Series 23SX-H2

High-precision piezoresistive pressure transmitter for hydrogen applications

Features

- Stainless steel with increased nickel content for a lower embrittlement rate
- Gold-plated diaphragm for minimal H2 diffusion
- RS485 interface can be combined with analog interface
- Analog interface scaleable by RS485 interface (turn-down)
- Modbus RTU protocol for process values and configuration
- Excellent long-term stability
- Optional: Intrinsically safe version 33X-Ei-H2 available for use in explosive environments

Technology

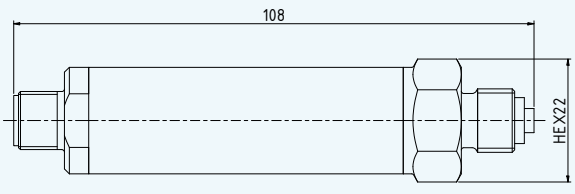
- Insulated and encapsulated piezoresistive pressure sensor chip
- Fully welded design with no internal seals
- High-quality pressure transducers and proven mathematical compensation
- Based on technology from the well-known 33X series with the highest level of accuracy

Typical applications of hydrogen

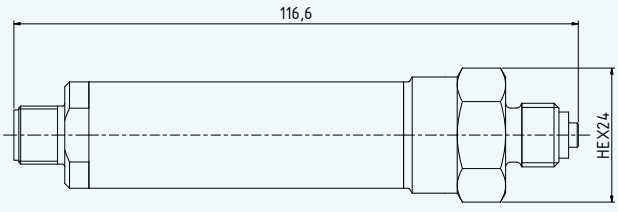
- Manufacturing / production
- Transport
- Containment / storage
- Petrol stations

Accuracy
± 0,1 %FS
Total error band
± 0,25 %FS @ -10…80 °C
Pressure ranges
0…4 to 0…1000 bar

Series 23SX-H2: ≤ 120 bar



Series 23SX-H2: > 120 bar



Edition 01/2026
Subject to alterations
info@keller-pressure.com

Series 23SX-H2 – Specifications

Standard pressure ranges

Relative pressure PR	Relative pressure PR	Proof pressure
0…4	-1…4	12
0…6	-1…6	18
0…10	-1…10	30
0…16	-1…16	48
0…25	-1…25	75
bar rel.		bar
Reference pressure at atmospheric pressure		Based on reference pressure

Absolute pressure PAA	Absolute pressure PA	Proof pressure
0...4	0...4	12
0...6	0…6	18
0...10	0…10	30
0...16	0…16	48
0...25	0…25	75
0...40	0…40	120
0...60	0...60	180
0...100	0...100	300
0...160	0...160	
0...250	0...250	500
0...350	0...350	800
0...400	0...400	
0...600	0...600	1200
0...700	0...700	
0...900	0...900	
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

Accuracy @ RT (20…25 °C)	≤ ± 0,1 %FS	Non-linearity (best fit straight line, BFSL), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation
Total error band (-10…80 °C)	≤ ± 0,25 %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	
Long-term stability	≤ ± 0,15 %FS	Per year under reference conditions, annual recalibration recommended.
Position dependency	≤ ± 1,5 mbar	Calibrated in vertical installation position with pressure connection facing downwards.
Resolution	0,002 %FS	Digital
Signal stability	0,01 %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.
Note	Higher accuracy available on request.	

Temperature

Accuracy	≤ ± 2 °C	The temperature is measured on the pressure sensor chip that sits behind the metallic separating diaphragm. The data applies within the compensated temperature range.
Resolution	≤ 0,01 °C	
Internal measurement rate	≥ 10 Hz	

Series 23SX-H2 – Specifications

Electrical information

Connectivity	digital	2-wire + digital	3-wire + digital	
Analog interface		4…20 mA	0…10 V	0…5 V
Digital interface	RS485	RS485	RS485	RS485
Power supply 23SX-H2	3,2…32 VDC	8…32 VDC	13…32 VDC	8…32 VDC
Power supply 33X-Ei-H2	3,2...8,5 VDC	10...30 VDC	15...30 VDC	10...30 VDC
Power consumption (without communication)	< 8 mA	3,5…22,5 mA	< 8 mA	< 8 mA
RS485 voltage insulation	± 32 VDC	± 18 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 23SX-H2	< (U - 8 V) / 25 mA	2-wire
	> 5 kΩ	3-wire
Load resistance 33X-Ei-H2	< (U - 10 V) / 25 mA	2-wire
	> 100 kΩ	3-wire (Ri = 100 Ω)
Limiting frequency	≥ 300 Hz	2-wire
	≥ 1000 Hz	3-wire
Note	Filter properties can be adjusted by the customer. The ATEX version (3-wire) has an effective internal resistance of 100 Ω. With a typical PLC input with 100 kΩ load resistance, this results in a load-related signal deviation of approx. 0,1 %FS compared to the unloaded state.	

