BD SENSORS
pressure measurement

DS 400

Intelligent Electronic Pressure Switch Stainless Steel

Stainless Steel Sensor

accuracy according to IEC 60770:
standard: 0.35 % FSO
option: 0.25 % FSO

Nominal pressure

from 0 ... 100 mbar up to 0 ... 600 bar

Contacts

1 or 2 independent PNP contacts,
freely configurable

Analogue output

2-wire: 4 ... 20 mA
3-wire: 4 … 20 mA
3-wire: 0 … 10 V (on request)
others on request

Special characteristics

- indication of measured values on a 4-digit LED display
- rotatable and configurable display module

Optional versions

- **IS-version**
  Ex ia = intrinsically safe
  for gases and dust
- welded pressure sensor
- customer specific versions

The electronic pressure switch DS 400 is the successful combination of

- intelligent pressure switch
- digital display

and has been specially designed for numerous applications in various industrial sectors.

As standard the DS 400 offers a PNP contact and a display module, which is mounted rotable in the globe housing. Additional optional versions like e.g. an intrinsically safe version, a second contact and an analogue output complete the profile.

Preferred areas of use are

- Plant and machine engineering
- Heating and air conditioning
- Environmental engineering (water – sewage – recycling)

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Input pressure range											
Nominal pressure gauge	[bar]	-1 … 0	0.10	0.16	0.25	0.40	0.60	1	1.6	2.5	4	6
Nominal pressure abs.	[bar]	-	-	-	-	0.40	0.60	1	1.6	2.5	4	6
Overpressure	[bar]	5	0.5	1	1	2	5	5	10	10	20	40
Burst pressure	[bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50

Nominal pressure gauge / abs.	[bar]	10	16	25	40	60	100	160	250	400	600
Overpressure	[bar]	40	80	80	105	210	210	600	1000	1000	1000
Burst pressure	[bar]	50	120	120	210	420	420	1000	1250	1250	1250
Vacuum resistance		$p_N \geq 1$ bar: unlimited vacuum resistance						$p_N < 1$ bar: on request			

Contact [1]	
Number, type	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 (on request): contact rating 125 mA, short-circuit resistant
Accuracy of contacts [2]	≤ ± 0.25 % FSO
Repeatability	≤ ± 0.1 % FSO
Switching frequency	2-wire: max. 10 Hz / 3-wire: 50 Hz
Switching cycles	> 100 x 10^6
Delay time	0 ... 100 sec
[1] with IS-protection max. 1 contact possible	
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
2-wire current signal with IS-protection	4 ... 20 mA / V_S = 15 ... 28 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 = 24 V_{DC} ± 10 % adjustable (turn-down of span 1:5) [3] permissible load: R_{max} = 500 Ω response time: < 30 msec
3-wire voltage signal (on request)	0 … 10 V / V_S = 24 V_{DC} ± 10 % adjustable (turn-down of span 1:5) [3] permissible load: R_{min} = 10 kΩ response time: < 30 msec
Without analogue output	V_S = 15 ... 36 V_{DC}
Accuracy [2]	standard: nominal pressure < 0.4 bar: ≤ ± 0.5 % FSO nominal pressure ≥ 0.4 bar: ≤ ± 0.35 % FSO option: nominal pressure ≥ 0.4 bar: ≤ ± 0.25 % 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*	

Thermal effects (Offset and Span)			
Nominal pressure p_N [bar]	-1 … 0	< 0.40	≥ 0.40
Tolerance band [% FSO]	≤ ± 0.75	≤ ± 1	≤ ± 0.75
in compensated range [°C]	-20 ... 85	0 ... 70	-20 … 85

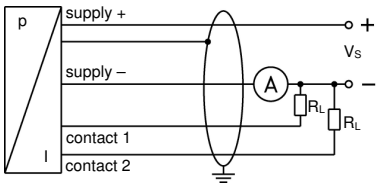
Permissible temperatures	
Permissible temperatures	medium: -40 ... 125 °C electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C
Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Mechanical stability	
Vibration	10 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	500 g / 1 msec according to DIN EN 60068-2-27
Materials	
Pressure port	stainless steel 1.4404 (316L)
Housing	stainless steel 1.4404 (316L)
Viewing glass	laminated safety glass
Seals (media wetted)	standard: FKM option: welded version [4] on request others on request
Diaphragm	stainless steel 1.4435 (316 L)
Media wetted parts	pressure port, seals, diaphragm
[4] welded version only for pressure ports according to EN 837; possible for nominal pressure ranges $p_N \leq 40$ bar	
Explosion protection (only for 4 … 20 mA / 2-wire)	
Approval AX14-DS 400	IBExU 06 ATEX 1050 X zone 0: II 1G Ex ia IIC T4 Ga (connector) / II 1G Ex ia IIB T4 Ga (cable) zone 20: II 1D Ex ia IIIC T135 °C Da
Safety techn. maximum values	U_i = 28 V, I_i = 93 mA, P_i = 660 mW, $C_i \approx 0$ pF, $L_i \approx 0$ µH
Max. switching current [5]	70 mA
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar in zone 1 or higher: -25 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 100 pF/m cable inductance: signal line/shield also signal line/signal line: 1 µH/m
[5] the real switching current in the application depends on the power supply unit	

