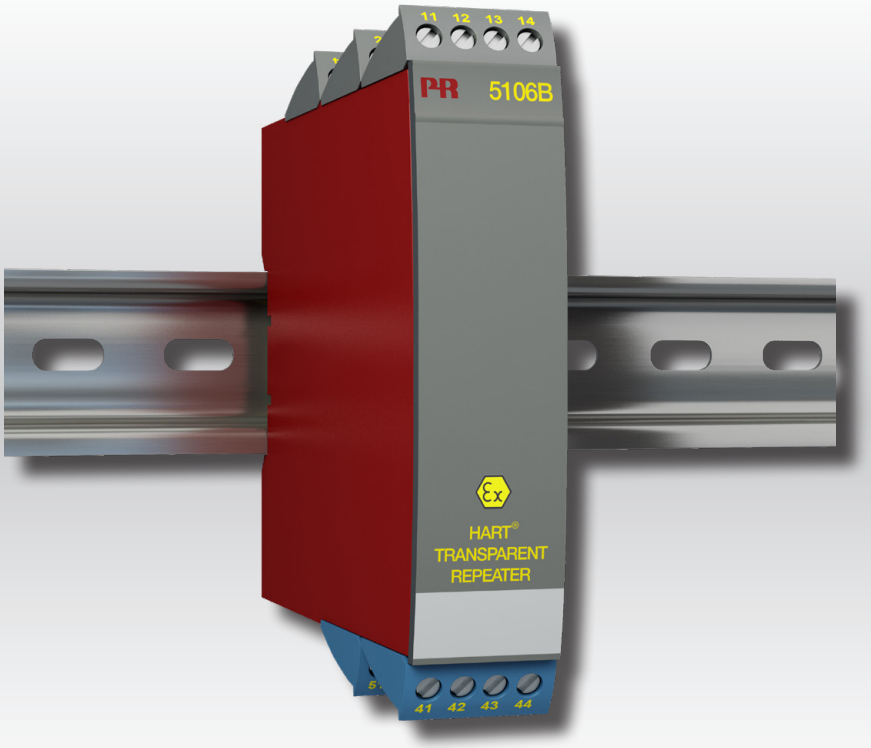
PERFORMANCE
MADE
SMARTER

Product manual
5106
HART transparent repeater



TEMPERATURE | I.S. INTERFACES | COMMUNICATION INTERFACES | MULTIFUNCTIONAL | ISOLATION | DISPLAY

No. 5106V104-UK
From serial no. 030459198

PR electronics

6 Product Pillars
to meet your every need

Individually outstanding, unrivalled in combination

With our innovative, patented technologies, we make signal conditioning smarter and simpler. Our portfolio is composed of six product areas, where we offer a wide range of analog and digital devices covering over a thousand applications in industrial and factory automation. All our products comply with or surpass the highest industry standards, ensuring reliability in even the harshest of environments and have a 5-year warranty for greater peace of mind.

Temperature

Our range of temperature transmitters and sensors provides the highest level of signal integrity from the measurement point to your control system. You can convert industrial process temperature signals to analog, bus or digital communications using a highly reliable point-to-point solution with a fast response time, automatic self-calibration, sensor error detection, low drift, and top EMC performance in any environment.

I.S. Interface

We deliver the safest signals by validating our products against the toughest safety standards. Through our commitment to innovation, we have made pioneering achievements in developing I.S. interfaces with SIL 2 Full Assessment that are both efficient and cost-effective. Our comprehensive range of analog and digital intrinsically safe isolation barriers offers multifunctional inputs and outputs, making PR an easy-to-implement site standard. Our backplanes further simplify large installations and provide seamless integration to standard DCS systems.

Communication

We provide inexpensive, easy-to-use, future-ready communication interfaces that can access your PR installed base of products. All the interfaces are detachable, have a built-in display for readout of process values and diagnostics, and can be configured via push-buttons. Product specific functionality includes communication via Modbus and Bluetooth and remote access using our PR Process Supervisor (PPS) application, available for iOS and Android.

Multifunction

Our unique range of single devices covering multiple applications is easily deployable as your site standard. Having one variant that applies to a broad range of applications can reduce your installation time and training, and greatly simplify spare parts management at your facilities. Our devices are designed for long-term signal accuracy, low power consumption, immunity to electrical noise and simple programming.

