



DS 400

Intelligent Electronic Pressure Switch Completely in Stainless Steel with or without Analogue Output

- ▶ piezoresistive stainless steel sensor
- ▶ up to 2 contacts, configurable
- ▶ analogue output in 2- and 3-wire version
- ▶ nominal pressure range from 0 ... 100 mbar up to 0 ... 600 bar

The electronic pressure switch DS 400 is the successful combination of:

- intelligent pressure switch
- digital display

and is suitable for universal usage in machine and plant engineering. The rotatable stainless steel globe housing is predestined for hard conditions and difficult installation positions due to its high functionality and robustness.

In 3-wire-version optionally an analogue output is available with configurable start and end point. Thereby the DS 400 becomes a precise pressure transmitter. 2-wire-version features an analogue output as standard, optionally 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.**

The 4-digit LED display, which is mounted rotatable in the housing, shows the system pressure and allows programming. The configuration works menu controlled and is easy to handle also without previous knowledge.

Typical areas of use are:

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

- ▶ 4-digit LED display, rotatable and configurable
- ▶ configuration of contacts (switch on / switch off points, hysteresis / window mode, switch on / switch off delay)
- ▶ analogue output:
 - 3-wire circuit:
option: 4 ... 20 mA or 0 ... 10 V; **start and end point adjustable**
 - 2-wire circuit:
standard: 4 ... 20 mA
Ex-protection optionally
- ▶ special functions (access protection, min. / max. value memory)
- ▶ several mechanical pressure ports
- ▶ industrial standard with reference to accuracy, thermal behaviour and long term stability

Functions



DS 400

TECHNICAL DATA

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		

Output signal / Supply			
Analogue output			
2-wire	standard: 4 ... 20 mA / $V_s = 18 \dots 41 V_{DC}$	Ex-protection: $V_s = 17 \dots 28 V_{DC}$	
3-wire (in preparation)	standard: without options: 4 ... 20 mA / $V_s = 19 \dots 30 V_{DC}$	0 ... 10 V / $V_s = 19 \dots 30 V_{DC}$	
Accuracy		IEC 60770 ²	BFSL
	standard: nominal pressure > 0.4 bar:	$\leq \pm 0.35\%$ FSO	$\leq \pm 0.175\%$ FSO
	nominal pressure ≤ 0.4 bar:	$\leq \pm 0.50\%$ FSO	$\leq \pm 0.250\%$ FSO
	option: nominal pressure > 0.4 bar:	$\leq \pm 0.25\%$ FSO	$\leq \pm 0.125\%$ FSO
Permissible load	current 2-wire: $R_{max} = [(V_s - V_{smin}) / 0.02] \Omega$ current 3-wire: $R_{max} = 500 \Omega$ voltage 3-wire: $R_{min} = 10 k\Omega$		
Response time	2-wire: < 10 msec		3-wire: 30 msec
Contact³			
Number, type	1 or 2 independent PNP outputs		
Switching current	2-wire: standard: contact rating max. 125 mA, short-circuit resistant; $V_{switch} = V_s - 2V$ Ex-protection: max. switching current ⁴ : 70 mA; max. $L_o = 2$ mH; max. $C_o = 40$ nF 3-wire: contact rating max. 500 mA, short-circuit resistant		
Accuracy of contacts		IEC 60770 ²	BFSL
	standard: nominal pressure > 0.4 bar:	$\leq \pm 0.35\%$ FSO	$\leq \pm 0.175\%$ FSO
	nominal pressure ≤ 0.4 bar:	$\leq \pm 0.50\%$ FSO	$\leq \pm 0.250\%$ FSO
	option: nominal pressure > 0.4 bar:	$\leq \pm 0.25\%$ FSO	$\leq \pm 0.125\%$ FSO
Repeatability	$\leq \pm 0.1\%$ FSO		
Switching frequency	2-wire: max. 10 Hz		3-wire: 50 Hz
Switching cycles	> 100 x 10 ⁶		
Delay time	0 ... 100 sec		

Thermal errors (Offset and Span)						
Nominal pressure P_N [bar]	-1 ... 0	≤ 0.1	≤ 0.25	≤ 0.4	≤ 1.0	> 1.0
Tolerance band [% FSO]	$\leq \pm 0.75$	$\leq \pm 2$	$\leq \pm 1.5$	$\leq \pm 1$	$\leq \pm 1$	$\leq \pm 0.75$
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	

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Option Ex-protection only with 4 ... 20 mA / 2-wire AX14-DS 400	zone 0 ⁵ : II 1 G EEx ia IIC T4 safety technical maximum values: $U_i = 28$ V, $I_i = 93$ mA, $P_i = 660$ mW

Display	
Type	4-digit, 7-segment-LED display, digit height 10 mm, visible area 37.2 x 11 mm
Range	-1999 ... +9999
Accuracy	0.1 % ± 1 digit
Digital damping	0.3 ... 30 sec (programmable)
Measured value update	0.0 ... 10 sec (programmable)

