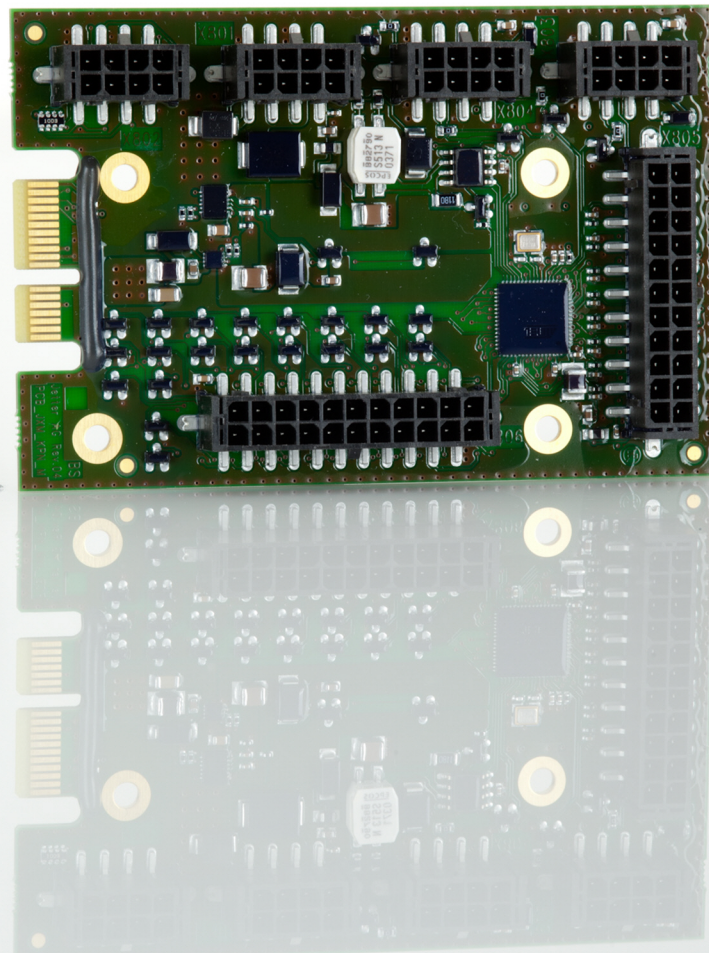


# JXM-IO-E11

## Digital I/O Module on the CAN Bus



User Manual

**Jetter**

Variant: Jetter

Item # 60877110

Revision 1.11.2

November 2011 / Printed in Germany

Jetter AG reserve the right to make alterations to their products in the interest of technical progress. These alterations will not necessarily be documented in every single case.

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**Assignment to Product**

This user manual is an integral part of JXM-IO-E11:

Type: \_\_\_\_\_  
Serial #: \_\_\_\_\_  
Year of construction: \_\_\_\_\_  
Order #: \_\_\_\_\_



To be entered by the customer:

Inventory #: \_\_\_\_\_  
Place of operation: \_\_\_\_\_

### Significance

#### Significance of this user manual

The user manual is an integral part of JXM-IO-E11:

- It must be kept in a way that it is always at hand, until the JXM-IO-E11 will be disposed of.
- If the JXM-IO-E11 is sold or loaned/leased out, the user manual has to be passed on.

In any case you encounter difficulties to clearly understand this user manual, please contact the manufacturer.

We would appreciate any suggestions and contributions on your part and would ask you to contact us by our e-mail address [info@jetter.de](mailto:info@jetter.de). This will help us to produce manuals that are more user-friendly and to address your wishes and requirements.

This user manual contains important information on how to transport, erect, install, operate, maintain and repair the JXM-IO-E11.

Therefore, the persons carrying out these jobs must carefully read, understand and observe this user manual, and especially the safety instructions.

Missing or inadequate knowledge of the user manual results in the loss of any claim of liability on part of Jetter AG. Therefore, the operating company is recommended to have the instruction of the persons concerned confirmed in writing.

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## Hazard Levels

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### Introduction

This topic describes the safety labels and hazard levels used in this manual.

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### Safety Labels






Signs using this symbol are to warn you of injuries or even death. It is imperative to follow the instructions to prevent hazards.

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### Hazard Levels

Safety information is classified into the following hazard levels:

Hazard Level	Consequences	Probability
 <b>DANGER</b>	Death/severe injury (irreversible)	The hazard is imminent
 <b>WARNING</b>	Death/severe injury (irreversible)	Potential occurrence
 <b>CAUTION</b>	Slight injury (reversible)	Potential occurrence
<b>CAUTION</b>	Material damage	Potential occurrence

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# 1 Safety Instructions

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**Introduction**

This chapter contains the general safety instructions and warns of possible residual dangers.

---

**Contents**

This chapter contains the following topics:

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## General Safety Instructions

---

### Introduction

This device complies with the valid safety regulations and standards. Special emphasis was given to the safety of the users.

Of course, the user should adhere to the following regulations:

- relevant accident prevention regulations;
  - accepted safety rules;
  - EC guidelines and other country-specific regulations
- 

### Intended Conditions of Use

Usage according to the intended conditions of use implies operation in accordance with this user manual.

The JXM-IO-E11 has been designed as a peripheral module for use in commercial vehicles and mobile machines. The peripheral module JXM-IO-E11 is connected to an already existing controller. The JXM-IO-E11 has been designed for various input and output signals.

The JXM-IO-E11 meets the requirement of the European Automotive EMC Directive for electric/electronic subassemblies.

The JXM-IO-E11 must be operated within the limits given in the technical specifications. The operating voltage of the JXM-IO-E11 is classified as SELV (Safety Extra Low Voltage). Therefore, the JXM-IO-E11 is not subject to the EU Low Voltage Directive.

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### Usage Other Than Intended

This device must not be used in technical systems which to a high degree have to be fail-safe, e.g. ropeways and aeroplanes.

The JXM-IO-E11 is no safety-related part as per Machinery Directive 2006/42/EC. This device is not qualified for safety-relevant applications and must, therefore, NOT be used to protect persons.

If the device is to be run under ambient conditions which differ from the allowed operating conditions, Jetter AG is to be contacted beforehand.

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### Personnel Qualification

Depending on the life cycle of the product, the persons involved must possess different qualifications. These qualifications are required to ensure proper handling of the device in the corresponding life cycle.

Product Life Cycle	Minimum Qualification
<b>Transport / Storage:</b>	Trained and instructed personnel with knowledge in handling electrostatic sensitive components.
<b>Mounting / Installation:</b>	Specialized personnel with training in electrical/automotive engineering, such as automotive mechatronics fitters.
<b>Commissioning / Programming:</b>	Trained and instructed experts with profound knowledge of, and experience with, automotive / automation technology, such as automotive engineers for mobile machinery.
<b>Operation:</b>	Trained, instructed and assigned personnel with knowledge in operating electronic devices for mobile machinery.

Product Life Cycle	Minimum Qualification
Decommissioning:	Specialized personnel with training in electrical/automotive engineering, such as automotive mechatronics fitters.

### Modifications and Alterations to the Device

**For safety reasons, no modifications and changes to the device and its functions are permitted.**

Any modifications to the device not expressly authorized by Jetter AG will result in a loss of any liability claims to Jetter AG.

**The original parts are specifically designed for the device. Parts and equipment from other manufacturers are not tested on our part, and are, therefore, not released by Jetter AG.**

The installation of such parts may impair the safety and the proper functioning of the device.

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

### Transport

The JXM-IO-E11 contains electrostatic sensitive components which can be damaged if not handled properly.

To exclude damages to the JXM-IO-E11 during transport it should only be shipped in its original packaging or in packaging protecting against electrostatic discharge. This is particularly true for transport via mail.

- Use an appropriate outer packaging to protect the JXM-IO-E11 against impact or shock.
- In case of damaged packaging inspect the device for any visible damage. Inform your freight forwarder and the manufacturer, if applicable.

### Storing

When storing the JXM-IO-E11 observe the environmental conditions given in the technical specification.

### Repair and Maintenance

This device must not be repaired by the operators themselves. The device does not contain any parts that could be repaired by the operator.

The device must be sent to Jetter AG for repair.

### Disposal

When disposing of devices, the local environmental regulations must be complied with.

---



## Residual Dangers and Protective Measures

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### Residual Dangers

Consider the residual dangers mentioned in this chapter when assessing the risks associated with your machine.


---

	 <b>DANGER</b>
	<p><b>Hazard in explosive gas atmosphere!</b></p> <p>This device can become a source of ignition in potentially explosive atmospheres.</p> <p>➤ <b>Do not use this device in potentially explosive atmospheres.</b></p>

---

	 <b>CAUTION</b>
	<p><b>Possible occurrence of malfunctions!</b></p> <p>CAN wires which have not been twisted may increase susceptibility to noise. This may disturb communications with the device which, in turn, may cause malfunctions.</p> <p>➤ Make sure that twisted pair cables are used for connecting the CAN interfaces.</p>

---

	<b>CAUTION</b>
	<p><b>Possible occurrence of malfunctions!</b></p> <p>This module is classified as ESDS (Electro Static Discharge Sensitive device). That is, it can be damaged by electrostatic discharge.</p> <p>➤ Always wear approved ESD-safe garments. Always wear an antistatic wrist band to avoid build-up of electrostatic charge.</p> <p>➤ Follow all safety procedures with regard to handling sensitive electronic devices.</p>

---

	<b>CAUTION</b>
	<p><b>Possible occurrence of malfunctions!</b></p> <p>No protection against polarity reversal has been designed for input and output pins.</p> <p>➤ Make sure to use the correct pin assignment.</p>

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## 2 Product Description and Design

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**Introduction**

This chapter covers the design of the device, as well as how the order reference is made up including all options.

---

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<b>Topic</b>	<b>Page</b>
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Parts and Interfaces.....	15
Order Reference / Options .....	16
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### JXM-IO-E11 - Product Description

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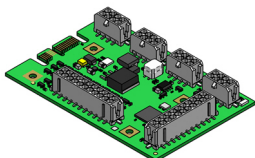
#### The Module JXM-IO-E11

The module JXM-IO-E11 is an I/O node and has especially been designed for use in the harsh environment of commercial vehicles and mobile machines. The module JXM-IO-E11 has various connectors for connecting to buttons and LEDs.

