



DS 233

Differential Pressure Switch for Gases and Compressed Air in Compact Version

Silicon Sensor

accuracy according to IEC 61298-2:
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



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; $V_{\text{Switch}} = V_S - 2V$ 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts ²	$p_N > 160$ mbar: $\leq \pm 0.35$ % FSO 40 mbar $\leq p_N \leq 160$ mbar: $\leq \pm 1$ % FSO $p_N < 40$ mbar: $\leq \pm 2$ % FSO
Repeatability	$\leq \pm 0.1$ % FSO
Switching frequency	max. 10 Hz
Switching cycles	$> 100 \times 10^6$
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 / $V_S = 13 \dots 36 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0.02 A] \Omega$ response time: < 10 msec
3-wire current signal	4 ... 20 mA / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span 1:5) ³ permissible load: $R_{\text{max}} = 500 \Omega$ response time: < 3 sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{\text{min}} = 10 k\Omega$ response time: < 3 msec
Without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy ²	$p_N > 160$ mbar: $\leq \pm 0.35$ % FSO 40 mbar $\leq p_N \leq 160$ mbar: $\leq \pm 1$ % FSO $p_N < 40$ mbar: $\leq \pm 2$ % FSO

² accuracy according to IEC 61298-2 – 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	$\leq \pm 0.2$ % FSO / year

Thermal effects (offset and span)				
Nominal pressure p_N [mbar]	≤ 10	≤ 20	≤ 250	> 250
Tolerance band [% FSO]	$\leq \pm 2$	$\leq \pm 1.5$	$\leq \pm 1$	$\leq \pm 0.5$
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	20 g RMS / 10 ... 2000 Hz according to DIN EN 60068-2-6
Shock	500 g / 1 msec half sine according to DIN EN 60068-2-6

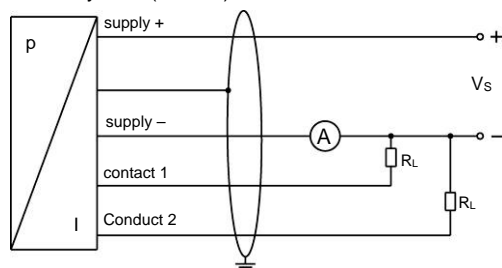
Materials	
Pressure port	aluminium, silver anodized
Housing	aluminium, silver anodised
Display housing	PA 6.6, polycarbonate
Seal	PUR
Sensor	silicon, RTV, ceramics Al_2O_3 , Epoxy, stainless steel
Media wetted parts	pressure port, housing, seal, sensor

Miscellaneous

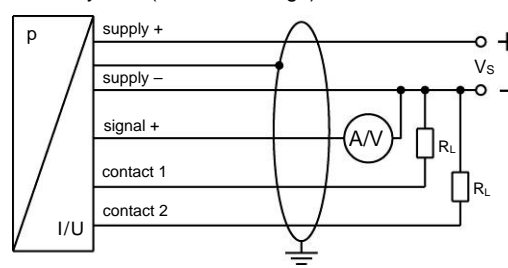
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy $0.1\% \pm 1$ digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	2-wire signal output current: max. 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)



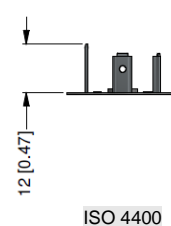
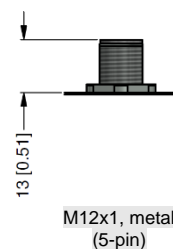
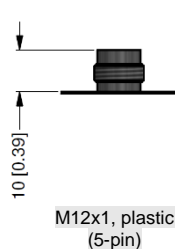
3-wire-system (current / voltage)



