

#### Description

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.

As standard the DS 400 P offers a PNP contact and is optionally available with a second, independent contact. Additionally the device could be equipped with an analogue output. The 2-wire version is also available with Exprotection.

#### Operating

The display module, which is mounted rotatable in the ball housing, shows the system pressure and allows programming. The configuration is menu controlled and easy to handle without previous knowledge.

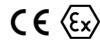
### Applications

- process industry
- ▶ food industry
- pharmacy

# **DS 400 P**

## Intelligent Electronic Pressure Switch in Hygienic Stainless Steel Ball Housing

- hygienic process connections with flush welded stainless steel diaphragm
- up to 2 independent contacts, configurable
- optionally:
  - analogue output
  - Ex-protection (for 2-wire)
- nominal pressure range from 0 ... 100 mbar up to 0 ... 40 bar
  - 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)
  - option analogue output:
    - 3-wire version:
       4 ... 20 mA or 0 ... 10 V
       with turn-down 1:6
    - 2-wire version:4 ... 20 mAEx-protection optionally
  - special functions (access protection, min. / max. value memory)
  - industrial standard in view of accuracy, thermal behaviour and long term stability



DS 400 P Electronic Pressure Switch



Characteristics

## Electronic Pressure Switch

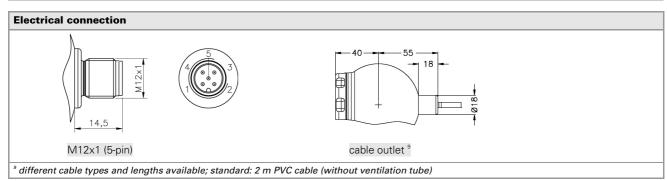
Input pressure range												
Nominal pressure gauge	[bar]	-1 0	0.1	0.25	0.4	1	2.5	4	10	0	25	40
Nominal pressure abs.	[bar]	-	-	-	-	1	2.5	4	10	0	25	40
Permissible overpressure	[bar]	3	1	1	1	3	6	20	60	0	60	100
Contact <sup>1</sup>					,							
Number, type		standar	d: 1 PNP	contact			option: 2	! indepe	ndent F	NP co	ntacts	
Max. switching current		2-wire:	contact	rating 125	mA, sho	rt-circuit r	esistant; V	$V_{\text{curitor}} = V_{\text{c}}$	- 2V			
				rating 500								
Accuracy of contacts		IEC 60770 BFSL										
		standard: nominal pressure > 0.4 bar:				≤± 0.35 % FSO ≤± 0.175 % FSO						
		nominal pressure ≤ 0.4 bar: option: nominal pressure > 0.4 bar:				$\leq \pm 0.50 \% FSO$ $\leq \pm 0.250 \% FSO$ $\leq \pm 0.25 \% FSO$ $\leq \pm 0.125 \% FSO$						
D . 1.994		option:		iai pressur	e > 0.4 ba	r:	$\leq \pm 0.25$	% FSO		$\leq \pm 0.12$	25 % FS	0
Repeatability		≤ ± 0,1 %		1 /		F0.11						
Switching frequency		2-wire: r		Hz /	3-wire	: 50 Hz						
Switching cycles		> 100 x										
Delay time		0 100	sec.									
with Ex-protection max. 1 co												
Analogue output (optiona	ally) / S											
2-wire current signal				: 18 41 V		0.007.0						
				: R <sub>max</sub> = [(V		0.02] Ω		r	espons	se time	: < 10 n	าร
2-wire current signal with Ex-protection				: 17 28 V : B _ [(V		0 021 0			oenon	ea time	- 10 -	20
3-wire current signal				$\frac{R_{\text{max}}}{24  V_{\text{DC}} \pm 1}$			n-down of			se ume	: < 10 n	15
5-wire current signal				$: R_{\text{max}} = 500$		itable (tui	ii-dowii o			se time	: < 30 n	าร
3-wire voltage signal				$24 V_{DC} \pm 10$		able (turn	down of s					
				: R <sub>min</sub> = 10		, , ,				se time	: < 30 n	าร
Without analogue output		V <sub>s</sub> = 15.	36 V <sub>DC</sub>						-			
Accuracy						_	IEC 6077	0 <sup>3</sup>	Į.	BFSL		
·		standard	d: nomir	al pressur	e > 0.4 ba	r:	≤±0.35 °	% FSO	-	≤ ± 0.17	75 % FS	0
			nominal pressure ≤ 0.4 bar:			$\leq \pm 0.50 \% \text{ FSO}$ $\leq \pm 0.250 \% \text{ FSO}$						
				•								
