



# 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

- ▶ Inspection certificate 3.1 according to EN 10204
- ▶ Test report 2.2 according to EN 10204



# DS 400P

Electronic Pressure Switch

Technical Data

Input pressure range <sup>1</sup>																
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 <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance								p <sub>N</sub> < 1 bar: on request						

<sup>1</sup> consider the pressure resistance of fitting and clamps

Contact <sup>2</sup>	
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 <sub>switch</sub> = V <sub>S</sub> - 2V 0 ... 10 V / 3-wire (on request):      contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>3</sup>	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 <sup>6</sup>
Delay time	0 ... 100 sec

<sup>2</sup> with IS-protection max. 1 contact possible

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>Smin</sub> ) / 0.02 A] Ω      response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>Smin</sub> ) / 0.02 A] Ω      response time: < 10 msec
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>max</sub> = 500 Ω      response time: < 30 msec
3-wire voltage signal (on request)	0 ... 10 V / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>min</sub> = 10 kΩ      response time: < 30 msec
Without analogue output	V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>
Accuracy <sup>3</sup>	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

<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal errors (offset and span) <sup>5</sup>			
Nominal pressure p <sub>N</sub>	[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

<sup>5</sup> an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions

Permissible temperatures		
Filling fluid	silicone oil	food compatible oil
Medium <sup>6</sup>	-40 ... 125 °C	-10 ... 125 °C
Medium with cooling element <sup>7</sup>	overpressure: -40 ... 300 °C vacuum: -40 ... 150 °C <sup>8</sup>	overpressure: -10 ... 250 °C vacuum: -10 ... 150 °C <sup>8</sup>
Electronics / environment	-40 ... 85 °C	
Storage	-40 ... 100 °C	

<sup>6</sup> max. temperature of the medium for overpressure > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C

<sup>7</sup> max. temperature depends on the used sealing material, type of seal and installation

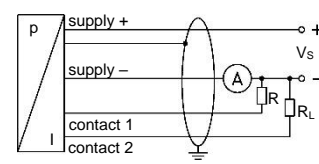
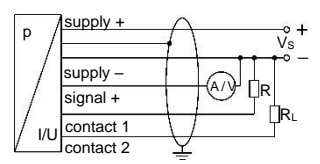
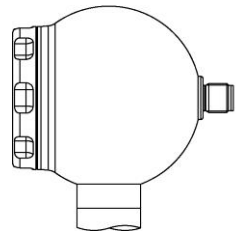
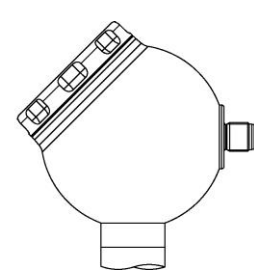
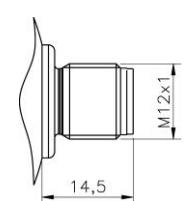
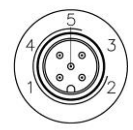
<sup>8</sup> also for p<sub>abs</sub> ≤ 1 bar

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

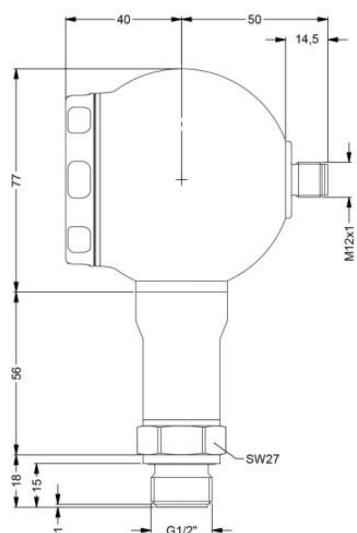
Filling fluids	
Standard	silicone oil
Optional	food compatible oil according to 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500)      others on request

Materials	
Pressure port	stainless steel 1.4435 (316 L)
Diaphragm	stainless steel 1.4435 (316L)
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 < 260 °C)      others on request Clamp, dairy pipe, Varivent®: without
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 <sub>i</sub> = 28 V, I <sub>i</sub> = 93 mA, P <sub>i</sub> = 660 mW, C ≈ 0 nF, L <sub>i</sub> ≈ 0 µH	
Max. switching current <sup>9</sup>	70 mA	
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p <sub>atm</sub> 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 µH/m	
<sup>9</sup> the real switching current in the application depends on the power supply unit		
Miscellaneous		
EHEDG certificate Type EL Class I	EHEDG conformity is only ensured in combination with an approved seal. This is e.g. for - Clamp (C61, C62, C63): T-ring-seal from Combifit International B.V. - Varivent® (P41): EPDM-O-ring which is FDA-listed - dairy pipe (M73, M75, M76): ASEPTO-STAR k-flex upgrade seal by Kieselmann GmbH	
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 <sub>N</sub> ≤ 4 bar have to be specified in the order)	
Surface roughness	pressure port R <sub>a</sub> < 0.8 µm (media wetted parts) diaphragm R <sub>a</sub> < 0.15 µm weld seam R <sub>a</sub> < 0.8 µm	
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		
<div><div>2-wire-system (current)</div></div> <div><div>3-wire-system (current / voltage)</div></div>		
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	GYNE (green-yellow)
Designs <sup>10</sup>		
Electrical connection (dimensions in mm)		
<div><div>side display</div></div> <div><div>45° display (others on request)</div></div> <div><div>M12x1 (5-pin)</div></div> <div></div>		
<sup>10</sup> all designs in horizontal rotatable housing as standard		

