

ProLine P 44000

Precise temperature measurement at high voltage potentials up to 6.6 kV.

When temperatures are to be measured using Pt100 resistance thermometers in high-voltage environments, standard temperature transmitters are often unsuitable due to their insufficient insulation.

Resistance thermometers can be insulated against high voltage. In practice, however, the available installation space is often too small. Moreover, the insulation is weakened by thermal and mechanical aging.

For temperature measurement on power electronics components, maximum safety is therefore provided by high-voltage resistant galvanic isolation from the Pt100 resistance thermometer. A typical application is the monitoring of the winding temperature of electric motors, generators or transformers.

The Solution: Pt100 Transmitter With 6.6 kV AC/DC Basic Insulation

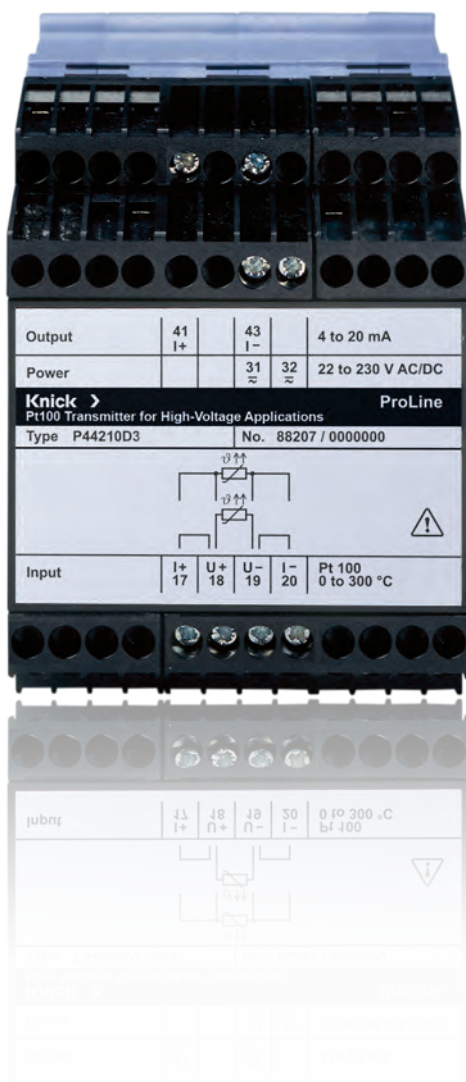
The new ProLine P 44000 Pt100 transmitters for high-voltage applications convert the resistance of a 2-, 3- or 4-wire Pt100 resistance thermometer into a 4 to 20 mA signal with high accuracy and short delay times.

The output signal is galvanically isolated from the input signal and the voltage supply. The isolation is designed for working voltages of up to 6.6 kV AC/DC. During routine testing, the test voltage is 15 kV AC. Vacuum encapsulation protects the circuit against environmental influences and ensures that the extraordinary isolation properties are maintained.

The product line covers the standard ranges of 0 to 150 °C, 0 to 200 °C and 0 to 300 °C. The transmitters are available in 67.5 and 22.5 mm modular housings to suit different requirements.

Facts and Features

- **Transmitter for Pt100 temperature sensors**
2-, 3- or 4-wire connection
- **Fixed range models for the input ranges:**
0 ... 150 °C, 0 ... 200 °C and 0 ... 300 °C
- **Impressed output current**
4 ... 20 mA
- **Compact modular housing**
67.5 and 22.5 mm based on proven VariTrans technology
- **High isolation**
up to 6.6 kV AC/DC basic insulation and up to 2.5 kV AC/DC reinforced insulation with overvoltage category III and pollution degree 2 (input against output and power supply)
- **Versions for lower insulation requirements**
22.5 mm housing up to 2 kV AC/DC (basic insulation)
- **Measurement error of just ± 1 K**
(typical ± 0,5 K) and short T90 reponse time of 100 ms
- **VariPower broad-range power supply**
22 ... 230 V AC/DC ensures safe operation even with unstable power supply
- **Protected from environmental influences**
thanks to vacuum encapsulation
- **Suitable for extreme environments**
ambient temperature during operation -40 to +85 °C



