

# Modular Housings for Hazardous Areas

**Knick** >

## ThermoTrans® 205/206



**The practical solution for temperature measurement with resistance thermometers.**

### The Advantages

The ThermoTrans® 205/206 temperature transmitters provide you with just the flexibility you need:

- Configuration effort where it is only really necessary, instead of complicated parameter 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 preconfigured standard models.

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

### The Technology

The ThermoTrans® 205/206 temperature transmitters provide Safe Isolation and high insulation resistance between the input, output, and power supply. They meet the strict NAMUR EMC requirements and can easily be used for measurements in hazardous areas.

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

### ThermoTrans® 205/206 for resistance thermometers

Resistance thermometers are highly accurate temperature sensors with long-term stability for measuring temperatures up to max. 850 °C.

They are mainly used to measure low and medium temperatures, for example, in air-conditioning, process engineering, and the food industry.

The ThermoTrans® 205/206 transmitters allow connection of all common resistance thermometers either in 2-, 3-, or 4-wire configuration.

The possibility for connecting resistive sensors and potentiometers creates a wide range of application possibilities, for example, in the field of path measurement. Converting the input signal into a proportional current/voltage signal allows simple further processing.

**Warranty  
5 years!**

*Defects occurring within 5 years from delivery are remedied free of charge at our works (carriage and insurance paid by sender).*

# Temperature Transmitters

Isolation Amplifiers  
Transmitters

Indicators

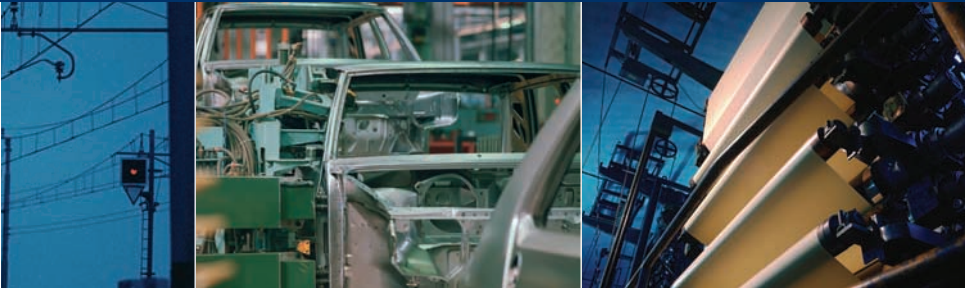
Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



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## ■ The Facts

### Explosion protection [Ex ia] IIC according to ATEX

Trouble-free use in hazardous areas

### Extensive range of standard models

Configuration not necessary for standard applications

### Adjustable via optical interface

Universal for a wide range of measuring tasks, can also be configured on site

### EMC tested

Reliable operation even with electromagnetic interference in the mains or in the environment

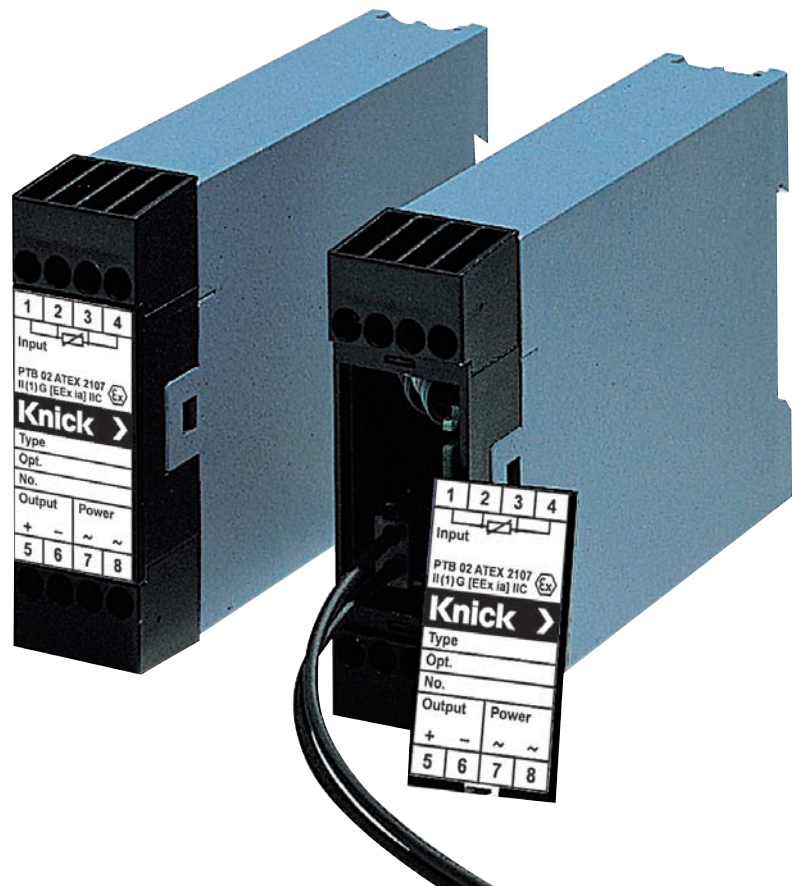
### Safe Isolation according to EN 61140

