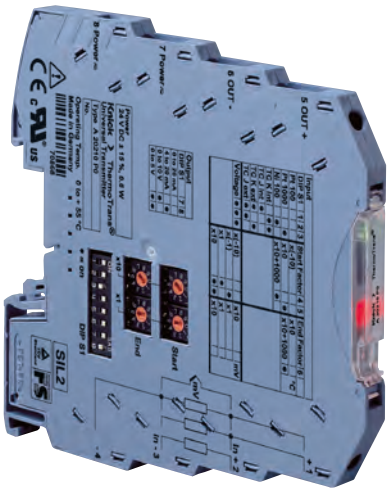

ThermoTrans A 20210

Standard transmitters for temperature measurement in a 6 mm housing using resistance thermometers or thermocouples.

The Task
In virtually all areas of industry, temperatures are continuously measured and often used as a reference input for closed-loop control systems, monitoring systems, safety shutdown systems, or for similar critical jobs.
As a rule, high demands are placed on function, accuracy, flexibility and electrical safety. Different sensors are used depending on the measuring task. They provide a raw signal which is prepared, linearized and standardized for further processing using a temperature transmitter.

The Problem
The range of standardized and commercial temperature sensors is extremely broad. The large number of sensors, connection variants, individual temperature ranges, different supply voltages, and required output signals call for very flexible transmitters that can be optimally suited to the different conditions.
However, the required flexibility should not come at the price of complex operation. Rather, being able to easily make adjustments on site is desirable. High performance should not result in increased susceptibility – high reliability and availability are essential.

The Solution
The flexible ThermoTrans A 20210 temperature transmitters provide connection possibilities for most of the common thermocouples and resistance thermometers. They can be flexibly adapted to the respective measuring task using DIP and rotary encoder switches.
3-port isolation with protective separation up to 300 V AC/DC according to EN 61140 ensures optimum protection of personnel and equipment as well as unaltered transmission of measuring signals. The ThermoTrans A 20210 offer maximum performance in the smallest of spaces.
Resistance thermometers can be operated in 2-, 3- or 4-wire configuration. The connection configuration is automatically recognized, adjustment is not required. Thermocouples can be detected with internal or external reference junction compensation.

Input voltage signals up to ±1000 mV are converted into standard 0/4 to 20 mA or 0 to 10 V signals. This enables low-cost implementation of current measurements using shunt resistors, for example.

Special measuring tasks can be solved with ThermoTrans devices which Knick configures according to individual specifications. Fixed-range devices without switch are used, for example, when manipulations or mix-ups must be precluded.

The Housing
The modular housing – 6 mm slim – is stingy with enclosure space and allows for high component densities. DIN rail bus connectors inserted in the mounting rail facilitate the power supply connection if necessary.

ThermoTrans A 20210

Facts and Features

- **Flexible use**
  with common temperature sensors: Pt100, Pt1000, Ni100, type J and K thermocouples
- **Intuitive configuration**
  easy, without tools, using 4 rotary and 8 DIP switches
- **Calibrated range selection**
  without complicated adjustment
- **Automatic detection**
  of the sensor connection (2-, 3-, or 4-wire)
- **Protective separation**
  according to EN 61140 – protection of the maintenance staff and downstream devices against excessively high voltages up to 300 V AC/DC
- **High accuracy**
  with innovative switching concept
- **Minimum space requirement**
  in the enclosure – only 6 mm wide modular housing – more transmitters per meter of mounting rail
- **Low-cost assembly**
  quick mounting, convenient, connection of power supply via DIN rail bus connectors
- **5-year warranty**

Product Line

ThermoTrans A 20210, adjustable

Order no.	**A 20210 P0**

ThermoTrans A 20210, fixed setting

Order no.	**A 20210 P0 /**	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Input / sensor type	Pt100 (-200 … +850 °C)	**P**															
	Pt1000 (-200 … +850 °C)	**Q**															
	Ni100 (-60 … +180 °C)	**N**															
	TC / J (-210 … +1200 °C)	**J**															
	TC / K (-200 … +1372 °C)	**K**															
	TC / J (-210 … +1200 °C), ext. ref. junction compensation (Pt100)	**X**															
	TC / K (-200 … +1372 °C), ext. ref. junction compensation (Pt100)	**Y**															
	U (-1000 mV … +1000 mV)	**U**															
	Other	**S**															
Start of range	Prefix + or -		**X**														
	4-digit number (°C / mV)			**X**	**X**	**X**	**X**										
End of range	Prefix + or -							**X**									
	4-digit number (°C / mV)								**X**	**X**	**X**	**X**					
Output	0 … 20 mA												**A**				
	4 … 20 mA												**B**				
	0 … 10 V												**C**				
	0 … 5 V												**D**				
Further customer-specific settings (e.g., different thermocouple)	Without																
	As specified													**n**	**n**	**n**	**n**

