

Modular Housings

Knick ➤

The transmitter for potentiometers for position determination, path measurement, or set-point specification – in a 6 mm housing with infrared interface, SIL approval, and broad-range power supply.

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 accuracy, flexibility, and functional safety as well as 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 to 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.

SensoTrans® R P 32300

The Solution

The universal SensoTrans® R P 32300 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 switches or via an IrDA® port. The broad-range power supply covers all common supply voltages from 24 to 230 V AC/DC and ensures maximum safety even with unstable mains supplies. 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 P 32300 offer maximum performance in the smallest of spaces. Adjusting the start and end value to the individual position sensor is particularly convenient via the infrared interface, for example using a PDA. 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.

Knick offers the SensoTrans® R P 32300 transmitter with SIL approval for applications with high demands on functional safety. The requirements of EN 61508 were implemented by a specially developed hardware and software. The fail-safe concept makes use of structural measures at the device level (redundancy of system components) and diagnostic methods for selective fault detection. The product is SIL 2 approved (EN 61508) by an authorized body (TÜV Rheinland).



Resistance Transmitters

Isolation Amplifiers
Transmitters

Indicators

Process Analytics

Portable Meters

Laboratory Meters

Sensors

Fittings

Knick 

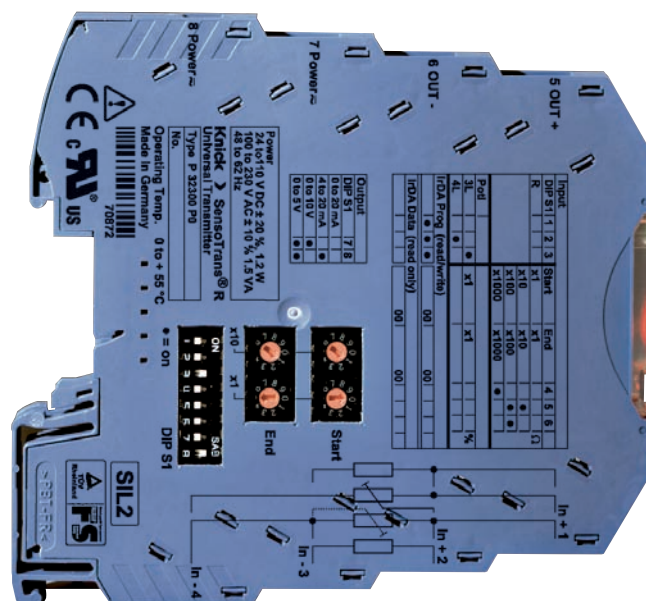


The Operating Software

The user-friendly, menu-guided Paraly® SW 111 communication software runs on standard and pocket PCs and opens a number of further options such as input of customer-specific linearization curves, readout of the connection configuration, as well as the use of extensive diagnostic functions. Configuration, documentation and, if necessary, maintenance of entire plant components can be accomplished by “infrared remote control”. Moreover, the output current or voltage can be specified independently of the input value using the simulation function – a useful feature for plant commissioning or revision.

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).

IrDA® is a registered trademark of the Infrared Data Association.

Modular Housings

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SensoTrans® R P 32300

■ The Facts

Universal usability

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

Convenient parameter setting

via IrDA® port – uncomplicated, menu-guided adjustment also “on site” including archiving of configuration data

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 adjustable via IrDA® interface

Simulation of any desired output values for correct installation/commissioning

World-wide application

due to broad-range power supply 24 ... 110 V DC ($\pm 20\%$) and 110 ... 230 V AC ($\pm 10\%$)

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

Functional safety up to SIL 2

(up to SIL 3 in the case of redundant configuration) with TÜV certificate – systematically developed according to EN 61508

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 (in the case of 24 V DC supply)

5-year warranty

■ Product Line

Resistance transmitters, adjustable

SensoTrans® R P 32300

Functional safety (EN 61508)

Power supply

Order No.

