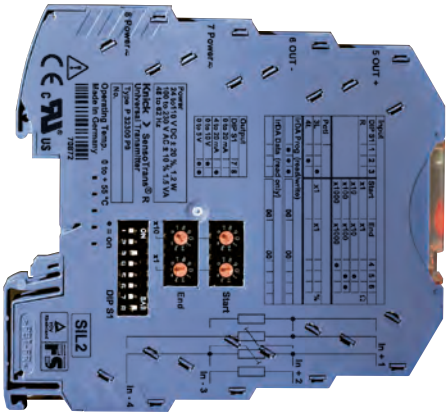


SensoTrans R P 32300

The transmitter for potentiometer position detection, path measurement, or setpoint specification – in a 6 mm housing with infrared interface, SIL approval and broad-range power supply.

The Task

In many fields of industry the positions of actuators or setpoint devices, for example, must be measured accurately. In many cases they are used as a reference input for controllers or monitoring systems, safety shutdown systems, or for similar critical tasks. As a rule, high demands are placed on accuracy, flexibility and functional safety as well as electrical safety. Rotary motion can be measured with potentiometers configured as angle sensors, translational motion with linear potentiometers as path sensors. 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

Commercial 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, several versions with different supply voltages were often used.

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 encoder switches or via an IrDA interface. 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 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 four rotary encoder switches and eight DIP switches.

Special measuring tasks can be solved with SensoTrans 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.

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 through specially developed hardware and software.

The implemented 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).

SensoTrans R P 32300

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 for high component densities. DIN rail bus connectors inserted in the mounting rail facilitate the power supply connection if necessary.

IrDA is a registered trademark of the Infrared Data Association.

Facts and Features

- **Universal usability**
  with potentiometers, resistive sensors, potentiometric transmitters 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
- **Easy adjustment**
  start and end points adjustable via IrDA port
- **Simulation**
  of any desired output values for correct installation/commissioning
- **Protective separation**
  according to EN 61140 – protection of the maintenance staff and downstream devices against excessively 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**
  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**

5 Year Warranty!

Product Line

SensoTrans R P 32300, adjustable

Order no.	P 32300 P0 /	□	□
Functional safety (EN 61508)	Without	**0**	
	SIL 2 (up to SIL 3 in the case of redundant configuration)	**1**	
Power supply	24 V DC via screw terminals or DIN rail bus connector		**0**

SensoTrans R P 32300, fixed setting

Order no.	P 32300 P0 /	□	□	□	□	□	□	□	–	□	□	□	□	□	□	□	□	□
Functional Safety (EN 61508)	Without	**0**																
	SIL 2 (up to SIL 3 in the case of redundant configuration)	**1**																
Power supply	24 V DC via screw terminals or DIN rail bus connector		**0**															
Input / Sensor type	Potentiometer			**P**														
	Resistor			**R**														
Start of range	4-digit number (0xxx % / xx.xx kohms)				**X**	**X**	**X**	**X**										
End of range	4-digit number (0xxx % / xx.xx kohms)									**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	Without																	
	As specified														**n**	**n**	**n**	**n**

Accessories		Order no.
Paraly SW 111	Communication software	**SW 111**
ZU 0628 DIN rail bus connector	Power supply bridging for two isolators, A 20XXX P0 or P 32XXX P0	**ZU 0628**
IsoPower A 20900	Power supply unit 24 V DC, 1 A	**A 20900 H4**
ZU 0677 power terminal block	For connecting the 24 V DC supply voltage to the ZU 0628 DIN rail bus connector	**ZU 0677**
ZU 0678 DIN rail bus connector	Tapping of supply voltage (A 20900), routing to ZU 0628 DIN rail bus connector	**ZU 0678**

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: ± (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)

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 the input	< 50 ppm/K of adjusted end value (average TC within allowable operating temp range, reference temp 23 °C)

Output data

Outputs	0 … 20 mA, calibrated switching 4 … 20 mA, (default setting 4 … 20 mA) 0 … 5 V, 0 … 10 V
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
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
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	< 10 mV_{rms}
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, red LED and IrDA for out-of-range conditions, incorrect parameter setting, sensor short circuit and line break, output load error, accidental changing of the switch settings during operation (only for SIL devices), other device errors. See also "Error Signaling" table.

Specifications *(continued)*

Transmission behavior	
Characteristic	Rising / falling linearly; configurable characteristic curves using interpolation points (via IrDA port)
Measuring rate	Approx. 3/s *)
Display	
Green LED	Power supply
Yellow LED	Signaling of connection type, IrDA communication
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.
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	
Functional safety	SIL 2 according to IEC 61508, SIL 3 with redundant configuration
EMC	Product family standard: EN 61326 Emitted interference: Class B Immunity to interference[1)]: Industrial environment 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
KTA approval	KTA3507 (special versions)
RoHS conformity	According to directive 2011/65/EU
Interfaces	
IrDA	Specification 1.1, slave device for bidirectional communication Paraly SW 111 communication software Free download at www.knick.de

