

DS 400

Intelligent Electronic Pressure Switch Completely in Stainless Steel



Description

The electronic pressure switch DS 400 is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and is suitable for universal usage. As standard the DS 400 offers a PNP contact and is optionally available with a second, independent contact. Additionally the device could be equipped with an analogue output, which has a turn-down-possibility of 1:6 for the 3-wire-version. The 2-wire version is also available with Ex-protection. **So BD SENSORS is one of the few competitors on the world market offering intelligent, intrinsically safe electronic pressure switches for the use in explosion hazard areas.**

Operating

The display module, which is mounted rotatable in the ball housing, shows the system pressure and allows programming. The configuration is menu controlled and easy to handle without previous knowledge.

Applications

- ▶ machine and plant engineering
- ▶ test benches
- ▶ environmental engineering

- ▶ piezoresistive stainless steel sensor
- ▶ up to 2 independent contacts, configurable
- ▶ optional:
 - analogue output
 - Ex-protection (for 2-wire)
- ▶ nominal pressure range from 0 ... 100 mbar up to 0 ... 600 bar

- ▶ indication of measured values on a 4-digit LED display
- ▶ rotatable and configurable display module
- ▶ configurable contacts (switch on / switch off points, hysteresis / window mode, switch on / switch off delay)
- ▶ option analogue output:
 - 3-wire version: 4 ... 20 mA or 0 ... 10 V with turn-down 1:6
 - 2-wire version: 4 ... 20 mA**Ex-protection optionally**
- ▶ special functions (access protection, min. / max. value memory)
- ▶ industrial standard in view of accuracy, thermal behaviour and long term stability

Characteristics

DS 400
Electronic Pressure Switch



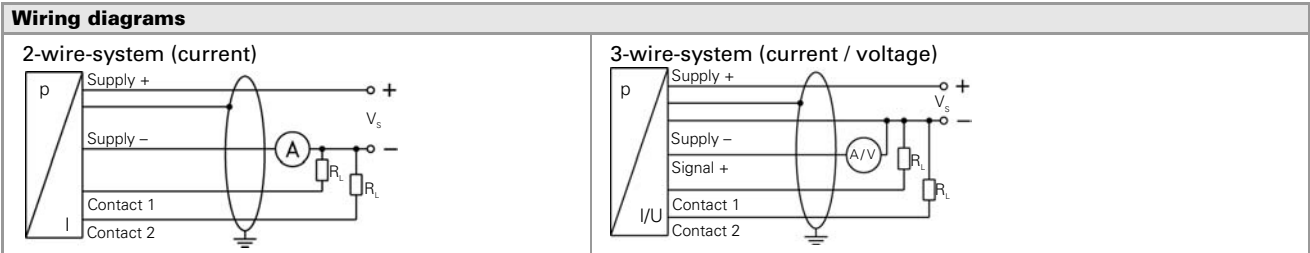
Input pressure range												
Nominal pressure gauge [bar]	-1 ... 0	0.1	0.25	0.4	1	2.5	4	10	25	40		
Nominal pressure abs. [bar]	-	0.1	0.25	0.4	1	2.5	4	10	25	40		
Permissible overpressure [bar]	3	1	1	1	3	6	20	60	60	100		
Nominal pressure gauge ¹ [bar]	100			250			400			600		
Nominal pressure abs. [bar]	100			250			400			600		
Permissible overpressure [bar]	340			600			600			1000		
¹ measurement starts with ambient pressure												
Contact²												
Number, type	standard: 1 PNP contact option: 2 independent PNP contacts											
Max. switching current	2-wire: contact rating 125 mA, short-circuit resistant; $V_{switch} = V_s - 2V$ 3-wire: contact rating 500 mA, short-circuit resistant											
Accuracy of contacts	standard: nominal pressure > 0.4 bar: nominal pressure ≤ 0.4 bar: option: nominal pressure > 0.4 bar:						IEC 60770			BFSL		
							≤ ± 0.35 % FSO			≤ ± 0.175 % FSO		
							≤ ± 0.50 % FSO			≤ ± 0.250 % FSO		
							≤ ± 0.25 % FSO			≤ ± 0.125 % 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.											
² with Ex-protection max. 1 contact possible												
Analogue output (optionally) / Supply												
2-wire current signal	4 ... 20 mA / $V_s = 18 ... 41 V_{DC}$ permissible load: $R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$ response time: < 10 ms											
2-wire current signal with Ex-protection	4 ... 20 mA / $V_s = 17 ... 28 V_{DC}$ permissible load: $R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$ response time: < 10 ms											
3-wire current signal	4 ... 20 mA / $V_s = 24 V_{DC} \pm 10\%$ adjustable (turn-down of span 1:6) ³ permissible load: $R_{max} = 500 \Omega$ response time: < 30 ms											
3-wire voltage signal	0 ... 10 V / $V_s = 24 V_{DC} \pm 10\%$ adjustable (turn-down of span 1:6) ³ permissible load: $R_{min} = 10 k\Omega$ response time: < 30 ms											
Without analogue output	$V_s = 15 ... 36 V_{DC}$											
Accuracy	standard: nominal pressure > 0.4 bar: nominal pressure ≤ 0.4 bar: option: nominal pressure > 0.4 bar:						IEC 60770 ⁴			BFSL		
							≤ ± 0.35 % FSO			≤ ± 0.175 % FSO		
							≤ ± 0.50 % FSO			≤ ± 0.250 % FSO		
							≤ ± 0.25 % FSO			≤ ± 0.125 % FSO		
³ with turn-down of span the analogue signal is adjusted automatically to the new measuring range												
⁴ accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)												
Thermal errors (offset and span) / Permissible temperatures												
Nominal pressure P_N [bar]	-1 ... 0	≤ 0.1	≤ 0.25	≤ 0.4	≤ 1	> 1						
Tolerance band [% FSO]	≤ ± 0.75	≤ ± 2	≤ ± 1.5	≤ ± 1	≤ ± 1	≤ ± 0.75						
TC, average [% FSO / 10 K]	± 0.07	± 0.3	± 0.2	± 0.14	± 0.1	± 0.07						
in compensated range [°C]	0 ... 70	0 ... 50				0 ... 70						
Permissible temperatures	medium: -25 ... 125 °C			electronics / environment: -25 ... 85 °C				storage: -40 ... 85 °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	5 g RMS (20 ... 2000 Hz)											
Shock	100 g / 11 msec.											
Materials												
Pressure port	stainless steel 1.4571 (316Ti)											
Housing	stainless steel 1.4301 (304)											
Viewing glass	laminated safety glass											
Seals (media wetted)	standard: $P_N \leq 40$ bar: FKM / $P_N > 40$ bar: NBR option: welded version for pressure ports according to EN 837 with pressure ranges P_N between 0.25 bar and 40 bar; others on request											
Diaphragm	stainless steel 1.4435 (316L)											
Media wetted parts	pressure port, seals, diaphragm											

