



# ProLine P 22400

## Functional Safety And Maximum Availability Can Go Together



**Passive isolators with a technological advantage: fewer parts mean rare failures.**

For measurement and safety reasons, analog signals are routinely isolated in industrial facilities.

The requirements on plant and safety-related circuits are continuously increasing, for instance because of a growing awareness of occupational safety. Thereby, the technical requirements on components are also being raised. However, higher functional safety is often bought by more effort and at the expense of availability. This does not have to be the case, as

proven by the new ProLine P 22400 passive isolator for standard signals. Its operating principle enables the implementation of a product that combines high functional safety with high availability in a unique way – a balancing act that would otherwise be hard to achieve.



### SIL 3 even in single-channel structure

ProLine P 22400's safety functionality is the highly precise, linear transmission of 4 ... 20 mA signals.

A high level of functional safety can be achieved even in single-channel structure and without diagnostics. For instance, sensors and actuators in safety circuits can be directly connected, requiring no elaborate evaluation equipment for redundant structures. At the same time, the device has a low total failure rate and provides high availability.

After all, what good is a safety device that will keep turning off (switch to a safe state) and thereby regularly close down the facility it is meant to monitor?

ProLine P 22400 is safe and highly available.

### ProLine P 22400 – at one glance

- Functional safety up to SIL 3 according to EN 61508, certified by an accredited authority
- MTBF: 965 years
- Low transmission error of 0.08% full scale
- High isolation including protection against electric shocks through reinforced insulation up to 600 V AC/DC
- Test voltage: 5.4 kV AC
- Minimal losses and reduced installation efforts thanks to loop-powered operation
- Robust design
  - Mechanically stable, approved by an independent testing lab, suitable for marine applications
  - Ambient temperature range during operation: -40 ... +85°C
  - Resistant against electromagnetic interferences, meeting stringent SIL requirements



**DNV·GL**



# Loop-Powered Isolators for Standard Signals

## Product Line

Device	Order No.
Loop-powered isolator for standard signals. 1 channel	P 22401 P1
Loop-powered isolator for standard signals. 2 channels	P 22402 P1
Loop-powered splitter for standard signals	P 22412 P1

## Specifications

<b>Input</b>	0(4) ... 20 mA / max. 30.5 V
Min. operating current	Approx. 30 $\mu$ A (P22412P1: approx. 40 $\mu$ A)
Voltage drop	Approx. 2.9 V at 20 mA (P22412P1: approx. 5.8 V at 20 mA)
Overload capacity	30 mA, 31 V, max. 1 minute (limited by Z-diode) reverse polarity protection by PTC element, recovery time approx. 1 min.
<b>Output</b>	0(4) ... 20 mA / max. 27.5 V (1375 $\Omega$ load at 20 mA) P22412P1: 2 x 0(4) ... 20 mA / total of max. 24 V for both outputs
Overload capacity	30 mA, 30 V, max. 1 minute (limited by Z-diode) reverse polarity protection by PTC element, recovery time approx. 1 min.
Residual ripple	< 10 mV <sub>rms</sub> at 500 $\Omega$ load
<b>Transmission behavior</b>	
Transmission error	< 0.08 % full scale
Load error	< 0.015 % meas.val. / 100 $\Omega$ load
Step response (10-90%)	Approx. 5 ms at 500 $\Omega$ load
Temperature influence <sup>1)</sup>	TC < 8 ppm / K meas. val. per 100 $\Omega$ load (reference temp. 23 °C)
<b>Isolation</b>	
Test voltage	Input against output: 5.4 kV AC, 50 Hz Channels against one another: 3.6 kV AC, 50 Hz
Working voltage (with protection against electric shock)	Up to 600 V AC/DC, protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010-1: 2010 with overvoltage category III and pollution degree 2 Up to 600 V AC/DC, protective separation acc. to EN 61140 by reinforced insulation acc. to EN 61010-1: 2010 with overvoltage category II and pollution degree 2 across the channels. For applications with high working voltages, take measures to prevent accidental contact and make sure that there is sufficient distance or insulation between adjacent devices.



