



DS 400

Intelligent Electronic Pressure Switch Stainless Steel

Stainless Steel Sensor

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

Nominal pressure

from 0 ... 100 mbar up to 0 ... 600 bar

Contacts

1 or 2 independent PNP contacts,
freely configurable

Analogue output

2-wire: 4 ... 20 mA
3-wire: 4 ... 20 mA
3-wire: 0 ... 10 V (on request)
others on request

Special characteristics

- ▶ indication of measured values on a 4-digit LED display
- ▶ rotatable and configurable display module

Optional versions

- ▶ **IS-version**
Ex ia = intrinsically safe for gases and dust
- ▶ welded pressure sensor
- ▶ customer specific versions




The electronic pressure switch DS 400 is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and has been specially designed for numerous applications in various industrial sectors.

As standard the DS 400 offers a PNP contact and a display module, which is mounted rotatable in the globe housing. Additional optional versions like e.g. an intrinsically safe version, a second contact and an analogue output complete the profile.

Preferred areas of use are

-  Plant and machine engineering
-  Heating and air conditioning
-  Environmental engineering (water – sewage – recycling)



Input pressure range													
Nominal pressure gauge	[bar]	-1 ... 0	0.10	0.16	0.25	0.40	0.60	1	1.6	2.5	4	6	
Nominal pressure abs.	[bar]	-	-	-	-	0.40	0.60	1	1.6	2.5	4	6	
Overpressure	[bar]	5	0.5	1	1	2	5	5	10	10	20	40	
Burst pressure	[bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50	
Nominal pressure gauge / abs.	[bar]	10	16	25	40	60	100	160	250	400	600		
Overpressure	[bar]	40	80	80	105	210	210	600	1000	1000	1000		
Burst pressure	[bar]	50	120	120	210	420	420	1000	1250	1250	1250		
Vacuum resistance		p _N ≥ 1 bar: unlimited vacuum resistance						p _N < 1 bar: on request					
Contact ¹													
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 ²		≤ ± 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											
¹ 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) ³ 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) ³ permissible load: R _{min} = 10 kΩ response time: < 30 msec											
Without analogue output		V _S = 15 ... 36 V _{DC}											
Accuracy ²		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											
² accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)													
³ with turn-down of span the analogue signal is adjusted automatically to the new measuring range													
Thermal effects (Offset and Span)													
Nominal pressure p _N	[bar]	-1 ... 0			< 0.40			≥ 0.40					
Tolerance band	[% FSO]	≤ ± 0.75			≤ ± 1			≤ ± 0.75					
in compensated range	[°C]	-20 ... 85			0 ... 70			-20 ... 85					
Permissible temperatures													
Permissible temperatures		medium: -40 ... 125 °C			electronics / environment: -40 ... 85 °C			storage: -40 ... 100 °C					
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		10 g RMS (25 ... 2000 Hz)					according to DIN EN 60068-2-6						
Shock		500 g / 1 msec					according to DIN EN 60068-2-27						
Materials													
Pressure port		stainless steel 1.4404 (316L)											
Housing		stainless steel 1.4404 (316L)											
Viewing glass		laminated safety glass											
Seals (media wetted)		standard: FKM option: welded version ⁴ on request others on request											
Diaphragm		stainless steel 1.4435 (316 L)											
Media wetted parts		pressure port, seals, diaphragm											
⁴ welded version only for pressure ports according to EN 837; possible for nominal pressure ranges p _N ≤ 40 bar													
Explosion protection (only for 4 ... 20 mA / 2-wire)													
Approval AX14-DS 400		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 techn. maximum values		U _i = 28 V, I _i = 93 mA, P _i = 660 mW, C _i ≈ 0 pF, L _i ≈ 0 μH											
Max. switching current ⁵		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 μH/m											
⁵ the real switching current in the application depends on the power supply unit													

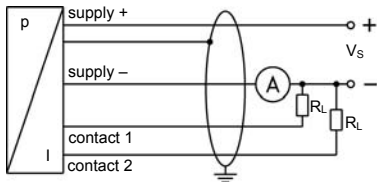
Miscellaneous	
Display	4-digit, 7-segment-LED display visible range 37.2 x 11 mm digit height 10 mm range of indication -1999 ... +9999 accuracy 0.1 % ± 1 digit digital damping 0.3 ... 30 sec (programmable) measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	2-wire 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 6
Weight	approx. 400 g
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) ⁷
ATEX Directive	2014/34/EU

⁶ 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 $p_N \leq 1$ bar.