Example

Fixed setting model	Pt1000 / -50 °C … +150 °C / 4 … 20 mA																
	Order no. A 20210 P0 /	**Q**	**–**	**0**	**0**	**5**	**0**	**+**	**0**	**1**	**5**	**0**	**B**				

Accessories		**Order no.**
DIN rail bus connector	Power supply bridging for two isolators each	**ZU 0628**
IsoPower A 20900	Power supply	**A 20900 H4**
ZU 0678 DIN rail bus connector	for tapping of supply voltage (on right side of IsoPower A 20900, 2 units required)	**ZU 0678**
Supply terminal	for 24 V DC (redundant) to ZU 0628	**ZU 0677**

ThermoTrans A 20210

Specifications

Resistance thermometers

Input data	Sensor type	Standard	Range
Input	Pt100	DIN 60751	–200 … +850 °C
	Pt1000	DIN 60751	–200 … +850 °C
	Ni100	DIN 43760	–60 … +180 °C
Connection	2-, 3- or 4-wire (automatic recognition), signaling via yellow LED		
Resistance range incl. line resistance	0 … 5 kohms		
Max. line resistance	100 ohms		
Supply current	200 µA, 400 µA or 0 … 500 µA		
Line monitoring	Open circuits		
Input error limits	Resistances < 5 kohms:	± (50 mohms + 0.05 % meas. val.) for spans > 15 ohms	
	Resistances > 5 kohms:	± (1 ohm +0.2 % meas. val.) for spans >50 ohms	
Temperature coefficient at the input	< 50 ppm/K of adjusted end value (average TC within allowable operating temp range, reference temp 23 °C)		

Thermocouples

Input data	Sensor type	Standard	Range
Input	Type J	DIN 60584-1	-210 … +1200 °C
	Type K	DIN 60584-1	-200 … +1372 °C
Input resistance	> 10 Mohms		
Max. line resistance	1 kohm		
Line monitoring	Open circuits		
Input error limits	± (10 µV + 0.05 % meas. val.) for spans > 2 mV		
Temperature coefficient at the input	< 50 ppm/K of adjusted end value (average TC within allowable operating temp range, reference temp 23 °C)		
Reference junction compensation	internal external (Pt100), fixed value or uncompensated		
Internal reference junction compensation error	< 1.5 K		
External reference junction compensation error	< 80 mohms + 0.1 % meas. val.	via Pt100 for T_{comp} = 0 … 80 °C	

Shunt voltages

Input data	
Input	–1000 … +1000 mV unipolar/bipolar
Input resistance	> 10 Mohms
Input error limits	± (200 µV + 0.05 % meas. val.) for spans > 50 mV
Line monitoring	Open circuits
Temperature coefficient at the input	< 50 ppm/K of adjusted end value (average TC within allowable operating temp range, reference temp 23 °C)
Overload capacity	5 V across all inputs

Specifications *(continued)*

Output data		
Outputs	0 … 20 mA, 4 … 20 mA, 0 … 5 V 0 … 10 V	calibrated switching (default setting 4 … 20 mA)
Control range	0 … approx. 102.5 % of span at 0 … 20 mA, 0 … 10 V or 0 … 5 V output –1.25 … approx. 102.5 % of span at 4 … 20 mA output	
Resolution	16 bit	
Load	Current output: Voltage output:	≤ 10 V (≤ 500 ohms at 20 mA) ≤ 1 mA (≥ 10 kohms at 10 V)
Output error limits	Current output: Voltage output:	±(10 µA + 0.05 % meas. val.) ±(5 mV + 0.05 % meas. val.)
Residual ripple	< 10 mV_{eff}	
Temperature coefficient at the output	< 50 ppm/K full scale (average TC in allowable operating temperature range, reference temperature 23 °C)	
Error signaling	0 … 20 mA output: I = 0 mA or ≥ 21 mA 4 … 20 mA output: I ≤ 3.6 mA or ≥ 21 mA 0 … 5 V or 0 … 10 V output: V = 0 V or V ≥ 5.25 V or V ≥ 10.5 V via output signal and red LED for out-of-range conditions, incorrect parameter setting, sensor short circuit and line break, output load error, other device errors. See also "Error Signaling" table.	
Response		
Characteristic	Rising / falling linearly	
Measuring rate	approx. 3 / s*	
Display		
Green LED	Power supply	
Yellow LED	Signaling the connection type	
Red LED	Maintenance request/device failure	
Power supply		
Power supply	24 V DC (–20 %, +25 %), approx. 1.2 W The power supply can be routed from one device to another via DIN rail bus connectors.	

