

PRODUCT CATALOGUE  
PRESSURE SWITCH





# PRESSURE AT THE HIGHEST LEVEL.

“Successful medium-sized companies are not successful because they are active in many areas, but rather because they concentrate on one area and do it better than anyone else.”

This is our philosophy. That’s why BD|SENSORS has concentrated on electronic pressure measurement technology from the beginning.

With our unremitting product and quality strategy we have been successful in becoming a major player on the world market for electronic pressure sensing devices within a few years.

With 260 employees at 4 locations in Germany, the Czech Republic, Russia and China BD|SENSORS has solutions from 0.1 mbar to 8000 bar:

- > pressure sensors, pressure transducers  
pressure transmitters

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- > electronic pressure switches

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- > pressure measuring devices with display and  
switching outputs

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- > hydrostatic level probes

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Two pressure transmitters and a submersible probe, based on a stainless steel silicon sensor were the beginning. Today the range extends to more than 100 standard products, from economical OEM devices to high-end products with HART® communication or field bus interface.

In addition we have developed hundreds of customer-specific applications, underlining the competence and flexibility of BD|SENSORS. The excellent price/performance ratio of our products is proof of the fact that we are able to meet the toughest demand: Being a problem-solver for our customers.

For large production batches as well as for small production numbers, no matter for what medium or external factors, with almost any mechanical or electrical connection - we solve your problem

**flexibly, quickly and cost-efficiently.**

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	stainless steel ball housing	plastic	accuracy (FSO) <sup>1a</sup>	digital communication	1 / 2	1 / 2 / 4	analog signal mA / V	nominal pressure [bar]	inch and NPT thread	inch thread flush	dairy pipe	clamp	certificates	page
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DS 400	•		0,35 %		•		•	0 ... 100 up to 0 ... 600	•				EX	5-9
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<sup>1</sup> according to IEC 60770



# 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 <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance						P <sub>N</sub> < 1 bar: on request						
Contact <sup>1</sup>														
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 <sub>switch</sub> = V <sub>S</sub> - 2V									
		0 ... 10 V / 3-wire (on request):			contact rating 125 mA, short-circuit resistant									
Accuracy of contacts <sup>2</sup>		≤ ± 0.25 % FSO												
Repeatability		≤ ± 0.1 % FSO												
Switching frequency		2-wire: max. 10 Hz			/ 3-wire: 50 Hz									
Switching cycles		> 100 x 10 <sup>6</sup>												
Delay time		0 ... 100 sec												
<sup>1</sup> with IS-protection max. 1 contact possible														
Analogue output (optionally) / Supply														
2-wire current signal		4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub>			permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>Smin</sub> ) / 0.02 A] Ω				response time: < 10 msec					
2-wire current signal with IS-protection		4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub>			permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>Smin</sub> ) / 0.02 A] Ω				response time: < 10 msec					
3-wire current signal		4 ... 20 mA / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>3</sup>			permissible load: R <sub>max</sub> = 500 Ω				response time: < 30 msec					
3-wire voltage signal (on request)		0 ... 10 V / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>3</sup>			permissible load: R <sub>min</sub> = 10 kΩ				response time: < 30 msec					
Without analogue output		V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>												
Accuracy <sup>2</sup>		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						
<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)														
<sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range														
Thermal effects (Offset and Span)														
Nominal pressure P <sub>N</sub>	[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 <sup>4</sup> on request				others on request					
Diaphragm		stainless steel 1.4435 (316 L)												
Media wetted parts		pressure port, seals, diaphragm												
<sup>4</sup> welded version only for pressure ports according to EN 837; possible for nominal pressure ranges P <sub>N</sub> ≤ 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 <sub>i</sub> = 28 V, I <sub>i</sub> = 93 mA, P <sub>i</sub> = 660 mW, C <sub>i</sub> ≈ 0 pF, L <sub>i</sub> ≈ 0 μH												
Max. switching current <sup>5</sup>		70 mA												
Permissible temperatures for environment		-20 ... 60 °C with p <sub>atm</sub> 0.8 bar up to 1.1 bar												
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									
<sup>5</sup> the real switching current in the application depends on the power supply unit														



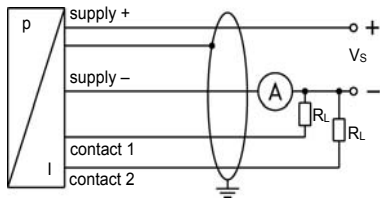
Miscellaneous	
Display	4-digit, 7-segment-LED display, visible range 37.2 x 11 mm; digit height 10 mm, range of indication -1999 ... +9999; accuracy 0.1 % ± 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	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) <sup>7</sup>
ATEX Directive	2014/34/EU

<sup>6</sup> 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.

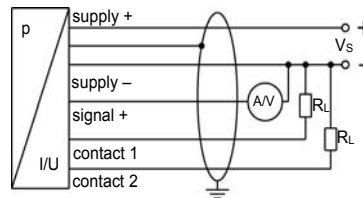
<sup>7</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

**Wiring diagrams**

2-wire-system (current)



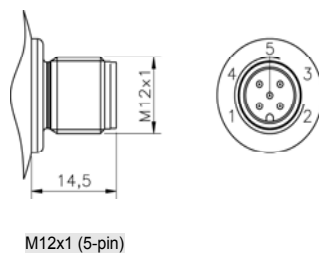
3-wire-system (current / voltage)



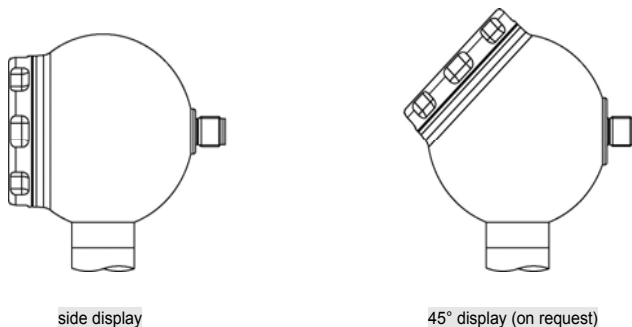
**Pin configuration**

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

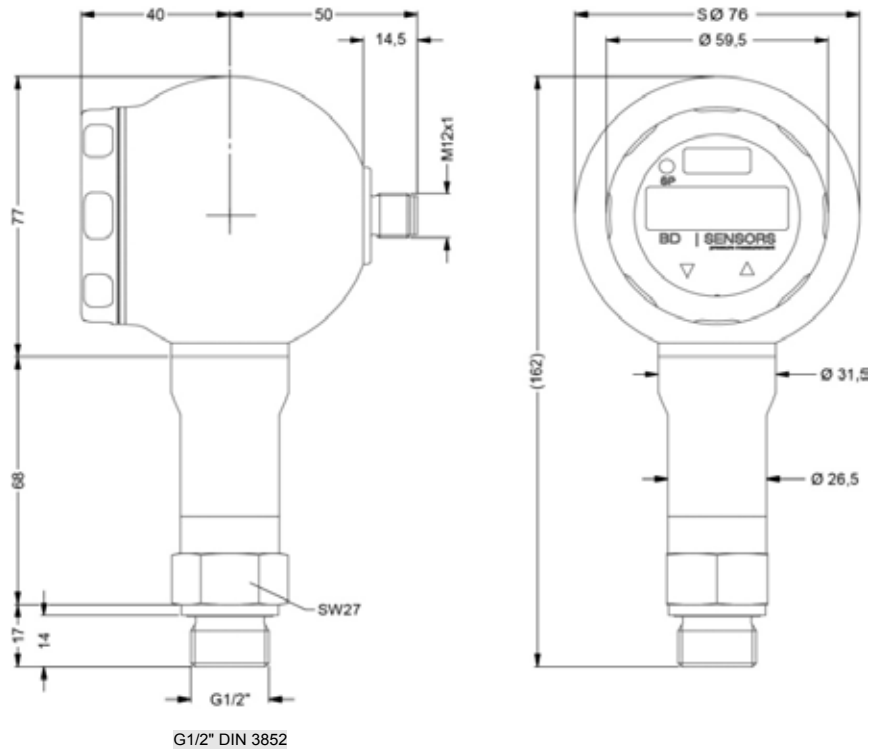
**Electrical connection (dimensions in mm)**



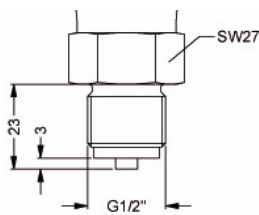
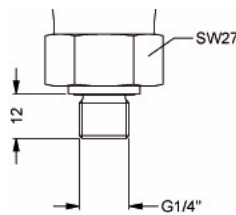
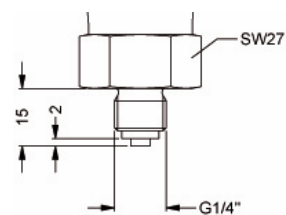
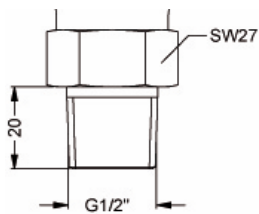
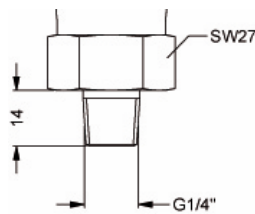
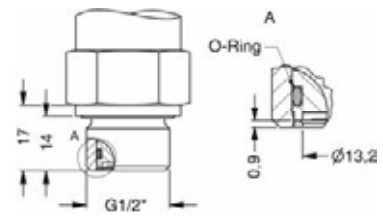
**Designs <sup>8</sup>**



<sup>8</sup> 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







# DS 401

## Intelligent Electronic Pressure Switch Stainless Steel

Ceramic Sensor

accuracy according to IEC 60770:  
0.5 % FSO

### Nominal pressure

from 0 ... 400 mbar up to 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
- ▶ pressure port PVDF
- ▶ customer specific versions

The electronic pressure switch DS 401 is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and has been specially designed for universal usage in industry applications; with flush diaphragm the DS 401 is suitable for the usage in viscous, pasty or highly contaminated media. The rotatable stainless steel globe housing is predestined for rough conditions and difficult installing conditions, caused by the high functionality and robustness. As standard the DS 401 offers a PNP contact and is optionally available with a second, independent contact. Additionally the DS 401 could be equipped with an analogue output.

### Preferred areas of use are

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

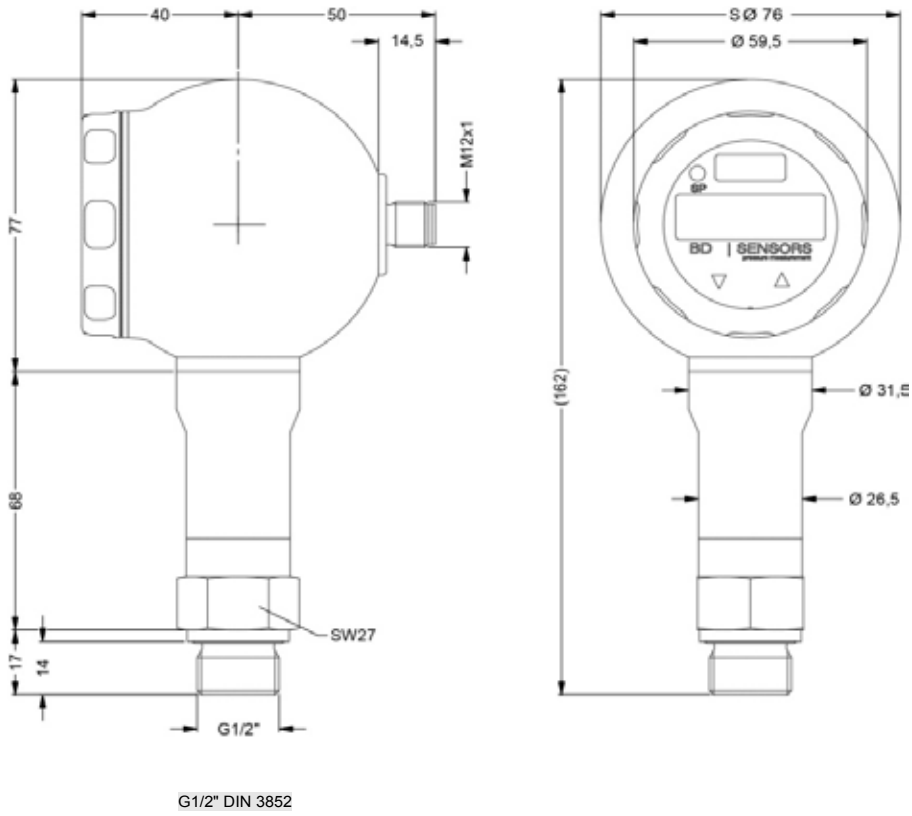


<b>Input pressure ranges</b>																		
Nominal pressure gauge [bar]	-1...0	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400	600
Nominal pressure abs. [bar]	-	-	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400	600
Level gauge [mH <sub>2</sub> O]	-	4	6	10	16	25	40	60	100	160	250	400	600	-	-	-	-	-
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	P <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance P <sub>N</sub> < 1 bar: on request																	
<b>Contact <sup>1</sup></b>																		
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 <sub>Switch</sub> = V <sub>S</sub> - 2V 0 ... 10 V / 3-wire (on request): contact rating 125 mA, short-circuit resistant																	
Accuracy of contacts <sup>2</sup>	≤ ± 0.5 % FSO																	
Repeatability	≤ ± 0.2 % FSO																	
Switching frequency	2-wire: max. 10 Hz / 3-wire: 50 Hz																	
Switching cycles	> 100 x 10 <sup>6</sup>																	
Delay time	0 ... 100 sec																	
<sup>1</sup> with Ex-protection max. 1 contact possible																		
<b>Analogue output (optionally) / Supply</b>																		
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec																	
2-wire current signal, Ex-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec																	
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>3</sup> permissible load: R <sub>max</sub> = 500 Ω response time: < 30 msec																	
3-wire voltage signal (on request)	0 ... 10 V / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>3</sup> permissible load: R <sub>min</sub> = 10 kΩ response time: < 30 msec																	
Without analogue output	V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>																	
Accuracy <sup>2</sup>	≤ ± 0.5 % FSO																	
<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)																		
<sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range																		
<b>Thermal effects (Offset and Span) / Permissible temperatures</b>																		
Thermal error	≤ ± 0.2 % FSO / 10 K																	
in compensated range	-25 ... 85 °C																	
Permissible temperatures	medium: -40 ... 125 °C electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C																	
<sup>4</sup> for pressure port of PVDF the minimum permissible temperature is -30 °C																		
<b>Electrical protection</b>																		
Short-circuit protection	permanent																	
Reverse polarity protection	no damage, but also no function																	
Electromagnetic compatibility	emission and immunity according to EN 61326																	
<b>Mechanical stability</b>																		
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																	
<b>Materials</b>																		
Pressure port / housing	standard: 1.4404 (316L) option for G1/2" open port (up to 60 bar): PVDF																	
Housing	1.4404 (316L)																	
Display housing	stainless steel 1.4301 (304)																	
Viewing glass	laminated safety glass																	
Seals	standard: FKM option: EPDM (P <sub>N</sub> ≤ 160 bar) others on request																	
Diaphragm	ceramics Al <sub>2</sub> O <sub>3</sub> 96 %																	
Media wetted parts	pressure port, seals, diaphragm																	

