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UNICONT

PGK–301 Ex
INTRINSIC SAFETY ISOLATOR
POWER SUPPLY MODULES

USER'S MANUAL

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1. INTRODUCTION

The UNICONT PGK–301 Ex is a DIN-rail-mountable, partially intrinsically safe device that supplies limited power to two-wire transmitters following intrinsic safety rules. Furthermore, it provides galvanic isolation between explosion-hazardous and non-explosion-hazardous spaces between the power supply, signal input, and signal outputs. Galvanic isolation reduces the risk of ground loops and noise entering the current loop. Depending on the type, signal transmission can be the traditional 4…20 mA input / 4…20 mA output current transmission, or via digital HART® communication, or both simultaneously. The signal of the field current loop is transmitted to the safe space by microprocessor signal processing, which is inherently a high-precision transmission. Such accuracy is required for precision transmitters. If the fast conversion is preferred, choose the high-speed types. Intrinsic safety limits determine the maximum number of connected transmitters.

2. TECHNICAL DATA

2.1 General data

Type		High-precision		High-speed	
		PGK–301–A Ex	PGK–301–B Ex	PGK–301–C Ex	PGK–301–D Ex
Input		4…20 mA			
Output	Normal operation	4…20 mA			
	Current error	3.6 mA: I_{IN} = 3.6 mA or I_{IN} > 24 mA			
Protection		Input / output: with overcurrent and overvoltage protection			
Loop resistance		300…1000 Ω / 24 V DC			
Communication		–	HART®	–	HART®
Supply voltage		20…35 V DC			
Power supply indication		green LED			
Power supply for transmitters		24 V DC galvanically isolated			
Galvanic isolation		> 2 kV			
Power consumption		Max. 2.2 W			
Transmission accuracy		1 µA (at +20 °C [+68 °F])		8 µA (at +20 °C [+68 °F])	
Response time		100 ms		5 ms	
Temperature-dependence		< 1 µA / °C			
Ambient temperature		–20…+60 °C (–4…+140 °F)			
Electrical connection		Terminal, wire cross section 0.5…2.5 mm² (AWG20…14)			
Electrical protection		Class III.			
Mechanical connection		DIN EN 50022-35 rail-mountable, module width: 22.5 mm (0.885")			
Weight		0.25 kg (0.55 lb)			

2.2 Ex data

Type		PGK–301–A Ex, PGK–301–C Ex, PGK–301–B Ex, PGK–301–D Ex	
Ex marking	ATEX	⟨Ex⟩ II (1) G [Ex ia Ga] IIC	⟨Ex⟩ II (1) G [Ex ia Ga] IIB
	IEC Ex	[Ex ia Ga] IIC	[Ex ia Ga] IIB
Intrinsic safety limits		L_o = 2 mH C_o = 60 nF	L_o = 9 mH C_o = 450 nF
		U_o=26 V I_o=94 mA P_o=0.65 W	
		U_m = 253 V AC	

2.3 Accessories

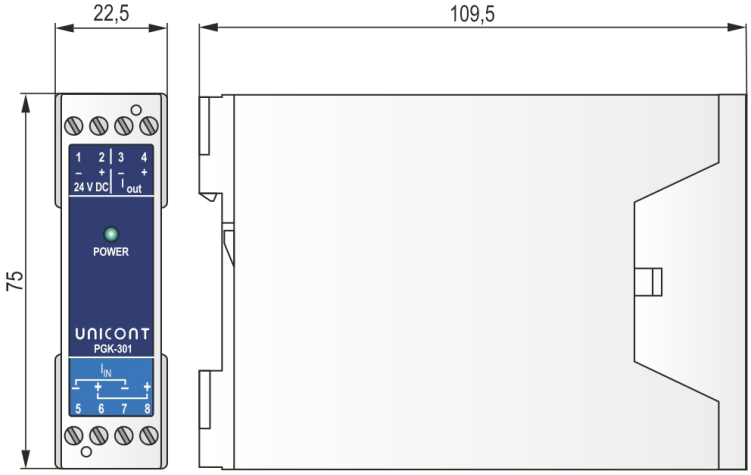
- User's manual,
- Warranty Card,
- EU declaration of Conformity

