



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.



DS 400P

Electronic Pressure Switch

Technical Data

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: 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 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

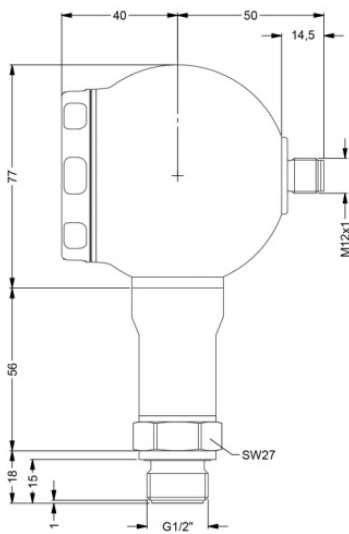
Filling fluids	
Standard	silicone oil
Optional	food compatible oil according to 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500) others on request

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) others on request Clamp and dairy pipe, Varivent®: without
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	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 $\mu\text{H}/\text{m}$	
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% \pm 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		

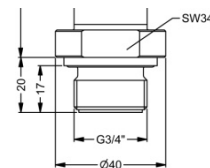
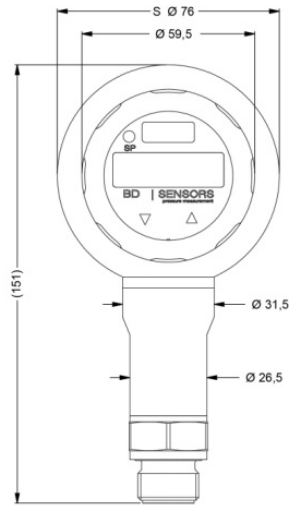
Mechanical connections (dimensions in mm)

Standard



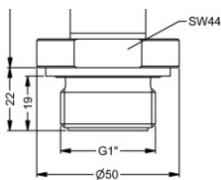
G1/2" flush DIN 3852
($p_N \geq 1$ bar)

Option

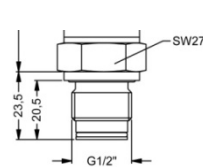


G 3/4" flush DIN 3852

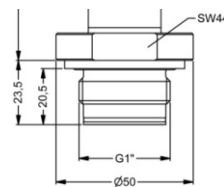
Option



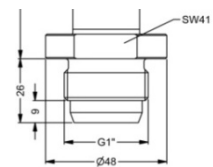
G1" flush DIN 3852



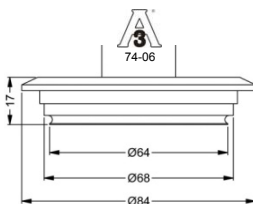
G1/2" flush
with radial o-ring



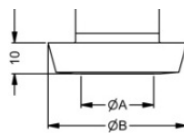
G1" flush
with radial o-ring ($p_N \leq 2$ bar)



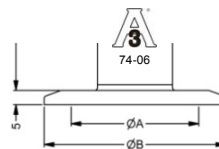
G1" cone



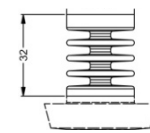
Varivent®
 $p_N \leq 25$ bar



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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Ordering code DS 400P

DS 400P

Pressure										
gauge	7	A	5							
absolute ¹	7	A	6							
Input [bar]										
0.10	1	0	0	0						
0.16	1	6	0	0						
0.25	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						
-1 ... 0	X	1	0	2						
customer	9	9	9	9					consult	
Design										
stainless steel ball housing (side display)						K	H			
stainless steel ball housing (45° display)						K	4			consult
Analogue output										
without								0		
4 ... 20 mA / 2-wire								1		
0 ... 10 V / 3-wire, adjustable								3		consult
4 ... 20 mA / 3-wire, adjustable								7		
intrinsic safety 4 ... 20 mA / 2-wire ²								E		
customer								9		consult
Contact										
1 contact								1		
2 contacts ²								2		
Accuracy										
standard for p _N ≥ 0,4 bar:	0.35 % FSO							3		
standard for p _N < 0,4 bar:	0.5 % FSO							5		
option for p _N ≥ 0,4 bar:	0.25 % FSO							2		
customer								9		consult
Electrical connection										
male plug M12x1 (5-pin) / metal							N	1	1	
customer							9	9	9	consult
Mechanical connection										
G1/2" with flush welded diaphragm (DIN 3852) ³							Z	0	0	
G3/4" with flush welded diaphragm (DIN 3852)							Z	3	0	
G1" with flush welded diaphragm (DIN 3852)							Z	3	1	
G1" DIN 3852 with rad. o-ring and flush diaphragm ⁴							Z	5	7	
G1/2" DIN 3852 with rad. o-ring and flush diaphragm							Z	6	1	
G 1" cone							K	3	1	
Clamp DN 25 (DIN 32676) / 3A							C	6	1	
Clamp DN 32 (DIN 32676) / 3A							C	6	2	
Clamp DN 50 (DIN 32676) / 3A							C	6	3	
Clamp 3/4" (DIN 32676) / 3A							C	6	9	
dairy pipe DN 25 (DIN 11851) ⁵							M	7	3	
dairy pipe DN 40 (DIN 11851) ⁵							M	7	5	
dairy pipe DN 50 (DIN 11851) ⁵							M	7	6	
Varivent® DN 40/50 / 3A							P	4	1	
customer							9	9	9	consult
Diaphragm										
stainless steel 1.4435 (316L)								1		
customer								9		consult
Seals										
for clamp, dairy pipe, Varivent®:	none							0		
for inch thread:	FKM							1		
	FFKM							7		consult
customer								9		consult
Filling fluids										
silicone oil								1		
food compatible oil (FDA) / 3A								2		
customer								9		consult
Special version										
standard								0	0	0
with cooling element up to 300°C / 3A								2	0	0
customer								9	9	9
										consult

¹ absolute pressure possible from 1 bar
² with IS version max. 1 contact is possible
³ only possible for nominal pressure ranges p_N ≥ 1 bar
⁴ only possible for nominal pressure ranges p_N ≤ 2 bar
⁵ The cup nut for dairy pipe has to be mounted by production of pressure transmitter. The cup nut has to be ordered as separate position.
 Varivent® is a brand name of GEA Tukenhagen GmbH