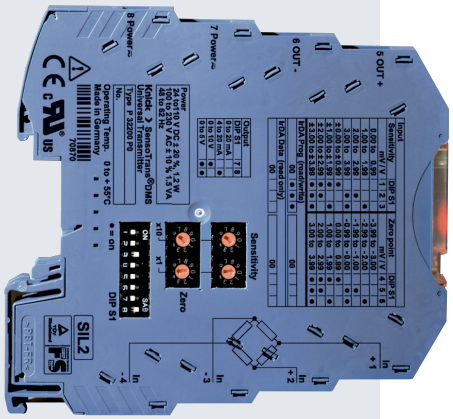


SensoTrans DMS P 32200

The transmitters for strain gauge full bridges – in a 6-mm housing with infrared interface, SIL approval and broad-range power supply.

The Task

In many different industrial applications strain gages are used to continuously measure mechanical quantities such as force/weight or deflection/torsion. In many cases they are used as reference input for monitoring systems, safety shutdown systems, or for similar critical jobs. As a rule, high demands are placed on accuracy, flexibility and functional safety as well as electrical safety.

Strain gauges are highly sensitive resistors which react to mechanical stress with a slight change in resistance. These changes can be detected by a bridge circuit, in most cases a full bridge. In force transducers and load cells, the strain gauges are already mechanically applied in full bridge circuits. These sensors provide a raw signal which is prepared and standardized for further processing using a strain gauge transmitter.

The Problem

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

Furthermore, strain gage 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 DMS A 32200 strain gauge transmitters provide connection possibilities for all standard strain gauge force transducers and strain gauge load cells in full bridge configuration.

They can be flexibly adapted to the respective measuring task using DIP and rotary encoder switches or via an IrDA interface. The broad-range power supply covers all common supply voltages from 110 to 230 V and ensures maximum safety even with unstable power grids.

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 DMS P 32200 offer maximum performance in the smallest of spaces.

Adjusting the zero point and sensitivity to the individual strain gauge sensor is particularly convenient via the infrared port, 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 models without switch are used, for example, when manipulations or mix-up are to be excluded.

Knick offers the SensoTrans DMS P 32200 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).

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 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.

Safety Integrity Level SIL 2 IEC 61508

Safety Integrity Level SIL 2 IEC 61508/ IEC 61511* *gemäß 11.4

6 mm CLASS

The Facts

– **Universal usability**
for strain gauges, pressure and load cells, and other resistive measuring bridges

– **Convenient configuration**
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

– **Comfortable adjustment**
Zero point and sensitivity adjustable via IrDA port

– **Simulation**
of any desired output values for correct installation/commissioning

– **Worldwide usability**
with broad-range power supply 110 ... 230 V AC

– **Protective separation**
according to EN 61140 – protection of the maintenance staff and subsequent 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**
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 installation**
Quick mounting, convenient connection of the power supply through DIN rail bus connectors (in the case of 24 V DC supply)

– **5-year warranty**

Warranty
5 years!

Warranty
Defects occurring within 5 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).

SensoTrans DMS P 32200

Product Line

SensoTrans DMS P 32200, adjustable

Order No.		P 32200 P0 / □ □
Functional safety (EN 61508)	Without	0
	SIL 2 (up to SIL 3 in the case of redundant configuration)	1
Power supply	Broad-range power supply 110 ... 230 V AC only via screw terminals	2
	24 V DC via screw terminals or DIN rail bus connector	0

SensoTrans DMS P 32200, fixed setting

Order No.		P 32200 P0 / □ □ □ □ □ □
Functional safety (EN 61508)	Without	0
	SIL 2 (up to SIL 3 in the case of redundant configuration)	1
Power supply	Broad-range power supply 110 ... 230 V AC only via screw terminals	2
	24 V DC via screw terminals or DIN rail bus connector	0
Customer-specific settings (e.g. cutoff frequency, zero point/sensitivity)	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, resp., A 20XXX P0 or P 32XXX P0	ZU 0628
IsoPower A 20900	Power supply unit 24 V DC, 1 A	A 20900 H4
ZU 0678 DIN rail bus connector	Tapping of supply voltage (A 20900), routing to ZU 0628 DIN rail bus connector	ZU 0678
ZU 0677 power terminal block	For connecting the 24 V DC supply voltage to the ZU 0628 DIN rail bus connector	ZU 0677

Specifications

Strain gauge input data

Input	±7.5 mV/V
Bridge resistance	200 ohms …10 kohms
Zero adjustment	Within the input range
Supply current (int. supply)	0 … 5 mA
Supply voltage (ext. supply)	1 … 2.8 V

