Modular Housings

Knick

SensoTrans® R A 20230

The transmitter for potentiometers for position determination, path measurement, or setpoint specification in a 6 mm housing.

The Task

In many fields of industry positions of actuators or directors, for example, must be accurately detected. In many cases they are used as reference input for control or monitoring systems, safety shutdown systems, or for similar critical jobs. Here, normally the highest demands are placed on function, accuracy, flexibility, and electrical safety.

Rotative motions can be detected by potentiometers used as angle encoder, translative motions by linear potentiometers used as position encoder.
These and other sensors provide a raw signal which is prepared, scaled, and converted into a standard signal for further processing using a resistance transmitter.

The Problem

Customary position sensors have individual characteristics, which requires tedious and time-consuming adjustment of the respective resistance transmitter using potentiometers.

Furthermore, resistance transmitters up to now had a very wide modular housing and therefore occupied a large amount of space in the enclosure. For world-wide applications, often several versions with different supply voltages were used.

The Solution

The universal SensoTrans® R A 20230 resistance transmitters provide connection possibilities for all standard potentiometers for angle, path, or position detection up to 50 kohms. They can be flexibly adapted to the respective measuring task using DIP and rotary coding switches or via a "teach-in function". 3-port isolation with Safe Isolation up to 300 V AC/DC according to EN 61140 ensures optimum protection of personnel and equipment as well as unaltered transmission of measurement signals. The SensoTrans® R A 20230 offer maximum performance in the smallest of spaces.

Adjusting the start and end value to the individual position sensor is particularly convenient using the "teach-in function" – just at the push of a button at the device front. Sensors with known characteristics can be very easily calibrated using 4 rotary coding switches and 8 DIP switches.

Special measuring tasks can be solved with SensoTrans® devices that Knick configures according to individual specifications. Fixed-range models without switch are used, for example, when manipulations or mix-up are to be excluded.

The devices meet the requirements of type of protection "n". This means they can be installed and used in Zone 2 hazardous areas in the EC, the USA, and in Canada. Thanks to their approval to Class 1, Division 2 (UL 1604), they can also be used according to the traditional North American classification system.

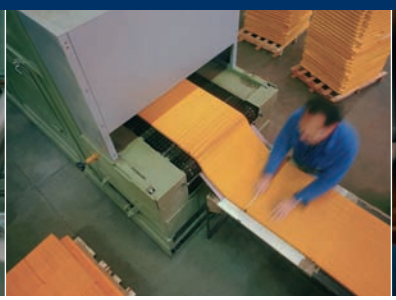
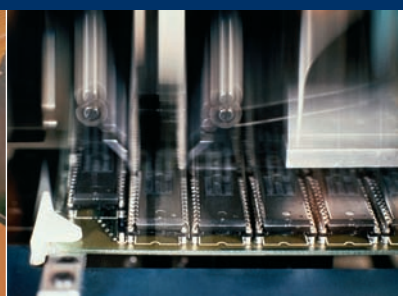
The Housing

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

Warranty
5 years!

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

Resistance Transmitters

Knick

The Facts

Universal usability with potentiometers, resistive sensors, remote resistance transducers, and similar sensors

Intuitive configuration of basic parameters – easy, without tools, using 4 rotary and 8 DIP switches

Calibrated range selection without complicated trimming

Convenient adjustment Start and end point are directly adjusted "at the push of a utton" using the teach-in function

Safe Isolation to EN 61140 – protection of maintenance staff and subsequent devices against non-permitted high voltages up to 300 V AC/DC

