tr> </table>	Input resistance	2.4 k Ω	Input frequency	50 Hz	Switch-on level	$> 0.7 U_B$	Switch-off level	$< 0.4 U_B$
Input resistance	2.4 k Ω								
Input frequency	50 Hz								
Switch-on level	$> 0.7 U_B$								
Switch-off level	$< 0.4 U_B$								
B_IN00...B_IN08									
Digital input for positive sensor signals (B_L)	<table> <tr> <td>Input resistance</td><td>3.21 kΩ</td></tr> <tr> <td>Input frequency</td><td>50 Hz</td></tr> <tr> <td>Switch-on level</td><td>$> 0.7 U_B$</td></tr> <tr> <td>Switch-off level</td><td>$< 0.2 U_B$</td></tr> </table>	Input resistance	3.21 k Ω	Input frequency	50 Hz	Switch-on level	$> 0.7 U_B$	Switch-off level	$< 0.2 U_B$
Input resistance	3.21 k Ω								
Input frequency	50 Hz								
Switch-on level	$> 0.7 U_B$								
Switch-off level	$< 0.2 U_B$								
B_IN09...B_IN10									
Digital input for positive sensor signals (B_L)	<table> <tr> <td>Input resistance</td><td>3.21 kΩ</td></tr> <tr> <td>Input frequency</td><td>1 kHz</td></tr> <tr> <td>Switch-on level</td><td>$> 0.7 U_B$</td></tr> <tr> <td>Switch-off level</td><td>$< 0.2 U_B$</td></tr> </table>	Input resistance	3.21 k Ω	Input frequency	1 kHz	Switch-on level	$> 0.7 U_B$	Switch-off level	$< 0.2 U_B$
Input resistance	3.21 k Ω								
Input frequency	1 kHz								
Switch-on level	$> 0.7 U_B$								
Switch-off level	$< 0.2 U_B$								

7.4 Output characteristics

CR2520	Output characteristics												
B_OUT00...B_OUT02													
Digital output positive switching (B _H)	<table> <tr> <td>Switching voltage</td><td>10...32 V DC</td></tr> <tr> <td>Switching current</td><td>≤ 2 A</td></tr> <tr> <td>Total current</td><td>≤ 6 A</td></tr> <tr> <td>Protective circuit for inductive loads</td><td>integrated</td></tr> <tr> <td>Short-circuit proof and overload protected</td><td>yes</td></tr> </table>	Switching voltage	10...32 V DC	Switching current	≤ 2 A	Total current	≤ 6 A	Protective circuit for inductive loads	integrated	Short-circuit proof and overload protected	yes		
Switching voltage	10...32 V DC												
Switching current	≤ 2 A												
Total current	≤ 6 A												
Protective circuit for inductive loads	integrated												
Short-circuit proof and overload protected	yes												
PWM output (PWM)	<table> <tr> <td>Output frequency</td><td>20...250 Hz</td></tr> <tr> <td>Pulse/pause ratio</td><td>1...1000 ‰</td></tr> <tr> <td>Resolution</td><td>1 ‰</td></tr> <tr> <td>Switching current</td><td>≤ 2 A</td></tr> <tr> <td>Total current</td><td>≤ 6 A</td></tr> </table>	Output frequency	20...250 Hz	Pulse/pause ratio	1...1000 ‰	Resolution	1 ‰	Switching current	≤ 2 A	Total current	≤ 6 A		
Output frequency	20...250 Hz												
Pulse/pause ratio	1...1000 ‰												
Resolution	1 ‰												
Switching current	≤ 2 A												
Total current	≤ 6 A												
B_OUT03...B_OUT04													
Digital output positive switching (B _H)	<table> <tr> <td>Switching voltage</td><td>10...32 V DC</td></tr> <tr> <td>Switching current</td><td>≤ 2 A</td></tr> <tr> <td>Total current</td><td>≤ 4 A</td></tr> <tr> <td>Protective circuit for inductive loads</td><td>integrated</td></tr> <tr> <td>Short-circuit proof and overload protected</td><td>yes</td></tr> </table>	Switching voltage	10...32 V DC	Switching current	≤ 2 A	Total current	≤ 4 A	Protective circuit for inductive loads	integrated	Short-circuit proof and overload protected	yes		
Switching voltage	10...32 V DC												
Switching current	≤ 2 A												
Total current	≤ 4 A												
Protective circuit for inductive loads	integrated												
Short-circuit proof and overload protected	yes												
B_OUT05...B_OUT06													
Digital output positive switching (B _H)	<table> <tr> <td>Switching voltage</td><td>10...32 V DC</td></tr> <tr> <td>Switching current</td><td>≤ 5 A</td></tr> <tr> <td>Protective circuit for inductive loads</td><td>integrated</td></tr> <tr> <td>Short-circuit proof and overload protected</td><td>yes</td></tr> <tr> <td>Diagnosis wire break / overload</td><td>via current feedback with set switching thresholds</td></tr> </table>	Switching voltage	10...32 V DC	Switching current	≤ 5 A	Protective circuit for inductive loads	integrated	Short-circuit proof and overload protected	yes	Diagnosis wire break / overload	via current feedback with set switching thresholds		
Switching voltage	10...32 V DC												
Switching current	≤ 5 A												
Protective circuit for inductive loads	integrated												
Short-circuit proof and overload protected	yes												
Diagnosis wire break / overload	via current feedback with set switching thresholds												
Channel 23...24													
Full H-bridge with/without PWM (H, PWM)	<table> <tr> <td>Switching voltage</td><td>10...32 V DC</td></tr> <tr> <td>Switching current, static</td><td>≤ 5 A</td></tr> <tr> <td>Inrush current, peak</td><td>≤ 30 A</td></tr> <tr> <td>PWM frequency</td><td>20...250 Hz</td></tr> <tr> <td>Pulse/pause ratio</td><td>1...1000 ‰</td></tr> <tr> <td>Resolution</td><td>1 ‰</td></tr> </table>	Switching voltage	10...32 V DC	Switching current, static	≤ 5 A	Inrush current, peak	≤ 30 A	PWM frequency	20...250 Hz	Pulse/pause ratio	1...1000 ‰	Resolution	1 ‰
Switching voltage	10...32 V DC												
Switching current, static	≤ 5 A												
Inrush current, peak	≤ 30 A												
PWM frequency	20...250 Hz												
Pulse/pause ratio	1...1000 ‰												
Resolution	1 ‰												
Half bridge (H) Push-pull output	<table> <tr> <td>Switching voltage</td><td>10...32 V DC</td></tr> <tr> <td>Switching current, static</td><td>≤ 5 A</td></tr> <tr> <td>Total current</td><td>≤ 10 A</td></tr> <tr> <td>Inrush current, peak</td><td>≤ 30 A</td></tr> </table>	Switching voltage	10...32 V DC	Switching current, static	≤ 5 A	Total current	≤ 10 A	Inrush current, peak	≤ 30 A				
Switching voltage	10...32 V DC												
Switching current, static	≤ 5 A												
Total current	≤ 10 A												
Inrush current, peak	≤ 30 A												

