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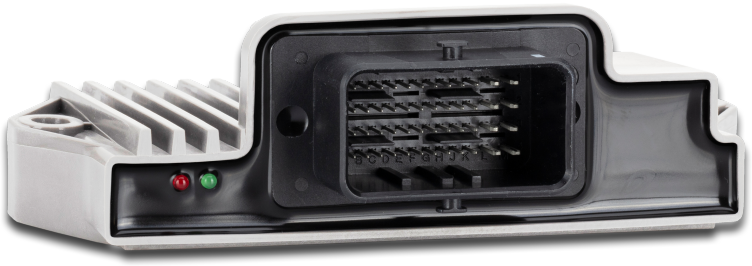

User Manual

JXM-IO-E32

Expansion module

60885294_01

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Translation of the german original User Manual

Revision	1.05.1
Date of issue	10/7/2022

Table of Contents

1 Introduction

1.1 Information on this document

This document forms an integral part of the product and must be read and understood prior to using it. It contains important and safety-related information for the proper use of the product as intended.

Target groups

This document is intended for specialists with appropriate qualifications.
Only competent and trained personnel is allowed to put this device into operation.
During the whole product life cycle, safe handling and operation of the device must be ensured. In the case of missing or inadequate technical knowledge or knowledge of this document any liability is excluded.

Availability of information

Make sure this document is kept at the ready in the vicinity of the product throughout its service life.
For information on new revisions of this document, visit the download area on our website. This document is not subject to any updating service.

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For further information refer to the following information products:

- JetSym software Online Help
  Detailed description of software functions with application examples
- Application-oriented manuals
  Cross-product documentation
- Version updates
  Information about new versions of software products or of the operating system of your controller

1.2 Typographical conventions

This manual uses different typographical effects to support you in finding and classifying information. Below, there is an example of a step-by-step instruction:

✓ This symbol indicates requirements which have to be met before executing the following action.

► This sign or a numbering at the beginning of a paragraph marks an action instruction that must be executed by the user. Execute the instructions one after the other.

⇨ The target after a list of instructions indicates reactions to, or results of these actions.

ⓘ INFO

Further information and practical tips

In the info box you will find helpful information and practical tips about your product.

2 Safety

2.1 General Information

When placed on the market, this product corresponds to the current state of science and technology.
In addition to the operating instructions, the laws, regulations and guidelines of the country of operation or the EU apply to the operation of the product. The operator is responsible for compliance with the relevant accident prevention regulations and generally accepted safety rules.

2.2 Purpose

2.2.1 Intended use

This module is for adding multifunctional inputs and outputs to controllers.

Operate the device only in accordance with the intended conditions of use, and within the limits set forth in the technical specifications.
Intended use of the product includes its operation in accordance with this manual.

SELV

The operating voltage of this device is classified as Safety Extra Low Voltage and is therefore not subject to the European Low Voltage Directive. The device may only be operated from a SELV source.

2.2.2 Usage other than intended

This device must not be used in technical systems which to a high degree have to be fail-safe.

Machinery Directive

This device is no safety-related part as per Machinery Directive 2006/42/EC, and must, therefore, not be used for safety-relevant applications. This device is NOT intended for the purpose of personal safety, and must, therefore, not be used to protect persons.

2.3 Warnings used in this document

⚠ DANGER

High risk

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Medium risk

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Low risk

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Material damage

Indicates a situation which, if not avoided, could result in malfunctions or material damage.

3 Product Description

The JXM-IO-E32 is a CAN device with digital inputs for a wide range of pulse measurements and analog inputs for current, voltage and temperature measurement. One pin with supply voltage and ground reference is added to each of the 10 analog inputs reducing the cabling effort to a minimum. 3 analog outputs (current and voltage) allow for additional applications to be implemented.

3.1 Design

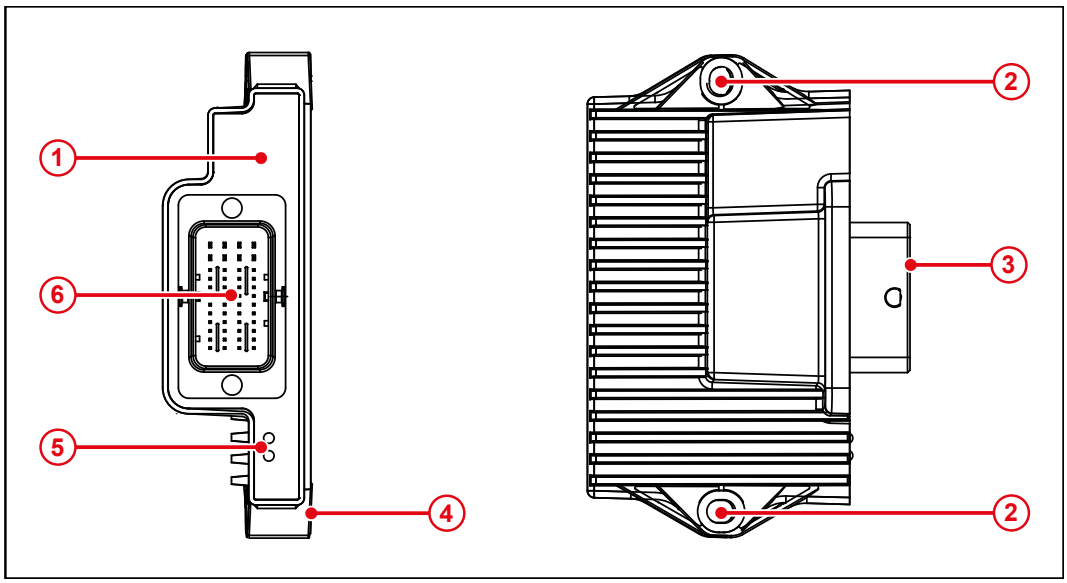

Fig. 1: Design

1	Housing
2	Fastening lugs
3	MOLEX connector
4	Mounting surface
5	LED indicators
6	Contact pins

3.2 Product features

- 1 CAN port, CAN 2.0, with internal termination via the connector
- 10 analog inputs for current or voltage measurement
  - of which 8 PT1000 inputs with a 12 bit resolution
- 2 high-accuracy inputs with 16 bit resolution
- 6 digital inputs for use as digital, frequency, period time or counter inputs
- 3 analog outputs with current and voltage measurement (0 mA ... 20 mA or 0 V ... 10 V)
- 2 tri-state configuration pins to define the node ID in the wiring harness
- 2 LEDs for diagnostics
- 2 reference sensor supplies (10 V/200 mA)
- 8 24 V sensor supplies from battery voltage

3.3 Diagnostic capability via LEDs

The JXM-IO-E32 is equipped with 2 LEDs to indicate various states and errors.

Color	Blinking pattern		Description
Red	Permanently ON		■ Operating voltage is present (VBAT_ECU). ■ The boot loader is not running.
Red	Steady	200 ms	■ The boot loader is running. ■ The device has no firmware.
	OFF	200 ms	
Red	Steady	400 ms	■ The start process was completed without errors. ■ The device is in the **Stopped** state.
	OFF	400 ms	
Green	Steady	200 ms	■ The start process was completed without errors. ■ The device is in the **Pre-Operational** state.
	OFF	200 ms	
Green	Steady	200 ms	■ The start process was completed without errors. ■ The device is in the **Operational** state.
	OFF	600 ms	
Green	3x ON/OFF	200 ms	■ The start process was completed without errors. ■ The device is in calibration mode.
	Break	400 ms	
Red	Steady	200 ms	■ The device is in the **Bus Off** state. ■ Bus communication is not possible. ■ There is a wiring error.
	OFF	400 ms	
Green	Steady	200 ms	
	OFF	400 ms	
Red	3x ON/OFF	200 ms	Measured values are outside their specified ranges. The following errors may have occurred: ■ The PCB temperature is too high. ■ The CPU temperature is too high.
Green	Steady	400 ms	
	OFF	400 ms	

3.4 Nameplate

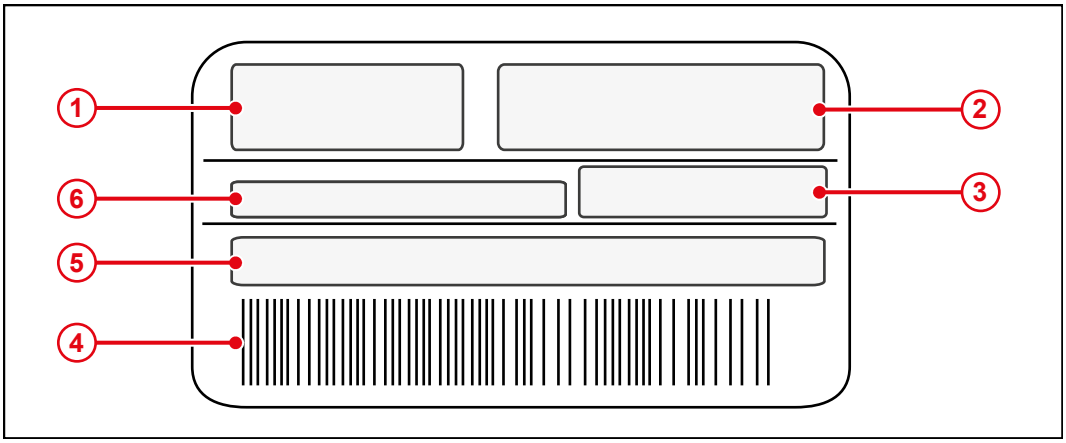

Fig. 2: Sample nameplate

1	Logo
2	Certification mark
3	Registration number and hardware revision
4	Barcode
5	Serial number
6	Model code number

3.5 Scope of delivery

Scope of delivery	Item number	Quantity
JXM-IO-E32-G20-K00	10001912	1

4 Technical specifications

This chapter contains information on electrical and mechanical data as well as operating data of the JXM-IO-E32.