¹ measurement starts with ambient pressure

² accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

³ with Ex-protection max. 1 contact possible

⁴ the real switching current in the application depends on the power supply unit

⁵ approved for atmospheric pressure from 0.8 bar up to 1.1 bar

TECHNICAL DATA

Mechanical stability

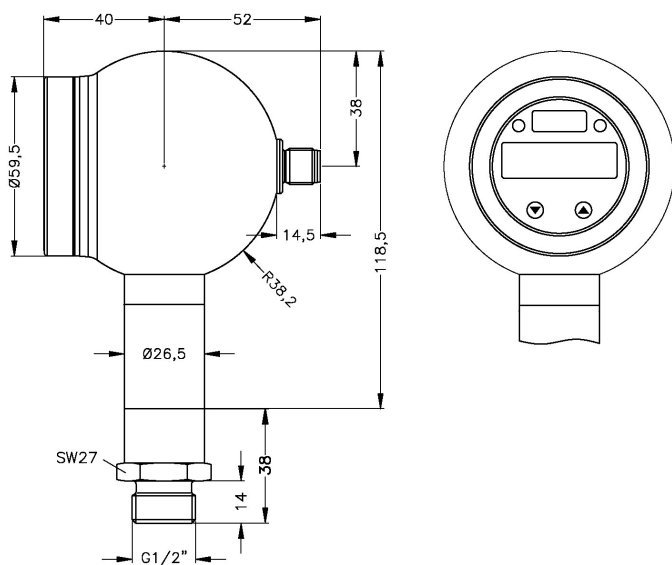
Vibration	5 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 msec

Permissible temperatures

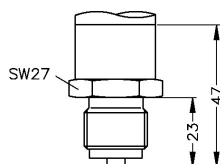
Medium	-25 ... 125 °C	
Electronics / environment	-25 ... 85 °C	Ex-protection: application in zone 0: -20 ... 60 °C application in zone 1 or higher: -25 ... 70 °C
Storage	-40 ... 85 °C	

Dimensions

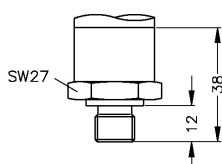
Standard



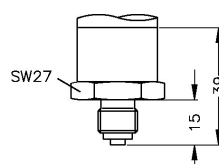
G1/2" DIN 3852
M20x1,5



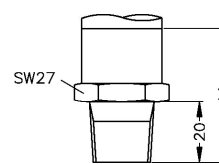
G1/2" EN 837
M20x1,5



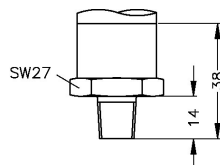
G1/4" DIN 3852
M10x1; M12x1; M12x1.5
(up to 100 bar)



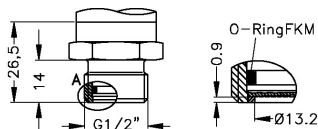
G1/4" EN 837



1/2" NPT

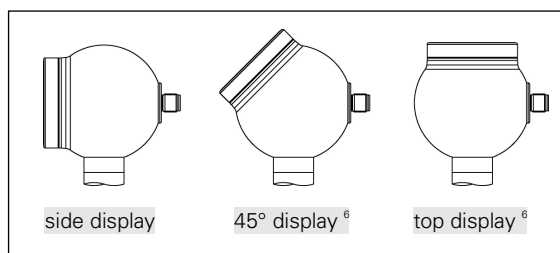


1/4" NPT



G1/2" flush (DIN 3852)⁷
(up to 40 bar)

Design



side display

45° display⁶

top display⁶

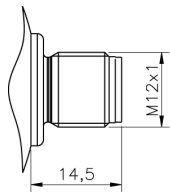
- ⇒ Total length of devices with nominal pressure range $P_N > 40$ increases by 14 mm!
- ⇒ Total length of devices with Ex-protection increases by 20 mm!

⁶ on request

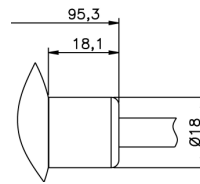
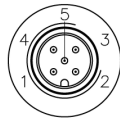
⁷ not possible for vacuum ranges

TECHNICAL DATA

Electrical connection



M12x1 5-pin



cable gland⁸

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, seal, diaphragm

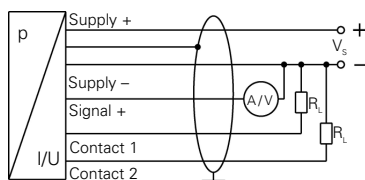
Miscellaneous

Cable capacitance ⁹	signal line/shield also signal line/signal line: 160 pF/m
Cable inductance ⁹	signal line/shield also signal line/signal line: 1,0 μ H/m
Current consumption (without contacts)	2-wire signal output current: max. 25 mA 3-wire signal output current: max. 45 mA + signal current 3-wire signal output voltage: max. 45 mA
Weight	approx. 400 g
Installation position	any ¹⁰
Operational life	$> 100 \times 10^6$ cycles
Ingress protection	IP 67

Pin configuration

Electrical connection		M12x1 metal (5-pin)	cable colours (DIN 47100) ⁹
2-wire-system	Supply +	1	white
	Supply -	3	brown
	Contact 1	4	grey
	Contact 2	5	pink
	Ground	plug housing / pressure port	yellow / green (shield)
3-wire-system	Supply +	1	white
	Supply -	3	brown
	Signal +	2	green
	Contact 1	4	grey
	Contact 2	5	pink
	Ground	plug housing / pressure port	yellow / green (shield)

Wiring diagrams



⁸ different cable types and lengths available; standard: 2 m PVC cable without ventilation tube, optionally cable with ventilation tube

⁹ if the electrical connection is a mounted cable by factory

¹⁰ Pressure switches are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviations in the zero point for pressure ranges $P_N \leq 1$ bar.