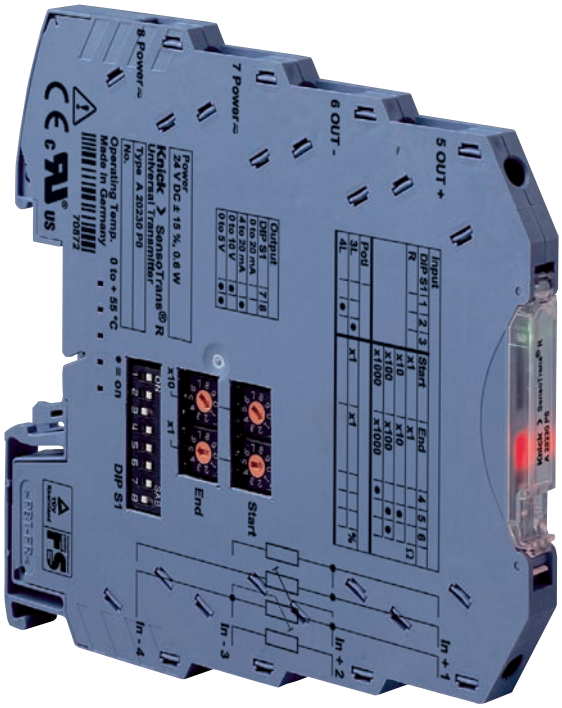
High accuracy due to innovative circuit design

Minimum space consumption 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 through DIN rail bus connectors

5-year warranty

6 mm CLASS



SensoTrans® R A 20230

Product Line

Resistance transmitters, adjustable

SensoTrans® R A 20230	Order No.	A 20230 P0

Resistance transmitters, with fixed settings

SensoTrans® R A 20230	Order No.	A 20230 P0 /	□ □ □ □ □ – □ □ □ □ □ □ □ □ □
Input / Sensor type	Potentiometer Resistor		P R
Start of range	4-digit number (0xxx % / xx.xx kOhm)		X X X X
End of range	4-digit number (0xxx % / xx.xx kOhm)		X X X X
Output	0 … 20 mA 4 … 20 mA 0 … 10 V 0 … 5 V		A B C D
Further customer-specific settings	Without As specified		n n n n

Accessories		Order No.
DIN rail bus connector ZU 0628	Power supply bridging for two devices, A 20XXX P0 or P 32XXX P0	ZU 0628
IsoPower® A 20900	Power supply, 24 V DC, 1 A, see Page 212	A 20900 H4
Power terminal block ZU 0677	Feeding the 24 V DC supply voltage to the ZU 0628 DIN rail bus connector	ZU 0677
DIN rail bus connector ZU 0678	Tapping of supply voltage (A 20900), routing to ZU 0678 DIN rail bus connector	ZU 0678

Specifications

Resistance measurement
Input data

Resistance measurement incl. line resistance	0 ... 5 kohms or 5 ... 100 kohms
Connection	2-, 3-, or 4-wire (automatic recognition), signaling via yellow LED
Max. line resistance	100 ohms
Supply current	200 µA, 400 µA, or 0 ... 500 µA

Specifications *(continued)*

Resistance measurement
Input data *(continued)*

Line monitoring	Open circuits
Input error limits	Resistances < 5 kohms: ±(50 mohms +0.05 % meas. val.) for spans > 15 ohms Resistances < 5 kohms: ±(1 mohms +0.05 % meas. val.) for spans > 50 ohms
Temperature coefficient at input	< 50 ppm/K of adjusted end value (average TC in permitted operating temp range, reference temp 23 °C)

Potentiometer input data

Input	200 ohms ... 50 kohms
Connection	3- or 4-wire
Supply current	0 ... 5 mA
Line monitoring	Short circuit or open circuit
Input error limits	± (0.2 % full scale + 0.05 % meas. val.) for spans > 5 %
Temperature coefficient at 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, Calibrated selection 4 ... 20 mA, (factory setting 4 ... 20 mA) 0 ... 5 V, 0 ... 10 V
Control range	0 ... ≈102.5% span with 0 ... 20 mA, 0 ... 10 V or 0 ... 5 V output –1.25 ... ≈102.5% span with 4 ... 20 mA output
Resolution	16 bits
Load	Current output: ≤ 10 V (≤ 500 ohms at 20 mA) Voltage output: ≤ 1 mA (≥ 10 kohms at 10 V)
Output error limits	Current output: ±(10 µA + 0.05 % meas. val.) Voltage output: ±(5 mV + 0.05 % meas. val.)
Residual ripple at output	< 10 mV_{rms}
Temperature coefficient at output	< 50 ppm/K full scale (average TC in permitted operating temp range, reference temp 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, faulty settings, sensor short circuit or open circuit, output load error, other device errors. Also see "Error Signaling" Page 205.

