



DS 400P

Intelligent Electronic Pressure Switch Stainless Steel

Pressure Ports and Process Connections with Flush Welded Stainless Steel Diaphragm

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

Nominal pressure

from 0 ... 100 mbar up to 0 ... 40 bar

Contacts

1 or 2 independent PNP contacts,
freely configurable

Analogue output

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA

others on request

Special characteristics

- ▶ 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)
- ▶ hygienical version

Optional versions

- ▶ **IS-version**
Ex ia = intrinsically safe for gases and dusts
- ▶ customer specific versions

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

- ▶ intelligent pressure switch
- ▶ digital display

and has been developed for process industry; especially for food industry and pharmacy.

As standard the DS 400P offers a PNP contact and a rotatable display module with 4-digit LED display.

Optional versions like e.g. an intrinsically safe version, max. two contacts and an analogue output complete the profile.

Preferred areas of use are



Food industry



Pharmacy

Material and test certificates

- ▶ material test report according to DIN EN 10204-3.1.
- ▶ specific test report according to DIN EN 10204-2.2.



Input pressure range ¹																		
Nominal pressure gauge	[bar]	-1 ... 0	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40		
Nominal pressure abs.	[bar]	-	-	-	-	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40		
Overpressure	[bar]	5	0.5	1	1	2	5	5	10	10	20	40	40	80	80	105		
Burst pressure ≥	[bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50	50	120	120	210		
Vacuum resistance		P _N ≥ 1 bar: unlimited vacuum resistance								P _N < 1 bar: on request								
¹ consider the pressure resistance of fitting and clamps																		
Contact ²																		
Number, type		standard: 1 PNP contact								option: 2 independent PNP contacts								
Max. switching current		4 ... 20 mA / 2- and 3-wire: 0 ... 10 V / 3-wire (on request):								contact rating 125 mA, short-circuit resistant; V _{switch} = V _S - 2V contact rating 125 mA, short-circuit resistant								
Accuracy of contacts ³		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								
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 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] Ω								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] Ω								response time: < 10 msec								
3-wire current signal		4 ... 20 mA / V _S = 24 V _{DC} ± 10 % adjustable (turn-down of span 1:5) ⁴ 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) ⁴ permissible load: R _{min} = 10 kΩ								response time: < 30 msec								
Without analogue output		V _S = 15 ... 36 V _{DC}																
Accuracy ³		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								
³ accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)																		
⁴ with turn-down of span the analogue signal is adjusted automatically to the new measuring range																		
Thermal errors (offset and span) ⁵ / Permissible temperatures																		
Nominal pressure P _N	[bar]	-1 ... 0					< 0.40					≥ 0.40						
Tolerance band	[% FSO]	≤ ± 0.75					≤ ± 1.5					≤ ± 0.75						
in compensated range	[°C]	-20 ... 85					0 ... 50					-20 ... 85						
Permissible temperatures ⁶		medium: -40 ... 125 °C for filling fluid silicone oil -10 ... 125 °C for filling fluid food compatible oil electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C																
Permissible temperature medium for cooling element 300°C		filling fluid silicone oil					overpressure: -40 ... 300 °C					vacuum: -40 ... 150 °C ⁷						
		filling fluid food compatible oil					overpressure: -10 ... 250 °C					vacuum: -10 ... 150 °C						
⁵ an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions																		
⁶ max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C																		
⁷ also for P _{abs} ≤ 1 bar																		
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 (DIN EN 60068-2-6)		G 1/2": 20 g RMS (25 ... 2000 Hz)								others except G 1/2": 10 g RMS (25 ... 2000 Hz)								
Shock (DIN EN 60068-2-27)		G 1/2": 500 g / 1 msec								others except G 1/2": 100 g / 1 msec								
Filling fluids																		
Standard		silicone oil																
Optional		food compatible oil according to 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500)											others on request					
Materials																		
Pressure port		stainless steel 1.4435 (316 L)														others on request		
Housing		stainless steel 1.4404 (316 L)																
Viewing glass		laminated safety glass																
Seals		standard: FKM (recommended for medium temperatures ≤ 200 °C) option: FFKM (recommended for medium temperatures > 200 °C) Clamp and dairy pipe, Varivent®: without											others on request					
Diaphragm		stainless steel 1.4435 (316L)																
Media wetted parts		pressure port, seals, diaphragm																

Explosion protection (only for 4 ... 20 mA / 2-wire)	
Approval AX14-DS 400P	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 technical maximum values	$U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C \approx 0 \text{ nF}$, $L_i \approx 0 \text{ }\mu\text{H}$
Max. switching current ⁸	70 mA
Permissible temperatures for environment	0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar
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 $\mu\text{H}/\text{m}$

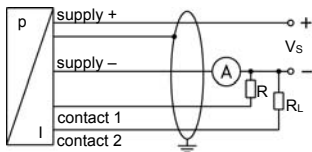
⁸ the real switching current in the application depends on the power supply unit

