

DS 233

Differential Pressure Switch for Gases and Compressed Air in Compact Version

Silicon Sensor

accuracy according to IEC 60770:
0.35 % FSO

Differential pressure

from 0 ... 6 mbar up to 0 ... 1000 mbar

Output signal

2-wire: 4 ... 20 mA
3-wire: 4 … 20 mA
0 … 10 V

Special characteristics

- aluminium housing
- LED display
- rotatable and configurable display module
- suited for non-aggressive gases and compressed air

Optional versions

- 1 / 2 PNP contacts
- customer specific versions

The DS 233 is a differential pressure switch with digital display for non-aggressive gases and compressed air. Because of its compact and robust aluminium housing it is particularly suited for machine and plant engineering.

Basic element of the DS 233 is a piezoresistive silicon pressure sensor, which features high accuracy and excellent long term stability.

As standard the DS 233 offers a PNP contact and a rotatable display module with 4-digit LED display for representing the differential pressure. Optional up to two freely configurable contacts are available.

Preferred areas of use are

- Plant and machine engineering
- Heating and air conditioning

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Input pressure range											
Nominal pressure p_N (over, differential pressure) [mbar]	0...6	0...10	0...20	0...40	0...60	0...100	0...160	0...250	0...400	0...600	0...1000
Nominal pressure p_N symmetric (differential pressure) [mbar]	± 6	± 10	± 20	± 40	± 60	± 100	± 160	± 250	± 400	± 600	± 1000
Overpressure [mbar]	100	100	200	350	350	1000	1000	1000	1000	3000	3000

Contact [1]	
Standard	1 PNP contact
Option	2 independent PNP contacts
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; $V_{Switch} = V_S$ - 2V 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts [2]	p_N > 160 mbar: ≤ ± 0.35 % FSO 40 mbar ≤ p_N ≤ 160 mbar: ≤ ± 1 % FSO p_N < 40 mbar: ≤ ± 2 % FSO
Repeatability	≤ ± 0.1 % FSO
Switching frequency	max. 10 Hz
Switching cycles	> 100 x 10^6
Delay time	0 ... 100 sec
[1] max. 1 contact for 2-wire current signal with plug ISO 4400, no contact possible with 3-wire in combination with plug ISO 4400	

Analogue output (optionally) / Supply		
2-wire current signal	4 ... 20 mA / V_S = 13 ... 36 V_{DC} permissible load: $R_{max} = [(V_S - V_{S\,min}) / 0.02\ A]\ \Omega$	response time: < 10 msec
3-wire current signal	4 ... 20 mA / V_S = 19 ... 30 V_{DC} adjustable (turn-down of span 1:5) [3] permissible load: R_{max} = 500 Ω	response time: < 3 sec
3-wire voltage signal	0 … 10 V / V_S = 15 ... 36 V_{DC} permissible load: R_{min} = 10 kΩ	response time: < 3 msec
Without analogue output	V_S = 15 ... 36 V_{DC}	
Accuracy [2]	p_N > 160 mbar: ≤ ± 0.35 % FSO 40 mbar ≤ p_N ≤ 160 mbar: ≤ ± 1 % FSO p_N < 40 mbar: ≤ ± 2 % FSO	
[2] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability) *[3] with turn-down of span the analogue signal is adjusted automatically to the new measuring range*		

Performance	
Influence effects	supply: 0.05 % FSO / 10 V load: 0.05 % FSO / k
Long term stability	≤ ± 0.2 % FSO / year

Thermal effects (offset and span)				
Nominal pressure p_N [mbar]	≤ 10	≤ 20	≤ 250	> 250
Tolerance band [% FSO]	≤ ± 2	≤ ± 1.5	≤ ± 1	≤ ± 0.5
TC, average [% FSO / 10 K]	± 0.3	± 0.25	± 0.15	± 0.08
in compensated range	0 ... 60 °C			

Permissible temperatures	
Medium	-25 ... 125 °C
Electronics / environment	-25 ... 85 °C
Storage	-40 ... 100 °C

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326

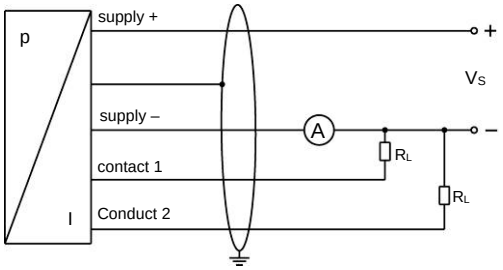
Mechanical stability		
Vibration	10 g RMS (20 ... 2000 Hz)	according to DIN EN 60068-2-6
Shock	100 g / 11 msec	according to DIN EN 60068-2-6

Materials	
Pressure port	aluminium, silver anodized
Housing	aluminium, silver anodised
Display housing	PA 6.6, polycarbonate
Seal	PUR
Sensor	silicon, RTV, ceramics Al_2O_3, Epoxy, stainless steel
Media wetted parts	pressure port, housing, seal, sensor

