



ECX-PoE-PE

Power-Extractor for InRailBus



Hardware Manual

to Product E.3020.02



NOTE

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Document-File:	I:\Texte\Doku\MANUALS\ECX\ECX-PoE-PE\English\ECX-POE-PE_Hardware_en_10.wpd
Date of print:	2011-02-22

PCB version:	from ECX-PoE-PE Rev. 1.0
Firmware version:	from Rev. 2.6

Changes in the chapters

The changes in the document listed below affect changes in the hardware and firmware as well as changes in the description of facts only.

Chapter	Changes versus previous version
-	First English version
-	-

Technical details are subject to change without further notice.



Safety Instructions

- When working with ECX-PoE-PE follow the instructions below and read the manual carefully to protect yourself and the ECX-PoE-PE from damage.
- Do not open the housing of the ECX-PoE-PE
- In order to prevent overvoltage damage due to thunder storm, unplug the ECX-PoE-PE beforehand.
- Never let liquids get inside the ECX-PoE-PE. Otherwise, electric shocks or short circuits may result.
- Protect the ECX-PoE-PE from dust, moisture and steam.
- Protect the ECX-PoE-PE from shocks and vibrations.
- The ECX-PoE-PE may become warm during normal use. Always allow adequate ventilation around the ECX-PoE-PE and use care when handling.
- Do not operate the ECX-PoE-PE adjacent to heat sources and do not expose it to unnecessary thermal radiation. Ensure an ambient temperature as specified in the technical data.
- Do not use damaged or defective cables to connect the ECX-PoE-PE.

Conformity

The ECX-PoE-PE is an industrial product and meets the demands of the EU regulations and EMC standards for industrial environments printed in the conformity declaration at the end of this manual.

Warning: In a residential, commercial or light industrial environment the ECX-PoE-PE may cause radio interferences in which case the user may be required to take adequate measures.

Qualified Personal

This documentation is directed exclusively towards qualified personal in control and automation engineering. The installation and commissioning of the product may only be carried out by qualified personal, which is authorized to put devices, systems and electric circuits into operation according to the applicable national standards of safety engineering.

Intended Use

The intended use of the ECX-PoE-PE is the operation as a power extractor for InRailBus, applicable with ECX and CBX units. The esd guarantee does not cover damages which result from improper use, usage not in accordance with regulations or disregard of safety instructions and warnings.

- The ECX-PoE-PE is intended for indoor installation only.
- The operation of the ECX-PoE-PE in hazardous areas, or areas exposed to potentially explosive materials is not permitted.
- The operation of the ECX-PoE-PE for medical purposes is prohibited.

Service Note

The ECX-PoE-PE does not contain any parts that require maintenance by the user. The ECX-PoE-PE does not require any manual configuration of the hardware. Unauthorized intervention in the device voids warranty claims.

Remove all cables before cleaning. Clean the device with a slightly moist, lint-free cloth. Cleaning agents or solvents are not suitable.

Disposal

Devices which have become defective in the long run have to be disposed in an appropriate way or have to be returned to the manufacturer for proper disposal. Please, make a contribution to environmental protection.

