ThermoTrans 210/211

The practical solution for temperature measurement with thermocouples.

The Advantages
The ThermoTrans 210/211 temperature transmitters provide you with the perfect amount of flexibility:

– Configuration effort only where it is really necessary and without complicated configuration tables.
– High level of reliability and compact design due to digital signal processing specially developed for the measuring task, instead of unnecessary reduction in reliability due to overburdening with complicated technology.

The Models
For the majority of standard applications with fixed preset parameters, you simply select one of the numerous fixed setting standard models.

You can solve special measurement tasks with a transmitter that we configure according to your specifications.

The Technology
The ThermoTrans 210/211 temperature transmitters provide protective separation and high insulation between input, output and power supply. They meet the strict EMC requirements according to NAMUR and the European EMC regulations and can easily be used for measurements in hazardous areas.

Vacuum encapsulation protects the devices against aggressive environmental influences, shock, and vibrations.

ThermoTrans 210/211 for Thermocouples
Thermocouples have very low resistance, making them interference-resistant. Their preferred field of application is high temperature ranges, for example, for measurements in ovens, smelting plants, and plastic machines. The range of standard thermocouples is extremely broad. The ThermoTrans 210/211 transmitters therefore provide connection possibilities for all common thermocouples.

To avoid long compensation lines, an external reference junction can be used in addition to the internal one. For reference junctions with thermostat, the reference temperature can be a fixed setting or measured with a Pt100.

The ThermoTrans 210/211 transmitters can also be used to measure voltages in the range of –20 to +100 mV at a transmission rate of 1/s. The transfer curve can be freely configured using various functions or interpolation points, which makes the transmitters ideal for difficult measuring tasks, e.g., the fill level in spherical tanks.

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Facts and Features

- **Explosion protection [EEx ia] IIC** according to ATEX, trouble-free use in hazardous areas
- **Wide range of standard models** No configuration required for standard applications
- **EMC tested** Reliable operation even with electromagnetic interference in the power grid or in the environment
- **Protective separation** according to EN 61140, protection of maintenance staff and subsequent devices against excessively high voltages
- **Modular housing, 22.5 mm wide with 73.5 mm standard height** Compact design means easy installation, also easy to fit in standard enclosures
- **5-year warranty**

5 Year Warranty!

Temperature Transmitters (Ex)

Product Line

		ThermoTrans 210 with current output						ThermoTrans 211 with voltage output					
Models with fixed settings	**Order no.**	**210 A7**	**X**	**XX**	**XX**	**X**	**Opt. 444**	**211 A7**	**X**	**XX**	**XX**	**V**	**Opt. 444**
Sensor													
J			**J**						**J**				
K			**K**						**K**				
S			**S**						**S**				
Span													
700 K				**60**						**60**			
1000 K				**75**						**75**			
1700 K				**97**						**97**			
Start of scale													
0 °C					**00**						**00**		
Output													
0 … 20 mA						**D**							
4 … 20 mA						**L**							
0 … 10 V												**V**	

		ThermoTrans 210 with current output	ThermoTrans 211 with voltage output
Models with customer-specific settings	**Order no.**	**210 A7 999 999 opt. 444**	**211 A7 999 999 opt. 444**

Output curve rising, without filter constant, internal reference junction
ThermoTrans 210: Open circuit detection 22 mA; ThermoTrans 211: Open circuit detection 11 V

Power supply	**Order No.**
230 V AC	
24 V AC/DC	**336**
115 V AC	**363**

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Configuration Form

Important! Please fill in the configuration form completely and enclose it with your order.
If entries are missing, the value entered in square brackets or the colored setting ■ will be configured.

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Sensor	Temperature detector:	
	☐ Type B	☐ Type R
	☐ Type E	☐ Type S
	☐ Type J	☐ Type T
	■ Type K	☐ Type U
	☐ Type L	☐ Voltage
	☐ Type N	
Measuring range	Start of scale[1] __ __ __ __ °C [0 °C]	or __ __ __ __ mV
	Span[1] __ __ __ __ K [1000 K]	or __ __ __ __ mV
Reference junction	■ internal	☐ internal / external switchable (via jumper)
	☐ external Pt100	☐ fixed temperature setting[2]
		or __ __ . __ °C [25 °C]
Output[3]	■ 0 … 20 mA	☐ 0 … 10 V
	☐ 4 … 20 mA	
Characteristic	■ Rising	☐ Falling
Error Messages	Message:	
	■ only for open circuit	
	☐ for open circuit and overrange	
	Notification signal:	
	■ 22 mA or 11 V	
	☐ –1 mA or –0.5 V	
Filter constant T_{99}	__ __ __ s[1] (1st order filter)	[0 s]
Tag number	__ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __	[none]
Power supply	■ 230 V AC standard	☐ 115 V AC
	☐ 24 V AC/DC	

[1] See the specifications for the possible parameter range
[2] Compensation range –10 … 80 °C
[3] Other values upon request