---

#### Product Features

The features of this product are listed below:



- CANopen® node with 1 interface to CAN-2.0B
  - 26 digital inputs
  - 24 digital outputs for LEDs
  - Joystick connectors
  - Protective features
- 

#### Protective Features

The module JXM-IO-E11 features the following protective functions:

- Protection against polarity reversal of up to DC -100 V except for input and output contacts.
  - A protective circuit limiting the voltage to DC 36 V.
  - Each switch input has clamping diodes to 5 V and ground.
-

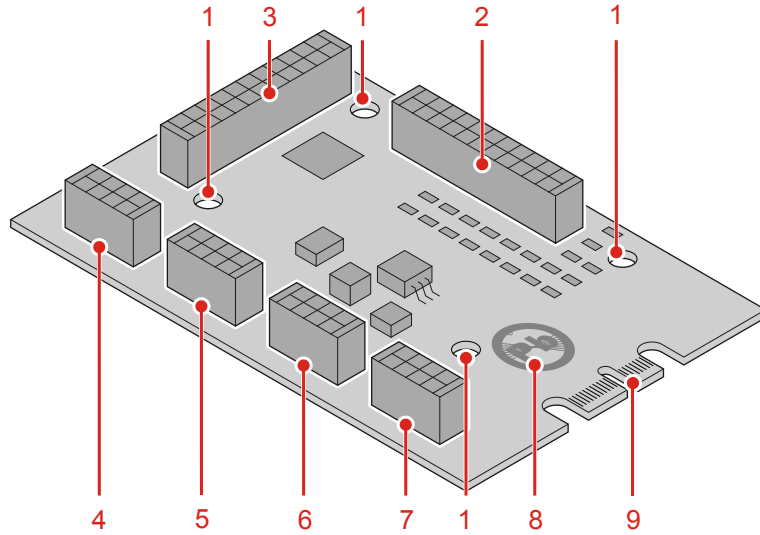
## Parts and Interfaces

### Introduction

This chapter describes the parts and interfaces of the JXM-IO-E11.

### Parts and Interfaces

The illustration below shows the parts and interfaces of the JXM-IO-E11:



Number	Description	Function
1	Mounting holes	For fastening the module using 4 bolts M3
2	X 806	LED outputs 1 through 20
3	X 805	Switch inputs 1 through 16
4	X 803	LED output # 3 and 4 / switch input # 3 and 4 (4 W)
5	X 804	LED output # 1 and 2 / switch input # 1 and 2 (4 W)
6	X 801	CANopen®
7	X 802	Joystick
8	Sticker	Reference to lead-free soldering process
9		Only for test purposes by Jetter AG (do not connect!)

### Order Reference / Options

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#### Order Reference

The JXM-IO-E11 is available in the following configurations. To order a specific module from Jetter AG please specify the corresponding part number.

Part Number	Order Reference	Name
10000889	JXM-IO-E11-G00-K00	Standard I/O node

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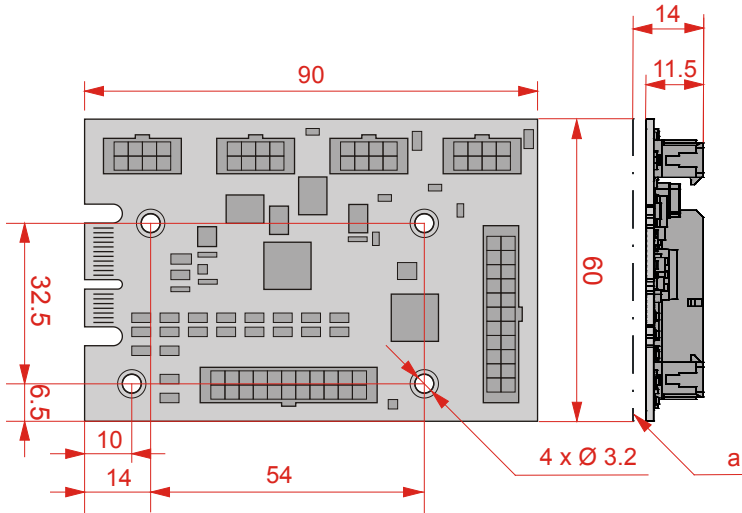
# Physical Dimensions

## Introduction

This chapter describes the physical dimensions of the module JXM-IO-E11.

## Physical Dimensions

The illustration below shows the dimensions of the JXM-IO-E11:



Number	Description
a	Maximum height of electronic components (in the case of back-mounted components)



## 3 Identifying the Module

<b>Purpose of this Chapter</b>	<p>This chapter is for supporting you in obtaining the following information from the JXM-IO-E11 module:</p> <ul style="list-style-type: none"> <li>▪ Hardware revision.</li> <li>▪ Electronic data sheet (EDS). Numerous production-relevant data are permanently stored in the EDS.</li> <li>▪ Reading out the software components via CANopen®.</li> </ul>						
<b>Prerequisites</b>	<p>To be able to identify the JXM-IO-E11 module the following prerequisites must be fulfilled:</p> <ul style="list-style-type: none"> <li>▪ The module is connected to a controller and a PC via CANopen® bus.</li> <li>▪ Communication with the module takes place via CANopen®.</li> </ul>						
<b>Information for Hotline Requests</b>	<p>If you wish to contact the hotline of Jetter AG in case of a problem, please have the following information on the module JXM-IO-E11 ready:</p> <ul style="list-style-type: none"> <li>▪ Serial number</li> <li>▪ Software version of the module</li> <li>▪ Hardware revision</li> </ul>						
<b>Contents</b>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><b>Topic</b></th> <th style="text-align: right;"><b>Page</b></th> </tr> </thead> <tbody> <tr> <td>Identification by Means of the Nameplate .....</td> <td style="text-align: right;">20</td> </tr> <tr> <td>Identification via CANopen® Bus .....</td> <td style="text-align: right;">22</td> </tr> </tbody> </table>	<b>Topic</b>	<b>Page</b>	Identification by Means of the Nameplate .....	20	Identification via CANopen® Bus .....	22
<b>Topic</b>	<b>Page</b>						
Identification by Means of the Nameplate .....	20						
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## 3.1 Identification by Means of the Nameplate

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### Introduction

The nameplate is attached to the housing of the JXM-IO-E11 and contains details, such as hardware revision number and serial number. You will need this information when contacting the Jetter AG hotline in case of a problem.

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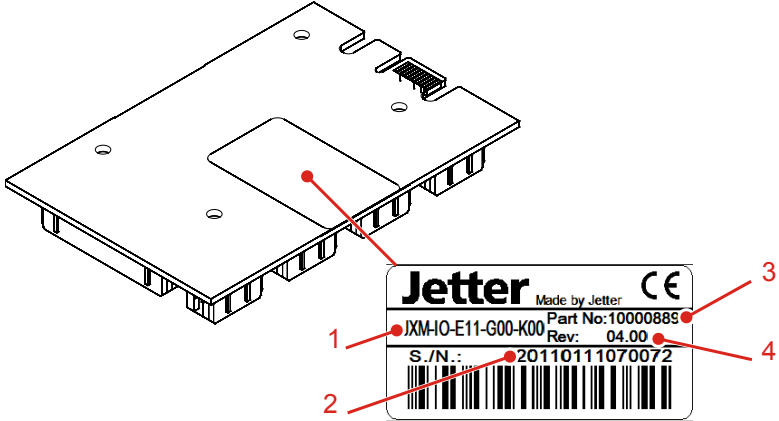
### Contents

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## Nameplate

### Nameplate

The nameplate of a JXM-IO-E11 contains the following information:



Number	Description
1	Module type
2	Serial number
3	Part number
4	Hardware revision

## 3.2 Identification via CANopen® Bus

---

### Introduction

Each module features an Electronic Data Sheet (EDS). Numerous production-relevant data are permanently stored in the EDS. EDS data can be read via CANopen® bus.

---

### Contents

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Electronic Data Sheet (EDS) and Software Version .....	23

---

## Electronic Data Sheet (EDS) and Software Version

---

### Communication with the JXM-IO-E11

Communication with the JXM-IO-E11 takes place via CAN bus. The CANopen® standard is used as protocol. CANopen® is an open standard for networking and communication in the automobile sector.

The CANopen® protocol has been further developed by the CiA e.V. (CAN in Automation) and works on the physical layer with CAN Highspeed in accordance with ISO 11898.

---

### Electronic Data Sheet (EDS)

The Electronic Data Sheet (EDS) provides information clearly identifying the JXM-IO-E11. Data contained in the EDS are production-specific and are relevant for support purposes. If required, the data can be read using the object "Electronic Data Sheet" (0x4555).

---

### Software Version of the JXM-IO-E11

Use the object "Detailed Software Version" (0x4559) to read out the version of the software running in the JXM-IO-E11. This read-only object supplies the same software version as object 0x100A, but in a 32-bit unsigned integer format which is compatible with the standard IP-type version numbers used at Jetter AG.

Example:

The 32-bit word 0x01070001 translates to a software version of 1.07.0.01.

---

### Useful Documents

The CANopen® specifications can be obtained from the **CiA e.V.** <http://www.can-cia.org> homepage. The key specification documents are:

- CiA DS 301 - This document is also known as the communication profile and describes the fundamental services and protocols used under CANopen®.
- CiA DS 302 - Framework for programmable devices (CANopen® Manager, SDO Manager)
- CiA DR 303 - Information on cables and connectors
- CiA DS 4xx - These documents describe the behavior of a number of device classes in, what are known as, device profiles.