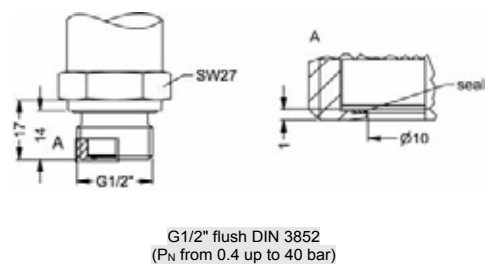
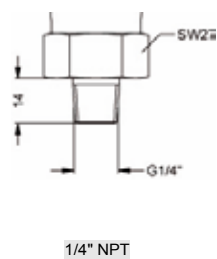
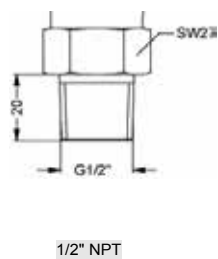
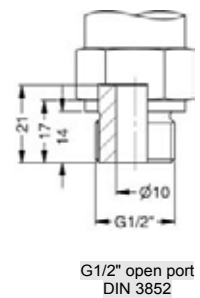
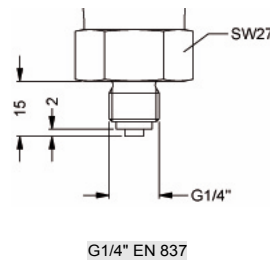
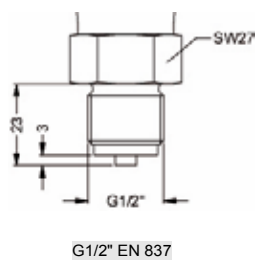
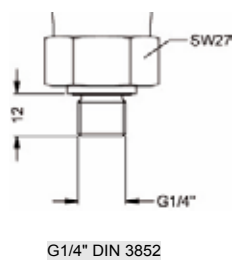
<b>Explosion protection (only for 4 ... 20 mA / 2-wire)</b>	
Approval AX14-DS 401	IBExU06ATEX1050 X zone 0: II 1G Ex ia IIC T4 Ga (connector) / II 1G Ex ia IIB T4 Ga (cable) zone 20: II 1D Ex ia IIIC T135 °C Da
Safety technical maximum values	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$
Max. switching current <sup>5</sup>	70 mA
Permissible temperatures for environment	-20 ... 60 °C with $p_{\text{atm}}$ 0.8 bar up to 1.1 bar
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 $\mu\text{H}/\text{m}$
<sup>5</sup> the real switching current in the application depends on the power supply unit	
<b>Miscellaneous</b>	
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)
Option oxygen application <sup>6</sup>	for $P_N \leq 25 \text{ bar}$ : O-ring in FKM Vi 567 (with BAM-approval); permissible maximum values are 25 bar / 150° C
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
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) <sup>7</sup>
ATEX-Richtlinie	2014/34/EU
<sup>6</sup> not possible with flush pressure ports <sup>7</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar	
<b>Wiring diagrams</b>	
<p>2-wire-system (current)</p>	<p>3-wire-system (current / voltage)</p>
<b>Pin configuration</b>	
Electrical connections	M12x1 metal (5-pin)
Supply +	1
Supply -	3
Signal + (only 3-wire)	2
Contact 1	4
Contact 2	5
Shield	plug housing / pressure port
<b>Electrical connections (dimensions in mm)</b>	
<p>M12x1 (5-pin)</p>	
<b>Design <sup>8</sup></b>	
<p>side display                      45° display (on request)</p>	
<sup>8</sup> all designs in horizontal rotatable housing as standard	

**Mechanical connections (dimensions in mm)**

**standard**



**optionally**



⇒ metric threads and other versions on request





# DS 300

## Electronic Pressure Switch

with IO-Link interface

Stainless Steel Sensor

accuracy according to IEC 60770:  
0.35 % FSO

### Nominal pressure

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

### Digital output signal

IO-Link according to specification V 1.1

Smart sensor profile

Data transfer 38.4 kBaud

2 contacts

### Analog output (optional)

4 ... 20 mA or 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)

### Optional versions

- ▶ different mechanical connections
- ▶ customer specific versions

The electronic pressure switch DS 300 is equipped with an IO-Link interface as standard in order to exchange process data, diagnostic reports and status messages with a superordinate control level.

The parameters are set either also via the control level or via the VDMA-compliant menu system, which can be carried out at a local level using two keys.

The DS 300 is designed for the mechanical engineering and plant engineering sectors. A large number of inch threads, metric threads or NPT threads are available to users in order to ensure optimum integration in the application. In addition, unusual display positions can be compensated to the multiple rotatability of the display so that the user is able to read the vital information without any problems.

### Preferred areas of use are



Plant and machine engineering

- machine tools
- pneumatic plants
- hydraulic plants





<b>Input pressure range</b>												
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 (static)	[bar]	5	0.5	1	1	2	5	5	10	10	20	40
Burst pressure $\geq$	[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 (static) [bar]	40	80	80	105	210	210	600	1000	1000	1000
Burst pressure $\geq$ [bar]	50	120	120	210	420	420	1000	1250	1250	1800
Vacuum resistance	$P_N \geq 1$ bar: fully vacuum resistant $P_N < 1$ bar: on request									

<b>Contact</b>			
Voltage supply	$V_S = 18 \dots 30 V_{DC}$		
	<table border="0"> <tr> <td style="text-align: center;"><b>Output signal 1</b></td> <td style="text-align: center;"><b>Output signal 2</b></td> </tr> </table>	<b>Output signal 1</b>	<b>Output signal 2</b>
<b>Output signal 1</b>	<b>Output signal 2</b>		
Standard	IO-Link / SIO (PNP or NPN) + 1 PNP contact		
Optional	IO-Link / SIO (PNP or NPN) + 1 NPN contact (on request)		
Switching current	200 mA		
Accuracy of switching points <sup>1</sup>	$\leq \pm 0.35$ % FSO		
Repeatability	$\leq \pm 0.1$ % FSO		
Switching frequency	max. 200 Hz		
Switching cycles	$> 100 \times 10^6$		
Delay time	0.0 ... 50.0 sec		

<b>Analog output (optional)</b>			
	<table border="0"> <tr> <td style="text-align: center;"><b>Output signal 1</b></td> <td style="text-align: center;"><b>Output signal 2</b></td> </tr> </table>	<b>Output signal 1</b>	<b>Output signal 2</b>
<b>Output signal 1</b>	<b>Output signal 2</b>		
Voltage (3-wire)	IO-Link / SIO (PNP or NPN) + 0 ... 10 V permissible load: $R_{min} \geq 10$ k $\Omega$		
Current (3-wire)	IO-Link / SIO (PNP or NPN) + 4 ... 20 mA permissible load: $R_{max} \leq 330$ $\Omega$		
Accuracy <sup>1</sup>	nominal pressure $\geq 0.4$ bar: $\leq \pm 0.35$ % FSO nominal pressure $< 0.4$ bar: $\leq \pm 0.5$ % FSO		
Influence effects	supply: 0.05 % FSO load: $\leq 0.1$ % FSO		
Long term stability	$\leq \pm 0.3$ % FSO / year at reference conditions		
Response time	$< 12$ msec		

<sup>1</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<b>Thermal effects (Offset and Span)</b>					
Nominal pressure $P_N$	[bar]	-1 ... 0	$< 0.40$	$\geq 0.40$	$> 40$
Tolerance band	[% FSO]	$\leq \pm 0.75$	$\leq \pm 1$	$\leq \pm 1$	$\leq \pm 0.75$
in compensated range	[°C]	-20 ... 85	0 ... 70	-20 ... 85	0 ... 70

<b>Permissible temperatures</b>	
Permissible temperatures	medium: -40 ... 125 °C electronics/environment: -40 ... 85 °C storage: -40 ... 100 °C

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

<b>IO-Link</b>	
Interface	IO-Link 1.1; Slave
Data transfer	COM2, 38.4 kBaud
Mode	SIO / IO-Link
Standard	IEC 61131-9

<b>Mechanical stability</b>	
Vibration	10 g / 25 Hz ... 2 kHz according to DIN EN 60068-2-6
Shock	500 g / 1 ms ec according to DIN EN 60068-2-27

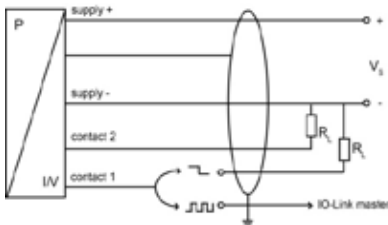
Materials	
Pressure port / Housing	stainless steel 1.4404 (316L)
Display housing	standard: PA 6.6
Seals (media wetted)	standard: FKM option: EPDM <span style="float: right;">others on request</span>
Diaphragm	stainless steel 1.4435 <span style="float: right;">others on request</span>
Media wetted parts	pressure port, seal, diaphragm
Miscellaneous	
Display	4-digit, red LED display, digit height 7 mm, range of indication -1999 ... +9999, visible range 22.5 x 10.5 mm, 4 LED's for unit switching (bar, mbar, PSI, MPa) status display contact: contact 1 : LED, green, contact 2: LED, yellow
Operation	2 buttons / functions according to VDMA 24574-1
Turn-on time	110 msec
Weight	approx. 220 g
Operational life	100 million load cycles
Current consumption	< 40 mA
Protection class	IP 65 / IP 67
Installation position	any <sup>2</sup>
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) <sup>3</sup>

<sup>2</sup> Pressure transmitters are calibrated vertically with pressure port downwards. Changing the installation position could lead to minor zero offsets for pressure ranges  $P_N \leq 1$  bar.

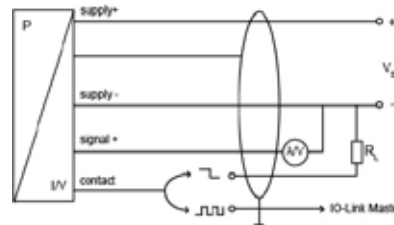
<sup>3</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar.

**Wiring diagrams**



3-wire-system (IO-Link / SIO with contact)



3-wire-system (IO-Link / SIO with analogue output)

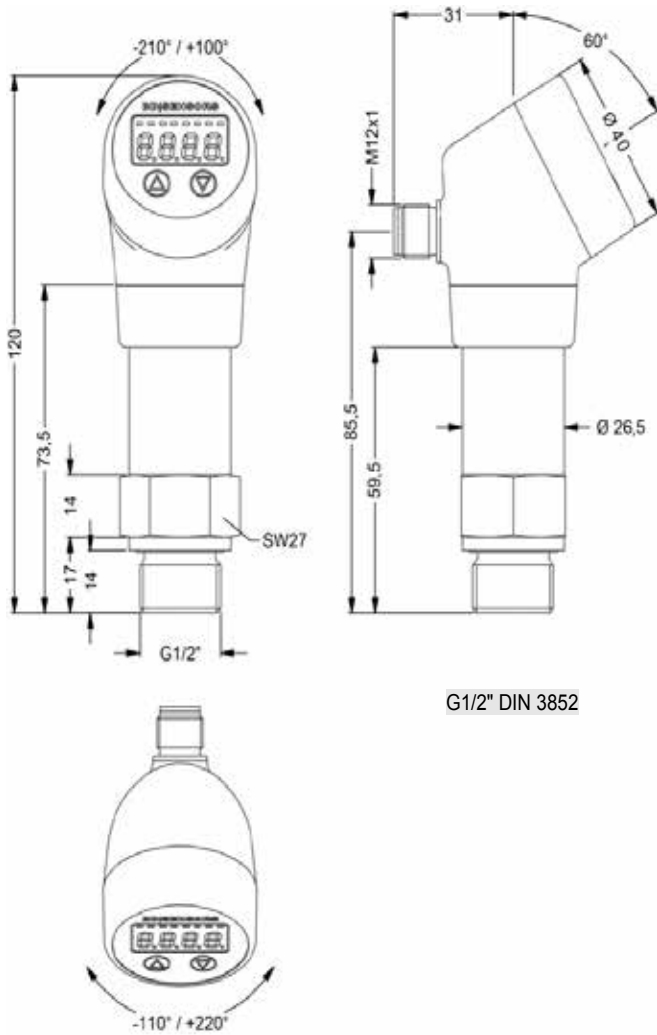


**Pin configuration**

Electrical connections	M12x1 (4-pin) metal (without analogue output) 	M12x1 (4-pin) metal (with analogue output) 
Supply +	1	1
Supply -	3	3
Signal +	-	2
Communication / contact 1	4	4
Contact 2	2	-
Shield	pressure port	pressure port

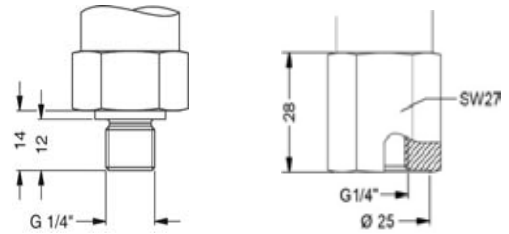
**Mechanical connections (dimensions in mm)**

**standard**



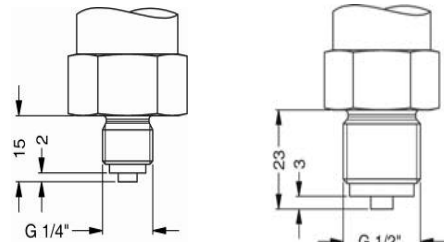
G1/2" DIN 3852

**option**



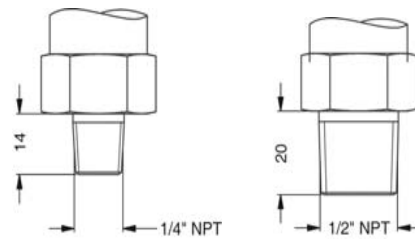
G1/4" DIN 3852

G1/4" DIN 3852 internal thread



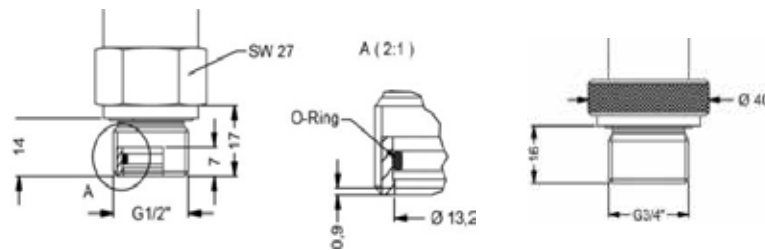
G1/4" EN 837

G1/2" EN 837



1/4" NPT

1/2" NPT



G1/2" DIN 3852 flush<sup>4</sup>

G3/4" DIN 3852 flush<sup>4</sup>

<sup>4</sup> not possible for nominal pressure PN > 40 bar and for vacuum ranges; for G3/4" flush absolute pressure on request





# DS 200

## Electronic Pressure Switch

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, 2 or 4 independent PNP contacts,  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA  
3-wire: 4 ... 20 mA / 0 ... 10 V  
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**
- ▶ pressure sensor welded
- ▶ customer specific versions




The electronic pressure switch DS 200 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 200 offers a PNP contact and a rotatable display module with 4-digit LED display. Optional versions like e.g. an intrinsically safe version, max. four contacts 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 <sup>1</sup> [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	
Level gauge <sup>1</sup> [mH <sub>2</sub> O]	-	1	1.6	2.5	4	6	10	16	25	40	60	
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 <sup>1</sup> / abs. [bar]	10	16	25	40	60	100	160	250	400	600	
Level gauge <sup>1</sup> [mH <sub>2</sub> O]	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 <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance; P <sub>N</sub> < 1 bar: on request										
<sup>1</sup> from 60 bar: measurement starts with ambient pressure											

Contact <sup>2</sup>	
Standard	1 PNP contact
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; V <sub>switch</sub> = V <sub>S</sub> - 2V 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>3</sup>	standard: P <sub>N</sub> < 0.4 bar: ≤ ± 0.5 % FSO P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.35 % FSO option: P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.25 % FSO
Repeatability	≤ ± 0.1 % FSO
Switching frequency	max. 10 Hz
Switching cycles	> 100 x 10 <sup>6</sup>
Delay time	0 ... 100 sec

<sup>2</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 as well as 2-wire current signal with IS-protection  
no contact possible with 3-wire in combination with plug ISO 4400

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 19 ... 30 V <sub>DC</sub> adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>max</sub> = 500 Ω response time: < 3 sec
3-wire voltage signal without analogue output	0 ... 10 V / V <sub>S</sub> = 15 ... 36 V <sub>DC</sub> permissible load: R <sub>min</sub> = 10 kΩ response time: < 3 msec
Accuracy <sup>3</sup>	standard: P <sub>N</sub> < 0.4 bar: ≤ ± 0.5 % FSO; P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.35 % FSO option: P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.25 % FSO

<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal effects (Offset and Span)			
Nominal pressure P <sub>N</sub> [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