2.4 Order code

UNICONT PGK – 301 – ☐

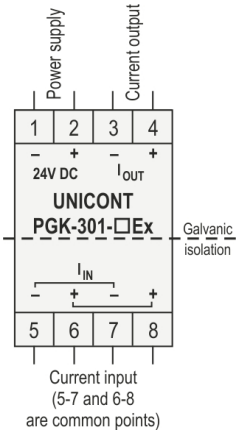
Function / Output	Code
High-precision / 4…20 mA	**A**
High-precision / 4…20 mA + HART®	**B**
High-speed / 4…20 mA	**C**
High-speed / 4…20 mA + HART®	**D**

2.5 Dimensions



3. WIRING

The number of connected transmitters is determined by the intrinsic safety limits (transmitters + cables), along with the minimum supply voltage for the transmitters.



For proper HART® communication, the maximum allowed C_o values for HART-compatible transmitters are the following.

IIB	IIC
C_o = 450 nF	C_o = 60 nF

Calculation example to determine the number of connected transmitters:
I_{IN}: 4 mA (HART®!), **C_i:** 10 nF
Supply voltage of the transmitters: min. 12.5 V
Cable capacitance: 10 nF
Cable resistance: 10 Ω
Ex isolating internal limiting resistance: 310 Ω
The calculation for transmitter and wiring with the above technical specifications is as follows:
:

For IIC-rated transmitters:

Number of connected devices:
max. 5×, because: 5 transmitters × 4 mA = 20 mA
(310 Ω + 10 Ω) × 20 mA = 6.4 V
Supply voltage of the transmitters:
24 V – 6.4 V = 17.6 V > 12.5 V
C_i = 5 × 10 nF = 50 nF + 10 nF max.
max. cable capacitance = 60 nF

If cable capacitance is greater, then only fewer transmitters are allowed to be connected!

For IIB-rated transmitters:

Number of connected devices:
max. 8× because: 8 transmitters × 4 mA = 32 mA
(310 Ω + 10 Ω) × 32 mA= 10.24 V
Supply voltage of the transmitters:
24 V – 10.24 V = 13.76 V > 12.5 V
C_i = 8 × 10 nF = 80 nF + 10 nF
max. cable capacitance = 90 nF < 450 nF

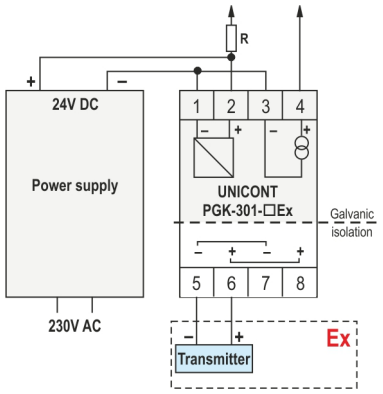
The maximum number of connected transmitters is reduced as the cable resistance increases!

The maximum number of connected transmitters to a single unit depends on the cable capacitance in the case of IIC-rated transmitters, and it depends on the cable resistance in the case of IIB-rated transmitters.

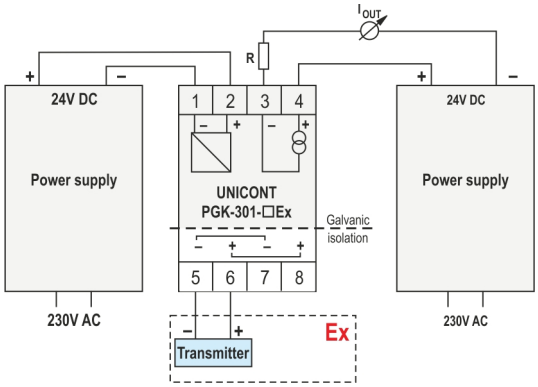
4. RECOMMENDED WIRING EXAMPLES

Wiring of 2-wire, 4…20 mA transmitter

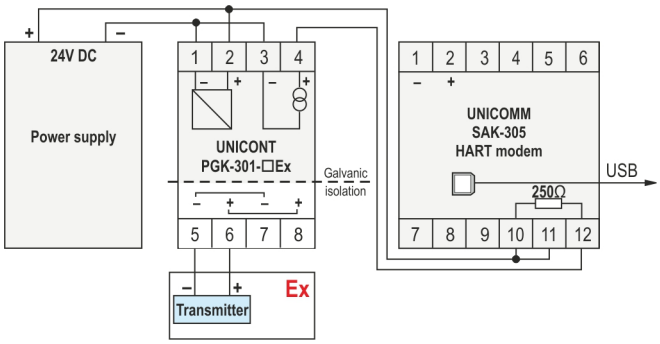
With no galvanic isolation between the power supply and the current loop output.