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1. Overview

1.1 Description of the Module

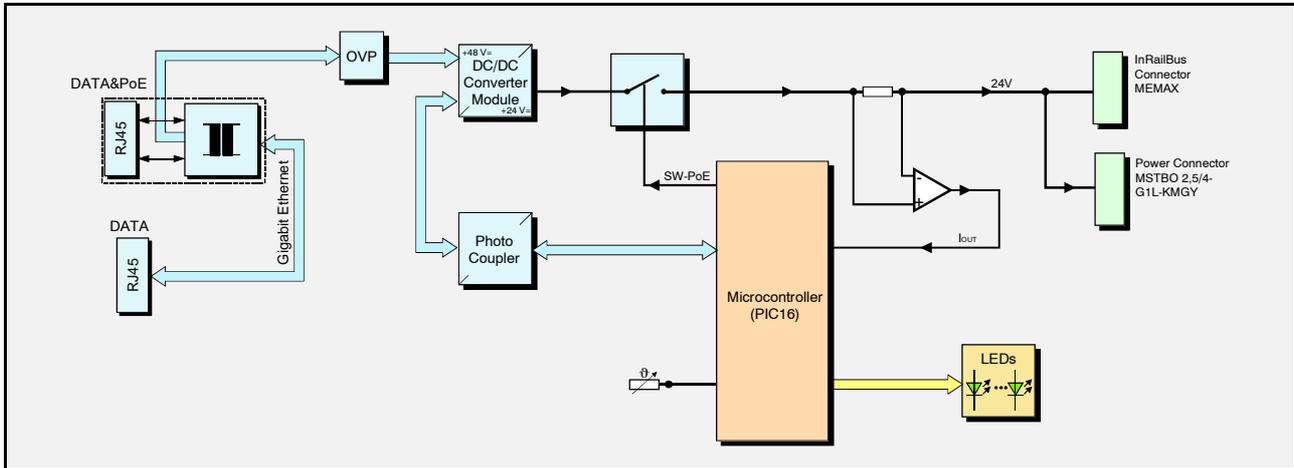


Fig. 1: Block circuit diagram of the ECX-PoE-PE module

The ECX-PoE-PE is a power extractor that provides 24 V power supply voltage for the InRailBus. It can be used for ECX and CBX units.

The power supply voltage is fed via the Ethernet lines (PoE).

The module is designed for hat-rail mounting in a control enclosure. The connectors and status LEDs are mounted in the front panel.

The ECX-PoE-PE supports IEEE 802.03at (PoE+, layer 1 only), and is compatible with IEEE 802.03af (Class 4).

Ethernet data (10/100/1000BASE-T) is electrically passed through.

The ECX-PoE-PE comes with LEDs which indicate the state of operation and the states of the temperature- and the output current control.



The following figure shows an example for the usage of the ECX-PoE-PE module.

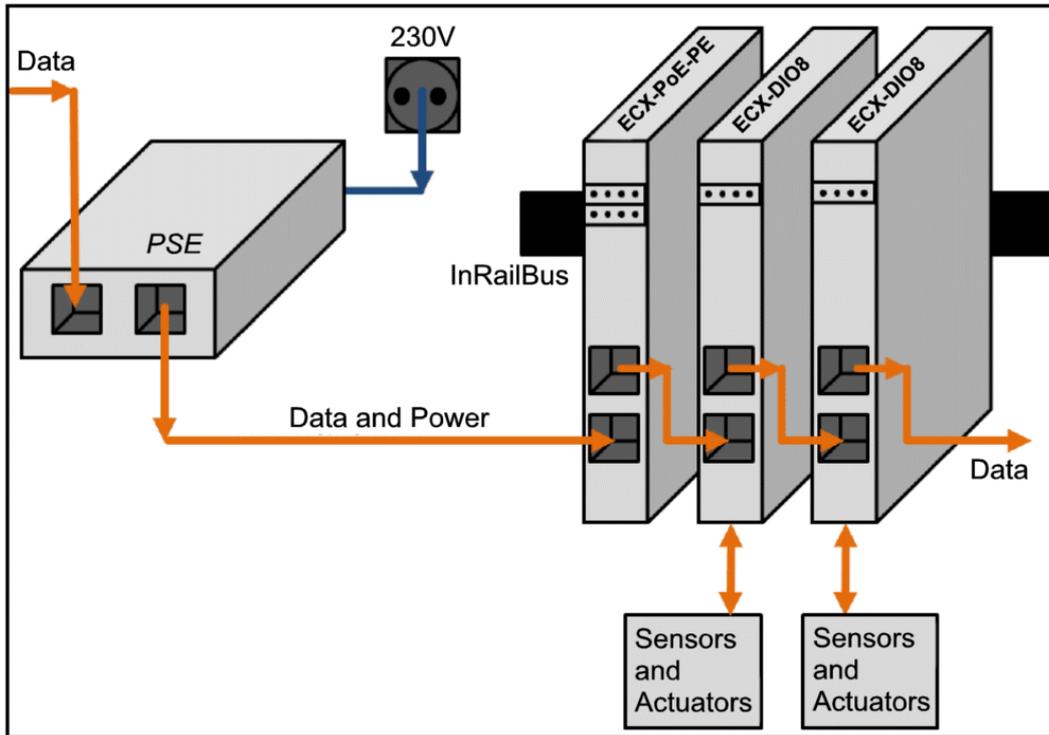
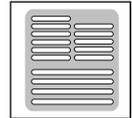


Fig. 2: Exemplary installation of the ECX-PoE-PE

The ECX-PoE-PE receives the Ethernet data and the power supply for the InRailBus from the Power Source Equipment (PSE). The 24 V power supply voltage is fed into the InRailBus and the Ethernet data is electrically passed through to the Powered Devices (PD), e.g. to ECX-DIO8.