		option:	nomir	al pressur	e > 0.4 ba	r:	≤± 0.25 °				25 % FS	
with turn-down of span the a		e signal is a	nomir	nal pressur utomatically	e > 0.4 ba to the nev	r: v measurin	≤ ± 0.25 ° g range					
<sup>3</sup> accuracy according to IEC 607	770 – Iii	e signal is a mit point ac	nomir djusted a ljustment	nal pressur utomatically (non-lineari	e > 0.4 ba to the new ty, hystere	r: v measurin	≤ ± 0.25 ° g range					
<sup>3</sup> accuracy according to IEC 607 Thermal errors (offset an	770 – lii d spar	e signal is a mit point ad n) <sup>4</sup> / Permi	nomir djusted a ljustment ssible te	nal pressur utomatically (non-lineari emperatur	e > 0.4 ba to the new ty, hystere	r: v measurin sis, repeata	≤± 0.25 ° g range ability)	% FSO	<u> </u>	≤ ± 0.12		0
accuracy according to IEC 602 Thermal errors (offset and Nominal pressure P <sub>N</sub>	770 – Iii <b>d spar</b> [bar]	e signal is a mit point ac n) <sup>4</sup> / Permi -1	nomir djusted a ljustment ssible to 0	nal pressur utomatically (non-lineari emperatur ≤ 0.1	re > 0.4 ba y to the new ity, hystere res	r: v measurin sis, repeata ≤ 0.25	$\leq \pm 0.25$ g range ability) $\leq 0$ .	% FSO 4	<u> </u>	≤ ± 0.12	25 % FS	> 1
accuracy according to IEC 603  Thermal errors (offset and Nominal pressure P <sub>N</sub> Tolerance band	770 – lii <b>d spar</b> [bar] FSO]	e signal is a mit point act	nomir djusted a ljustment ssible to 0	nal pressur utomatically (non-lineari emperatur $\leq 0.1$ $\leq \pm 2$	re > 0.4 ba y to the new ity, hystere res	r:  v measurin sis, repeata  0.25 ± 1.5	$ \leq \pm 0.25$ grange ability) $ \leq 0.25$ $ \leq \pm 0.25$	% FSO 4 1	\frac{\sigma}{\sigma} \leq \frac{\sigma}{\sigma}	≤±0.12 1 ±1	25 % FS	> 1 ± 0.75
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Thermal errors (offset and Nominal pressure PN Tolerance band [% TC, average [% FSO / in compensated range Permissible temperatures an optional cooling element of for vacuum ranges and noming with optional cooling element of the following permissible temperatures are possible temperatures. The following element of the following element electrical protection. The following element electrical protection. The following element electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic electro	d spar [bar] b FSO] 10 K] [°C] can infl inal pre- int its ma	e signal is a mit point act and point act act and point act act and point act and point act act act act act act act act act ac	nomin djusted a djustment ssible te 0 75 2 70 : -25 1 mal effects the max. n missible age, but n and im s (20 2 1 msec. bil mpatible s steel 1. ed safety ead: star	and pressur utomatically (non-lineari emperatur ≤ 0.1 ≤ ± 2 ± 0.4  25 °C 5 a for offset a medium tem temperature  also no fur munity acc  000 Hz)  oil (with F  4435 (316L 4301 (304) glass adard: FK	re > 0.4 ba // to the new // ty, hystere // res // ces //	r: v measurintsis, repeate 4 0.25 4 ± 1.5 ± 0.3 1 50 cs / environtsis / environtsi	$ \leq \pm 0.25^{\circ}$ $ g $ range $ g $ range $ g $	% FSO  4 1 2 25 85 on position  / others	≤ ≤ ± ± 0.  C : n and fill  on reco	$\leq \pm 0.12$ 1 $\pm 1$ .15  0  storage  Hing con	≥5 % FS ≤ ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±	> 1 ± 0.75 : 0.12