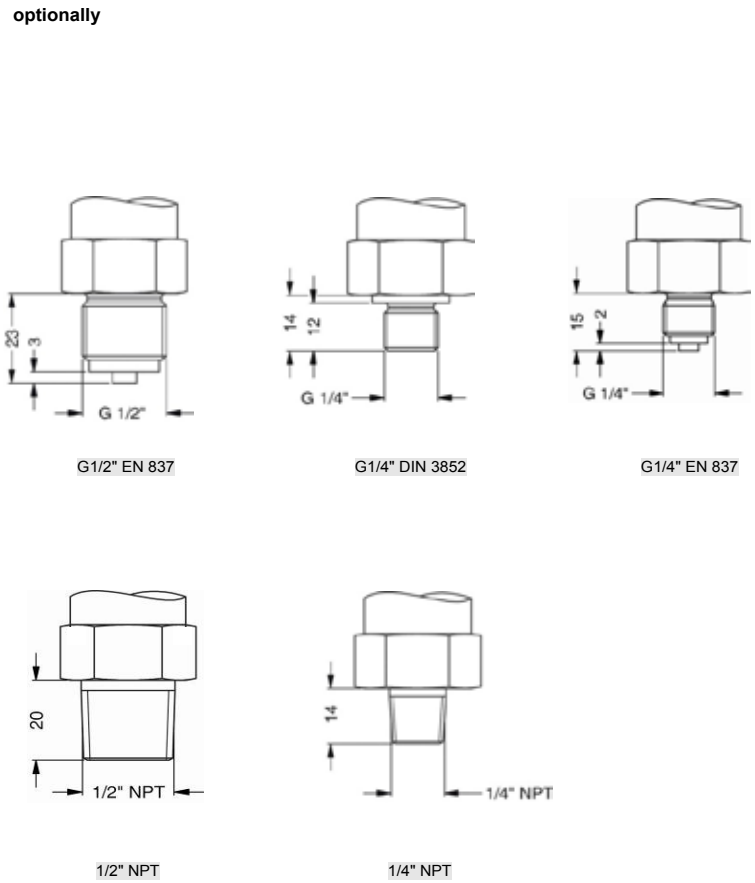
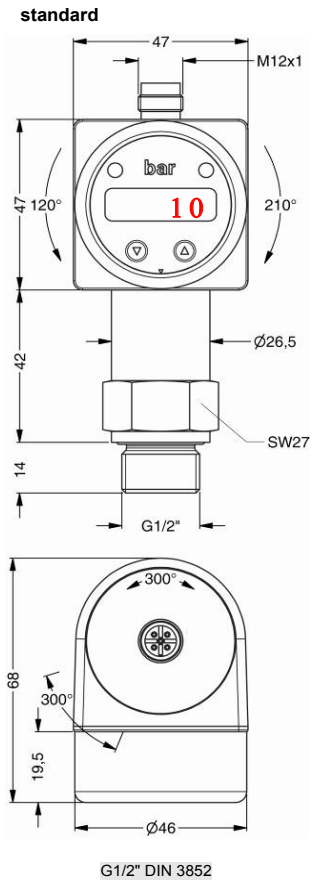
Materials	
Pressure port	stainless steel 1.4404 (316 L)
Housing	stainless steel 1.4404 (316 L)
Display housing	PA 6.6, polycarbonate
Seals (media wetted)	standard: FKM option: welded version <sup>5</sup> others on request
Diaphragm	stainless steel 1.4435 (316 L)
Media wetted parts	pressure port, seals, diaphragm

<sup>5</sup> welded version only for pressure ports according to EN 837; possible for nominal pressure ranges P<sub>N</sub> ≤ 40 bar

Explosion protection (only for 4 ... 20 mA / 2-wire)						
Approval AX14-DS 200	IBExU 06 ATEX 1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)					
Safety technical maximum values	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$					
Max. switching current <sup>6</sup>	70 mA					
Permissible temperatures for environment	-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 $\mu\text{H}/\text{m}$					
<sup>6</sup> the real switching current in the application depends on the power supply unit						
Miscellaneous						
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA					
Ingress protection	IP 65					
Installation position	any <sup>7</sup>					
Weight	min. 160 g (depending on mechanical connection)					
Operational life	100 million load cycles					
CE-conformity	EMC Directive: 2014/30/EU			Pressure Equipment Directive: 2014/68/EU (module A) <sup>8</sup>		
ATEX Directive	2014/34/EU					
<sup>7</sup> 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 $P_N \leq 1 \text{ bar}$ .						
<sup>8</sup> 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 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	gnye (green-yellow)
Electrical connections (dimensions in mm)						
						cable outlet PVC $\varnothing = 4.9 \text{ mm}$ cable outlet PUR $\varnothing = 5.7 \text{ mm}$
<sup>9</sup> different cable types and lengths available; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)						

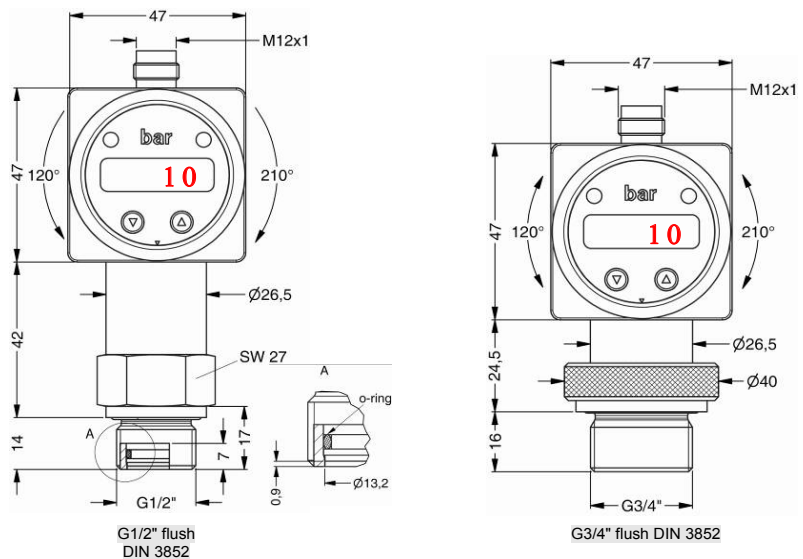


**Mechanical connections (dimensions in mm)**



⇒ 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

**optionally for  $P_N$  from 0.1 up to 40 bar**



⇒ metric threads and other versions on request

## Ordering code DS 200

DS 200		[ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]										
<b>Pressure</b>												
gauge in bar	<sup>1</sup>	7	8	0								
gauge in mH <sub>2</sub> O	<sup>1</sup>	7	8	H								
absolute in bar	<sup>2</sup>	7	8	1								
<b>Input</b>												
[mH <sub>2</sub> O]	[bar]	<sup>2</sup>										
1	0.10		1	0	0	0						
1.6	0.16	<sup>2</sup>	1	6	0	0						
2.5	0.25	<sup>2</sup>	2	5	0	0						
4	0.40		4	0	0	0						
6	0.60		6	0	0	0						
10	1.0		1	0	0	1						
16	1.6		1	6	0	1						
25	2.5		2	5	0	1						
40	4.0		4	0	0	1						
60	6.0		6	0	0	1						
100	10		1	0	0	2						
160	16		1	6	0	2						
250	25		2	5	0	2						
400	40		4	0	0	2						
600	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	
<b>Analogue output</b>												
without						0						
4 ... 20 mA / 2-wire						1						
0 ... 10 V / 3-wire						3						
4 ... 20 mA / 3-wire, adjustable						7J						
Intrinsic safety 4 ... 20 mA / 2-wire	<sup>3</sup>					E						
customer						9					consult	
<b>Contact</b>												
1 contact	<sup>3,4</sup>					1						
2 contacts	<sup>3,4</sup>					2						
4 contacts	<sup>5</sup>					4						
<b>Accuracy</b>												
standard for P <sub>N</sub> > 0.4 bar	0.35 %					3						
standard for P <sub>N</sub> ≤ 0.4 bar	0.5 %					5						
option for P <sub>N</sub> ≥ 0.4 bar	0.25 %					2						
customer						9					consult	
<b>Electrical connection</b>												
Male plug M12x1 (5-pin) / plastic version						N	0	1				
Male plug M12x1 (8-pin) / plastic version	<sup>5</sup>					M	5	0				
Male plug M12x1 (5-pin) / metal version						N	1	1				
Male and female plug ISO 4400	<sup>4</sup>					1	0	0				
Male plug Binder series 723 (5-pin)						2	0	4				
Cable outlet incl. cable	<sup>6</sup>					T	A	0				
customer						9	9	9			consult	
<b>Mechanical connection</b>												
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	<sup>7</sup>					F	0	0				
G3/4" DIN 3852 with flush sensor	<sup>7</sup>					K	0	0				
1/2" NPT						N	0	0				
1/4" NPT						N	4	0				
customer						9	9	9			consult	
<b>Seals</b>												
FKM								1				
without (welded version)	<sup>8</sup>							2				
customer								9			consult	
<b>Special version</b>												
standard								0	0	0		
customer								9	9	9	consult	

<sup>1</sup> from 60 bar: measurement starts with ambient pressure<sup>2</sup> absolute pressure possible from 0.4 bar<sup>3</sup> with Ex version max. 1 contact is possible<sup>4</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible<sup>5</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request<sup>6</sup> standard: 2 m PVC cable without ventilation tube, others on request<sup>7</sup> not possible for nominal pressure P<sub>N</sub> > 40 bar; for G3/4" flush nominal pressure abs. on request<sup>8</sup> welded version only with pressure ports according to EN 837; possible for nominal pressure ranges P<sub>N</sub> ≤ 40 bar



# DS 201

## Electronic Pressure Switch

Ceramic Sensor

accuracy according to IEC 60770:  
0.5 % FSO

### Nominal pressure

from 0 ... 400 mbar up to 0 ... 600 bar

### Contacts

1, 2 or 4 independent PNP contacts,  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA / 0 ... 10 V

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**
- ▶ pressure port PVDF
- ▶ customer specific versions



The electronic pressure switch DS 201 is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and has been specially designed for universal usage in industry applications. The DS 201 is available with flush pressure ports for viscous, pasty and highly contaminated media.

As standard the DS 201 offers a PNP contact and a rotatable display module with 4-digit LED display. Optional versions like e.g. an intrinsically safe version, max. four contacts and an analogue output complete the profile.

### Preferred areas of use are

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



Input pressure range <sup>1</sup>																		
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 abs. [bar]	-	-	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	250	400	600
Level gauge [mH <sub>2</sub> O]	-	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	P <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance P <sub>N</sub> < 1 bar: on request																	

<sup>1</sup> PVDF pressure port possible for nominal pressure ranges up to 60 bar

Contact <sup>2</sup>	
Standard	1 PNP contact
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; V <sub>Switch</sub> = V <sub>S</sub> - 2V 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>3</sup>	≤ ± 0.5 % FSO
Repeatability	≤ ± 0.2 % FSO
Switching frequency	max. 10 Hz
Switching cycles	> 100 x 10 <sup>6</sup>
Delay time	0 ... 100 sec

<sup>2</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 as well as 2-wire current signal with IS-protection  
no contact possible with 3-wire in combination with plug ISO 4400

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 19 ... 30 V <sub>DC</sub> adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>max</sub> = 500 Ω response time: < 0.5 sec
3-wire voltage signal	0 ... 10 V / V <sub>S</sub> = 15 ... 36 V <sub>DC</sub> permissible load: R <sub>min</sub> = 10 kΩ response time: < 3 msec
Without analogue output	V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>
Accuracy <sup>3</sup>	≤ ± 0.5 % FSO

<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal effects (Offset and Span) / Permissible temperatures	
Thermal error	≤ ± 0.2 % FSO / 10 K
in compensated range	-25 ... 85 °C
Permissible temperatures <sup>5</sup>	medium: -40 ... 125 °C electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C

<sup>5</sup> for pressure port of PVDF the minimum permissible temperature is -30 °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 / housing	standard:	pressure port	housing
	option for G1/2" open port (up to 60 bar): options for G3/4" flush (0.6 bar ≤ P <sub>N</sub> ≤ 25 bar):	stainless steel 1.4404 PVDF PVDF	stainless steel 1.4404 stainless steel 1.4404 PVDF
Display housing	PA 6.6, polycarbonate		
Seals (media wetted)	standard: FKM option: EPDM (P <sub>N</sub> ≤ 160 bar) others on request		
Diaphragm	ceramics Al <sub>2</sub> O <sub>3</sub> 96 %		
Media wetted parts	pressure port, seals, diaphragm		

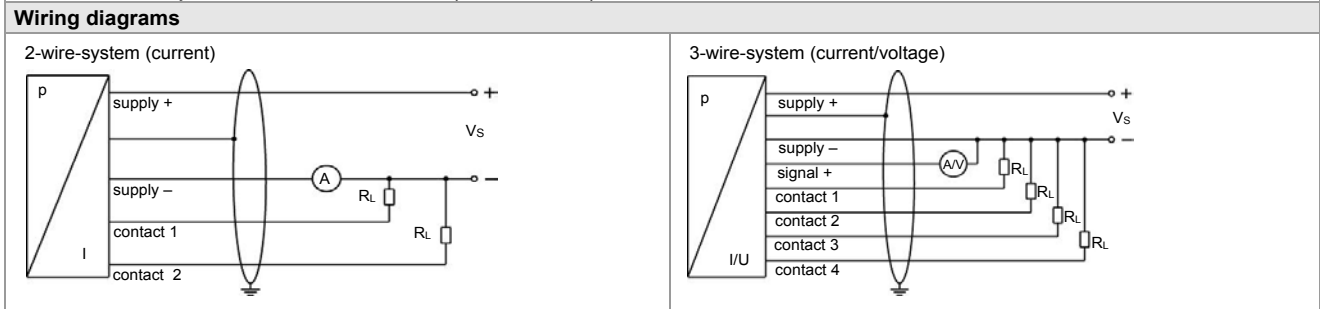
<b>Explosion protection (only for 4 ... 20 mA / 2-wire)</b>	
Approval AX14-DS 201	IBExU 06 ATEX 1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)
Safety tech. maximum values	$U_i = 28\text{ V}$ , $I_i = 93\text{ mA}$ , $P_i = 660\text{ mW}$ , $C \approx 0\text{ nF}$ , $L_i \approx 0\text{ }\mu\text{H}$
Max. switching current <sup>6</sup>	70 mA
Permissible temperatures for environment	-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 $\mu\text{H}/\text{m}$

<sup>6</sup> the real switching current in the application depends on the power supply unit

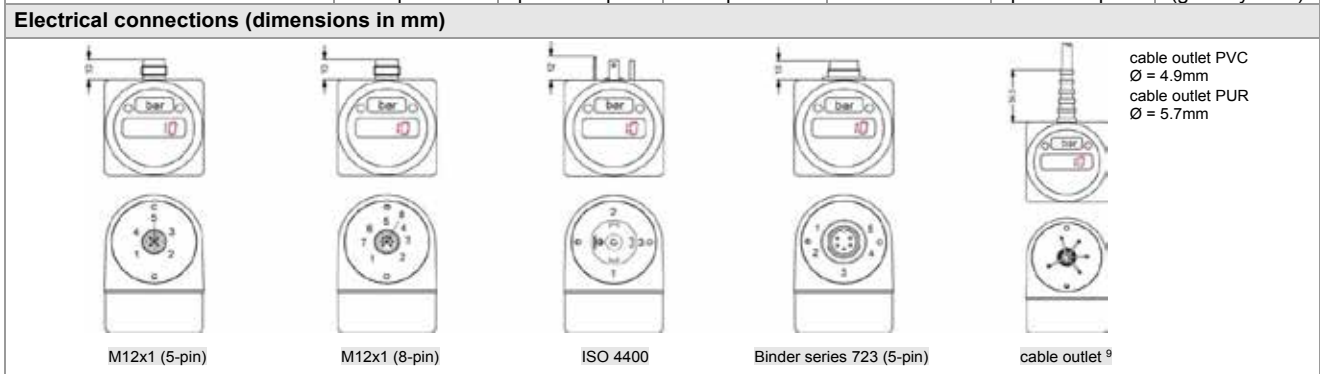
<b>Miscellaneous</b>	
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % $\pm$ 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Option oxygen application <sup>7</sup>	for $P_N \leq 25\text{ bar}$ : O-ring in FKM Vi 567 (with BAM-approval); permissible maximum values are 25 bar / 150 °C
Current consumption (without contacts)	2-wire signal output current: max. 25 mA 3-wire signal output current: approx. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA
Ingress protection	IP 65
Installation position	any
Weight	approx. 200 g
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) <sup>8</sup>
ATEX Directive	2014/34/EU

<sup>7</sup> not possible with flush pressure ports

<sup>8</sup> this directive is only valid for devices with maximum permissible overpressure > 200 bar

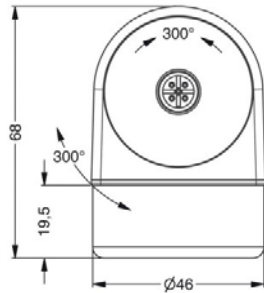
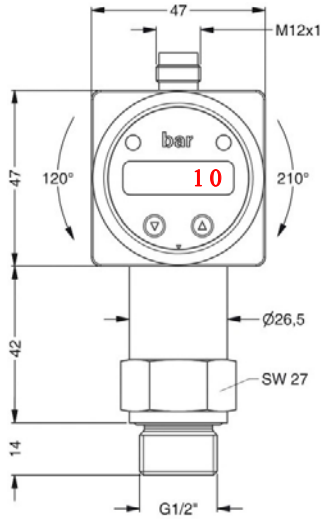


<b>Pin configuration</b>						
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	gnye (green-yellow)

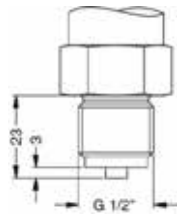


<sup>9</sup> different cable types and lengths available, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)

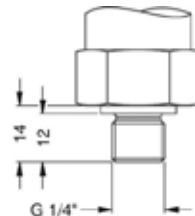
**Mechanical connections (dimensions in mm)**