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Digital output positive/negative switching ($B_{H/L}$)

Channel 25...26

Full H-bridge with PWM (H, PWM)

Full H-bridge without PWM (H)

Half bridge (H)
Push-pull output

Digital output positive/negative switching ($B_{H/L}$)

Output characteristics

Switching voltage	10...32 V DC
Switching current, static	≤ 5 A
Total current	≤ 10 A
Inrush current, peak	≤ 30 A
Protective circuit for inductive loads	integrated
Short-circuit proof and overload protected	yes

Switching voltage	10...32 V DC
Switching current, static	≤ 10 A
Inrush current, peak	≤ 90 A
PWM frequency	20...250 Hz
Pulse/pause ratio	1...1000 ‰
Resolution	1 ‰
Diagnosis wire break / overload	via current feedback with set switching thresholds

Switching voltage	10...32 V DC
Switching current, static	≤ 15 A
Inrush current, peak	≤ 90 A

Switching voltage	10...32 V DC
Switching current, static	≤ 15 A
Total current	≤ 24 A
Inrush current, peak	≤ 90 A
Diagnosis wire break / overload	via current feedback with set switching thresholds

Switching voltage	10...32 V DC
Switching current, static	≤ 15 A
Total current	≤ 24 A
Inrush current, peak	≤ 90 A
Short-circuit proof and overload protected	yes

7.5 Wiring

CR2520

Technical data

Wiring

Inputs

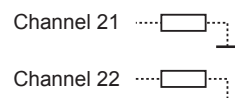
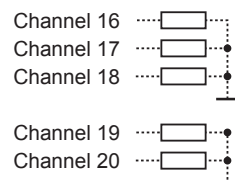
Channel 01	30	A_IN00	A, BH
Channel 02	11	A_IN01	A, BH
Channel 03	48	A_IN02	A, BH
Channel 04	12	A_IN03	A, BH
	36	A_GND	

