BD|SENSORS
pressure measurement

DS 351

Electronic Pressure Switch with IO-Link Interface

Ceramic Sensor

accuracy according to IEC 61298-2:
0.5 % FSO

Nominal pressure

from 0 ... 0.4 bar up to 0 ... 600 bar gauge
from 0 ... 0.6 bar up to 0 ... 600 bar absolute

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
- pressure port in PVDF
- customer specific versions

The DS 351 has been designed for applications in machine tools or pneumatic and hydraulic systems. In combination with the optionally available PVDF pressure port also the usage in aggressive media is possible, whereby material resistance has to be checked in advance.

It offers an IO-Link interface as standard, which provides process data, diagnostics reports and status messages as well as other features, which are helpful for service / maintenance and condition analysis of a machine or plant.

The parameters are set either also via control level or via VDMA-compliant menu system, which can be carried out in situ by using two buttons.

The multiple, infinitely variable adjustability of the display as well as the individually parameterizable output signal (switching or analogue signal (mA / V)) support the user in realizing the measurement task.

Preferred areas of use are

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

CE ROHS REACH IO-Link

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Input pressure range																			
Nominal pressure gauge	[bar]	-1…0	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400	600
Nominal pressure absolute	[bar]	-	-	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400	600
Overpressure	[bar]	4	1	2	2	4	4	10	10	20	40	40	100	100	200	400	400	600	800
Burst pressure ≥	[bar]	7	2	4	4	5	5	12	12	25	50	50	120	120	250	500	500	650	880
Vacuum resistance	[bar]	p_N ≥ 1 bar: unlimited vacuum resistance p_N < 1 bar: on request																	

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 [1]	≤ ± 0.5 % 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 [1]	≤ ± 1 % 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 %
[1] accuracy according to IEC 61298-2 – limit point adjustment (non-linearity, hysteresis, repeatability)	
Thermal effects (offset and span)	
Thermal error	≤ ± 0.3 % FSO / 10 K
in compensated range	-25 ... 85 °C
Permissible temperatures	
Permissible temperatures [2]	medium: -40 ... 125 °C electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C
[2] for pressure port in PVDF the medium temperature is -30 … 60 °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
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	20 g RMS / 10 … 2000 Hz according to DIN EN 60068-2-6
Shock	500 g / 1 msec half sine according to DIN EN 60068-2-27
Materials	
Display housing	PA 6.6
Housing	stainless steel 1.4404 (316L)
Pressure port	standard: stainless steel 1.4404 (316L) option for G1/2" open port (with p_N ≤ 60 bar): PVDF
Seal	standard: FKM option: EPDM (for p_N ≤ 160 bar) others on request
Diaphragm	ceramics Al_2O_3 96 %
Media wetted parts	pressure port, seal, diaphragm

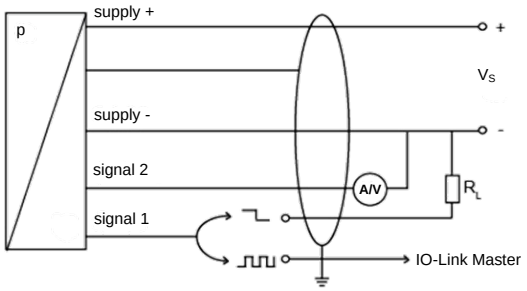
Miscellaneous	
Display	4-digit, 7-segment-LED display on black base body, white, blue foil, digit height 7 mm, range of indication -1999 ... +9999, visible range 22.5 x 10.5 mm 4 LEDs for unit switching (bar, mbar, PSI, MPa) LED status display for IO-Link and contacts
Operation	2 buttons
Featured	functions according to VDMA 24574-1
Turn-on time	110 msec
Weight	approx. 230 g
Operational life	100 million load cycles
Current consumption	< 50 mA (without contacts)
Ingress protection	IP 67
Installation position	any
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) [3]

[3] *This directive is only valid for devices with maximum permissible overpressure > 200 bar.*

Wiring diagrams

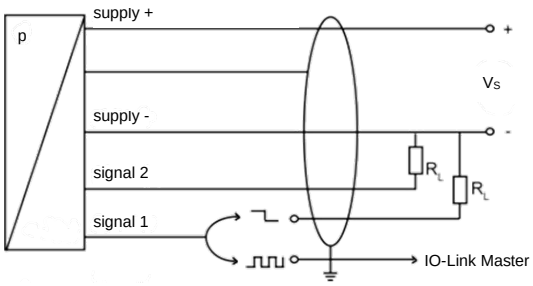
3-wire-system / configuration of analogue output:

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



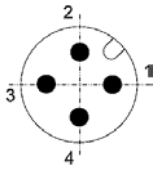
3-wire-system / configuration of contact:

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

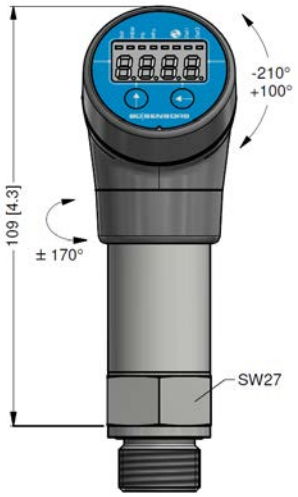


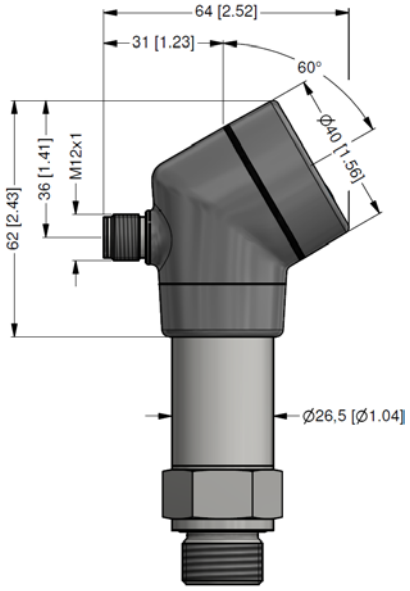
Electrical connection

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

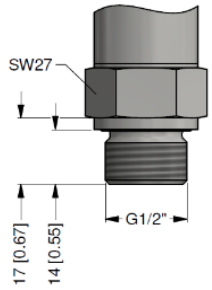


Dimensions (mm / in)

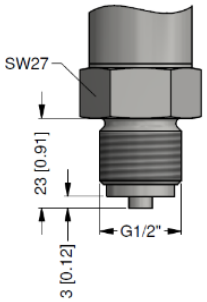




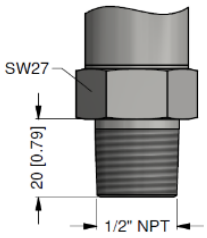
Mechanical connections (dimensions mm / in)



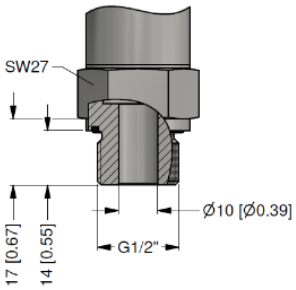
G1/2" DIN 3852



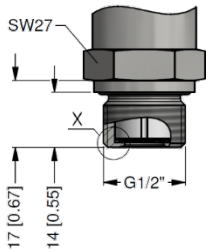
G1/2" EN 837

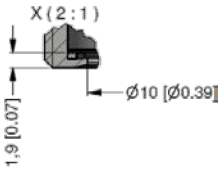


1/2" NPT

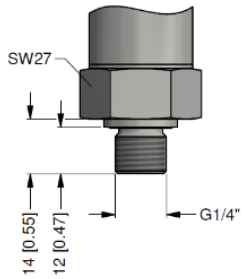


G1/2" DIN 3852 open port [4]

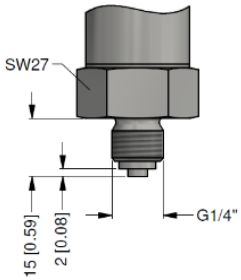




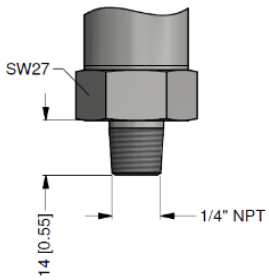
G1/2" DIN 3852 with semi-flush diaphragm
p_N ≤ 40 bar



G1/4" DIN 3852



G1/4" EN 837



1/4" NPT

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

[4] pressure port in PVDF only possible for p_N ≤ 60 bar

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Ordering code DS 351

DS 351 □□□-□□□□-□□-□-□□□-□□□-□-□-□-□□□

	Option	Code	
Pressure			
	gauge	7 E 2	
	absolute	7 E 3	
Input	[bar]		
only gauge	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
Output			
	IO-Link + PNP/NPN + analogue output [1]	I X	
Accuracy			
	0.5 % FSO	5	
	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	1 0 0	
	G1/2" EN 837	2 0 0	
	G1/4" DIN 3852	3 0 0	
	G1/4" EN 837	4 0 0	
p_N ≤ 40 bar:	G1/2" DIN 3852 with semi-flush sensor	F 0 0	
	G1/2" DIN 3852 open port	H 0 0	
	1/2" NPT	N 0 0	
	1/4" NPT	N 4 0	
	customer	9 9 9	consult
Seal			
	FKM	1	
p_N ≤ 160 bar:	EPDM	3	
	customer	9	consult
Pressure port			
	stainless steel 1.4404 (316L)	1	
	PVDF [2]	B	
	customer	9	consult
Diaphragm			
	ceramics Al_2O_3 96 %	2	
	customer	9	consult
Special version			
	standard	0 0 0	
	customer	9 9 9	consult

[1] contact PNP/NPN switchable; analogue output 0 ... 10 V / 4 … 20 mA switchable

[2] PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar); permissible medium temperature: -30 … 60 °C

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