Miscellaneous	
Display	4-digit, 7-segment-LED display visible range 37.2 x 11 mm digit height 10 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. 30 mA + signal current 3-wire signal output voltage: approx. 30 mA
Ingress protection	IP 67
Installation position	any 6
Weight	approx. 400 g
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) [7]
ATEX Directive	2014/34/EU

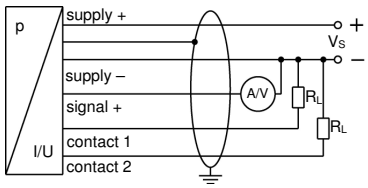
[6] Pressure switches are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviation in the zero point for pressure ranges $p_N \leq 1$ bar.
[7] This directive is only valid for devices with maximum permissible overpressure > 200 bar.

Wiring diagrams

2-wire-system (current)

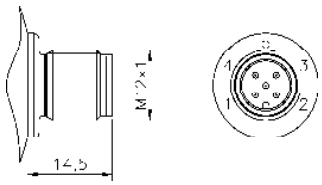


3-wire-system (current / voltage)



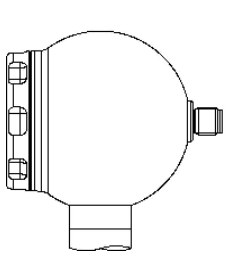
Pin configuration	
Electrical connection	M12x1 metal (5-pin)
Supply +	1
Supply –	3
Signal + (only 3-wire)	2
Contact 1	4
Contact 2	5
Shield	plug housing / pressure port

Electrical connection (dimensions in mm)

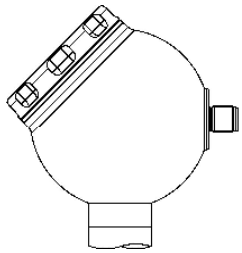


M12x1 (5-pin)

Designs [8]



side display

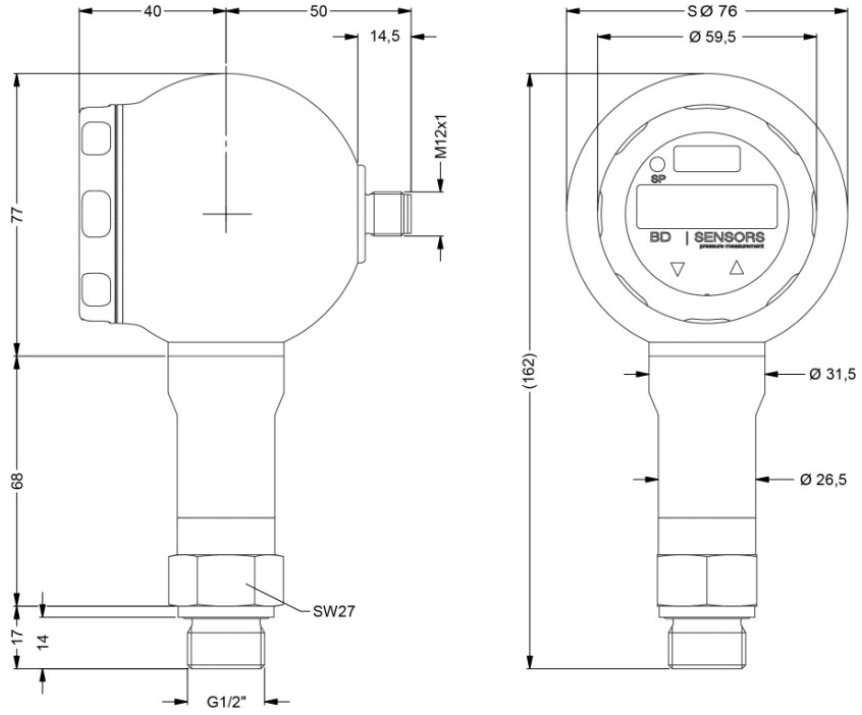


45° display (on request)

