

PI-EX-ME-RPS-I/I



Ex-i Repeater Power Supply, With Intrinsically Safe Input, for 0(4) ... 20 mA Signals

INTERFACE

Data Sheet
100317_01_en

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1 Description

The PI-EX-ME-RPS-I/I repeater power supply supplies an intrinsically safe 2 or 3-wire measuring transducer located in the Ex area and transmits the 0(4) ... 20 mA signal to a load in the safe area. It is also designed to transmit active signals (supplied from the field side).

The safety data is designed so that measuring transducers can be operated in an IIC group gas.

The device is installed in the safe area and only the sensor cable is led into the potentially explosive area (zone 0, 1, 2, 20, 21 or 22).

The input, output, and auxiliary voltage circuits are safely electrically isolated.

1.1 Properties

- Single-channel
- For 2 and 3-wire measuring transducers
- 0/4 mA ... 20 mA input, [EEx ia] IIC
- 0/4 mA ... 20 mA output
- 20 V DC ... 30 V DC supply
- 3-way electrical isolation
- ZERO/SPAN adjustment



WARNING: Explosion hazard

The device is an associated item of equipment and must not be installed in potentially explosive areas.

When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.



WARNING: Explosion hazard

Observe the safety regulations and installation notes on page 4.



Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.
A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.



This data sheet is valid for all products listed on the following page:

Table of Contents

1	Description.....	1
2	Ordering Data	2
3	Technical Data.....	2
4	Safety Regulations and Installation Notes.....	4
5	Structure	6
6	Basic Circuit Diagram	6
7	Installation	6
8	Comparison of Safety Data.....	7

2 Ordering Data

Repeater Power Supply

Description	Type	Order No.	Pcs./Pck.
Ex-i repeater power supply, with intrinsically safe input, for 0(4) ... 20 mA signals	PI-EX-ME-RPS-I/I	2835435	1

Accessories

Description	Type	Order No.	Pcs./Pck.
Loop wire jumper, 50-pos., can be separated, maximum jumpering distance of 60 mm, for jumpering identical inputs and outputs, 0.5 mm ² , insulation:			
Black	DB 50- 90 BK	2820916	1
Blue	DB 50- 90 BU	2821180	1
Gray	DB 50- 90 GY	2820929	1



For additional accessories, please refer to the "INTERFACE" catalog from Phoenix Contact.

3 Technical Data

Input

Input	Current input, intrinsically safe
Available input sources	<ul style="list-style-type: none"> – 4 mA ... 20 mA 2-wire measuring transducer – 4 mA ... 20 mA 3-wire measuring transducer – Active 0(4) mA ... 20 mA signals (supplied from the field side)
Current input signal	4 mA ... 20 mA
Transmitter supply voltage	17 V (at 20 mA)
Connection method	2, 3-wire

Output

Signal output	Current output
Current output signal	0 mA ... 20 mA (no level shift between input and output) 4 mA ... 20 mA (no level shift between input and output)
Load/output load current output	1000 Ω

Transmission Behavior

Maximum transmission error	< 0.1% (of final value)
Maximum temperature coefficient (/K)	< 0.01%/K

Connection Data

Conductor cross-section	
Solid (minimum/maximum)	0.2 mm ² /2.5 mm ²
Stranded (minimum/maximum)	0.2 mm ² /2.5 mm ²
AWG/kcmil (minimum/maximum)	24/14
Stripping length	8 mm
Thread	M3
Connection method	Plug-in screw connection
Tightening torque	0.5 Nm, minimum/0.6 Nm, maximum

General Data

Supply voltage range	20 V DC ... 30 V DC
Current consumption	< 90 mA (at 24 V DC/20 mA)
Power consumption	2.2 W
Number of channels	1
Electrical isolation (input/output/supply)	375 V (peak value according to EN 50020)
Test voltage (input/output)	1.5 kV AC, 50 Hz, 1 min.
Housing material	Polyamide PA, not reinforced
Color	Green
Degree of protection	IP20
Width x length x height	22.5 mm x 114.5 mm x 99 mm
Inflammability class according to UL 94	V0
Design	Terminal block housing for mounting on DIN rails
Connection method	Plug-in screw terminal blocks
Step response (10% ... 90%)	2.2 ms
NAMUR recommendation	NE 21

Climatic Data

Ambient temperature	
Operation	-20°C ... +60°C
Storage/transport	-25°C ... +80°C
Permissible humidity (operation)	< 75% (annual average) < 95% (30 days/year, no condensation)
Inflammability class according to UL 94	V0