Protection of maintenance staff and the subsequent devices against non-permitted 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 cabinets

### 5-year warranty



# Modular Housings for Hazardous Areas

## ThermoTrans® 205/206

### ■ Product Line

		ThermoTrans® 205 with current output	ThermoTrans® 206 with voltage output
<b>Adjustable models</b>	Order No.	205 A7 000 000 Opt. 444	206 A7 000 000 Opt. 444
Adjustable via interface, communication kit on request. See Configuration Schedule for factory setting.			
<b>Fixed range standard models</b>	Order No.	205 A7 x xx xx x Opt. 444	206 A7 x xx xx V Opt. 444
<b>Sensors</b>			
Pt 100 (–200 ... +850 °C)		A	A
Pt 1000 (–200 ... +850 °C)		B	B
Ni 100 (–60 ... +180 °C)		C	C
1000 ohms		D	D
5000 ohms		E	E
<b>Span</b>			
50 K		05	05
100 K		10	10
150 K		15	15
200 K		20	20
300 K		30	30
400 K		40	40
1000 K		70	70
5000 K		88	88
<b>Start of scale</b>			
–100 °C		02	02
–50 °C		01	01
0 °C		00	00
50 °C		11	11
100 °C		12	12
200 °C		14	14
0 ohm		30	30
<b>Output</b>			
0 ... 20 mA			
4 ... 20 mA		D	
0 ... 10 V		L	V

Sensor with 4-wire connection (3-wire connection Option 494), rising output curve, without filter constant  
 ThermoTrans® 205: open circuit recognition 22 mA; ThermoTrans® 206: open circuit recognition 11 V

Power supply	Order No.
230 V AC	
24 V AC/DC	336
115 V AC	363
<b>Options</b>	
ThermoTrans® 205/206 standard model with 3-wire connection	494

# Temperature Transmitters

Isolation Amplifiers  
Transmitters

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Process Analytics

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## Product Line (continued)

	ThermoTrans® 205 with current output	ThermoTrans® 206 with voltage output
<b>Customer-specific models</b> Order No.	205 A7 999 999 Opt. 444	206 A7 999 999 Opt. 444

## ■ Configuration Schedule

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

### ThermoTrans® 205/206

Sensor <sup>1)</sup>	Temperature detector: <input checked="" type="checkbox"/> Pt 100 according to IEC 751 <input type="checkbox"/> Ni 100 according to DIN 43 760 <input type="checkbox"/> Pt 500 <input type="checkbox"/> Ni 120 <input type="checkbox"/> Pt 1000 <input type="checkbox"/> Ni 500 <input type="checkbox"/> <input type="checkbox"/> Ni 1000
Connection	Resistive sensor or potentiometer: <input type="checkbox"/> ≤ 500 ohms <input type="checkbox"/> ≤ 5000 ohms <input type="checkbox"/> 2-wire connection, line resistance <sup>2)</sup> _____, ____ ohms <input type="checkbox"/> 3-wire connection <input checked="" type="checkbox"/> 4-wire connection
Range	Start of scale <sup>2)</sup> _____ °C [0 °C] or _____ ohms Span <sup>2)</sup> _____ K [100 K]      or _____ ohms
Output <sup>3)</sup>	<input checked="" type="checkbox"/> 0 ... 20 mA <input type="checkbox"/> 0 ... 10 V <input type="checkbox"/> 4 ... 20 mA
Curve	<input checked="" type="checkbox"/> Rising <input type="checkbox"/> Falling
Error messages	Message: <input checked="" type="checkbox"/> only with open circuit <input type="checkbox"/> with open circuit and overrange
Filter constant T <sub>99</sub>	Signal: <input checked="" type="checkbox"/> 22 mA or 11 V <input type="checkbox"/> -1 mA or -0.5 V _____ s <sup>2)</sup> (1st order filter)      [0 s]
Tag number	_____ [none]

