1. General Information

Warning!
Protection against electric shock
For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

Caution!
Be sure to take protective measures against electrostatic discharge (ESD) when handling the devices!

Caution!
Installation of the ThermoTrans® P 32100 temperature transmitters must be performed by trained and qualified personnel only. Do not connect the device to power supply before it is professionally installed. Do not change the measurement range during operation! Be sure to observe the national codes and regulations during installation and selection of cables and lines. A two-pole circuit breaker must be installed between device and mains supply.

2. Application
The ThermoTrans® P 32100 temperature transmitters provide connection possibilities all common thermocouples and resistance thermometers.
When a resistive sensor is connected, 2-, 3-, or 4-wire configuration is automatically recognized at device startup.
Note: When the configuration is changed from 2-wire to 3-wire (or 4-wire) or from 3-wire to 4-wire, this is only recognized after device's next restart.
The output signal is adjustable to 0 / 4 ... 20 mA, or 0 ... 5 / 10 V. The calibrated range selection is performed using DIP and rotary coding switches. Alternatively, the devices can be configured via an IrDA interface located in the upper part of the unit. The device provides a broad-range power supply and galvanic 3-port isolation.

3. Configuration
Set the DIP and rotary coding switches according to the table on the housing. An example is shown on the back.
Sensor type:
Adjust the connected sensor using the switches DIP1 to DIP3.
Start value:
Adjust the numeric value (00 ... 99) using the "Start" coding switches.
Adjust the factor using the switches DIP4, DIP5.
A falling curve is obtained with the setting "start value">"end value".
End value:
Adjust the numeric value (00 ... 99) using the "End" coding switches.
Adjust the factor using the switch DIP6.
Output signals:
Adjust the output signal using the switches DIP7, DIP8.

Caution! Important notice!
After completion of configuration you must cover the switches with the included self-adhesive polyimide tape.
For information on IrDA interface configuration, please refer to the instruction manual for the Paraly® 111 software.

4. Mounting, Electrical Connection
The transmitters are snapped onto TS 35 standard rails and laterally fixed by suitable end brackets. See dimension drawing for terminal assignments. Conductor cross-section: 0.2 mm^2 ... 2.5 mm^2 (AWG 24-14).

5. Functional Safety according to IEC/EN 61508
The ThermoTrans® P 32100P0/1x temperature transmitters can be used for monitoring safety-relevant points of measurement up to SIL2 (or SIL3 in the case of redundant configuration).
The safety-relevant characteristics and further information concerning functional safety are to be taken from the Safety Manual.

CE In compliance with the EU directives 89/336/EEC "Electromagnetic Compatibility" and 73/23/EEC "Low-Voltage Directive"

6. Specifications

Input data RTD / R

Sensor type (Standard)	Range [°C]
Pt100 (DIN 60751)	- 200 ... 850
Pt1000 (DIN 60751)	- 200 ... 850
Ni100 (DIN 43760)	- 60 ... 180
Connection	2-, 3- or 4-wire (automatic identification)
Resistance range (incl. line resistance)	Temperature measurement: 0 ... 5 kΩ Resistance measurement: 0 ... 5 kΩ or 5 ... 100 kΩ
Max. line resistance	100 Ω
Supply current	Max. 500 µA
Line monitoring	Open circuits
Input error limits	For resistances < 5 kΩ: ± (50 mΩ + 0.05 % meas.val.) for spans > 15Ω For resistances > 5 kΩ: ± (1 Ω + 0.2 % meas.val.) for spans > 50Ω
Temperature coefficient at the input	50 ppm/K of adjusted end value (average TC in permitted operating temp range, reference temp 23 °C)

Thermocouple input data

Sensor type (Standard)	Meas. range [°C]	selectable via IrDA only:
B (DIN 60584-1)	250 ... 1820	x
E (DIN 60584-1)	- 200 ... 1000	x
J (DIN 60584-1)	- 210 ... 1200	
K (DIN 60584-1)	- 200 ... 1372	
L (DIN 43710)	- 200 ... 900	x
N (DIN 60584-1)	- 200 ... 1300	x
R (DIN 60584-1)	- 50 ... 1767	x
S (DIN 60584-1)	- 50 ... 1767	x
T (DIN 60584-1)	- 200 ... 400	x
U (DIN 43710)	- 200 ... 600	x
W3Re/W25Re (ASTM E988-96)	0 ... 2315	x
W5Re/W26Re (ASTM E988-96)	0 ... 2315	x
Input resistance	> 10 MΩ	
Max. line resistance	1 kΩ	
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 in permitted operating temp range, reference temp 23 °C)	
Reference junction compensation	Internal / external Via IrDA or fixed value	
Error of external reference junction compensation	Via Pt100 for T_{comp}= 0 ... 80 °C: ± (80 mΩ + 0.1 % meas.val.)	
Error of internal reference junction compensation	± 1.5 °C	