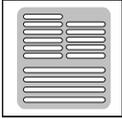


2. Technical Data

2.1 General technical Data

Input voltage	36 - 57 V/DC
Output voltage	24 V \pm 5%
Power output	maximum 25 W (Derating from approximately 33 °C or 41 °C, depending on the mounting position, see page 15)
Connectors	ETH/PoE (8-pin RJ45 jack, X110) - Ethernet Data, Power over Ethernet (PoE) ETH (8-pin RJ45 jack, X120) - Ethernet Data 24V (4-pin COMBICON connector with spring-cage connection, X201) - 24V-power supply voltage InRailBus (5-pin ME-MAX-TBUS-connector, Phoenix Contact, X200) - power supply voltage for InRailBus
Temperature range	-20 ... + 60 °C ambient temperature
Humidity	max. 90%, non-condensing
Protection class	IP20
Pollution degree	maximum permissible according to DIN EN 61131-2: Pollution Degree 2
Housing	Plastic housing for carrier rail mounting NS35/7,5 DIN EN 60715
Dimensions	width: 22.5 mm, length: 99 mm, constructional height: 114.5 mm (dimensions without mating connectors)
Weight	approx. 135 g

Table 1: General technical data



Technical Data

2.2 Microcontroller

Microcontroller	PIC16, 8 MHz
-----------------	--------------

Table 2: Microcontroller

2.3 EtherNet Data & Data/PoE

Ethernet	data (10/100/1000BASE-T), electrically passed through
PoE supply	according to IEEE 802.03at (PoE+, only layer 1 is supported), and compatible with IEEE 802.03 af (Class 4)

Table 3: Data of analog inputs



3. Hardware Installation

3.1 Connecting Diagram

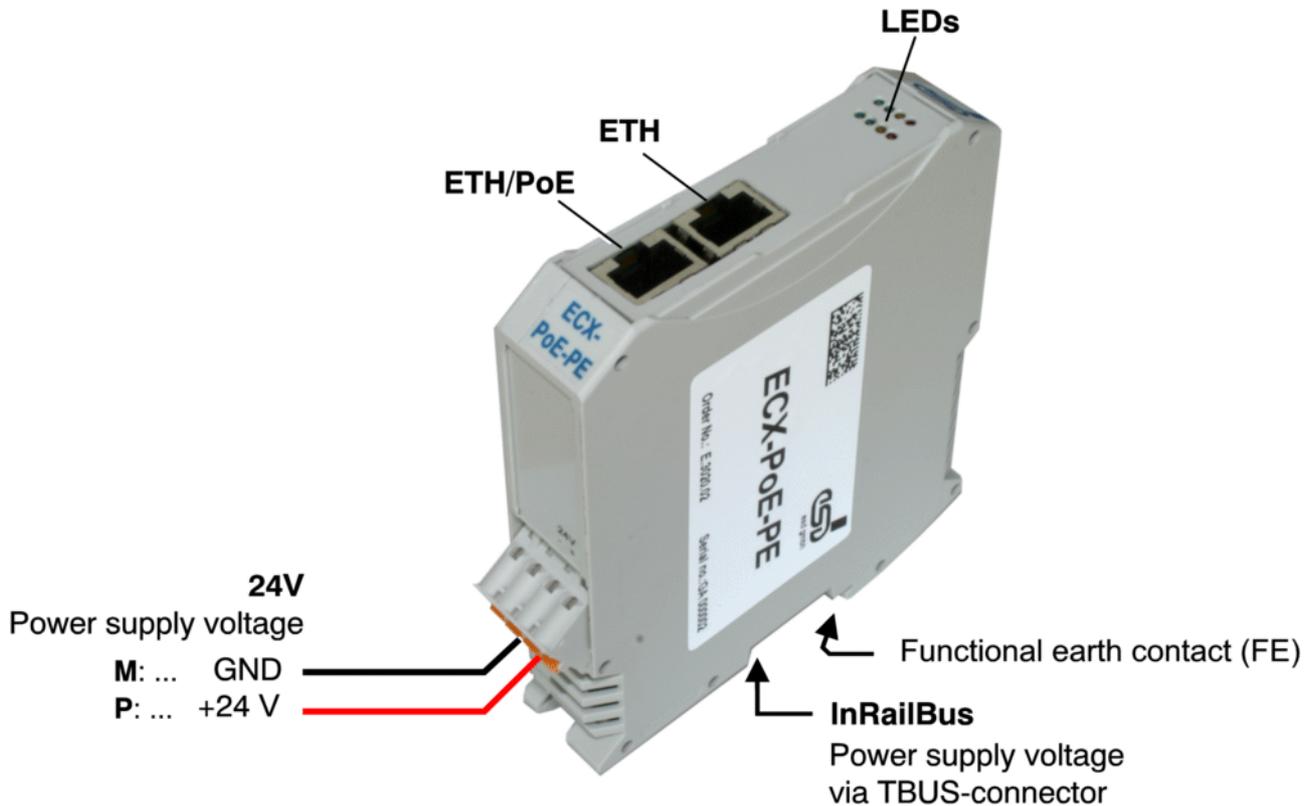


Fig. 3: Connections of the ECX-PoE-PE module

The connector pin assignment can be found on page 20 and following.