Specifications

Input data	Sensor type	Standard	Range
Intrinsically safe	Type B	DIN / IEC 584-1	0 … +1820 °C
	Type E	DIN / IEC 584-1	–270 … +1000 °C
	Type J	DIN / IEC 584-1	–210 … +1200 °C
	Type K	DIN / IEC 584-1	–270 … +1372 °C
	Type L	DIN 43710	–200 … +900 °C
	Type N	ASTM E 230-87	–270 … +1300 °C
	Type R	DIN / IEC 584-1	–50 … +1767 °C
	Type S	DIN / IEC 584-1	–50 … +1767 °C
	Type T	DIN / IEC 584-1	–270 … +400 °C
	Type U	DIN 43710	–200 … +600 °C
Voltage input	–20 … +100 mV		
Input resistance	> 10 Mohms		
Span (user-defined)	Min.: ≥ 2 mV, max.: end of scale – start of scale		
Sensor break monitoring	all inputs for open circuit (not with voltage measurement)		
Input error limits	±10 µV + 0.05 % meas. val.		
Temperature coefficient at the input	0.01 ppm/K full scale (average TC in allowable operating temperature range, reference temperature 23 °C)		
Reference junction input (adjustable)	Internal Pt100	< ±1.0 K	
	External Pt100	< ±0.3 K + error of the Pt100 used	

Output data	
Output signal (0 … 100 %)	Model 210: 0 / 4 … 20 mA, impressed current, load voltage ≤ 10 V Model 211: 0 … 10 V, impressed voltage, load current ≤ 10 mA
Resolution	Approx. 8000 increments (for 0 … 100 %)
Control range	–2.5 % … +102.5 % span
Overload range with error message	Model 210: –1.0 mA or +22 mA Model 211: –0.5 V or +11 V
Output error limits	0.1 % full scale
Temperature coefficient at the output	0.01 ppm/K full scale (average TC in allowable operating temperature range, reference temperature 23 °C)
Residual ripple at output	< 10 mV_{pp} + input digitization error

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Specifications *(continued)*

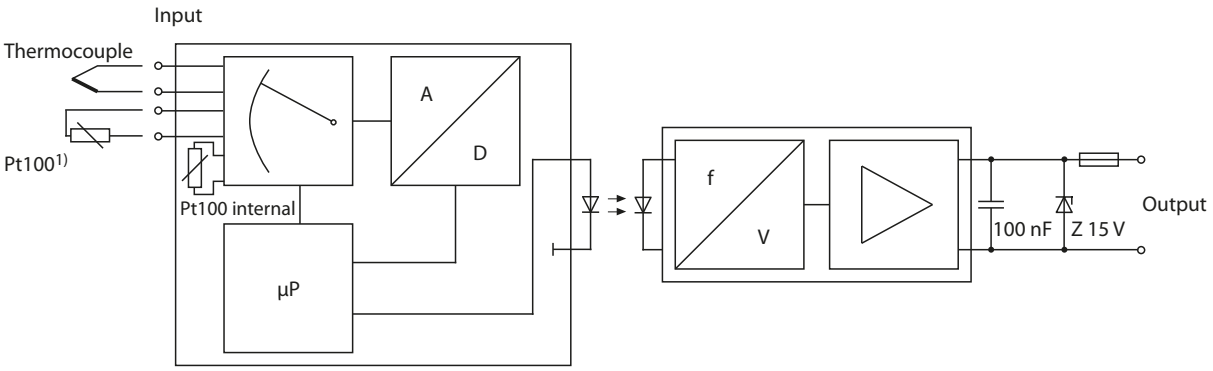
Transmission behavior	
Characteristic	Temperature or voltage linear or customer specific rising or falling
Measuring rate	Approx. 1/sec
Response time t_{99}	≤ 900 ms
Digital output filter	T_{99} = 0 … 100 s (1st order filter)
Power supply	
Power supply	230 V AC –15 % +10 %, 48 … 62 Hz, approx. 2 VA
Option 336:	24 V AC/DC AC: –15 % +10 %, 48 … 500 Hz, approx. 1.5 VA DC: –15 % +20 %, approx. 1.2 W
Option 363:	115 V AC –15 % +10 %, 48 … 62 Hz, approx. 2 VA
Isolation	
Galvanic isolation	3-port isolation between input, output, and power supply
Test voltage	4 kV AC (across input and output / power supply) 3 kV AC (across output and power supply)
Working voltage (basic insulation)	1000 V AC/DC across input and output / power supply with overvoltage category II and pollution degree 2, 330 V AC/DC across output and power supply with overvoltage category II and pollution degree 1 according to EN 61010-1 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. The maximum working voltage for use in hazardous areas is 250 V.
Protection against electric shock	Protective separation to EN 61140 by reinforced insulation according to EN 61010-1. Working voltages with overvoltage category II and pollution degree 2: 600 V AC/DC for input against output and power supply, 300 V AC/DC for output against power supply. 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. The maximum working voltage for use in hazardous areas is 250 V.
Standards and approvals	
Explosion protection (opt. 444)	II (1) G [EEx ia] II C PTB 02 ATEX 2107 For further details see Certificates of Conformity
Surge withstand	5 kV 1.2/50 µs according to IEC 255-4
EMC[1)]	EN 61326-1, NAMUR NE 21