4.1 Dimensions

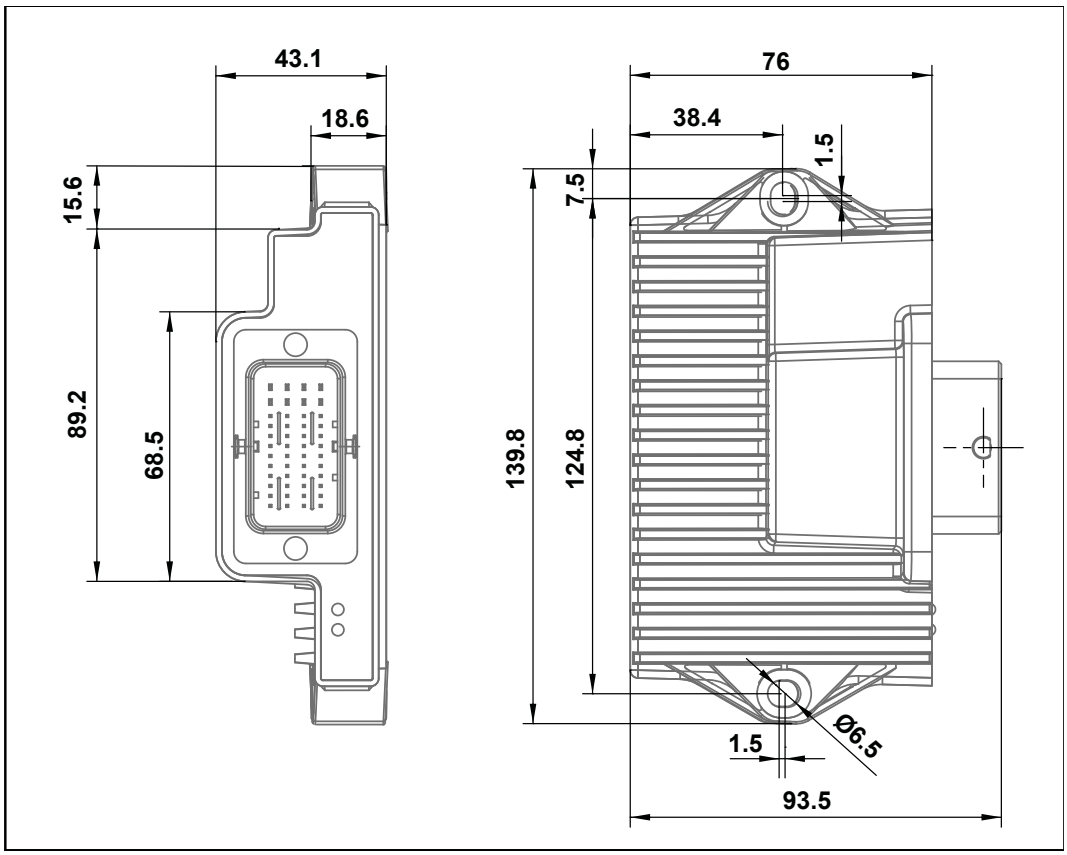

Fig. 3: Dimensions in mm

ⓘ INFO

CAD data

CAD data of the device can be found in the download area of our *homepage*.

4.2 Mechanical specifications

Parameter	Description	Standards
Weight	325 g	
Enclosure specifications		
Material	Polyamid	
Potting material	Polyurethane	
Enclosure potential	Isolated	
Vibration resistance	10 Hz ... 150 Hz, 6 h	ISO 16750-3
Shock resistance		
Type of shock	Half-sine wave	ISO 16750-3
Intensity and duration	50 g for 11 ms	
Number and direction	10 shocks in the directions of all 3 spatial axes	
Free fall		
Height of fall	From 1 m height on solid ground	ISO 16750-3

Tab. 1: Mechanical specifications

4.3 Electrical properties

ECU power supply

Parameter	Description
Abbreviation	VBAT_ECU
Operating voltage	DC 8 V … 32 V
Protection against polarity reversal	Max. -32 V
Voltage protection	+36 V for 1 h at T_{max} -20 °C, function state C

Tab. 2: ECU power supply

Ground reference

Pin	Description
GND	Ground reference for VBAT_ECU
GND_SEN	Ground reference for ext. sensors

Tab. 3: Ground reference

4.4 Environmental conditions

Parameter	Description	Standards
Operating temperature	-40 °C … +85 °C	ISO 16750-4
Storage temperature	-40 °C … +85 °C	
Relative humidity	5 % … 95 %	
Weather resistance	The device is designed for use in all weather conditions and is suitable for outdoor use.	
Salt water resistance	The device is not designed for maritime applications.	
Degree of protection		
Without mating connector	IP23	ISO 20653:2013
with mating connector	IP66	

Tab. 4: Environmental conditions

4.5 EMI values

The device has E1 approval according to ECE R10 Rev. 5 and CE conformity according to ISO 14982.

Pulses ISO 7637-2

Test pulse	Values	Functional class
1	-450 V	C
2 a	+37 V	B
2b	+20 V	C
3 a	-150 V	A
3b	+150 V	A
4	Ua1: -12 V / 50 ms Ua2: -5 V / 500 ms	B (24 V systems)
5b	Load dump 70 V / 2 Ω / 350 ms	C

Tab. 5: Pulses ISO 7637-2

Irradiation ISO 11452

Parameter	Values	Functional class
Protection against RF noise	20 MHz ... 2 GHz 100 V/m	B
	20 MHz … 2 GHz 30 V/m	A

Tab. 6: Irradiation ISO 11452

Emission CISPR 25

Parameter	Values	
Narrowband emission	30 MHz ... 1,000 MHz	Min. 1 dB below limit
Wideband emission	30 MHz ... 1,000 MHz	Min. 1 dB below limit

Tab. 7: Emission CISPR 25

ESD EN 61000-4-2

Parameter	Values	Functional class
Contact discharge	±4 kV	A
Discharge through air	±8 kV	A

Tab. 8: ESD EN 61000-4-2

4.6 Outputs

Analog outputs

Parameter	Description	
Analog output		
Abbreviation	AO	
Quantity	3	
Mode	0 mA ... 20 mA or 0 V … 10 V: 20 mA max.	It is possible to switch between the configuration as current output or voltage output.
Accuracy (current)	±2.5 % of the value range	
Accuracy (voltage)	100 mV	
Resolution	12 bits configured in mV	

Tab. 9: Outputs AO_1 ... AO_3

Outputs VREF_10V

Parameter	Description
Abbreviation	VREF_10V
Quantity	2
Operating voltage	10 V
Accuracy	1 %
Operating current	Min. 100 mA
Accuracy	1 %
Diagnostic function	The voltage generated at the 10 V power supply unit can be read out via SDO. Each channel can be checked for short circuit.

Tab. 10: Outputs VREF_10V

Sensor output VEXT_SEN

Parameter	Description
VEXT_SEN is the 24 V output for supplying power to external sensors and is supplied from VBAT_ECU.	
Abbreviation	VEXT_SEN
Quantity	8
Operating voltage	VBAT
Accuracy	1 %
Operating current	100 mA
Accuracy	1 %
Diagnostic function	Each channel can be checked for short circuit.

Tab. 11: Sensor output VEXT_SEN

4.7 Inputs

Within the operating voltage range, all inputs are voltage-proof and overcurrent protected. Alternatively, the analog inputs can also be used as digital inputs (DI).

The JXM-IO-E32 has 8 separate VEXT_SEN pins and 2 separate VREF_10V pins that should be used to power the sensors. Each sensor supply is output via a PTC thermistor so that a voltage dip caused by a short circuit can be detected.

VREF_10V supplies a stabilized 10 V voltage, while VEXT_SEN outputs the battery voltage.