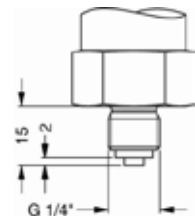
G1/2" DIN 3852



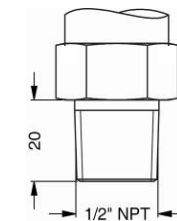
G1/2" EN 837



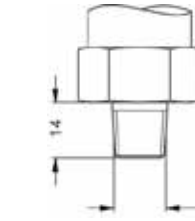
G1/4" DIN 3852



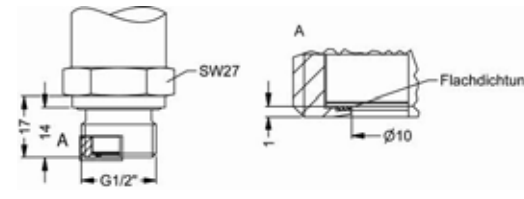
G1/4" EN 837



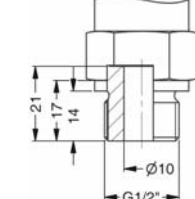
1/2" NPT



1/4" NPT



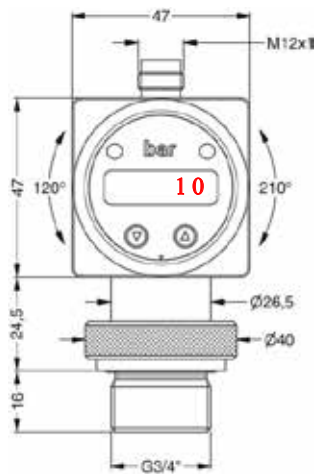
G1/2" (DIN 3852)  
semi-flush; M20x1.5<sup>10</sup>



G1/2" open port

⇒ metric threads and others on request

optionally for P<sub>N</sub> from 0.6 up to 60 bar gauge



G3/4" flush (DIN 3852)

<sup>10</sup> possible for nominal pressure ranges P<sub>N</sub> ≤ 40 bar

Ordering code DS 201										
DS 201		□	□	□	□	□	□	□	□	□
<b>Pressure</b>										
	gauge in bar	7	8	2						
	gauge in mH <sub>2</sub> O	7	8	E						
	absolute in bar	7	8	3						
<b>Input</b>										
	[mH <sub>2</sub> O]									
	[bar]									
	4	0	4	0	0	0				
	6	0	6	0	0	0				
	10	1	0	0	1					
	16	1	6	0	1					
	25	2	5	0	1					
	40	4	0	0	1					
	60	6	0	0	1					
	100	1	0	0	2					
	160	1	6	0	2					
	250	2	5	0	2					
	400	4	0	0	2					
	600	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
<b>Analogue output</b>										
	without					0				
	4 ... 20 mA / 2-wire					1				
	0 ... 10 V / 3-wire					3				
	4 ... 20 mA / 3-wire, adjustable					7				
	Intrinsic safety 4 ... 20 mA / 2-wire <sup>1</sup>					E				
	customer					9				consult
<b>Contact</b>										
	1 contact <sup>1,2</sup>					1				
	2 contacts <sup>1,2</sup>					2				
	4 contacts <sup>3</sup>					4				
<b>Accuracy</b>										
	0.5 %					5				
	customer					9				consult
<b>Electrical connection</b>										
	Male plug M12x1 (5-pin) / plastic version					N	0	1		
	Male plug M12x1 (8-pin) / plastic version <sup>3</sup>					M	5	0		
	Male plug M12x1 (5-pin) / metal version					N	1	1		
	Male and female plug ISO 4400 <sup>2</sup>					1	0	0		
	Male plug Binder series 723 (5-pin)					2	0	4		
	Cable outlet incl. cable <sup>4</sup>					T	A	0		
	customer					9	9	9		consult
<b>Mechanical connection</b>										
	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 <sup>5</sup> flush sensor					F	0	0		
	G3/4" DIN 3852 with <sup>6</sup> flush sensor					K	0	0		
	G1/2" DIN 3852 open pressure port					H	0	0		
	1/2" NPT					N	0	0		
	1/4" NPT					N	4	0		
	customer					9	9	9		consult
<b>Seals</b>										
	FKM					1				
	EPDM <sup>7</sup>					3				
	customer					9				consult
<b>Pressure port</b>										
	Stainless steel 1.4404 (316L)					1				
	PVDF <sup>8</sup>					B				
	customer					9				consult
<b>Diaphragm</b>										
	Ceramics Al <sub>2</sub> O <sub>3</sub> 96%					2				
	customer					9				consult
<b>Special version</b>										
	standard					0	0	0		
	oxygen application <sup>9</sup>					0	0	7		
	customer					9	9	9		consult

<sup>1</sup> with Ex version max. 1 contact possible  
<sup>2</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible  
<sup>3</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request  
<sup>4</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), others on request  
<sup>5</sup> possible for nominal pressure ranges P<sub>N</sub> ≥ 0.6 bar up to P<sub>N</sub> ≤ 25 bar gauge, absolute on request  
<sup>6</sup> possible for nominal pressure ranges P<sub>N</sub> ≥ 0.6 bar up to P<sub>N</sub> ≤ 60 bar gauge  
<sup>7</sup> possible for nominal pressure ranges P<sub>N</sub> ≤ 160 bar  
<sup>8</sup> PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar) and G3/4" DIN 3852 with flush sensor (0.6 bar ≤ P<sub>N</sub> ≤ 25 bar), (min. permissible temperature -30°C)  
<sup>9</sup> oxygen application with FKM-seal up to 25 bar possible, flush version on request





# DS 202

## Electronic Pressure Switch

Welded, Dry Stainless Steel Sensor

accuracy according to IEC 60770:  
0.5 % FSO

### Nominal pressure

from 0 ... 6 bar up to 0 ... 600 bar

### Contacts

1, 2 or 4 independent PNP contacts,  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA / 0 ... 10 V

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**
- ▶ oxygen application
- ▶ customer specific versions





The electronic pressure switch DS 202 is the successful combination of

- ▶ robust pressure transmitter
- ▶ digital display

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

As standard the DS 202 offers a PNP contact and a rotatable display module with 4-digit LED display. The transmitters are suitable for an unrestricted use in oxygen applications up to 600 bar and an intrinsically safe IS-Version.

### Preferred areas of use are

-  Medical technology
-  Plant and machine engineering
-  Refrigeration
-  Oxygen application



Input pressure range												
Nominal pressure gauge	[bar]	6	10	16	25	40	60	100	160	250	400	600
Overpressure	[bar]	12	20	32	50	80	120	200	320	500	800	1 200
Burst pressure $\geq$	[bar]	30	50	80	125	200	300	500	800	1 400	2 000	3 000
Vacuum resistance		unlimited										

Contact <sup>1</sup>	
Number, type	standard: 1 PNP contact option: 2 independent PNP contacts 4 independent PNP contacts (possible with M12x1 8-pin for 4 ... 20 mA / 3-wire)
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: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>2</sup>	$\leq \pm 0.5$ % FSO
Repeatability	$\leq \pm 0.1$ % FSO
Switching frequency	max. 10 Hz
Switching cycles	$> 100 \times 10^6$
Delay time	0 ... 100 sec

<sup>1</sup> 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 / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span up to 1:5) <sup>3</sup> permissible load: $R_{max} = 500 \Omega$ response time: $< 0.5$ sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{min} = 10 k\Omega$ response time: $< 3$ msec
Without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy <sup>2</sup>	$\leq \pm 0.5$ % FSO

<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal effects (Offset and Span)	
Thermal error	$\pm 0.3$ % FSO / 10 K
in compensated range	0 ... 70 °C
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 1.4571 (316 Ti)
Housing	stainless steel 1.4404 (316 L)
Display housing	PA 6.6, polycarbonate
Seals (media wetted)	none (welded)
Diaphragm	stainless steel 1.4542 (17-4PH)
Media wetted parts	pressure port, diaphragm

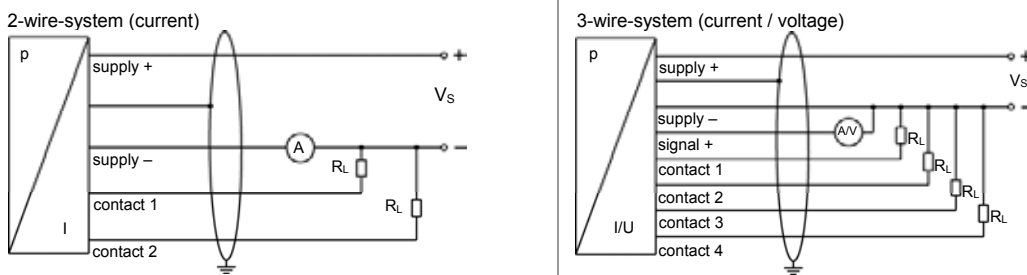
Explosion protection (only for 4 ... 20 mA / 2-wire)	
Approval AX14-DS 202	IBExU 06 ATEX 1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)
Safety technical maximum values	$U_i = 28 V$ , $I_i = 93 mA$ , $P_i = 660 mW$ , $C \approx 0 nF$ , $L_i \approx 0 \mu H$
Max. switching current <sup>4</sup>	70 mA
Permissible temperatures for environment	-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 $\mu H/m$

<sup>4</sup> the real switching current in the application depends on the power supply unit

Miscellaneous	
Display	4-digit, red 7-segment-LED display, digit height 7 mm, digit width 4.85 mm (angle 10°); 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA
Ingress protection	IP 65
Installation position	any
Weight	min. 160 g (depending on mechanical connection)
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU      Pressure Equipment Directive: 2014/68/EU (module A) <sup>5</sup>
ATEX Directive	2014/34/EU

<sup>5</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

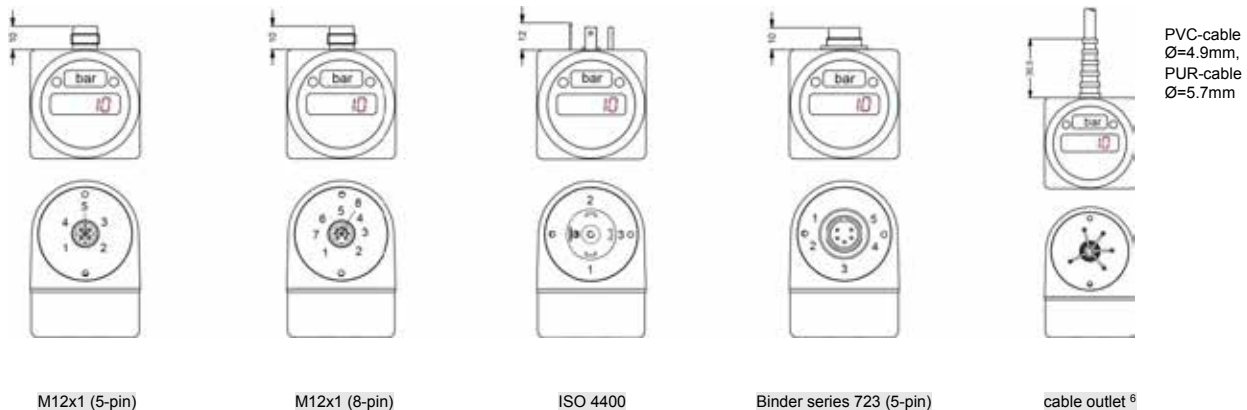
#### Wiring diagrams



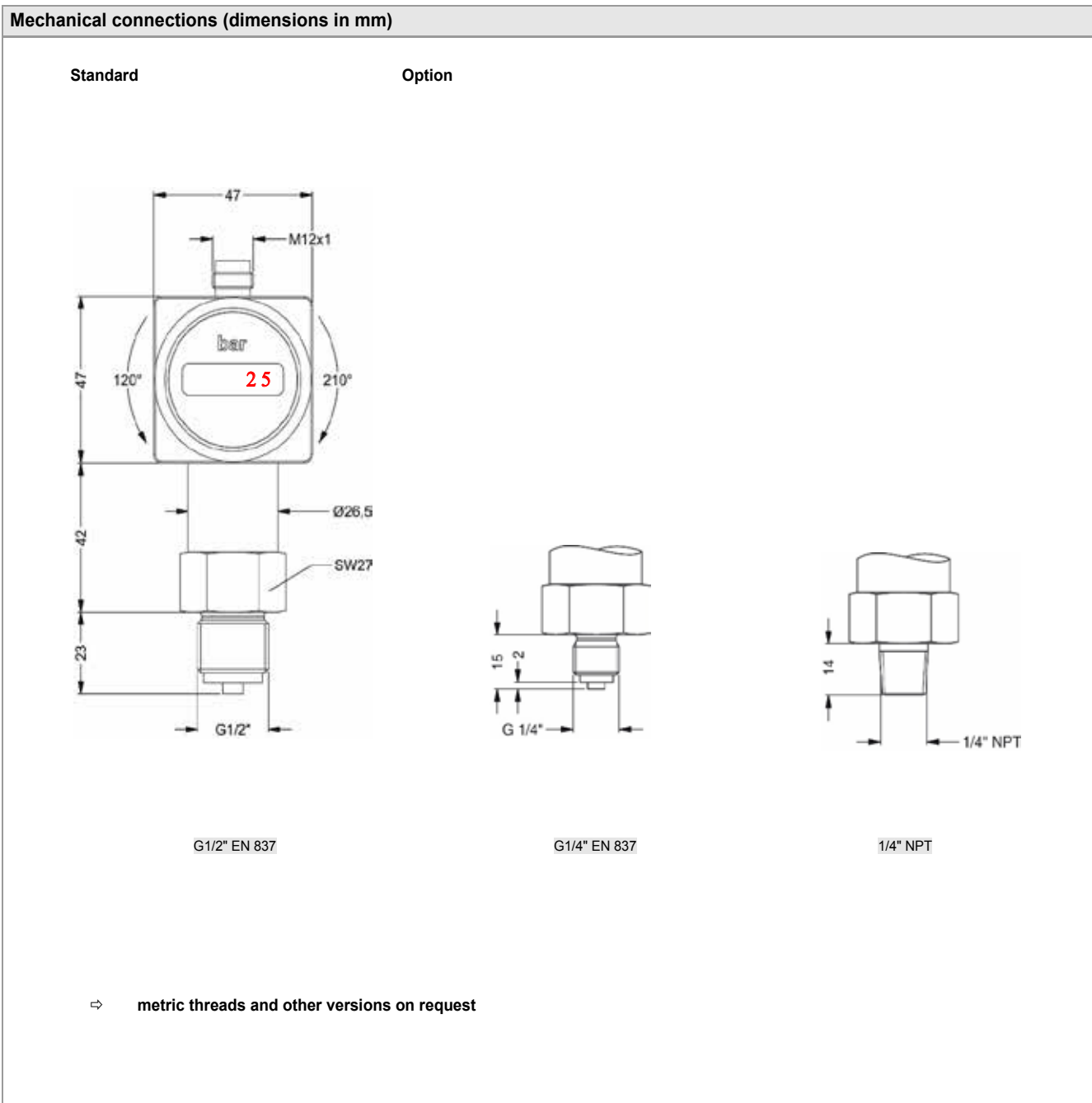
#### Pin configuration

Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/ pressure port	via pressure port	ground con- tact	plug housing/ pressure port	gnye (green-yellow)

#### Electrical connections (dimensions in mm)



<sup>6</sup> different cable types and lengths available, permissible temperature depends on kind of cable;  
standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)







# DS 210

## Electronic Pressure Switch

Without Media Isolation

accuracy according to IEC 60770:  
0.35 % FSO

### Nominal pressure

from 0 ... 10 mbar up to 0 ... 1000 mbar

### Contacts

1, 2 or 4 independent contacts  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA  
3-wire: 4 ... 20 mA / 0 ... 10 V  
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**
- ▶ customer specific versions




The electronic pressure switch DS 210 is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and has been specially designed for measuring of very small overpressure and for vacuum applications. Permissible media are gases, pressurized air and thin non aggressive media.

As standard the DS 210 offers a PNP-contact and a rotatable display module. Additional features like e.g. an intrinsically safe version, max. four contacts and an analogue output complete the profile.