Note:

For the connection of the Ethernet interfaces use cables of type: unshielded twisted-pair, minimum Cat 5 U/UTP cable



3.2 LED Display

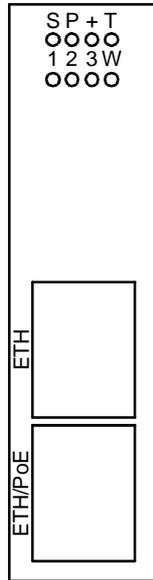


Fig. 4: Position of the LEDs in the front panel

The ECX-PoE-PE module is equipped with 8 LEDs. The indicator states are described in the following chapters.

The system LED S indicates the state of the system power. All other LEDs only indicate, if the power supply voltage is fed via the Ethernet lines (PoE).

3.2.1 Operation of the System LED S

LED indication			Display function		LED-Name in Schematics Diagram
Label	Name	Colour	Indicator state	Description	
S	System	green	off	power off	LED320A
			on	System power on, supply via 24 V connector or via PoE	

Table 4: Indicator states of the system LED S



3.2.2 Operation of the PoE LEDs P, +

LED indication			Display function		LED-Name in Schematics Diagram
Label	Name	Colour	Indicator state	Description	
P	PoE	green	off	System power supply via 24 V connector	LED320B
			on	System power on, supply via PoE	
+	PoE+	yellow	off	System power on, supply via PSE according to 802.3af (PoE = 15 W)	LED320C
			on	System power on, supply via PSE according to 802.3at (PoE+ = 30 W)	

Table 5: Indicator states of the PoE and PoE+ LED

3.2.3 Operation of the Temperature LED T

The temperature LED only indicates, if the power supply voltage is fed via the Ethernet lines (PoE).

LED indication			Display function		LED-Name in Schematics Diagram
Label	Name	Colour	Indicator state	Description	
T	Temperature	red	off	Temperature OK	LED320D
			blinking	Temperature Warning	
			on	Temperature Error	

Table 6: Indicator states of the red temperature LED



3.2.4 Operation of the Current LEDs 1, 2, 3 and W

LED indication			Description	LED-Name in Schematics Diagram
Label	Name	Colour		
1	Current1	green	In Combination, these LEDs indicate the current load state as described in the following table. The LEDs only indicate, if the power supply voltage is fed via the Ethernet lines (PoE).	LED321A
2	Current2	green		LED321B
3	Current3	yellow		LED321C
W	Current4	red		LED321D

Table 7: Indicators 1, 2, 3, W

Load State	LED 1	LED 2	LED 3	LED W	Load (referred to I_{Nom})
0	-	-	-	-	0% ... 5 %
1	B	-	-	-	5 % ... 10 %
2	X	-	-	-	10 % ... 25 %
3	X	B	-	-	25 % ... 45 %
4	X	X	-	-	45 % ... 70 %
5	X	X	B	-	70 % ... 80 %
6	X	X	X	-	80 % ... 90 %
7	X	X	X	B	90 % ... 100 %
8	-	-	-	X	> 100 %

Table 8: Current load

Description

- ... LED off
- B ... LED blinking
- X ... LED on

Load referred to I_{Nom} , I_{Nom} depends on the standard used for the PSE
 PSE according to 802.3at (PoE+ = 25 W), $I_{nom} = 1.042$ A
 PSE according to 802.3af (PoE = 12.5 W), $I_{Nom} = 0.520$ A



3.3 Power Derating Depending on the Mounting Position

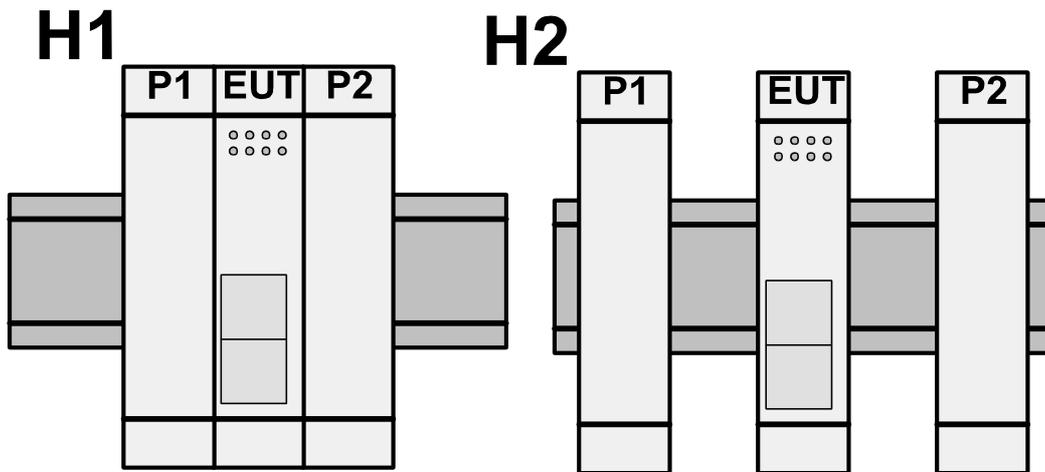
The power derating of the ECX-PoE-PE depends on the mounting position of the ECX-PoE-PE module (EUT) and the neighbouring modules (P1, P2) on the mounting rail.