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### Related Topics

- **Electronic Datasheet Object** on page 63
  - **Detailed Software Version Object** on page 67
-





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# 4 Mounting and Installation

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**Purpose of this Chapter** This chapter is for supporting you in mounting and installing the JXM-IO-E11 in the vehicle and covers the following topics:

- Planning the wiring of a JXM-IO-E11
- Connecting sensors and actuators to the JXM-IO-E11
- Installation
- CANopen® Bus - Engineering

---

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Installing the JXM-IO-E11 .....	42

## 4.1 Wiring

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**Purpose of this Chapter** This chapter covers wiring of the JXM-IO-E11 and contains the following topics:

- Wiring Principle
  - Pin Assignment
  - Technical Specifications
- 

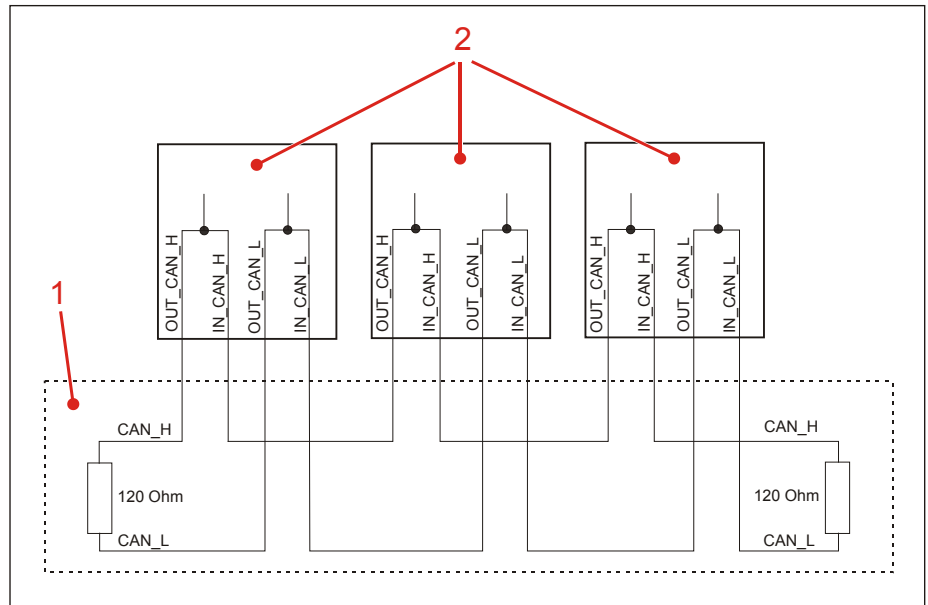
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Pin Assignment X 805 (LED Output # 1 Through 16).....	38
Pin Assignment X 806 (LED Output # 1 Through 20).....	40

## Specification - CANopen® Bus Cable

### Layout of CAN Bus Wiring

Jetter AG CANopen® devices are wired in accordance with the following diagram.



Number	Description
1	CAN bus
2	Jetter AG CANopen® devices

There is an option to enable a resistor in the device as a bus termination resistor of 120 Ohm.

The stub length with this type of wiring is practically zero.

The CAN\_L and CAN\_H cables must be twisted together.

## 4 Mounting and Installation

---

### CAN Bus Cable Specification

Parameter	Description
Core cross-sectional area	1000 kBaud: 0.25 ... 0.34 mm <sup>2</sup> 500 kBaud: 0.34 ... 0.50 mm <sup>2</sup> 250 kBaud: 0.34 ... 0.60 mm <sup>2</sup> 125 kBaud: 0.50 ... 0.60 mm <sup>2</sup>
Cable capacitance	60 pF/m max.
Resistivity	1000 kBaud: max. 70 Ω/km 500 kBaud: max. 60 Ω/km 250 kBaud: max. 60 Ω/km 125 kBaud: max. 60 Ω/km
Number of cores	2
Shield	Complete shielding, no paired shielding
Twisting	Core pairs CAN_L and CAN_H are twisted

---

### Cable Lengths

The maximum permitted cable length depends on the baud rate used and the number of CANopen® devices connected.

Baud Rate	Cable length	Stub length	Overall stub length
1000 kBaud	max. 25 m	max. 0.3 m	3 m
500 kBaud	max. 100 m	max. 1.0 m	39 m
250 kBaud	max. 200 m	max. 3.0 m	78 m
125 kBaud	max. 200 m	-	-

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## Wiring Principle

### Introduction

This chapter covers the wiring principle of the JXM-IO-E11.

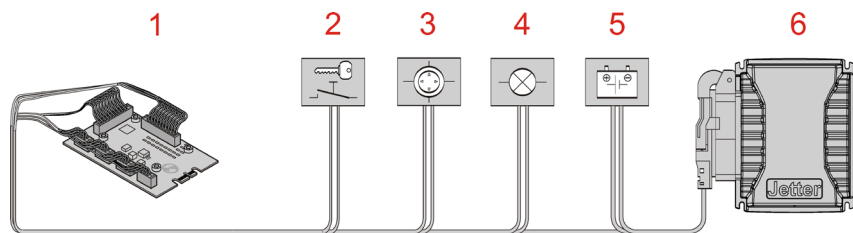
### Wiring Principle

The JXM-IO-E11 is connected through a wiring harness with external components, such as:

- Power supply
- Controller
- Peripheral module
- Sensors
- Actuators
- Indicator lights

### Example

The illustration below shows an example of a layout using a wiring harness.



Number	Description
1	Module JXM-IO-E11 (illustration: board without control panel)
2	Ignition lock
3	Joystick
4	Indicator light (LED)
5	Battery
6	Controller JCM-350-E03

### Jetter Connector Set

Jetter offers a connector set matching the JXM-IO-E11 (order number 10000881). The Jetter connector set includes the following components:

Type	Description	Quantity
Micro-Fit 3.0™, 8-pin	Mating connector for 8-pin plug	4
Micro-Fit 3.0™, 22-pin	Mating connector for 22-pin plug	2
Molex receptacle, crimp contact	-	76

### Related Topics:

- [Installing the JXM-IO-E11](#) on page 42


### Information on How to Handle Electrostatic-Sensitive Devices

---

#### Introduction

This chapter describes how to handle electrostatic-sensitive devices.

---

	<b>CAUTION</b>
	<p><b>Possible occurrence of malfunctions!</b></p> <p>This module is classified as ESDS (Electro Static Discharge Sensitive device). That is, it can be damaged by electrostatic discharge.</p> <ul style="list-style-type: none"><li>➤ Always wear approved ESD-safe garments. Always wear an antistatic wrist band to avoid build-up of electrostatic charge.</li><li>➤ Follow all safety procedures with regard to handling sensitive electronic devices.</li></ul>

#### Measures

Electronic or microelectronic components in a device can be damaged or destroyed by electrostatic discharge. Therefore, take the following measures for handling electrostatic-sensitive devices.

- Always wear ESD-safe garments, antistatic safety shoes and an antistatic wrist band or ESD-safe gloves when handling the device, for example when installing, servicing or repairing it.
  - Do not take the device out of the antistatic packaging until you are ready to install or mount it.
  - Always handle PCBs by their outer edge. Never touch the tin-plated terminals and components on the PCBs.
  - If you must put down the device, lay it down on its antistatic packaging.
-

## Pin Assignment X 801 (CANopen® Interface)

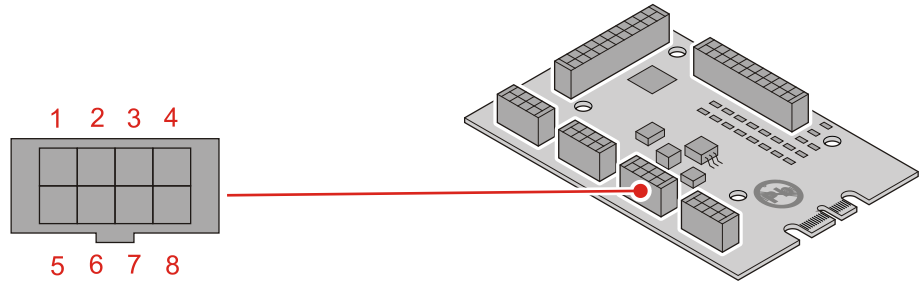
**Introduction**

The illustration below shows the pin assignment of the connector (top view).

**Connector Type**

8-pin male connector Micro-Fit 3.0™ by MOLEX.


**CAN**




Pin	Function	Terminal number in vehicles
1	Ignition (+) (IGNITION FEED)	Terminal # 15
2	IN_CAN_H	-
3	OUT_CAN_H	-
4	IN_CAN_L	-
5	OUT_CAN_L	-
6	Ground	Terminal # 31
7	(do not use)	(do not connect)
8	Ground	Terminal # 31

**Mating Part**

Compatible mating parts for the 8-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 8 pins, two rows, 3 mm contact spacing
	Manufacturer's order reference	Micro-Fit 3.0™
	Order reference (Jetter connector set)	included in Jetter connector set (10000881)

	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro Fit series
	Order number	included in Jetter connector set (10000881)

## Pin Assignment X 802 (Joystick)

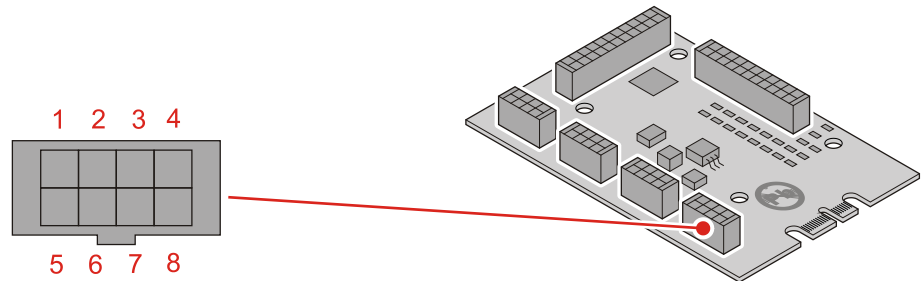
**Introduction**

The illustration below shows the pin assignment of the connector (top view).

**Connector Type**

8-pin male connector Micro-Fit 3.0™ by MOLEX.

**Joystick**



Pin	Function
1	(not connected)
2	Joystick North
3	Joystick East
4	Joystick South
5	Joystick West
6	Joystick button # 1
7	Joystick button # 2
8	Ground

**Technical Data - Analog Joystick**

Parameter	Description
Maximum input voltage	DC 5 V
Resolution	8 bits (256 discrete values per axis)
Number of axes (joystick)	3


**Technical Data - Digital Joystick**


Parameter	Description
Maximum input voltage	DC 5 V
Resolution	8 bits (256 discrete values per axis)
Logic high threshold	> 3 V
Logic low threshold	< 1 V



**Mating Part**

Compatible mating parts for the 8-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 8 pins, two rows, 3 mm contact spacing
	Manufacturer's order reference	Micro-Fit 3.0™
	Order reference (Jetter connector set)	included in Jetter connector set (10000881)

	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro Fit series
	Order number	included in Jetter connector set (10000881)

## Pin Assignment X 803 (Switch # 3 and 4, LED # 3 and 4)

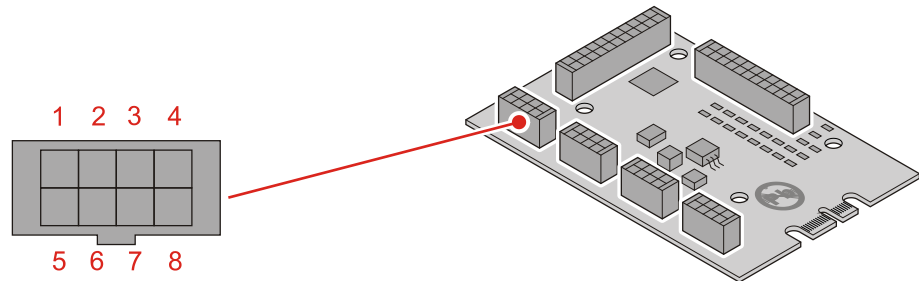
**Introduction**

The illustration below shows the pin assignment of the connector (top view).