Isolation

Our compact, fast, high-quality 6 mm isolators are based on microprocessor technology to provide exceptional performance and EMC-immunity for dedicated applications at a very low total cost of ownership. They can be stacked both vertically and horizontally with no air gap separation between units required.

Display

Our display range is characterized by its flexibility and stability. The devices meet nearly every demand for display readout of process signals and have universal input and power supply capabilities. They provide a real-time measurement of your process value no matter the industry and are engineered to provide a user-friendly and reliable relay of information, even in demanding environments.

HART transparent repeater

5106

Table of contents

Warning

GENERAL

This device is designed for connection to hazardous electric voltages.
Ignoring this warning can result in severe personal injury or mechanical damage.
To avoid the risk of electric shock and fire, the safety instructions of this manual must be observed and the guidelines followed.
The specifications must not be exceeded, and the device must only be applied as described in the following.
Prior to the commissioning of the device, this manual must be examined carefully.
Only qualified personnel (technicians) should install this device.
If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Warning

HAZARD-OUS VOLTAGE

Until the device is fixed, do not connect hazardous voltages to the device.
The following operations should only be carried out on a disconnected device and under ESD-safe conditions:

- Dismantlement of the device for setting of DIP-switches and jumpers.
- General mounting, wire connection and disconnection.
- Troubleshooting the device.

Repair of the device and replacement of circuit breakers must be done by PR electronics A/S only.

Warning

INSTAL-LATION

SYSTEM 5000 must be mounted on a DIN rail according to DIN 60715.
The communication connector of SYSTEM 5000 is connected to the input terminals on which dangerous voltages can occur, and it must only be connected to the programming unit Loop Link by way of the enclosed cable.

Symbol identification

Triangle with an exclamation mark: Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage. Warning / demand. Potentially lethal situations.

The CE mark proves the compliance of the device with the essential requirements of the EU-directives.

The double insulation symbol shows that the device is protected by double or reinforced insulation.

Ex devices have been approved acc. to the ATEX directive for use in connection with installations in explosive areas.

Safety instructions

Definitions

Hazardous voltages have been defined as the ranges: 75 to 1500 Volt DC, and 50 to 1000 Volt AC.
Technicians are qualified persons educated or trained to mount, operate, and also trouble-shoot technically correct and in accordance with safety regulations.
Operators, being familiar with the contents of this manual, adjust and operate the knobs or potentiometers during normal operation.

Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until this has been permanently mounted.

Environment

Avoid direct sun light, dust, high temperatures, mechanical vibrations and shock, and rain and heavy moisture. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation.
The device must be installed in pollution degree 2 or better.
The device is designed to be safe at least under an altitude up to 2 000 m.
The device is designed for indoor use.

Mounting

Only technicians, who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these, should connect the device. Should there be any doubt as to the correct handling of the device, please contact your local distributor or, alternatively,

PR electronics A/S
www.prelectronics.com

Mounting and connection of the device should comply with national legislation for mounting of electric materials, i.e. wire cross section, protective fuse, and location.

Stranded wire should be installed with an insulation stripping length of 5 mm or via a suitable insulated terminal such as a bootlace ferrule.

Descriptions of input / output and supply connections are shown in the block diagram and side label.
The following apply to fixed hazardous voltages-connected devices:

The max. size of the protective fuse is 10 A and, together with a power switch, it should be easily accessible and close to the device. The power switch should be marked with a label telling it will switch off the voltage to the device.

Year of manufacture can be taken from the first two digits in the serial number.

Calibration and adjustment

During calibration and adjustment, the measuring and connection of external voltages must be carried out according to the specifications of this manual. The technician must use tools and instruments that are safe to use.

Normal operation

Operators are only allowed to adjust and operate devices that are safely fixed in panels, etc., thus avoiding the danger of personal injury and damage. This means there is no electrical shock hazard, and the device is easily accessible.