### Preferred areas of use are

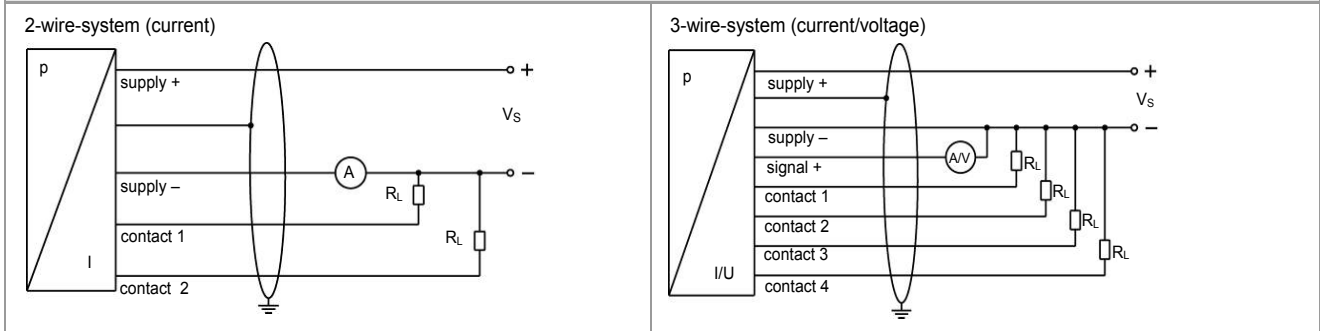
-  Plant and machine engineering
-  Heating and air conditioning
-  Laboratory techniques



Input pressure range															
Nominal pressure gauge	[mbar]	-1000 ... 0	10	16	25	40	60	100	160	250	400	600	1000		
Overpressure	[bar]	3	0.2	0.2	0.5	0.5	0.5	1	2	3	3	3	3		
Burst pressure	[bar]	5	0.3	0.3	0.75	0.75	0.75	1.5	3	5	5	5	5		
Contact <sup>1</sup>															
Standard	1 PNP contact														
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)														
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: contact rating 125 mA, short-circuit resistant														
Accuracy of contacts <sup>2</sup>	standard: $\leq \pm 0.35\%$ FSO nominal pressure $\leq 100$ mbar: $\leq \pm 0.5\%$ FSO														
Repeatability	$\leq \pm 0.1\%$ FSO														
Switching frequency	max. 10 Hz														
Switching cycles	$> 100 \times 10^6$														
Delay time	0 ... 100 sec														
<sup>1</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 as well as 2-wire current signal with Ex-protection no contact possible with 3-wire in combination with plug ISO 4400															
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 Ex-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 / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span max. 1:5) <sup>3</sup> permissible load: $R_{max} = 500 \Omega$ response time: $< 3$ sec														
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{min} = 10 k \Omega$ response time: $< 3$ msec														
Without analogue output	$V_S = 15 \dots 36 V_{DC}$														
Accuracy <sup>2</sup>	standard: $\leq \pm 0.35\%$ FSO nominal pressure $\leq 100$ mbar: $\leq \pm 0.5\%$ FSO														
<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability) <sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range															
Thermal effects (Offset and Span)															
Nominal pressure $P_N$	[mbar]	-1000 ... 0					$\leq 100$					$\leq 400$			$> 400$
Tolerance band	[% FSO]	$\leq \pm 0.75$		$\leq \pm 1.5$		$\leq \pm 1$		$\leq \pm 1$		$\leq \pm 0.75$				$\leq \pm 0.75$	
in compensated range	[°C]	-20 ... 85		0 ... 50		0 ... 70		0 ... 70		-20 ... 85				-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)														
Display housing	PA 6.6, Polycarbonate														
Seal (media wetted)	FKM														
Sensor	stainless steel 1.4404 (316L), silicon, Epoxy or RTV, glass														
Media wetted parts	pressure port, seal, sensor														
Explosion protection (for 2-wire current signal)															
Approval AX14-DS 210	IBExU 06 ATEX 1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)														
Safety technical maximum values	$U_i = 28 V$ , $I_i = 93 mA$ , $P_i = 660 mW$ , $C \approx 0 nF$ , $L_i \approx 0 \mu H$														
Max. switching current <sup>4</sup>	70 mA														
Permissible temperatures for environment	-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 $\mu H/m$														
<sup>4</sup> the real switching current in the application depends on the power supply unit															

Miscellaneous	
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA
Ingress protection	IP 65
Installation position	any
Weight	approx. 180 g
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU
ATEX Directive	2014/34/EU

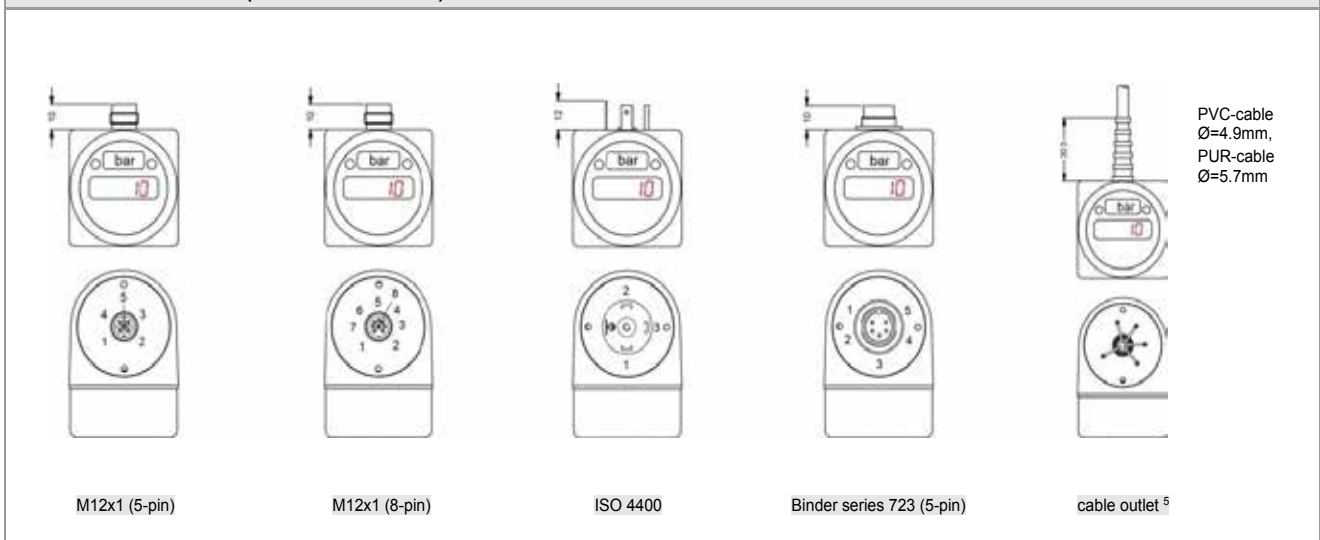
**Wiring diagrams**



**Pin configuration**

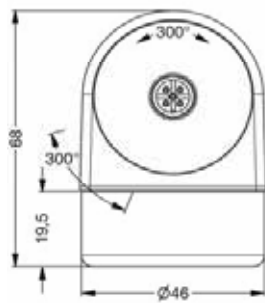
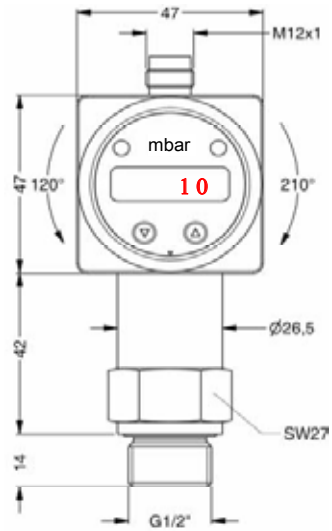
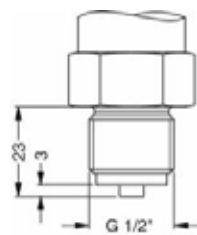
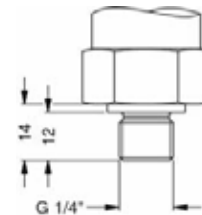
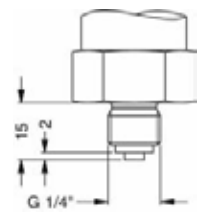
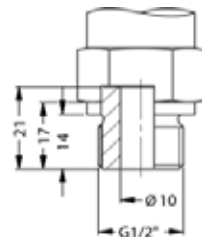
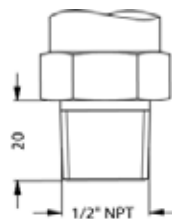
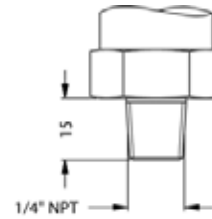
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	gnye (green-yellow)

**Electrical connections (dimensions in mm)**



<sup>5</sup> different cable types and lengths available, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)



**Mechanical connections (dimensions in mm)**
**standard**

**G1/2" DIN 3852**
**optionally**

**G1/2" EN 837**

**G1/4" DIN 3852**

**G1/4" EN 837**

**G1/2" open port**

**1/2" NPT**

**1/4" NPT**
**⇒ metric threads and other versions on request**

Ordering code DS 210

DS 210



<b>Pressure</b>										
gauge	7	8	A							
<b>Input</b>										
[mbar]										
10			0	1	0	0				
16			0	1	6	0				
25			0	2	5	0				
40			0	4	0	0				
60			0	6	0	0				
100			1	0	0	0				
160			1	6	0	0				
250			2	5	0	0				
400			4	0	0	0				
600			6	0	0	0				
1000			1	0	0	1				
-1000 ... 0			X	1	0	2				
customer			9	9	9					consult
<b>Analogue output</b>										
without						0				
4 ... 20 mA / 2-wire						1				
0 ... 10 V / 3-wire						3				
4 ... 20 mA / 3-wire, adjustable						7				
Intrinsic safety 4 ... 20 mA / 2-wire <sup>1</sup>						E				
customer						9				consult
<b>Contact</b>										
1 contact <sup>1,2</sup>						1				
2 contacts <sup>1,2</sup>						2				
4 contacts <sup>3</sup>						4				
<b>Accuracy</b>										
standard for P <sub>N</sub> > 0.1 bar						3				
standard for P <sub>N</sub> ≤ 0.1 bar						5				
customer						9				consult
<b>Electrical connection</b>										
Male plug M12x1 (5-pin) / plastic version						N	0	1		
Male plug M12x1 (8-pin) / plastic version <sup>3</sup>						M	5	0		
Male plug M12x1 (5-pin) / metal version						N	1	1		
Male and female plug ISO 4400 <sup>2</sup>						1	0	0		
Male plug Binder series 723 (5-pin)						2	0	4		
Cable outlet incl. cable <sup>4</sup>						T	A	0		
customer						9	9	9		consult
<b>Mechanical connection</b>										
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 open pressure port						H	0	0		
1/2" NPT						N	0	0		
1/4" NPT						N	4	0		
customer						9	9	9		consult
<b>Seals</b>										
FKM								1		
customer								9		consult
<b>Special version</b>										
standard								0	0	0
customer								9	9	9
										consult

<sup>1</sup> with Ex version max. 1 contact is possible  
<sup>2</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible  
<sup>3</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request  
<sup>4</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), others on request



# DS 214

## Electronic Pressure Switch for Very High Pressure

Thinfilm Sensor

accuracy according to IEC 60770:  
standard: 0.35 % FSO

### Nominal pressure

from 0 ... 600 bar up to 0 ... 2 200 bar

### Contacts

1, 2 or 4 independent PNP contacts,  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA / 0 ... 10 V

others on request

### Special characteristics

- ▶ indication of measured values  
on a 4-digit LED display
- ▶ pressure sensor welded
- ▶ extremely robust and excellent long-  
term stability

### Optional versions

- ▶ adjustability of span and offset  
(4 ... 20 mA / 3-wire)
- ▶ customer specific versions

The electronic pressure switch DS 214 for very high pressure up to 2 200 bar has been designed especially for use in plant and machine engineering as well as in mobile hydraulics.

The DS 214 has one 1 contact with standard version, this can optionally be upgraded up to four independent contacts.

Via the rotatable modul with an integrated 4-digit display the DS 214 can be programmed easily and comfortably.

### Preferred areas of use are



Plant and machine engineering



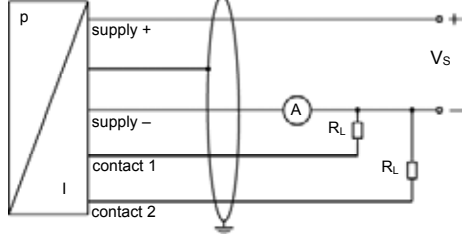
Commercial vehicles and  
mobile hydraulics



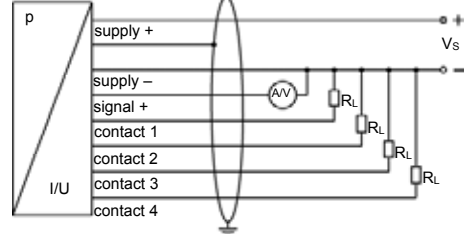
Input pressure range						
Nominal pressure gauge	[bar]	600 <sup>1</sup>	1000	1600	2000	2200
Overpressure	[bar]	800	1400	2200	2800	2800
<sup>1</sup> only available with pressure port G1/2" EN 837						
Contact <sup>2</sup>						
Standard	1 PNP contact					
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire)					
Max. switching current	4 ... 20 mA / 2- and 3-wire: 0 ... 10 V / 3-wire:		contact rating 125 mA, short-circuit resistant; $V_{switch} = V_S - 2V$ contact rating 125 mA, short-circuit resistant			
Accuracy of contacts <sup>3</sup>	$\leq \pm 0.35\%$ FSO					
Repeatability	$\leq \pm 0.1\%$ FSO					
Switching frequency	max. 10 Hz					
Switching cycles	$> 100 \times 10^6$					
Delay time	0 ... 100 sec					
<sup>2</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 no contact possible with 3-wire in combination with plug ISO 4400						
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	
3-wire current signal	4 ... 20 mA / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span 1:5) <sup>4</sup>		permissible load: $R_{max} = 500 \Omega$		response time: < 3 sec	
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$		permissible load: $R_{min} = 10 k\Omega$		response time: < 3 msec	
Without analogue output	$V_S = 15 \dots 36 V_{DC}$					
Accuracy <sup>3</sup>	$\leq \pm 0.35\%$ FSO IEC 60770					
<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability) <sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range						
Thermal effects (Offset and Span)						
Thermal error	$\leq \pm 0.25\%$ FSO / 10 K					
in compensated range	-20 ... 85 °C					
Permissible temperatures						
Permissible temperatures	medium:	-40 ... 140 °C				
	electronics / environment:	-25 ... 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)					
Shock	100 g / 11 msec					
Materials						
Pressure port	stainless steel 1.4542 (17-4 PH)					
Housing	stainless steel 1.4404 (316 L)					
Display housing	PA 6.6, polycarbonate					
Seals (media wetted)	none (welded version)					
Diaphragm	stainless steel 1.4542 (17-4 PH)					
Media wetted parts	pressure port, diaphragm					
Miscellaneous						
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA				
	3-wire signal output voltage:	approx. 7 mA + signal current				
Ingress protection	IP 65					
Installation position	any					
Weight	min. 200 g (depending on mechanical connection)					
Operational life	$p_N = 600$ bar: 100 million load cycles	$p_N > 600$ bar: 10 million load cycles				
CE-conformity	EMC Directive: 2014/30/EU		Pressure Equipment Directive: 2014/68/EU (module A)			

**Wiring diagrams**

2-wire-system (current)



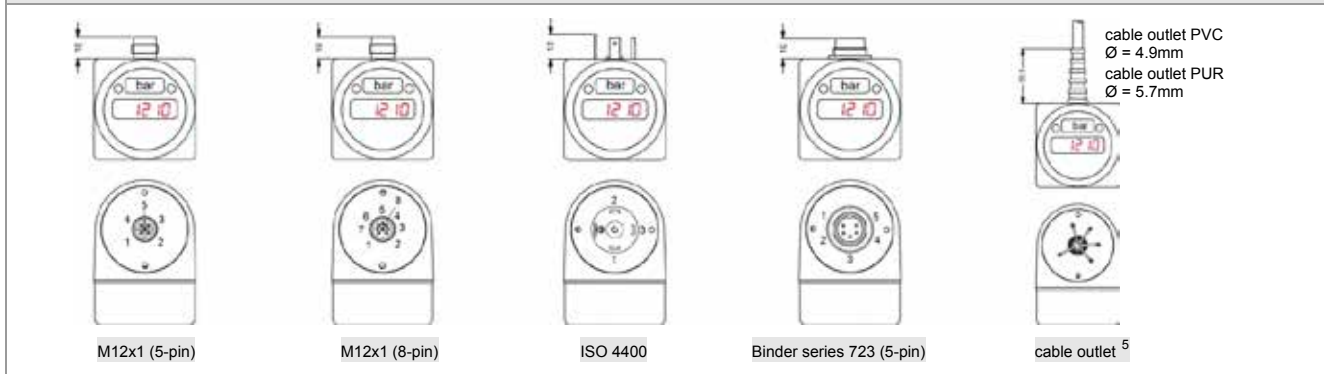
3-wire-system (current / voltage)