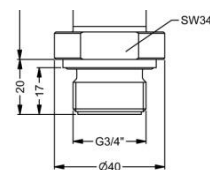
## Mechanical connections (dimensions in mm)

### Standard



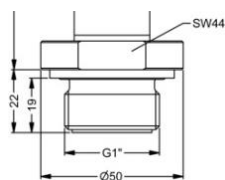
G1/2" flush DIN 3852  
( $p_N \geq 1$  bar)

### Option

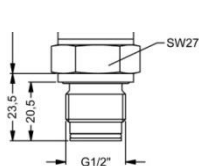


G 3/4" flush DIN 3852

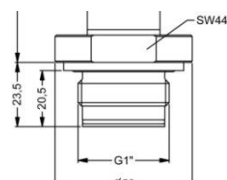
### Option



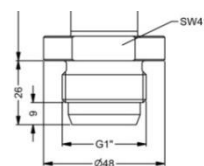
G1" flush DIN 3852



G1/2" flush  
with radial o-ring



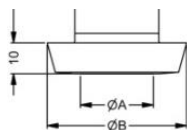
G1" flush  
with radial o-ring ( $p_N \leq 2$  bar)



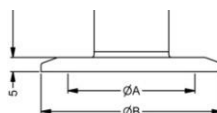
G1" cone



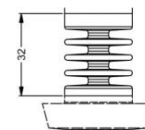
Varivent®  
 $p_N \leq 25$  bar



dairy pipe (DIN 11851)



Clamp (DIN 32676)



cooling element up to 300 °C<sup>7</sup>

dimension in mm			
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68.5
$p_N$ [bar]	$\geq 0.25$ $\leq 40$	$\geq 0.25$ $\leq 40$	$\geq 0.25$ $\leq 25$

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]	$\geq 4$ $\leq 8$	$\geq 0.25$ $\leq 16$	$\leq 16$	$\leq 16$

⇒ metric threads and other versions on request

<sup>7</sup> max. temperature depends on the used sealing material, type of seal and installation

Ordering code DS 400P

DS 400P

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Pressure					
	gauge absolute <sup>1</sup>	7 A 7 A	5 6		
<b>Input</b>					
[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
<b>Design</b>					
stainless steel ball housing (side display)	K	H			
stainless steel ball housing (45° display)	K	4			
<b>Analogue output</b>					
without				0	
4 ... 20 mA / 2-wire				1	
0 ... 10 V / 3-wire, adjustable				3	
4 ... 20 mA / 3-wire, adjustable				7	
intrinsic safety 4 ... 20 mA / 2-wire <sup>2</sup>	E				
customer	9				
<b>Contact</b>					
1 contact				1	
2 contacts <sup>2</sup>				2	
<b>Accuracy</b>					
standard for p <sub>N</sub> ≥ 0.4 bar:	0.35 % FSO			3	
standard for p <sub>N</sub> < 0.4 bar:	0.5 % FSO			5	
option for p <sub>N</sub> ≥ 0.4 bar:	0.25 % FSO			2	
customer				9	
<b>Electrical connection</b>					
male plug M12x1 (5-pin) / metal			N	1 1	
customer			9 9 9		
<b>Mechanical connection</b>					
G1/2" with flush welded diaphragm (DIN 3852) <sup>3</sup>	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 <sup>4</sup>	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) <sup>5</sup>	M	7	3		
dairy pipe DN 40 (DIN 11851) <sup>5</sup>	M	7	5		
dairy pipe DN 50 (DIN 11851) <sup>5</sup>	M	7	6		
Varivent® DN 40/50 / 3A	P	4	1		
customer	9	9	9		
<b>Diaphragm</b>					
stainless steel 1.4435 (316L)				1	
customer				9	
<b>Seals</b>					
for clamp, dairy pipe, Varivent®:	none			0	
for inch thread:	FKM			1	
	FFKM			7	
customer				9	
<b>Filling fluids</b>					
silicone oil				1	
food compatible oil (FDA) / 3A				2	
customer				9	
<b>Special version</b>					
standard				0	0
with cooling element up to 300°C / 3A				2	0
customer				9	9

<sup>1</sup> absolute pressure possible from 1 bar

<sup>2</sup> with IS version max. 1 contact is possible

<sup>3</sup> only possible for nominal pressure ranges  $p_N \geq 1$  bar

<sup>4</sup> only possible for nominal pressure ranges  $p_N \leq 2$  bar

<sup>5</sup> 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 Tuchenhausen GmbH