The following examples show the measured power derating depending on the mounting position.

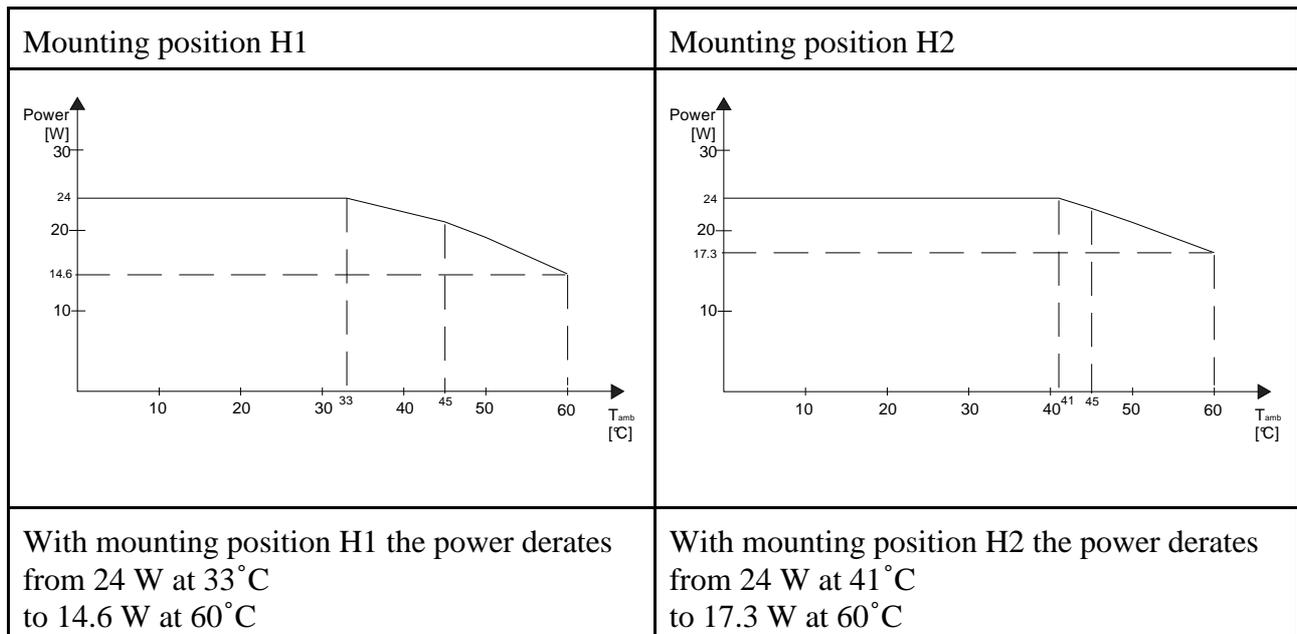
Example H1: Neighbouring modules P1 and P2 on the left and on the right side, without space.

Example H2: Neighbouring modules P1 and P2 on the left and on the right side, with a space of approximately 20mm.

In both cases no additional heat has been produced in the modules P1 and P2.



Examples for power derating depending on mounting position:





3.4 Installation of the Module Using InRailBus Connector

3.4.1 Connection of the Power Supply Voltage



Attention!

Please note the safety instructions containing the requirements on power supply current (see page 4).

The power supply voltage of the ECX-PoE-PE is supplied via the Ethernet lines. The ECX-PoE-PE supplies the 24 V power supply voltage for the InRail Bus. Alternatively the 24 V power supply voltage can be supplied via the +24V power supply connector.

