



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 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 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	$\leq \pm 0.25$ % FSO
Repeatability	$\leq \pm 0.1$ % FSO
Switching frequency	2-wire: max. 10 Hz 3-wire: 50 Hz
Switching cycles	$> 100 \times 10^6$
Delay time	0 ... 100 sec

¹ with IS-protection max. 1 contact possible

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / $V_S = 13 \dots 36 V_{DC}$ permissible load: $R_{max} = [(V_S - V_{Smin}) / 0.02 A] \Omega$ response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / $V_S = 15 \dots 28 V_{DC}$ permissible load: $R_{max} = [(V_S - V_{Smin}) / 0.02 A] \Omega$ response time: < 10 msec
3-wire current signal	4 ... 20 mA / $V_S = 24 V_{DC} \pm 10$ % adjustable (turn-down of span 1:5) ³ permissible load: $R_{max} = 500 \Omega$ response time: < 30 msec
Without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy ²	standard: nominal pressure < 0.4 bar: $\leq \pm 0.50$ % FSO nominal pressure ≥ 0.4 bar: $\leq \pm 0.35$ % FSO option: nominal pressure ≥ 0.4 bar: $\leq \pm 0.25$ % 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]	$\leq \pm 0.75$	$\leq \pm 1$ $\leq \pm 0.75$
in compensated range	[°C]	-20 ... 85	0 ... 70 -20 ... 85

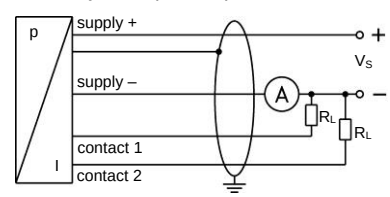
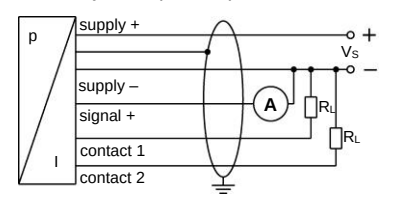
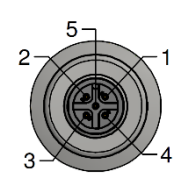
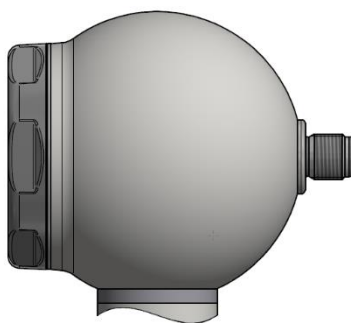
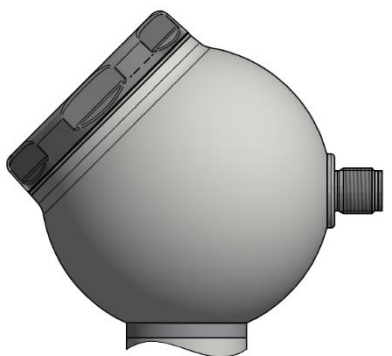
Permissible temperatures	
Medium	-40 ... 125 °C
Electronics / environment	-40 ... 85 °C
Storage	-40 ... 100 °C

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326

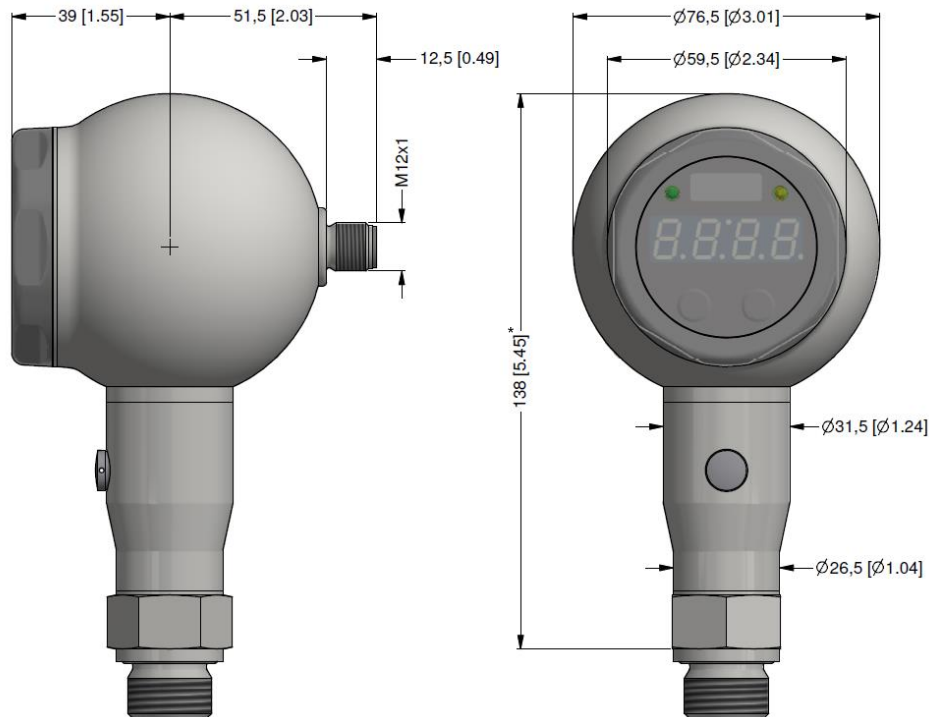
Mechanical stability	
Vibration	10 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	500 g / 1 msec according to DIN EN 60068-2-27