Specifications *(continued)*

Further data	
Ambient temperature	Operation: –10 … +60 °C Transport and storage: –30 … +80 °C
Ambient conditions	Indoor use[2] Relative humidity 5 … 95 %, no condensation; max. altitude 2000 m (air pressure: 790 … 1060 hPa)[3]
Design	Modular housing A7, 22.5 mm wide, screw terminals See dimension drawings for further measurements
Tightening torque	0.6 Nm
Ingress protection	Housing: IP 40, terminals: IP 20
Mounting	With snap-on mounting for 35 mm DIN rail according to EN 60715
Connection	Captive terminal screws M 3 x 8 ; box-type terminals with self-raising wire protection, max. conductor cross section: 1 x 4 mm^2 solid 1 x 2.5 mm^2 stranded with ferrule 2 x 1.5 mm^2 stranded with ferrule Only trained and qualified personnel may perform installation, commissioning, and maintenance!
Weight	Approx. 300 g

[1] Slight deviations are possible while there is interference from RF radiation
[2] Closed, weather-protected operating areas (stationary operation), water or wind-driven precipitation (rain, snow, hail etc.) excluded
[3] Lower air pressure reduces the allowable working voltages.

Block Diagram



[1] For temperature measurement of external reference junctions

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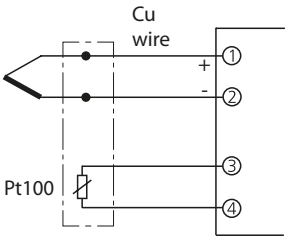
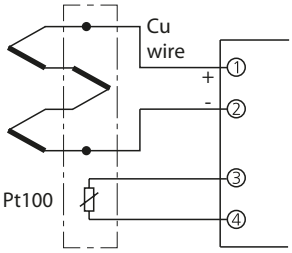
Typical Applications

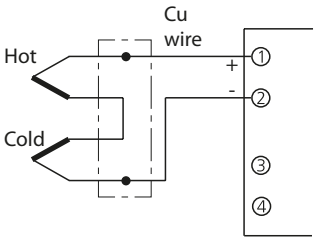
With external reference junction



Summing circuit with external reference junction

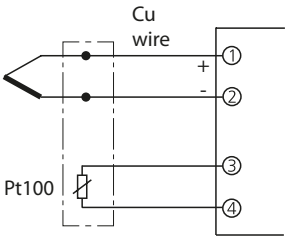


Differential circuit

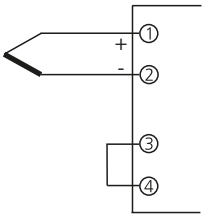


Connection with switchable internal/external reference junction

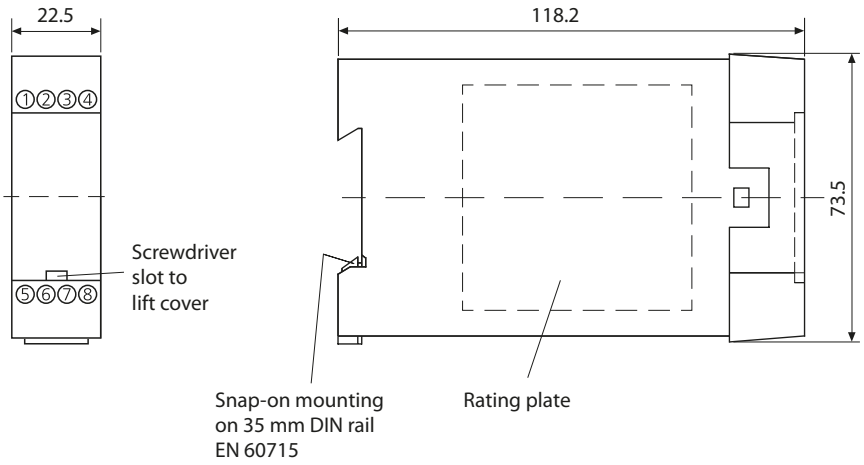
Pt100 external



Pt100 internal



Dimension Drawing and Terminal Assignments



ThermoTrans 210/211

1 Input +/hot
2 Input –/cold

3 Pt100 input
4 Pt100 input

5 Output +
6 Output –

7 Power supply AC/DC
8 Power supply AC/DC

Captive terminal screws M 3 x 8
Box-type terminals with
self-raising wire protection,
max. conductor cross section:
1 x 4 mm^2 solid
1 x 2.5 mm^2 stranded with ferrule
2 x 1.5 mm^2 stranded with ferrule

All dimensions in mm