Analog inputs

Parameter	Description	
Analog inputs		
Abbreviation	AI	
Quantity	8	
Resolution	12 bits	
Voltage measuring		
Rated measuring range	0 V … 10 V	
Overvoltage measurement	10 V … 12 V	
Input resistance	≥ 43 kΩ	
Load resistor	120 Ω	
Maximum voltage	+32 V	
Measuring accuracy	±1.5 % relative to the measuring range of 12 V	
Moving average filter		
Filter depth range	1 ... 32	At 1 no filtering is active.
Measuring cycle	1 ms	
Current measurement		
Rated measuring range	0 mA ... 20 mA	
Overcurrent range	21 mA ... 24 mA	
Measuring accuracy	±1 % referred to the current measuring range 20 mA	
Behavior in case of overcurrent detection	Overcurrent detection limits the current so that the device is not damaged.	
Sample time	2 ms	
As AI_PT1000		
Measuring range	-45 °C … +150 °C	Resolution and Accuracy ±1 °C
Connection	Between AI and any GND_SEN	
As DI_PNP		
H level	≥ 4.6 V	
L level	≤ 1.6 V	
Input frequency	Max. 10 Hz	
Input resistance	≥ 43 kΩ	

Tab. 12: Analog input AI_1 … AI_8

High-precision analog inputs

The AI_PREC serve as inputs for high-precision sensors for current measurement.

Parameter	Description
High-precision analog inputs	
Abbreviation	AI_PREC
Quantity	2
Resolution	16 bits
Dielectric strength	Max. +32 V
Current measurement	
Measuring range	0 mA ... 20 mA
Overcurrent range	21 mA ... 24 mA
Measuring accuracy	±0.5 % referred to the current measuring range 20 mA
Behavior in case of overcurrent detection	Overcurrent detection limits the current so that the device is not damaged.
Sample time	8 ms while both AI_PREC_1 and AI_PREC_2 are sampling. 2 ms, if only one AI_PREC is sampling.

Tab. 13: High-precision analog inputs AI_PREC

Digital inputs

All digital inputs can be used as PNP or NPN inputs.

With restrictions, the analog inputs can also be used as PNP inputs.

Parameter	Description
Digital inputs with frequency measurement	
Abbreviation	DI
Quantity	6
Pull resistor	5.6 kΩ
H level	≥ 4.6 V
L level	≤ 1.6 V
Input frequency	0.1 Hz … 10 kHz
Dielectric strength	Max. +32 V

Tab. 14: Digital inputs DI_1 ... DI_6

Configuration inputs

Configuration inputs are tristate inputs and are used to set the node ID. The base address can be set via SDO and has the default value 0x50. The node ID can be shifted by connecting the configuration inputs with VBAT_ECU or GND via an offset.

Parameter	Description	
Configuration inputs for configuring the node ID		
Abbreviation	CFG1	CFG2
Quantity	2	

Tab. 15: Configuration inputs CFG1 … CFG2

For more information refer to chapter Setting the node ID [▶ 36].

5 Mechanical installation

⚠ WARNING

Risk of burns

Contact with hot surface may cause burns.

- ► Take protective measures to prevent inadvertent contact with the device.
- ► Allow the device to cool down for some time before you start working on it.

NOTICE

Damages to material or functional impairment due to welding

Welding on the chassis may damage the device material, or impair device functions.

- ► Before you start welding, disconnect all connections between the device and the electric system of the vehicle.
- ► Protect the device from flying sparks and welding beads (splatter).
- ► Do not touch the device with the welding electrode or earth clamp.

NOTICE

Dirt and moisture can affect the electrical connections.

- ► Protect unused pins using blanking plugs.
- ► Protect all electrical connections with appropriate single wire seals.
- ► Clean the area around a connector prior to removing the mating connector.

NOTICE

Functional impairment due to magnets or motors with coil

Using magnets or motors with a coil in the vicinity of the JXM-IO-E32 may adversely affect current readings of the inputs and outputs.

- ► Ensure that there is sufficient clearance or shield the JXM-IO-E32.

5.1 Requirements for installation location and mounting surface

Requirements for the mounting surface

Parameter	Description
Suitable materials	No special material requirements
Shape / quality	The contact surface must be plane.
Fastening lugs	All existing fastening lugs must be screwed down. The device can directly be fastened to the vehicle or to a mounting plate.

Tab. 16: Requirements for the mounting surface

Requirements for the installation space

- Sufficient air circulation
- Sufficient space between the device and parts that may become very hot
- The device must be accessible for service work at all times.

5.2 Mounting orientation

When mounting, observe the permitted and prohibited mounting orientations.

ⓘ INFO

Overheating due to incorrect mounting orientation

If the device switches itself off, check whether the device has overheated due to an unfavorable mounting orientation.

5.2.1 Allowed mounting orientations

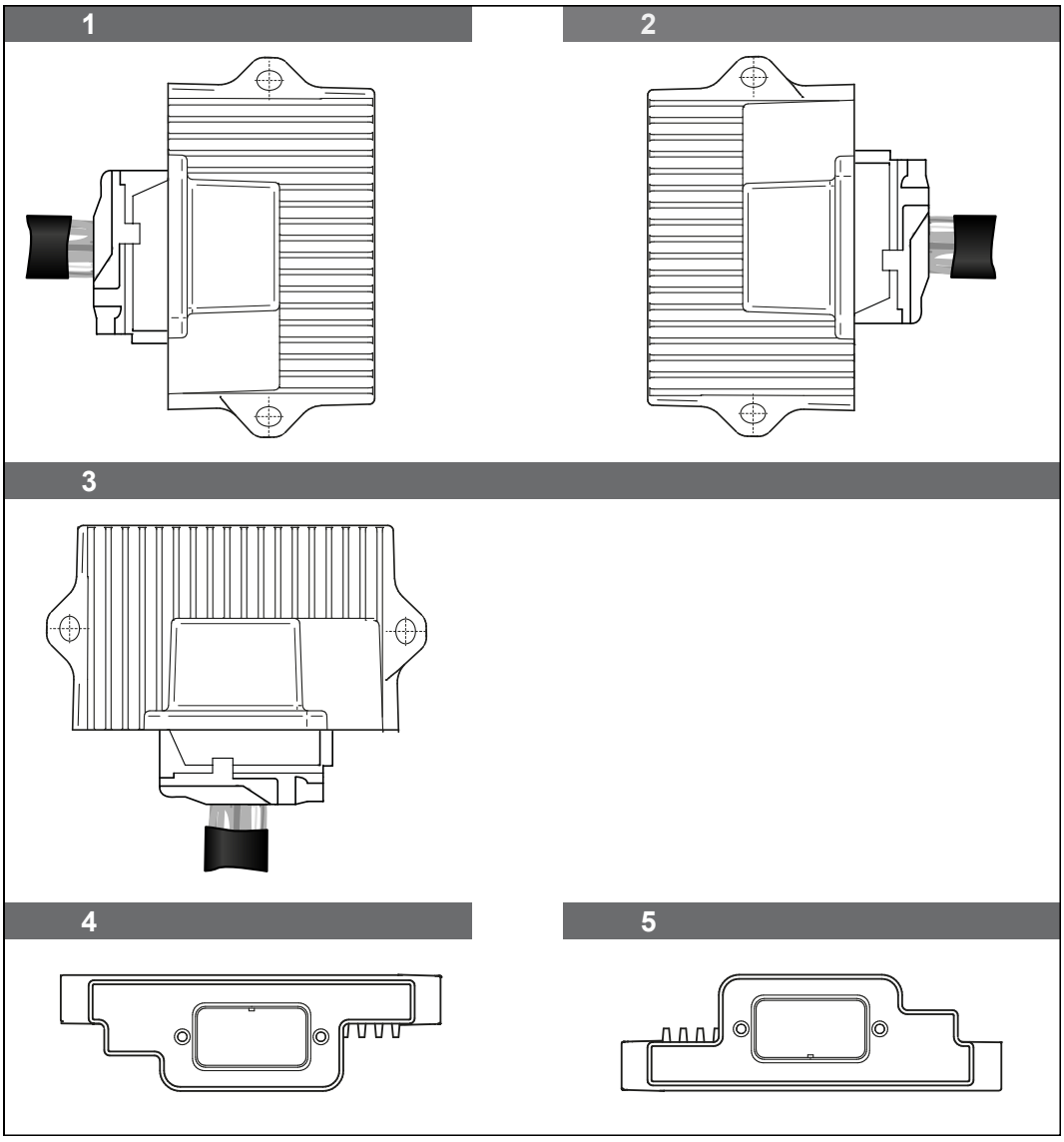

Fig. 4: Allowed mounting orientations

5.2.2 Forbidden mounting orientations

NOTICE

Ingress of moisture in the case of incorrect mounting orientation

- ► Protect the device from splash and condensate.
- ► Do not route the connector plug vertically upwards.
- ► Do not use a steam jet near the unprotected device.