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Specifications *(continued)*

Isolation

Galvanic isolation	3-port isolation between input, output, and power supply
Test voltage	2.5 kV AC, 50 Hz: power supply against input against output
Working voltage (basic insulation)	Up to 300 V AC/DC across all circuits with overvoltage category II and pollution degree 2 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.
Protection against electric shock	Protective separation to EN 61140 by reinforced insulation according to EN 61010-1. Working voltage up to 300 V AC/DC across all circuits with overvoltage category II and pollution degree 2. 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.

Standards and approvals

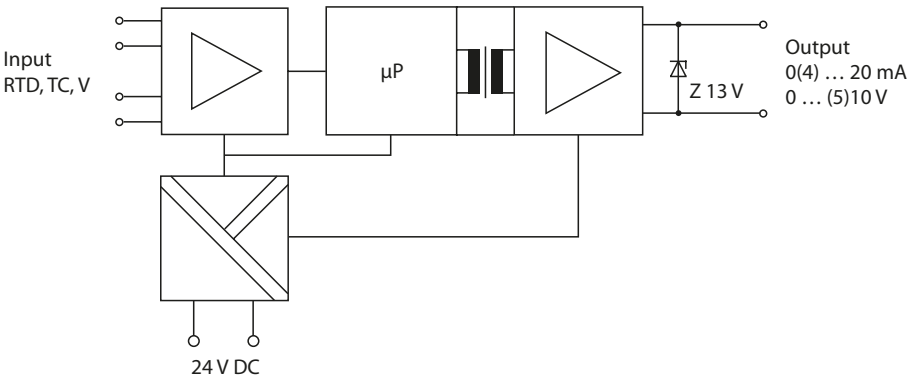
EMC	Product family standard: EN 61326 Emitted interference: Class B Immunity to interference[1]: Industrial environment
cURus	File no. 220033 Standards: UL 508 and CAN/CSA 22.2 No. 14-95
RoHS conformity	According to directive 2011/65/EU

Further data

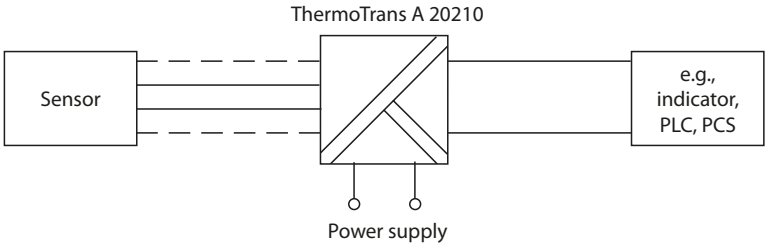
Ambient temperature	Operation: 0 … +55 °C mounted without gaps 0 … +65 °C with gaps ≥ 6 mm Storage: –25 … +85 °C
Ambient conditions	Stationary, weather-protected operation Relative humidity: 5 … 95 %, no condensation Barometric pressure: 70 … 106 kPa Water or wind-driven precipitation (rain, snow, hail, etc.) excluded
Design	Modular housing with screw terminals, 6.2 mm wide See dimension drawings for further measurements
Tightening torque	0.6 Nm
Ingress protection	Terminals IP 20, housing IP 40
Mounting	For 35 mm DIN rail acc. to EN 60715
Connection	Conductor cross sections Single wire 0.2 … 2.5 mm² Stranded wire: 0.2 … 2.5 mm² 24-14 AWG
Weight	Approx. 60 g

*) For thermocouples with external reference junction compensation: approx. 2 / s
1) Slight deviations are possible while there is interference