Channel 05	40	B_IN00	BL (50 Hz)
Channel 06	29	B_IN01	BL (50 Hz)
Channel 07	22	B_IN02	BL (50 Hz)
Channel 08	43	B_IN03	BL (50 Hz)
Channel 09	44	B_IN04	BL (50 Hz)
Channel 10	28	B_IN05	BL (50 Hz)
Channel 11	45	B_IN06	BL (50 Hz)
Channel 12	41	B_IN07	BL (50 Hz)
Channel 13	46	B_IN08	BL (50 Hz)
Channel 14	27	B_IN09	BL (1 kHz)
Channel 15	47	B_IN10	BL (1 kHz)

Power supply CAN Bus

	38	VBBs	
	01	GND	
	32	CAN_L	
	14	CAN_H	

Outputs



Abbreviations

A	analogue
B _H	binary high side
B _L	binary low side
H	H-bridge function
PWM	pulse-width modulation
VBB _s	supply sensors/module
VBB _o	supply outputs

8 Parameter overview

8.1 General

Automatic saving of the communication and device parameters can be activated or deactivated by means of the "save parameter" entry (see object directory, index 1010).

When the value 0x02 is entered into SIdx 01, all parameters are automatically saved if changes were made.

With the value 0x00 there is no automatic saving, i.e. changed parameters will only be valid until the device is switched off or until the next reset is made.

With the function "restore" (see object directory , index 1011) the factory default values can be restored (except for the baud rate and the node ID). They become valid with the next power on.

8.2 Manufacturer-specific profiles; index 2000 to 6FFF

Parameters	Index in object directory	Default value (factory set)	Change saved automatically	Change effective
I/O configuration	2000	analogue inputs 0...10 V binary inputs binary outputs	adjustable	after PreOp
PWM frequency Channel 16...18	2001	0xFA (250 Hz)	adjustable	after PreOp
PWM frequency Channel 23...26	2010	0x64 (100 Hz)	adjustable	after PreOp
Node ID*	20F0, 20F1	0x20 (0d32)	yes	after reset
Baud rate*	baud rate*	0x04 (125 Kbits/s)	yes	after reset
Autostart	20F4	0x00 (deactivated)		

*) The entries 20F0/20F1 and 20F2/20F3 must always contain identical values. The new entries are valid after a reset (switching the module off/on). Values outside the permissible ranges will be rejected.

8.3 Communication profiles; index 1000 to 1FFF

Parameters	Index in object directory	Default value (factory set)	Change saved automatically	Change effective
COB ID Sync Object	1005	0x80	adjustable	after reset
Communication Cycle	1006	0x00 (Off)	adjustable	immediately
Guard Time	100C	0x00 (Off)	adjustable	immediately
Life Time Factor	100D	0x00	adjustable	immediately
Save Parameter	1010	0x02 (AutoSave ON)	yes	immediately
COB-ID EMCY	1014	0x80 + node ID	adjustable	after reset
Consumer Heartbeat Time	1016	0x00 (off)	adjustable	immediately
Producer Heartbeat Time	1017	0x00 (off)	adjustable	immediately
COB-ID Rec PDO 1	1400 01	0x200 + node ID	adjustable	after reset
Trans Type Rec PDO 1	1400 02	0x01 (synchronous)	adjustable	immediately
COB-ID Rec PDO 2	1401 01	0x300 + node ID	adjustable	after reset
Trans Type Rec PDO 2	1401 02	0x01 (synchronous)	adjustable	immediately
COB-ID Rec PDO 3	1402 01	0x400 + node ID	adjustable	after reset
Trans Type Rec PDO 3	1402 02	0x01 (synchronous)	adjustable	immediately
COB-ID Rec PDO 4	1403 01	0x500 + Node-ID	adjustable	after reset
Trans Type Rec PDO 4	1403 02	0x01 (synchronous)	adjustable	immediately
COB-ID Trans PDO 1	1800 01	0x180 + node ID	adjustable	after reset
Trans Type Trans PDO 1	1800 02	0xFF (asynchronous)	adjustable	immediately
Inhibit Time Trans PDO 1	1800 03	0x00	adjustable	immediately
Event Timer Trans PDO 1	1800 05	0x00	adjustable	immediately
COB-ID Trans PDO 2	1801 01	0x280 + node ID	adjustable	after reset
Trans Type Trans PDO 2	1801 02	0x01 (synchronous)	adjustable	immediately
Inhibit Time Trans PDO 2	1801 03	0x00	adjustable	immediately
Event Timer Trans PDO 2	1801 05	0x00	adjustable	immediately
COB-ID Trans PDO 3	1802 01	0x380 + node ID	adjustable	after reset
Trans Type Trans PDO 3	1802 02	0xFF (asynchronous)	adjustable	immediately
Inhibit Time Trans PDO 3	1802 03	0x00	adjustable	immediately
Event Timer Trans PDO 3	1802 05	0x00	adjustable	immediately
COB-ID Trans PDO 4	1803 01	0x480 + node ID	adjustable	after reset
Trans Type Trans PDO 4	1803 02	0x01 (synchronous)	adjustable	immediately
Inhibit Time Trans PDO 4	1803 03	0x00	adjustable	immediately
Event Timer Trans PDO 4	1803 05	0x00	adjustable	immediately

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The life time factor 0 is interpreted as 1.