**Connector Type**

8-pin male connector Micro-Fit 3.0™ by MOLEX.

**Switch # 3 and 4,  
LED Output # 3 and 4**




Pin	Function
1	Supply voltage DC 5 V
2	4 W switch # 3
3	4 W LED 3
4	Ground
5	Supply voltage DC 5 V
6	4 W switch # 4
7	4 W LED 4
8	Ground


**Technical Data - Digital  
Inputs and Outputs**

Parameter	Description
4 W switch 1 - 4 W switch 4	Digital inputs (active-low)
Maximum input voltage	DC 5 V
4 W LED 1 - 4 W LED 4	Digital outputs (active-low)
Logic high threshold	> 3 V
Logic low threshold	< 1 V

**Mating Part**

Compatible mating parts for the 8-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 8 pins, two rows, 3 mm contact spacing
	Manufacturer's order reference	Micro-Fit 3.0™
	Order reference (Jetter connector set)	included in Jetter connector set (10000881)

	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro Fit series
	Order number	included in Jetter connector set (10000881)

## Pin Assignment X 804 (Switch # 1 and 2, LED # 1 and 2)

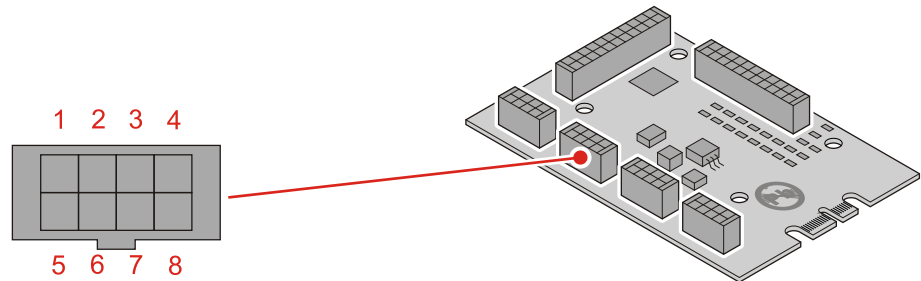
**Introduction**

The illustration below shows the pin assignment of the connector (top view).

**Connector Type**

8-pin male connector Micro-Fit 3.0™ by MOLEX.

**Switch # 1 and 2,  
LED Output # 1 and 2**




Pin	Function
1	Supply voltage DC 5 V
2	4 W switch # 1
3	4 W LED 1
4	Ground
5	Supply voltage DC 5 V
6	4 W switch # 2
7	4 W LED 2
8	Ground


**Technical Data - Digital  
Inputs and Outputs**

Parameter	Description
4 W switch 1 - 4 W switch 4	Digital inputs (active-low)
Maximum input voltage	DC 5 V
4 W LED 1 - 4 W LED 4	Digital outputs (active-low)
Logic high threshold	> 3 V
Logic low threshold	< 1 V

**Mating Part**

Compatible mating parts for the 8-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 8 pins, two rows, 3 mm contact spacing
	Manufacturer's order reference	Micro-Fit 3.0™
	Order reference (Jetter connector set)	included in Jetter connector set (10000881)

	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro Fit series
	Order number	included in Jetter connector set (10000881)

## Pin Assignment X 805 (LED Output # 1 Through 16)

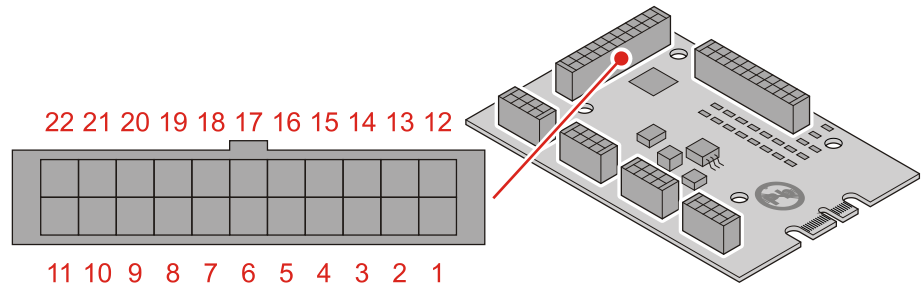
**Introduction**

The illustration below shows the pin assignment of the connector (top view):

**Connector Type**

22-pin male connector Micro-Fit 3.0™ by MOLEX.

**Switch Input # 1 Through 16**





Pin	Function
1	Supply voltage DC 5 V
2	Switch 1
3	Switch 3
4	Switch 5
5	Switch 7
6	Switch 9
7	Switch 11
8	Switch 13
9	Switch 15
10	Ground
11	Ground
12	Switch 2
13	Switch 4
14	Switch 6
15	Switch 8
16	Switch 10
17	Switch 12
18	Switch 14
19	Switch 16
20	Ground
21	Ground
22	Ground

**Technical Data -  
Switches**

Parameter	Description
Purpose	The module JXM-IO-E11 can control up to 16 switches.
Power supply	DC 5 V
Rated current	5 mA
Resolution	32-bit word

**Mating Part**

Compatible mating parts for the 22-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 22 circuits, dual-row version, 3 mm pitch
	Manufacturer's order reference	Micro-Fit 3.0™
	Order number	included in Jetter connector set (10000881)
	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro-Fit family
	Order number	included in Jetter connector set (10000881)

## Pin Assignment X 806 (LED Output # 1 Through 20)

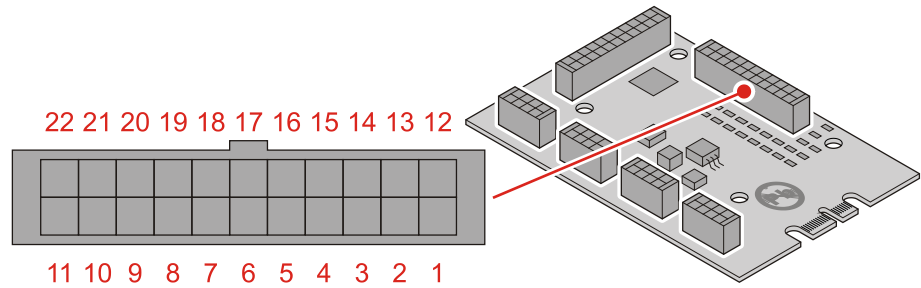
**Introduction**

The illustration below shows the pin assignment of the connector (top view):

**Connector Type**

22-pin male connector Micro-Fit 3.0™ by MOLEX.

**LED Driver # 1  
Through 20**



Pin	Function
1	Supply voltage DC 5 V
2	LED driver # 1
3	LED driver # 3
4	LED driver # 5
5	LED driver # 7
6	LED driver # 9
7	LED driver # 11
8	LED driver # 13
9	LED driver # 15
10	LED driver # 17
11	LED driver # 19
12	LED driver # 2
13	LED driver # 4
14	LED driver # 6
15	LED driver # 8
16	LED driver # 10
17	LED driver # 12
18	LED driver # 14
19	LED driver # 16
20	LED driver # 18
21	LED driver # 20
22	Ground





**Technical Data - LED Driver**

Parameter	Description
Purpose	The module JXM-IO-E11 is equipped with an LED driver capable of driving up to 20 LEDs. The negative electrode of the LED is connected to ground by an N-channel MOSFET.
Power supply	DC 5 V
Rated current	5 mA per LED
Current limitation	The module JXM-IO-E11 is not equipped with a current limiting resistor. <b>It's the user's responsibility to provide current limitation.</b>
Resolution	4-bit PWM algorithm
Brightness	Can be set between 1 and 15.

**Mating Part**

Compatible mating parts for the 22-pin Molex Micro-Fit 3.0™ connector are as follows:

	Manufacturer	MOLEX
	Product description	Female connector, 22 circuits, dual-row version, 3 mm pitch
	Manufacturer's order reference	Micro-Fit 3.0™
	Order number	included in Jetter connector set (10000881)
	Manufacturer	MOLEX
	Product description	Female MOLEX connector, crimp contact
	Manufacturer's order reference	Micro-Fit family
	Order number	included in Jetter connector set (10000881)

## 4.2 Installing the JXM-IO-E11

---

### Introduction

This chapter describes how to install the JXM-IO-E11.

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## JXM-IO-E11: Installation

### Introduction

This chapter describes how to install the JXM-IO-E11 with control panel JVM-407 as example.

### Installation Location

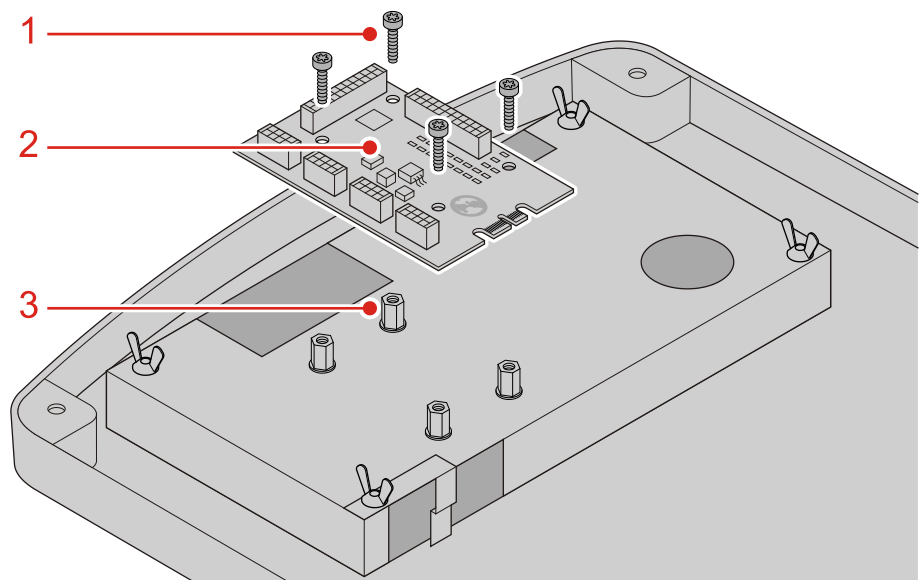
The module JXM-IO-E11 is fastened to the back of the control panel using screws.