Any orientation where the connector plug is not protected against splash water or condensation is prohibited.

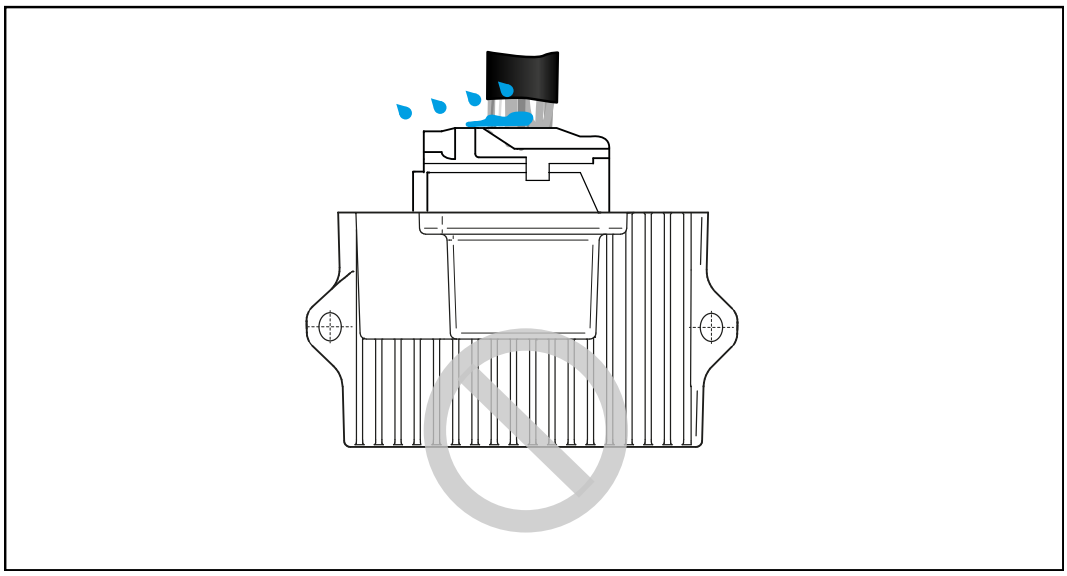

Fig. 5: Forbidden mounting orientation

5.3 Installing the expansion module

Fastening material

Installation hardware is not included in the scope of delivery. Jetter AG recommends the following mounting hardware:

Material	Type	Quantity
Screws/bolts	M6	2
Washers	DIN 125-1	2

Tab. 17: Fastening material

Mechanical installation

► Use both mounting lugs to fasten the JXM-IO-E32. The stud torque is 4 Nm max.

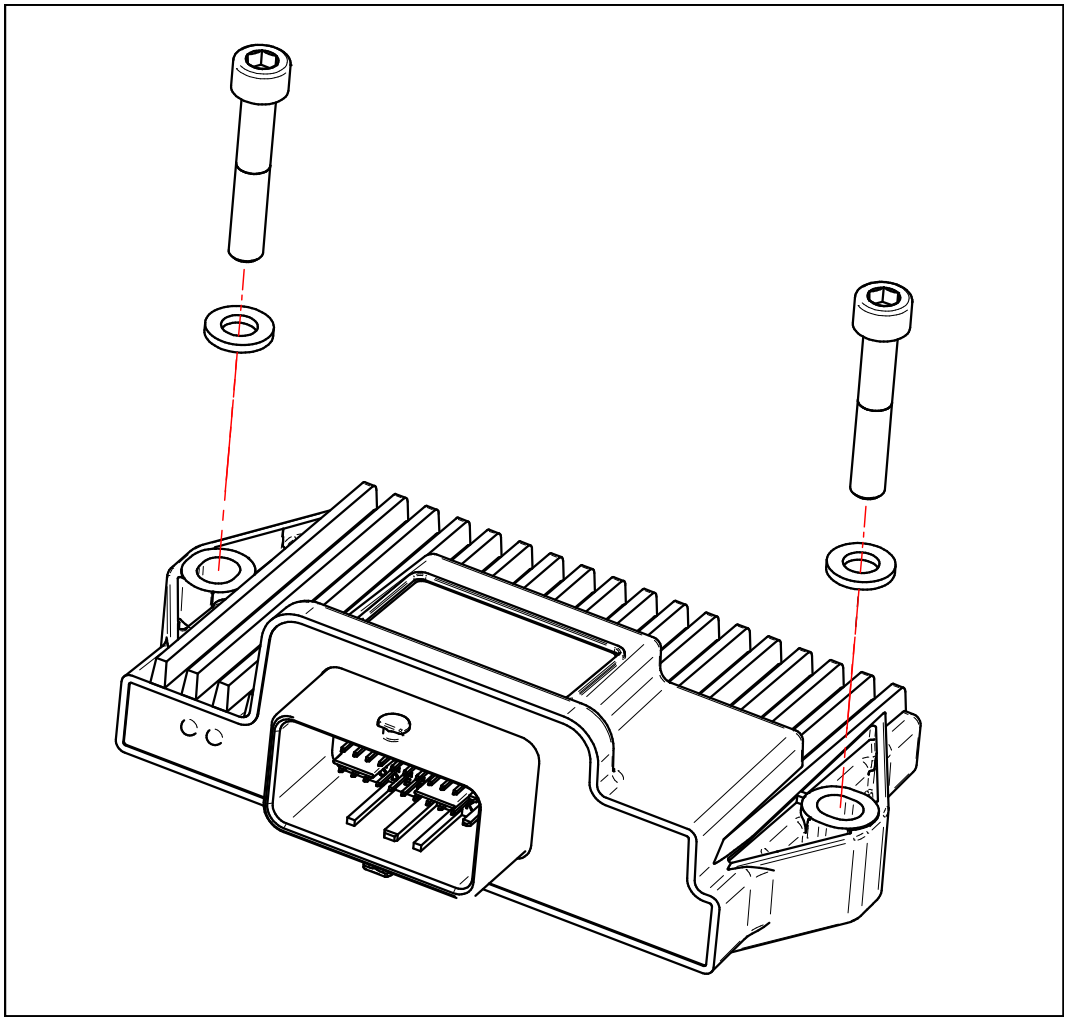

Fig. 6: Installation drawing

6 Electrical connection

⚠ WARNING

Signal disruption due to incorrect CAN wiring

Unshielded or incorrectly twisted CAN lines may cause communication faults. In the worst case, a malfunction of the device can lead to subsequent physical injury.

- ► Connect 120 Ω termination resistors to both ends of the CAN bus.
- ► Alternatively, connect the internal terminating resistor (see pinout).

NOTICE

Improving electromagnetic compatibility

Improper implementation of the wiring harness may impair electromagnetic compatibility.

- ► Keep the cables as short as possible.
- ► Lay power lines and signal lines separated from each other.

NOTICE

Damages to material or functional impairment

Improper implementation of the wiring harness may cause mechanical stress.

- ► Protect the cables from bending, twisting or chafing.
- ► Install strain reliefs for the connecting cables.

NOTICE

Surges resulting from missing protection or fusing

Surges may cause malfunctions or damage to the product.

- ► Protect the voltage inputs from surges according to the requirements.
- ► Ensure that the device is handled in accordance with ESD regulations.

NOTICE

Interferences due to differences in potential

Differences in potential can lead to interferences.

► Wire sensors and actuators including their supply lines in star configuration to prevent differences in potential.

6.1 Pin assignment

6.1.1 MOLEX connector

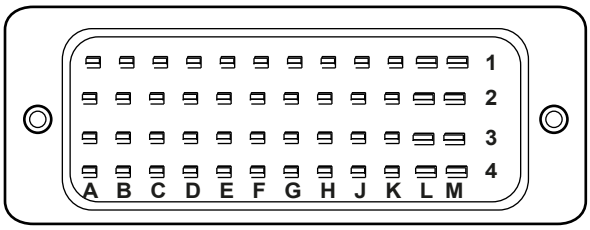

Fig. 7: MOLEX connector

	4	3	2	1
A	DI_1	NC (BOOT)	CAN1_TERM2	CAN1_H
B	DI_2	AO_3	CAN1_TERM1	CAN1_L
C	DI_3	GND_SEN	VEXT_SEN_1	AI_1
D	DI_4	GND_SEN	VEXT_SEN_2	AI_2
E	DI_5	GND_SEN	VEXT_SEN_3	AI_3
F	DI_6	GND_SEN	VEXT_SEN_4	AI_4
G	AO_1	GND_SEN	VEXT_SEN_5	AI_5
H	AO_2	GND_SEN	VEXT_SEN_6	AI_6
J	CFG1	GND_SEN	VEXT_SEN_7	AI_7
K	CFG2	VBAT_ECU	GND_SEN	AI_8
L	VEXT_SEN_8	GND_SEN	VREF_10V_1	AI_PREC_1
M	GND	GND_SEN	VREF_10V_2	AI_PREC_2