The first guard protocol is interpreted as "start guarding" even if guarding is not yet active at that time (guard time =0).

8.4 EMCY objects

The following error codes according to DSP-401 or DSP-301 are supported:

EMCY code	Error reg	Additional code	Description
0x6100	0x11	0x00	"Internal Software" Overflow of an Rx queue; e.g. frequency of the RxPDOs is too high. Only external reset via an entry in 1003 00
0x6101	0x11	0x00	"Internal Software" Overflow of a Tx queue; e.g. device does not communicate with the bus. Only external reset via an entry in 1003 00
0x8100	0x11	0x00	"Monitoring" (Guarding Error) No guard object is received for "guard time" x "life time factor". Reset with the next communication.
0x8200	0x11	0x00	"Monitoring" (Sync Error) For "communication cycle" no sync object is received. Only in OPERATIONAL Reset with the next sync OBJ or PREOP



CANopen does not provide for two identical EMCY objects to be sent consecutively.

9 Maintenance, repair and disposal

The device is maintenance-free

- ▶ Do not open the housing as the device does not contain any components which can be repaired by the user. The device must only be repaired by the manufacturer.
- ▶ Dispose of the device in accordance with the national environmental regulations.

10 Approvals / standards

Test standards and regulations

The CE declaration of conformity and approvals can be found at:
www.ifm.com

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11 Appendix (UK)

11.1 Object directory

11.1.1 Manufacturer-specific profiles; index 2000 to 6FFF

Index	S-Idx	Name	Type		Default	Description
2000	0	number of IOs	ro	u8	0x1A	
	1	configuration analog input 1 Chan 01	rw	u8	0x03	0x00 = off 0x03 = 0 ... 10.000 mV 0x06 = ratiometric 0 ... 1000 promille 0x07 = 0 ... 20.000 µA 0x09 = 0 ... 32.000 mV 0x0A = binary low side
	2	configuration analog input 2 Chan 02	rw	u8	0x03	0x00 = off 0x03 = 0 ... 10.000 mV 0x06 = ratiometric 0 ... 1000 promille 0x07 = 0 ... 20.000 µA 0x09 = 0 ... 32.000 mV 0x0A = binary low side
	3	configuration analog input 3 Chan 03	rw	u8	0x03	0x00 = off 0x03 = 0 ... 10.000 mV 0x06 = ratiometric 0 ... 1000 promille 0x07 = 0 ... 20.000 µA 0x09 = 0 ... 32.000 mV 0x0A = binary low side
	4	configuration analog input 4 Chan 04	rw	u8	0x03	0x00 = off 0x03 = 0 ... 10.000 mV 0x06 = ratiometric 0 ... 1000 promille 0x07 = 0 ... 20.000 µA 0x09 = 0 ... 32.000 mV 0x0A = binary low side
	5	configuration binary input 1 Chan 05	rw	u8	0x01	0x00 = off 0x01 = binary input
	6	configuration binary input 2 Chan 06	rw	u8	0x01	0x00 = off 0x01 = binary input
	7	configuration binary input 3 Chan 07	rw	u8	0x01	0x00 = off 0x01 = binary input
	8	configuration binary input 4 Chan 08	rw	u8	0x01	0x00 = off 0x01 = binary input
	9	configuration binary input 5 Chan 09	rw	u8	0x01	0x00 = off 0x01 = binary input
	A	configuration binary input 6 Chan 10	rw	u8	0x01	0x00 = off 0x01 = binary input
	B	configuration binary input 7 Chan 11	rw	u8	0x01	0x00 = off 0x01 = binary input
	C	configuration binary input 8 Chan 12	rw	u8	0x01	0x00 = off 0x01 = binary input