The module JXM-IO-E11 is part of the control panel located in the center console.

### Installing the Module

Proceed as follows:

Step	Action
1	Dismantle the control panel from the center console.
2	Screw the module down to the spacer bolts using 4 screws. (Screws: 4 x M3, not included in the scope of delivery)
3	Connect the cables leading to the connectors with the module.



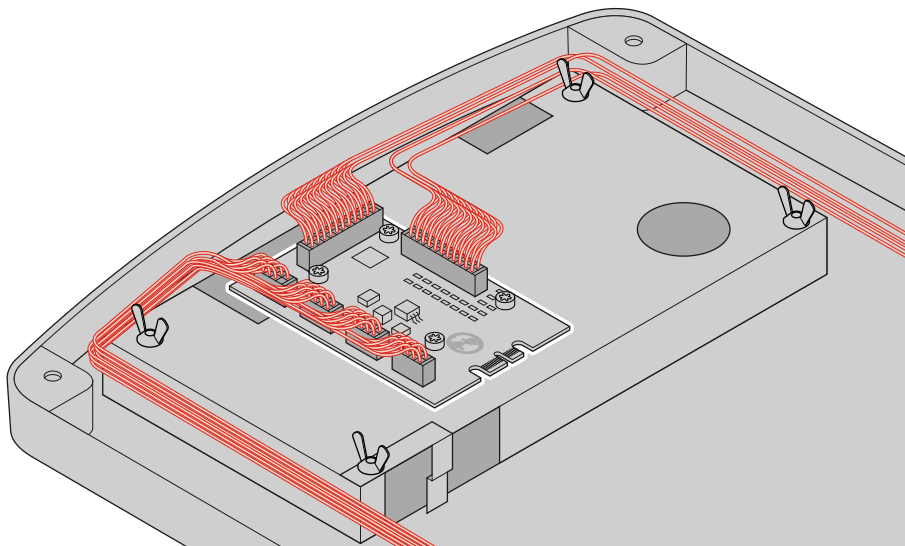
Number	Part	Description
1	Screw (4 x M3)	Cylinder head screw M 3 x 5; Torx X 10 (ISO 14580)
2	Module JXM-IO-E11	
3	Spacer bolts (4 x)	Spacer bolts M 3 x 6 I/A

## 4 Mounting and Installation

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### Routing of Cables

Route the cables in a way that keeps them from getting pinched when installing the control panel:



### Related Topics:

- **Wiring** on page 26
-

## 5 Initial Commissioning

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### Introduction

This chapter gives a compact description of the initial commissioning of the module JXM-IO-E11 covering the following steps:

- Connecting the power supply and interfaces
  - Initial commissioning via CANopen® interface
- 

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### Preparatory Work for Initial Commissioning

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#### Introduction

To be able to commission and program the JXM-IO-E11 the following preparations are necessary:

- Connecting a controller with power supply and CAN interface
  - Changing the node ID in the case of several CANopen® nodes of the same module type.
- 

#### Default Values

The default values of the JXM-IO-E11 module are listed below:

- Baud rate: 250 kBaud
  - CAN terminating resistor: 0x01 (resistor at the end of the CAN bus is enabled)
  - Node ID: 0x29
- 

#### Protective Features

The module JXM-IO-E11 features the following protective functions:

- Protection against polarity reversal of up to DC -100 V except for input and output contacts.
  - A protective circuit limiting the voltage to DC 36 V.
  - Each switch input has clamping diodes to 5 V and ground.
- 

#### Wiring

To wire the module JXM-IO-E11 using connector X801, proceed as follows:

Step	Action
1	Connect the following terminals with the power supply DC 8 ... 32 V: <ul style="list-style-type: none"><li>▪ IGNITION FEED (+) <b>Pin 1</b> (terminal 30 in the vehicle)</li><li>▪ GROUND <b>Pin 6</b> (terminal 31 in the vehicle)</li><li>▪ GROUND <b>Pin 8</b> (terminal 31 in the vehicle)</li></ul>
2	Connect the module to the CANopen® bus ( <b>pin 2</b> and <b>pin 3, pin 4</b> and <b>pin 5</b> ).
3	Make sure that there is a terminating resistor of 120 Ω at both ends of the CAN bus.
4	Energize the power supply. Make sure that the ignition is on. Communication with the module is now possible. During cranking the voltage must not fall below 5.0 V.

**Result:** The module is now operational and can be initialized by the controller.

---

**Data Collision in the Case of Several Modules with the Same Node ID.**

If you connect several nodes of the same type to the CANopen® bus, this leads to data collisions on the CANopen® bus. The reason for this is that modules of the same type in as delivered condition have got the same node ID. To allow communication with all nodes on the bus, the node ID of modules with the same default ID must be changed.

Connect the modules one after the other to the CANopen® bus and change the node ID through the system parameters: The legal range for values is between 1 and 254.

Step	Action	Result
1	Connect module 1 to the CANopen® bus.	
2	Enter a new node ID into the system parameter (index 0x4556, sub-index 4).	As a result, module 1 has got a new node ID.
3	Then, connect module 2 to the CANopen® bus.	
4	Enter a new node ID into the system parameter (index 0x4556, sub-index 4).	As a result, module 2 has got a new node ID.
5	Repeat this procedure for all modules of the same type until all modules are connected to the CANopen® bus.	Now, collision of data is avoided in communication between nodes of the same type connected to the CANopen® bus since each node has got an individual node ID.

**Related Topics:**

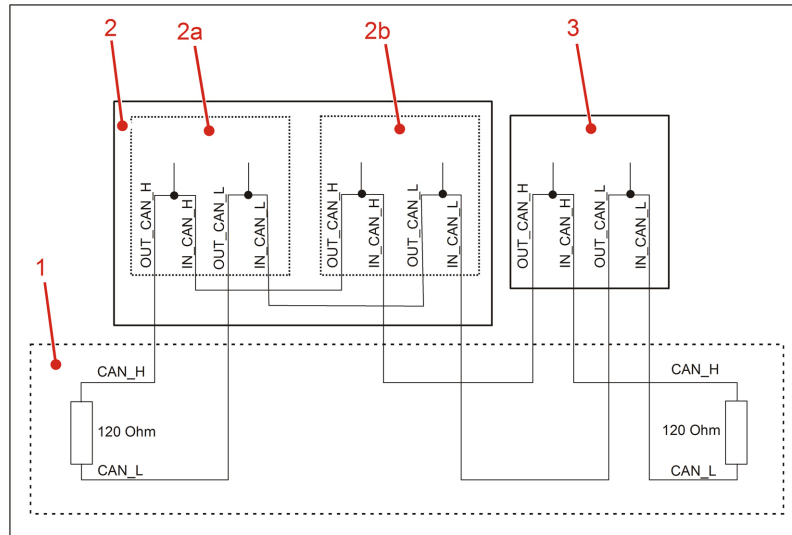
- **Wiring** on page 26
- **CANopen® Interface** on page 31
- **Information on Communication with the Module JXM-IO-E11** on page 48

## Information on Communication with a JXM-IO-E11

### Example - Wiring Diagram

The illustration below shows an wiring example of the following CANopen® devices by Jetter AG:

- Controller JCM-350-E03
- Peripheral Module JXM-IO-E11



Number	Description	Node ID
1	CAN bus	
2	Controller JCM-350-E03 by Jetter	
2a	Controller JCM-350	0x7F (127 decimal)
2b	Integrated I/O module JXM-IO-E02	0x10 (16 decimal)
3	I/O module JXM-IO-E11	0x28 (40 decimal)

### CANopen® Interface - Restrictions

During initial commissioning the following restrictions/limitations of the CANopen® interface on the JXM-IO-E11 must be taken into account:

- PDOs are not user configurable.
- PDOs are transmitted only asynchronously on request.

### Communication with Peripheral Modules

The following information supports you in commissioning peripheral modules, such as JXM-IO-E11:

- Initialize the controller as described in the corresponding manual.
- Send an RTR frame to the peripheral module JXM-IO-E11. This parameter is needed once in order to prompt the peripheral module JXM-IO-E11 to send the required data to the controller.



**JetSym STX Sample Program**

The following program code fragment shows how the node ID on the JXM-IO-E11 can be changed from 0x29 to 0x2A by a Jetter controller, such as JCM-350.

```
Const
    CAN_CONTROLLER_0 = 0;
    //Node ID of controller JCM-350
    NodeID_Node_0 = 0x7F;
    //Node ID of I/O module JXM-IO-E11
    NodeID_Node_1 = 0x29;
End_Const;
Var
    busy: Int;
    SW_Version: String;
    New_NodeID: Long;
    Objectindex: Word;
    Subindex: Byte;
End_Var;
Task Main Autorun
    // Software version of the controller
    SW_Version := 'v4.3.0';
    // Selecting the new node ID
    New_NodeID:= 0x2A;
    // Initializing CAN 0
    CanOpenInit(CAN_CONTROLLER_0, NodeID_Node_0, SW_Version);
    // System parameters
    Objektindex := 0x4556;
    // CANopen node ID
    Subindex := 4;
    // Changing the node ID
    CanOpenDownloadSDO(CAN_CONTROLLER_0, NodeID_Node_1, Objectindex,
        Subindex, CANOPEN_DWORD, sizeof(New_NodeID), New_NodeID, busy);
End_Task;
```

Restart the JXM-IO-E11 so that the new node ID can be stored.

**Result:**

The node ID of the JXM-IO-E11 module has been changed to 0x2A.

**Note:**

If you want to address this module, make sure that all other program codes refer to the new node ID of the JXM-IO-E11.

**Related Topics:**

- **CANopen® Objects** on page 51



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## 6 CANopen® Objects

---

### Introduction

This chapter covers the CANopen® objects implemented on the JXM-IO-E11 and their functions, as well as the permanently mapped process data objects (PDO).