Block Diagram

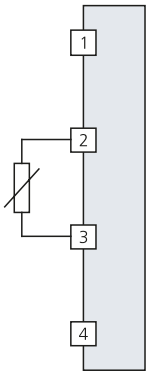


Typical Applications

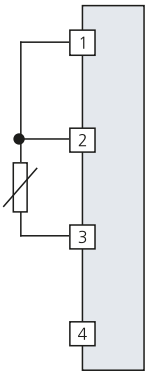


Connection of Resistance Thermometers

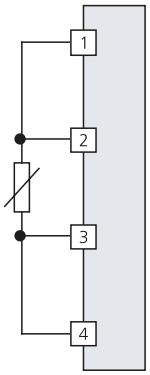
RTD
2-wire configuration



RTD
3-wire configuration



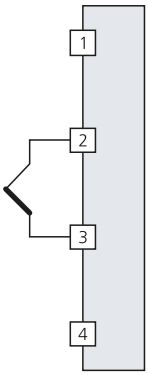
RTD
4-wire configuration



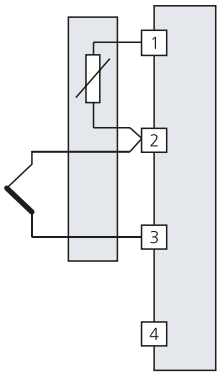
Typical Applications *(continued)*

Connection of Thermocouples

Thermocouple with internal reference junction compensation

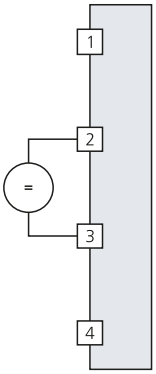


Thermocouple with external reference junction compensation

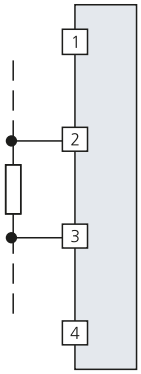


Voltage Input

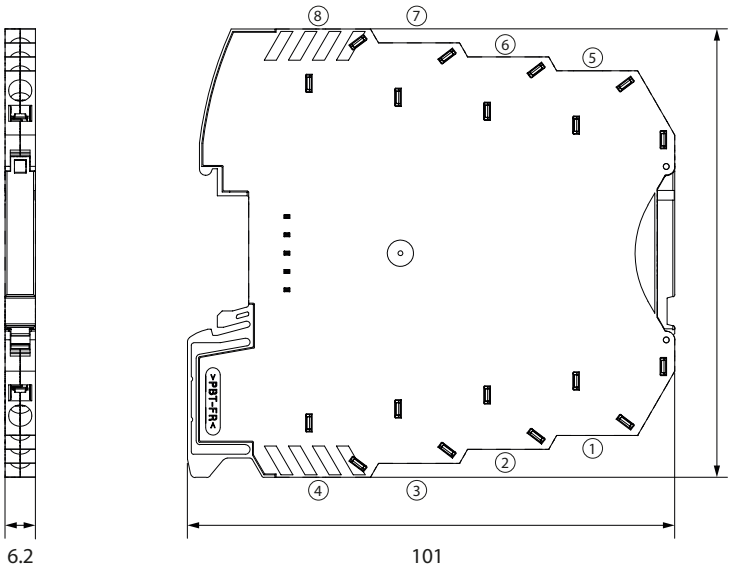
Voltage measurement



Current measurement via shunt resistor



Dimension Drawing and Terminal Assignments



Terminal assignments

1	Input	+
2	Input	+
3	Input	–
4	Input	–
5	Output	+
6	Output	–
7	Power supply	+
8	Power supply	–

Conductor cross-sections:
single wire 0.2 … 2.5 mm²
stranded wire 0.2 … 2.5 mm²
24-14 AWG

All dimensions in mm

ThermoTrans A 20210

Error Signaling

No.	Error	Signal configuration[1)]	Output			
			4 ... 20 [mA]	0 ... 20 [mA]	0 ... 5 [V]	0 ... 10 [V]
0	None	Not self-locking	–	–	–	–
1	Underrange	Not self-locking	3.6	0	0	0
2	Overrange	Not self-locking	21	21	5.25	10.5
3	Sensor short circuit	Not self-locking	21	21	5.25	10.5
4	Sensor open	Not self-locking	21	21	5.25	10.5
5	–	–	–	–	–	–
6	Output load error	Not self-locking	3.6	0	0	0
7	Identification of connection	Not self-locking	21	21	5.25	10.5
8	Switch misadjusted	Not self-locking	21	21	5.25	10.5
9	Adjustment error	Not self-locking	21	21	5.25	10.5
10	Device error	Not self-locking	3.6	0	0	0

[1)] With the "self-locking" configuration, the error signal is maintained after termination of the error cause. The error message can be reset through a restart (power supply on/off).

Response of the Output Current (4 … 20 mA) to Out-of-Range Conditions