1) Other models on request

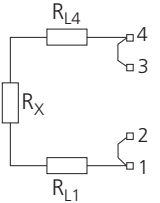
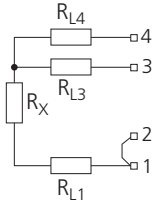
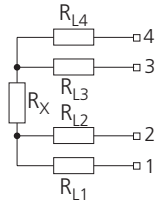

2) See the specifications for the possible parameter range

3) Other values on request

# Modular Housings for Hazardous Areas

## ThermoTrans® 205/206

### ■ Specifications

Input data	Sensor type	Measurement range	Span (user-defined)	
Intrinsically safe	Pt 100 to IEC 751 Pt 500 Pt 1000	-200 ... +850 °C	25 ... 1050 K	
	Ni 100 to DIN 43760 Ni 120 Ni 500 Ni 1000	-60 ... +180 °C	25 ... 240 K	
	Remote resistance transducer and potentiometer	0 ... 500 ohms or 0 ... 5000 ohms	9 ... 500 ohms or 90 ... 5000 ohms	
Connection	2-wire connection: configured line resistance is calculated in the measured value			
	3-wire connection: $R_{L1} = R_{L4}$			
	4-wire connection	2-wire connection	3-wire connection	4-wire connection
		$R_{L1} + R_{L4} = 100 \text{ ohms}$		
Max. line resistance	Approx. 1 mA or 0.1 mA depending on the measurement range			
Sensor current	< 5 V			
Open-circuit voltage	All inputs for open circuit			
Sensor failure monitoring	Resistance: Range 0 ... 500 ohms ± 0.05 ohm Range 0 ... 5 kohms ± 0.5 ohm			
Input error limits	With Pt: Range -200 ... +850 °C ± 0.2 K With Ni: Range -60 ... +180 °C ± 0.2 K			
Temperature coefficient at input	0.0025 % / K full scale (average TC in permitted operating temperature range, reference temperature 23 °C)			
Output data				
Output signal (0 ... 100 %)	Model 205: 0/4 ... 20 mA, impressed current, load voltage ≤ 10 V Model 206: 0 ... 10 V, impressed voltage, load current ≤ 10 mA			
Resolution	Approx. 8000 steps (for 0 ... 100 %)			
Control range	-2.5 ... 102.5 % span			
Overload range with error message	Model 205: -1.0 mA or 22 mA Model 206: -0.5 V or 11 V			
Output error limits	0.1 % full scale			

### Specifications (continued)

#### Output data

Temperature coefficient at output	0.01 % / K full scale (average TC in permitted operating temperature range, reference temperature 23 °C)
Residual ripple at output	< 10 mV <sub>pp</sub> + digitalization error of input

#### Transmission behavior

Characteristic	Resistance or temperature linear rising or falling
Meas. rate	Approx. 1 / s
Response time T <sub>99</sub>	≤ 900 ms
Digital output filter	T <sub>99</sub> = 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 (input against output and power supply) 3 kV AC (output against power supply)
Working voltage (basic insulation)	1000 V AC/DC input against output and power supply with overvoltage category II and pollution degree 2, 300 V AC/DC output against power supply with overvoltage category II and pollution degree 2 according to EN 61010-1. For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks. For hazardous area applications the maximum working voltage is 250 V.
Protection against electric shock	Safe Isolation according to EN 61140 by reinforced insulation in accordance with 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, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks. When used in hazardous areas, the max. working voltage is 250 V.