Abbreviations used in this document

Abbreviation	Description
AI	Analog input
AI_PREC	High-resolution analog input (16 bits)
AO	Analog output
CAN1_TERM	These two pins must be jumpered to enable the 120 Ω terminating resistor.
CFG	Configuration pins for setting the CAN ID
DI	Digital and frequency input
GND	Ground
GND_SEN	Ground - sensor power supply
n.c.	Reserved pin that must not be connected. **NOTICE! Seal unused pins with pin plugs.**
VBAT_ECU	Power supply for logic unit and sensors
VEXT_SEN	Battery voltage for sensors
VREF_10V	Stabilized reference voltage for sensors

MOLEX mating connector – Specification

Category	Description	
Designation	MOLEX connector	
Type	48-pin	
Series production	64320	
Manufacturer part number	0643201311	
Crimp contacts		
For 0.75 mm² lines	Quantity	40
	Manufacturer part number	0643221029
For 1.5 mm² lines	Quantity	8
	Manufacturer part number	0643231039
Protective cap		
Manufacturer part number	0643201301	

Tab. 18: MOLEX mating connector - Specification

7 Identification and Configuration

7.1 Identification

This chapter describes how to identify the JXM-IO-E32 device:

- Determining the hardware revision
- Retrieving Electronic Data Sheet (EDS) information. The EDS holds numerous non-volatile production-relevant data.
- Determining the OS version of the device and its software components

7.1.1 Device information

Device information

Index	Subindex	Description	Type	Types of access	Default value
0x1018	0	Number of supported entries	U8	R	
	1	Manufacturer ID	U32	R	0x000000B3
	2	Product code	U32	R	
	3	Revision number	U32	R	
	4	Serial number	U32	R	
0x1000	0	Type of device	U32	R	
0x1008	0	Device Name	String	R	
0x1009	0	Hardware revision	String	R	
0x100A	0	Software version	String	R	

Tab. 19: Device information

7.1.2 Electronic Data Sheet (EDS)

Each JXM-IO-E32 features an Electronic Data Sheet (EDS). Production-specific data is stored in the CANopen object indexes 0x4555 and 0x4565.

EDS information

Index	Subindex	Description	Type	Types of access
0x4555	0	Number of supported entries	U8	R
	1	Reserved		
	2	Reserved		
	3	Reserved		
	4	Module code	U16	R
	5	Product name	String	R
	6	PCB revision number	I16	R
	7	PCB options	I16	R
	8	Reserved		
	9	Serial number	String	R
	10	Production time stamp: Day	U8	R
	11	Production time stamp: Month	U8	R
	12	Production time stamp: Year	U16	R
	13	Reserved		
	14	Reserved		
	15	Minimum OS version	U32	R
	16	Minimum bootloader version	U32	R

Tab. 20: EDS information

Electronic nameplate

Index	Subindex	Description	Type	Default
0x4565	0	Number of supported entries	U32	5
	1	Version number of the electronic name plate	U32	0
	2	Command	U32	0
	3	Product serial number	String	0
	4	Item number	String	0
	5	Product revision	String	0

Tab. 21: Electronic nameplate

7.2 Operating system

We are continuously striving to enhance the operating systems of our products. Enhancing means adding new features, and upgrading existing functions. Current OS files are available for download on our homepage in the downloads area of the respective product.

ⓘ INFO

Further information

More information on this subject is available on our website.

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7.2.1 OS update via JetEasyDownload

To update the operating system of this device, use a CAN dongle from PEAK and the Jetter command line tool JetEasyDownload (version 1.00.0.15 or higher).

JetEasyDownload Parameters

To call JetEasyDownload you need specific parameters.

Parameter	Description	Values	
-H<Num>	Hardware	0=	PCAN_ISA1CH
		1=	PCAN_ISA2CH
		2=	PCAN_PCI_1CH
		3=	PCAN_PCI_2CH
		4=	PCAN_PCC_1CH
		5=	PCAN_PCC_2CH
		6=	PCAN_USB_1CH
		7=	PCAN_USB_2CH
		8=	PCAN_Dongle Pro
		9=	PCAN_Dongle
		10=	PCAN_NET Jetter
		11=	PCAN_DEV default device
		20=	IXXAT V2.18
		22=	IXXAT V3
		100=	CAN hardware detected first
-T<nodeID>	Target node ID		
-B<Num>	Baud rate **Observe the permissible baud rates of your device!**	0=	10 kB
		1=	20 kB
		2=	50 kB
		3=	100 kB
		4=	125 kB
		5=	250 kB
		6=	500 kB
		7=	1 MB
-S<Num>	SDO timeout	Default	300 ms
-L<name>	OS filename	e.g. JXM-IO-E30_Vx.xx.x.xx.os	

Tab. 22: JetEasyDownload Parameters

Performing the update

JetEasyDownload -H100 –T80 -B5 -S8000 –LJXM-IO-E32_Vx.xx.x.xx.os

ⓘ INFO

Selecting the CAN dongle

When selecting the CAN hardware, the –H100 parameter gives priority to the hardware detected as connected to the PC. Ensure that the PEAK CAN dongle is the only CAN device connected to the PC, to prevent the selection of the wrong CAN dongle.

✓ JetEasyDownload and PEAK CAN dongle are ready for use.

✓ A CAN connection is open between the PEAK CAN dongle and the JXM-IO-E32.

1. Call up JetEasyDownload with the above parameters and a valid OS file.
   ⇨ The device carries out a reset.
   ⇨ The device starts in boot loader mode with a single heartbeat in init state (data = 0x00).
2. Wait for approx. 7 seconds while the device formats the flash memory.
   ⇨ The device starts the download process.

⇨ The device starts automatically with the new firmware.

8 Parameterization

8.1 Concept and control

The concept of the JXM-IO-E32 is based on the assignment of interfaces to the inputs and outputs of the device. Each input and output of the device is called a port and can be configured. The function of a port is determined by assigning an interface to it. Each interface contains parameters, values and a state:

- Parameters can be assigned to each interface.
- Information can be transmitted and set via values to any interface.
- The status provides information about the status of the interface.

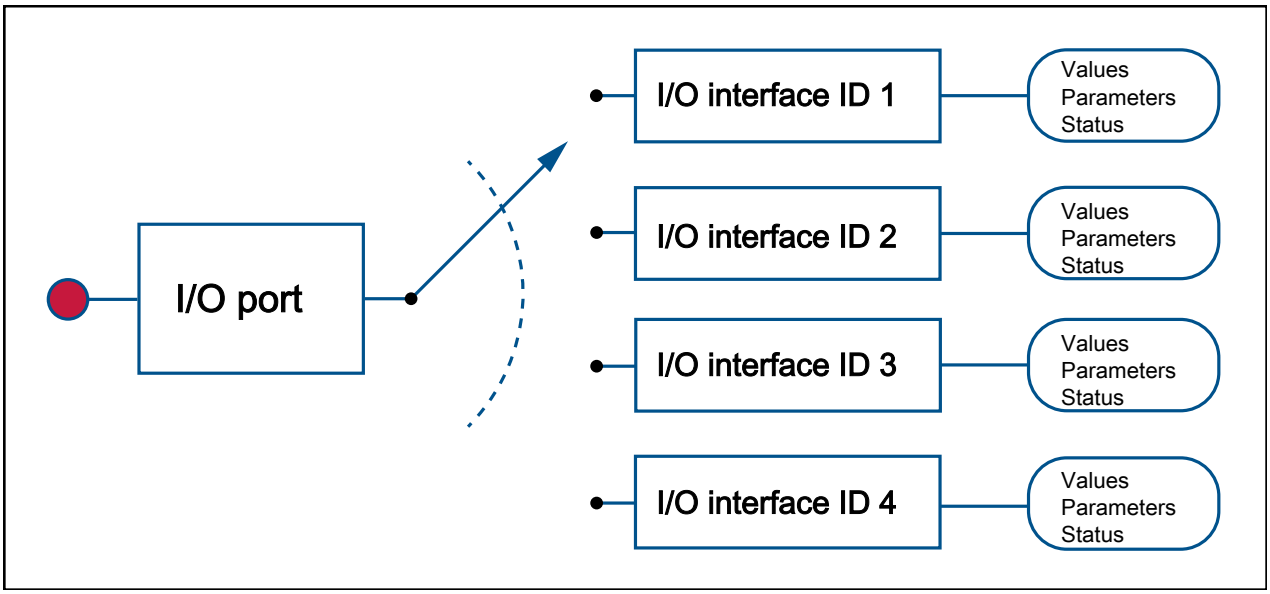

Fig. 8: Concept and control

8.1.1 Configuration options of connections

The table below shows an overview of the ports and the respective interfaces:

Ports	Description	Supported interfaces
AI_1 … AI_8	Analog inputs with 12 bit resolution	AI_VOLTAGE AI_CURRENT AI_TEMPERATURE DI_PNP
DI_1 … DI_6	Digital inputs	DI_PNP DI_NPN FI_PNP FI_NPN
AI_PREC_1 … AI_PREC_2	Current input with 16 bit resolution (0 mA ... 24 mA)	AI_CURRENT
AO_1 … AO_3	20 mA analog output	AO_VOLTAGE AO_CURRENT

Tab. 23: Supported ports and interfaces - Overview

When configuring the outputs, observe the information in chapter Outputs [▶ 14].