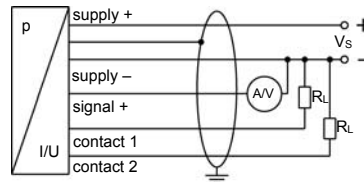
⁷ This directive is only valid for devices with maximum permissible overpressure > 200 bar.

Wiring diagrams

2-wire-system (current)



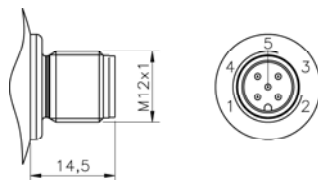
3-wire-system (current / voltage)



Pin configuration

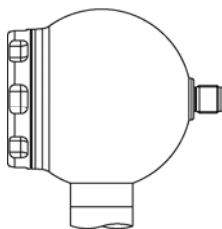
Electrical connection	M12x1 metal (5-pin)
Supply +	1
Supply -	3
Signal + (only 3-wire)	2
Contact 1	4
Contact 2	5
Shield	plug housing / pressure port

Electrical connection (dimensions in mm)

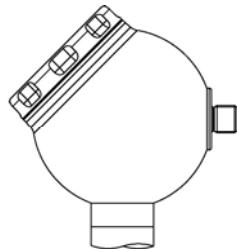


M12x1 (5-pin)

Designs ⁸



side display

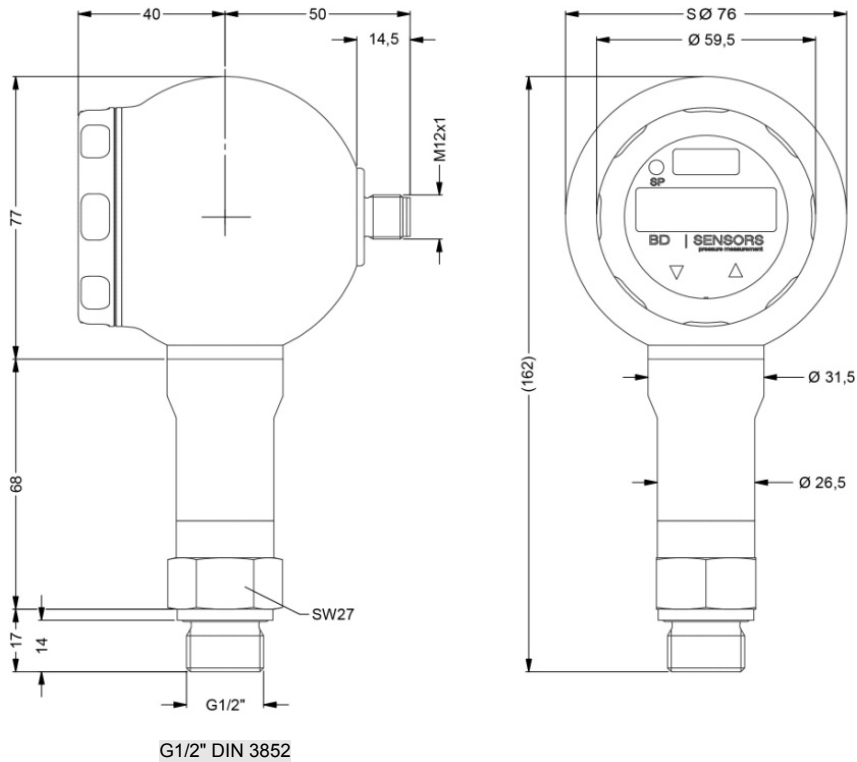


45° display (on request)