# Modular Housings for Hazardous Areas

## ThermoTrans® 205/206

### Specifications (continued)

#### Standards and approvals

Explosion protection  
(Opt. 444)

II (1) G [Ex ia] II C PTB 02 ATEX 2107

For further details see certificates of conformity at our website: [www.knick.de](http://www.knick.de)

Surge withstand

5 kV 1.2 / 50  $\mu$ s according to IEC 255-4

EMC <sup>1)</sup>

89/336/EEC directive, EN 61326, NAMUR NE 21

#### Other data

Interface  
(adjustable models only)

Optical, interface adapter on RS 232 interface (PC) is included in the communications kit (ZU 0254)

Ambient temperature

Operation: -10 ... +60 °C

Transport and storage: -30 ... +80 °C

Design

A7 modular housing, width 22.5 mm, screw terminals  
See dimension drawings for further measurements

Ingress protection

Housing IP 40, terminals IP 20

Mounting

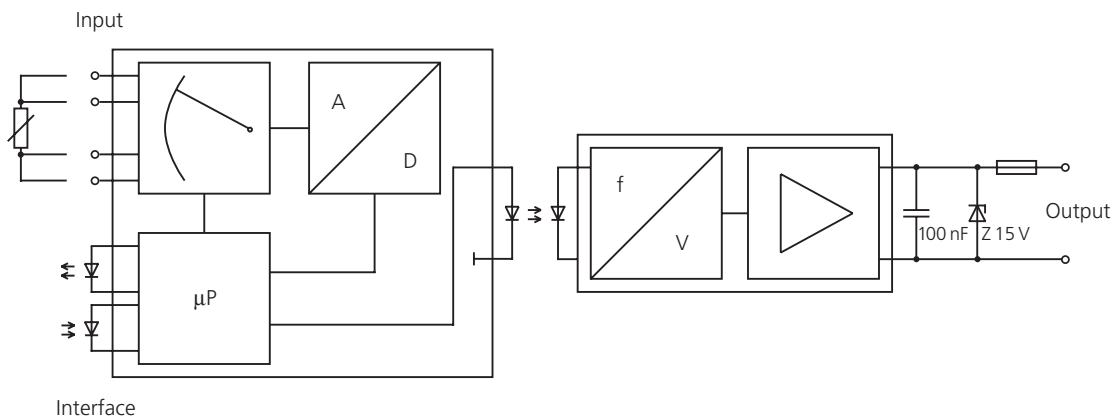
With snap-on mounting for 35 mm top hat rail according to EN 50022-35,  
width 22.5 mm, see dimension drawings for conductor cross section

Weight

Approx. 300 g

1) Slight deviations are possible while there is interference from RF radiation

### ■ Block Diagram



# Temperature Transmitters

Isolation Amplifiers  
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

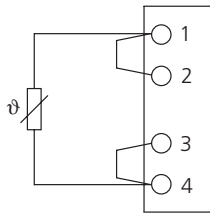
Sensors

Fittings

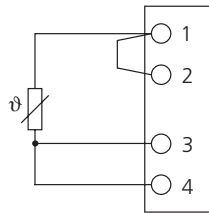
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## Application Examples