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Specifications *(continued)*

Transmission behavior

Characteristic	Linear rising/falling
Meas. rate	Approx. 3/s *)

Display

Green LED	Power supply
Yellow LED	Connection type
Red LED	Maintenance request or 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.

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, you should ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.
Protection against electric shock	Safe Isolation according to EN 61140 by reinforced insulation in accordance with 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

Explosion protection	ATEX Zone 2 (EN 60079-15) Class 1, Div 2 / Zone 2 (UL 1604)
EMC	Product family standard: EN 61326 Emitted interference: Class B Immunity to interference[1)]: Industry
cURus	File No. 220033 Standards: UL 508 and CAN/CSA 22.2 no. 14-95

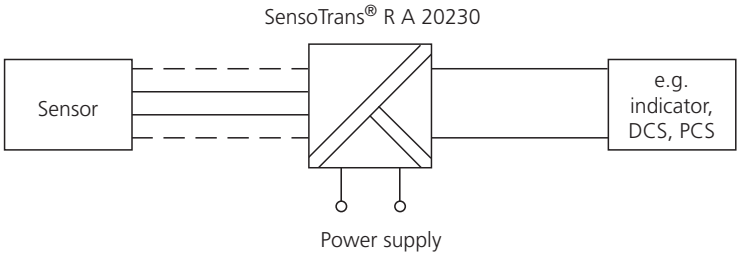
*) For resistance measurements in the range 5 kohms ... 100 kohms: measuring rate 2/s.
1) Slight deviations are possible while there is interference

Specifications *(continued)*

Other data

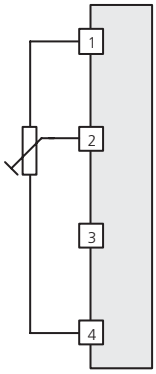
Ambient temperature	Operation:	0 ... +55 °C in row, without spacing 0 ... +65 °C with spacing ≥6 mm
	Storage:	–25 ... +85 °C
Ambient conditions	Stationary application, weather-protected relative air humidity: 5 ... 95 %, no condensation barometric pressure: 70 ... 106 KPa water or wind-driven rain, snow, or hail excluded	
Design	Modular housing with screw terminals, width 6.2 mm, see dimension drawings for further measurements and conductor cross section	
Ingress protection	Terminal IP 20, housing IP 40	
Mounting	For 35 mm top hat rail to EN 50022	
Weight	Approx. 60 g	