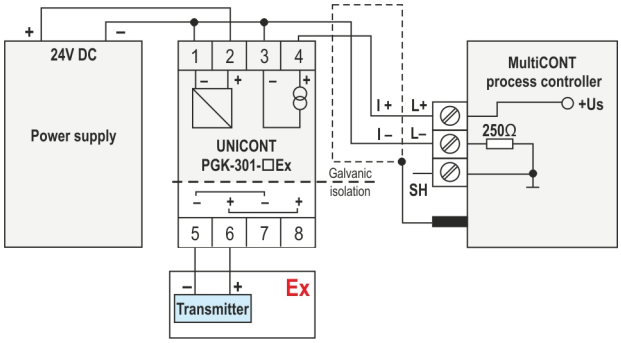
With galvanic isolation between the power supply and the current loop output.



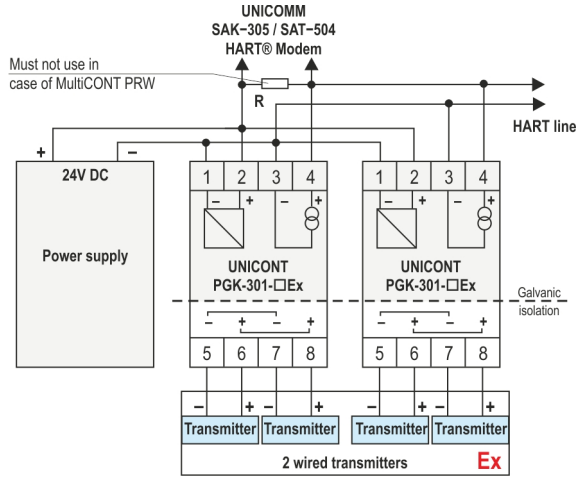
Wiring of 2-wire, HART®-capable transmitter to a HART® modem



Wiring of a 2-wire, HART®-capable transmitter to a MultiCONT process controller



Wiring of two UNICONT PGK–301–☐ Ex isolator modules connected to multiple 2-wire HART®-capable transmitters



Note: All transmitters must have different HART short-addresses!

Resistance must be between 300 Ω / 2 W … 1 kΩ / 2 W, depending on the number of the applied isolator modules. It must be connected to only one unit!
The resistance value of the resistor can be calculated using the following formula:

$$R[\Omega] = \frac{24[V] - 7[V]}{\Sigma I_{IN}[A]}$$

5. OPERATION

The device is ready for operation immediately as soon as it is mounted on the rails and connected. The presence of the 24 V DC supply voltage is indicated by the green LED.
If the input current (I_{IN}) is above 24 mA, the output current (I_{OUT}) is set to 3.6 mA (error current). The supply voltage and the current input and output are protected against overcurrent and overvoltage.
If the power fuse is blown, the POWER LED is no longer illuminated, and the unit is no longer operational. When the POWER LED is lit but the unit does not work, it is a sign of a malfunction.

6. MAINTENANCE, REPAIR

The device does not require regular maintenance. The warranty card contains the terms and conditions. Before returning the device for repairs, it must be cleaned thoroughly. The parts in contact with the medium may contain harmful substances; therefore, they must be decontaminated.
Our official form (Returned Equipment Handling Form) must be filled and enclosed in the parcel. Download it from our website www.nivelco.com. The device must be sent back with a declaration of decontamination. A statement must be provided in the declaration that the decontamination process was successfully completed and that the device is clean from any hazardous substances.

7. STORAGE

Ambient temperature: –30…+60 °C (−22…+140 °F)
Relative humidity: max. 98%

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