P 32300 P0 / ☐ ☐

Without SIL 2 (up to SIL 3 in the case of redundant configuration)

0

1

Broad-range power supply 24 ... 110 V DC, 110 ... 230 V AC via screw terminals only, 24 V DC via screw terminals or DIN rail bus connector

1

0

Isolation Amplifiers Transmitters	Indicators	Process Analytics	Portable Meters	Laboratory Meters	Sensors	Fittings
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Modular Housings

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Paraly® SW 111	Communication software	SW 111
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 0628 DIN rail bus connector	ZU 0678

Modular Housings

SensoTrans® R P 32300

■ 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
Line monitoring	Open circuits
Input error limits	Resistances < 5 kohms: $\pm(50 \text{ mohms} + 0.05 \% \text{ meas. val.})$ for spans > 15 ohms Resistances < 5 kohms: $\pm(1 \text{ mohms} + 0.05 \% \text{ meas. val.})$ 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	$\pm(0.2 \% \text{ full scale} + 0.05 \% \text{ meas. val.})$ 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 ... $\approx 102.5 \% \text{ span}$ with 0 ... 20 mA, 0 ... 10 V or 0 ... 5 V output -1.25 ... $\approx 102.5 \% \text{ span}$ with 4 ... 20 mA output
Resolution	16 bits
Simulation mode Adjustable via IrDA®	0 ... 20 mA current output: 0 ... 21 mA 4 ... 20 mA current output: 3 ... 21 mA 0 ... 5 V voltage output: 0 ... 5.25 V 0 ... 10 V voltage output: 0 ... 10.5 V

Resistance Transmitters

Isolation Amplifiers Transmitters	Indicators	Process Analytics	Portable Meters	Laboratory Meters	Sensors	Fittings
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Specifications (continued)

Output data (continued)

Load	Current output: $\leq 10 \text{ V}$ ($\leq 500 \text{ ohms}$ at 20 mA) Voltage output: $\leq 1 \text{ mA}$ ($\geq 10 \text{ kohms}$ at 10 V)
Output error limits	Current output: $\pm(10 \text{ }\mu\text{A} + 0.05 \% \text{ meas. val.})$ Voltage output: $\pm(5 \text{ mV} + 0.05 \% \text{ meas. val.})$
Residual ripple	$< 10 \text{ mV}_{\text{rms}}$
Temperature coefficient at output	$< 50 \text{ ppm/K}$ full scale (average TC in permitted operating temp range, reference temp $23 \text{ }^{\circ}\text{C}$)
Error signaling	0 ... 20 mA output: $I = 0 \text{ mA}$ or $\geq 21 \text{ mA}$ 4 ... 20 mA output: $I \leq 3.6 \text{ mA}$ or $\geq 21 \text{ mA}$ 0 ... 5 V or 0 ... 10 V output: $V = 0 \text{ V}$ or $V \geq 5.25 \text{ V}$ or $V \geq 10.5 \text{ V}$ via output signal, red LED, and IrDA® for out-of-range conditions, faulty settings, sensor short circuit or open circuit, output load error, unintentional adjustment of switches during operation (for SIL devices only), other device errors. Also see "Error Signaling" Page 197.

Transmission behavior

Characteristic	Linear rising / falling, curves defined by sampling points (via IrDA® port)
Meas. rate	Approx. 3/s *)

Display

Green LED	Power supply
Yellow LED	Connection type IrDA® communication
Red LED	Maintenance request or device failure

Power supply

	24 V DC power supply unit	Broad-range power supply unit
Power supply	24 V DC (-20% , $+25 \%$), approx. 1.2 W	24 V ... 110 V DC ($\pm 20 \%$), approx. 1.2 W 110 V ... 230 V AC ($\pm 10 \%$), 48 ... 62 Hz, approx. 1.5 VA

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

*) For resistance measurements in the range 5 kohms ... 100 kohms: measuring rate 2/s.