8.1.2 I/O ports and SDO map

Each I/O port is mapped with an SDO index:

I/O port	SDO index
AI_1 … AI_8	0x2100 … 0x2107
DI_1 … DI_6	0x2108 … 0x210D
AI_prec_1 … AI_prec_2	0x210E … 0x210F
AO_1 … AO_3	0x2110 … 0x2112

Tab. 24: SDO mappings of the I/O ports

Use subindex 1 to assign a specific interface to a port (Overview – I/O interfaces [▶ 32]). Use the other subindexes to access the parameters, values, and statuses.

ⓘ INFO

Assigning Interfaces

You can only assign an interface in the **Pre-Operational** state during the start process.

Index	Subindex	Description	Type	Types of access	Default value
0x2100 … 0x2112	0	Number of supported entries	U8	R	
	1	I/O interface type	U32	R/W	0 (disabled)
	2	I/O status	U32	R	1 (disabled bit set)
	10 … 29	Input values		R	
	30 … 49	Output values		R/W	W only in **Operational** state
	50 … 199	Parameter		R/W	

Tab. 25: Subindexes for accessing parameters, values, and statuses

8.1.3 Overview – I/O interfaces

The following table lists the I/O interfaces along with respective Parameters, values and statuses [▸ 34].

ⓘ INFO

Restrictions

The following restrictions must be observed in the **Operational** and **Pre-Operational** states:

- You can only assign an interface during the start process while the system is **Pre-Operational** state.
- You can only configure output values while the system is in **Operational** state.
  You can configure parameters in both states.
- If you leave the **Pre-Operational** state, all values are set to 0.
- All outputs are inactive in the **Pre-Operational** state.
  The inputs remain active in the **Pre-Operational** state.

ID	Interface	Parameter	Values	Status
0	**INACTIVE IO**			Disabled
1	**AI_VOLTAGE** Analog voltage input (0 V … 12 V)	SENSOR_SUPPLY FILTER_DEEP MIN_DEVIATION	I_VOLTAGE I_RATIO	INACTIVE ERROR OVERVOLTAGE SUPPLY_FAULT
2	**AI_CURRENT** Analog current input (0 … 24 mA)	SENSOR_SUPPLY FILTER_DEEP MIN_DEVIATION	I_CURRENT	INACTIVE ERROR OVERCURRENT SUPPLY_FAULT
3	**DI_PNP** Digital input (active-high with pull-down)	SENSOR_SUPPLY	I_DIGITAL	INACTIVE ERROR SUPPLY_FAULT

ID	Interface	Parameter	Values	Status
4	**FI_PNP** Frequency input (active-high with pull-down)	SENSOR_SUPPLY TIMEOUT_TIME GATE_TIME	I_FREQUENCY I_DUTY_CYCLE I_DIGITAL I_COUNTER I_PERIODIC_TIME I_H_PULSE_TIME I_L_PULSE_TIME	INACTIVE ERROR SUPPLY_FAULT TIMEOUT
5	**DI_NPN** Digital input (active-low with pull-up)	SENSOR_SUPPLY	I_DIGITAL	INACTIVE ERROR SUPPLY_FAULT
13	**FI_NPN** Frequency input (active-low with pull-up)	SENSOR_SUPPLY TIMEOUT_TIME GATE_TIME	I_FREQUENCY I_DUTY_CYCLE I_DIGITAL I_COUNTER I_PERIODIC_TIME I_H_PULSE_TIME I_L_PULSE_TIME	INACTIVE ERROR SUPPLY_FAULT TIMEOUT
19	**AI_TEMPERATURE** Temperature input	MIN_DEVIATION **NOTICE! If necessary, reduce the MIN_DEVIATION value!** MIN_TEMPERATURE MAX_TEMPERATURE	I_TEMPERATURE	INACTIVE ERROR TEMPERATURE-FAULT
20	**AO_VOLTAGE** (Analog voltage output)	FILTER_DEEP MIN_DEVIATION	I_VOLTAGE O_VOLTAGE	INACTIVE ERROR OVERVOLTAGE
21	**AO_CURRENT** (Analog current output)	FILTER_DEEP MIN_DEVIATION	I_VOLTAGE O_CURRENT	INACTIVE ERROR OVERVOLTAGE

Tab. 26: Available interfaces, parameters, values and statuses

8.1.4 Parameters, values and statuses

Input values

Subindex		Description	Type	Types of access	Value range
10	I_VOLTAGE	Voltage value	U16	R	0 … 12,000 Increment 1 mV
11	I_RATIO	Relation to VBAT_ECU	U16	R	Increment 0.1 %
12	I_CURRENT	Current value (small measuring range)	U16	R	0 … 20,000 Increment 1 µA
14	I_FREQUENCY	Frequency value, GATE_TIME and counter value calculated	U32	R	0.1 … 10,000 Increment 0.1 Hz
16	I_DIGITAL	Digital value	Bool	R	0 or 1
17	I_COUNTER	Count value	U32	R	0 … 4294967295
18	I_PERIODIC_TIME	Period time in timeout	U32	R	Increment 1 µs
19	I_HPULS_TIME	H pulse time	U32	R	Increment 1 µs
20	I_LPULS_TIME	L pulse time	U32	R	Increment 1 µs
21	I_TEMPERATURE	Temperature value	U16		-45 °C ... 130 °C Increment 1 °C

Tab. 27: Input values

Output values

Subindex		Description	Type	Value range
33	O_VOLTAGE	Voltage value	U16	0 mV … 10,000 mV Increment 1 mV
34	O_CURRENT	Set current value	U16	0 µA … 20,000 µA

Tab. 28: Output values

Parameter

Subindex type		Description	Type	Types of access	Unit/ Value range
50	SENSOR_SUPPLY	Associated sensor supply, which is also monitored. If the assigned sensor supply is short-circuited, the input sets the SUPPLY_FAULT error.	U16	R/W	0 = OFF 1 … 8 = VEXT_SEN_x$_{(1-8)}$ 9 … 10 = VREF_10_x$_{(1-2)}$ Default: 0
59	TIMEOUT_TIME	Sets the TIMEOUT bit in the status during frequency measurement, if no signal change is present.	U32	R/W	0 … 4294967295 Default: 1,000 ms
61	FILTER_DEEP	Moving average calculation depth	U32	R/W	1 … 32 Default: 1
62	GATE_TIME	Measuring time of the frequency measurement	U32	R/W	1 ms Default: 1000
63	MIN_DEVIATION	Minimum deviation for AI input values	U16	R/W	µA, mV or °C Default: 10
66	MIN_TEMPERATURE	If the temperature falls below the minimum permitted temperature, the status is set to TEMPERATUREFAULT.	I16	R/W	-45 °C Increment 1 °C
67	MAX_TEMPERATURE	If the maximum allowed temperature is exceeded, the TEMPERATUREFAULT status is set.	I16	R/W	130 °C Increment 1 °C

Tab. 29: Parameter

Status

Bit	Status	Description
0x00000001	INACTIVE	This port is disabled.
0x00000002	ERROR	An undefined error has occurred.
0x00000008	OVERVOLTAGE	Overvoltage is present at the input.
0x00000010	OVERCURRENT	Overcurrent is present at the input/output.
0x00000020	SUPPLY_FAULT	The assigned VEXT_xxx channel is faulty
0x00000040	TEMPERATUREFAULT	Temperature outside the set range
0x00000100	TIMEOUT	The time (GATE_TIME) for the frequency measurement has been exceeded.

Tab. 30: Status

8.2 Setting the node ID

The base node ID can be set in the System parameters. The default value is 0x50.