Knick

Specifications *(continued)*

Strain gauge input data *(continued)*	
Input error limits	± (2 µV/V + 0.1 % meas.val.) for spans ≥ 0.5 mV/V
Line monitoring	Short circuit or open circuit
Temperature coefficient at the input	< 50 ppm/K of adjusted sensitivity (average TC in allowable operating temp range, reference temp 23 °C)
Overload capacity	5 V across all inputs

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: 4 … 20 mA current output: 0 … 5 V voltage output: 0 … 10 V voltage output:	0 … 21 mA 3 … 21 mA 0 … 5.25 mA 0 … 10.5 V
Load	Current output: Voltage output:	≤ 10 V (≤ 500 ohms at 20 mA) ≤ 1 mA (≥ 10 kohms at 10 V)
Output error limits	Current output: Voltage output:	± (10 µA + 0.05 % meas. val.) ± (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".	

Transmission behavior	
Characteristic	Rising / falling linearly; configurable characteristic curves using interpolation points (via IrDA port)
Measuring rate	Approx. 3/sec

SensoTrans DMS P 32200

Specifications *(continued)*

Display		
Green LED	Power supply	
Yellow LED	Signaling the connection type IrDA communication	
Red LED	Maintenance request or device failure	
Power supply	24 V DC power supply	Broad-range 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.	110 V … 230 V AC (±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	
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, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.	
Protection against electric shock	Protective separation according 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, ensure there is sufficient spacing or isolation from neighboring devices and protection against electric shocks.	
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]: 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 Free download at www.knick.de	

Knick

Specifications *(continued)*

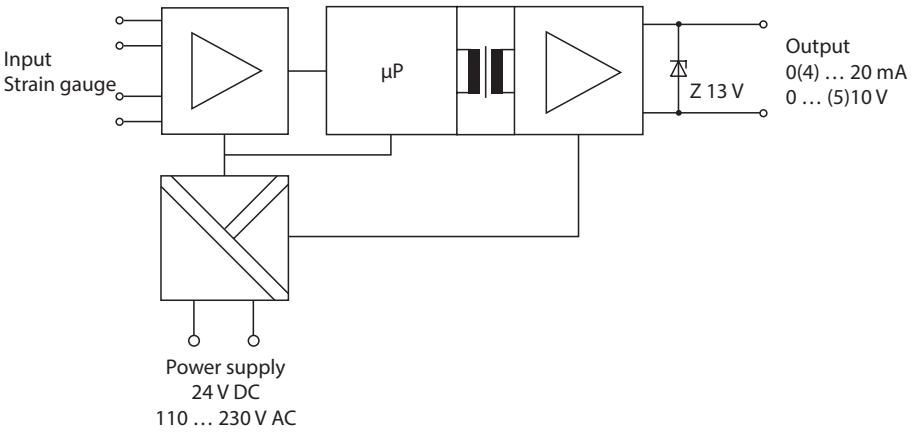
Further data

Ambient temperature	Operation:	0 … +55 °C mounted without gaps 0 … +65 °C with gaps ≥ 6 mm
	Storage:	-25 … +85 °C
Ambient conditions	Stationary operation, weatherproof 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 and conductor cross-section	
Ingress protection	Terminals IP 20, Housing IP 40	
Mounting	For 35-mm top-hat rail (EN 50022)	
Weight	Approx. 60 g	

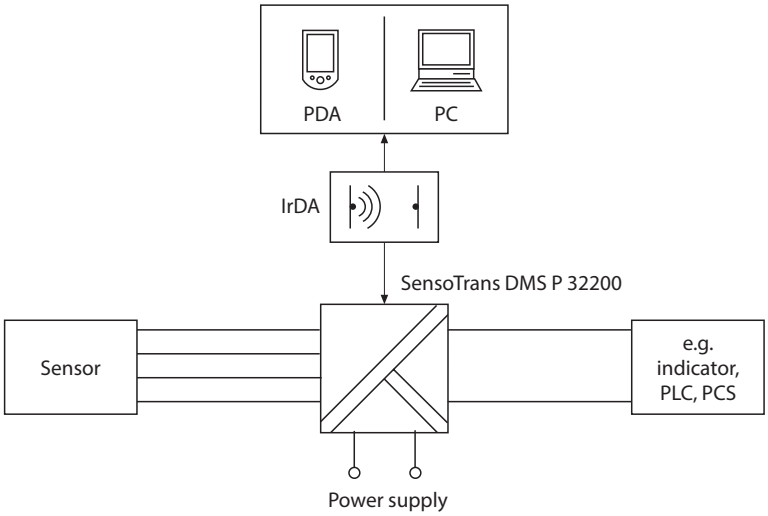
[1] Slight deviations are possible while there is interference

