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
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 rotable 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)

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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 absolute	[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 / absolute	[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		$p_N \geq 1$ 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	contact rating 125 mA, short-circuit resistant; $V_{switch} = V_S - 2V$	
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: $R_{max} = [(V_S - V_{S\,min}) / 0.02\ A]\ \Omega$	response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / V_S = 15 ... 28 V_{DC} permissible load: $R_{max} = [(V_S - V_{S\,min}) / 0.02\ A]\ \Omega$	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
Without analogue output	V_S = 15 ... 36 V_{DC}	
Accuracy [2]	standard: nominal pressure < 0.4 bar: ≤ ± 0.50 % 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

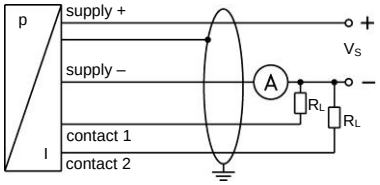
Permissible temperatures	
Medium	-40 ... 125 °C
Electronics / environment	-40 ... 85 °C
Storage	-40 ... 100 °C
Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
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 1.4301 (304)
Housing cap	standard: plastic HDPE for option IS-protection: stainless steel 1.4301 (304)
Viewing glass	laminated safety glass
Seals (media wetted)	standard: FKM on request: welded version [4] and others
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 $p_N \leq 40$ 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 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, $C_i \approx 0$ pF, $L_i \approx 0$ 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
[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
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

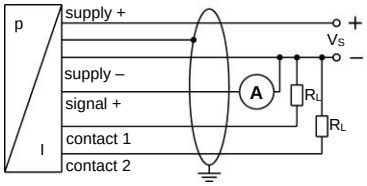
[6] Pressure switches are calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviation in the zero point for pressure ranges $p_N \leq 1$ bar.
[7] This directive is only valid for devices with maximum permissible overpressure > 200 bar.

Wiring diagrams

2-wire-system (current)



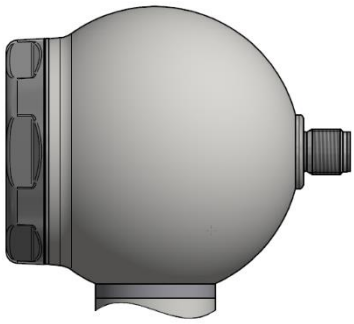
3-wire-system (current)



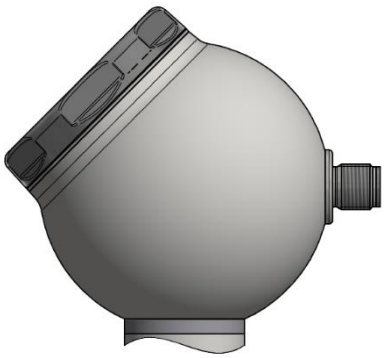
Pin configuration

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

Designs [8]