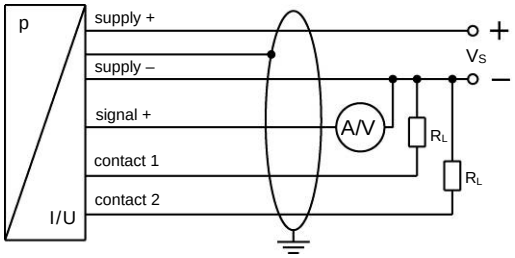
Miscellaneous	
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % ± 1 digit; digital damping 0.3 … 30 sec (programmable); measured value update 0.0 … 10 sec (programmable)
Current consumption (without contacts)	2-wire signal output current: max. 25 mA 3-wire signal output current: approx. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA
Ingress protection	IP 65
Weight	approx. 350 g
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU

Wiring diagrams

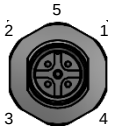
2-wire-system (current)



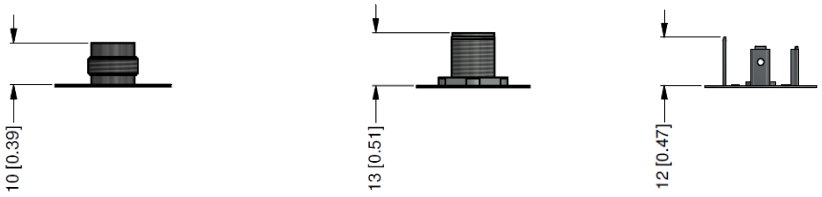
3-wire-system (current / voltage)



Pin configuration

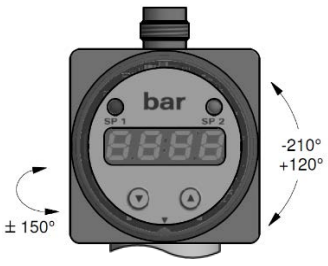
Electrical connection	M12x1, plastic (5-pin)	M12x1, metal (5-pin)	ISO 4400
			
Supply +	1	1	1
Supply –	3	3	2
Signal + (only 3-wire)	2	2	3
Contact 1	4	4	3
Contact 2	5	5	-
Shield	via pressure port	plug housing / pressure port	ground pin ⏚

Electrical connections (size mm / in)

