

20SX Series

Piezoresistive pressure transmitter heads with the highest level of accuracy

Features

- RS485 interface can be combined with analog interface
- Analog interface scaleable via RS485 interface (turn-down)
- Modbus RTU protocol for process values and configuration
- Optimum long-term stability



Technology

- Insulated and encapsulated piezoresistive pressure sensor
- Fully welded design with no internal seals
- High-quality pressure transducer and tried-and-tested mathematical compensation
- Based on technology from the well-known 33X series with the highest level of accuracy

Typical applications

- OEMs
- Manufacturing industry
- Oil and gas

Accuracy

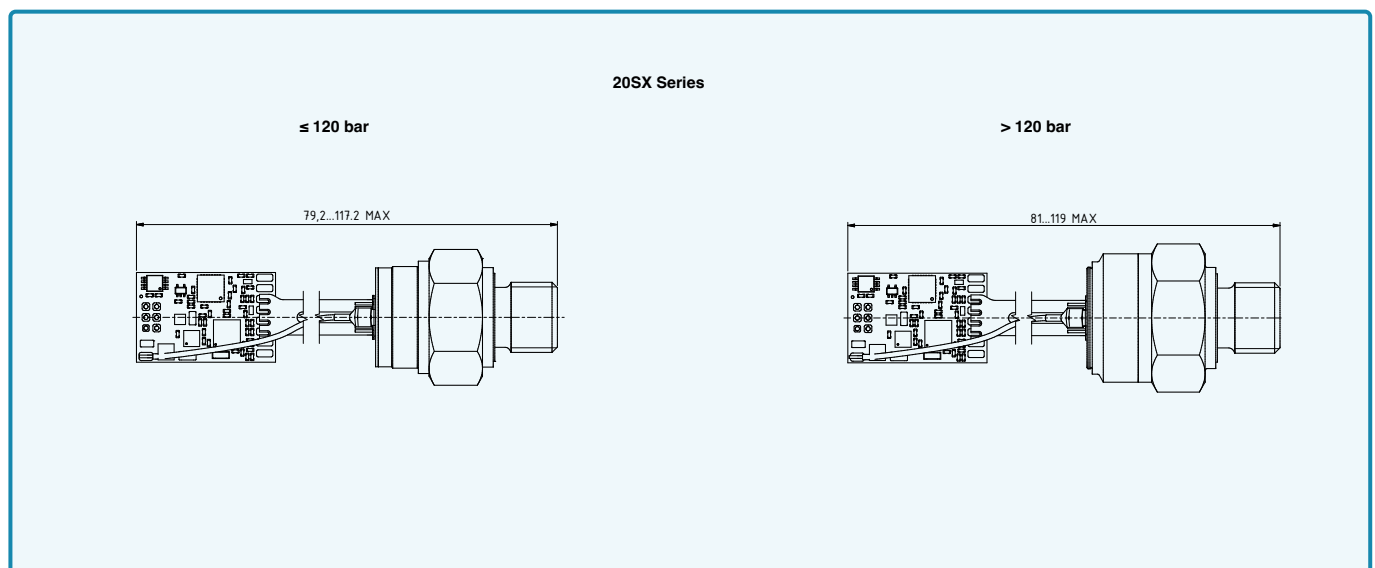
± 0,05 %FS

Total error band

± 0,1 %FS @ -10...80 °C

Pressure ranges

0...0,3 to 0...1000 bar



20SX Series – Specifications

Standard pressure ranges

Relative pressure PR		Proof pressure
0...0,3	-0,3...0,3	3
0...1	-1...1	
0...3	-1...3	9
0...6	-1...6	18
0...10	-1...10	30
0...16	-1...16	48
0...30	-1...30	90
bar rel.		bar
Reference pressure at atmospheric pressure		Based on reference pressure

All intermediate ranges for the analog interface can be scaled (turn-down) from the standard ranges without surcharge.
Smallest range: 0,1 bar. Negative and further +/- ranges also possible.
Optional: Adjust directly to intermediate ranges.

Absolute pressure PAA	Absolute pressure PA	Proof pressure
0,8...1,2		3
0...1	0...1	
0...3	0...3	9
0...6	0...6	18
0...10	0...10	30
0...16	0...16	48
0...30	0...30	90
0...100	0...100	300
0...300	0...300	600
0...700	0...700	1100
0...1000	0...1000	
bar abs.	bar	bar
Reference pressure at 0 bar abs. (vacuum)	Reference pressure at 1 bar abs.	Based on reference pressure