Indicators

Status indicator	Green LED (supply voltage)
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Conformance With EMC Directive 89/336/EEC

Noise emission	EN 61326
Noise immunity	EN 61326

Safety Data According to ATEX for Intrinsically Safe Circuits

Maximum output voltage U_o	28 V	
Maximum output current I_o	93 mA	
Maximum output power P_o	650 mW	
Gas group	IIB	IIC
Maximum external inductance L_o	14 mH	2 mH
Maximum external capacitance C_o	0.65 μ F	0.083 μ F
U_m	250 V AC	

Approvals

ATEX	Ⓔ II (1) GD [EEx ia] IIC, TÜV 00 ATEX 1522
UL/CUL	See "UL/CUL Approval" on page 5.

4 Safety Regulations and Installation Notes

4.1 Installation and Operation

Follow the installation instructions.



NOTE: Installation, operation, and maintenance may only be carried out by qualified specialist personnel.

When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.



NOTE: The circuits inside the device must not be accessed.

Do not repair the device yourself, replace it with an equivalent device. Repairs may only be carried out by the manufacturer.



NOTE: The device must not be subject to mechanical strain and/or thermal loads, which exceed the limits described in these operating instructions.



NOTE: The device is only designed to meet IP20 protection in a clean and dry environment.

In order to provide protection against mechanical or electrical damage, install the device in corresponding housing with a suitable degree of protection according to IEC 60529.

Where dust is present, install the device in suitable housing with at least IP5x protection.

4.2 Safety Regulations for Installation in Potentially Explosive Areas



WARNING: Explosion hazard

The device is an associated item of equipment and must not be installed in potentially explosive areas.

Regulations for Intrinsically Safe Circuits



WARNING: Explosion hazard

When carrying out **measurements** on the intrinsically safe side, observe the relevant regulations regarding the connection of intrinsically safe equipment.

Only use devices approved for use in intrinsically safe circuits.



WARNING: Explosion hazard

If the **device has been used in non-intrinsically safe circuits**, it must **not** be used again in intrinsically safe circuits.

The module must be clearly labeled as non-intrinsically safe.

For the safety data, please refer to the operating instructions and certificates (EC-type examination, other approvals, if necessary).

Installation in Areas With a Danger of Dust Explosions



WARNING: Explosion hazard

The device is **not** designed for use in areas with a danger of dust explosions.

Connection to the **intrinsically safe circuit in areas with a danger of dust explosions** (zone 20, 21, and 22) is **only** permitted if the equipment connected to this circuit is approved for this zone (e.g., category 1D, 2D or 3D).

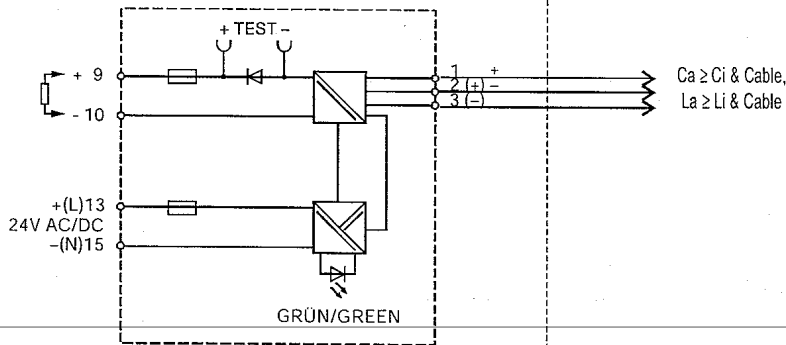
4.3 UL/CUL Approval



Control Drawing	Drawing No. 100-T426
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non Hazardous Area or Class I,
Division 2
Groups A,B,C,D
Hazardous Area

Hazardous Area
Class I, II, III
Division 1
Groups A - G



Entity Parameters for terminals 1,2 & 3

Voc = 28 V Isc = 93 mA

Group A,B
Ca = 83 nF
La = 2 mH

Group C,E
Ca = 650 nF
La = 14 mH

Order Code: PI/Ex-ME-RPS-I/I

- 1) Electrical Apparatus connected to the intrinsically safe system should not use or generate more than 250V.
- 2) Installation should be in accordance with NEC ANSI/NFPAS 70 and ANSI/RP 12.6.
- 3) Maximum ambient temperature : 60 °C

Drawing cannot be altered without prior consent of approval agencies !