Miscellaneous

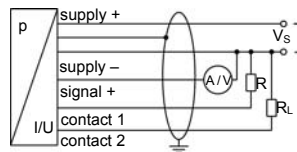
Display	4-digit, 7-segment-LED display, visible range 37.2 x 11 mm; digit height 10 mm, range of indication -1999 ... +9999; accuracy 0.1% ± 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	2-wire signal 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 (standard calibration in a vertical position with the pressure port connection down; differing installation position for $P_N \leq 4 \text{ bar}$ have to be specified in the order)
Weight	min. 500 g (depending on mechanical connection)
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU
ATEX Directive	2014/34/EU

Wiring diagrams

2-wire-system (current)



3-wire-system (current / voltage)

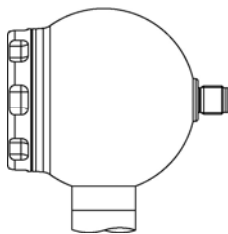


Pin configuration

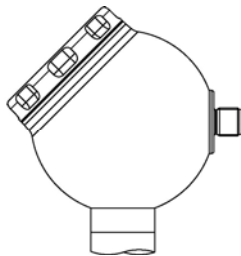
Electrical connection	M12x1 metal (5-pin)	cable colours (IEC 60757)
Supply +	1	wh (white)
Supply -	3	bn (brown)
Signal + (only 3-wire)	2	gn (green)
Contact 1	4	gy (grey)
Contact 2	5	pk (pink)
Shield	plug housing / pressure port	gnye (green-yellow)

Designs ⁹

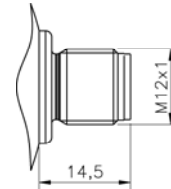
Electrical connection (dimensions in mm)



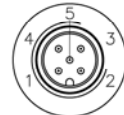
side display



45° display (others on request)



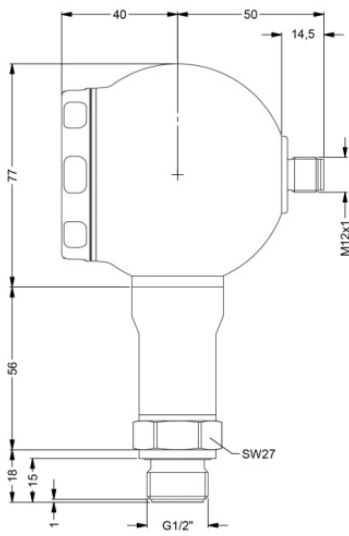
M12x1 (5-pin)



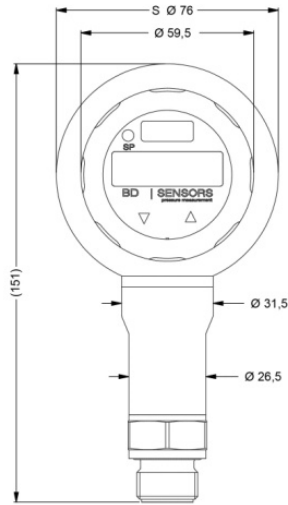
⁹ all designs in horizontal rotatable housing as standard

Mechanical connections (dimensions in mm)

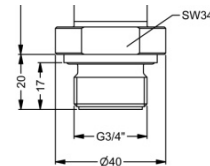
Standard



G1/2" flush DIN 3852
($P_N \geq 1$ bar)

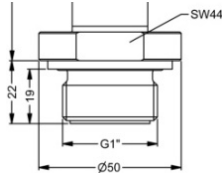


Option

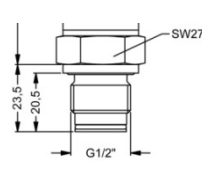


G 3/4" flush DIN 3852

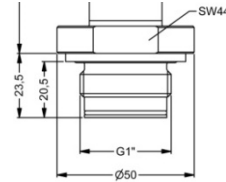
Option



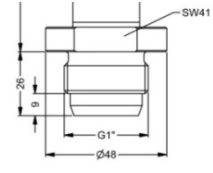
G1" flush DIN 3852



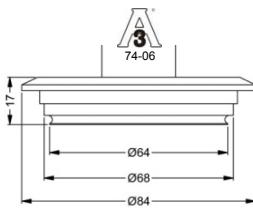
G1/2" flush
with radial o-ring



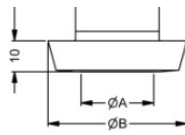
G1" flush
with radial o-ring ($P_N \leq 2$ bar)



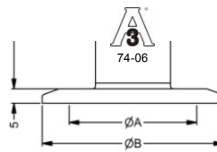
G1" cone



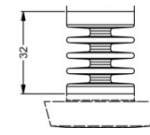
Varivent®
 $P_N \leq 25$ bar



dairy pipe (DIN 11851)



Clamp (DIN 32676)



cooling element 300 °C

	dimension in mm		
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68.5
P_N [bar]	≥ 0.25 ≤ 40	≥ 0.25 ≤ 40	≥ 0.25 ≤ 25

	dimension in mm			
size	3/4"	DN 25	DN 32	DN 50
A	14	23	32	45
B	25	50.5	50.5	64
P_N [bar]	≥ 4 ≤ 8	≥ 0.25 ≤ 16	≤ 16	≤ 16

⇨ metric threads and other versions on request

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