Index	S-Idx	Name	Type		Default	Description
	D	configuration binary input 9 Chan 13	rw	u8	0x01	0x00 = off 0x01 = binary input
	E	configuration binary input 10 Chan 14	rw	u8	0x01	0x00 = off 0x01 = binary input
	F	configuration binary input 11 Chan 15	rw	u8	0x01	0x00 = off 0x01 = binary input
	10	configuration binary output 1 Chan 16	rw	u8	0x02	0x00 = off 0x02 = binary output 0x04 = PWM output
	11	configuration binary output 2 Chan 17	rw	u8	0x02	0x00 = off 0x02 = binary output 0x04 = PWM output
	12	configuration binary output 3 Chan 18	rw	u8	0x02	0x00 = off 0x02 = binary output 0x04 = PWM output
	13	configuration binary output 4 Chan 19	rw	u8	0x02	0x00 = off 0x02 = binary output
	14	configuration binary output 5 Chan 20	rw	u8	0x02	0x00 = off 0x02 = binary output
	15	configuration binary output 6 Chan 21	rw	u8	0x02	0x00 = off 0x02 = binary output
	16	configuration binary output 7 Chan 22	rw	u8	0x02	0x00 = off 0x02 = binary output
	17	configuration H-Bridge 1 Chan 23	rw	u8	0x0E	0x00 = off 0x0B = binary output high side 0x0C = binary output low side 0x0D = Half bridge 0x0E = H-bridge without PWM 0x0F = H-bridge with PWM
	18	configuration H-Bridge 2 Chan 24	rw	u8	0x0E	0x00 = off 0x0B = binary output high side 0x0C = binary output low side 0x0D = Half bridge 0x0E = H-bridge without PWM 0x0F = H-bridge with PWM
	19	configuration H-Bridge 3 Chan 25	rw	u8	0x0E	0x00 = off 0x0B = binary output high side 0x0C = binary output low side 0x0D = Half bridge 0x0E = H-bridge without PWM 0x0F = H-bridge with PWM
	1A	configuration H-Bridge 4 Chan 26	rw	u8	0x0E	0x00 = off 0x0B = binary output high side 0x0C = binary output low side 0x0D = Half bridge 0x0E = H-bridge without PWM 0x0F = H-bridge with PWM

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Index	S-Idx	Name	Type		Default	Description
2001	0	PWM frequency binary outputs	rw	u8	0xFA (250 Hz)	20...250 Hz PWM frequency for binary outputs 1...3 Chan 16, 17, 18
2002	0	number analog inputs	ro	u8	4	
	1	analogue input 1	ro	u16	-	depends on IO configuration
	2	analogue input 2	ro	u16	-	depends on IO configuration
	3	analogue input 3	ro	u16	-	depends on IO configuration
	4	analogue input 4	ro	u16	-	depends on IO configuration
2010	0	PWM frequency H-bridges	rw	u8	0x64 (100 Hz)	20..250 Hz PWM frequency for H bridges Chan 23, 24, 25, 26
2012	0	number H-bridges	ro	u8	4	
	1	set value H-bridge 1	rw	u8	0	depends on configuration H-bridge 1 case binary output low/high side: byte is divided in two nibbles L/R 0b xxxxL xxxR; L = set value (0/1) left switches of bridge R = set value (0/1) right switches of bridge case half bridge: byte is divided in two nibbles L/R 0b xxxLL xxRR; L = set value left switches of bridge R = set value right switches of bridge 0 = OFF 1 = push high 2 = pull low case H-bridge: 0 = OFF 1 = turn right 2 = turn left 3 = break; shorten via GND
	2	set value H-bridge 2	rw	u8	0	see above
	3	set value H-bridge 2	rw	u8	0	see above
	4	set value H-bridge 2	rw	u8	0	see above
2013	0	number current sense chan	ro	u8	6	
	1	current sense chan 21	ro	u16		current value out 05 unscaled
	2	current sense chan 22	ro	u16		current value out 06 unscaled
	3	current sense chan 25	ro	u16		current value HB2 right unscaled
	4	current sense chan 25	ro	u16		current value HB2 left unscaled
	5	current sense chan 26	ro	u16		current value HB3 right unscaled
	6	current sense chan 26	ro	u16		current value HB3 left unscaled