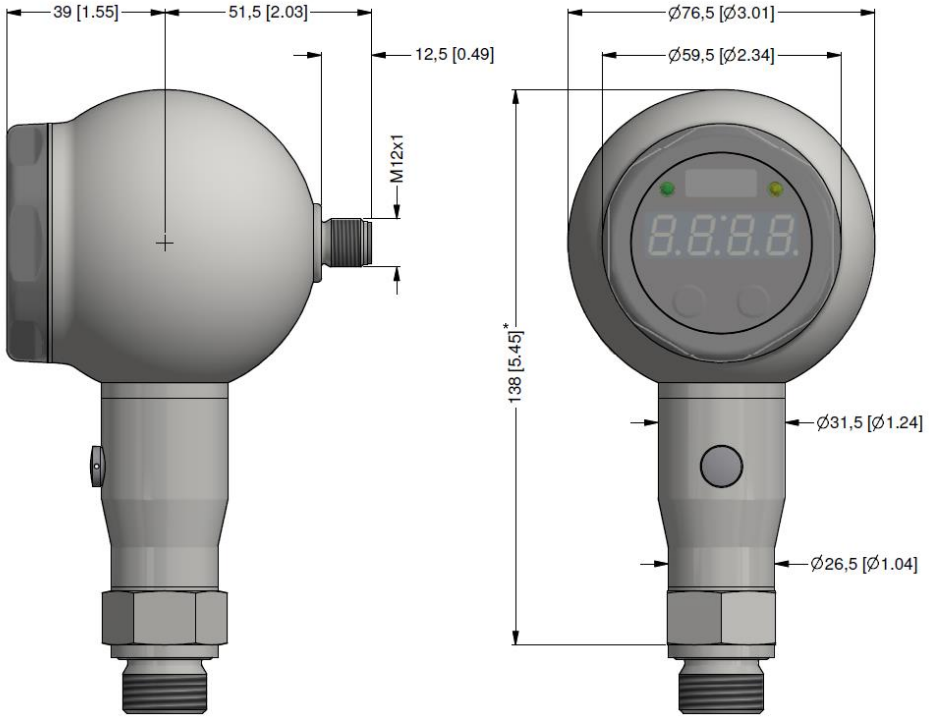
side display



45° display (on request)

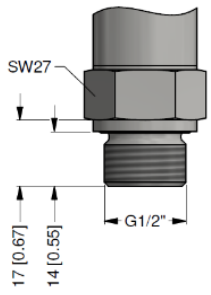
[8] all designs in horizontal rotatable housing as standard

Dimensions (mm / in)

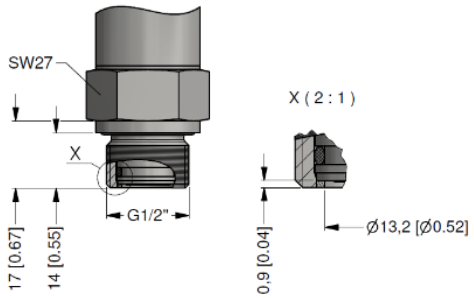


** for nominal pressure p_N > 400 bar increases the length of devices without IS-protection by 19 mm*

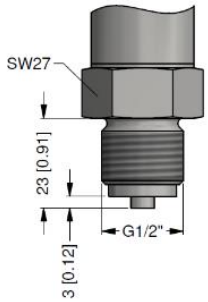
Mechanical connections (dimensions mm / in)



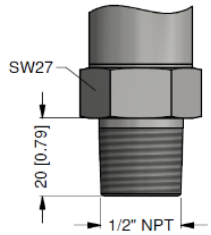
G1/2" DIN 3852



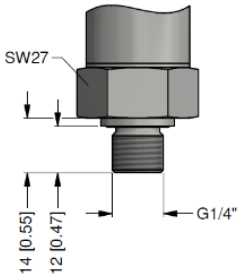
G1/2" flush DIN 3852
(p_N from 0.1 up to 40 bar)



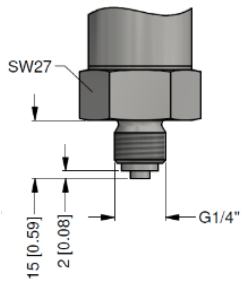
G1/2" EN 837



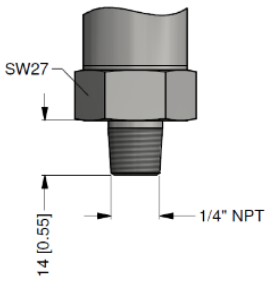
1/2" NPT



G1/4" DIN 3852



G1/4" EN 837



1/4" NPT

⇨ **metric threads and other versions on request**

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BD|SENSORS pressure measurement

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Ordering code DS 400

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		Code	
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	
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	0.50 %	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 1	
customer		9 9 9	consult
Mechanical connection			
G1/2" DIN 3852		1 0 0	
G1/2" EN 837		2 0 0	
G1/4" DIN 3852		3 0 0	
G1/4" EN 837		4 0 0	
G1/2" DIN 3852 with flush sensor [4]		F 0 0	
1/2" NPT		N 0 0	
1/4" NPT		N 4 0	
customer		9 9 9	consult
Seals			
FKM		1	
without (welded version) [5]		2	consult
customer		9	consult
Special version			
standard		0 0 0	
customer		9 9 9	consult

[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

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