Cleaning

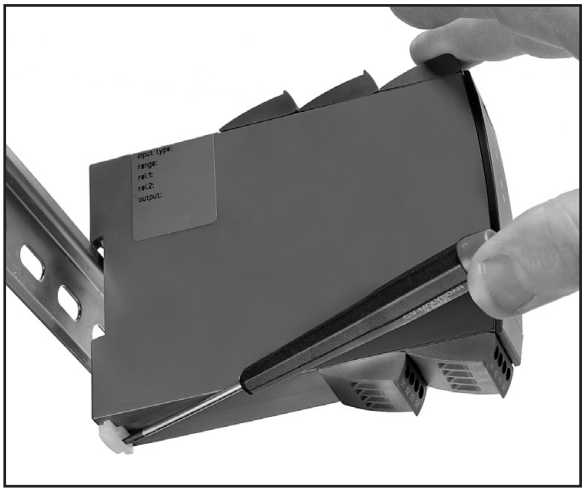
When disconnected, the device may be cleaned with a cloth moistened with distilled water.

Liability

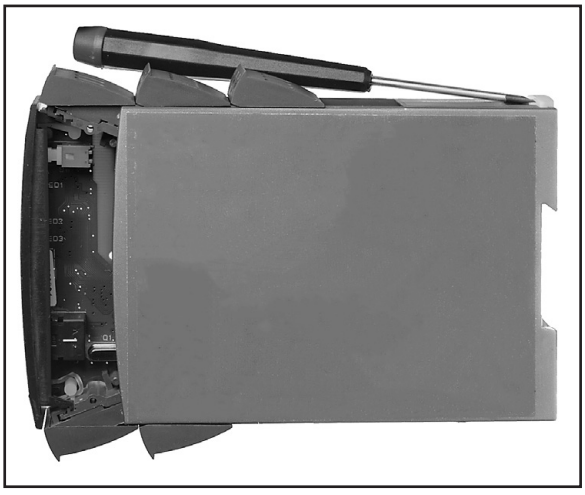
To the extent the instructions in this manual are not strictly observed, the customer cannot advance a demand against PR electronics A/S that would otherwise exist according to the concluded sales agreement.

How to demount system 5000

First, remember to demount the connectors with hazardous voltages.



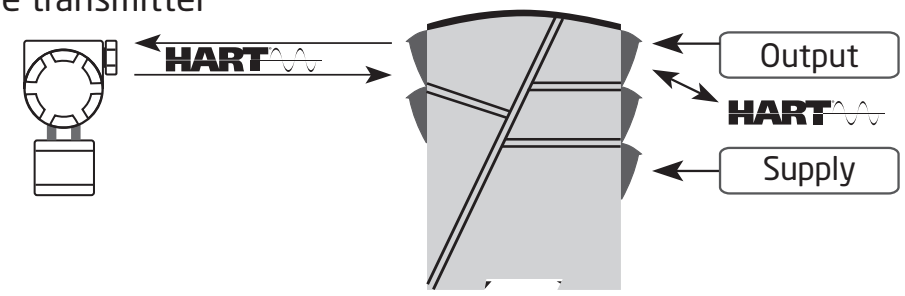
Picture 1:
By lifting the bottom lock, the device is detached from the DIN rail.



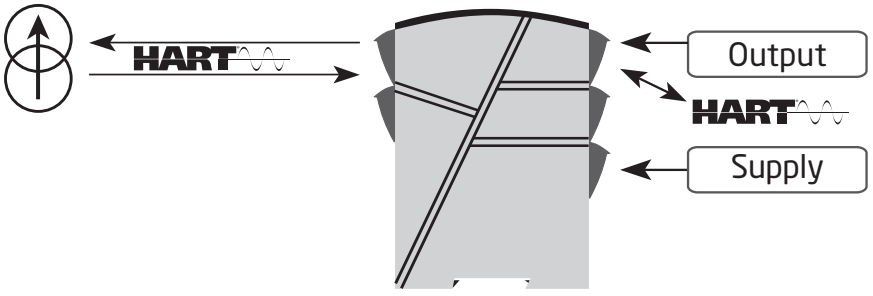
Picture 2:
By lifting the upper lock and pulling the front plate simultaneously the PCB can be removed.
Switches and jumpers can now be adjusted.

Applications

2-wire transmitter



Current, mA



HART transparent repeater
5106

- 3- / 5-port 3.75 kVAC galvanic isolation
- Low response time
- 2-wire supply > 17 V
- 1- or 2-channel version
- Universal AC or DC supply

Application

- Power supply and signal isolator with 2-way HART communication for 2-wire transmitters.
- Signal isolator with 2-way HART communication for supplied current transmitters.
- Signal isolator with low response time on analog current signals.