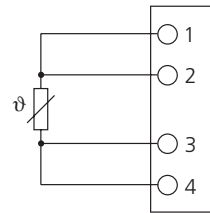
2-wire connection



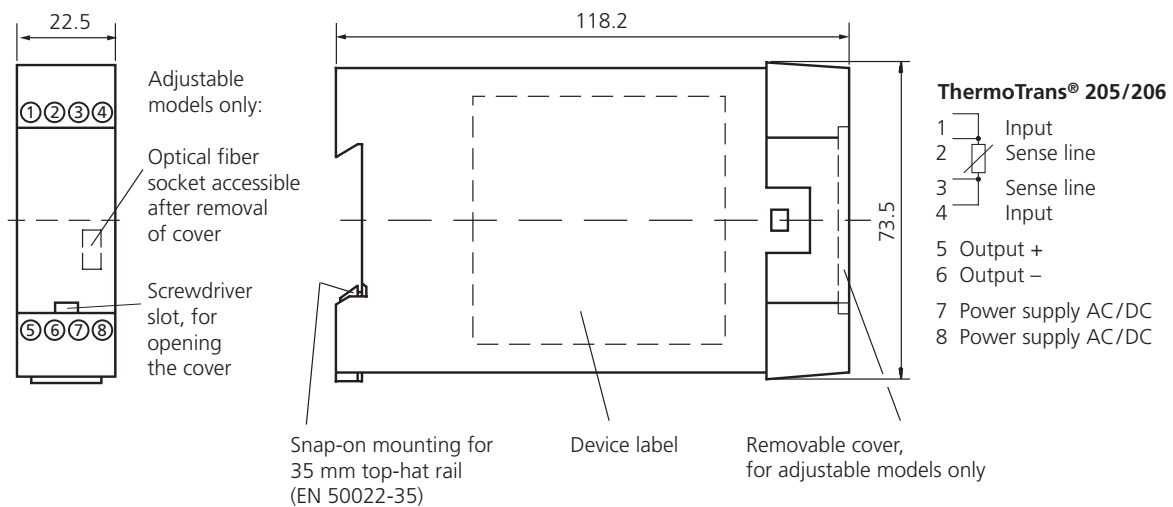
3-wire connection



4-wire connection



## Dimension Drawings and Terminal Assignments



Captive M3x8 clamping screws, box terminals with self-releasing wire protection

Max. conductor cross-section

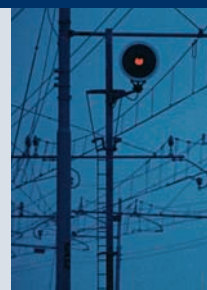
- 1 x 4 mm<sup>2</sup> solid
- 1 x 2.5 mm<sup>2</sup> stranded wire with ferrule
- 2 x 1.5 mm<sup>2</sup> stranded wire with ferrule

All dimensions in mm!

# Modular Housings for Hazardous Areas

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## ThermoTrans® 210/211



**The practical solution for temperature measurement with thermocouples.**

### The Advantages

The ThermoTrans® 210/211 temperature transmitters provide you with just the flexibility you need:

- Configuration effort where it is only really necessary, instead of complicated parameter 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 preconfigured standard models.

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

### The Technology

The ThermoTrans® 210/211 temperature transmitters provide Safe Isolation and high insulation resistance between the input, output, and power supply. They meet the strict NAMUR EMC requirements 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 which makes them fail-safe. They are preferably used for high temperatures, for example, for measurements in ovens, smelting plants, and plastic machines.

The range of standard thermocouples is very wide.

The ThermoTrans® 210/211 transmitters therefore provide consistent connection possibilities for all common thermocouples.

To avoid long compensating cables, an external reference junction can also be used in addition to the internal one. For reference junctions with thermostat, the reference temperature can be fixed or measured with a Pt 100.

The ThermoTrans® 210/211 transmitters can also be used to measure voltages in the range of  $-20 \dots +100$  mV at a transmission rate of 1/sec. Due to the transfer curve freely configured using functions or sampling points, they are ideal for difficult measuring tasks, such as level measurement in spherical tanks.

Warranty  
**5 years!**

*Defects occurring within 5 years from delivery are remedied free of charge at our works (carriage and insurance paid by sender).*

# Temperature Transmitters

Isolation Amplifiers  
Transmitters

Indicators

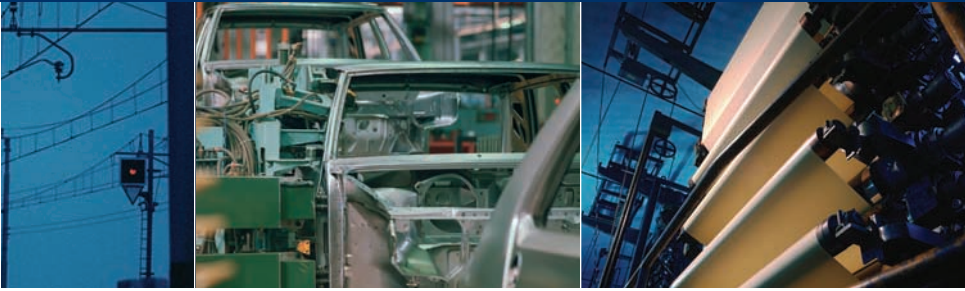
Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings



**Knick** >

## ■ The Facts

### Explosion protection [EEx ia] IIC

according to ATEX, trouble-free use in hazardous areas

### Extensive range of standard models

Configuration not necessary for standard applications

### Adjustable via optical interface

Universal for a wide range of measuring tasks, can also be configured on site

### EMC tested

Reliable operation even with electromagnetic interference in the mains or in the environment

### Safe Isolation according to EN 61140

Protection of maintenance staff and the subsequent devices against non-permitted 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 cabinets

### 5-year warranty



# Modular Housings for Hazardous Areas

## ThermoTrans® 210/211

### ■ Product Line

		ThermoTrans® 210 with current output	ThermoTrans® 211 with voltage output
<b>Adjustable models</b>	Order No.	210 A7 000 000 Opt. 444	211 A7 000 000 Opt. 444
Adjustable via interface, communication kit on request. See Configuration Schedule for factory setting.			
<b>Fixed range standard models</b>	Order No.	210 A7 x xx xx x Opt.444	211 A7 x xx xx V Opt.444
Sensors	J K S	J K S	J K S
Span	700 K 1000 K 1700 K	60 75 97	60 75 97
Start of scale	0 °C	00	00
Output	0 ... 20 mA 4 ... 20 mA 0 ... 10 V	D L	V

Output curve rising, without filter constant, internal reference junction

ThermoTrans® 210: open circuit recognition 22 mA; ThermoTrans® 211: open circuit recognition 11 V

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

# Temperature Transmitters

Isolation Amplifiers  
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors


Fittings

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## Product Line (continued)

Customer-specific models	Order No.	ThermoTrans® 210 with current output	ThermoTrans® 211 with voltage output
		210 A7 999 999 Opt. 444	211 A7 999 999 Opt. 444

## ■ Configuration Schedule

**Important!** Please fill in the configuration schedule completely and enclose it with your order. If entries are missing, the value entered in square brackets or the red-colored setting  will be set.

### ThermoTrans® 210/211

Sensor	Thermocouple: <input type="checkbox"/> Type B <input type="checkbox"/> Type E <input type="checkbox"/> Type J <input checked="" type="checkbox"/> Type K <input type="checkbox"/> Type L <input type="checkbox"/> Type N <input type="checkbox"/> Type R <input type="checkbox"/> Type S <input type="checkbox"/> Type T <input type="checkbox"/> Type U <input type="checkbox"/> Voltage
Range	Start of scale <sup>1)</sup> ___ °C [0 °C] or ___ mV Span <sup>1)</sup> ___ K [1000 K] or ___ mV
Reference junction	<input checked="" type="checkbox"/> Internal <input type="checkbox"/> External Pt 100 <input type="checkbox"/> Internal/external, selectable (via jumper) <input type="checkbox"/> Permanently set temperature <sup>2)</sup> or ___ , ___ °C [25 °C]
Output <sup>3)</sup>	<input checked="" type="checkbox"/> 0 ... 20 mA <input type="checkbox"/> 4 ... 20 mA <input type="checkbox"/> 0 ... 10 V
Curve	<input checked="" type="checkbox"/> Rising <input type="checkbox"/> Falling
Error messages	Message: <input checked="" type="checkbox"/> only with open circuit <input type="checkbox"/> with open circuit and overrange Signal: <input checked="" type="checkbox"/> 22 mA or 11 V <input type="checkbox"/> -1 mA or -0.5 V
Filter constant T <sub>99</sub>	___ s <sup>1)</sup> (1st order filter) [0 s]
Tag number	_____ [none]