Index	S-Idx	Name	Type		Default	Description
2014	0	number PWM outputs	ro	u8	7	
	1	set value PWM chan 16	rw	u16	0	PWM value 0 ... 1000 out 0
	2	set value PWM chan 17	rw	u16	0	PWM value 0 ... 1000 out 1
	3	set value PWM chan 18	rw	u16	0	PWM value 0 ... 1000 out 2
	4	set value PWM chan 23	rw	u16	0	PWM value 0 ... 1000 HB0
	5	set value PWM chan 24	rw	u16	0	PWM value 0 ... 1000 HB1
	6	set value PWM chan 25	rw	u16	0	PWM value 0 ... 1000 HB2
	7	set value PWM chan 26	rw	u16	0	PWM value 0 ... 1000 HB3
20F0	0	CANopen node ID	rw	u8	0x20	1...127
20F1	0	CANopen node ID	rw	u8	0x20	The entries 20F0/20F1 must always contain identical values. The new entries are valid after a reset (switching the module off/on). Values outside the permissible ranges will be rejected.
20F2	0	CAN baud rate	rw	u8	0x04	0 = 1000 Kbaud 1 = 800 Kbaud 2 = 500 Kbaud 3 = 250 Kbaud 4 = 125 Kbaud 5 = 100 Kbaud 6 = 50 Kbaud 7 = 20 Kbaud
20F3	0	CAN baud rate	rw	u8	0x04	The entries 20F2/20F3 must always contain identical values. The new entries are valid after a reset (switching the module off/on). Values outside the permissible ranges will be rejected.
20F4	0	auto start	rw	u16	0x00	Time after reaching Preoperational State to change to Operational State. 0...5000 ms 0 = auto start deactivated
6100	0	number of binary inputs (8bit)	ro	u8	0x01	
	1	binary inputs	ro	u16	-	bits 0...10: binary inputs 0...10
6200	0	number of binary outputs (8bit)	ro	u8	0x02	
	1	binary outputs	wo	u8	0x00	bits 0...6: binary outputs 0...7

11.1.2 Communication profiles; index 1000 to 1FFF

Index	S-Idx	Name	Type		Default	Description
1000	0	device type	ro	u32	0x000F0191	I/O-module profile DS401 digital/analogue inputs/outputs
1001	0	error register	ro	u8	0x00	
1003	0	pre-defined error field	rw	u8	0x00	up to 4 entries in error history supported error history can be deleted by writing '0' to this entry
	1	error history	ro	u32	0x00000000	
	2	error history	ro	u32	0x00000000	
	3	error history	ro	u32	0x00000000	
	4	error history	ro	u32	0x00000000	
1005	0	COB ID SYNC	rw	u32	0x00000080	
1006	0	communication cycle period	rw	u32	0x00000000	max. time between 2 synch objects in µs; useful resolution = 1ms
1008	0	device name	ro	str	CR2520	
1009	0	HW Version	ro	str	HW Vx.x	
100A	0	SW Version	ro	str	SW Vx.x	
100C	0	guard time	rw	u16	0x0000	time in ms within this time the module expects a "node guarding" of the network master 0 = node guarding deactivated
100D	0	life time factor	rw	u8	0x00	if no "node guarding" is received for "guard time" x "life time", the module generates an EMCY the result from "guard time" x "life time" must be between 0 and 65535
1010	0	number of save options	ro	u8	0x01	
	1	save parameter	rw	u32	0x00000002	0x00000000 = no save 0x00000001 = saving all parameters after the string 'save' is written to this entry 0x00000002 = auto save
1011	0	number of restore options	ro	u8	0x01	
	1	restore default parameter	rw	u32	0x00000001	restore all parameters to default value after next reset if the string 'load' is written to this entry
1014	0	COB ID EMCY	rw	u32	0x00000080 + NodeID	module generates EMCY messages (bit 31 = 0)
1016	0	number of monitored devices	ro	u8	0x01	

Index	S-Idx	Name	Type		Default	Description
	1	consumer heartbeat time	rw	u32	0x00000000	heartbeat monitoring time for node n monitoring of only one node is supported 0x0nnntttt = monitoring time [ms] 0x0nnntttt = node number (if nn or tttt = 0, no monitoring is carried out)
1017	0	producer heartbeat time	rw	u16	0x0000	time interval [ms] where the module generates a producer heartbeat
1018	0	number of identity objects	ro	u8	0x04	
	1	vendor ID	ro	u32	0x0069666D	
1400	0	highest numbered subindex Receive PDO 1	ro	u8	0x02	
	1	COB ID Receive PDO 1	rw	u32	0x00000200 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Rec PDO 1	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
1401	0	highest numbered subindex Receive PDO 2	ro	u8	0x02	
	1	COB ID Receive PDO 2	rw	u32	0x00000300 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Rec PDO 2	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
1402	0	highest numbered subindex Receive PDO 3	ro	u8	0x02	
	1	COB ID Receive PDO 3	rw	u32	0x00000400 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Rec PDO 3	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
1403	0	highest numbered subindex Receive PDO 4	ro	u8	0x02	
	1	COB ID Receive PDO 4	rw	u32	0x00000500 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Rec PDO 4	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
1600	0	number of application objects linked with Rec PDO 1	rw	u8	0x01	
	1	1st mapping object Rec PDO 1	rw	u32	0x08010062	index 6200, subindex 1, 8 bits
	2	2nd mapping object Rec PDO 1	rw	u32	0x00000000	no object
	3	3rd mapping object Rec PDO 1	rw	u32	0x00000000	no object
	4	4th mapping object Rec PDO 1	rw	u32	0x00000000	no object
	5	5th mapping object Rec PDO 1	rw	u32	0x00000000	no object
	6	6th mapping object Rec PDO 1	rw	u32	0x00000000	no object