ProLine P 44000

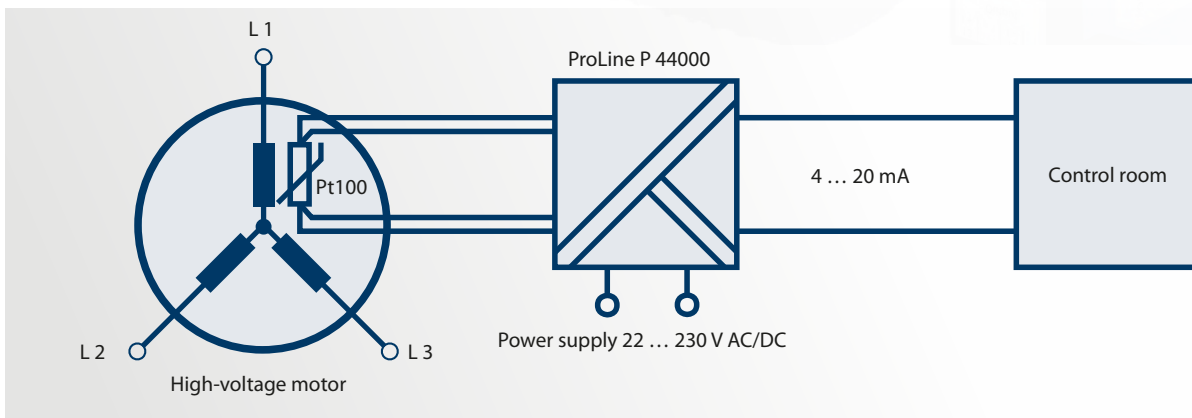


Typical Application:

Monitoring the winding temperature of high-voltage motors

Galvanic isolation of the slot RTD using ProLine P 44000:

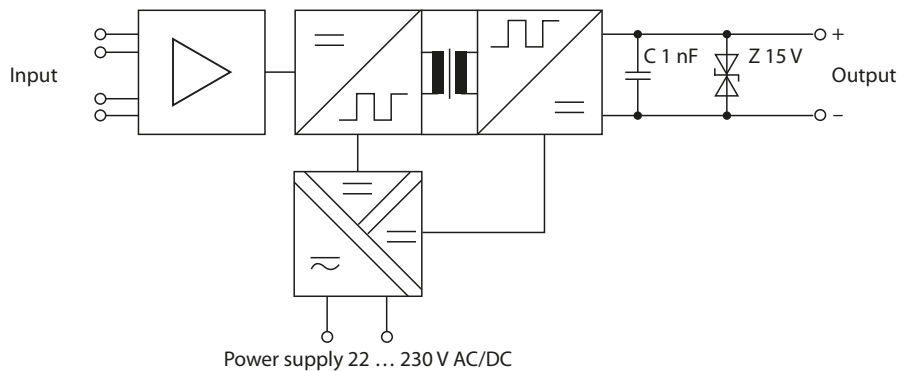
- Protects the operators
- Prevents damage to the equipment
- Interference-free transmission of 4 to 20 mA signals to the control room – even with long cables



Product Line

Device	Input	Output	Test voltage	Order no.
ProLine P 44000	0 ... 150 °C	4 ... 20 mA	15 kV	P44210D3-0007
	0 ... 200 °C	4 ... 20 mA	15 kV	P44210D3-0008
	0 ... 300 °C	4 ... 20 mA	15 kV	P44210D3-0009
	0 ... 150 °C	4 ... 20 mA	7.5 kV	P44100D1-0004
	0 ... 200 °C	4 ... 20 mA	7.5 kV	P44100D1-0005
	0 ... 300 °C	4 ... 20 mA	7.5 kV	P44100D1-0006

Block Diagram



Specifications

Eingang

Resistive sensor	Pt100 acc. to DIN 60751	
Measuring ranges	P44210D3-0007	0 ... 150 °C
	P44210D3-0008	0 ... 200 °C
	P44210D3-0009	0 ... 300 °C
	P44100D1-0004	0 ... 150 °C
	P44100D1-0005	0 ... 200 °C
	P44100D1-0006	0 ... 300 °C
Connection	2-, 3- or 4-wire Note: With 3-wire connection, the sensor cable resistance is not completely compensated for.	
Max. line resistance	100 ohms	
Supply current	approx. 1 mA	