**Pin configuration**

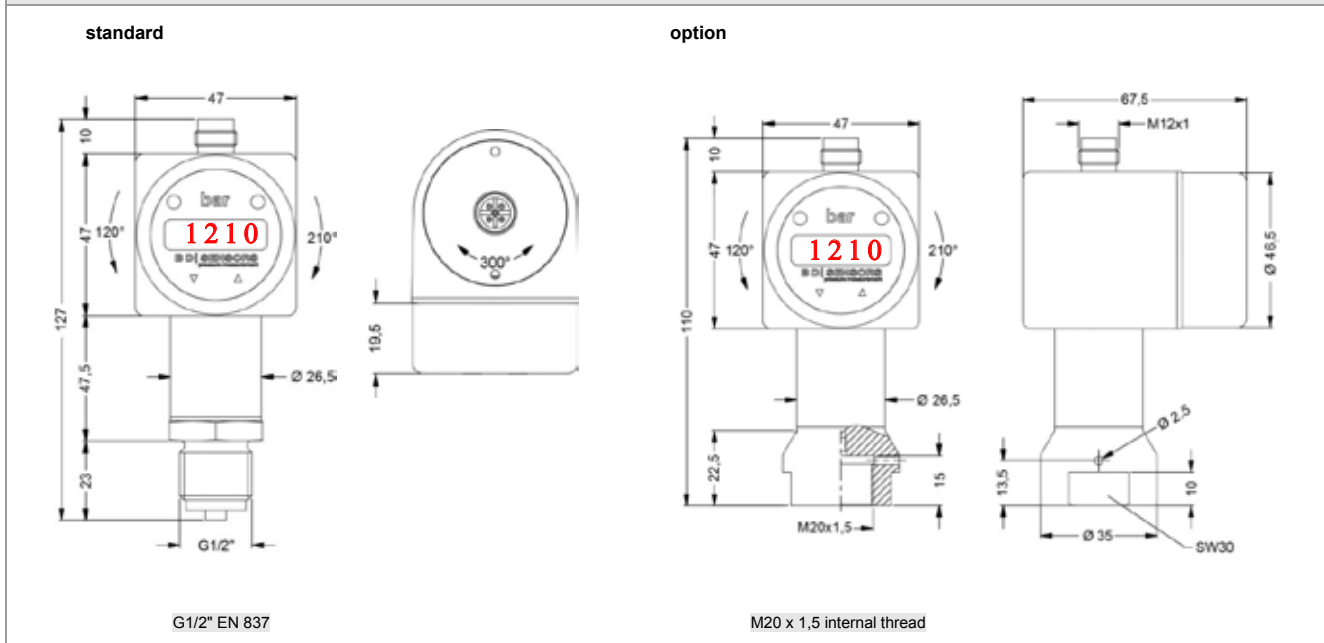
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	gnye (green-yellow)

**Electrical connections (dimensions in mm)**



<sup>5</sup> different cable types and lengths available; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)

**Mechanical connections (dimensions in mm)**



Ordering code DS 214

DS 214



<b>Pressure</b>										
gauge	7	8	B							
<b>Input</b>										
[bar]										
600 <sup>1</sup>	6	0	0	3						
1000	1	0	0	4						
1600	1	6	0	4						
2000	2	0	0	4						
2200	2	2	0	4						
customer	9	9	9	9						consult
<b>Analogue output</b>										
without				0						
4 ... 20 mA / 2-wire				1						
0 ... 10 V / 3-wire				3						
4 ... 20 mA / 3-wire, adjustable				7						
customer				9						consult
<b>Contact</b>										
1 contact <sup>2</sup>					1					
2 contacts <sup>2</sup>					2					
4 contacts <sup>3</sup>					4					
<b>Accuracy</b>										
0.35 %					3					
customer					9					consult
<b>Electrical connection</b>										
Male plug M12x1 (5-pin) / plastic version						N	0	1		
Male plug M12x1 (8-pin) / plastic version <sup>3</sup>						M	5	0		
Male plug M12x1 (5-pin) / metal version						N	1	1		
Male and female plug ISO 4400 <sup>2</sup>						1	0	0		
Male plug Binder series 723 (5-pin)						2	0	4		
Cable outlet incl. cable <sup>4</sup>						T	A	0		
customer						9	9	9		consult
<b>Mechanical connection</b>										
G1/2" EN 837 <sup>5</sup>						2	0	0		
M20x1.5 internal thread						D	2	8		
customer						9	9	9		consult
<b>Seals</b>										
without (welded version)								2		
customer								9		consult
<b>Special version</b>										
standard							0	0	0	
customer							9	9	9	consult

<sup>1</sup> only available with pressure port G1/2" EN 837

<sup>2</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible

<sup>3</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request

<sup>4</sup> standard: 2 m PVC cable without ventilation tube, others on request

<sup>5</sup> According to EN 837, the pressure port and the complement, at pressure over 1000 bar must be preferably made of stainless steel with a tensile strength of R<sub>p</sub> > 260 N/mm<sup>2</sup> in accordance with DIN 17440. The maximum allowed pressure is 1600 bar!



# DS 233

## Differential Pressure Switch for Gases and Compressed Air in Compact Version

Silicon Sensor

accuracy according to IEC 60770: 0.35% FSO

### Differential pressure

from 0 ... 6 mbar up to 0 ... 1000 mbar

### Output signal

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA  
0 ... 10 V

### Special characteristics

- ▶ aluminium housing
- ▶ LED display
- ▶ rotatable and configurable display module
- ▶ suited for non aggressive gases and compressed air

### Optional versions



- ▶ 1 / 2 PNP contacts
- ▶ customer specific versions

The DS 233 is a differential pressure switch with digital display for non-aggressive gases and compressed air. Because of its compact and robust aluminium housing it is particularly suited for machine and plant engineering.

Basic element of the DS 233 is a piezoresistive silicon pressure sensor, which features high accuracy and excellent long term stability.

As standard the DS 233 offers a PNP contact and a rotatable display module with 4-digit LED display for representing the differential pressure. Optional up to two freely configurable contacts are available.

### Preferred areas of use are

-  Plant and machine engineering
-  Heating and air conditioning



Input pressure range												
Nominal pressure $P_N$ (over, differential pressure) [mbar]	0...6	0...10	0...20	0...40	0...60	0...100	0...160	0...250	0...400	0...600	0...1000	
Nominal pressure $P_N$ symmetric (differential pressure) [mbar]	± 6	± 10	± 20	± 40	± 60	± 100	± 160	± 250	± 400	± 600	± 1000	
Overpressure [mbar]	100	100	200	350	350	1000	1000	1000	1000	3000	3000	

Contact <sup>1</sup>	
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; $V_{\text{Switch}} = V_S - 2V$ 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>2</sup>	$P_N > 160$ mbar: $\leq \pm 0.35$ % FSO 40 mbar $\leq P_N \leq 160$ mbar: $\leq \pm 1$ % FSO $P_N < 40$ mbar: $\leq \pm 2$ % FSO
Repeatability	$\leq \pm 0.1$ % FSO
Switching frequency	max. 10 Hz
Switching cycles	$> 100 \times 10^6$
Delay time	0 ... 100 sec

<sup>1</sup> max. 1 contact for 2-wire current signal with plug ISO 4400, no contact possible with 3-wire in combination with plug ISO 4400

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / $V_S = 13 \dots 36 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S\text{min}}) / 0.02 \text{ A}] \Omega$ response time: $< 10$ msec
3-wire current signal	4 ... 20 mA / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span 1:5) <sup>3</sup> permissible load: $R_{\text{max}} = 500 \Omega$ response time: $< 3$ sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{\text{min}} = 10 \text{ k}\Omega$ response time: $< 3$ msec
Without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy <sup>2</sup>	$P_N > 160$ mbar: $\leq \pm 0.35$ % FSO 40 mbar $\leq P_N \leq 160$ mbar: $\leq \pm 1$ % FSO $P_N < 40$ mbar: $\leq \pm 2$ % FSO

<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

<sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Performance	
Influence effects	supply: 0.05 % FSO / 10 V load: 0.05 % FSO / k
Long term stability	$\leq \pm 0.2$ % FSO / year

Thermal effects (Offset and Span) / Permissible temperatures				
Nominal pressure $P_N$ [mbar]	$\leq 10$	$\leq 20$	$\leq 250$	$> 250$
Tolerance band [% FSO]	$\leq \pm 2$	$\leq \pm 1.5$	$\leq \pm 1$	$\leq \pm 0.5$
TC, average [% FSO / 10 K]	$\pm 0.3$	$\pm 0.25$	$\pm 0.15$	$\pm 0.08$
in compensated range	0 ... 60 °C			
Permissible temperatures	medium:	-25 ... 125 °C		
	electronics / environment:	-25 ... 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 (20 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	100 g / 11 msec according to DIN EN 60068-2-6

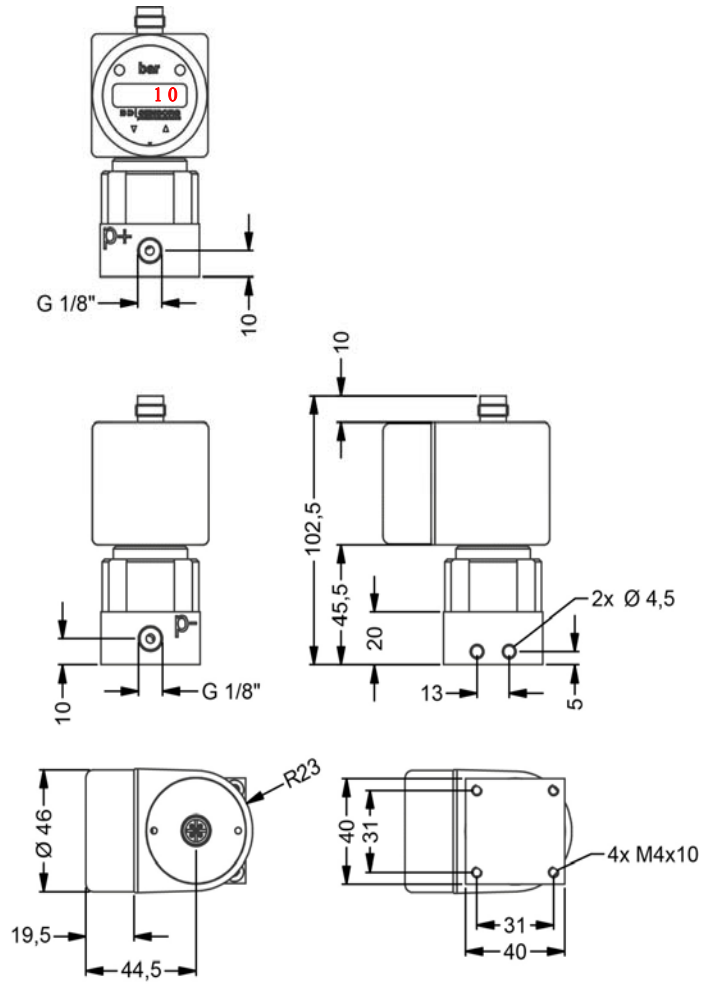
Materials	
Pressure port	aluminium, silver anodized
Housing	aluminium, silver anodised
Display housing	PA 6.6, polycarbonate
Seal	PUR
Sensor	silicon, RTV, ceramics $Al_2O_3$ , Epoxy, stainless steel
Media wetted parts	pressure port, housing, seal, sensor



Miscellaneous				
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA			
Ingress protection	IP 65			
Weight	approx. 350 g			
Operational life	100 million load cycles			
CE-conformity	EMC Directive: 2014/30/EU			
Pin configuration				
Electrical connection	ISO 4400	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	wh (white)
Supply -	2	3	3	bn (brown)
Signal + (only 3-wire)	3	2	2	gn (green)
Contact 1	3	4	4	gy (grey)
Contact 2	-	5	5	pk (pink)
Shield	ground contact	via pressure port	plug housing/pressure port	gnye (green-yellow)
Wiring diagrams				
2-wire-system (current)		3-wire-system (current / voltage)		
Electrical connections (dimensions in mm)				
standard		option		
ISO 4400		M12x1 (5-pin)		
				PVC-cable Ø=4.9mm, PUR-cable Ø=5.7mm
				cable outlet with PVC-cable <sup>4</sup>

<sup>4</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), optionally cable with ventilation tube

Mechanical connection (dimensions in mm)



G1/8" internal

## Ordering code DS 233

DS 233

□□□ - □□□□ - □ - □ - □ - □□□ - □□□□ - □ - □□□

Pressure																		
	differential pressure	3	3	5														
	gauge pressure	3	3	6														
Input																		
	[mbar]																	
	6	0	0	6	0													
	10	0	1	0	0													
	20	0	2	0	0													
	40	0	4	0	0													
	60	0	6	0	0													
	100	1	0	0	0													
	160	1	6	0	0													
	250	2	5	0	0													
	400	4	0	0	0													
	600	6	0	0	0													
	1000	1	0	0	1													
	-6 ... 6	S	0	0	6													
	-10 ... 10	S	0	1	0													
	-20 ... 20	S	0	2	0													
	-40 ... 40	S	0	4	0													
	-60 ... 60	S	0	6	0													
	-100 ... 100	S	1	0	0													
	-160 ... 160	S	1	6	0													
	-250 ... 250	S	2	5	0													
	-400 ... 400	S	4	0	0													
	-600 ... 600	S	6	0	0													
	-1000 ... 1000	S	1	0	2													
	customer	9	9	9	9													
Output																		
	without					0												
	4 ... 20 mA / 2-wire <sup>1</sup>					1												
	0 ... 10 V / 3-wire					3												
	4 ... 20 mA / 3-wire					7												
	customer					9												
Contact																		
	1 contact					1												
	2 contacts					2												
Accuracy																		
	standard for $P_N > 160$ mbar	0.35 %				3												
	standard for $40 \text{ mbar} \leq P_N \leq 160$ mbar	1.0 %				8												
	standard for $P_N < 40$ mbar	2.0 %				G												
	customer					9												
Electrical connection																		
	plastic male plug M12x1 (5-pin)					N	0	1										
	metal male plug M12x1 (5-pin)					N	1	1										
	male and female plug ISO 4400 <sup>1</sup>					1	0	0										
	cable outlet with PVC cable <sup>2</sup>					T	A	0										
	customer					9	9	9										
Mechanical connection																		
	G1/8" internal thread						Q	0	0									
	Ø 6.6 x 11 (for flex. tubes Ø 6)						Y	0	0									
	customer						9	9	9									
Seals																		
	PUR, bonded									6								
Special version																		
	standard						0	0	0									
	customer						9	9	9									

<sup>1</sup> max. 1 contact for 2-wire current signal with plug ISO 4400, no contact possible with 3-wire in combination with plug ISO 4400

<sup>2</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C)



# DS 400P

## Intelligent Electronic Pressure Switch Stainless Steel

Pressure Ports and Process Connections with Flush Welded Stainless Steel Diaphragm

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

### Nominal pressure

from 0 ... 100 mbar up to 0 ... 40 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
- ▶ configurable contacts (switch on / switch off points, hysteresis/ window mode, switch on / switch off delay)
- ▶ hygienical version

### Optional versions

- ▶ **IS-version**  
Ex ia = intrinsically safe for gases and dusts
- ▶ customer specific versions

The electronic pressure switch DS 400P is the successful combination of



- ▶ intelligent pressure switch
- ▶ digital display

and has been developed for process industry; especially for food industry and pharmacy.

As standard the DS 400P offers a PNP contact and a rotatable display module with 4-digit LED display.

Optional versions like e.g. an intrinsically safe version, max. two contacts and an analogue output complete the profile.

### Preferred areas of use are

-  Food industry
-  Pharmacy

### Material and test certificates

- ▶ material test report according to DIN EN 10204-3.1.
- ▶ specific test report according to DIN EN 10204-2.2.