Index	S-Idx	Name	Type		Default	Description
	7	7th mapping object Rec PDO 1	rw	u32	0x00000000	no object
	8	8th mapping object Rec PDO 1	rw	u32	0x00000000	no object
1601	0	number of application objects linked with Rec PDO 2	rw	u8	0x04	
	1	1st mapping object Rec PDO 2	rw	u32	0x08011220	index 2012 subindex 1, 8 bits
	2	2nd mapping object Rec PDO 2	rw	u32	0x08021220	index 2012 subindex 2, 8 bits
	3	3rd mapping object Rec PDO 2	rw	u32	0x08031220	index 2012 subindex 3, 8 bits
	4	4th mapping object Rec PDO 2	rw	u32	0x08041220	index 2012 subindex 4, 8 bits
	5	5th mapping object Rec PDO 2	rw	u32	0x00000000	no object
	6	6th mapping object Rec PDO 2	rw	u32	0x00000000	no object
	7	7th mapping object Rec PDO 2	rw	u32	0x00000000	no object
	8	8th mapping object Rec PDO 2	rw	u32	0x00000000	no object
1602	0	number of application objects linked with Rec PDO 3	rw	u8	0x03	
	1	1st mapping object Rec PDO 3	rw	u32	0x10011420	index 2014, subindex 1, 16 bits
	2	2nd mapping object Rec PDO 3	rw	u32	0x10021420	index 2014, subindex 2, 16 bits
	3	3rd mapping object Rec PDO 3	rw	u32	0x10031420	index 2014, subindex 3, 16 bits
	4	4th mapping object Rec PDO 3	rw	u32	0x00000000	no object
	5	5th mapping object Rec PDO 3	rw	u32	0x00000000	no object
	6	6th mapping object Rec PDO 3	rw	u32	0x00000000	no object
	7	7th mapping object Rec PDO 3	rw	u32	0x00000000	no object
	8	8th mapping object Rec PDO 3	rw	u32	0x00000000	no object
1603	0	number of application objects linked with Rec PDO 4	rw	u8	0x04	
	1	1st mapping object Rec PDO 4	rw	u32	0x10041420	index 2014, subindex 4, 16 bits
	2	2nd mapping object Rec PDO 4	rw	u32	0x10051420	index 2014, subindex 5, 16 bits
	3	3rd mapping object Rec PDO 4	rw	u32	0x10061420	index 2014, subindex 6, 16 bits
	4	4th mapping object Rec PDO 4	rw	u32	0x10071420	index 2014, subindex 7, 16 bits
	5	5th mapping object Rec PDO 4	rw	u32	0x00000000	no object
	6	6th mapping object Rec PDO 4	rw	u32	0x00000000	no object
	7	7th mapping object Rec PDO 4	rw	u32	0x00000000	no object
	8	8th mapping object Rec PDO 4	rw	u32	0x00000000	no object
1800	0	highest numbered subindex Transmit PDO 1	ro	u8	0x05	
	1	COB ID Transmit PDO 1	rw	u32	0x00000180 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Trans PDO 1	rw	u8	0xFF	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)