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 later by the customer using software.
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 plug	Round plug	M12 x 1	DIN EN 61076-2-101, A-coded, 5-pin
Alternative plug	Valve plug (without RS485)	Form A (18 mm)	DIN EN 175301-803-A (formerly DIN 43650)

Electromagnetic compatibility

CE-conformity as per 2014/30/EU (EMC)	EN IEC 61326-1 / EN IEC 61326-2-3 / EN IEC 61000-6-1 / EN IEC 61000-6-2 / EN IEC 61000-6-3 / EN IEC 61000-6-4

Series 23SX-H2 – Specifications

Mechanical data

Materials in contact with media

Pressure connection	Stainless steel AISI 316L / 1.4435
Pressure transducer diaphragm	Stainless steel AISI 316L / 1.4435, gold plating 6 µm
Pressure transducer seal (internal)	None
Pressure connection seal (external)	None, metallically sealed

Other materials

Pressure transducer oil filling	Silicone oil

Further details

Pressure connection	G1/4 “Mano” with centring pin	See dimensions and variants
	1/4-18NPT male	
	7/16-20 UNF 2B female	
Diameter × length	ø 22 mm × approx. 115 mm	
Weight	approx. 130 g	Low pressure
	approx. 200 g	High pressure

Environmental conditions

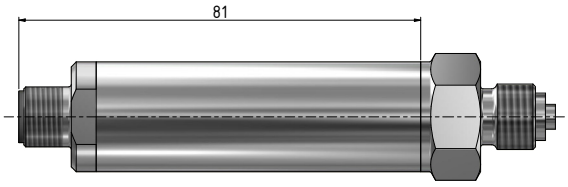
Medium temperature range	-40…125 °C		Icing not permitted
Ambient temperature range 23SX-H2	-40…85 °C		
Ambient temperature range 33X-Ei-H2	See operating instructions		
Storage temperature range	-40…85 °C		
Protection	IP67	Round plug, M12 x 1	For relative pressure IP54
	IP65	Valve plug, form A	For relative pressure, use a cable with integrated capillary.
Notes	• Degrees of protection are only valid with the corresponding mating plug in the connected state. • The design implementation of the ventilation for relative pressure versions can be found in the respective technical drawing.		
Vibration resistance	10 g, 10…2000 Hz, ±10 mm	IEC 60068-2-6	
Shock resistance	50 g, 6 ms	IEC 60068-2-27	
Load cycles @ RT (20…25 °C)	10 m. pressure cycles	≤ 400 bar	0…100 %FS
	2 m. pressure cycles	> 400…600 bar	
	100'000 pressure cycles	> 600…1000 bar	

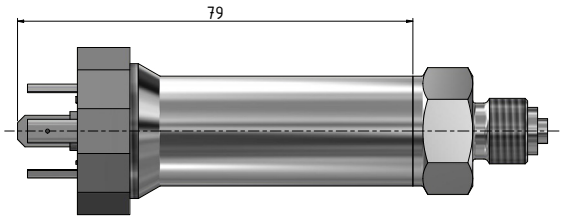
Explosion protection 33X-Ei-H2

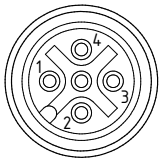
Intrinsically safe version in accordance with 2014/34/EU (ATEX), UKSI 2016/1107 (UKEX) and IECEx	KEMA 04 ATEX 1081 X IECEx DEK 14.0070 X ExV 21 UKEX 1014 X	Ex II 1G Ex ia IIC T6-T4 Ga Ex II 1D Ex ia IIIC T 130 °C Da
Note	The conditions for safe use can be found in the operating instructions.	