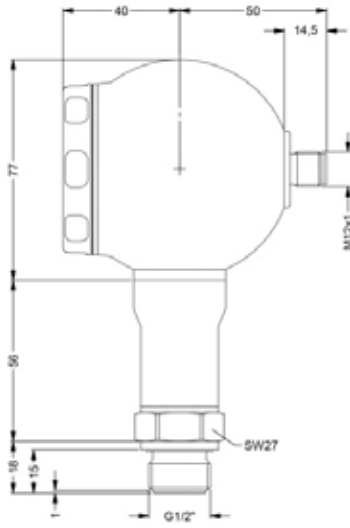


Input pressure range <sup>1</sup>															
Nominal pressure gauge [bar]	-1 ... 0	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40
Nominal pressure abs. [bar]	-	-	-	-	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40
Overpressure [bar]	5	0.5	1	1	2	5	5	10	10	20	40	40	80	80	105
Burst pressure ≥ [bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50	50	120	120	210
Vacuum resistance	P <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance								P <sub>N</sub> < 1 bar: on request						
<sup>1</sup> consider the pressure resistance of fitting and clamps															
Contact <sup>2</sup>															
Number, type	standard: 1 PNP contact								option: 2 independent PNP contacts						
Max. switching current	4 ... 20 mA / 2- and 3-wire: 0 ... 10 V / 3-wire (on request):								contact rating 125 mA, short-circuit resistant; V <sub>switch</sub> = V <sub>S</sub> - 2V contact rating 125 mA, short-circuit resistant						
Accuracy of contacts <sup>3</sup>	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														
Repeatability	≤ ± 0.1 % FSO														
Switching frequency	2-wire: max. 10 Hz								/ 3-wire: 50 Hz						
Switching cycles	> 100 x 10 <sup>6</sup>														
Delay time	0 ... 100 sec														
<sup>2</sup> with IS-protection max. 1 contact possible															
Analogue output (optionally) / Supply															
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω								response time: < 10 msec						
2-wire current signal with IS-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω								response time: < 10 msec						
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>max</sub> = 500 Ω								response time: < 30 msec						
3-wire voltage signal (on request)	0 ... 10 V / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 % adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>min</sub> = 10 kΩ								response time: < 30 msec						
Without analogue output	V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>														
Accuracy <sup>3</sup>	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														
<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability) <sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range															
Thermal errors (offset and span) <sup>5</sup> / Permissible temperatures															
Nominal pressure P <sub>N</sub> [bar]	-1 ... 0				< 0.40				≥ 0.40						
Tolerance band [% FSO]	≤ ± 0.75				≤ ± 1.5				≤ ± 0.75						
in compensated range [°C]	-20 ... 85				0 ... 50				-20 ... 85						
Permissible temperatures <sup>6</sup>	medium: -40 ... 125 °C for filling fluid silicone oil -10 ... 125 °C for filling fluid food compatible oil electronics / environment: -40 ... 85 °C								storage: -40 ... 100 °C						
Permissible temperature medium for cooling element 300°C	filling fluid silicone oil				overpressure: -40 ... 300 °C				vacuum: -40 ... 150 °C <sup>7</sup>						
	filling fluid food compatible oil				overpressure: -10 ... 250 °C				vacuum: -10 ... 150 °C						
<sup>5</sup> an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions <sup>6</sup> max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C <sup>7</sup> also for P <sub>abs</sub> ≤ 1 bar															
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 (DIN EN 60068-2-6)	G 1/2": 20 g RMS (25 ... 2000 Hz)								others except G 1/2": 10 g RMS (25 ... 2000 Hz)						
Shock (DIN EN 60068-2-27)	G 1/2": 500 g / 1 msec								others except G 1/2": 100 g / 1 msec						
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															
Pressure port	stainless steel 1.4435 (316 L)											others on request			
Housing	stainless steel 1.4404 (316 L)														
Viewing glass	laminated safety glass														
Seals	standard: FKM (recommended for medium temperatures ≤ 200 °C) option: FFKM (recommended for medium temperatures > 200 °C) Clamp and dairy pipe, Varivent®: without											others on request			
Diaphragm	stainless steel 1.4435 (316L)														
Media wetted parts	pressure port, seals, diaphragm														

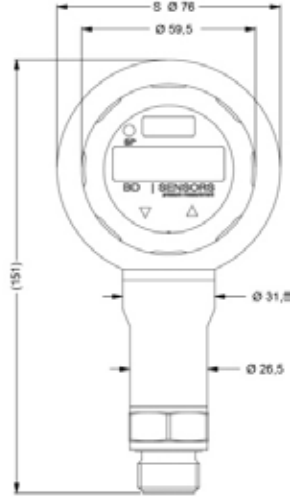
Explosion protection (only for 4 ... 20 mA / 2-wire)		
Approval AX14-DS 400P	IBExU 06 ATEX 1050 X zone 0: II 1G Ex ia IIC T4 Ga (connector) / II 1G Ex ia IIB T4 Ga (cable) zone 20: II 1D Ex ia IIIC T135 °C Da	
Safety technical maximum values	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$	
Max. switching current <sup>8</sup>	70 mA	
Permissible temperatures for environment	0: -20 ... 60 °C with $p_{\text{atm}}$ 0.8 bar up to 1.1 bar	
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 $\mu\text{H}/\text{m}$	
<sup>8</sup> 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 3-wire signal output voltage: approx. 30 mA	
Ingress protection	IP 67	
Installation position	any (standard calibration in a vertical position with the pressure port connection down; differing installation position for $P_N \leq 4 \text{ bar}$ have to be specified in the order)	
Weight	min. 500 g (depending on mechanical connection)	
Operational life	100 million load cycles	
CE-conformity	EMC Directive: 2014/30/EU	
ATEX Directive	2014/34/EU	
Wiring diagrams		
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>2-wire-system (current)</p> </div> <div style="width: 45%;"> <p>3-wire-system (current / voltage)</p> </div> </div>		
Pin configuration		
Electrical connection	M12x1 metal (5-pin)	cable colours (IEC 60757)
Supply +	1	wh (white)
Supply -	3	bn (brown)
Signal + (only 3-wire)	2	gn (green)
Contact 1	4	gy (grey)
Contact 2	5	pk (pink)
Shield	plug housing / pressure port	gnye (green-yellow)
Designs <sup>9</sup>		Electrical connection (dimensions in mm)
<p>side display</p> <p>45° display (others on request)</p> <p>M12x1 (5-pin)</p>		
<sup>9</sup> all designs in horizontal rotatable housing as standard		

**Mechanical connections (dimensions in mm)**

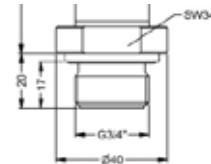
**Standard**



G1/2" flush DIN 3852  
( $P_N \geq 1$  bar)

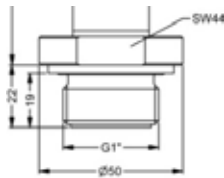


**Option**

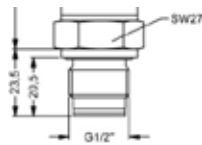


G 3/4" flush DIN 3852

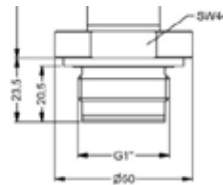
**Option**



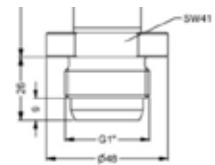
G1" flush DIN 3852



G1/2" flush  
with radial o-ring



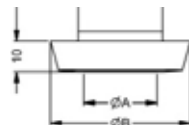
G1" flush  
with radial o-ring ( $P_N \leq 2$  bar)



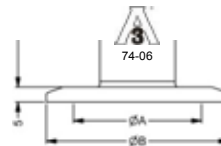
G1" cone



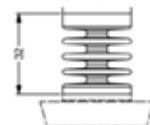
Varivent®  
 $P_N \leq 25$  bar



dairy pipe (DIN 11851)



Clamp (DIN 32676)



cooling element 300 °C

	dimension in mm		
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68.5
$P_N$ [bar]	$\geq 0.25$ $\leq 40$	$\geq 0.25$ $\leq 40$	$\geq 0.25$ $\leq 25$

	dimension in mm			
size	3/4"	DN 25	DN 32	DN 50
A	14	23	32	45
B	25	50.5	50.5	64
$P_N$ [bar]	$\geq 4$ $\leq 8$	$\geq 0.25$ $\leq 16$	$\leq 16$	$\leq 16$

↪ metric threads and other versions on request

Ordering code DS 400P											
DS 400P		□	□	□	□	□	□	□	□	□	□
<b>Pressure</b>											
	gauge	7	A	5							
	absolute <sup>1</sup>	7	A	6							
<b>Input</b>											
	[bar]										
	0.10	1	0	0	0						
	0.16	1	6	0	0						
	0.25	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						
	-1 ... 0	X	1	0	2						
	customer	9	9	9	9						consult
<b>Design</b>											
	stainless steel ball housing (side display)					K	H				
	stainless steel ball housing (45° display)					K	4				consult
<b>Analogue output</b>											
	without						0				
	4 ... 20 mA / 2-wire						1				
	0 ... 10 V / 3-wire, adjustable						3				consult
	4 ... 20 mA / 3-wire, adjustable						7				
	intrinsic safety 4 ... 20 mA / 2-wire <sup>2</sup>						E				
	customer						9				consult
<b>Contact</b>											
	1 contact						1				
	2 contacts <sup>2</sup>						2				
<b>Accuracy</b>											
	standard for P <sub>N</sub> ≥ 0,4 bar						3				
	standard for P <sub>N</sub> < 0,4 bar						5				
	option for P <sub>N</sub> ≥ 0,4 bar						2				
	customer						9				consult
<b>Electrical connection</b>											
	male plug M12x1 (5-pin) / metal						N	1	1		
	customer						9	9	9		consult
<b>Mechanical connection</b>											
	G1/2" with flush welded diaphragm (DIN 3852) <sup>3</sup>						Z	0	0		
	G3/4" with flush welded diaphragm (DIN 3852)						Z	3	0		
	G1" with flush welded diaphragm (DIN 3852)						Z	3	1		
	G1" DIN 3852 with rad. o-ring and flush diaphragm <sup>4</sup>						Z	5	7		
	G1/2" DIN 3852 with rad. o-ring and flush diaphragm						Z	6	1		
	G 1" cone						K	3	1		
	Clamp DN 25 (DIN 32676) / 3A						C	6	1		
	Clamp DN 32 (DIN 32676) / 3A						C	6	2		
	Clamp DN 50 (DIN 32676) / 3A						C	6	3		
	Clamp 3/4" (DIN 32676) / 3A						C	6	9		
	dairy pipe DN 25 (DIN 11851) <sup>5</sup>						M	7	3		
	dairy pipe DN 40 (DIN 11851) <sup>5</sup>						M	7	5		
	dairy pipe DN 50 (DIN 11851) <sup>5</sup>						M	7	6		
	Varivent® DN 40/50 / 3A						P	4	1		
	customer						9	9	9		consult
<b>Diaphragm</b>											
	stainless steel 1.4435 (316L)									1	
	customer									9	consult
<b>Seals</b>											
	for clamp, dairy pipe, Varivent®:									0	
	for inch thread:									1	
										7	consult
	customer									9	consult
<b>Filling Fluids</b>											
	silicone oil									1	
	food compatible oil (FDA) / 3A									2	
	customer									9	consult
<b>Special version</b>											
	standard									0	0
	with cooling element up to 300°C / 3A									2	0
	customer									9	9

<sup>1</sup> absolute pressure possible from 1 bar

<sup>2</sup> with Ex version max. 1 contact is possible

<sup>3</sup> only possible for nominal pressure ranges P<sub>N</sub> ≥ 1 bar

<sup>4</sup> only possible for nominal pressure ranges P<sub>N</sub> ≤ 2 bar

<sup>5</sup> The cup nut for dairy pipe has to be mounted by production of pressure transmitter. The cup nut has to be ordered as separate position.

Varivent® is a brand name of GEA Tuchenhagen GmbH





# DS 200P

## Electronic Pressure Switch

Pressure Ports and Process Connections with Flush Welded Stainless Steel Diaphragm

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

### Nominal pressure

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

### Contacts

1, 2 or 4 independent PNP contacts, freely configurable

### Analogue output

2-wire: 4 ... 20 mA

3-wire: 4 ... 20 mA / 0 ... 10 V

others on request

### Special characteristics

- ▶ indication of measured values on a 4-digit LED display
- ▶ rotatable and configurable display module
- ▶ configurable contacts (switch on / switch off points, hysteresis / window mode, switch on / switch off delay)

### Optional versions

- ▶ IS-version  
Ex ia = intrinsically safe for gases
- ▶ customer specific versions

The electronic pressure switch DS 200P is the successful combination of

- ▶ intelligent pressure switch
- ▶ digital display

and is suitable for the usage with viscous and pasty media.

As standard the DS 200P offers a PNP contact and a rotatable display module with 4-digit LED display. Optional versions like e.g. an intrinsically safe version, max. four contacts and an analogue output complete the profile.

### Preferred areas of use are



Food industry



Pharmacy



74-06



Input pressure range <sup>1</sup>																	
Nominal pressure gauge [bar]	-1 ... 0	0.10	0.16	0.25	0.40	0.60	1	1.6	2.5	4	6	10	16	25	40		
Nominal pressure abs. [bar]	-	-	-	-	0.40	0.60	1	1.6	2.5	4	6	10	16	25	40		
Overpressure [bar]	5	0.5	1	1	2	5	5	10	10	20	40	40	80	80	105		
Burst pressure ≥ [bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15	15	25	50	50	120	120	210		
Vacuum resistance	P <sub>N</sub> ≥ 1 bar: unlimited vacuum resistance									P <sub>N</sub> < 1 bar: on request							

<sup>1</sup> consider the pressure resistance of fitting and clamps

Contact <sup>2</sup>	
Standard	1 PNP contact
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; V <sub>Switch</sub> = V <sub>S</sub> - 2V 0 ... 10 V / 3-wire: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>3</sup>	standard: P <sub>N</sub> < 0.4 bar: ≤ ± 0.5 % FSO P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.35 % FSO option: P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.25 % FSO
Repeatability	≤ ± 0.1 % FSO
Switching frequency	max. 10 Hz
Switching cycles	> 100 x 10 <sup>6</sup>
Delay time	0 ... 100 sec

<sup>2</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 as well as 2-wire current signal with IS-protection  
no contact possible with 3-wire in combination with plug ISO 4400

<sup>3</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

Analogue output (optionally) / Supply	
2-wire current signal	4 ... 20 mA / V <sub>S</sub> = 13 ... 36 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
2-wire current signal with IS-protection	4 ... 20 mA / V <sub>S</sub> = 15 ... 28 V <sub>DC</sub> permissible load: R <sub>max</sub> = [(V <sub>S</sub> - V <sub>S min</sub> ) / 0.02 A] Ω response time: < 10 msec
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 19 ... 30 V <sub>DC</sub> adjustable (turn-down of span 1:5) <sup>4</sup> permissible load: R <sub>max</sub> = 500 Ω response time: < 0.5 sec
3-wire voltage signal	0 ... 10 V / V <sub>S</sub> = 15 ... 36 V <sub>DC</sub> permissible load: R <sub>min</sub> = 10 kΩ response time: < 10 msec
Without analogue output	V <sub>S</sub> = 15 ... 36 V <sub>DC</sub>
Accuracy <sup>3</sup>	standard: P <sub>N</sub> < 0.4 bar: ≤ ± 0.5 % FSO P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.35 % FSO option: P <sub>N</sub> ≥ 0.4 bar: ≤ ± 0.25 % FSO

<sup>4</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal errors (Offset and Span) <sup>5</sup> / Permissible temperatures			
Nominal pressure P <sub>N</sub> [bar]	-1 ... 0	< 0.40	≥ 0.40
Tolerance band [% FSO]	≤ ± 0.75	≤ ± 1.5	≤ ± 0.75
in compensated range [°C]	-20 ... 85	0 ... 50	-20 ... 85
Permissible temperatures <sup>6</sup>	medium: electronics / environment: storage:	-40 ... 125 °C for filling fluid silicone oil -10 ... 125 °C for filling fluid food compatible oil -40 ... 85 °C -40 ... 100 °C	
Permissible temperature medium for cooling element 300 °C	filling fluid silicone oil filling fluid food compatible oil	overpressure: -40 ... 300 °C overpressure: -10 ... 250 °C	vacuum: -40 ... 150 °C <sup>7</sup> vacuum: -10 ... 150 °C

<sup>5</sup> an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions.