Performance

Pressure

Digital non-linearity	$\leq \pm 0,02$ %FS	Best fit straight line (BFSL)
Accuracy @ RT (20...25 °C)	$\leq \pm 0,05$ %FS	Non-linearity (best fit straight line, BFSL), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation
Total error band (-10...80 °C)	$\leq \pm 0,1$ %FS	Max. deviation within the compensated pressure and temperature range. Experience shows that, outside the compensated temperature range, the total error band in the ambient temperature range is expanded by 0,1 %FS.
Compensated temperature range	-10...80 °C	Other optional temperature ranges within -40...125 °C possible.
Analog interface additional deviation	$\leq \pm 0,05$ %FS	With reference to accuracy @ RT and the total error band.
Long-term stability	$\leq \pm 0,15$ %FS	Per year under reference conditions, annual recalibration recommended.
Position dependency	$\leq \pm 1,5$ mbar	Calibrated in vertical installation position with pressure connection facing downwards.
Resolution	0,002 %FS	Digital
Signal stability	0,0025 %FS	Digital noise-free
Internal measurement rate	≥ 1800 Hz	> 6000 Hz in the case of the "3-wire + digital (0...10 V, 0...5 V)" version.
Pressure range reserve	± 10 %	Outside the pressure range reserve, +Inf / -Inf is displayed. If there is an error in the device, NaN is displayed.
Vacuum resistance	For operating pressures $\leq 0,1$ bar abs., a vacuum-optimised version is recommended.	
Note	For pressure ranges < 1 bar, all data apply with reference to a full-range signal (FS) of 1 bar.	

Temperature

Accuracy	$\leq \pm 2$ °C	The temperature is measured on the pressure sensor (silicon chip) that sits behind the metallic diaphragm. The data applies within the compensated temperature range.
Resolution	$\leq 0,01$ °C	
Internal measurement rate	≥ 10 Hz	

20SX Series – Specifications

Electrical data

Connectivity	Digital	2-wire + digital	3-wire + digital		
Analog interface		4...20 mA	0...10 V	0...5 V	0,1...2,5 V
Digital interface	RS485	RS485	RS485	RS485	RS485
Voltage supply	3,2...32 VDC	8...32 VDC	13...32 VDC	8...32 VDC	3,2...32 VDC
Power consumption (without communication)	< 8 mA	3,5...22,5 mA	< 8 mA	< 8 mA	< 8 mA
Voltage insulation	± 32 VDC	± 18 VDC	± 32 VDC	± 32 VDC	± 32 VDC
Note	Disturbance of the 4...20 mA signal occurs during communication through the digital interface. 3-wire types are suitable for simultaneous operation of the analog and digital interface.				

Start-up time (power supply ON)	< 250 ms
Overvoltage protection and reverse polarity protection	± 32 VDC
GND case insulation	> 10 MΩ @ 300 VDC

Analog interface

Load resistance	< (U - 8 V) / 25 mA	2-wire
	> 5 kΩ	3-wire
Limiting frequency	≥ 300 Hz	2-wire
		3-wire (0,1...2,5 V)
	≥ 1000 Hz	3-wire (0...10 V, 0...5 V)
Note	Filter properties can be adjusted by the customer.	

Digital interface

Type	RS485	Half-duplex
Communication protocols	Modbus RTU	
	KELLER bus protocol	Proprietary
Identification	Class.Group: 5.24	Standard settings: bus address 1, baud rate 9600 bit/s. Other default settings available on request. Can be reconfigured via software by the customer later.
Unit of pressure	bar	
Unit of temperature	°C	
Data type	Float32 and Int32	
Baud rates	9600 and 115,200 bit/s	
Cable lengths	up to 1,2 km	

Electrical connection

Standard	Through-hole technology	6 x ø 0,8 mm
Plug	Molex bent upwards	6-pin
	Molex straight	6-pin
Cable	Wires	On request

20SX Series – Specifications

Mechanical data

Materials in contact with media

Pressure connection	Stainless steel AISI 316L	≤ 400 bar
	Stainless steel AISI 318LN, 1.4462	> 400 bar
Pressure transducer diaphragm	Stainless steel AISI 316L	
Pressure transducer seal (internal)	None	
Pressure connection seal (external)	FKM (75 Shore) -20...200 °C	For medium temperatures < -20 °C, FVMQ (70 Shore, -60...175 °C) is used. Optional: EPDM (-40...150 °C)

Other materials

Pressure transducer oil filling	Silicone oil	Others available on request.
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Further details

Pressure connection	G1/4 male	See Dimensions and options
	1/4-18NPT male	
Diameter × length	Depends on pressure range	
Connection for capillary for reference pressure compensation	ø 1,2 mm × 3 mm	Optional: Capillary (silicone)
Weight	approx. 60 g	

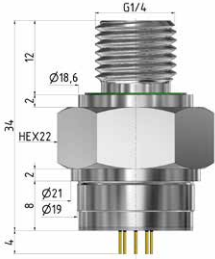

Environmental conditions

Medium temperature range	-20...125 °C	Optional: -55...150 °C	Operating temperature, consider seals. Icing not permitted.
Ambient temperature range	-20...85 °C	Optional: -40...85 °C	
Storage temperature range	-20...85 °C		
Load cycles @ RT (20...25 °C)	> 10 million pressure cycles	0...100 %FS	