[8] all designs in horizontal rotatable housing as standard

Mechanical connections (dimensions in mm)

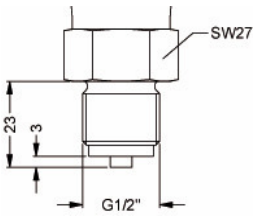
standard



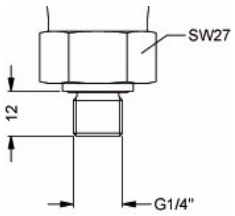
G1/2" DIN 3852

⇨ **for nominal pressure p_N > 400 bar increases the length of devices without IS-version by 19 mm and of devices with IS-version by 39 mm**

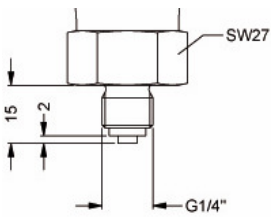
options



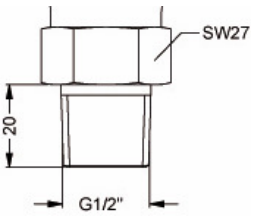
G1/2" EN 837



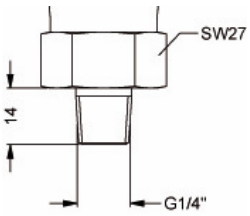
G1/4" DIN 3852



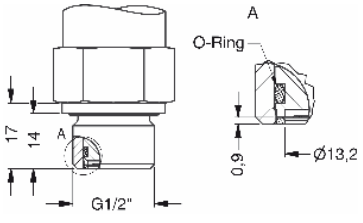
G1/4" EN 837



1/2" NPT



1/4" NPT



G1/2" flush DIN 3852
(p_N from 0.1 up to 40 bar)

⇨ **metric threads and other versions on request**

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BD|SENSORS pressure measurement

Ordering code DS 400

DS 400 □□□-□□□□-□□-□-□-□-□□□-□□□-□-□□□

Item	Code	Remark
Pressure		
gauge [1]	7 A 0	
absolute [2]	7 A 1	
Input [bar]		
0.10 [2]	1 0 0 0	
0.16 [2]	1 6 0 0	
0.25 [2]	2 5 0 0	
0.40	4 0 0 0	
0.60	6 0 0 0	
1.0	1 0 0 1	
1.6	1 6 0 1	
2.5	2 5 0 1	
4.0	4 0 0 1	
6.0	6 0 0 1	
10	1 0 0 2	
16	1 6 0 2	
25	2 5 0 2	
40	4 0 0 2	
60	6 0 0 2	
100	1 0 0 3	
160	1 6 0 3	
250	2 5 0 3	
400	4 0 0 3	
600	6 0 0 3	
-1 … 0	X 1 0 2	
customer	9 9 9 9	consult
Design		
stainless steel globe housing (side display)	K H	
stainless steel globe housing (45° display)	K 4	consult
Analogue output		
without	0	
4 … 20 mA / 2-wire	1	
0 … 10 V / 3-wire, adjustable	3J	consult
4 … 20 mA / 3-wire, adjustable	7J	
intrinsic safety 4 … 20 mA / 2-wire [3]	E	
customer	9	consult
Contact		
1 contact	1	
2 contacts [3]	2	
Accuracy		
standard for $p_N \geq 0.4$ bar — 0.35 %	3	
standard for $p_N < 0.4$ bar — 0.5 %	5	
option for $p_N \geq 0.4$ bar — 0.25 %	2	
customer	9	consult
Electrical connection		
male plug M12x1 (5-pin) / metal version	N 1 1	
customer	9 9 9	consult
Mechanical connection		
G1/2" DIN 3852	1 0 0	
G1/2" EN 837	2 0 0	
G1/4" DIN 3852	3 0 0	
G1/4" EN 837	4 0 0	
G1/2" DIN 3852 with flush sensor [4]	F 0 0	
1/2" NPT	N 0 0	
1/4" NPT	N 4 0	
customer	9 9 9	consult
Seals		
FKM	1	
without (welded version) [5]	2	consult
customer	9	consult
Special version		
standard	0 0 0	
customer	9 9 9	consult

[1] from 60 bar: measurement starts with ambient pressure
[2] absolute pressure possible from 0.4 bar
[3] with IS version max. 1 contact is possible
[4] only possible for nominal pressure ranges $p_N \leq 40$ bar
[5] welded version only with pressure ports according to EN 837; possible for nominal pressure ranges $p_N \leq 40$ bar

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