Thermal errors (offset and Nominal pressure P <sub>N</sub> Tolerance band [% TC, average [% FSO / in compensated range Permissible temperatures  an optional cooling element of for vacuum ranges and nomi	d spar [bar] b FSO] 10 K] [°C] can infl inal pre- int its ma	e signal is a mit point act and point act act and point act act and point act and point act act act act act act act act act ac	nomin djusted a djustment ssible te 0 75 2 7025 1 mal effects the max. n missible and im and im a continuation of the continuation of th	and pressur utomatically (non-lineari emperatur ≤ 0.1 ≤ ± 2 ± 0.4  25 °C 5 s for offset a nedium tem temperature also no fur munity acc  000 Hz)  oil (with F  4435 (316L 4301 (304) glass dard: FK onally: FF	re > 0.4 ba / to the new / to t	r: v measurintsis, repeate 4 0.25 4 ± 1.5 ± 0.3 1 50 cs / environtsis / environtsi	$ \leq \pm 0.25^{\circ}$ $ g $ range $ g $ range $ g $	% FSO  4 1 2 25 85 on position  / others	≤ ≤ ± ± 0.  C : n and fill  on reco	$\leq \pm 0.12$ 1 $\pm 1$ .15  0  storage  Hing con	≥5 % FS ≤ ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±	> 1 ± 0.75 : 0.12
Thermal errors (offset and Nominal pressure PN Tolerance band [% TC, average [% FSO / in compensated range Permissible temperatures an optional cooling element of for vacuum ranges and noming with optional cooling element of the following permissible temperatures are possible temperatures. The following element of the following element electrical protection. The following element electrical protection. The following element electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic electro	d spar [bar] b FSO] 10 K] [°C] can infl inal pre- int its ma	e signal is a mit point act at inch three	nomin djusted a djustment ssible te 0 75 2 7025 1 mal effects the max. In missible to 1 1 msec.	and pressur utomatically (non-lineari emperatur  ≤ 0.1  ≤ ± 2  ± 0.4  25 °C 5  for offset a nedium tem temperature  also no fur munity acc  000 Hz)  oil (with F  4435 (316L 4301 (304) glass dard: FK onally: FF ers on requ	re > 0.4 ba / to the new / to t	r: v measurintsis, repeate 4 0.25 4 ± 1.5 ± 0.3 1 50 cs / environtsis / environtsi	$ \leq \pm 0.25^{\circ}$ $ g $ range $ g $ range $ g $	% FSO  4 1 2 25 85 on position  / others	≤ ≤ ± ± 0.  C : n and fill  on reco	$\leq \pm 0.12$ 1 $\pm 1$ .15  0  storage  Hing con	≥5 % FS ≤ ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±	> 1 ± 0.75 : 0.12
Thermal errors (offset and Nominal pressure PN Tolerance band [% TC, average [% FSO / in compensated range Permissible temperatures an optional cooling element of for vacuum ranges and noming with optional cooling element of the following permissible temperatures are possible temperatures. The following element of the following element electrical protection. The following element electrical protection. The following element electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic compatible electromagnetic electro	d spar [bar] b FSO] 10 K] [°C] can infl inal pre- int its ma	e signal is a mit point act at inch three clamp a mit point act at inch three clamp a	nomin djusted a djustment ssible te 0 75 2 7025 1 mal effects the max. nominsible in a nomin and im a control of the	and pressur utomatically (non-lineari emperatur ≤ 0.1 ≤ ± 2 ± 0.4  25 °C 5 s for offset a nedium tem temperature also no fur munity acc  000 Hz)  oil (with F  4435 (316L 4301 (304) glass dard: FK onally: FF	re > 0.4 ba / to the new / to t	r: v measurintsis, repeate 4 0.25 4 ± 1.5 ± 0.3 1 50 cs / environtsis / environtsi	$ \leq \pm 0.25^{\circ}$ $ g $ range $ g $ range $ g $	% FSO  4 1 2 25 85 on position  / others	≤ ≤ ± ± 0.  C : n and fill  on reco	$\leq \pm 0.12$ 1 $\pm 1$ .15  0  storage  Hing con	≥5 % FS ≤ ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±± ±	> 1 ± 0.75 : 0.12