Index	S-Idx	Name	Type		Default	Description
	3	inhibit timer Trans PDO 1	rw	u16	0x0000	min. interval for transmission (in 100µs)
	5	event timer Trans PDO 1	rw	u16	0x0000	max transfer break in trans type "asynch" (0...65535ms) when this time has elapsed the PDO is transferred even if the appl. event has not occurred
1801	0	highest numbered subindex Transmit PDO 2	ro	u8	0x05	
	1	COB ID Transmit PDO 2	rw	u32	0x00000280 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Trans PDO 2	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
	3	inhibit timer Trans PDO 2	rw	u16	0x0000	min. interval for transmission (in 100µs)
	5	event timer Trans PDO 2	rw	u16	0x0000	max transfer break in trans type "asynch" (0...65535ms) when this time has elapsed the PDO is transferred even if the appl. event has not occurred
1802	0	highest numbered subindex Transmit PDO 3	ro	u8	0x05	
	1	COB ID Transmit PDO 3	rw	u32	0x00000380 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Trans PDO 3	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
	3	inhibit timer Trans PDO 3	rw	u16	0x0000	min. interval for transmission (in 100µs)
	5	event timer Trans PDO 3	rw	u16	0x0000	max transfer break in trans type "asynch" (0...65535ms) when this time has elapsed the PDO is transferred even if the appl. event has not occurred
1803	0	highest numbered subindex Transmit PDO 4	ro	u8	0x05	
	1	COB ID Transmit PDO 4	rw	u32	0x00000480 + NodeID	PDO is valid (bit 31 = 0)
	2	transmission type Trans PDO 4	rw	u8	0x01	0x01...0xF0 = synch cyclic 0xFE...0xFF = asynch (immediately)
	3	inhibit timer Trans PDO 4	rw	u16	0x0000	min. interval for transmission (in 100µs)
	5	event timer Trans PDO 4	rw	u16	0x0000	max transfer break in trans type "asynch" (0...65535ms) when this time has elapsed the PDO is transferred even if the appl. event has not occurred
1A00	0	number of application objects linked with Trans PDO 1	rw	u8	0x01	
	1	1st mapping object Trans PDO 1	rw	u32	0x10010061	index 6100, subindex 1, 16 bits

Index	S-Idx	Name	Type		Default	Description
	2	2nd mapping object Trans PDO 1	rw	u32	0x00000000	no object
	3	3rd mapping object Trans PDO 1	rw	u32	0x00000000	no object
	4	4th mapping object Trans PDO 1	rw	u32	0x00000000	no object
	5	5th mapping object Trans PDO 1	rw	u32	0x00000000	no object
	6	6th mapping object Trans PDO 1	rw	u32	0x00000000	no object
	7	7th mapping object Trans PDO 1	rw	u32	0x00000000	no object
	8	8th mapping object Trans PDO 1	rw	u32	0x00000000	no object
1A01	0	number of application objects linked with Trans PDO 2	rw	u8	0x04	
	1	1st mapping object Trans PDO 2	rw	u32	0x10010220	index 2002, subindex 1, 16 bits
	2	2nd mapping object Trans PDO 2	rw	u32	0x10020220	index 2002, subindex 2, 16 bits
	3	3rd mapping object Trans PDO 2	rw	u32	0x10030220	index 2002, subindex 3, 16 bits
	4	4th mapping object Trans PDO 2	rw	u32	0x10040220	index 2002, subindex 4, 16 bits
	5	5th mapping object Trans PDO 2	rw	u32	0x00000000	no object
	6	6th mapping object Trans PDO 2	rw	u32	0x00000000	no object
	7	7th mapping object Trans PDO 2	rw	u32	0x00000000	no object
	8	8th mapping object Trans PDO 2	rw	u32	0x00000000	no object
1A02	0	number of application objects linked with Trans PDO 3	rw	u8	0x02	
	1	1st mapping object Trans PDO 3	rw	u32	0x10011320	index 2013, subindex 1, 16 bits
	2	2nd mapping object Trans PDO 3	rw	u32	0x10021320	index 2013, subindex 2, 16 bits
	3	3rd mapping object Trans PDO 3	rw	u32	0x00000000	no object
	4	4th mapping object Trans PDO 3	rw	u32	0x00000000	no object
	5	5th mapping object Trans PDO 3	rw	u32	0x00000000	no object

Index	S-Idx	Name	Type		Default	Description
	6	6th mapping object Trans PDO 3	rw	u32	0x00000000	no object
	7	7th mapping object Trans PDO 3	rw	u32	0x00000000	no object
	8	8th mapping object Trans PDO 3	rw	u32	0x00000000	no object
1A03	0	number of application objects linked with Trans PDO 4	rw	u8	0x02	
	1	1st mapping object Trans PDO 4	rw	u32	0x10031320	index 2013, subindex 3, 16 bits
	2	2nd mapping object Trans PDO 4	rw	u32	0x10041320	index 2013, subindex 4, 16 bits
	3	3rd mapping object Trans PDO 4	rw	u32	0x10051320	index 2013, subindex 5, 16 bits
	4	4th mapping object Trans PDO 4	rw	u32	0x10061320	index 2013, subindex 6, 16 bits
	5	5th mapping object Trans PDO 4	rw	u32	0x00000000	no object
	6	6th mapping object Trans PDO 4	rw	u32	0x00000000	no object
	7	7th mapping object Trans PDO 4	rw	u32	0x00000000	no object
	8	8th mapping object Trans PDO 4	rw	u32	0x00000000	no object

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