SensoTrans DMS P 32200

Block Diagram

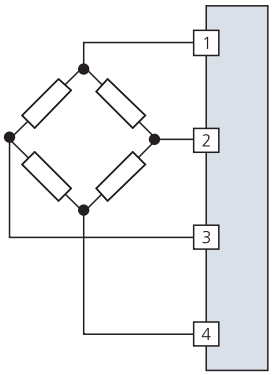


Typical Applications

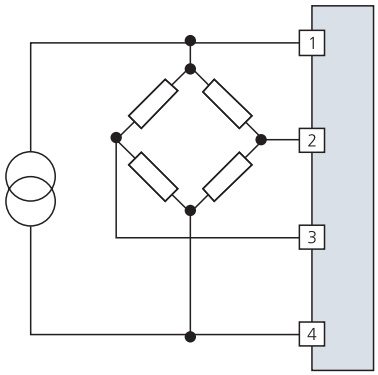


Connection of Strain Gauges

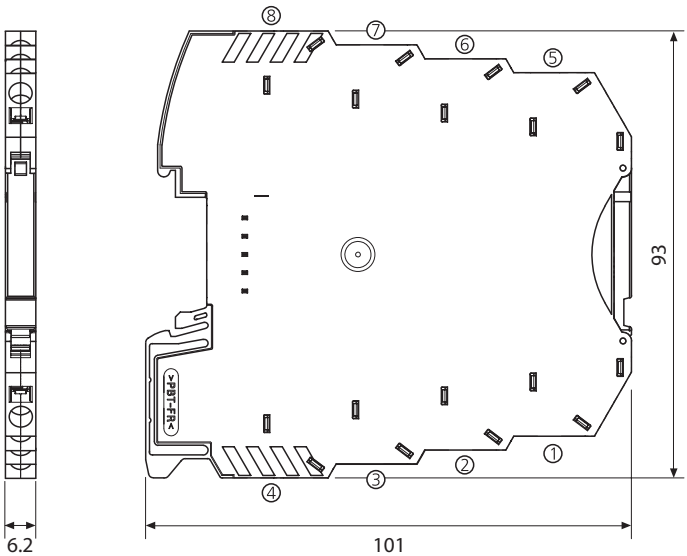
4-wire connection



6-wire connection
(with external supply 1 … 3 V)



Dimension Drawings and Terminal Assignments



Terminal assignments

1	Input	+
2	Input	+
3	Input	–
4	Input	–
5	Output	+
6	Output	–
7	Power supply AC/DC	
8	Power supply AC/DC	

Conductor cross-section:

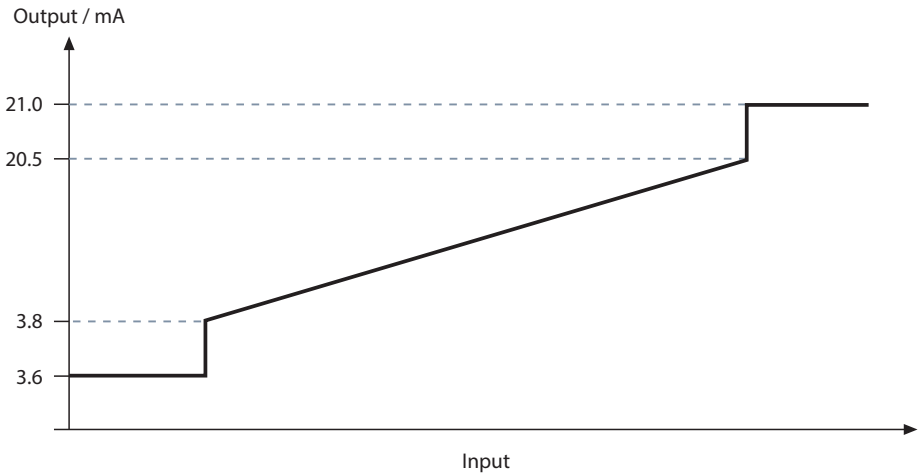
single wire	0.2 … 2.5 mm²
stranded wire 24-14 AWG	0.2 … 2.5 mm²

All dimensions in mm

SensoTrans DMS P 32200

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	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	Resistance error	Self-locking	Not self-locking	21	21	5.25	10.5
6	Output load error[2]	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 SIL models P 32200 P0/1x only

Response of the output current (4 … 20 mA) to out-of-range conditions