Explosion protection (for 2-wire current signal with Ex-protection)	
Approval AX14-DS 400	zone 0: II 1 G EEx ia IIC T4
Safety techn. maximum values	$U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$
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: -25 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 µH/m

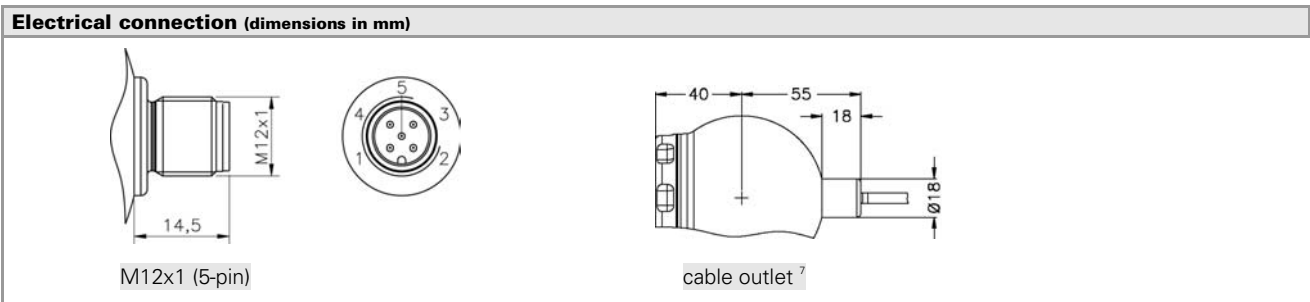
⁵ the real switching current in the application depends on the power supply unit