Modular Housings

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Specifications (continued)

Isolation (continued)

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

Functional safety	Optional: SIL 2 to EN 61508, SIL 3 with redundant configuration
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 EMC requirements for devices with safety-related functions IEC 61326-3: draft
cURus	File No. 220033 Standards: UL 508 and CAN/CSA 22.2 no. 14-95

Interfaces

IrDA®	Specification 1.1, slave device for bidirectional communication Paraly® SW 111 communication software is included in the shipment Free download at www.knick.de
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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

1) Slight deviations are possible while there is interference

Resistance Transmitters

Isolation Amplifiers
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Portable Meters

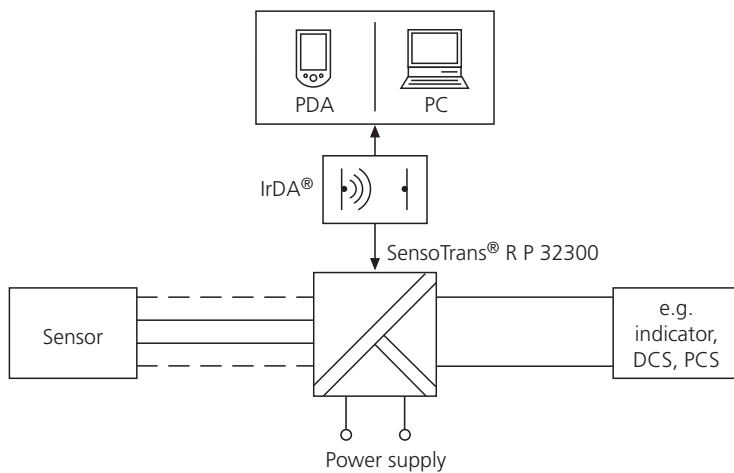
Laboratory Meters

Sensors

Fittings

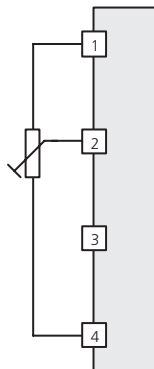
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■ Application Examples