1) See the specifications for the possible parameter range

2) Compensation range -10 ... 80 °C

3) Other values on request

# Modular Housings for Hazardous Areas

## ThermoTrans® 210/211

### ■ Specifications

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

### Specifications (continued)

#### Transmission behavior

Characteristic	Resistance or temperature linear rising or falling
Meas. rate	Approx. 1/s
Response time $T_{99}$	$\leq 900$ ms
Digital output filter	$T_{99} = 0 \dots 100$ 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 (input against output and power supply) 3 kV AC (output against power supply)
Working voltage (basic insulation)	1000 V AC/DC input against output and power supply with overvoltage category II and pollution degree 2, 330 V AC/DC output against power supply with overvoltage category II and pollution degree 1, according to EN 61010-1. For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks. For hazardous area applications the maximum working voltage is 250 V.
Protection against electric shock	Safe Isolation according to EN 61140 by reinforced insulation in accordance with 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, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks. For hazardous area applications the maximum working voltage is 250 V.

# Modular Housings for Hazardous Areas

## ThermoTrans® 210/211

### Specifications (continued)

#### Standards and approvals

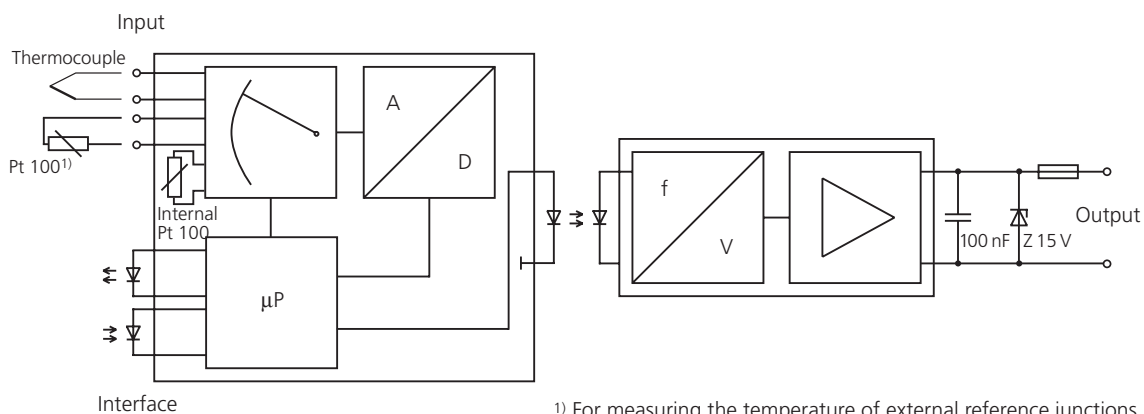
Explosion protection (Opt. 444)	II (1) G [EEx ia] II C PTB 02 ATEX 2107 For further details see certificates of conformity at our website: <a href="http://www.knick.de">www.knick.de</a>
Surge withstand	5 kV 1.2 / 50 $\mu$ s according to IEC 255-4
EMC <sup>1)</sup>	89/336/EEC directive, EN 61326, NAMUR NE 21

#### Other data

Interface (adjustable models only)	Optical, interface adapter on RS 232 interface (PC) is included in the communications kit (ZU 0254)
Ambient temperature	Operation: -10 ... +60 °C Transport and storage: -30 ... +80 °C
Design	A7 modular housing, width 22.5 mm, screw terminals See dimension drawings for further measurements
Ingress protection	Housing IP 40, terminals IP 20
Mounting	With snap-on mounting for 35 mm top hat rail according to EN 50022-35, width 22.5 mm, see dimension drawings for conductor cross section
Weight	Approx. 300 g