### Restrictions

Due to design constraints the following restrictions/limitations apply to the CANopen® interface of the JXM-IO-E11:

- SDO expedited transfer only supports 4-byte transfers. Any smaller data element must be extended to 32 bit before the SDO transfer.
- SDO segmented transfer is only supported on certain objects. Most notably the OS update feature makes use of segmented transfer, but also some other objects that need to transfer strings implement SDO segmented transfer for this purpose. Unless an object is documented to support segmented transfers, assume that it does not.
- SDO block transfer is NOT implemented.
- PDOs are not user configurable.
- PDOs are transmitted only asynchronous on request. This is not configurable.
- Although emergency messages are transmitted to notify of detected faults, the CANopen® emergency handling system is not fully implemented.

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## 6.1 CANopen® Object Dictionary

**Purpose of this Chapter** This section describes the SDO objects implemented on the JXM-IO-E11.

### Supported Objects

A summary of the objects covered in this document are given in the table below. There are also a few more objects which are mandatory according to the CANopen® specification which are not covered in this document:

Index (hex)	Object Name	Object (Code)	Type	see
1000	Device Type	VAR	Unsigned32	<b>Page</b> 54
1001	Error Register	VAR	Unsigned8	<b>Page</b> 54
100A	Manufacturer Software Version	VAR	String	<b>Page</b> 54
1017	Producer Heartbeat Time	VAR	Unsigned16	-
1018	Identity	RECORD	Identity (23h)	<b>Page</b> 54
1200	Server SDO (COB-ID) Parameter	ARRAY	Unsigned8 (22h)	<b>Page</b> 54
1600	Receive PDO mapping Parameter	ARRAY	Unsigned32 (21h)	<b>Page</b> 54
1A00	Transmit PDO mapping Parameter	ARRAY	Unsigned32 (21h)	<b>Page</b> 54
2000	Features	ARRAY	Unsigned8	<b>Page</b> 54
2100	LED Group	ARRAY	Unsigned32	<b>Page</b> 56
2200	Button / Switch Group	ARRAY	Unsigned32	<b>Page</b> 58
2300	Joystick (digital)	ARRAY	Unsigned8	<b>Page</b> 60
2400	Joystick (analog)	ARRAY	Unsigned32	<b>Page</b> 60
4554	OS Update	ARRAY	Unsigned32	<b>Page</b> 63
4555	Electronic Datasheet	ARRAY	Unsigned32	<b>Page</b> 63
4556	System Parameters	ARRAY	Unsigned16	<b>Page</b> 64
4559	Detailed Software Version	ARRAY	Unsigned32	<b>Page</b> 67
4560	CAN Termination	ARRAY	Unsigned32	<b>Page</b> 68
5000	User EEPROM Access	ARRAY	Unsigned32	<b>Page</b> 69

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## Objects Ranging from Index 0x1000 through 0x2000

### Device Type (Index 0x1000)

The following table shows the structure of the object "Device Type".

Index	Sub-Index	Default	Description	Attributes
0x1000	0	0x00030191	Type of device	ro (read only)

This value is read-only (ro).

### Error Register (Index 0x1001)

The following table shows the structure of the object "Error Register".

Index	Sub-Index	Default	Description	Attributes
0x1001	0	0	Error Register	ro (read only)

This object returns the error condition from the CANOpen® error register. The error register is not currently in use and will always return a zero. This object is read only.

### Manufacturer Software Version (Index 0x100A)

The following table shows the structure of the object "Manufacturer Software Version".

Index	Sub-Index	Default	Description	Attributes
0x100A	0	-	Software version	const

Use only the STX function CanOpenUploadSDO () to determine the version of the software running in the JXM-IO-E11.

The version string is at least 9 characters long and is of the format "1.06.0.00". The first digit is the major revision followed by the minor revision and the branch and beta indicators (which will usually be zero). This value is read-only (ro).

### Producer Heartbeat Time (Index 0x1017)

The following table shows the structure of the object "Producer Heartbeat Time".

Index	Sub-Index	Default	Description	Attributes
0x1017	0	1,000 [ms]	Heartbeat time	rw (read & write)

The legal range for values is 250 ... 65,535.

**Server SDO Parameters  
(Index 0x1200)**

The following table shows the structure of the object "Server SDO Parameters".

Index	Sub-Index	Default	Description	Attributes
0x1200	0	2	Number of entries	ro (read only)
	1	0x629	COB-ID Client -> Server (Rx)	ro
	2	0x5A9	COB-ID Server -> Client (Tx)	ro

This objects contains the COB-IDs for SDO transfer messages from client-to-server and server-to-client. This object is read only.

**Receive PDO Mapping Parameters  
(Index 0x1600)**

The following table shows the structure of this object.

Index	Sub-Index	Default	Description	Attributes
0x1600	0	1	Number of entries	ro (read only)
	1	0x21000520	LED Group	ro

Contains the mapping for the PDOs the module JXM-IO-E11 is able to receive. Each entry describes the PDO contents by its index, sub-index and length. This object is read only.

**Transmit PDO Mapping Parameters  
(Index 0x1A00)**

The following table shows the structure of this object.

Index	Sub-Index	Default	Description	Attributes
0x1A00	0	1	Number of entries	ro (read only)
	1	0x22000420	Buttons	ro
	2	0x23000408	Joystick	ro

Contains the mapping for the PDOs the module JXM-IO-E11 is able to transmit. Each entry describes the PDO contents by its index, sub-index and length. Both the Buttons and Joystick PDOs are event driven. This object is read only.

**Features (Index 0x2000)**

The following table shows the structure of the object "Features".

Index	Sub-Index	Default	Description	Attributes
0x2000	0	-	Features Object	ro (read only)

This object is provided for compatibility reasons. This object is read only.

## Object "LED States" (Index 0x2100)

### LED Group (Index 0x2100)

The structure of the object "LED States" is shown in the following table.

Index	Sub-Index	Default	Description	Attributes
0x2200	0	6	Number of entries	ro (read only)
	1	0	Status: Not used	
	2	0	Instruction: Not used	
	3	0	Not used	
	4	0	Process value 0: Output read back state	ro
	5	0	Process value 1: Output state	rw (read & write)
	6	26	Parameter 0: Number of LEDs in group	ro

### Sub-Index 4

The function of sub-index 4 is described below:

- Sub-index 4 can be read to obtain the latest measured LED states.
- The result is a 32-bit unsigned word where the bits represent the information indicated in sub-index 5 below.

### Sub-Index 5

The function of sub-index 5 is described below:

- Write to sub-index 5 to set the LED states.
- The result is a 32-bit unsigned word where the bits represent the information indicated below.

The following bit allocation only applies to sub-index 4 and 5.

Bits 31 ... 24							
0	0	0	0	0	0	0	0

Bits 23 ... 16							
LED SW 4	LED SW 3	LED SW 2	LED SW 1	LED 20	LED 19	LED 18	LED 17

Bits 15 ... 8							
LED 16	LED 15	LED 14	LED 13	LED 12	LED 11	LED 10	LED 9

Bits 7 ... 0							
LED 08	LED 07	LED 06	LED 05	LED 04	LED 03	LED 02	LED 01

- The most significant byte is reserved and should always be set to zero.



- A bit value of "1" indicates that the LED is active. A bit value of "0" indicates that the LED is inactive.

### Sub-Index 6

The function of sub-index 6 is described below:

- Sub-index 6 can be read to obtain the number of available LEDs in a group.

### LED Assignment to Connector Outputs

Name	Description	Connector see
<b>LED SW 4</b>	LED output # 4 - switch # 4 (4 W)	<b>Page</b> 34
<b>LED SW 3</b>	LED output # 3 - switch # 3 (4 W)	<b>Page</b> 34
<b>LED SW 2</b>	LED output # 2 - switch # 2 (4 W)	<b>Page</b> 36
<b>LED SW 1</b>	LED output # 1 - switch # 1 (4 W)	<b>Page</b> 36
<b>LED # 01 through 20</b>	LED output drivers	<b>Page</b> 40

## Object "State of all Switches" (Index 0x2200)

### Button/Switch Group (Index 0x2200)

The structure of the object "Switch States" is shown in the following table. This object is read only.

Index	Sub-Index	Default	Description	Attributes
0x2200	0	6	Number of entries	ro (read only)
	1	0	Status: Not used	
	2	0	Instruction: Not used	
	3	0	Not used	
	4	0	Process value 0: Input states	ro
	5	0	Process value 1: Not used	
	6	26	Parameter 0: Input quantity:	ro

### Sub-Index 4

The function of sub-index 4 is described below:

- Sub-index 4 can be read to obtain the latest measured state of all switches.
- The result is a 32-bit unsigned word where the bits represent the information indicated below.

#### Note

Note that data bits 22 ... 25 are only valid for digital joysticks.

Bits 31 ... 24							
0	0	0	0	0	0	Joystick W	Joystick S

Bits 23 ... 16							
Joystick O	Joystick N	Joystick Switch 2	Joystick Switch 1	4 W Switch 4	4 W Switch 3	4 W Switch 2	4 W Switch 1

Bits 15 ... 8							
Switch 16	Switch 15	Switch 14	Switch 13	Switch 12	Switch 11	Switch 10	Switch 9

Bits 7 ... 0							
Switch 08	Switch 07	Switch 06	Switch 05	Switch 04	Switch 03	Switch 02	Switch 01

- The six most significant bits are reserved and should always be written zero.
- A bit value of "1" indicates that the switch is active. A bit value of "0" indicates that the switch is inactive.

**Sub-Index 6**

The function of sub-index 6 is described below:

- Sub-index 6 can be read to obtain the number of available inputs.
-

## Objects "Joystick, digital and analog" (Index 0x2300 through 0x2400)

### Joystick Digital (Index 0x2300)

The structure of the object "Joystick (digital)" is shown in the following table. This object is read only.

Index	Sub-Index	Default	Description	Attributes
0x2300	0	6	Number of entries	ro (read only)
	1	0	Status: Not used	
	2	0	Instruction: Not used	
	3	0	Not used	
	4	0	Process value 0: Input states	ro
	5	0	Process value 1: Not used	
	6	26	Parameter 0: Number of Joysticks	ro

### Sub-Index 4

The function of sub-index 4 is described below:

- Sub-index 4 can be read to obtain the current joystick state.
- This returns an 8-bit value with the following structure:

Bits 7 ... 0							
0	Button 2	Button 1	0	Joystick W	Joystick S	Joystick O	Joystick N

- A bit value of "1" indicates that the input is active. A bit value of "0" indicates that the input is inactive.