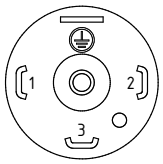
Series 23SX-H2 – Dimensions and variants

Electrical connections





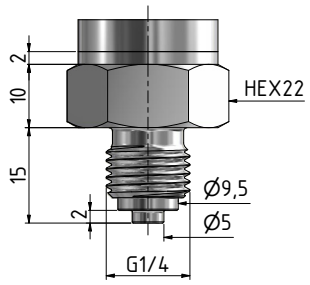
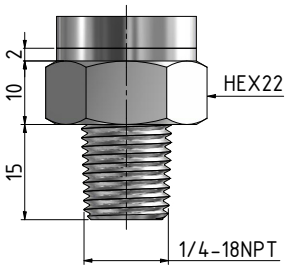
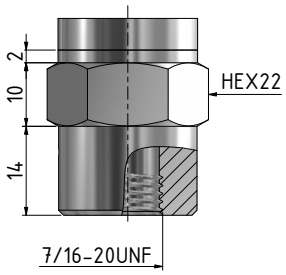
Round plug	2-wire		3-wire	
M12 × 1	4…20 mA		0…max. 10 V	
	1	OUT/GND	1	GND
	2	n.c.	2	+OUT
	3	+Vs	3	+Vs
	4	RS485A	4	RS485A
	5	RS485B	5	RS485B

Valve plug	2-wire		3-wire	
Form A (18 mm)	4…20 mA		0…max. 10 V	
		Standard	Alternative	Standard
	1	OUT/GND	n.c.	GND
	2	n.c.	OUT/GND	+OUT
	3	+Vs	+Vs	+Vs
	⏚	CASE	CASE	CASE

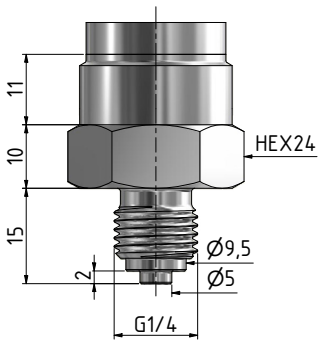
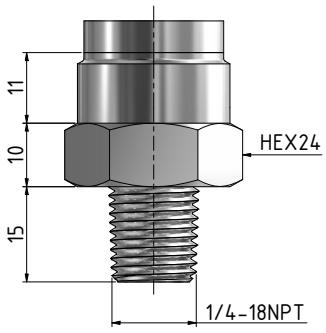
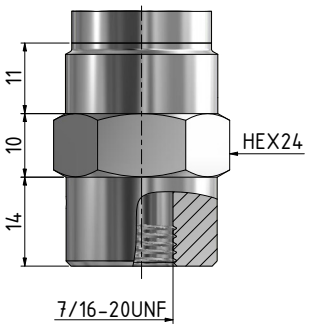
Series 23SX-H2 – Dimensions and variants

Available pressure connections

Pressure ranges ≤ 120 bar

G1/4 “Mano” with centring pin	1/4-18NPT male	7/16-20 UNF 2B female
		
DIN EN837	ASME/ANSI B 120.1	Autoclave SF250CX20

Pressure ranges > 120 bar

G1/4 “Mano” with centring pin	1/4-18NPT male	7/16-20 UNF 2B female
		
DIN EN837	ASME/ANSI B 120.1	Autoclave SF250CX20

Examples of similar products

- Series 23SY-H2: Industrial transmitter for hydrogen applications
- Series 23SXc-H2: Industrial transmitter with increased accuracy and CANopen interface for hydrogen applications.
- LEO-Record-H2: Digital gauge with logger function for hydrogen applications
- Pressure transmitter modules: Pressure transducer with electronics (e.g. Series 10LX-H2 or 20SX-H2 with thread) for integration into one’s own systems

Series 23SX-H2 – Software, scope of delivery and accessories

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-pressure.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 free license software CCS30 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

Calibration certificate	Mating plug to valve plug, form A, DIN EN 175301-803-A	Copper seal for G 1/4 «mano» with centering pin
		

Series 23SX-H2 – Software, scope of delivery and accessories

Accessories

Calibration certificate with 5 measuring points	Calibration certificate with 11 measuring points	Calibration certificate	Mating plug to round plug M12
			
Deviation at room temperature. Issued by KELLER.	Deviation at room temperature with hysteresis. Issued by KELLER.	Issued by an external calibration laboratory accredited by DakkS or SAS.	• Angled socket, cable 5 m PN 602515.0093 • Angled socket, cable 2 m PN 602515.0094 • Female connector, cable 5 m PN 602515.0095 • Female connector, cable 2 m PN 602515.0096

Interface converter	
	
K-114 • 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	Connection options • E.g. K-114-M with cable outlet instead of screw-type terminals for round plug M12 • Various adapter cables available