# ProLine P 22400

## Specifications

### EMC

Product standard EN 61326-1  
 Emitted interference Class B  
 Immunity to interference Industry

### Approvals

ATEX	Zone 2 nA, IIC, T4 (functional separation) II 3G Ex nA IIC T4 Gc X
UL (USA/Canada)	cULus listed Open-type Process Control Equipment also listed Proc. Contr. Eq. for Use in Haz. Loc. UL OrdLoc listed ANSI/UL 61010-1 UL HazLoc marking: Class I Div. 2 Groups A,B,C,D T4
GL	GL EMC 2 C

### Functional safety

EN 61508 Suitable up to SIL 3  
 Suitable for PL c or PL e

### Further data

#### RoHS conformity

According to directive 2011/65/EU

#### MTBF<sup>3)</sup>

965 years

#### Ambient temperature

During operation	-40 ... +85 °C (-40 ... +185 °F) when mounted in row
During storage	-40 ... +85 °C (-40 ... +185 °F)

#### Ambient conditions

Indoor use <sup>4)</sup>	
Relative humidity	5 ... 95%, no condensation
Altitude	up to 2000 m (air pressure: 790 ... 1060 hPa) <sup>5)</sup>

#### Housing

Design	Modular housing with pluggable screw terminals
Dimensions	99 x 114.5 x 12.5 mm (L x H x W)

#### Diameter of the test jacks

2.1 mm

#### Ingress protection

Housing and terminals IP 20

#### Mounting

For 35-mm DIN rail acc. to EN 60715

#### Connection

Conductor cross section max. 2.5 mm<sup>2</sup>, AWG 20-12, tightening torque: 0.6 Nm

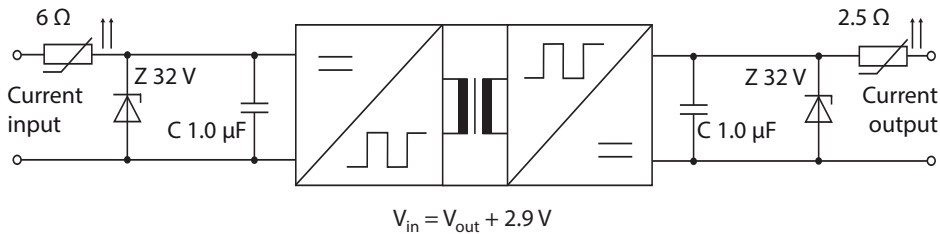
#### Weight

2 channels: approx. 90 g, 1 channel: approx. 60 g

- 1) Average TC in specified operating temperature range
- 2) For SIL applications, the 20 mA signal lines must be galvanically isolated from the mains.
- 3) Mean Time Between Failures - according to EN 61709 (SN 29500)  
 Conditions: stationary operation in well-kept rooms, average ambient temperature 40 °C, no ventilation, continuous operation.
- 4) Closed, weather-protected operating areas (stationary operation), water or wind-driven precipitation (rain, snow, hail, etc.) excluded
- 5) Lower air pressure reduces the allowable working voltages.

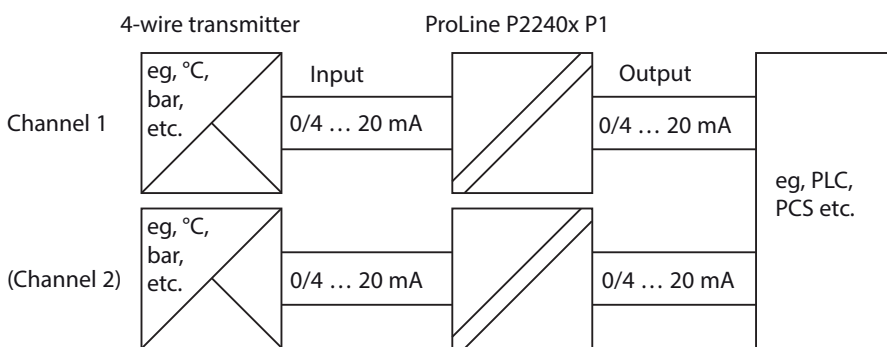
# Loop-Powered Isolators for Standard Signals