### Sub-Index 6

The function of sub-index 6 is described below:

- Sub-index 6 can be read to obtain the number of available joysticks.

**Joystick Analog  
(Index 0x2400)**

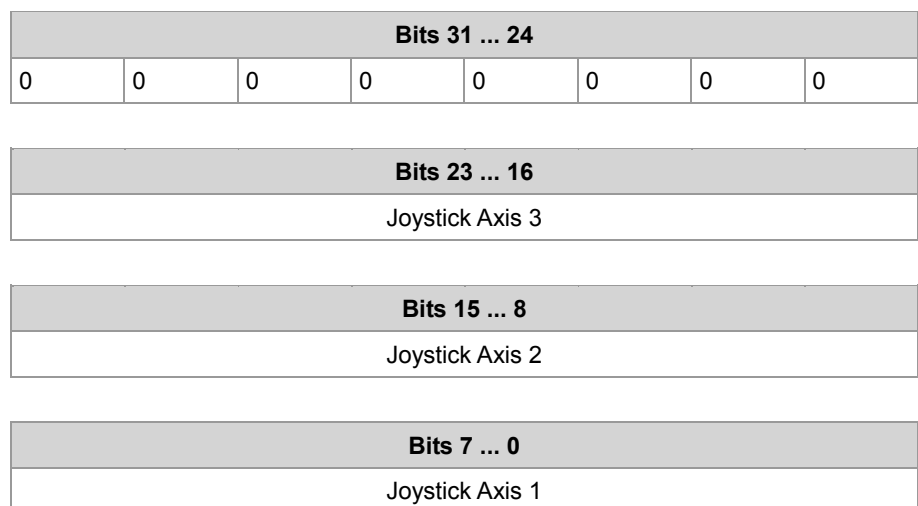
The structure of the object "Joystick (analog)" is shown in the following table. This object is read only.

Index	Sub-Index	Default	Description	Attributes
0x2400	0	6	Number of entries	ro (read only)
	1	0	Status: Not used	
	2	0	Instruction: Not used	
	3	0	Not used	
	4	0	Process value 0: Input states	ro
	5	0	Process value 1: Not used	
	6	26	Parameter 0: Number of Joysticks	ro

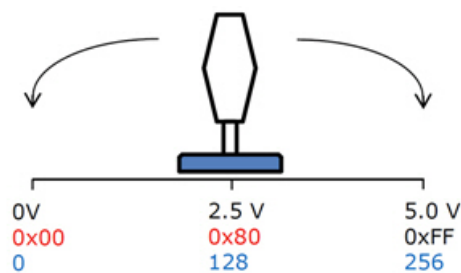
**Sub-Index 4**

The function of sub-index 4 is described below:

- Sub-index 4 can be read to obtain the current joystick state.
- This returns a 32-bit value with the following structure:



- The joystick is sampled with 8-bit resolution. This divides each axis into 256 discrete values.



An axis supplied with 5 V will return the following values:

- 0xFF at maximum thrust in the positive direction (5.0 V)

## 6 CANopen® Objects

---

- 0x80 when neutral (2.5 V)
- 0x00 at maximum thrust in the negative direction (0 V)
- Each bit is therefore representative of  $5\text{ V} \div 256 = 19.53\text{ mV}$ .
- The analog joystick inputs are specified with a maximum voltage of 5.0 V

---

### Sub-Index 6

The function of sub-index 6 is described below:

- Sub-index 6 can be read to obtain the number of available joysticks.
-

## OS Update (Index 0x4554) and EDS Objects (Index 0x4555)

### OS Update (Index 0x4554)

This object is used for OS updates. Do not access this object. Contact Jetter AG if you intend to update the operation system.

### Electronic Data Sheet (Index 0x4555)

The Electronic Data Sheet (EDS) is provided for production and support purposes. It is user readable.

Index	Sub-Index	Default	Description	Attributes
0x4555	0	15	Number of entries	ro (read only)
	1	0	Status	ro
	2	0	Command	ro
	3		Page 0: Version	ro
	4		Page 0: Module code	ro
	5		Page 0: Module name (string)	ro
	6		Page 0: PCB revision	ro
	7		Page 0: PCB options	ro
	8		Page 1: Revision	ro
	9		Page 1: Module serial number (string)	ro
	10		Page 1: Production date: Day	ro
	11		Page 1: Production date: Month	ro
	12		Page 1: Production date: Year	ro
	13		Page 1: Test device number	ro
	14		Page 1: Test device revision	ro
	15		Page 0: Minimum OS version	ro

## Object "System Parameters" (Index 0x4556)

### System Parameters (Index 0x4556)

Use the object "System Parameters" to permanently change the parameters mentioned below. Any changes made to these parameters are stored in non-volatile memory and are therefore recovered when the JXM-IO-E11 is next powered up.

Note that some of these settings can also be set using other SDO objects. However, the object "System Parameters" is the only way to make these changes permanently.

Index	Sub-Index	Default	Description	Attributes
0x4556	0	30	Number of entries	ro (read only)
	1	0	Version	ro
	2	0	CAN Bus Termination (0 = No, 1 = Enabled)	rw (read & write)
	3	1	CAN Baud Rate (0 = 125 kBaud, 1 = 250 kBaud, 2 = 500 kBaud, 3 = 1 MBaud)	rw
	4	0x29	CANopen® Node ID	rw
	5	1.000	CANopen® Heartbeat time period [ms]	rw
	6	12	LED 1 PWM Duty Cycle	rw
	7	12	LED 2 PWM Duty Cycle	rw
	8	12	LED 3 PWM Duty Cycle	rw
	9	12	LED 4 PWM Duty Cycle	rw
	10	12	LED 5 PWM Duty Cycle	rw
	11	12	LED 6 PWM Duty Cycle	rw
	12	12	LED 7 PWM Duty Cycle	rw
	13	12	LED 8 PWM Duty Cycle	rw
	14	12	LED 9 PWM Duty Cycle	rw
	15	12	LED 10 PWM Duty Cycle	rw
	16	12	LED 11 PWM Duty Cycle	rw
	17	12	LED 12 PWM Duty Cycle	rw
	18	12	LED 13 PWM Duty Cycle	rw
	19	12	LED 14 PWM Duty Cycle	rw
	20	12	LED 15 PWM Duty Cycle	rw
	21	12	LED 16 PWM Duty Cycle	rw
	22	12	LED 17 PWM Duty Cycle	rw
	23	12	LED 18 PWM Duty Cycle	rw



Index	Sub-Index	Default	Description	Attributes
	24	12	LED 19 PWM Duty Cycle	rw
	25	12	LED 20 PWM Duty Cycle	rw
	26	12	4 W LED 1 PWM Duty Cycle	rw
	27	12	4 W LED 2 PWM Duty Cycle	rw
	28	12	4 W LED 3 PWM Duty Cycle	rw
	29	12	4 W LED 4 PWM Duty Cycle	rw
	30	0	Joystick Type (0 = digital, 1 = analog)	rw

**Delay**

When writing to the System Parameters, a delay **must** be implemented after the SDO command. This delay is required because the JXM-IO-E11 needs to access EEPROM memory on both processors when writing to this object. This process may take several minutes. Therefore, it is recommended that a delay of 50 ms be implemented before the next SDO or PDO access to the same JXM-IO-E11.

**CAN Bus Termination**

- This parameter enables/disables the CAN termination resistors inside the JXM-IO-E11.
- The CAN termination resistor at the beginning and the end of the CAN bus is 120 Ω.

**CAN Baud Rate**

- This parameter selects the CAN Baud rate to use.
- The default value is 250 kBaud. To change the Baud rate, the JXM-IO-E11 must be connected to a CAN bus with a BAUD rate of 250 kBaud.
- Valid options are:
  - 0: 125 kBaud
  - 1: 250 kBaud
  - 2: 500 kBaud
  - 3: 1 MBaud

**CANopen® Node ID**

- This parameter changes the node ID stored to the internal EEPROM. If several modules are to be used on one CANopen® bus, a unique node ID must be assigned to each module. There is no automatic node ID assignment.
- The legal range for values is between 0x01 and 0xFE.
- The default value is 0x28.

### **CANopen® Heartbeat Time Period**

- This is the time period, specified in milliseconds (ms), at which the JXM-IO-E11 will transmit a CANopen® heartbeat message.
  - The legal range for values is between 250 and 65,535 ms.
  - The default value is 1,000 ms.
  - Time periods less than 250 ms are allowed by CANopen® but do not make practical sense for the JXM-IO-E11 and are therefore not allowed.
- 

### **LED PWM Duty Cycle**

- These parameters are used to select the duty cycle (percentage of ON-time) for each LED.
  - The allowed values range from 0 to 15 where 0 represents a 0 % duty cycle and 15 represents 100 %.
  - The default value is 12.
  - It is important not to set the duty cycle too high if multiple LEDs are to be used at the same time. Duty cycles higher than 12 are not recommended.
- 

### **Joystick Type**

- This parameter is used to select the joystick type.
  - Allowed values are 0 and 1 where 0 represents digital joystick types and 1 analog joystick types.
  - The default value is 0.
-

---

## Detailed Software Version Object (Index 0x4559)

---

### Detailed Software Version (Index 0x4559)

The structure of the object "Detailed software version" is shown in the following table.

Index	Sub-Index	Default	Description	Attributes
0x4559	0	3	Number of entries	ro (read only)
	1	-	Software version	ro
	2	0	Bootloader version	ro

---

### Sub-Index 1

The function of sub-index 1 is described below:

- Sub-Index 1 returns the same software version as object 0x100A, but in a 32-bit unsigned integer format.
  - This format is compatible with the standard IP-type version number used at Jetter AG.
  - **Example:**  
The 32-bit word 0x01070001 translates to a software version of 1.07.0.01.
- 

### Sub-Index 2

The function of sub-index 2 is described below:

- Reading sub-index 2 returns the software version number of the boot loader.
-

## CAN Bus Termination (Index 0x4560)

---

### CAN Termination (Index 0x4560)

The structure of the object "CAN Termination" is shown in the following table.

Index	Sub-Index	Default	Description	Attributes
0x4560	0	-	CAN Termination ( 0 = Off, 1 = On)	rw (read & write)

Use this object to test the CAN termination. This is a volatile write used primarily for production.