The configuration inputs (CFG1 and CFG2) generate an offset to the set base node ID.
CFG1 and CFG2 may have one of the following 3 states:

- Jumpered to GND → Low (L)
- Jumpered to VBAT → High (H)
- Open → O

The offset corresponds to the values in the following table:

CFG1	CFG2	Offset of module ID
O	O	0
L	O	1
H	O	2
O	L	3
L	L	4
H	L	5
O	H	6
L	H	7
H	H	8

Tab. 31: Offset for set base node ID

8.3 Diagnostic information

Diagnostic information

Index	Subindex	Description	Type	Types of access	Unit
0x2000	0	Number of supported entries	U8	R	
	1	Hardware coding pins on PCB	U8	R	
	2	VREF_10V	U16	R	mV
	3	V_13V5	U16	R	mV
	4	V_5V	U16	R	mV
	5	V_3V3_D	U16	R	mV
	6	V_3V3	U16	R	mV
	7	V_7V	U16	R	mV
	8	VBAT_ECU	U16	R	0.1 °C
	9	VBAT_Temperature	I16	R	mV
	10	CFG1	U16	R	mV
	11	CFG2	U16	R	mV
	12	VEXT_SEN_1_SC	Bool	R	On/Off
	13	VEXT_SEN_2_SC	Bool	R	On/Off
	14	VEXT_SEN_3_SC	Bool	R	On/Off
	15	VEXT_SEN_4_SC	Bool	R	On/Off
	16	VEXT_SEN_5_SC	Bool	R	On/Off
	17	VEXT_SEN_6_SC	Bool	R	On/Off
	18	VEXT_SEN_7_SC	Bool	R	On/Off
	19	VEXT_SEN_8_SC	Bool	R	On/Off
	20	VREF_10_1_SC	Bool	R	On/Off
	21	VREF_10_2_SC	Bool	R	On/Off

Tab. 32: Diagnostic information

Status information

Index	Subindex	Description	Type	Types of access
0x1001	0	Error register	U8	R
	Bit 0	General error		R
	Bit 1	Total overcurrent		R
	Bit 3	Temperature		R
	Bit 4	Communication error		R
	Bit 7	CI error (invalid input)		R

Tab. 33: Status information

8.4 Saving settings permanently and resetting to default values

The following parameters are permanently stored in the EEPROM:

- PDO mapping
- All I/O interface assignments and parameters
- Producer heartbeat time

Save settings

Index	Subindex	Description	Type	Types of access	Default value
0x1010	0	Number of supported entries	U8	R	1
	1	Saving all parameters	U32	R/W	
		When the specific signature 0x65766173 ("save") is written, the parameters are saved.			

Tab. 34: Save settings in EEPROM

Resetting the settings to their default values

Index	Subindex	Description	Type	Types of access	Default value
0x1011	0	Number of supported entries	U8	R	1
	1	Command register	U32	R/W	1
		When the specific signature 0x64616F6C ("load") is written, all settings are reset to the default values.			

Tab. 35: Resetting the settings to their default values

ⓘ INFO

Loading the settings from the EEPROM

During bootup, the last saved settings are automatically loaded.
During a firmware update, the settings may be reset to the default values.

Setting parameters

The parameters are set as follows:

1. The vehicle controller configures the parameters of the JXM-IO-E32.
2. The vehicle controller stores the settings via index 0x1010 in the EEPROM.
3. The vehicle controller reads the CRC via index 0x4556, subindex 1 and saves this value locally in a remanent memory.
4. After restarting the JXM-IO-E32, the vehicle controller compares the locally saved CRC value with the value in index 0x4556, subindex 1. If the values do not match, parameterization must be restarted.

ⓘ INFO

Activating the Changes

The changes to the indexes 0x1010 and 0x1011 only become active after a restart.

8.5 System parameters

Index	Sub-index	Description	Type	Types of access	Default value
0x4556	0	Number of supported entries	U8	R	4
	1	CRC of the current parameter settings* Used to check whether the settings need to be transferred to the device again.	U32	R	
	3	CAN baud rate	U8	R/W	1
		0: 125 kBaud			
		1: 250 kBaud (default)			
		2: 500 kBaud			
		3: 1 MBaud			
	4	CANopen node ID to be used in the future (without config pins)	U8	R/W	0x50

Tab. 36: System parameters

*The CRC is calculated using the current parameter values described in chapter Saving settings permanently and resetting to default values [▶ 38].

ⓘ INFO

Activating the set system parameters

You can only use the set system parameters after restarting the system.

8.6 Mapping of Process Data Objects (PDOs)

The following parameters let you set the transmit PDOs (TPDO 1 ... 4) and receive PDOs (RPDO 1 ... 4).

> **ⓘ INFO**
>
> **Further information**
>
> For more information on this subject refer to the application-oriented manual *CANopen STX API* available for download from our *homepage*.

Validity of a PDO

The MSB (most significant bit) of the COB ID lets you determine the validity of a PDO. To map a PDO, first set the PDO to invalid (bit 31 = 1) and then to valid (bit 31 = 0).

Bit	Value	Description
31 (MSB)	0	PDO exists/is valid
	1	PDO does not exist/is invalid
30	0	RTR (Remote Transmission Request) permitted for this PDO
	1	No RTR allowed for this PDO
29	0	11-bit ID (CAN 2.0A)
	1	29-bit ID (CAN 2.0B)
28 … 11	0	If bit 29 = 0
	X	If bit 29 = 1: Bits 28 ... 11 of the 29-bit COB ID
10 … 0 (LSB)	X	Bits 10 ... 0 of the COB ID

Tab. 37: Validity of a PDO

8.6.1 RPDO communication parameters

Index	Sub-index	Description	Type	Types of access	Unit	Default value	
0x1400 … 0x1403	0	Number of supported entries	U8	R		0	
	1	COB ID (user-configurable value for PDOs)	U32	R/W		RPDO 1: Index 0x1400	0x200 + Node-ID
						RPDO 2: Index 0x1401	0x300 + Node-ID
						RPDO 3: Index 0x1402	0x400 + Node-ID
						RPDO 4: Index 0x1403	0x500 + Node-ID
	2	Transmission Type	U8	R		Acyclic type = 0	
	3	Inhibit Time	U16	R/W	0.1 ms	10 (1 ms)	
	5	Event Time	U16	R/W	1 ms	10 (10 ms)	

Tab. 38: RPDO communication parameters

> **ⓘ INFO**
>
> **Write access to communication parameters**
>
> Write access to communication parameters is only possible if the JXM-IO-E32 is in the **Pre-Operational** state.

8.6.2 TPDO communication parameters

Index	Sub-index	Description	Type	Types of access	Unit	Default value	
0x1800 … 0x1803	0	Number of supported entries	U8	R		0	
	1	COB ID (user-configurable value for PDOs)	U32	R/W		TPDO 1: Index 0x1800	0x180 + Node-ID
						TPDO 2: Index 0x1801	0x280 + Node-ID
						TPDO 3: Index 0x1802	0x380 + Node-ID
						TPDO 4: Index 0x1803	0x480 + Node-ID
	2	Transmission Type	U8	R		Acyclic type = 0	
	3	Inhibit Time	U16	R/W	0.1 ms	10 (1 ms)	
	5	Event Time	U16	R/W	1 ms	10 (10 ms)	

Tab. 39: TPDO communication parameters

> **INFO**
>
> **Write access to communication parameters**
>
> Write access to communication parameters is only possible if the JXM-IO-E32 is in the **Pre-Operational** state.

8.6.3 Mapping tables

RPDO mapping table

Index	Sub-index	Description	Type	Types of access	Default value
0x1600 … 0x1603	0	Number of supported entries	U8	R/W	0
	1	First object that is mapped	U32	R/W	
	2	Second object that is mapped	U32	R/W	
	…		U32	R/W	
	64	64. Object to be mapped	U32	R/W	

Tab. 40: RPDO mapping table

TPDO mapping table

Index	Sub-index	Description	Type	Types of access	Default value
0x1A00 … 0x1A03	0	Number of supported entries	U8	R/W	0
	1	First object that is mapped	U32	R/W	
	2	Second object that is mapped	U32	R/W	
	…		U32	R/W	
	64	64. Object to be mapped	U32	R/W	

Tab. 41: TPDO mapping table

Mapping entry U32

Byte	0	1	2 and 3
Contents	Bit length	Subindex	Index

Tab. 42: Mapping entry U32

8.6.4 Sending interface input values via TPDO

To send interface input values via TPDO, proceed as follows:

1. Switch the JXM-IO-E32 to **Pre-Operational** state.
2. Assign the desired interface.
3. Invalidate the TxPDO object.
4. Disable the mapping.
5. Enter the mapping value.
6. Enable the mapping.
7. Validate the TxPDO object.
8. Switch the JXM-IO-E32 to **Operational** state.