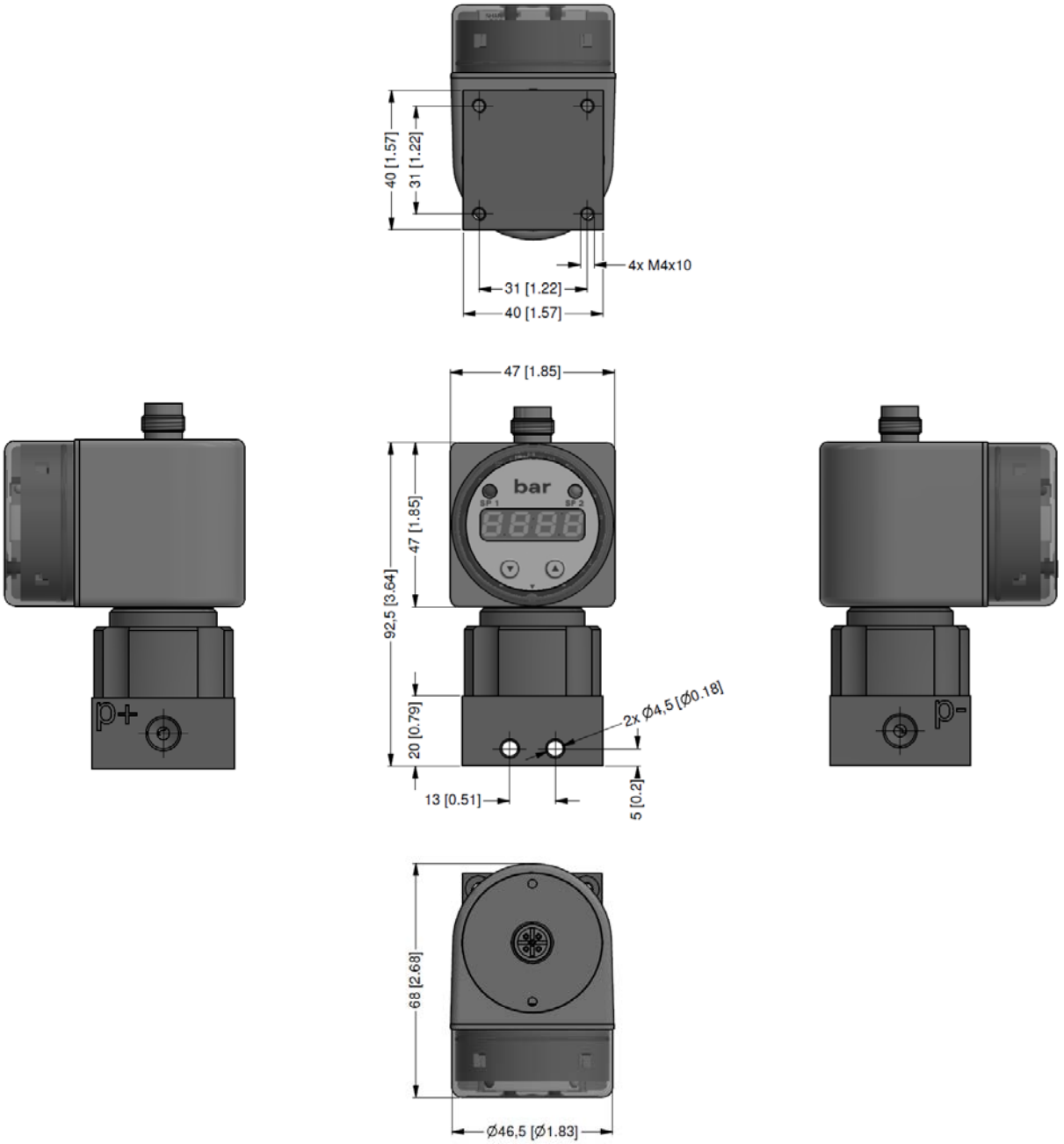


M12x1, plastic (5-pin) | M12x1, metal (5-pin) | ISO 4400

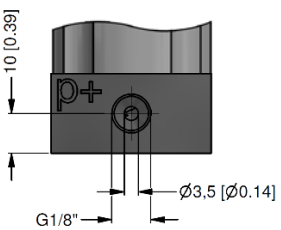
Rotatability of display module



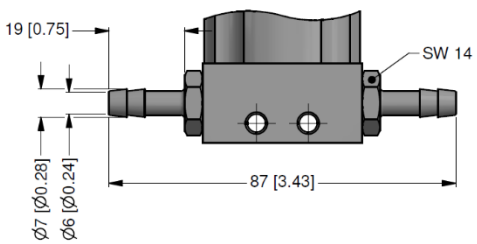
Dimensions (mm / in)



Mechanical connection (dimensions mm / in)



G1/8" internal thread



Ø6.6x11 (for flex. tubes Ø6)

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BD|SENSORS pressure measurement

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Ordering code DS 233

DS 233 □□-□□□□-□-□-□-□□□-□□□-□-□□□

Pressure																									
differential pressure				3	3	5																			
gauge pressure				3	3	6																			
Input	**[mbar]**																								
	6						0	0	6	0															
	10						0	1	0	0															
	20						0	2	0	0															
	40						0	4	0	0															
	60						0	6	0	0															
	100						1	0	0	0															
	160						1	6	0	0															
	250						2	5	0	0															
	400						4	0	0	0															
	600						6	0	0	0															
	1000						1	0	0	1															
	-6 ... 6						S	0	0	6															
	-10 ... 10						S	0	1	0															
	-20 ... 20						S	0	2	0															
	-40 ... 40						S	0	4	0															
	-60 ... 60						S	0	6	0															
	-100 ... 100						S	1	0	0															
	-160 ... 160						S	1	6	0															
	-250 ... 250						S	2	5	0															
	-400 ... 400						S	4	0	0															
	-600 ... 600						S	6	0	0															
	-1000 ... 1000						S	1	0	2															
	customer						9	9	9	9															consult
Output																									
	without										0														
	4 … 20 mA / 2-wire [1]										1														
	0 … 10 V / 3-wire										3														
	4 … 20 mA / 3-wire										7														
	customer										9														consult
Contact																									
	1 contact											1													
	2 contacts											2													
Accuracy																									
standard for p_N > 160 mbar	0.35 % FSO												3												
standard for 40 mbar ≤ p_N ≤ 160 mbar	1.0 % FSO												8												
standard for p_N < 40 mbar	2.0 % FSO												G												
	customer												9												consult
Electrical connection																									
	plastic male plug M12x1 (5-pin)													N	0	1									
	metal male plug M12x1 (5-pin)													N	1	1									
	male and female plug ISO 4400 [1]													1	0	0									
	customer													9	9	9									consult
Mechanical connection																									
	G1/8" internal thread																Q	0	0						
	Ø 6.6 x 11 (for flex. tubes Ø 6)																Y	0	0						
	customer																9	9	9						consult
Seal																									
	PUR, bonded																			6					
Special version																									
	standard																				0	0	0		
	customer																				9	9	9		consult

[1] max. 1 contact for 2-wire current signal with plug ISO 4400, no contact possible with 3-wire in combination with plug ISO 4400

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