20SX Series – Dimensions

Available pressure connections

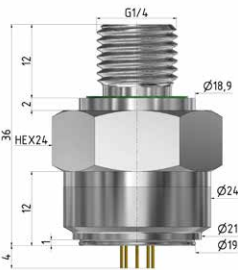
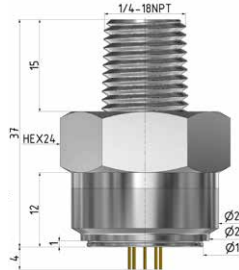
For pressure ranges ≤ 50 bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

For pressure ranges of > 50 bar to ≤ 120 bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

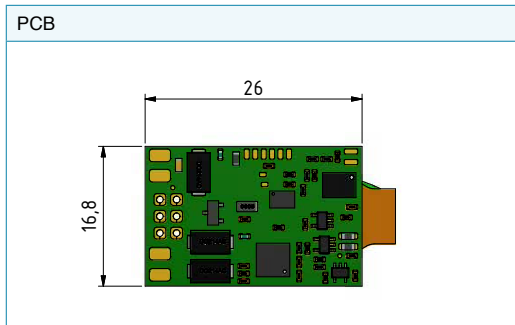
For pressure ranges > 120 bar

G1/4	1/4-18NPT
	
DIN EN ISO 1179-2	ASME/ANSI B 120.1

Other pressure connections available on request.

20SX Series – Dimensions and options

Electrical contacts – Electronics to pressure transmitter head



Electrical connections

				Molex type 87760-0616, 2 mm pitch
Molex type 87833-0631, 2 mm pitch	Digital	2-wire	3-wire	Molex type 87831-0641, 2 mm pitch
		4...20 mA	0...max. 10 V	
	1 Do not connect 2 Do not connect 3 +Vs 4 GND 5 RS485A 6 RS485B	1 Do not connect 2 Do not connect 3 +Vs 4 OUT/GND 5 RS485A 6 RS485B	1 +OUT 2 GND 3 +Vs 4 GND 5 RS485A 6 RS485B	
				Molex type 87758-0616, 2 mm pitch

Other customer-specific options

- Other compensated pressure ranges
- Other compensated temperature ranges within -40...125 °C
- Housing and diaphragm made from Hastelloy C-276, Inconel 718 or titanium
- O-rings made of other materials
- Other oil filling types for pressure transducers
- Vacuum-optimised version for operating pressures ≤0,1 bar abs
- Integration of application-specific calculations
- Modifications to customer-specific options

Examples of similar products

- 10LX/10LHPX Series: OEM pressure transmitters with RS485 interface
- 20SXiiic Series: Pressure transmitter heads with the highest accuracy and I2C interface
- 20SXc Series: Pressure transmitter heads with the highest accuracy and CANopen interface
- 23SX Series: High-precision pressure transmitters with RS485 interface
- 23SXc Series: High-precision pressure transmitters with CANopen interface
- 33X Series: Pressure transmitters with maximum performance

20SX Series – Software and scope of delivery

Modbus interface

The X-line products have a digital interface (RS485 half-duplex), which supports the MODBUS RTU and KELLER bus protocols. Details of the communication protocols can be found at www.keller-druck.com. Documentation, a Dynamic Link Library (DLL) and various programming examples are available for integrating the communication protocol into your own software.

Interface converters

The connection to a computer is established via an RS485-USB interface converter. To ensure smooth operation, we recommend the K-114 with the corresponding mating plug, robust driver module, fast RX/TX switching and connectable bias and terminating resistors.

“CCS30” software

The CCS30 software has no licence costs and is used to perform configurations and record measured values.

Record of measured values

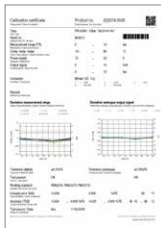
- Live visualisation
- Configurable measuring and storage interval
- Export function
- Parallel recording in bus operation
- Up to 100 measured values per second

Configuration






- Call up of information (pressure and temperature range, software version, serial number etc.)
- Readjustment of zero point and amplification
- Rescaling of analog output (unit, pressure range)
- Adjustment of low-pass filter
- Selection of instrument address and baud rate

Scope of delivery

KELLER test report



Accessories

Calibration certificate with 5 measuring points	Calibration certificate with 11 measuring points	Interface converter	Mating plug	Mating plug
				
Deviation at room temperature. Issued by KELLER.	Deviation at room temperature with hysteresis. Issued by KELLER.	K-114 <ul style="list-style-type: none"> • Analog measurement 0...10 V and 4...20 mA • 12 V measuring device supply via USB • USB interface galvanically isolated • Bias and terminating resistors can be activated 	Molex, 6p, 4 wires, 200 mm <ul style="list-style-type: none"> • Compatible with digital and 2-wire • Product number 600510.0143 	Molex, 6p, 5 wires, 200 mm <ul style="list-style-type: none"> • Compatible with 3-wire • Product number 600510.0144