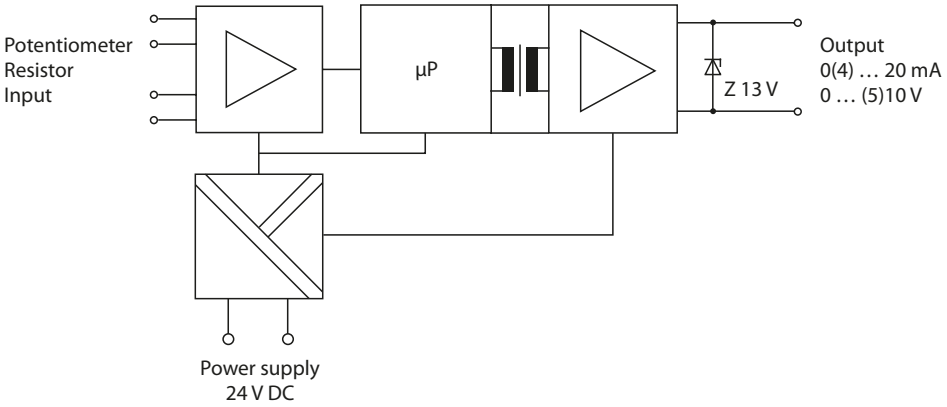
SensoTrans R P 32300

Specifications *(continued)*

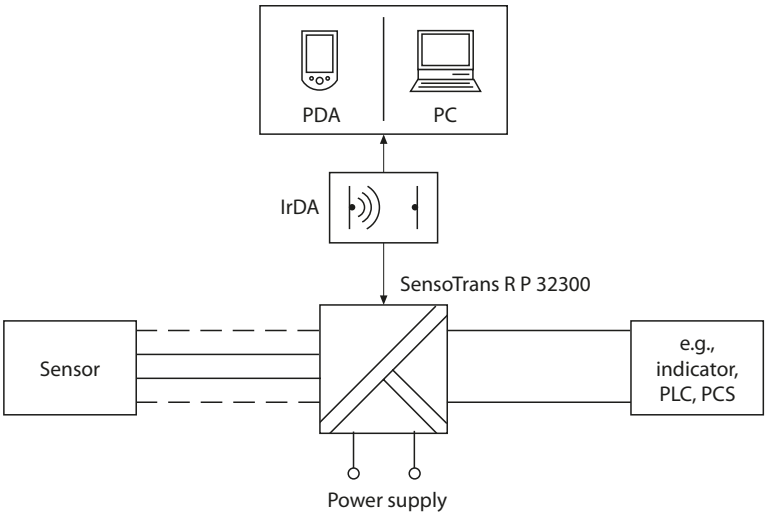
Further data	
Ambient temperature	Operation: 0 … +55 °C mounted without gaps 0 … +65 °C with gaps ≥ 6 mm Storage: –25 … +85 °C
Ambient conditions	Stationary, weather-protected operation Relative humidity: 5 … 95 %, no condensation Barometric pressure: 70 … 106 kPa Water or wind-driven precipitation (rain, 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 resistance measurements of 5 … 100 kohms: approx. 2/s
1) Slight deviations are possible while there is interference

Block Diagram

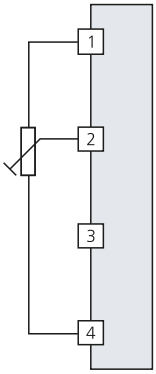


Typical Applications

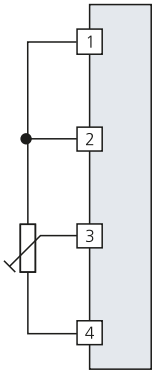


Connection of Potentiometers

3-wire connection

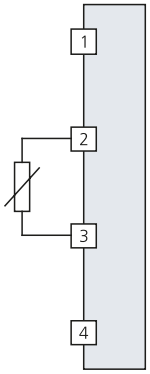


4-wire connection

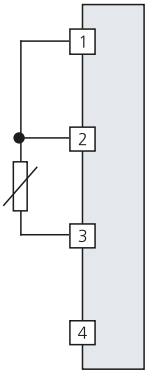


Connection of Resistors

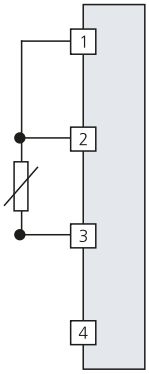
2-wire connection



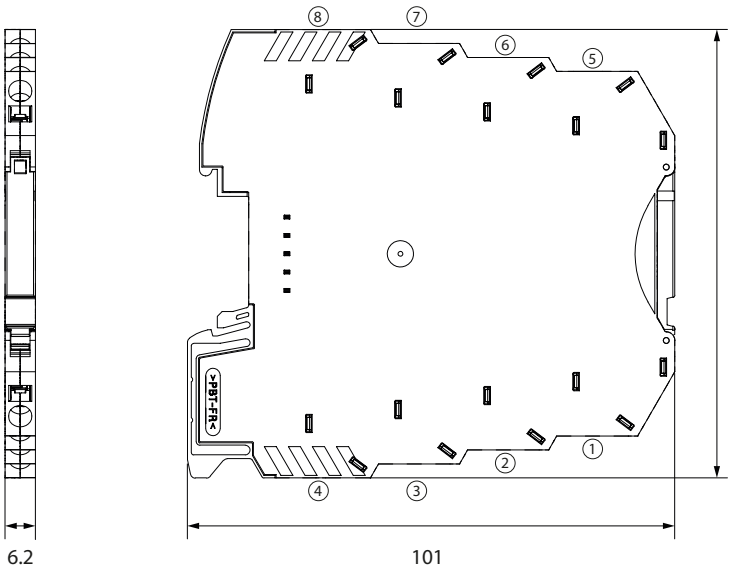
3-wire connection



4-wire connection



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

Error Signaling

No.	Error	Signal configuration[1]		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	Underrange	Not self-locking	Not self-locking	3.6	0	0	0
2	Overrange	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	Resistance error[2]	Self-locking	Not self-locking	21	21	5.25	10.5
6	Output load error[3]	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	Adjustment error	Self-locking	Not self-locking	21	21	5.25	10.5
10	Device error (subordinated error number differentiated via IrDA port)	Self-locking	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 or via IrDA port).
[2] With potentiometers only
[3] With SIL models P 32200 P0/1x only

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