Application Examples

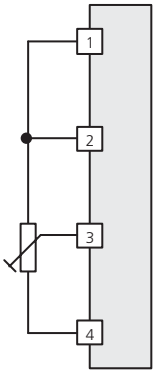


Connection of Potentiometers

3-wire connection

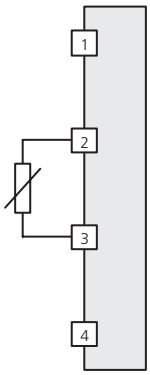


4-wire connection

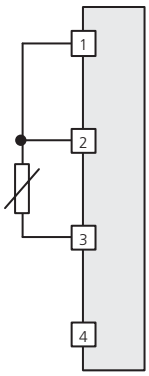


Connection of Resistors

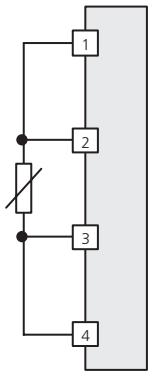
2-wire connection



3-wire connection



4-wire connection



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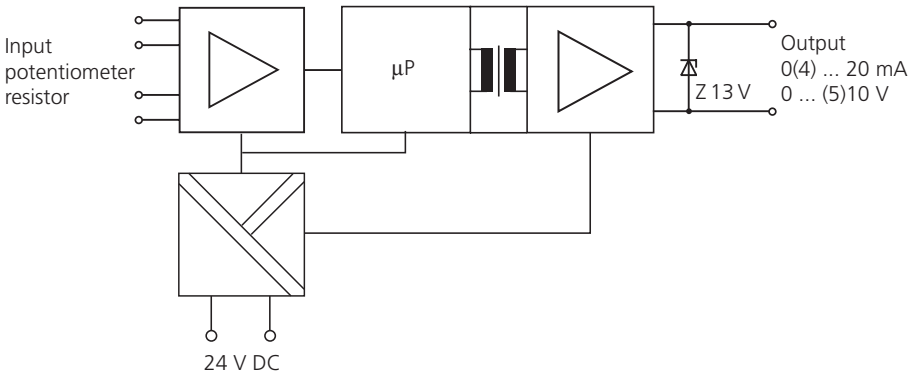
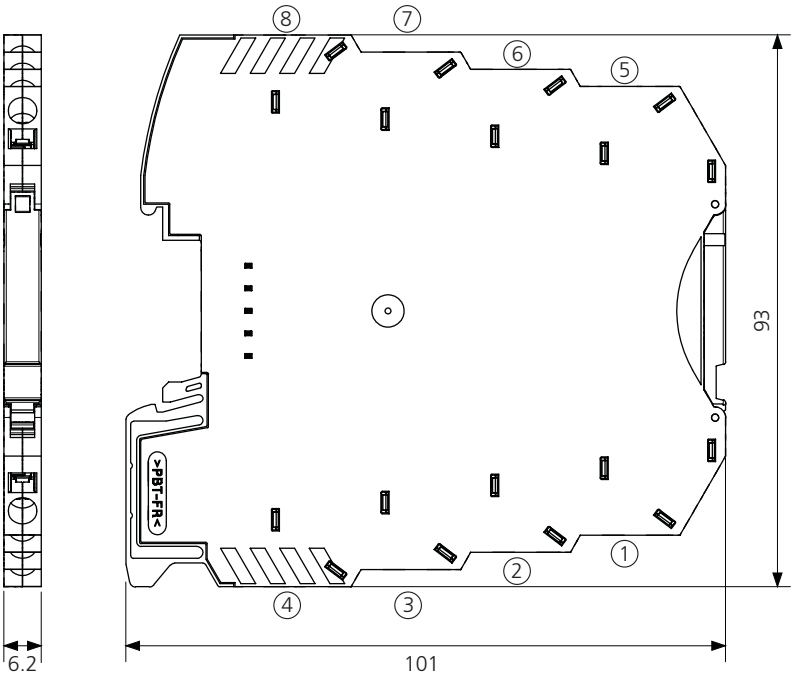
Block Diagram



Dimension Drawings and 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
– Fine-wire 0.2 ... 2.5 mm²
– 24-14 AWG

All dimensions in mm!

Error Signaling

No.	Error	Message configuration [2]	Output			
			4 ... 20 [mA]	0 ... 20 [mA]	0 ... 5 [V]	0 ... 10 [V]
0	None	Not self-locking	–	–	–	–
1	Value below range	Not self-locking	3.6	0	0	0
2	Value above range	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	Basic resistance invalid [3]	Not self-locking	21	21	5.25	10.5
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	Parameter error	Not self-locking	21	21	5.25	10.5
10	Device error	Self-locking	3.6	0	0	0

2) With the "self-locking" configuration, the error signal is maintained after termination of the error cause. The error message can be reset by restart (power supply on/off).
3) With potentiometers only

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