## Block Diagram



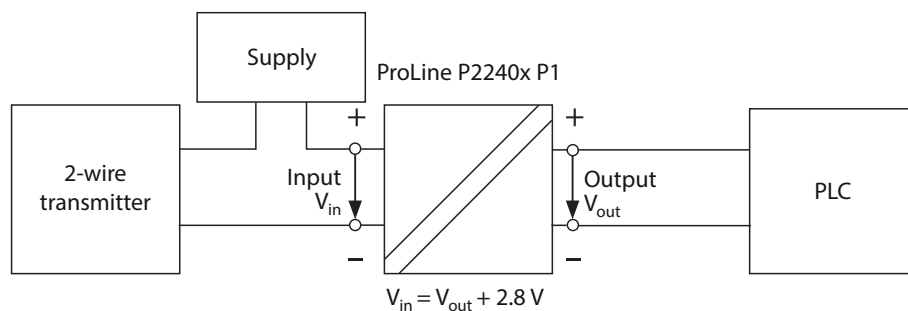
## Typical Wiring Diagrams

### Electrical isolation (1 or 2 channels)



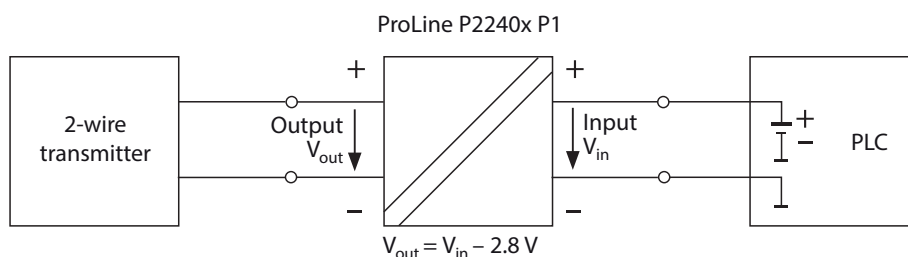
### Operation as repeater power supply (1 or 2 channels)

Power supply on the input (non-feeding PLC)



### Operation as repeater power supply (1 or 2 channels)

Input and output are connected "in reverse" (feeding PLC)

