



DS 400P

Intelligent Electronic Pressure Switch in Stainless Steel with/without Analogue Output

- ▶ hygienic process connections with flush welded stainless steel diaphragm
- ▶ up to 2 contacts, configurable
- ▶ analogue output in 2- and 3-wire version
- ▶ nominal pressure range from 0 ... 100 mbar up to 0 ... 40 bar

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

- intelligent pressure switch
- digital display

and has been developed for process industry especially for food industry and pharmacy. Besides the DS 400 P is suitable for applications with high requirements on hygienic process connections and a rugged housing which is easy to clean.

In 3-wire-version optionally an analogue output is available with configurable start and end point. Thereby the DS 400 P 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 occurs menu controlled and is easy to handle also without previous knowledge.

Typical areas of use are:

- ▶ process industry
- ▶ food industry
- ▶ pharmacy

- ▶ 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 process connections
- ▶ industrial standard in view of accuracy, thermal behaviour and long term stability

Functions



DS 400 P
Electronic Pressure Switch

TECHNICAL DATA

Input pressure range										
Nominal pressure gauge [bar]	-1 ... 0 ¹	0.1	0.25	0.4	1	2.5	4	10	25	40
Nominal pressure abs. ¹ [bar]	-	-	-	-	1	2.5	4	10	25	40
Permissible overpressure [bar]	3	1	1	1	3	6	20	60	60	100

Output signal / Supply			
Analogue output			
2-wire	standard: 4 ... 20 mA / $V_s = 18 ... 41 V_{DC}$	Ex-protection: $V_s = 17 ... 28 V_{DC}$	
3-wire (in preparation)	standard: without options: 4 ... 20 mA / $V_s = 19 ... 30 V_{DC}$	0 ... 10 V / $V_s = 19 ... 30 V_{DC}$	
Accuracy	standard: nominal pressure > 0.4 bar: nominal pressure ≤ 0.4 bar: option: nominal pressure > 0.4 bar:	IEC 60770 ²	BFSL
		≤ ± 0.35 % FSO	≤ ± 0.175 % FSO
		≤ ± 0.50 % FSO	≤ ± 0.250 % FSO
		≤ ± 0.25 % FSO	≤ ± 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	standard: nominal pressure > 0.4 bar: nominal pressure ≤ 0.4 bar: option: nominal pressure > 0.4 bar:	IEC 60770 ²	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		

Thermal errors (Offset and Span) ⁵							
Nominal pressure P_N [bar]	-1 ... 0	≤ 0.1	≤ 0.25	≤ 0.4	≤ 1.0	> 1.0	
Tolerance band [% FSO]	≤ ± 0.75	≤ ± 2	≤ ± 1.5	≤ ± 1	≤ ± 1	≤ ± 0.75	
TC, average [% FSO / 10 K]	± 0.12	± 0.4	± 0.3	± 0.2	± 0.15	± 0.12	
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 400P	zone 0 ⁶ ; 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 for vacuum ranges and nominal pressure abs. the max. medium temperature is 70 °C

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 an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions

⁶ approved for atmospheric pressure from 0.8 bar up to 1.1 bar

TECHNICAL DATA

Mechanical stability

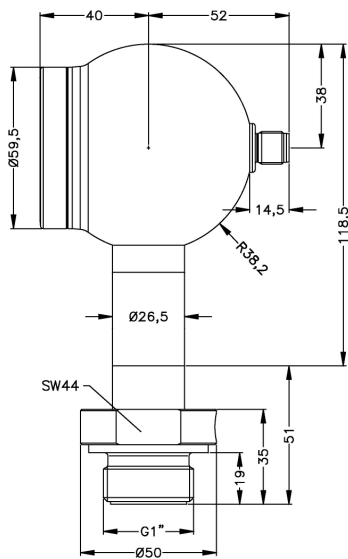
Vibration	5 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 msec

Permissible temperatures

Medium	-25 ... 125 °C ^{1,7}		
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		

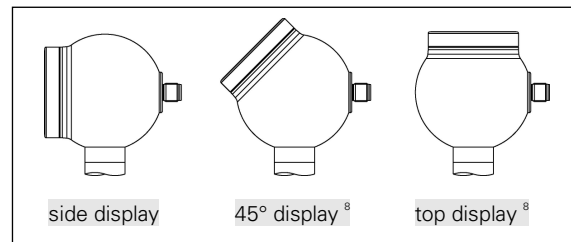
Mechanical connection

Standard



G1" flush (DIN 3852)

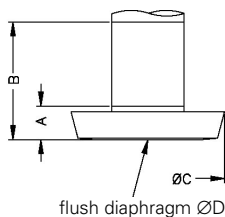
Design



⇒ Total length of devices with Ex-protection increases by 20 mm!

Options

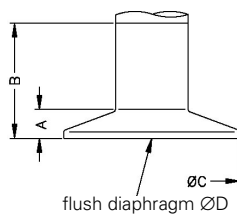
Dairy pipe (DIN 11851)



flush diaphragm ØD

Dimensions in mm			
Size	DN 25	DN 40	DN 50
A	14	23	23.5
B	44	23	23.5
C	44	56	68.5
D	24	32	45

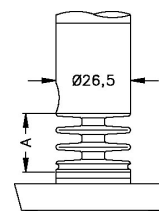
Clamp (ISO 2852)



flush diaphragm ØD

Dimensions in mm			
Size	1"	1 1/2"	2"
A	11	11	22
B	41	41	22
C	50.5	50.5	64
D	24	32	45

Cooling element



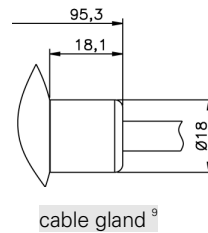
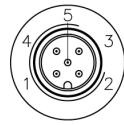
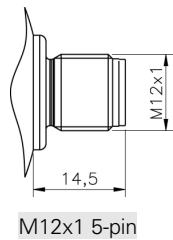
Dimensions in mm		
Size	150° C	300° C
A	22	34

⁷ with optional cooling element its maximum permissible temperature is valid

⁸ on request

TECHNICAL DATA

Electrical connection



M12x1 5-pin

cable gland⁹

Filling fluids

Standard	Silicon oil
Optional	food compatible oil (with FDA approval) / Halocarbon / others on request

Materials

Pressure port	stainless steel 1.4435 (316L)
Housing	stainless steel 1.4301 (304)
Viewing glass	laminated safety glass
Seals (media wetted)	inch thread: FKM / clamp and dairy pipe: without / others on request
Diaphragm	stainless steel 1.4435 (316L)
Media wetted parts	pressure port, seals, diaphragm

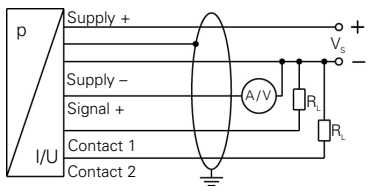
Miscellaneous

Cable capacitance ¹⁰	signal line/shield also signal line/signal line: 160 pF/m
Cable inductance ¹⁰	signal line/shield also signal line/signal line: 1,0 µH/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	min. 500 g (depending on mechanical connection)
Installation position	any ¹¹
Operational life	> 100 x 10 ⁶ cycles
Ingress protection	IP 67

Pin configuration

Electrical connection	M12x1 metal (5-pin)	cable colours (DIN 47100) ¹⁰	
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



⁹ different cable types and lengths available; standard: 2 m PVC cable without ventilation tube, optionally cable with ventilation tube

¹⁰ if the electrical connection is a mounted cable by factory

¹¹ 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.

This data sheet contains product specification, properties are not guaranteed. Subject to change without notice.