ProLine P 44000

Specifications (continued)

Output		
Output	4 ... 20 mA (linear up to 21 mA)	
Maximum load	550 ohms	
Residual ripple	< 10 mV _{rms}	
Input unconnected or measuring range exceeded	> 21 mA (max. 38 mA)	
Transmission behavior		
Transmission error	± 1 K (typically ± 0.5 K) at 23 °C ambient temperature	
Temperature influence	< 150 ppm/K of adjusted end value (average TC in the allowable operating temp range, reference temp 23 °C)	
Time response	T ₉₀ time max. 100 ms	
Power supply		
Power supply	22 ... 230 V AC/DC ± 10 %; AC 48 ... 62 Hz, < 1.8 W, < 4 VA	
Isolation		
Galvanic isolation	3-port isolation between input, output, and power supply	
Test voltage	P44210D3-xxxx	15 kV AC across input and output / power supply 4 kV AC across output and power supply
	P44100D1-xxxx	7.5 kV AC across input and output / power supply 4 kV AC across output and power supply
Rated isolation voltage acc. to EN 50178	P44210D3-xxxx	up to 6000 V AC/DC across input and output / power supply with overvoltage category III and pollution degree 2 Impulse withstand voltage: max. 33 kV
	P44100D1-xxxx	up to 2000 V AC/DC across input and output / power supply with overvoltage category III and pollution degree 2 Impulse withstand voltage: max. 13 kV
Rated isolation voltage acc. to UL 347	P44210D3-xxxx	up to 6600 V AC/DC with overvoltage category III and pollution degree 2 Rated impulse lightning voltage: max. 33 kV
Rated isolation voltage acc. to EN 50124-1 railway applications (stationary operation)	P44210D3-xxxx	up to 5500 V AC/DC across input and output / power supply with overvoltage category II and pollution degree 2 Rated impulse voltage: 25 kV
	P44100D1-xxxx	up to 4800 V AC/DC across input and output / power supply with overvoltage category III and pollution degree 2 Rated impulse voltage: 30 kV
Protection against electric shock	P44100D1-xxxx	up to 2000 V AC/DC across input and output / power supply with overvoltage category II and pollution degree 2 Rated impulse voltage: 12 kV
	P44210D3-xxxx	up to 2500 V AC/DC for input against output and power supply up to 300 V AC/DC for output against power supply
	P44100D1-xxxx	up to 1000 V AC/DC for input against output and power supply up to 300 V AC/DC for output against power supply

Specifications *(continued)*

Standards and approvals

EMC ¹⁾	Product family standard: EN 61326-1	EN 61326-2-3
	Emitted interference: Class A ²⁾	
	Immunity to interference: Industrial environment	
Approvals	UL:	Listed acc. to UL 347 File E356768
RoHS conformity	According to directive 2011/65/EU	

Further data

Ambient temperature	Operation, storage and transport	-40 ... +85 °C	
Relative humidity	Operation, storage and transport	5 ... 95 % (no condensation during operation)	
Air pressure	70 ... 106 kPa	Altitude up to 2000 m	
Operating conditions	Stationary operation		
MTBF ³⁾	Approx. 160 years		
Design	Modular housing with screw terminals		
	Housing width	Type D1: 22.5 mm	Type D3: 67.5 mm
	See dimension drawings for other measurements		
Connection	M 3.5 connecting screws with self-releasing terminal housing. Conductor cross-section max. 1 x 4 mm ² solid or 1 x 2.5 mm ² stranded with ferrule, min. 1 x 0.5 mm ² solid or stranded with ferrule		
Tightening torque	0.6 Nm		
Ingress protection	Housing: IP 40	Terminals: IP 20	
Mounting	For 35 mm DIN rail acc. to EN 60715		
Weight	D1: approx. 250 g	D3: approx. 500 g	