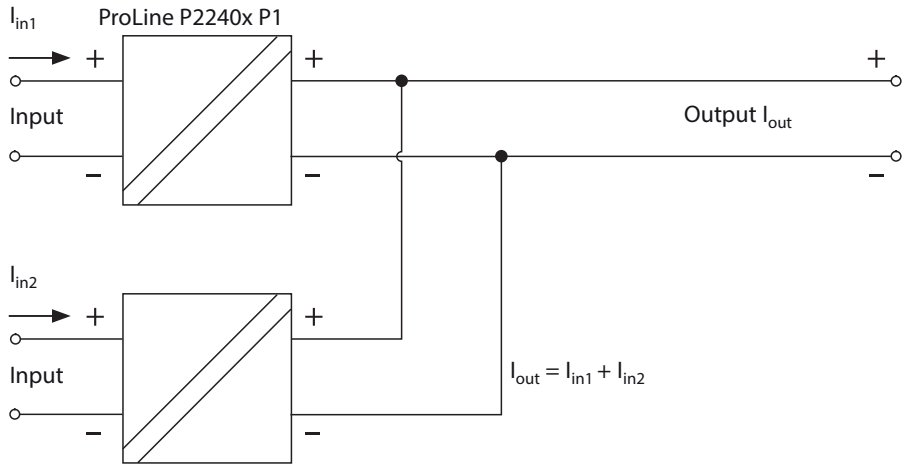




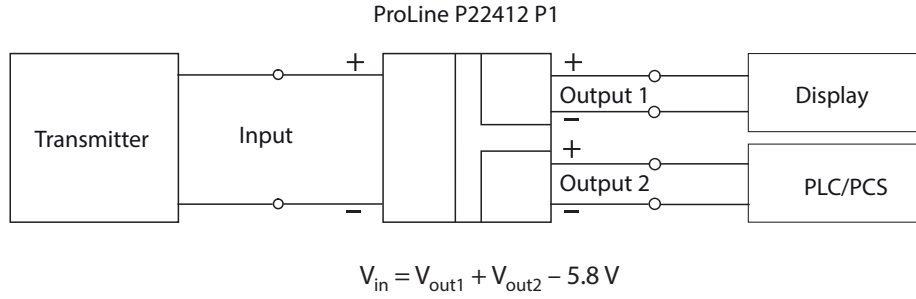
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## Typical Wiring Diagrams

### Electrical isolation with current addition for impressed currents

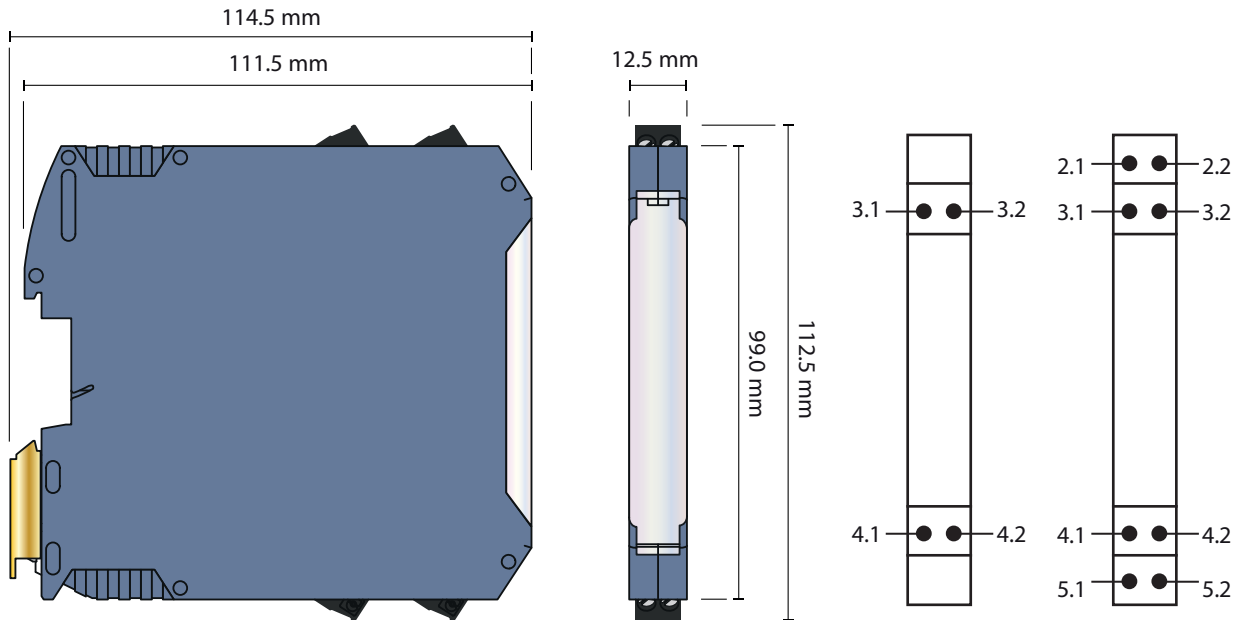


### Wiring of signal splitter



# Loop-Powered Isolators for Standard Signals

## Dimension Drawings and Terminal Assignments



Snap-on mounting on 35-mm DIN rail to EN 60715

Terminal	P22401 P1	P22402 P1	P22411 P1	P22412 P1
● 2.1		CH2 Out +		Out2 +
● 2.2		CH2 Out -		Out2 -
● 3.1	Out +	CH1 Out +	Out +/-	Out1 +
● 3.2	Out -	CH1 Out -	Out 0	Out2 -
● 4.1	In +	CH1 In +	In +/-	In +
● 4.2	In -	CH1 In -	In 0	In -
● 5.1		CH2 In +		
● 5.2		CH2 In -		