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

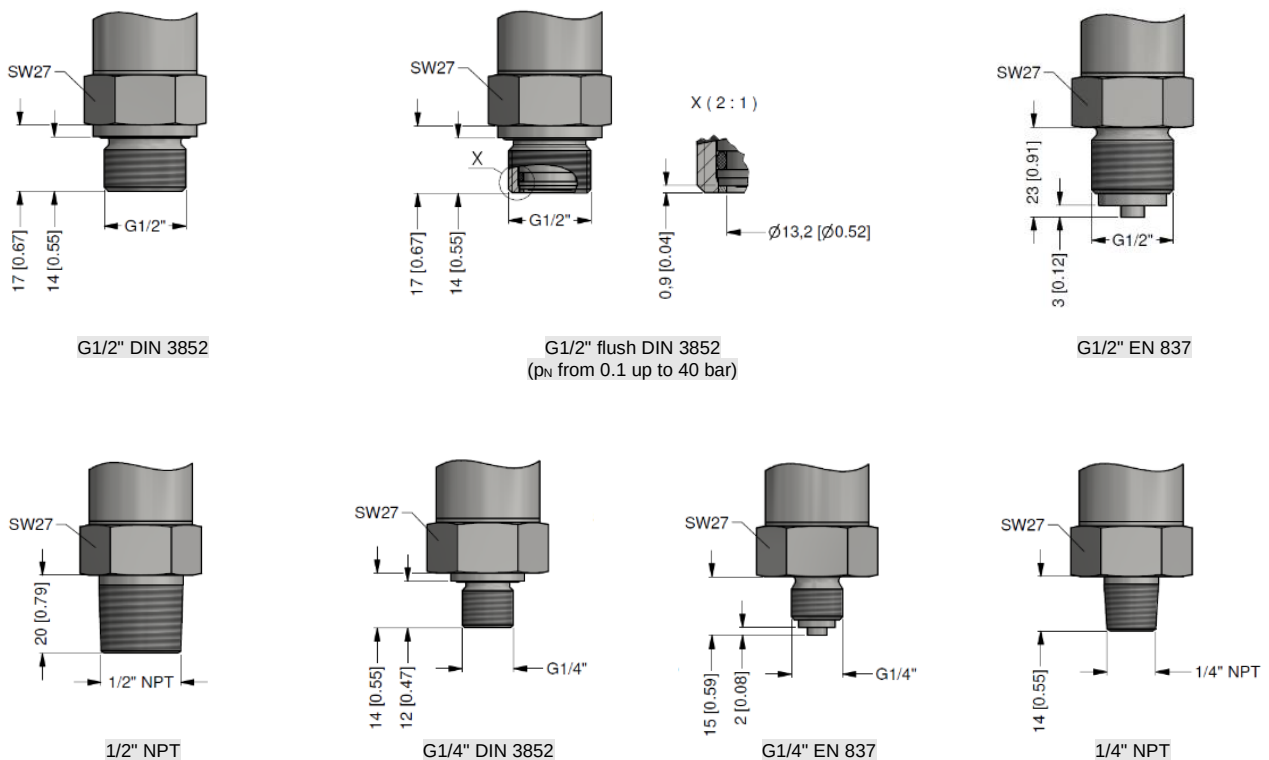
Explosion protection (only for 4 ... 20 mA / 2-wire)		
Approval AX14-DS 400	IBExU 06 ATEX 1050 X zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T135 °C Da	
Safety techn. maximum values	$U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C_i \approx 0 \text{ pF}$, $L_i \approx 0 \text{ }\mu\text{H}$	
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 % $\pm$ 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	
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 $p_N \leq 1 \text{ bar}$. 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)



⇒ metric threads and other versions on request

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
Design					
	stainless steel globe housing (side display)	K	H		
	stainless steel globe housing (45° display)	K	4		
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		
Contact					
	1 contact		1		
	2 contacts ³		2		
Accuracy					
	standard for p _N ≥ 0.4 bar		3		
	standard for p _N < 0.4 bar		5		
	option for p _N ≥ 0.4 bar		2		
	customer		9		
Electrical connection					
	male plug M12x1 (5-pin) / metal version		N	1	1
	customer		9	9	9
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
Seals					
	FKM				1
	without (welded version) ⁵				2
	customer				9
Special version					
	standard				0
	customer				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