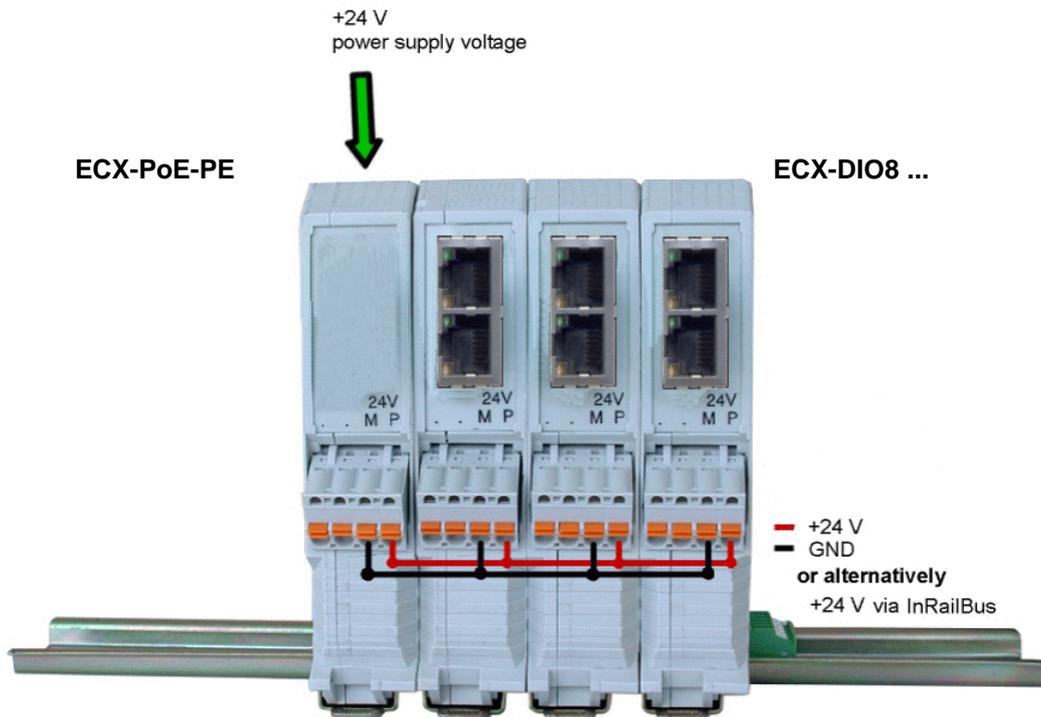


Fig. 5: ECX-Station



Earthing of the Mounting Rail



Note: The functional earth contact (FE) has to be connected to the mounting rail. Please note, that the impedance of the connector cable has to be kept as low as possible.

The functional earth contact is a current path of low impedance between circuits and earth, that is not intended as protection measure, but improves the stability. It is not a protection against accidental contact for persons.



Note: The EG conformity (see page 24) can only be warranted, if the earthing via the mounting rail is made as described herein.

3.4.2 Module Installation Using a Mounting Rail Bus Connector

If the power supply voltage shall be fed via the InRailBus, please proceed as follows:

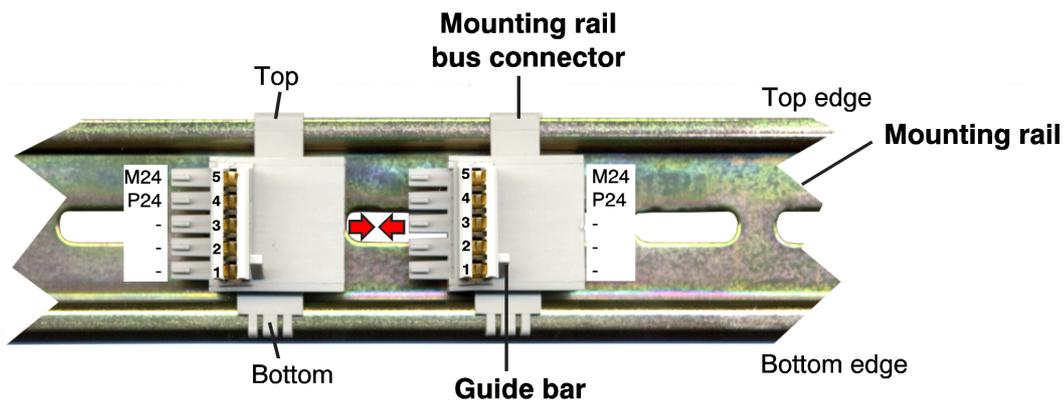


Figure 6: Mounting rail with bus connector

1. Position the InRailBus connector on the mounting rail and snap it onto the mounting rail using slight pressure. Plug the bus connectors together to contact the communication and power signals (in parallel with one). The bus connectors can be plugged together before or after mounting the ECX module.
2. Place the ECX module with the DIN rail guideway on the top edge of the mounting rail (see following figure).



