SensorsONE
Measurement Instrumentation Products

Series PD-33 X

Piezoresistive differential pressure transmitters with excellent accuracy

Features

- RS485 interface can be combined with analog interface
- Analog interface rangeable by RS485 interface (turn-down)
- Modbus RTU protocol for process values and configuration
- Line pressure up to 600 bar
- Excellent long-term stability

Technology

- Insulated and encapsulated piezoresistive pressure sensor
- High-quality differential pressure transducers and tried-and-tested mathematical compensation

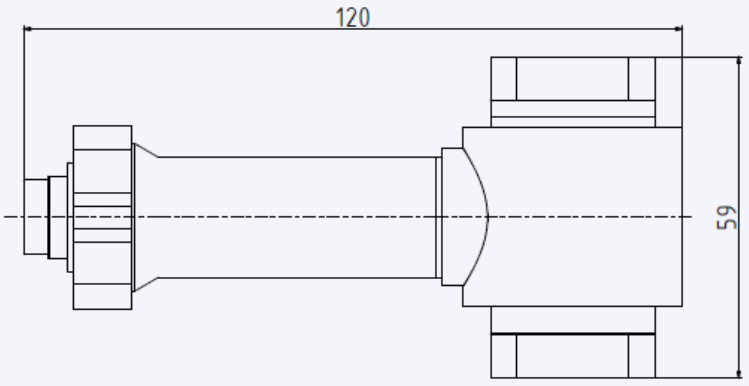
Typical applications

- Filter monitoring
- Flow rate measurement
- Leakage measurement
- Laboratory use
- Industrial applications

Accuracy
± 0,05 %FS
Total error band
± 0,1 %FS @ -10...80 °C
Pressure ranges
0...0,3 to 0...30 bar

Modbus RTU CE

Series PD-33 X



SensorsONE
Measurement Instrumentation Products

Series PD-33X – specifications

Standard pressure ranges

Differential pressure PD		Positive proof pressure	Negative proof pressure
0…0,3	-0,3…0,3	5	2,5
0…1	-1…0	15	7,5
	-1…1		
0…3	-1…3		
0…6		50	25
0…10	-1…10		
0…16		120	60
0…30	-1…30		
bar diff.		bar	
Reference pressure at ambient pressure		based on reference pressure	

Note:
all intermediate ranges for the analog interface possible from the standard ranges by scaling (turn-down) at no extra charge. Smallest range: 0,1 bar
Also negative and further +/- ranges possible. Optional: adjustment directly at intermediate ranges

Performance

Pressure

Digital nonlinearity	≤ ± 0,02 %FS	Best fitted straight line (BFSL)
Accuracy @ RT (20…25 °C)	≤ ± 0,05 %FS	Nonlinearity (best fitted straight line BFSL), pressure hysteresis, non-repeatability, zero point deviation and amplification deviation
Total Error Band (10…40 °C)	≤ ± 0,05 %FS	Max. deviation within the compensated pressure and temperature range
Total Error Band (-10…80 °C)	≤ ± 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...40 °C	Extended temperature range RT
	-10…80 °C	Other optional temperature ranges within -40…125 °C possible
Analog interface additional deviation	≤ ± 0,05 %FS	With reference to accuracy @ RT and the Total Error Band
Long-term stability	≤ ± 0,1 %FS	Per year under reference conditions, yearly recalibration recommended
Line pressure	≤ 200 bar	either, see Dimensions & options
	≤ 600 bar	
Line pressure dependency	< 0,005 %FS/bar	For pressure ranges ≥ 3 bar
	< 0,15 mbar/bar	For pressure ranges < 3 bar
Position dependency	≤ ± 5 mbar	Calibrated in vertical installation position with pressure connection (+) side facing downwards
Resolution	0,0005 %FS	Digital
Signal stability	0,0025 %FS	Digital noise-free
Internal measurement rate	> 1800 Hz	For version «3-wire + digital (0…10 V. 0…5 V)» > 6000 Hz
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	For pressure ranges < 1 bar, all data apply with reference to a full-range signal (FS) of 1 bar	

Temperature

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

SensorsONE
Measurement Instrumentation Products

Series PD-33X – 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
Power 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
RS485 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	± 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	
Lines	up to 1,2 km	

Electrical connection

Plug	Binder series 723	DIN EN 61076-2-106, 5-pin
	M12	DIN EN 61076-2-101, A-coded, 5-pin
	Souriau Series 8525	MIL-STD-1669
	GSP EN 175301-803-A	DIN 43650, without RS485
Cable	ø 5,8 mm, PE sheath	5-pin, cable gland

Electromagnetic compatibility

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

SensorsONE
Measurement Instrumentation Products

Series PD-33X – specifications

Mechanical data

Materials in contact with media

Pressure connection	Stainless steel AISI 316L	
Pressure transducer separating diaphragm	Stainless steel AISI 316L	
Pressure transducer seal (internal)	FKM	others on request
Pressure connection seal (external)	none	

Other materials

Pressure transducer oil filling	Silicone oil	others on request

Further details

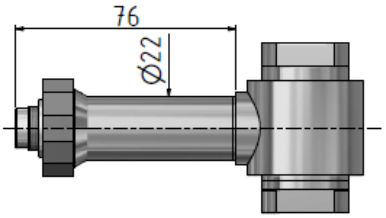
Pressure connection	G1/4 female	See Dimensions and options
	1/4-18NPT female	
Width × height	59 mm × approx. 120 mm	
Weight	approx. 500 g	Line pressure 200 bar
	approx. 650 g	Line pressure 600 bar