STX example

The following STX example shows you in part how you can output the value AI1 Voltage on TPDO1.

```
//Switch JXM-IO-E32 to Pre-Operational state
CanOpenSetCommand(
cCanChannel,CAN_CMD_NMT,CAN_CMD_NMT_Value(
cJXMNodeId,CAN_NMT_PREOPERATIONAL));

//AI_1 port type to AI_VOLTAGE (=1)
iTemp := 1;
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x2100, 1, CANOPEN_DWORD, 4, iTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;

//Invalidating TxPDO object, setting uppermost bit to 1
dTemp := 0x80000000+0x180+0x50;
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x1800, 1, CANOPEN_DWORD, 4, dTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;

//Disabling mapping
dTemp := 0;
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x1a00, 0, CANOPEN_BYTE, 1, dTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;

//Entering value for AI1 voltage
dTemp := 0x21000a10; // Index: 0x2100, subindex 0x0a = 10, length 0x10 = 16
bits
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x1a00, 1, CANOPEN_DWORD, 4, dTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;

//Enabling mapping
dTemp := 1; // Number of mapping entries
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x1a00, 0, CANOPEN_BYTE, 1, dTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;
```

```
//Validating object, setting uppermost bit to 0, specifying PDO COB
dTemp := 0x180+0x50;
CanOpenDownloadSDO(
cCanChannel, cJXMNodeId, 0x1800, 1, CANOPEN_DWORD, 4, dTemp, iBusy);
when SDOACCESS_FINISHED(iBusy) continue;

//Switch JXM-IO-E32 to Operational state
CanOpenSetCommand(
cCanChannel,CAN_CMD_NMT,CAN_CMD_NMT_Value(
cJXMNodeId,CAN_NMT_OPERATIONAL));
```

8.7 Frequency measurement at the digital inputs

For the frequency measurement at the digital inputs 2 measuring methods are available:

- Gating measurement
- Pulse length measurement

Gating measurement

The gate time (GATE_TIME) is the time period during which pulses are counted. Measurements of high-frequency signals can thus be easily recorded. The values I_FREQUENCY and I_PERIODIC_TIME are determined using this method.

In order to achieve the resolution of 0.1 Hz for low frequency signals, the gate time must be adjusted accordingly. The maximum gate time is 10 seconds.

> **ⓘ INFO** **Gate time and update rate**
>
> A gate time of 10 s means that the update rate is also 10 s.

Pulse length measurement

This method is suitable for the resolution of low frequencies. It is based on the time between the edge changes. To do this, it is necessary to calculate the values I_HPULSE_TIME and I_LPULSE_TIME externally:

f [mHz] = 10^9 / (I_HPULSE_TIME + I_LPULSE_TIME)

> **ⓘ INFO** **Decrease of resolution**
>
> In pulse length measurement, the resolution decreases with increasing frequency.

8.8 NMT commands

The JXM-IO-E32 supports the following NMT commands:

NMT commands	Description
RESET	Resets the JXM-IO-E32
PREOPERATIONAL	Switches to **Pre-Operational** state
OPERATIONAL	Switches to **Operational** state
START	Starts the JXM-IO-E32
STOP	Stops the JXM-IO-E32, the JXM-IO-E32 continues to send heartbeat signals and process NMT commands.

Tab. 43: Supported NMT commands

8.9 Troubleshooting

Emergency object telegrams (EMCY telegrams)

EMCY telegrams are sent at startup or after any changes at an inhibit time of 50 ms.

Byte	Contents	
0 … 1 =	Emergency Error Code	
2 =	Error register	Object 0x1001
3 =	I/O offset 0x21nn, where nn is the offset	
4 … 7 =	Manufacturer-specific „error field“ entry	
	Always 0 is sent.	

Tab. 44: Byte values of Emergency objects

Error memory (error history)

The EMCY errors are stored in a stacked memory. The sub-index 1 gives you access to the latest error.

Byte	Contents	
0 … 1 =	Emergency Error Code	
2 =	Error register	Object 0x1001
3 =	I/O offset 0x21nn, where nn is the offset	

Tab. 45: Byte values of the error memory

The error memory can be accessed via index 0x1003.

Index	Subindex	Description	Type	Types of access	Default value
0x1003	0	Number of errors	U8	R/W	0
		Entering 0 clears the entire memory. Values > 0 are not allowed.			
	1	Latest „Error Field“ entry	U32	R	
	2 … 254	Other current "Error Field" entries	U32	R	

Tab. 46: Subindexes of the error memory

Emergency Error Codes

Code	Description
0x0000	No error or error reset
0x1000	Generic error
0x2300	Total current is too high
0x3100	Voltage exceeding the required tolerance range
0x4200	Device temperature is too high
0x8110	CAN data overrun (lost objects)
0x8130	Life guard error or heartbeat error
0x8140	Recovered from **Bus-Off** state
0x8210	Processing errors due to incorrect length of PDOs
0x8220	PDO length exceeded
0xff00	Configuration error on the device
0xff01	I/O-Port OVERVOLTAGE
0xff02	I/O-Port OVERCURRENT

Code	Description
0xff03	I/O-Port SUPPLYFAULT
0xff06	I/O-Port TIMEOUT
0xff08	I/O port OVERTEMPERATURE signaled by PT1000 sensor
0xff09	I/O port SHORT_CIRCUIT at the output has been detected

Tab. 47: Emergency Error Codes

8.9.1 Heartbeat

The device sends a heartbeat message cyclically as soon as it is in the **Pre-Operational** state.

Index	Subindex	Description	Type	Types of access	Default value
0x1017	0	Producer heartbeat time in ms	U16	R/W	1000

Tab. 48: Index of the heartbeat message

Heartbeat monitoring

The number of heartbeats to be monitored can be set via the controller with the corresponding master node ID and corresponding timeout. If the device does not detect a heartbeat within the specified timeout period (e.g. in the event of a communication interruption), the device switches to the **Stopped** state and the outputs are de-energized.

Index	Subindex	Description				Type	Types of access	Default value
0x1016	0	Number of heartbeats to be monitored				U8	R/W	0
	1 … 4	Node ID to be monitored and timeout				U32	R/W	
			MSB		**LSB**			
		Bits	31 … 24	23 … 16	15 … 0			
		Value	Reserved (Value: 00h)	Node ID	Heartbeat timeout			
		Type	-	U8	U16			

Tab. 49: Heartbeat monitoring

Value ranges

- Node ID: 0 … 127
- Heartbeat timeout: 0 … 65535 (in ms)

Example

Command	Description
`r 0x1016 0`	Read number of node IDs that can be monitored.
`w 0x1016 1 4 0x007F03e8` ■ `1` = first entry ■ `4` = 4 bytes (U32) ■ `00` = reserved ■ `7F` = 127 (node ID) ■ `3e8` = 1000 (timeout in ms)	Set first node ID to be monitored to 127 with timeout 1000 ms.
`r 0x1016 1`	Read first configuration in first entry.

Tab. 50: Heartbeat Monitoring - Example

9 Maintenance and repairs

9.1 Maintenance, repairs and disposal

Maintenance

This device is maintenance-free.
Therefore, for the operation of the device no inspection or maintenance is required.

Repairs

Defective components could cause dangerous malfunctions and could compromise safety.
Only the manufacturer is allowed to repair the device.
It is forbidden to open the device.

Disposal of obsolete equipment

The device must be disposed of in accordance with the Environmental Product Declaration EPD. Applicable local environmental directives and regulations must be complied with. This product must be disposed of as waste electronic equipment. Waste packaging material must be recycled or reused.

Modifications and alterations to the device

Modifications and alterations to the device and its functions are not allowed. In the case of modifications to the device, any liability is excluded.

The original parts are specifically designed for the device. Parts and equipment from other manufacturers must, therefore, not be used.

Any liability for any damages resulting from the use of non-original parts and equipment is excluded.

9.2 Storage and shipment

Storage

When storing the device observe the environmental conditions given in chapter “Technical specifications”.

Shipment and packaging

The device contains electrostatically sensitive components which can be damaged if not handled properly. Damages to the device may impair its reliability.

To protect the device from impact or shock, it must be shipped in its original packaging, or in an appropriate protective ESD packaging.
In case of damaged packaging inspect the device for any visible damage, and inform your freight forwarder and the Jetter AG of the damage caused during shipment. If the device is damaged or has been dropped, it is strictly forbidden to use it.

10 Service

10.1 Customer service

Should you have any questions, suggestions, or problems, please don't hesitate to contact our service representatives. To contact them, please call our technical hotline or use the contact form on our homepage:

Technical hotline | Jetter - We automate your success.

You are also welcome to send an e-mail to our technical hotline:

hotline@jetter.de

Please supply the following information when contacting our technical hotline:

- Hardware revision and serial number
  For the hardware revision and serial number of your product, please refer to the nameplate.
- OS version
  For the operating system version, see index 0x100A.

11 Spare parts and accessories

NOTICE

Inadequate accessories might cause damage to the product

Parts and equipment from other manufacturers might impede the function of the device and cause damage to the product.

► Only use accessories recommended by Jetter AG.

11.1 Accessories

ⓘ INFO

Ordering accessories

The accessories are not part of the scope of delivery.

Suitable accessories can be obtained from Jetter AG.

Accessories	Item number
Connector set including crimp contacts and blanking plugs for individual pins	10001729

Tab. 51: Accessories

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Jetter automation

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