Hardware-Installation



Figure 7 : Mounting ECX modules

3. Swivel the ECX module onto the mounting rail in pressing the module downwards according to the arrow as shown in figure 7. The housing is mechanically guided by the DIN rail bus connector.
4. When mounting the ECX module, the metal foot catch snaps on the bottom edge of the mounting rail. Now the module is mounted on the mounting rail and connected to the InRailBus via the bus connector. Connect the bus connectors and the InRailBus if not already done.



Figure 8: Mounted ECX-module



3.4.3 Connecting Power Supply to InRailBus

To connect the power supply via the InRailBus, a terminal plug (order no.: C.3000.02) is needed. The terminal plug is not included in delivery and must be ordered separately (see order information).

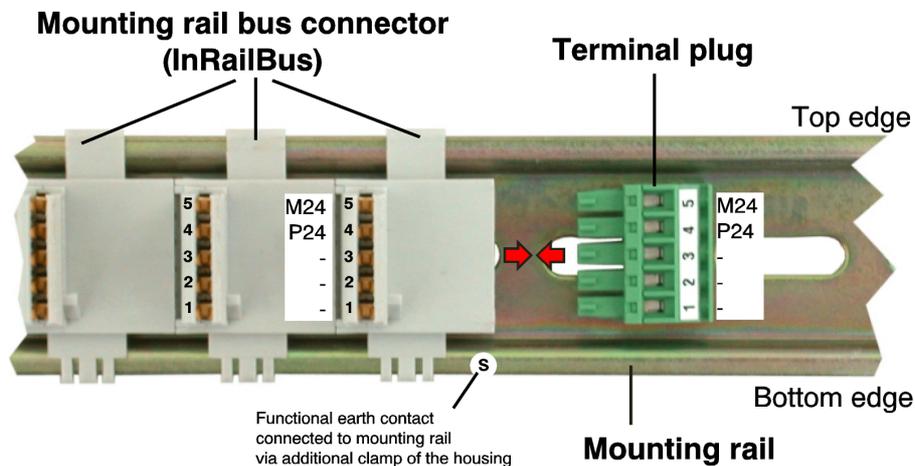


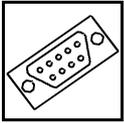
Fig. 9: Mounting rail with InRailBus and terminal plug

Plug the terminal plug into the socket on the right of the mounting-rail bus connector of the InRailBus, as described in Fig. 9. Then connect the power supply voltage via the terminal plug.

3.5 Remove the ECX Module from the InRailBus

If the ECX module is connected to the InRailBus please proceed as follows:

1. Disconnect the Ethernet lines ETH and ETH/PoE from the ECX-PoE-PE.
2. If applicable disconnect the +24 V power supply connector.
3. Release the module from the mounting rail in moving the foot catch (see Fig. 8) downwards (e.g. with a screwdriver).
Now the module is detached from the bottom edge of the mounting rail and can be removed.



Connector Pin Assignment

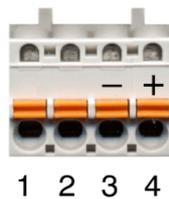
4. Connector Assignment

4.1 Power Supply Voltage 24 V (X201)

Device connector: Phoenix-Contact MSTBO 2,5/4-G1L-KMGY

Line connector: Phoenix-Contact FKCT 2,5/4-ST, 5.0 mm pitch, spring-cage connection,
Phoenix-Contact order no.: 19 21 90 0 (included in the scope of delivery)

Pin Position:



Pin Assignment:

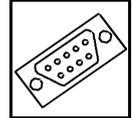
Labelling on Housing	24V			
			-	+
Labelling on connector			-	+
Pin No.	1	2	3	4
Signal	P24 (+ 24 V)	M24 (GND)	M24 (GND)	P24 (+ 24 V)

Please refer also to the connecting diagram on page 11.

Signal Description:

P24... power supply voltage +24 V

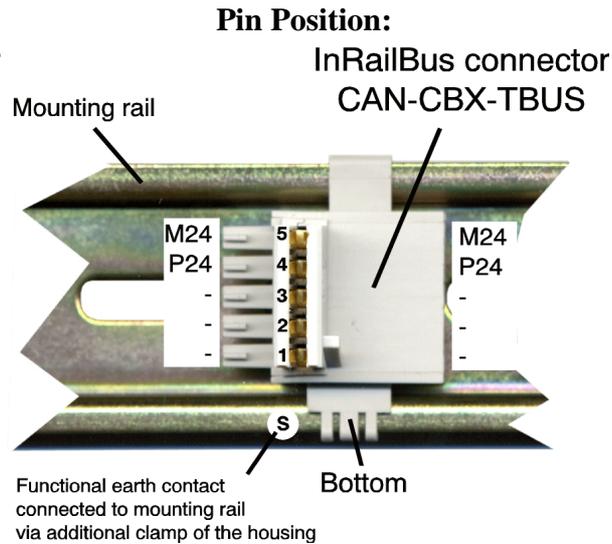
M24... reference potential



4.2 ETH (X400)

4.3 Power Supply Voltage via InRailBus Connector (X200)

Connector type: Mounting rail bus connector CAN-CBX-TBUS
(Phoenix-Contact ME 22,5 TBUS 1,5/5-ST-3,81 KMGY)

