

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 SensoTrans® R A 20230 resistance 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.

Information on explosion protection:

The device is a category 3 electrical apparatus for application in Zone 2. The device must be installed in a housing with IP 54 protection according to EN 60529. The specified limits for mechanical or thermal loads must be observed. Only devices designed for operation in the hazardous areas of Zone 2 may be connected.

2. Application

The SensoTrans® R A 20230 resistance transmitters provide connection possibilities for all standard resistors (0...5 kohm and 5kohm...100 kohm ranges) and potentiometers for angle, path, or position detection up to 50 kohms.
When a resistor is connected, 2-, 3-, or 4-wire configuration is automatically recognized at device startup.
Notice: 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 the 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.

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 DIP1 to DIP3 switches.

Start value:
Adjust the numerical value (00 ... 99) using the “Start” coding switches. Adjust the factor using the DIP4, DIP5 switches.
A falling curve is obtained with the setting “start value”>“end value”.

End value:
Adjust the numerical value (00 ... 99) using the “End” coding switches. Adjust the factor using the DIP6 switch.

Output signals:
Adjust the output signal using the DIP7, DIP8 switches.

Teach-in function:
The “teach-in function” can be used to adjust the measurement setup consisting of transmitter and potentiometer or resistor.
The currently measured value is stored as start or end value.

The teach-in function is activated using the button on the device front. This can be done with a screwdriver (blade width max. 2.5 mm). The front cover provides a corresponding opening.

Caution!
Only use a screwdriver that is safely isolated from the voltage applied to the input.

Step 1 (initial configuration):
Adjust the sensor type using the DIP1 ... 3 switches and the suitable output signal using the DIP7 and DIP8 switches.

Step 2:
Call up start value adjustment:
Hit the front button once. The yellow LED will repeatedly flash briefly (timeout: 30 sec)

To save the currently measured value as start value:
Press front button for 3 sec. The yellow LED will light up once.

Call up end value adjustment:
Hit the front button twice. The yellow LED will repeatedly double flash (timeout: 30 sec).

To save the currently measured value as end value:
Press front button for 3 sec. The yellow LED will light up once.

Step 3:
The data are stored in the teach-in configuration and can be activated with the following switch positions:

Teach-in configuration on, configuration cannot be changed:
All DIP switches = 0
All rotary switches = 0

Teach-in configuration on, configuration for start and end values can be changed by a new teach-in process:
All DIP switches = 1
All rotary switches = 0

Caution!
If you do not activate the teach-in configuration after having terminated the teach-in process, the transmitter uses the configuration adjusted by the DIP/rotary coding switches.

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

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 mm² ... 2.5 mm² (AWG 24-14).

5. Specifications


Resistor input data	
Resistance range (incl. line resistance)	0 ... 5 kΩ or 5 ... 100 kΩ
Connection	2-, 3- or 4-wire (automatic identification)
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)

Potentiometer input data	
Input	200 Ω ... 50 kΩ
Connection	3- or 4-wire
Supply current	0 ... 5 mA
Line monitoring	Open circuits
Input error limits	± (0.2 % f.s. +0.05 % meas.val.) for spans > 5 %
Temperature coefficient at the input	50 ppm/K of adjusted end value (average TC in permitted operating temp range, reference temp 23 °C)

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	≤ 10 V (≤ 500 Ω at 20 mA)
Voltage output	≤ 1 mA (≥ 10 kΩ at 10 V)
Output error limits	
Current output	± (10 µA + 0.05 % meas.val.)
Voltage output	± (5 mV + 0.05 % meas.val.)
Residual ripple	< 10 mV _{rms}
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 on back for more data)

Transmission behavior	
Curve	Rising / falling linearly
Meas. rate	Approx. 3/sec
Response time t ₉₉	300 ms

Power supply	
24 V DC power supply unit	24 V DC (-20%, +25%), approx. 1.2 W
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.

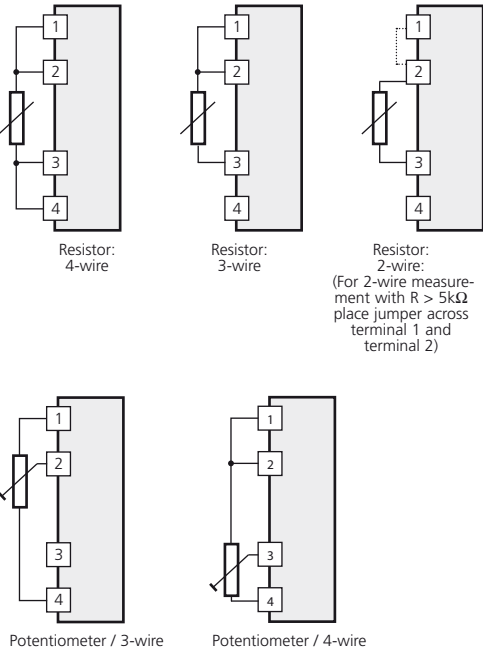
Standards and approvals	
EMC	Product family standard EN 61326 Emitted interference: Class B Immunity to interference*: Industry EMC requirements for devices with safety-related functions IEC 61326-3: * Slight deviations are possible while there is interference
 (coming soon)	Standards: UL 508 and CAN/CSA 22.2 No. 14-95
Explosion protection (coming soon)	ATEX Zone 2 (EN 60079-15) Class 1, Div 2 / Zone 2 (UL 1604)