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 x 10 ⁶ cycles

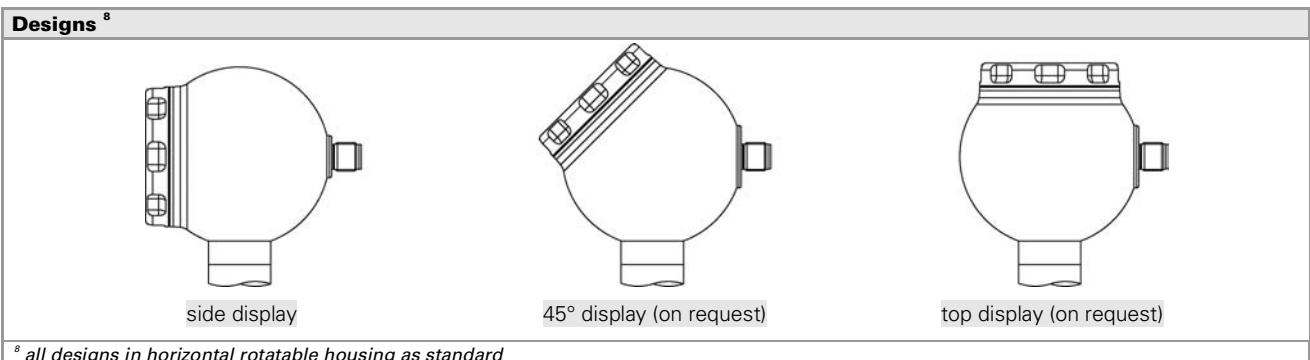
⁶ Pressure switches are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviation in the zero point for pressure ranges ≤ 1 bar.



Pin configuration		
Electrical connection	M12x1 metal (5-pin)	cable colours (DIN 47100)
Supply +	1	white
Supply -	3	brown
Signal + (only 3-wire)	2	green
Contact 1	4	grey
Contact 2	5	pink
Ground	plug housing / pressure port	yellow / green (shield)

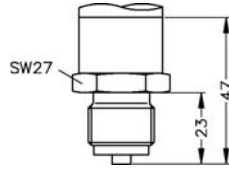
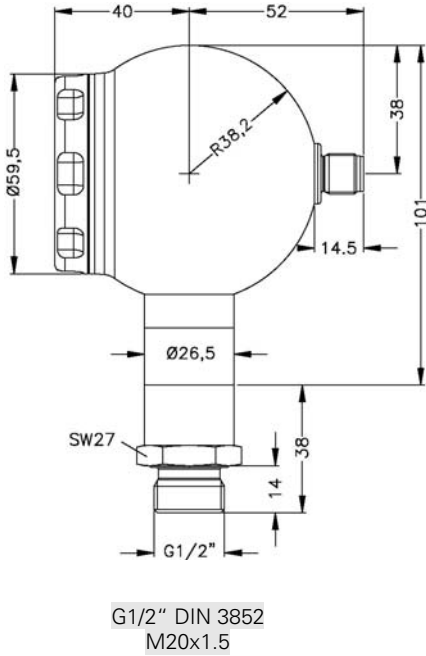


⁷ different cable types and lengths available

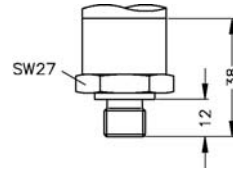


⁸ all designs in horizontal rotatable housing as standard

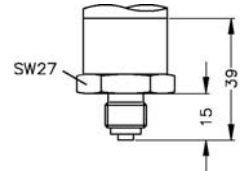
Mechanical connections (dimensions in mm)



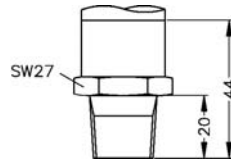
G1/2" EN 837
M20x1.5



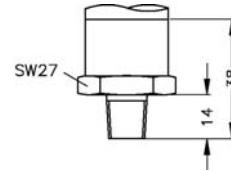
G1/4" DIN 3852
M10x1; M12x1; M12x1.5
(up to 100 bar)



G1/4" EN 837

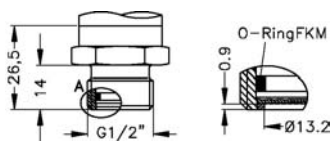


1/2" NPT

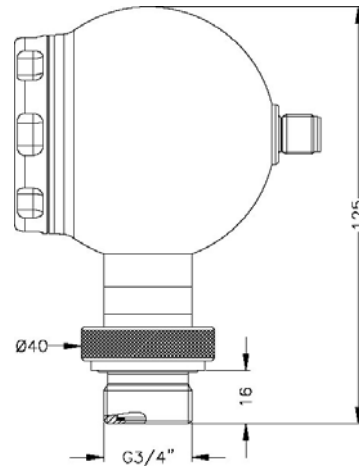


1/4" NPT

Optional for P_N from 0.1 up to 40 bar



G1/2" flush DIN 3852
M20x1.5



G3/4" flush DIN 3852
(on request)

- ⇒ Total length of devices with nominal pressure range P_N > 40 increases by 14 mm!
- ⇒ Total length of devices with Ex-protection increases by 10 mm (with welded version by 20 mm)!