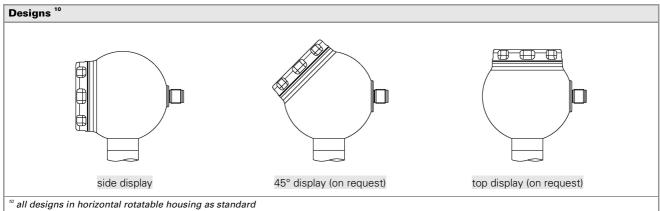
## Electronic Pressure Switch

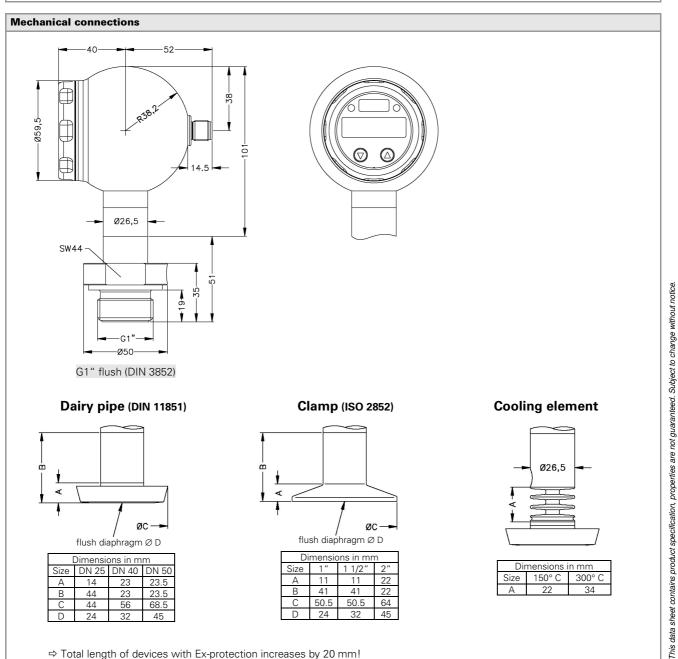
<b>Explosion protection (optionally</b>	y for 4 20 mA / 2-wire)
Approval AX14-DS 400P	zone 0: II 1 G EEx ia IIC T4
Safety technical maximum values	U <sub>i</sub> = 28 V, I <sub>i</sub> = 93 mA, P <sub>i</sub> = 660 mW
Max. switching current <sup>6</sup>	70 mA
Permissible temperatures for environment	in zone 0: -20 60 °C with p <sub>atm</sub> 0.8 bar up to 1.1 bar in zone 1: -25 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 μH/m
<sup>6</sup> the real switching current in the appl	ication 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 <sup>7</sup>
Weight	min. 500 g (depending on mechanical connection)
Operational life	> 100 x 10 <sup>6</sup> cycles
	vertical position with the pressure connection down. If this position is changed on installation there can be pressure ranges $\leq$ 1 bar. Therefore installation position has to be given in this case.

Wiring diagrams	
2-wire-system (current) 8    Description of the system of	3-wire-system (current / voltage)    Supply +
<sup>8</sup> for devices with Ex-protection the operating manual h	nas to be considered

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







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



## Ordering code DS 400P

DS 400P				]-[[
Pressure gauge absolute	7 A 5			
Input [bar]				
0,25	2 5 0 0			
0,40 1,0	4 0 0 0 1 0 0 1			
2,5 4,0	2 5 0 1 4 0 0 1			
10 25	1 0 0 2			
40	1 0 0 2 2 5 0 2 4 0 0 2			
-1 0 2 customer	2 X 1 0 2 9 9 9 9			
Design Stainless steel globe housing				
(side display)		КН		
Stainless steel globe housing (45° display)		K 4		
Stainless steel globe housing		κV		
(top display) Analogue output		IX V		
without		0		
4 20 mA / 2-wire 0 10 V / 3-wire, adjustable		1 3		
4 20 mA / 3-wire, adjustable Intrinsic safety 4 20 mA / 2-wire	1	7 E		
customer		9		
Contact 1 contact		1		
2 contacts 3	}	2		
standard for $P_N > 0.4$ bar 0.35 % standard for $P_N \le 0.4$ bar 0.5 %		3 5		
option for $P_N > 0.4$ bar 0,25 %		2		
customer Electrical connection		9		
M12x1 (5-pin) / metal version Cable outlet	4		N 1 0 T A 0	
customer			T A 0 9 9 9	
Mechanical connection G1" with flush welded			7 2 1	
diaphragm (DIN 3852) Clamp 1" (ISO 2852)			Z 3 1 C 6 1	
Clamp 1 1/2" (ISO 2852)			C 6 2	
Clamp 2" (ISO 2852) Dairy pipe DN 25 (DIN 11851)	5		C 6 3 M 7 3 M 7 5	
Dairy pipe DN 40 (DIN 11851) 5 Dairy pipe DN 50 (DIN 11851) 5			M 7 5 M 7 6	
customer			9 9 9	
Diaphragm Stainless steel 1.4435 (316L)			1	
Seals			9	
for clamp or dairy pipe: none for inch thread: FKM			0	
FFKM			1 7	
customer Filling Fluids			9	
Silicon oil food compatible oil	3			
Halocarbon				
Special version customer			(	
standard with cooling element up to 150°C				0 0 0
with cooling element up to 300°C				1 5 0 2 0 0
customer				9 9 9

<sup>&</sup>lt;sup>1</sup> absolute pressure possible from 1 bar

 $<sup>^2</sup>$  for vacuum and nominal pressure abs. the max. medium temperature is 70  $^\circ\text{C}$ 

<sup>&</sup>lt;sup>3</sup> with Ex version max. 1 contact is possible

<sup>&</sup>lt;sup>4</sup> standard: 2 m PVC cable without ventilation tube, optionally cable with ventilation tube

<sup>&</sup>lt;sup>5</sup> The cup nut for dairy pipe has to be mounted by production of pressure transmitter. The cup nut for dairy pipe has to be ordered as separate position.

<sup>&</sup>lt;sup>6</sup> Name of oil: Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662