Shunt voltage input data

input	-1000 ... 1000 mV unipolar/bipolar
Input resistance	> 10 MΩ
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 in permitted operating temp range, reference temp 23 °C)
Overload	5 V across all inputs

Output data

Outputs	0 ... 20 mA, 4 ... 20 mA, 0 ... 10 V or 0 ... 5 V, calibrated selection
Control range	0 % to approx. 102.5% span for 0 ... 20 mA, 0 ... 10 V or 0 ... 5 V output -1.25 % ... approx. 102.5% span for 4 ... 20 mA output
Resolution	16 bits
Load Current output Voltage output	≤ 500 Ω ≥ 10 kΩ
Load (SIL) Current output Voltage output	50 ... 500 Ω ≥ 10 kΩ
Output error limits Current output Voltage output	± (10 µA + 0.05 % meas.val.) ± (5 mV + 0.05 % meas.val.)
Residual ripple Current output Voltage output	< 10 mV$_{rms}$ (for 500 Ω load) < 10 mV$_{rms}$ (for 10 kΩ load)
Temperature coefficient at the output	50 ppm/K of end value (average TC in permitted operating temp range, reference temp 23 °C)
Error signaling	Output: 4 ... 20 mA: Current ≤ 3.6 mA or ≥ 21 mA (see table for more data)

Transmission behavior

Curve	Rising / falling linearly; via IrDA: curve defined by sampling points or polynomials
Meas. rate	Approx. 3/sec (The meas. rate is approx. 2/sec for the 5 ... 100 kohms resistance range or for thermocouples with external reference junctions (Pt 100)).

Power supply

Broad-range power supply P32100 /x1	24 V...110 V DC (± 20 %), appr. 1.0 W 110 V ... 230 V AC (± 10 %), 48 ... 62 Hz, approx. 2.0 VA
24 V DC power supply unit P32100 /x0	24 V DC (- 20%, + 25 %), appr. 0.8 W
Power supply unit P32100 /x2	110 V ... 230 V AC (± 10 %), 48 ... 62 Hz, approx. 1.8 VA

Isolation

Test voltage	2.5 kV, 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. For applications with high working voltages, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.
Protection against electric shock	Safe Isolation 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, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.

Standards and approvals

Functional Safety (SIL types according to IEC/EN 61508	SIL 2 SIL 3 with redundant configuration
EMC	Product family standard EN 61326 Emitted interference: Class B Immunity to interference*: Industry EMC requirements for devices with safety-related functions IEC 61326-3 * Slight deviations are possible while there is interference
⒰us	Standards: UL 508 and CAN/CSA 22.2 No. 14-95
KTA	KTA 3503:11/05 (only P32100P0/11 with test certificate, accessory ZU0541)

Other data

Ambient temperature during operation during storage	0 ... +55 °C (mounted in row) 0 ... +65 °C (spacing ≥ 6 mm) -25 ... +85 °C
Ambient conditions	Stationary application, weather-protected Rel. air humidity 5 ... 95 %, no condensation Barometric pressure: 70 ... 106 kPa Water or wind-driven rain, snow, or hail excluded
Protection	Terminal IP 20, housing IP 40
Fastening	For 35 mm top hat rail (EN 50022)
Weight	Approx. 60 g

7. LED and Error Signaling on Device

Note: Green and red LEDs flash momentarily at device startup.

Green: Supply voltage provided

Yellow: The identified connection type is signaled once at the start of RTD measurement
(2/3/4-time flashing corresponds to 2/3/4-wire measurement)
Blinking: IrDA active
Permanent light: IrDA connected

Red: Error status; LED flashing indicates error number

No.	Error	Output [mA] 4 ... 20	Output [mA] 0 ... 20	Output [V] 0 ... 5	Output [V] 0 ... 10
1	Value below range limit*	3.6	0	0	0
2	Value above range limit*	21	21	5.25	10.5
3	Sensor short circuit*	21	21	5.25	10.5
4	Sensor open	21	21	5.25	10.5
5	- not connected for P32100 -				
6	Output load error* **	3.6	0	0	0
7	Identification of connection	21	21	5.25	10.5
8	Switch misadjusted	21	21	5.25	10.5
9	Parameter error	21	21	5.25	10.5
10	Device error, self-locking				
	SIL	< 3.6	< 3.6	< 0.1	< 0.1
	Without SIL	3.6	0	0	0