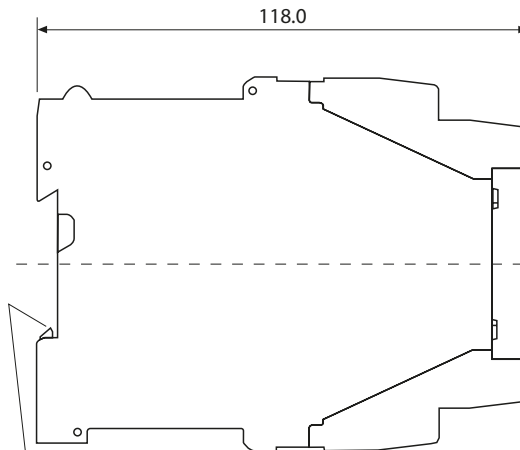
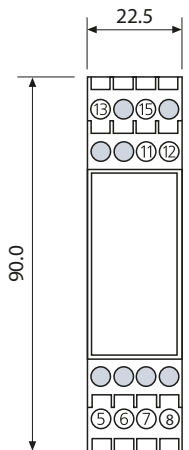
1) Slight deviations are possible while there is interference (typ. < 2 K).

2) Caution! – This is a Class A device for industrial use. When used in a residential environment, the device may cause radio interference.

3) acc. to EN 61709 (SN29500), stationary operation in well-kept rooms, average ambient temperature 40 °C, no ventilation, continuous operation

ProLine P 44000

Dimension Drawing and Terminal Assignments, Type D1



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

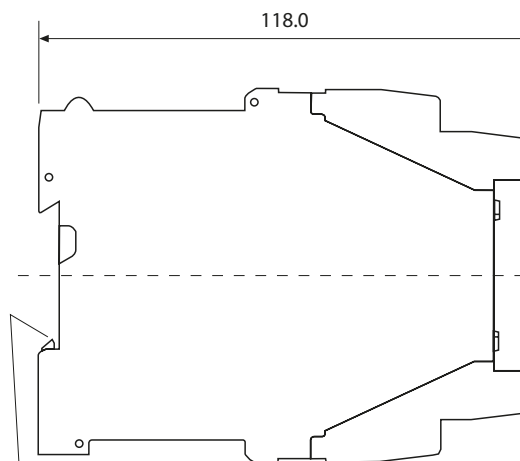
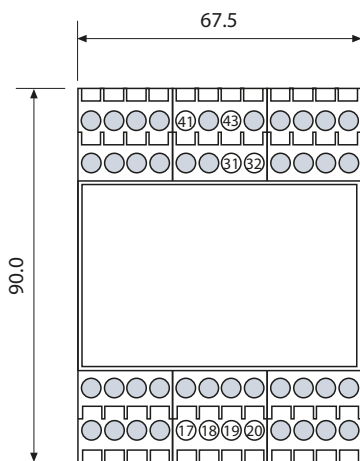
Terminal assignments

- 5 Input + Current
- 6 Input + Voltage
- 7 Input - Voltage
- 8 Input - Current
- 11 Power supply AC/DC
- 12 Power supply AC/DC
- 13 Output + Current
- 15 Output - Current

For 2-wire connection to Pt100, place jumpers from 5 to 6 and from 7 to 8.
For 3-wire connection, from 7 to 8 only.

M 3.5 connecting screws with self-releasing terminal housing.
Conductor cross-section max. 1 x 4 mm² solid or 1 x 2.5 mm² stranded with ferrule, min. 1 x 0.5 mm² solid or stranded with ferrule

Dimension Drawing and Terminal Assignments, Type D3



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

Terminal assignments

- 17 Input + Current
- 18 Input + Voltage
- 19 Input - Voltage
- 20 Input - Current
- 31 Power supply AC/DC
- 32 Power supply AC/DC
- 41 Output + Current
- 43 Output - Current

For 2-wire connection to Pt100, place jumpers from 17 to 18 and from 19 to 20; for 3-wire connection from 19 to 20 only

M 3.5 connecting screws with self-releasing terminal housing.
Conductor cross-section max. 1 x 4 mm² solid or 1 x 2.5 mm² stranded with ferrule, min. 1 x 0.5 mm² solid or stranded with ferrule