Technical characteristics

- PR5106 primarily processes current signals of 4...20 mA.
- PR5106 is based on microprocessor technology for gain and offset. The analog signal is transmitted at a response time of less than 25 ms.
- Inputs, outputs, and supply are floating and galvanically separated.
- The output can be connected either as an active current transmitter or as a 2-wire transmitter.

Mounting / installation

- Mounted vertically or horizontally on a DIN rail. As the devices can be mounted without distance between neighbouring units, up to 84 channels can be mounted per metre.

Order

Type	Version		Input		Output		Channels	
5106	Standard	: A	4...20 mA	: B	4...20 mA	: 2	Single	: A
	[EEx ia] II C	: B			20...4 mA	: 9	Double	: B

Electrical specifications

Environmental conditions

Operating temperature . . . . . -20°C to +60°C
Calibration temperature. . . . . 20...28°C
Relative humidity . . . . . < 95% RH (non-cond.)
Protection degree IP20

Mechanical specifications

Dimensions (HxWxD) . . . . . 109 x 23.5 x 130 mm
Weight approx. . . . . 245 g
DIN rail type. . . . . DIN 60715 - 35 mm
Wire size (min....max.) . . . . . 0.13...2.08 mm² AWG 26...14 mm² stranded wire
Screw terminal torque. . . . . 0.5 Nm

Common electrical specifications

Supply voltage . . . . . 21.6...253 VAC, 50...60 Hz
or 19.2...300 VDC
Fuse . . . . . 400 mA SB / 250 VAC
Max. required power. . . . . ≤ 3 W (2 channels)
Internal power dissipation . . . . . ≤ 2 W (2 channels)

Max. required power is the maximum power needed at terminals 31 and 33.
Max. power dissipation is the maximum power dissipated by the device.

Isolation voltage, test / operation. . . . . 3.75 kVAC / 250 VAC
PELV/SELV. . . . . IEC 61140
Communications interface . . . . . Loop Link
Signal / noise ratio . . . . . Min. 60 dB (0...100 kHz)
Response time (0...90%, 100...10%) . . . . . < 25 ms
Signal dynamics, input / output . . . . . Analog signal chain
Effect of supply voltage change (24...250 V) . . . . . < ±10 µA

Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
mA	±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
mA	≤ ±16 µA	≤ ±1.6 µA / °C

EMC - immunity influence. . . . . < ±0.5% of span
Extended EMC immunity:
NAMUR NE 21, A criterion, burst . . . . . < ±1% of span

Auxiliary supply:
2-wire supply (pin 44...42 & 54...52) . . . . . 25...17 VDC / 0...20 mA

Current input

Measurement range	4...20 mA
Min. measurement range (span)	16 mA
Input resistance:	
Supplied unit	Nom. 10 Ω
Non-supplied unit	R_{shunt} = ∞, V_{drop} < 4 V

Current output and 2-wire 4...20 mA output

Signal range (span)	4...20 mA
Min. signal range (span)	16 mA
Load (max.)	≤ 600 Ω
Load stability	≤ 0.01% of span / 100 Ω
Current limit	≤ 28 mA
Ripple on HART communication	< 3 mVRMS
Max. external 2-wire supply	29 VDC
Effect of external 2-wire supply voltage change	< 0.005% of span / V

EEx / I.S. approval - 5106B

DEMKO 00ATEX127483	II (1) GD [EEx ia] IIC
Applicable for	Zone 0, 1, 2, 20, 21 or 22
UL	IS, Cl. I, Div. 1, Group A, B, C, D IS, Cl. I, zone 0 and 1, Group IIC IS, Cl. II, Div. 1, Group E, F,G
UL control drawing no.	5106QU01

Ex / I.S. data

Terminal 31...33	
Um	: 250 V
Terminal 44 to 42, 41 (54 to 52, 51)	
Uo	: 28 VDC
Io	: 91 mADC
Po	: 0.65 W
Lo	: 3.0 mH
Co	: 80 nF
Terminal 41 to 42 (51 to 52)	
Uo	: 10 VDC
Io	: 2 mADC
Po	: 5 mW
Lo	: 1 H
Co	: 3 µF

