BD|SENSORS
pressure measurement

DS 350P

Electronic Pressure Switch with IO-Link Interface

Pressure Ports and Process Connections with Flush Welded Stainless Steel Diaphragm

Stainless Steel Sensor

accuracy according to IEC 60770:
standard: 0.5 % FSO / 0.35 % FSO
option: 0.25 % FSO

Nominal pressure

from 0 ... 100 mbar up to 0 ... 40 bar

Digital output signal

IO-Link according to specification V 1.1

smart sensor profile

data transfer 38.4 kbit/sec

Switchable output signal

PNP / NPN / 4 … 20 mA / 0 … 10 V

Special characteristics

- indication of measured values on a 4-digit LED display
- rotatable and configurable display module
- parameter settings via IO-Link or menu (VDMA-conform)
- additional information via IO-Link accessible

Optional versions

- different mechanical connections
- cooling element for medium temperatures up to 300 °C
- customer specific versions

The DS 350P is an electronic pressure switch which has been designed for food industry and pharmacy. In addition to a large number of flush process connections, a multi-rotatable display module as standard is offered. This makes it easier for the user to read / operate it also in unusual display positions due to installation conditions on-site.

The integrated IO-Link interface provides process data, diagnostics, and status messages as well as other features, which are helpful for service and maintenance.

The switchability of the output signal as switching signal or analogue signal (mA / V) increases flexibility and integration in different applications.

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

IO-Link

BD SENSORS GmbH
BD-Sensors-Straße 1
D - 95199 Thierstein

Tel.: +49 (0) 92 35 / 98 11- 0
Fax: +49 (0) 92 35 / 98 11- 11

www.bdsensors.de
info@bdsensors.de

Input pressure range [1]															
Nominal pressure gauge	[bar]	0.10	0.16	0.25	0.40	0.60	1	1.6	2.5	4	6	10	16	25	40
Nominal pressure absolute	[bar]	-	-	-	0.40	0.60	1	1.6	2.5	4	6	10	16	25	40
Overpressure (static)	[bar]	0.5	1	1	2	5	5	10	10	20	40	40	80	80	105
Burst pressure ≥	[bar]	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50	50	120	120	210
Vacuum resistance	[bar]	p_N ≥ 1 bar: unlimited vacuum resistance										p_N < 1 bar: on request			
[1] consider the pressure resistance of fitting and clamps															

Supply	
Voltage supply	V_S = 18 ... 30 V_{DC}
Output signals	
Output signal 1	IO-Link / SIO (PNP / NPN) switchable
Output signal 2	4 … 20 mA / 3-wire or 0 … 10 V / 3-wire or PNP / NPN switchable
Signal characteristics switching signal	
Accuracy of switching points [2]	≤ ± 0.35 % FSO
Repeatability	≤ ± 0.1 % FSO
Max switching current	150 mA
Switching frequency	max. 170 Hz
Delay time	0.0 … 50.0 sec
Response time	< 12 msec
Signal characteristics analogue signal	
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
Long term stability	≤ ± 0.3 % FSO / year at reference conditions
Load (4 … 20 mA / 3-wire)	R_{max} = 330 Ω
Load (0 … 10 V / 3-wire)	R_{min} = 10 kΩ
Influence effects	supply: 0.05% FSO load: ≤ 0.1 % FSO
Adjustability	offset: ± 5 % span: -10 %
[2] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)	

Thermal effects (offset and span) [3]			
Nominal pressure p_N	[bar]	< 0.40	≥ 0.40
Tolerance band	[%FSO]	≤ ± 1.5	≤ ± 0.75
in compensated range	[°C]	0 ... 50	-20 ... 85
[3] 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 [4]	-40 ... 125 °C	-10 ... 125 °C
Medium with cooling element [5]	overpressure: -40 ... 300 °C vacuum: -40 ... 150 °C	overpressure: -10 ... 250 °C vacuum: -10 ... 150 °C
Electronics / environment / storage	-40 ... 85 °C	
[4] max. temperature of the medium for overpressure > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C *[5] max. temperature depends on the used sealing material, type of seal and installation*		

Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
IO-Link	
Interface	IO-Link 1.1; Slave
Data transfer	38.4 kbit/sec (COM 2)
Mode	SIO / IO-Link
Standard	IEC 61131-2, IEC 61131-9
Mechanical stability	
Vibration	10 g RMS (25 … 2000 Hz) according to DIN EN 60068-2-6
Shock	100 g / 1 msec according to DIN EN 60068-2-27
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