1) Slight deviations are possible while there is interference from RF radiation

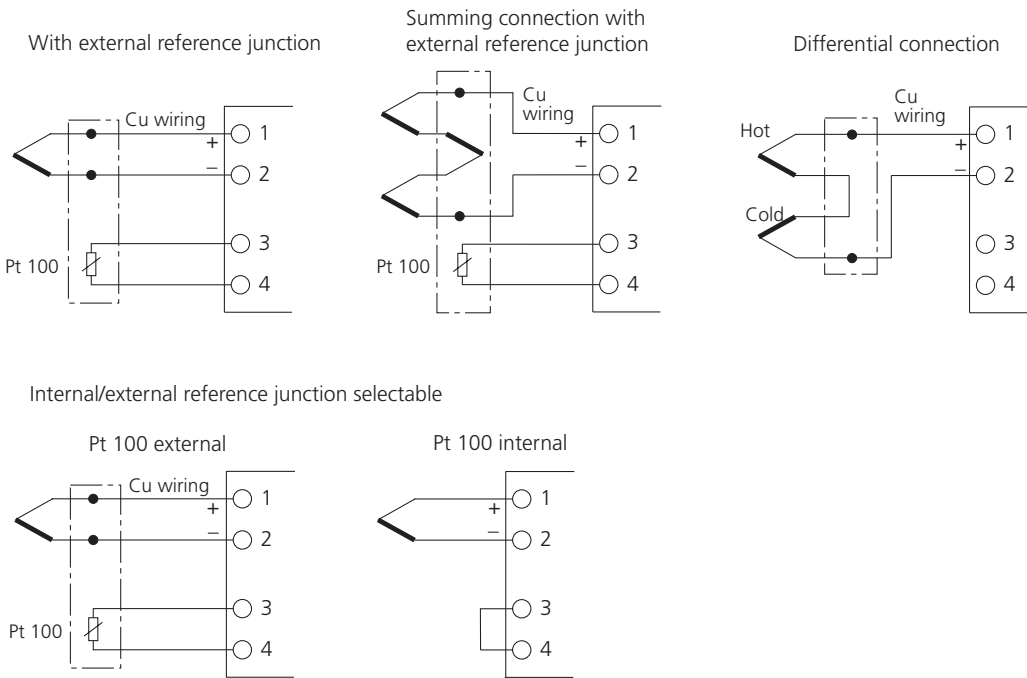
### ■ Block Diagram



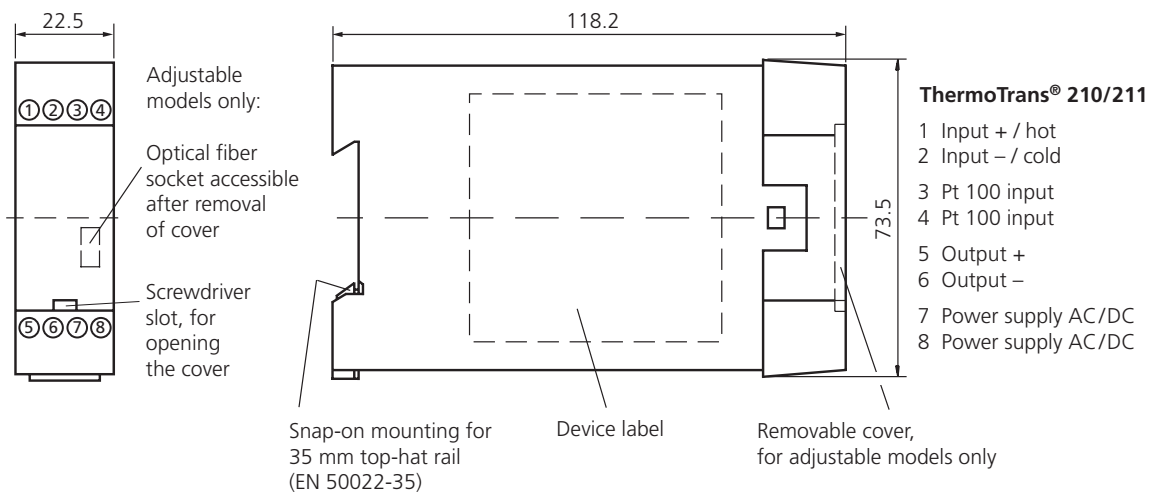
# Temperature Transmitters



## Application Examples



## Dimension Drawings and Terminal Assignments



Captive M3x8 clamping screws, box terminals with self-releasing wire protection  
 Max. conductor cross-section  
 1x4 mm<sup>2</sup> solid  
 1x2.5 mm<sup>2</sup> stranded wire with ferrule  
 2x1.5 mm<sup>2</sup> stranded wire with ferrule

All dimensions in mm!