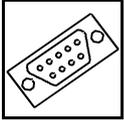


Pin Assignment:

Pin	Signal
5	M24 (GND)
4	P24 (+24 V)
3	-
2	-
1	-
S	FE (PE_GND)

Signal Description:

P24... power supply voltage +24 V
M24... reference potential
FE... functional earth contact (EMC)(connected to mounting rail potential)

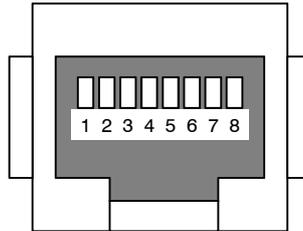


Connector Pin Assignment

4.4 Ethernet (X110, X120)

The Ethernet interfaces ETH/PoE (X110) and ETH (X120) are designed according to IEEE 802.03at (PoE+, layer 1 only) and they are compatible with IEEE 802.03af (Class 4)
 Connector type: 8-pin RJ45 socket

Pin Position:



Pin Assignment:

Pin	ETH/PoE X110 Signal	ETH X120 Signal
1	ETH1 A+	ETH2 A+
2	ETH1 A-	ETH2 A-
3	ETH1 B+	ETH2 B+
4	ETH1 C+	ETH2 C+
5	ETH1 C-	ETH2 C-
6	ETH1 B-	ETH2 B-
7	ETH1 D+	ETH2 D+
8	ETH1 D-	ETH2 D-

ETH1 X+/-...

Ethernet data and power lines of port ETH/PoE (X ... A, B, C or D),
 connected with PSE

ETH2 X+/-

Ethernet data lines of port ETH (X ... A, B, C or D),
 connected with PD



5. Quick Start Guide

For a quick start with a simple configuration for the event-triggered transmission of data the following steps are necessary:

Step		see page
	Read the safety notes at the beginning of the manual carefully before you start with the installation!	4
1	Mount the ECX-PoE-PE module	16
2	Connect the interfaces (ETH/PoE, ETH)	11
3	End of hardware installation	-

6. Declaration of Conformity



EG-KONFORMITÄTSERKLÄRUNG EC DECLARATION OF CONFORMITY

Adresse **esd electronic system design gmbh**
Address **Vahrenwalder Str. 207**
30165 Hannover
Germany

esd erklärt, dass das Produkt
esd declares, that the product

Typ, Modell, Artikel-Nr.
Type, Model, Article No.

ECX-PoE-PE

E.3020.02

die Anforderungen der Normen
fulfills the requirements of the standards

EN 61000-6-2 (08/2005),
EN 61000-6-3 (01/2007)

gemäß folgendem Prüfbericht erfüllt.
according to test certificate.

H-K00-0403-10

Das Produkt entspricht damit der EG-Richtlinie
Therefore the product corresponds to the EC-Directive

2004/108/EG

Diese Erklärung gilt für alle Exemplare, die das CE-Zeichen tragen und verliert ihre Gültigkeit,
wenn Veränderungen am Produkt vorgenommen werden.
*This declaration is valid for all units with the CE label on it and it loses its validity if a modification
is done on the product.*

Name / Name T. Ramm
Funktion / Title CE-Koordinator / CE Coordinator
Datum / Date Hannover, 2011-02-08

Rechtsgültige Unterschrift / authorized signature

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7. Order Information

Type	Features	Order No.
ECX-PoE-PE	Power Extractor for InRailBus with ECX and CBX units	E.3020.02
Manuals		
ECX-PoE-PE-ME	Manual in English	C.3020.21
Accessories		
CAN-CBX-TBUS 	Mounting-rail bus connector of the CBX-InRailBus for CAN-CBX-modules, (one bus connector is included in delivery of the CAN-CBX-module)	C.3000.01
CAN-CBX-TBUS-Connector 	Terminal plug of the CBX-InRailBus for the connection of the +24 V power supply voltage and the CAN interface Female type	C.3000.02
CAN-CBX-TBUS-Connection adapter 	Terminal plug of the CBX-InRailBus for the connection of the +24 V power supply voltage and the CAN interface Male type	C.3000.03

Table 9: Order information