* Self-locking error for P32100P0/1x version only
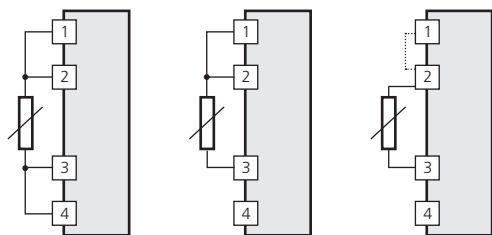** Output load error for P32100P0/1x version only

Operation via IrDA interface

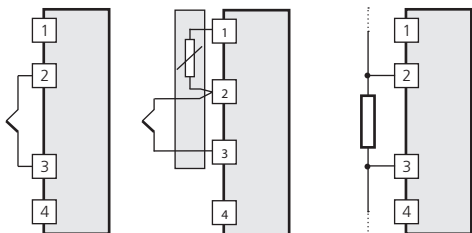| DIP switch All (1 ... 8):	Rotary coding switch 1	2	3	4	Function
ON	0	0	0	0	IrDA configuration, read / write
OFF	0	0	0	0	IrDA configuration, read only

8. Input Wiring (more via IrDA)

RTD/Resistor: 4-wire

RTD/Resistor: 3-wire

RTD/Resistor: 2-wire
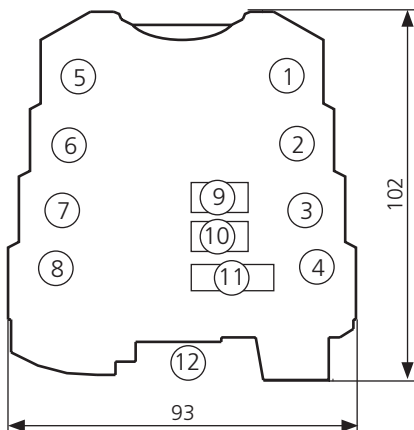(For 2-wire measurement with R > 5kΩ place jumper across terminal 1 and terminal 2)

TC

TC with ext. reference junction compensation (Pt 100)

Shunt

9. Dimension Drawing and Control Elements

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1	Input 1 +
2	Input 2 +
3	Input 3 -
4	Input 4 -
5	Output +
6	Output -
7	Power supply
8	Power supply
9	Start value (2 rotary coding switches)
10	End value (2 rotary coding switches)
11	DIP switches with the following assignment:
	1,2,3: Sensor selection
	4,5,6: Factor for start / end value
	7,8: Output signal selection
12	7,8: 24 VDC power supply via DIN rail bus connector

10. Typical Configuration

Sensor: Thermocouple type J
Range: 200 ... 1200 °C
Output signal: 4 - 20 mA

Adjust sensor type:
TC Type J: DIP1 = 1, DIP2 = 0, DIP 3 = 0

Adjust start value:
200 °C
This start value is composed of: numerical value = 20, factor = x10.

Adjust the numerical value at the coding switches (see dimension drawing, pos. 9):   20
Adjust factor x10:   DIP4 = 0, DIP5 = 1

Adjust end value:
1200 °C
For end values above 1000 °C, adjust factor x10+1000

Adjust the numerical value at the coding switches (see dimension drawing, pos. 10):   20
Adjust factor x10+1000:   DIP6 = 1

Adjust output signal:
4 ... 20 mA: DIP 7 = 0, DIP 8 = 1

Caution!
After completion of configuration you must cover the switches with the included self-adhesive polyimide tape.