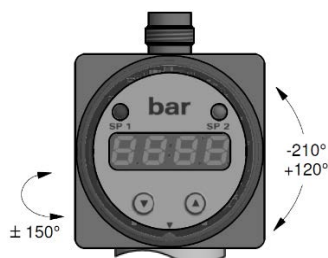
Pin configuration

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 \oplus

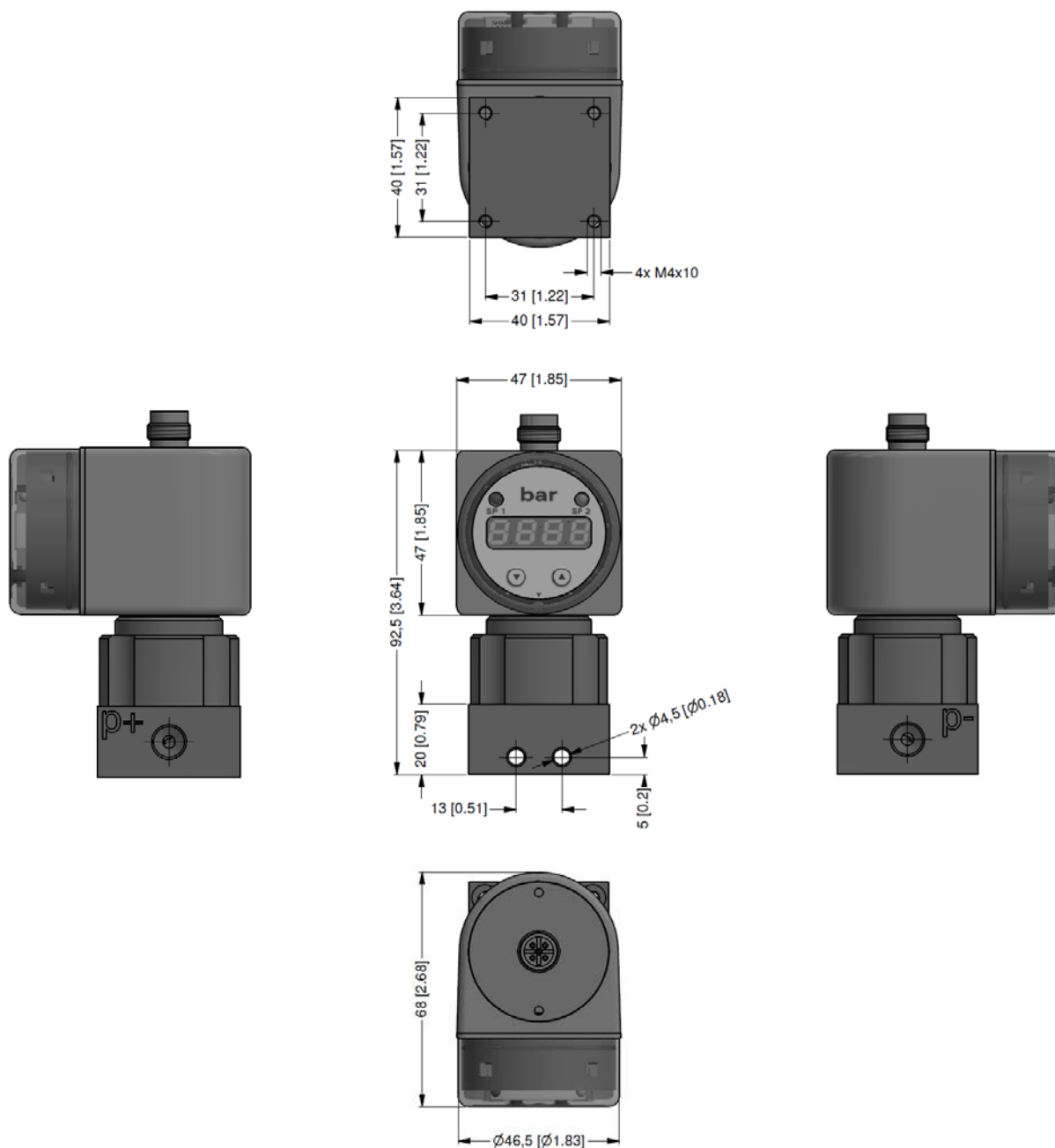
Electrical connections (size mm / in)



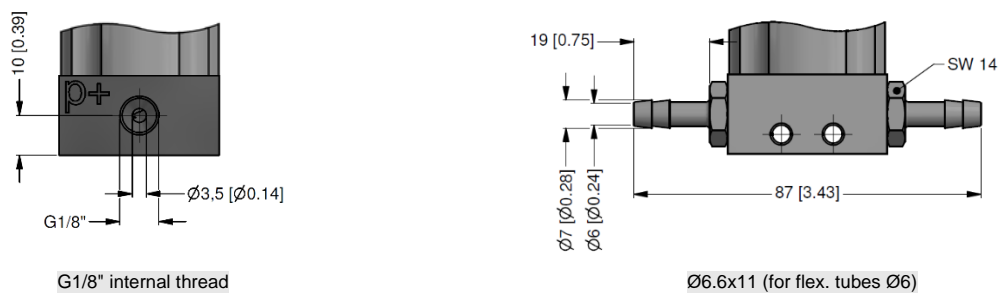
Rotatability of display module



Dimensions (mm / in)



Mechanical connection (dimensions mm / in)



Ordering code DS 233

DS 233

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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

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