



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



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: $\leq \pm 0.35$ % 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: $R_{max} = [(V_S - V_{Smin}) / 0.02 A] \Omega$ 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: $R_{max} = 500 \Omega$ response time: < 3 sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{min} = 10 k\Omega$ 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 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	$\leq \pm 0.2$ % FSO / year

Thermal effects (Offset and Span) / Permissible temperatures				
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: electronics / environment: storage:	-25 ... 125 °C -25 ... 85 °C -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

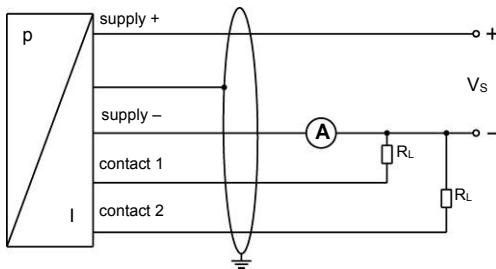
Materials	
Pressure port	aluminium, silver anodized
Housing	aluminium, silver anodised
Display housing	PA 6.6, polycarbonate
Seal	PUR
Sensor	silicon, RTV, ceramics Al_2O_3 , Epoxy, stainless steel
Media wetted parts	pressure port, housing, seal, sensor

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

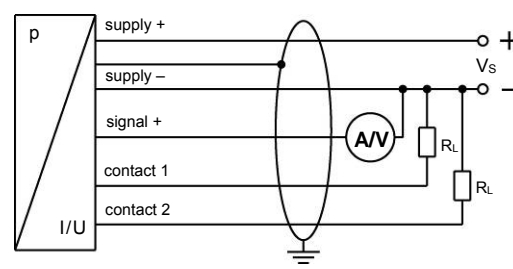
Pin configuration				
Electrical connection	ISO 4400	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	wh (white)
Supply -	2	3	3	bn (brown)
Signal + (only 3-wire)	3	2	2	gn (green)
Contact 1	3	4	4	gy (grey)
Contact 2	-	5	5	pk (pink)
Shield	ground contact	via pressure port	plug housing/pressure port	gnye (green-yellow)

Wiring diagrams

2-wire-system (current)

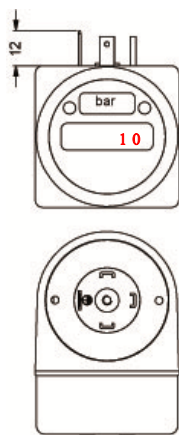


3-wire-system (current / voltage)



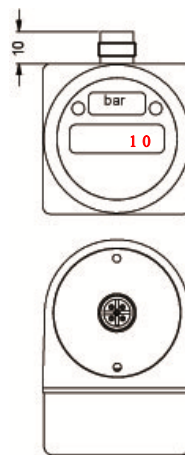
Electrical connections (dimensions in mm)

standard

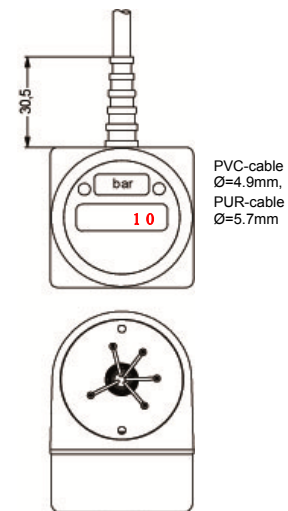


ISO 4400

option



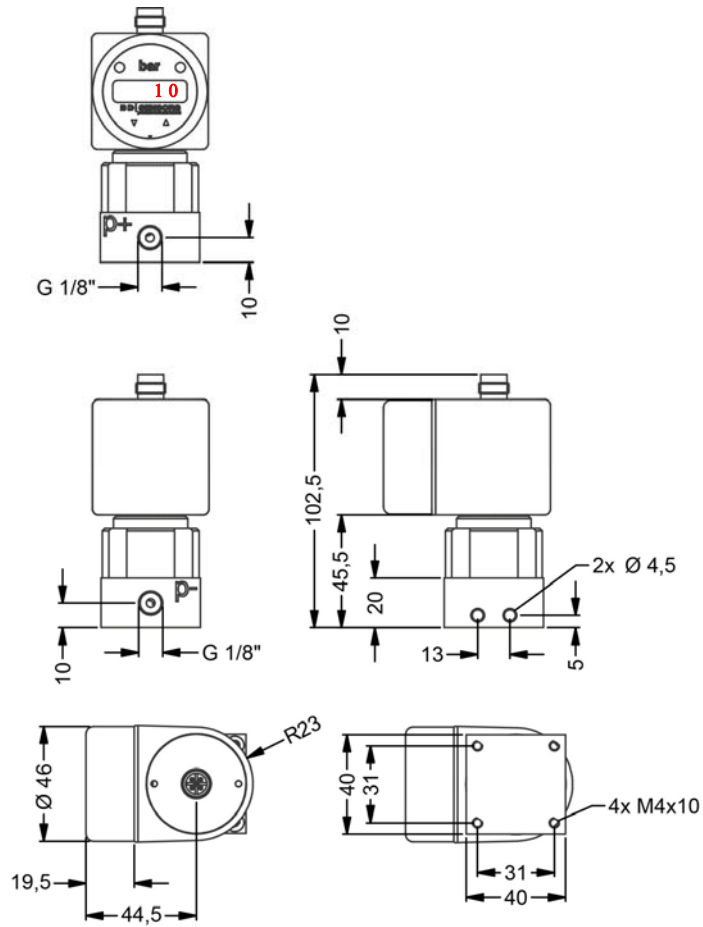
M12x1 (5-pin)



cable outlet with PVC-cable ⁴

⁴ standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), optionally cable with ventilation tube

Mechanical connection (dimensions in mm)



G1/8" internal

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