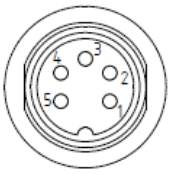
Ambient conditions

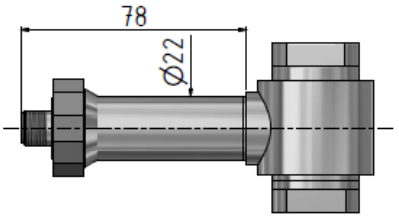
Media temperature range	-20…125 °C	Optional -40…125 °C	Icing not permitted
Ambient temperature range	-20…85 °C	Optional -30…85 °C	
Storage temperature range	-20…85 °C		
Protection	IP67	Binder series 723	For relative pressure, use a cable with integrated capillary
	IP65	GSP EN175301-803-A	
	IP65	Souriau Series 8525	
	IP67	M12	For relative pressure IP54
	IP68	Cable gland	For relative pressure, a cable with integrated capillary is used
Notes	Degrees of protection are valid with the corresponding mating plug		
Vibration resistance	10 g, 10…2000 Hz, ± 10 mm	IEC 60068-2-6	
Shock resistance	50 g, 11 ms	IEC 60068-2-27	
Pressure endurance @ RT (20…25 °C)	> 10 million pressure cycles	0…100 %FS	

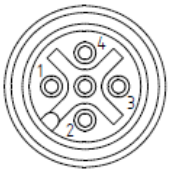
Series PD-33X – Dimensions and options

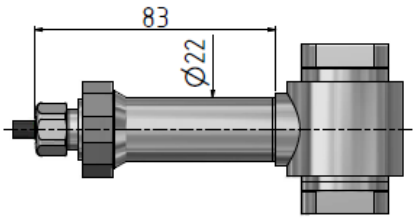
Electrical connections

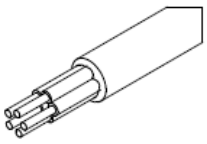


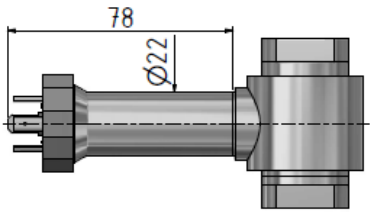
Binder series 723	2-wire		3-wire	
M12 × 1	4…20 mA		0…max. 10 V	
	1	OUT/GND	1	GND
	2	n.c.	2	+OUT
	3	+Vs	3	+Vs
	4	RS485A	4	RS485A
	5	RS485B	5	RS485B



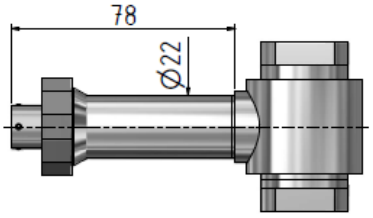
M12	2-wire		3-wire	
M12 × 1	4…20 mA		0…max. 10 V	
	1	OUT/GND	1	GND
	2	n.c.	2	+OUT
	3	+Vs	3	+Vs
	4	RS485A	4	RS485A
	5	RS485B	5	RS485B

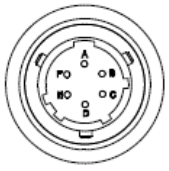


Cable gland	2-wire		3-wire	
Cable ø 5,8	4…20 mA		0…max. 10 V	
	WH	OUT/GND	WH	GND
	RD	n.c.	RD	+OUT
	BK	+Vs	BK	+Vs
	BU	RS485A	BU	RS485A
	YE	RS485B	YE	RS485B
	Shield on CASE		Shield on CASE	



GSP EN 175301-803-A	2-wire		3-wire	
□ 18	4…20 mA		0…max. 10 V	
	1	OUT/GND	1	GND
	2	n.c.	2	+OUT
	3	+Vs	3	+Vs
	⏚	CASE	⏚	CASE

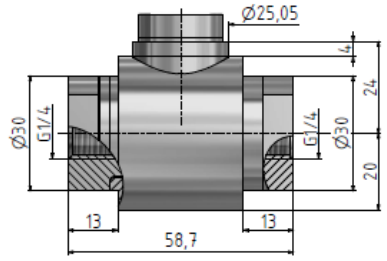
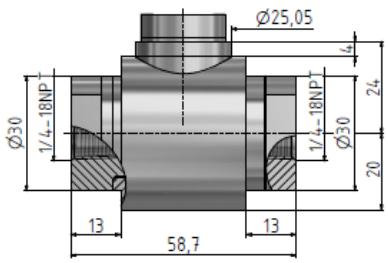


Sourlau Series 8525	2-wire		3-wire	
	4…20 mA		0…max. 10 V	
	C	OUT/GND	C	GND
	B	n.c.	B	+OUT
	A	+Vs	A	+Vs
	D	RS485A	D	RS485A
	F	RS485B	F	RS485B
	Shield on CASE		Shield on CASE	

Series PD-33X – Dimensions and options

Available pressure connections

For line pressure 200 bar

G1/4 female	1/4-18NPT female
	
ISO 228-1	ISO 228-1

For line pressure 600 bar dimensional drawings are available on request

Other customer-specific options

- Other compensated pressure ranges
- Other compensated temperature ranges within -40…125 °C are possible
- Other electrical connections
- Seal rings made of other materials
- Version without internal seals
- Other oil filling types for pressure transducers: e.g. special oils for oxygen applications
- Integration of application-specific calculations
- Modifications to customer-specific options

Examples of related products

- Series PD-33Xc: Differential pressure transmitters with very high accuracy and CANopen interface
- Series 33X: Pressure transmitters with excellent accuracy 0,01 %FS
- Series 35X: Pressure transmitters with front-flush metal diaphragm and very high accuracy
- OEM series: Pressure transducers with electronics (e.g. series PD-10LX) for integration in one's own systems