⁸ all designs in horizontal rotatable housing as standard

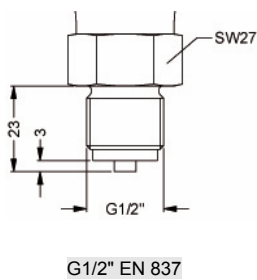
Mechanical connections (dimensions in mm)

standard

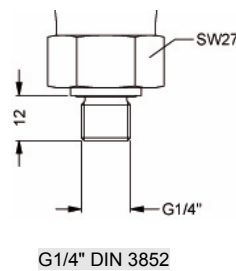


⇒ for nominal pressure $p_N > 400$ bar increases the length of devices without IS-version by 19 mm and of devices with IS-version by 39 mm

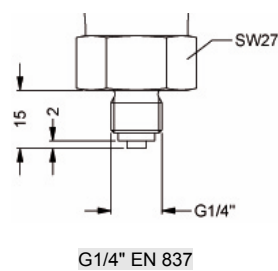
options



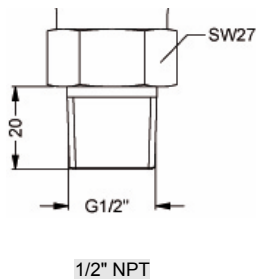
G1/2" EN 837



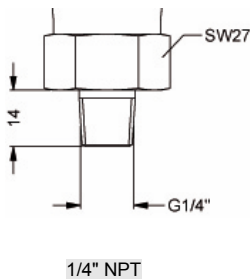
G1/4" DIN 3852



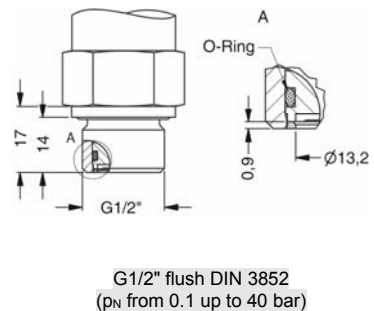
G1/4" EN 837



1/2" NPT



1/4" NPT



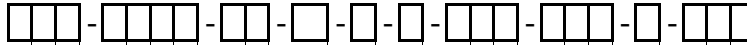
G1/2" flush DIN 3852
(p_N from 0.1 up to 40 bar)

⇒ metric threads and other versions on request

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Ordering code DS 400

DS 400



Pressure										
gauge	¹	7	A	0						
absolute	²	7	A	1						
Input										
[bar]										
0.10	²			1	0	0	0			
0.16	²			1	6	0	0			
0.25	²			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			
60				6	0	0	2			
100				1	0	0	3			
160				1	6	0	3			
250				2	5	0	3			
400				4	0	0	3			
600				6	0	0	3			
-1 ... 0				X	1	0	2			
customer				9	9	9	9			consult
Design										
stainless steel globe housing (side display)								K	H	
stainless steel globe housing (45° display)								K	4	consult
Analogue output										
without									0	
4 ... 20 mA / 2-wire									1	
0 ... 10 V / 3-wire, adjustable									3J	consult
4 ... 20 mA / 3-wire, adjustable									7J	
intrinsic safety 4 ... 20 mA / 2-wire	³								E	
customer									9	consult
Contact										
1 contact									1	
2 contacts	³								2	
Accuracy										
standard for $p_N \geq 0.4$ bar		0.35 %							3	
standard for $p_N < 0.4$ bar		0.5 %							5	
option for $p_N \geq 0.4$ bar		0.25 %							2	
customer									9	consult
Electrical connection										
male plug M12x1 (5-pin) / metal version									N	1
customer									9	9
Mechanical connection										
G1/2" DIN 3852									1	0
G1/2" EN 837									2	0
G1/4" DIN 3852									3	0
G1/4" EN 837									4	0
G1/2" DIN 3852 with flush sensor	⁴								F	0
1/2" NPT									N	0
1/4" NPT									N	4
customer									9	9
Seals										
FKM									1	
without (welded version)	⁵								2	consult
customer									9	consult
Special version										
standard									0	0
customer									9	9

¹ from 60 bar: measurement starts with ambient pressure

² absolute pressure possible from 0.4 bar

³ with IS version max. 1 contact is possible

⁴ only possible for nominal pressure ranges $p_N \leq 40$ bar

⁵ welded version only with pressure ports according to EN 837; possible for nominal pressure ranges $p_N \leq 40$ bar