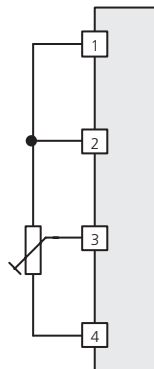


Connection of Potentiometers

3-wire connection

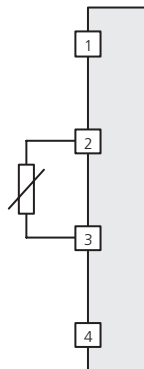


4-wire connection

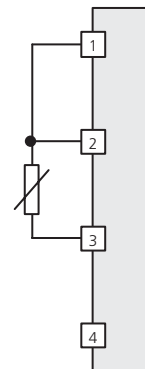


Connection of Resistors

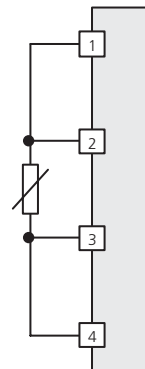
2-wire connection



3-wire connection



4-wire connection

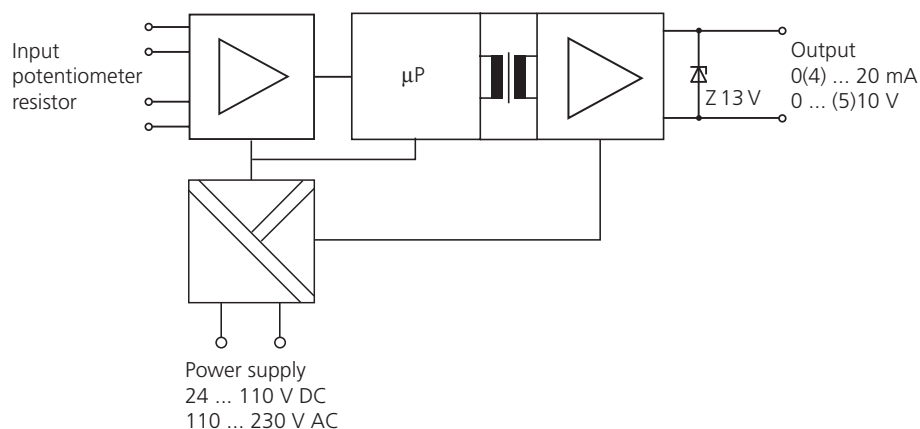


Modular Housings

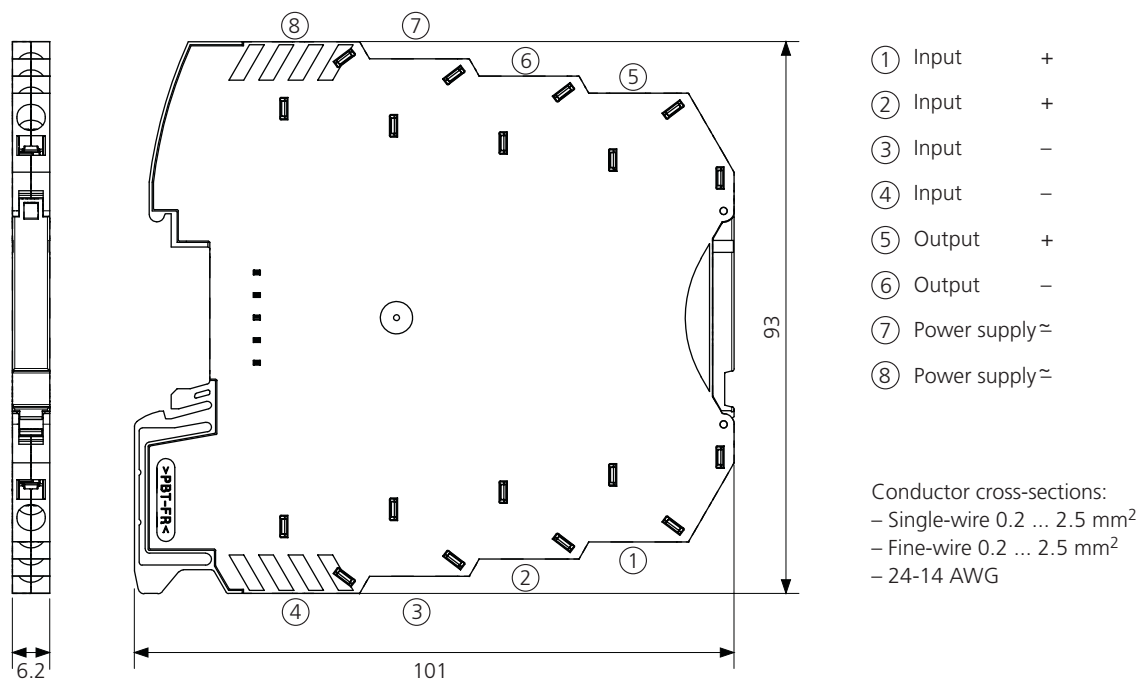
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SensoTrans® R P 32300

■ Block Diagram



■ Dimension Drawings and Terminal Assignments



All dimensions in mm!

■ Error Signaling

No.	Error	Message configuration ²⁾		Output			
		With SIL function	Without SIL function	4 ... 20 [mA]	0 ... 20 [mA]	0 ... 5 [V]	0 ... 10 [V]
0	None	Not self-locking	Not self-locking	—	—	—	—
1	Value below range	Not self-locking	Not self-locking	3.6	0	0	0
2	Value above range	Not self-locking	Not self-locking	21	21	5.25	10.5
3	Sensor short circuit	Self-locking	Not self-locking	21	21	5.25	10.5
4	Sensor open	Self-locking	Not self-locking	21	21	5.25	10.5
5	Basic resistance invalid ³⁾	Self-locking	Not self-locking	21	21	5.25	10.5
6	Load output error ⁴⁾	Not self-locking	Not self-locking	3.6	0	0	0
7	Identification of connection	Self-locking	Not self-locking	21	21	5.25	10.5
8	Switch misadjusted	Self-locking	Not self-locking	21	21	5.25	10.5
9	Parameter error	Self-locking	Not self-locking	21	21	5.25	10.5
10	Device error (subordinated error number distinguished via IrDA® port)	Self-locking	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 or via IrDA® port).

3) With potentiometers only

4) With SIL models P 32300 P0/1x only

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