5 Structure

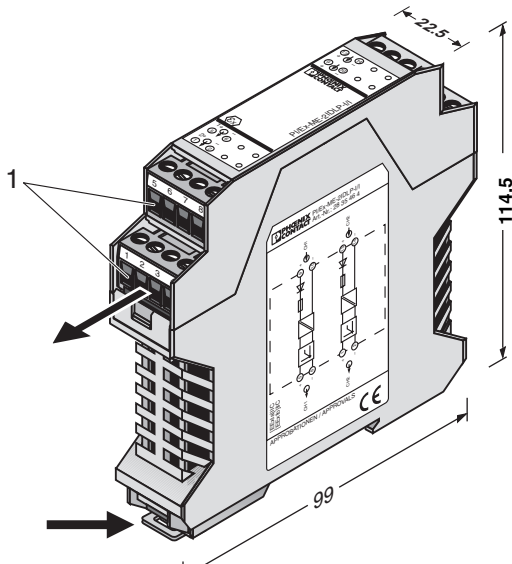


Figure 1 Structure

- 1 Test sockets
- 2 Green LED, for indicating the power supply.
- 3 Plug-in terminal blocks (to release with a flat-bladed screwdriver, push out laterally)
- 4 Direction for removing the screw terminal blocks
- 5 Metal lock for fixing on the DIN rail

6 Basic Circuit Diagram

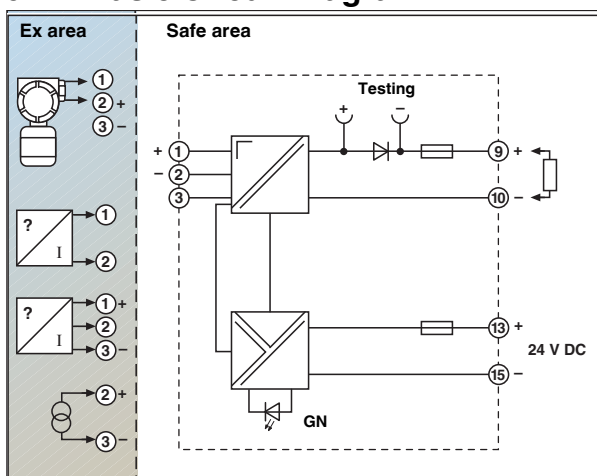


Figure 2 Basic circuit diagram with connection terminal blocks

7 Installation



NOTE: Electrostatic discharge

The device contains components that can be damaged or destroyed by electrostatic discharge. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2.

The device should only be transported and stored in its original packaging.

7.1 Mounting



WARNING: Explosion hazard

If the device has been used in non-intrinsically safe circuits, it must not be used again in intrinsically safe circuits. The module must be clearly labeled as non-intrinsically safe.

- Mount the device on a 35 mm DIN rail according to EN 60715.
- The device is calibrated by default upon delivery. For this reason, subsequent calibration of the zero point and final value is not provided.
- Before startup, check that the repeater power supply is operating and wired correctly, especially with regard to the wiring and labeling of the intrinsically safe circuits.

7.2 Connecting the Cables

- Plug-in screw terminal blocks; fit the litz wires with ferrules.
- Install intrinsically safe and non-intrinsically safe cables separately.
- Permissible cable cross-section: 0.2 mm² to 2.5 mm².

7.3 Pre-Startup Checklist

Before starting the device, make sure that the following conditions have been observed using the technical data:

Checkpoint	OK
Operating conditions have been observed?	
Correct polarity has been selected for all connections?	
No impermissibly high voltage in the output circuits during startup?	
Output load corresponds to the permissible values according to "Output" on page 2?	
Output circuit grounded at no more than one location?	
All power supply values correct?	

7.4 Level Shift



NOTE: A level shift is not provided between the input and output.

4 ... 20 mA input signals therefore become 4 ... 20 mA output signals.

Similarly, active 0 ... 20 mA input signals become electrically isolated 0 ... 20 mA output signals.

8 Comparison of Safety Data



WARNING: Explosion hazard

Compare the safety data before connecting a device located in the Ex-i area to the PI-EX-ME-RPS-I/I.

Safety data of:

Field devices: U_i, I_i, P_i, L_i, C_i

Repeater power supply: U_o, I_o, P_o, L_o, C_o

For the values for $U_o, I_o, P_o, L_o,$ and C_o , please refer to "Safety Data According to ATEX for Intrinsically Safe Circuits" on page 3.

Ex-i Requirements:

$$U_i \geq U_o$$

$$I_i \geq I_o$$

$$P_i \geq P_o$$

$$L_i + L_c \leq L_o$$

$$C_i + C_c \leq C_o$$

(L_c and C_c depend on the cables/lines used)