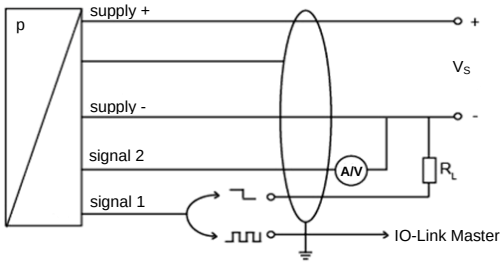
Materials	
Display housing	PA 6.6
Housing	stainless steel 1.4404 (316 L)
Pressure port	stainless steel 1.4404 (316 L) Clamp, Varivent®, G1" cone: stainless steel 1.4435 (316 L)
Diaphragm	stainless steel 1.4435 (316 L)
Seal	standard: FKM (recommended for medium temperatures ≤ 200 °C) option: EPDM (recommended for medium temperatures ≤ 140 °C) others on request G1" cone, Clamp, Varivent®: without
Media wetted parts	pressure port, seal, diaphragm
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, C63): T-ring-seal from Combifit International B.V. - Varivent® (P41): EPDM-O-ring which is FDA-listed
Display	4-digit, 7-segment-LED display on black base body, white, blue foil, digit height 7 mm, range of indication -1999 ... +9999, visible range 22.5 x 10.5 mm 4 LEDs for unit switching (bar, mbar, PSI, MPa) LED status display for IO-Link and contacts
Operation	2 buttons
Featured	functions according to VDMA 24574-1
Turn-on time	110 msec
Surface roughness	pressure port R_a < 0.8 µm (media wetted parts) diaphragm R_a < 0.15 µm weld seam R_a < 0.8 µm
Weight	approx. 250 g
Operational life	100 million load cycles
Current consumption	< 50 mA (without contacts)
Ingress protection	IP 67
Installation position	any [6]
CE-conformity	EMC Directive: 2014/30/EU

[6] *The pressure switch is calibrated in a vertical position with the pressure connection down. If this position is changed on installation there can be slight deviations in the zero point for pressure ranges p_N ≤ 1 bar.*

Wiring diagrams

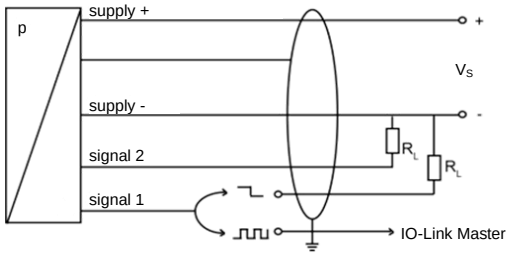
3-wire-system / configuration of analogue output:

signal 1: IO-Link or contact
signal 2: analogue output



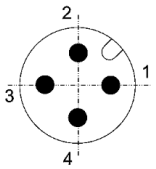
3-wire-system / configuration of contact:

signal 1: IO-Link or contact
signal 2: contact

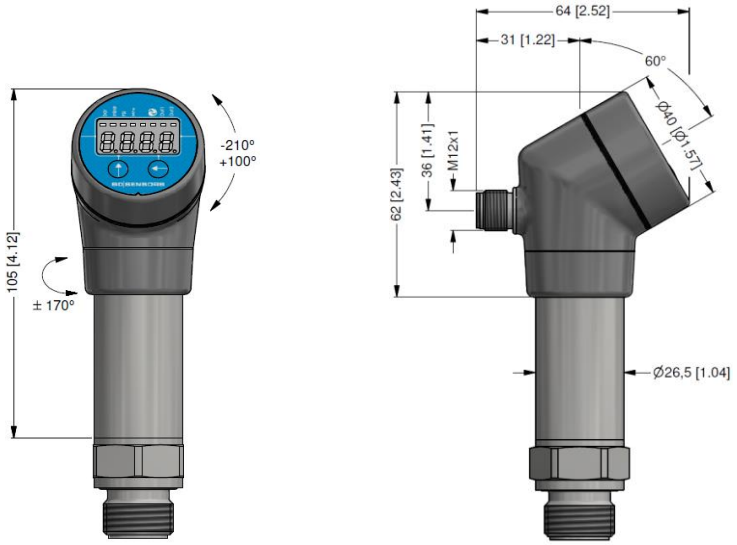


Electrical connection

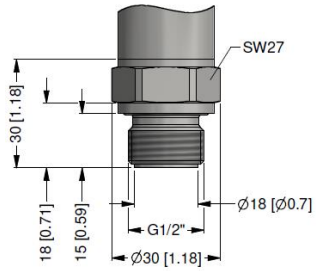
Pin configuration	Description	M12x1 (4-pin), metal
Supply +	supply	1
Supply –	supply	3
Output signal 1	IO-Link / SIO (PNP / NPN)	4
Output signal 2	4 … 20 mA – 3-wire / 0 …10 V – 3-wire (PNP / NPN)	2
Shield	shielding	plug housing



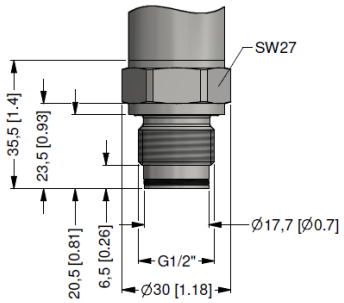
Dimensions (mm / in)