Other data	
Ambient temperature during operation	0 ... +55 °C (mounted in row)
during storage	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 precipitation (rain, snow, hail) excluded
Protection	Terminal IP 20, housing IP 40
Fastening	For 35 mm top-hat rail (EN 50022)
Weight	Approx. 60 g



In compliance with the EU directives 89/336/EEC “Electromagnetic Compatibility” and 73/23/EEC “Low-Voltage Directive”.
“ATEX directive” 94/9/EC coming soon

6. Input Wiring



7. LED and Error Signaling on Device

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

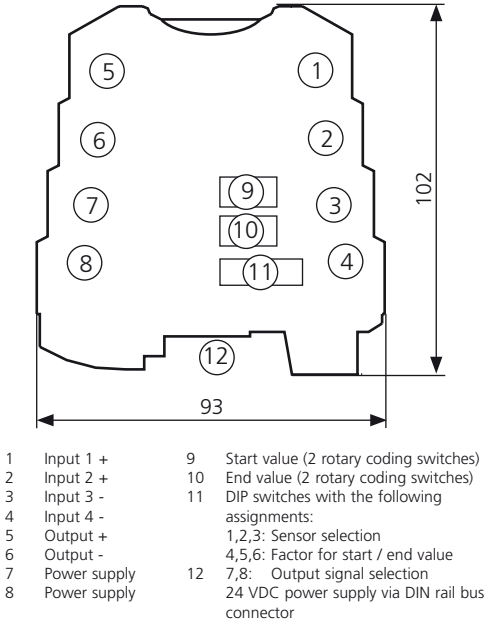
Green: Supply voltage provided

Yellow: Teach-in function signaling
The identified connection type is signaled once at the start of resistance measurements
(2/3/4-time flashing corresponds to 2/3/4-wire measurement)

Red: Error status; LED flashing indicates error number

No.	Error	Output [mA]			Output [V]		
		4 ... 20	0 ... 20	0 ... 5	10 ... 10	0 ... 5	10 ... 10
1	Value below range limit	3.6	0	0	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	Pot/Strain gage: resistance error	21	21	5.25	10.5		
6	- not connected for A 20230 -	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	3.6	0	0	0		

8. Dimension Drawing and Control Elements



9. Typical Configuration

Sensor: Potentiometer, 3-wire connection
Range: 0 ... 100 %
Output signal: 4 - 20 mA

Adjust sensor type:
Potentiometer 3L: DIP 1 = 0, DIP 2 = 0, DIP 3 = 1

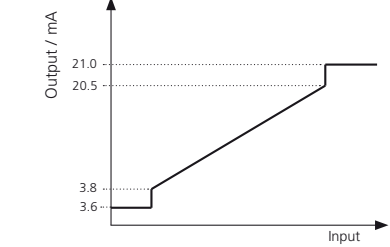
Adjust start value:
0 %
This start value is composed of: numerical value = 00, factor = 1.
Adjust the numerical value at the coding switches (see fig. above, pos. 9): 00
Adjust factor 1: DIP 5 = 0

Adjust end value:
100 %
For 100 % end value, adjust "factor 1 + 100"
Adjust the numerical value at the coding switches (see fig. above, pos. 10): 00
Adjust factor 1+100: DIP 6 = 1 (factor 1 + 100)

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.

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



12. Order Information

Type	Order No.
Resistance transmitter, adjustable	A 20230 P0
Order code for fixed-range models:	
A 20230 P0/ [DIP settings] 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-digit number: 0xxx % / xx.xx kohms)	
Start of range (4-digit number: 0xxx % / xx.xx kohms)	
Input / Sensor type: P Potentiometer R Resistor	

Accessories	Order No.
DIN rail bus connector: power supply bridging for 2 SensoTrans® R A 20230 each	ZU 0628
IsoPower® A 20900 current supply 24 V DC, 1 A	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

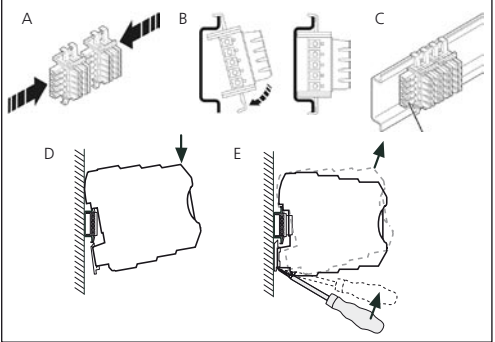


Fig.: A Mounting ZU 0628 DIN rail bus connectors in a row
B Snapping the bus connectors onto a DIN rail
C Bus connectors on a DIN rail
D Snapping a resistance transmitter onto a DIN rail
E Removing a resistance transmitter from a DIN rail

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SensoTrans® R A 20230

Resistance Transmitters