- 0 disables the terminating resistor of the CAN bus.
  - 1 enables the terminating resistor of the CAN bus.
  - This value is cleared when the module JXM-IO-E11 is reset.
-

## Object "User EEPROM Access" (Index 0x5000)

### User EEPROM Access (Index 0x5000)

The structure of the object "User EEPROM Access" is shown in the following table. This object grants the user read/write access to the EEPROM.

Index	Sub-Index	Default	Description	Attributes
0x5000	0	6	Number of entries	ro (read only)
	1	0	Byte offset inside memory space	rw (read & write)
	2	1.024	Size of memory in bytes (read only)	ro
	3	1	Auto increment	rw
	4	-	Byte R/W access	rw
	5	-	16-bit word R/W access	rw
	6	-	32-bit word R/W access	rw

### Sub-Index 1

The function of sub-index 1 is described below:

- To use this object, enter the byte offset inside the memory space in sub-index 1.
- If the byte offset is less than zero, the CANopen® error "Value of parameter written too low" is returned.
- If the byte offset is larger than the value in sub-index 2 (default value: 1,024), the CANopen® error "Value of parameter written too high" is returned.
- Also, if the byte offset is set to one of the last byte values and an attempt is made to read or write a 16-bit or 32-bit word which would cause reading/writing outside the memory space, the "General error" message is returned.

Unfortunately CANopen® doesn't have an error code that accurately describes this condition.

Example:

If the byte offset is 1,022 and an attempt is made to read a 32-bit word, this would normally try to read beyond the last memory address of 1,023. This is not allowed and the message "General error" is returned.

### Sub-Index 2

The function of sub-index 2 is described below:

- The JXM-IO-E11 offers 1 kByte of EEPROM memory space. But for some special devices the amount may differ.
- Reading sub-index 2 returns the available memory size in bytes.
- This sub-index is read-only.

### Sub-Index 3

The function of sub-index 3 is described below:

- Use sub-index 3 to enable/disable the function "Auto Increment":
    - 0: Auto increment is disabled
    - 1: Auto increment is enabled
  - Auto increment works as follows:
    - After either a read or write operation, the object will increment the offset in the memory space by the number of bytes that were transferred.
    - **Example:**
      - After a byte read the byte offset is incremented by 1.
      - After a 32-bit write the byte offset is incremented by 4.
- 

### Sub-Index 4

The function of sub-index 4 is described below:

- Read sub-index 4 to read a byte from the memory.
  - Enter a value into sub-index 4 to write a byte in the memory.
- 

### Sub-Index 5

The function of sub-index 5 is described below:

- Read sub-index 5 to read a 16-bit word from the memory.
  - Enter a value into sub-index 5 to write a 16-bit word in the memory.
- 

### Sub-Index 6

The function of sub-index 6 is described below:

- Read sub-index 6 to read a 32-bit word from the memory.
  - Enter a value into sub-index 6 to write a 32-bit word in the memory.
- 

### Delay

When writing to the EEPROM, a delay **must** be implemented after the SDO command. The JXM-IO-E11 first writes to the EEPROM memory. This may take a while before the JXM-IO-E11 transmits the SDO reply. This process can take at least 50 ms. Therefore, it is recommended that a delay of 100 ms be implemented before the next SDO or PDO access to the same JXM-IO-E11.

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## 6.2 CANopen® PDO Specification

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### Introduction

This chapter describes the CANopen® PDO specification implemented on the JXM-IO-E11. PDO is short for Process Data Object. The PDO data allocation is fixed and cannot be changed by the application.

Currently the TX PDOs will be both event-based and request-based. Event-based means that if the internal data changes, a PDO will be transmitted asynchronously. Similarly, request-based means the PDO will be transmitted asynchronously upon receiving a remote request.

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### RX PDO Allocation on the JXM-IO-E11

---

#### PDO Assignment and Parameters

The table below shows the allocation of RX PDOs implemented on the JXM-IO-E11. CANopen® objects are linked with their corresponding PDOs. Therefore, writing to that PDO will be the same as writing to that SDO index and sub-index.

The controller is able to read back the following data from the JXM-IO-E11 via PDO1\_TX (0x200 + node ID):

Byte Offset	Index / Sub-index	Size [byte]	Description
0	0x2100/05	4	LED Group

---



---

## TX PDO Allocation on the JXM-IO-E11

---

### PDO Assignment and Parameters

The table below shows the allocation of TX PDOs implemented on the JXM-IO-E11. CANopen® objects are linked with their corresponding PDOs.

The controller is able to read back the following data from the JXM-IO-E11 via PDO1\_RX (0x180 + node ID):

Byte Offset	Index / Sub-index	Size [byte]	Description
0	0x2200/04	4	Buttons (switches)
4	0x2300/04	1	Joystick (digital)

The controller is able to read back the following data from the JXM-IO-E11 via PDO2\_RX (0x280 + node ID):

Byte Offset	Index / Sub-index	Size [byte]	Description
4	0x2400/04	1	Joystick Axis 3
5	0x2400/04	1	Joystick Axis 2
6	0x2400/04	1	Joystick Axis 1

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# Appendix

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**Introduction**

This appendix contains electrical and mechanical data, as well as operating data.

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# A: Technical Data

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**Introduction**

This chapter contains information on electrical and mechanical data, as well as on operating data of the JXM-IO-E11.

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## Technical Specifications

### Technical Data - Power Supply

Parameter	Description
Operating voltage - IGNITION FEED	DC 8.0 ... 32.0 V
Overvoltage detection	yes; protective circuit limits the voltage to DC 36 V
Polarity reversal protection	yes; up to DC -100 V

### Measured (Base) Current Consumption

Input Voltage	Current
DC 8 V	37.3 mA
DC 10 V	33.2 mA
DC 12 V	31.1 mA
DC 16 V	29.6 mA
DC 20 V	30.1 mA
DC 24 V	31.8 mA

### Technical Data - CAN Interface

Parameter	Description
Bus type	CAN bus (CAN v2.0 a/b)
Protocol	CANopen®
Baud rate	250 kBaud (1 MBaud max.)
Terminating resistor	Can be activated by means of software

### Technical Data - Analog Joystick

Parameter	Description
Maximum input voltage	DC 5 V
Resolution	8 bits (256 discrete values per axis)
Number of axes (joystick)	3

### Technical Data - Digital Joystick

Parameter	Description
Maximum input voltage	DC 5 V
Resolution	8 bits (256 discrete values per axis)
Logic high threshold	> 3 V
Logic low threshold	< 1 V

**Technical Data -  
Digital Inputs and  
Outputs**

Parameter	Description
4 W switch 1 - 4 W switch 4	Digital inputs (active-low)
Maximum input voltage	DC 5 V
4 W LED 1 - 4 W LED 4	Digital outputs (active-low)
Logic high threshold	> 3 V
Logic low threshold	< 1 V

**Technical Data -  
LED Driver**

Parameter	Description
Purpose	The module JXM-IO-E11 is equipped with an LED driver capable of driving up to 20 LEDs. The negative electrode of the LED is connected to ground by an N-channel MOSFET.
Power supply	DC 5 V
Rated current	5 mA per LED
Current limitation	The module JXM-IO-E11 is not equipped with a current limiting resistor. <b>It's the user's responsibility to provide current limitation.</b>
Resolution	4-bit PWM algorithm
Brightness	Can be set between 1 and 15.

**Protective Features**

The module JXM-IO-E11 features the following protective functions:

- Protection against polarity reversal of up to DC -100 V except for input and output contacts.
- A protective circuit limiting the voltage to DC 36 V.
- Each switch input has clamping diodes to 5 V and ground.

**Jetter Connector Set**

Jetter offers a connector set matching the JXM-IO-E11 (order number 10000881). The Jetter connector set includes the following components:

Type	Description	Quantity
Micro-Fit 3.0™, 8-pin	Mating connector for 8-pin plug	4
Micro-Fit 3.0™, 22-pin	Mating connector for 22-pin plug	2
Molex receptacle, crimp contact	-	76

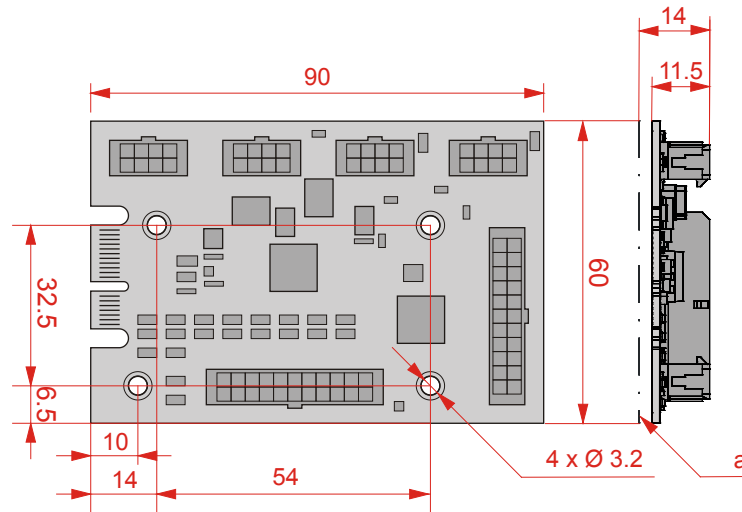
## Physical Dimensions

### Introduction

This chapter describes the physical dimensions of the module JXM-IO-E11.

### Physical Dimensions

The illustration below shows the dimensions of the JXM-IO-E11:



Number	Description
a	Maximum height of electronic components (in the case of back-mounted components)

## Operating Parameters - Environment and Mechanics

### Environment

Parameter	Value	Standard
Operating temperature range	-40 ... +85 °C	
Storage temperature range	-40 ... +85 °C	DIN EN 61131-2 DIN EN 60068-2-1 DIN EN 60068-2-2
Air humidity	10 ... 95 %	DIN EN 61131-2
Climate test	Humid heat	DIN EN 60068-2-30
Pollution degree	2	DIN EN 61131-2

### Mechanical Parameters

Parameter	Description	Standard
Vibration resistance	Vibration, broadband noise	DIN EN 60068-2-6 Severity level 2
Shock resistance	30 g occasionally, 18 ms, sinusoidal half-wave, 3 shocks in the directions of all three spatial axes	DIN EN 60068-2-27
Degree of protection	None; the board must be integrated into an appropriate housing.	We recommend to apply the standard DIN EN 60529 including all amendments to date.

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