Of span = of the currently selected measurement range

Observed authority requirements

EMC	2014/30/EU
LVD	2014/35/EU
ATEX	2014/34/EU
RoHS	2011/65/EU
EAC	TR-CU 020/2011
EAC Ex	TR-CU 012/2011

Approvals

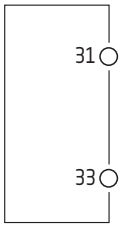
c UL us, UL 508	E231911

I.S. / Ex approvals

ATEX	00ATEX127483
c UL us, UL 913	E233311
EAC Ex	EAEU KZ 7500361.01.01.08756

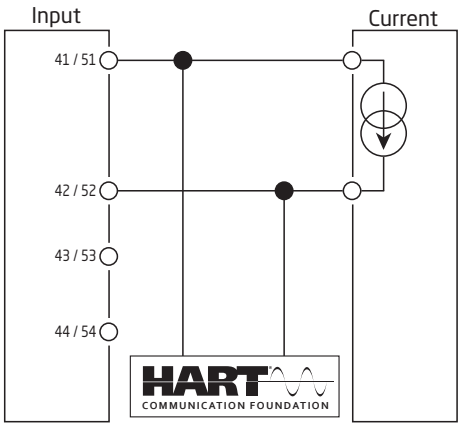
Connections

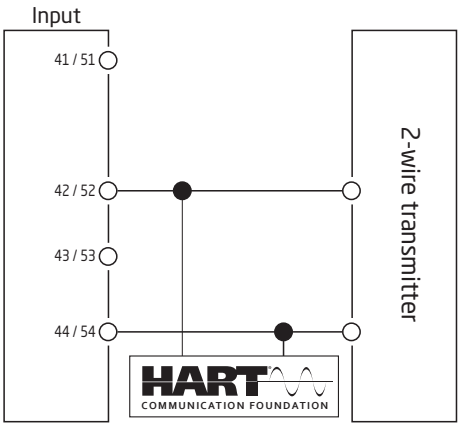
Supply:



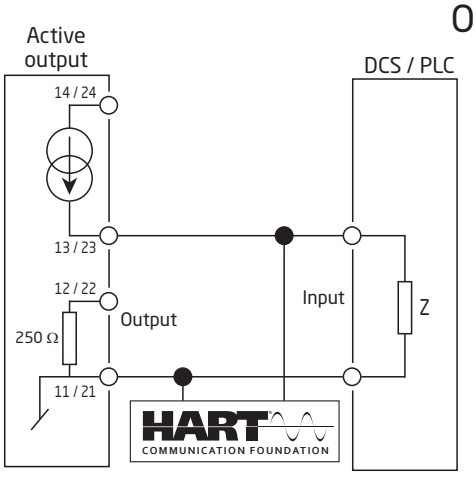
Connections are identical for channel 1 and channel 2.

Inputs:

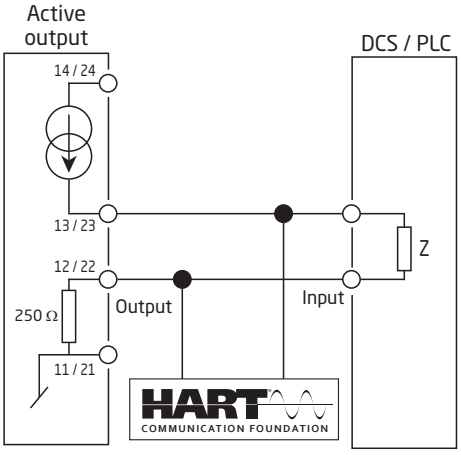




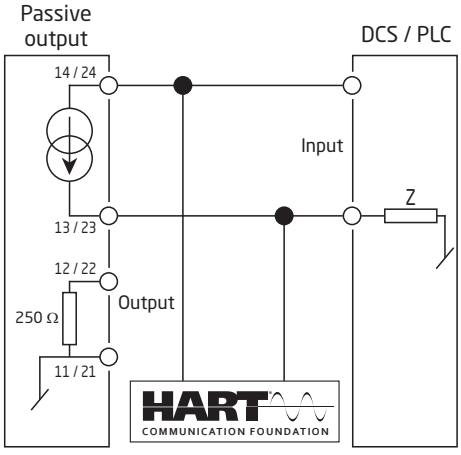
Outputs:



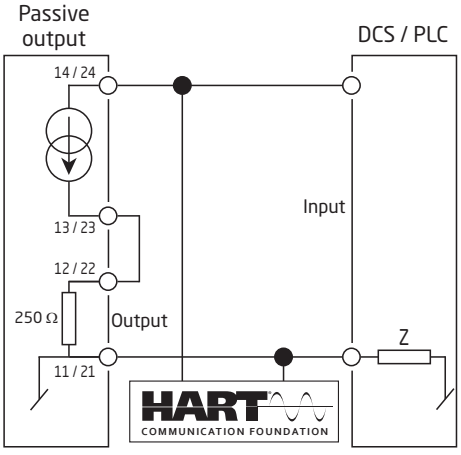
If the input impedance Z is 250 Ω or higher



If the input impedance Z is < 250 Ω

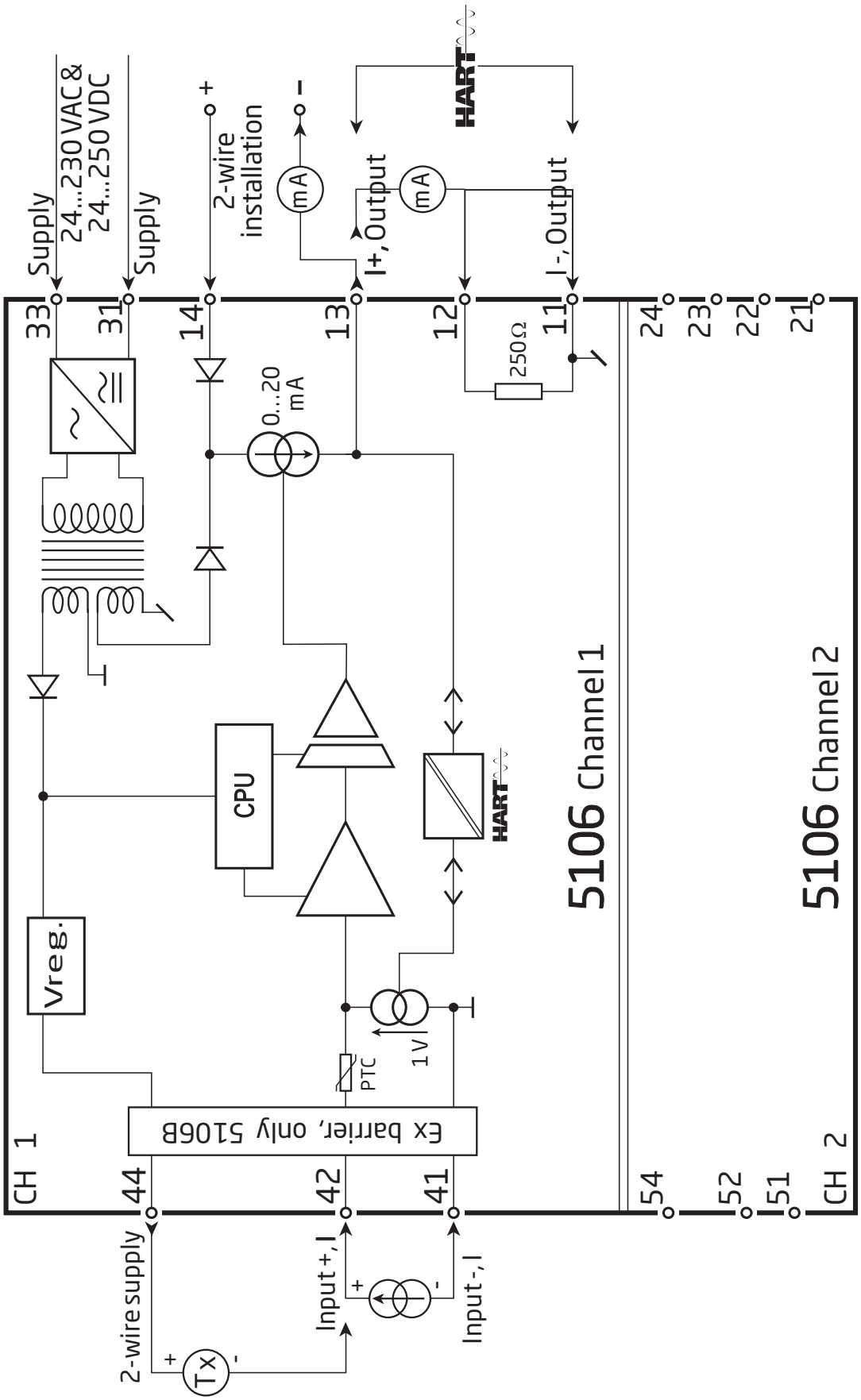


If the input impedance Z is 250 Ω or higher



If the input impedance Z is < 250 Ω

Block diagram



UL Control Drawing 5106QU01

Hazardous (Classified) Location

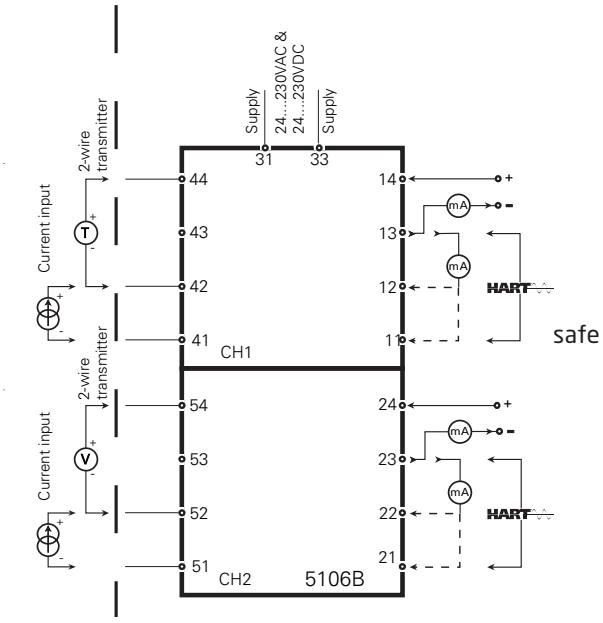
Class I, Division 1, Group A,B,C,D
Class I , Zone 0 and 1, Group IIC
Class II, Division 1 Group E, F, G

Intrinsically safe apparatus
entity parameters:

Vmax. (Ui) ≥ Vt (Uo)
Imax. (Ii) ≥ It (Io)
Pi ≥ Po
Ca ≥ C_{cable} + Ci
La ≥ L_{cable} + Li
The sum of capacitance and inductance of cable and intrinsic equipment must be less or equal to Ca and La

Nonhazardous

Associated apparatus
Galvanically Isolated



5106B Associated apparatus parameters				
CH1	Terminals 44 to 41,42			Terminals 41 to 42
CH2	Terminals 54 to 51,52			Terminals 51 to 52
Vt (Uo)	28 V			10V
It (Io)	93 mA			2 mA
Po	0.65 W			5 mW
	IIC / grp. A, B	IIB / grp. C	IIA / grp.D	IIC / grp. A, B
Ca (Co)	0.06 µF	0.52 µF	1.72 µF	3.0 µF
La (Lo)	2.4 mH	12 mH	20 mH	1.0 H

Installation notes:

1) The maximum nonhazardous location voltage is 250VAC/DC.
2) The installation shall be in accordance with the National Electrical Code NFPA 70, Articles 504 and 505.
3) The terminals of the two individual channels shall not be interconnected in any way.
4) Install in Pollution degree 2 or better
5) Use 60 / 75 °C copper conductors with wire size AWG: (26 - 14).
6) Warning: Substitution of components may impair intrinsic safety.

Document history

The following list provides notes concerning revisions of this document.

Rev. ID	Date	Notes
104	2507	New EAC Ex certificate.

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PR electronics is the leading technology company specialized in making industrial process control safer, more reliable and more efficient. Since 1974, we have been dedicated to perfecting our core competence of innovating high precision technology with low power consumption. This dedication continues to set new standards for products communicating, monitoring and connecting our customers' process measurement points to their process control systems.

Our innovative, patented technologies are derived from our extensive R&D facilities and from having a great understanding of our customers' needs and processes. We are guided by principles of simplicity, focus, courage and excellence, enabling some of the world's greatest companies to achieve PERFORMANCE MADE SMARTER.