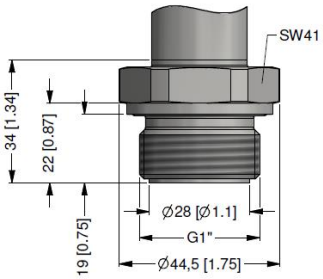
Mechanical connection (dimensions mm / in)



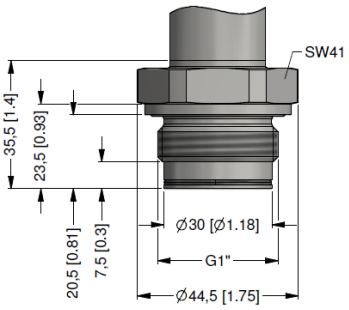
G1/2" DIN 3852 flush
p_N ≥ 1 bar



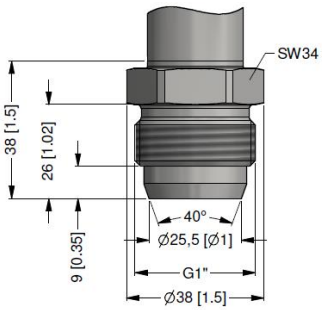
G1/2" DIN 3852 with 2x o-ring
p_N ≥ 1 bar



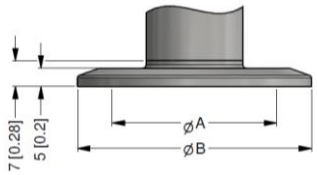
G1" DIN 3852
flush



G1" DIN 3852 with 2x o-ring
p_N ≤ 2 bar

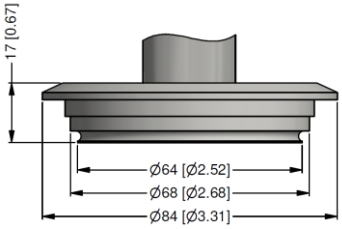


G1" cone

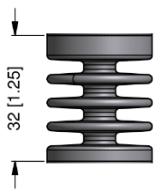


dimensions in mm / in		
size	DN 25 / 1"	DN 50 / 2"
A	23,0 [0.91]	45 [1.77]
B	50,5 [1.99]	64 [2.52]

Clamp (DIN 32676)
p_N ≤ 16 bar



Varivent® DN 40/50
p_N ≤ 25 bar



cooling element up to 300 °C [5]

⇨ metric threads and other versions on request

[5] *max. temperature depends on the used sealing material, type of seal and installation*

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Fax: +49 (0) 92 35 / 98 11- 11
www.bdsensors.de
info@bdsensors.de
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Ordering code DS 350P

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Section / option		Code	
Pressure			
gauge		7 E A	
absolute [1]		7 E C	
Input	[bar]		
	0.10 [1]	1 0 0 0	
	0.16 [1]	1 6 0 0	
	0.25 [1]	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	
	customer	9 9 9 9	consult
Output			
IO-Link + PNP/NPN + analogue output [2]		I X	
Accuracy			
standard for $p_N \leq 0.4$ bar	0.50% FSO	5	
standard for $p_N > 0.4$ bar	0.35% FSO	3	
option for $p_N \geq 0.4$ bar	0.25% FSO	2	
	customer	9	consult
Electrical connection			
male plug M12x1 (4-pin) / metal		M 1 B	
customer		9 9 9	consult
Mechanical connection			
G1/2" DIN 3852 flush ($p_N \geq 1$ bar)		Z 0 0	
G1/2" DIN 3852 with 2x o-ring ($p_N \geq 1$ bar)		Z 6 1	
G1" DIN 3852 flush		Z S 1	
G1" DIN3852 with 2x o-ring ($p_N \leq 2$ bar)		Z S 7	
G1" cone		K S 1	
Clamp DN 25 DIN 32676 ($p_N \leq 16$ bar)		C 6 1	
Clamp DN 50 DIN 32676 ($p_N \leq 16$ bar)		C 6 3	
Varivent® DN 40/50 ($p_N \leq 25$ bar)		P 4 1	consult
customer		9 9 9	consult
Diaphragm			
stainless steel 1.4435 (316L)		1	
customer		9	
Seal			
for Clamp, cone, Varivent®:	without	0	
	FKM	1	
	EPDM	3	
	customer	9	consult
Filling fluids			
silicone oil		1	
food compatible oil (FDA)		2	
customer		9	
Special version			
standard		0 0 0	
cooling element up to 300 °C		2 0 0	
customer		9 9 9	consult

[1] absolute pressure possible from 0.4 bar
[2] contact PNP/NPN switchable; analogue output 0 ... 10 V / 4 … 20 mA switchable
Varivent® is a brand name of GEA Tuchenhagen GmbH

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