11. Output Current (4 ... 20 mA) Response to Out-of-Range Conditions

12. Order Information

Type	Order No.
Temperature transmitter, adjustable, without SIL	P32100P0/0
Temperature transmitter, adjustable, with SIL	P32100P0/1
Power supply 110 ... 230 V AC via screw terminals only	2
Power supply Broad-range power supply, 24 ... 110 V DC / 110 ... 220 V AC via screw terminals only	1
Power supply 24 V DC via screw terminals or DIN rail bus connector	0

Order code for fixed-range models:

P32100P0/

Further customer-specific settings

Output:
A   0 ... 20 mA
B   4 ... 20 mA
C   0 ... 10 V
D   0 ... 5 V

End of range (4 digits with sign)

Start of range (4 digits with sign)

Input:

P	Pt100	(-200 ... +850 °C)
Q	Pt 1000	(-200 ... +850 °C)
N	Ni100	(-60 ... +180 °C)
J	TC / J	(-210 ... +1200 °C)
K	TC / K	(-270 ... +1372 °C)
X	TC / J	(-210 ... +1200 °C) *
Y	TC / K	(-270 ... +1372 °C) *
U	U	(-1000 mV ... +1000 mV)
S	Other	

* with ext. reference junction compensation (Pt100)

Power supply
2: Power supply, 110 ... 230 V AC
1: Broad-range power supply, 24 ... 110 V DC / 110 ... 220 V AC via screw terminals only
0: 24 V DC via screw terminals or DIN rail bus connector

Functional Safety (EN 61508)
0: Without
1: SIL 2 (up to SIL 3 in the case of redundant configuration)

Accessories	Order No.
DIN rail bus connector: Power supply bridging for 2 P 32100P0/x0 modules each	ZU 0628
IsoPower® A 20900 current supply 24 V DC, 1 A, A 20900 H4 current supply	A 20900 H4
DIN rail bus connector: tapping of supply voltage, routing to ZU 0628	ZU 0678
Power terminal block Feeding the supply voltage to the DIN rail bus connector ZU 0628	ZU 0677
Paraly® SW 111 communication software	SW111
Test certificate according to KTA 3507	ZU0541

ThermoTrans® P 32100
Temperature Transmitters
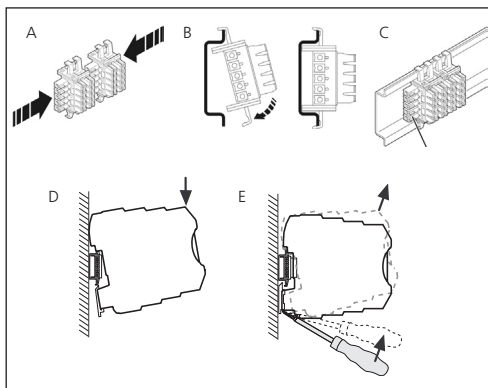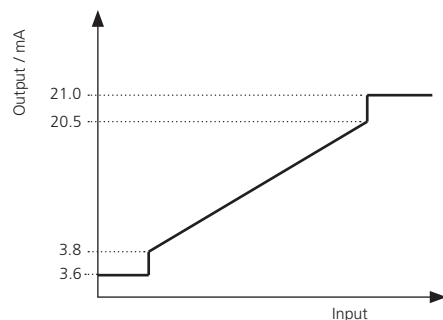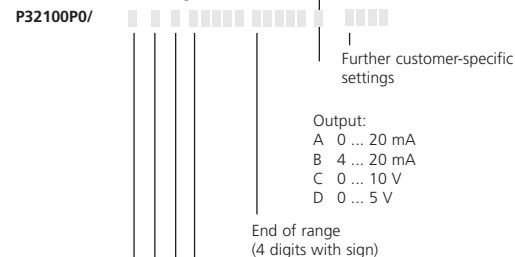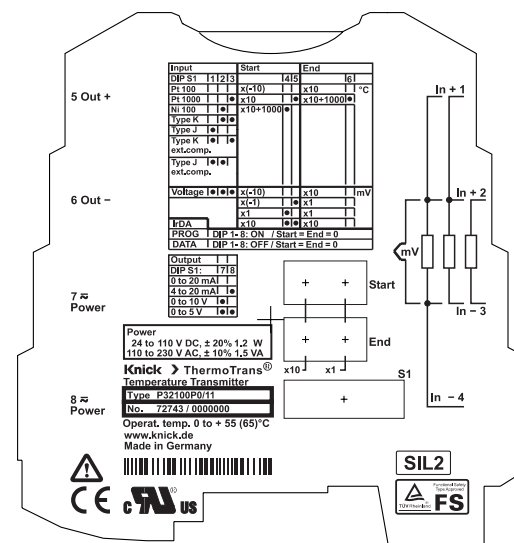

Fig.:   A   Mounting ZU 0628 DIN rail bus connectors in a row
        B   Snapping the bus connectors onto a DIN rail
        C   Bus connectors on a DIN rail
        D   Snapping a temperature transmitter onto a DIN rail
        E   Removing a temperature transmitter from a DIN rail

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