<sup>6</sup> max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C

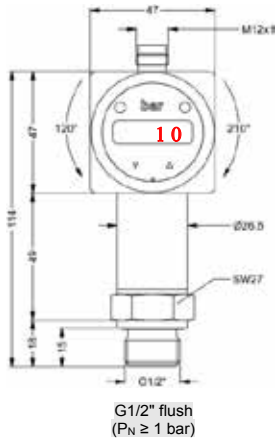
<sup>7</sup> also for P<sub>abs</sub> ≤ 1 bar

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	5 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	100 g / 11 msec according to DIN EN 60068-2-27
Filling fluids	
Standard	silicone oil
Options	food compatible oil according to 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500)
Materials	
Pressure port	stainless steel 1.4435 (316 L) others on request
Housing	stainless steel 1.4404 (316 L)
Display housing	PA 6.6, Polycarbonate
Seals (media wetted)	standard: FKM (recommended for medium temperatures ≤ 200 °C) option: FFKM (recommended for medium temperatures > 200 °C) clamp, dairy pipe, Varivent®: without
Diaphragm	standard: stainless steel 1.4435 (316 L) option: Hastelloy® C-276 (2.4819); Tantalum on request
Media wetted parts	pressure port, seals, diaphragm

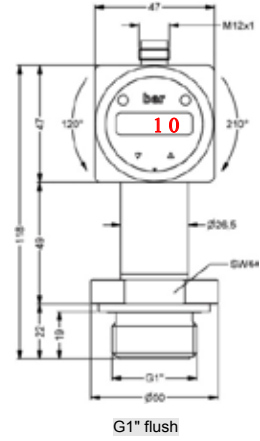
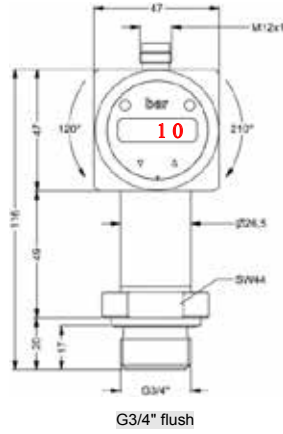
Explosion protection (only for 4 ... 20 mA / 2-wire)						
Approval AX14-DS 200P	IBExU06ATEX1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)					
Safety technical maximum values	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$					
Max. switching current <sup>8</sup>	70 mA					
Permissible temperatures for environment	-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 $\mu\text{H}/\text{m}$					
<sup>8</sup> the real switching current in the application depends on the power supply unit						
Miscellaneous						
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA					
Ingress protection	IP 65					
Installation position	any (standard calibration in a vertical position with the pressure port connection down; different installation position for $P_N \leq 2 \text{ bar}$ have to be specified in the order)					
Weight	approx. 160 ... 250 g					
Operational life	100 million load cycles					
CE-conformity	EMC Directive: 2014/30/EU					
ATEX Directive	2014/34/EU					
Wiring diagrams						
2-wire-system (current)			3-wire-system (current / voltage)			
Pin configuration						
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/ pressure port	via pressure port	ground contact	plug housing/ pressure port	gnye (green-yellow)
Electrical connections (dimensions in mm)						
<sup>7</sup> different cable types and lengths available, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70°C)						

### Mechanical connections (dimensions in mm)

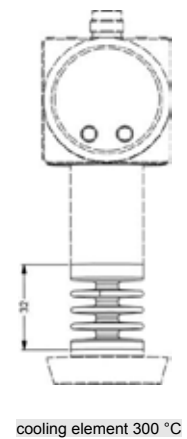
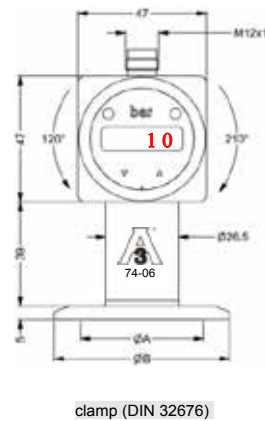
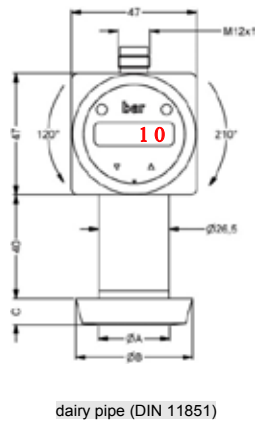
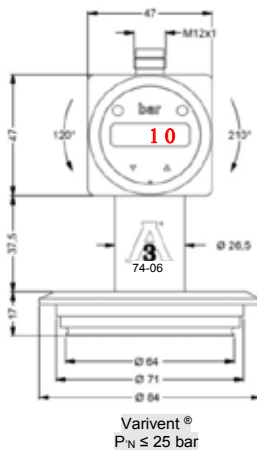
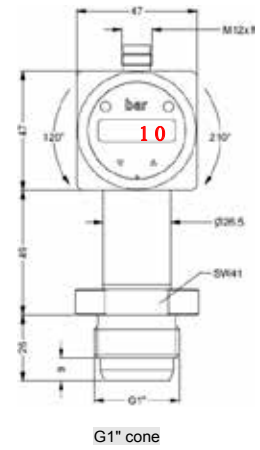
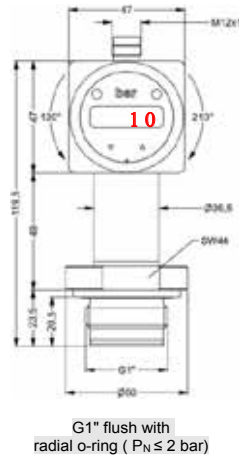
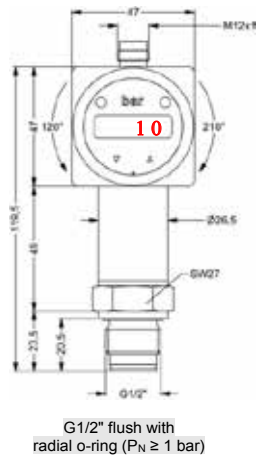
#### Standard



#### Option



#### Option



dimensions in mm			
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68,5
C	10	10	11
$P_N$ [bar]	$\geq 0,25$ $\leq 40$	$\geq 0,25$ $\leq 40$	$\geq 0,25$ $\leq 25$

dimensions in mm				
size	3/4"	DN 25	DN 32	DN 50
A	14	23	32	45
B	25	50,5	50,5	64
$P_N$ [bar]	$\geq 4$ $\leq 8$	$\geq 0,25$ $\leq 16$	$\leq 16$	$\leq 16$

⇒ SIL- and SIL-Ex version: total length increases by 26.5 mm!  
⇒ metric threads and other versions on request

Ordering code DS 200P										
DS 200P		□	□	□	□	□	□	□	□	□
<b>Pressure</b>										
	gauge	7	8	5						
	absolute	7	8	6						
<b>Input</b>										
	[bar]									
	0.10	1	0	0	0					
	0.16	1	6	0	0					
	0.25	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					
	-1 ... 0	X	1	0	2					
	customer	9	9	9	9					consult
<b>Analogue output</b>										
	without				0					
	4 ... 20 mA / 2-wire				1					
	0 ... 10 V / 3-wire				3					
	4 ... 20 mA / 3-wire, adjustable				7					
	Intrinsic safety 4 ... 20 mA / 2-wire <sup>1</sup>				E					
	customer				9					consult
<b>Contact</b>										
	1 contact <sup>1,2</sup>					1				
	2 contacts <sup>1,2</sup>					2				
	4 contacts <sup>3</sup>					4				
<b>Accuracy</b>										
	standard for P <sub>N</sub> > 0,4 bar					3				
	standard for P <sub>N</sub> ≤ 0,4 bar					5				
	option for P <sub>N</sub> ≥ 0,4 bar					2				
	customer					9				consult
<b>Electrical connection</b>										
	Male plug M12x1 (5-pin) / plastic					N	0	1		
	Male plug M12x1 (8-pin) / plastic <sup>3</sup>					M	5	0		
	Male plug M12x1 (5-pin) / metal					N	1	1		
	Male and female plug ISO 4400 <sup>2</sup>					1	0	0		
	Male plug Binder series 723 (5-pin)					2	0	4		
	Cable outlet incl. cable <sup>4</sup>					T	A	0		
	customer					9	9	9		consult
<b>Mechanical connection</b>										
	G1/2" with flush welded diaphragm (DIN 3852) for p <sub>n</sub> ≥ 1 bar					Z	0	0		
	G3/4" with flush welded diaphragm (DIN 3852)					Z	3	0		
	G1" with flush welded diaphragm (DIN 3852)					Z	3	1		
	G1" DIN 3852 with rad. o-ring and flush diaphragm (for p <sub>n</sub> ≤ 2 bar)					Z	5	7		
	G1/2" DIN 3852 with rad. o-ring and flush diaphragm (for p <sub>n</sub> ≥ 1 bar)					Z	6	1		
	G 1" cone					K	3	1		
	Clamp DN 25 / 1" (DIN 32676) / 3A					C	6	1		
	Clamp DN 32 / 1 1/2" (DIN 32676) / 3A					C	6	2		
	Clamp DN 50 / 2" (DIN 32676) / 3A					C	6	3		
	Clamp 3/4" (DIN 32676) / 3A					C	6	9		
	Dairy pipe DN 25 (DIN 11851) <sup>5</sup>					M	7	3		
	Dairy pipe DN 40 (DIN 11851) <sup>5</sup>					M	7	5		
	Dairy pipe DN 50 (DIN 11851) <sup>5</sup>					M	7	6		
	Varivent® DN 40/50 / 3A					P	4	1		
	customer					9	9	9		consult
<b>Diaphragm</b>										
	Stainless steel 1.4435 (316L)							1		
	Tantalum							T		consult
	Hastelloy® C-276 (2.4819)							H		consult
	customer							9		consult
<b>Seals</b>										
	for clamp, dairy pipe, Varivent®:							0		
	for inch thread:							1		
	FFKM							7		
	customer							9		consult
<b>Filling Fluids</b>										
	Silicone oil							1		
	food grade oil (FDA) / 3A							2		
	customer							9		consult
<b>Special version</b>										
	standard							0	0	0
	with cooling element up to 300°C / 3A							2	0	0
	customer							9	9	9

<sup>1</sup> with Ex version max. 1 contact is possible

<sup>2</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible

<sup>3</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request

<sup>4</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), others on request

<sup>5</sup> The cup nut for dairy pipe has to be mounted by production of pressure transmitter. The cup nut has to be ordered as separate position.

Varivent® is a brand name of GE A Tuchenhagen GmbH, Hastelloy® is a brand name of Haynes International Inc.



# DS 201P

## Electronic Pressure Switch

Pressure Port with Flush Welded  
Stainless Steel Diaphragm

accuracy according to IEC 60770:  
0.5 % FSO

### Nominal pressure

from 0 ... 60 bar up to 400 bar

### Contacts

1, 2 or 4 independent PNP contacts,  
freely configurable

### Analogue output

2-wire: 4 ... 20 mA  
3-wire: 4 ... 20 mA / 0 ... 10 V  
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**
- ▶ cooling element up to 300 °C
- ▶ customer specific versions

The electronic pressure switch DS 201P is the  
successful combination of


- ▶ intelligent pressure switch
- ▶ digital display

and is designed for universal applications in the  
mechanical engineering and other industries  
where a flush stainless steel diaphragm is  
necessary. This can be the case, for example,  
with higher viscous or slightly contaminated  
fluids. For usage with higher media temperature  
optionally a cooling element up to 300 °C is  
available.

### Preferred areas of use are

-  Plant and machine engineering
-  Food industry

### Preferred used for

-  Viscous and pasty media



Input pressure ranges					
Nominal pressure gauge/abs. [bar]	60	100	160	250	400
Overpressure [bar]	100	200	400	400	600
Burst pressure $\geq$ [bar]	120	250	500	500	650

Contact <sup>1</sup>	
Standard	1 PNP contact
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)
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-Leiter: contact rating 125 mA, short-circuit resistant
Accuracy of contacts <sup>2</sup>	$\leq \pm 0.5$ % FSO
Repeatability	$\leq \pm 0.2$ % FSO
Switching frequency	max. 10 Hz
Switching cycles	$> 100 \times 10^6$
Delay time	0 ... 100 sec

<sup>1</sup> max. 1 contact for 2-wire current signal with plug ISO 4400 as well as 2-wire current signal with Ex-protection no contact possible with 3-wire in combination with plug ISO 4400

<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

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 Ex-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 / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span max. 1:5) <sup>3</sup> permissible load: $R_{max} = 500 \Omega$ response time: < 0.5 sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{min} = 10 k\Omega$ response time: < 10 msec
Without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy <sup>2</sup>	$\leq \pm 0.5$ % FSO

<sup>3</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

Thermal error (offset and span) <sup>4</sup> / Permissible temperatures	
Thermal error	$\leq \pm 0.2$ % FSO / 10 K
in compensated range	-20 ... 85°C
Permissible temperatures <sup>5</sup>	medium: -40 ... 125 °C for filling fluid silicone oil -10 ... 125 °C for filling fluid food compatible oil electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C
Permissible temperature medium for cooling element 300°C	filling fluid silicone oil overpressure: -40 ... 300 °C vacuum: -40 ... 150 °C filling fluid food compatible oil overpressure: -10 ... 250 °C vacuum: -10 ... 150 °C

<sup>4</sup> an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions

<sup>5</sup> max. temperature of the medium for overpressure > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °

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	5 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	100 g / 11 msec according to DIN EN 60068-2-27

Filling fluids	
Standard	silicone oil
Optional	food compatible oil with FDA approval (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500) others on request

Materials	
Pressure port	stainless steel 1.4435 (316 L)
Housing	stainless steel 1.4404 (316 L)
Display housing	PA 6.6, Polycarbonate
Seals	standard: FKM (for media temperature $\leq 200$ °C) option: FFKM <sup>6</sup> (for media temperature > 200 °C) others on request
Diaphragm	stainless steel 1.4435
Media wetted parts	pressure port, seals, diaphragm

<sup>6</sup> for pressure ranges  $P_N \leq 100$  bar

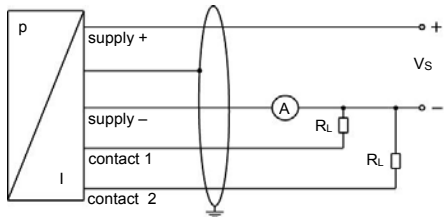


<b>Explosion protection (only for 4 ... 20 mA / 2-wire)</b>	
Approval AX14-DS 201P	IBExU06ATEX1050 X zone 1: II 2G Ex ia IIC T4 Gb (connector) / II 2G Ex ia IIB T4 Gb (cable)
Safety technical maximum values	$U_i = 28\text{ V}$ , $I_i = 93\text{ mA}$ , $P_i = 660\text{ mW}$ , $C \approx 0\text{ nF}$ , $L_i \approx 0\text{ }\mu\text{H}$
Max. switching current <sup>7</sup>	70 mA
Max. temperatures for environment	-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 $\mu\text{H}/\text{m}$
<sup>7</sup> the real switching current in the application depends on the power supply unit	
<b>Miscellaneous</b>	
Display	4-digit, red 7-segment-LED display, digit height 7 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. 45 mA + signal current 3-wire signal output voltage: approx. 45 mA
Ingress protection	IP 65
Installation position	any (standard calibration in a vertical position with the pressure port connection down)
Weight	min. 200 g (depending on mechanical connection)
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) <sup>8</sup>
ATEX Directive	2014/34/EU

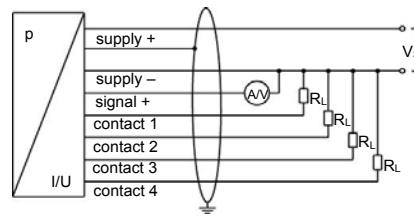
<sup>8</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar.

**Wiring diagrams**

2-wire-system (current)



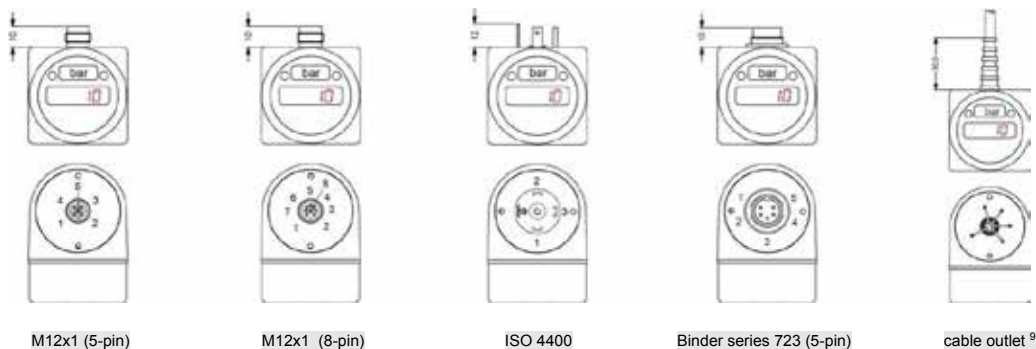
3-wire-system (current/voltage)



**Pin configuration**

Electrical connection	M12x plastic (5-pin)	M12x metal (5-pin)	M12x plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (IEC 60757)
Supply +	1	1	1	1	1	wh (white)
Supply -	3	3	3	2	3	bn (brown)
Signal + (only for 3-wire)	2	2	2	3	2	gn (green)
Contact 1	4	4	4	3	4	gy (grey)
Contact 2	5	5	5	-	5	pk (pink)
Contact 3	-	-	6	-	-	bu (blue)
Contact 4	-	-	7	-	-	rd (red)
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	gnye (green-yellow)

**Electrical connections (dimensions in mm)**



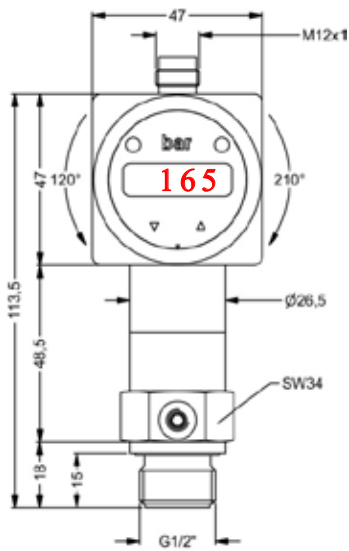
cable outlet PVC  
Ø = 4.9mm  
cable outlet PUR  
Ø = 5.7mm

<sup>9</sup> different cable types and lengths available, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70°C)



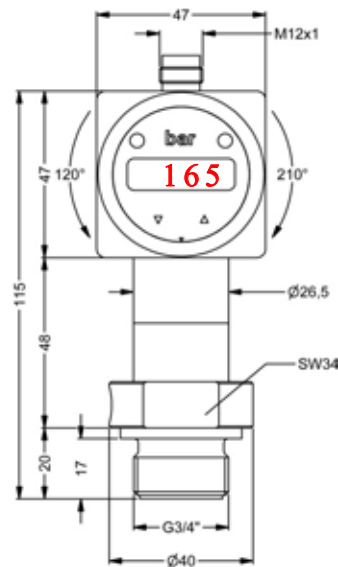
## Mechanical connection (dimensions in mm)

## Standard

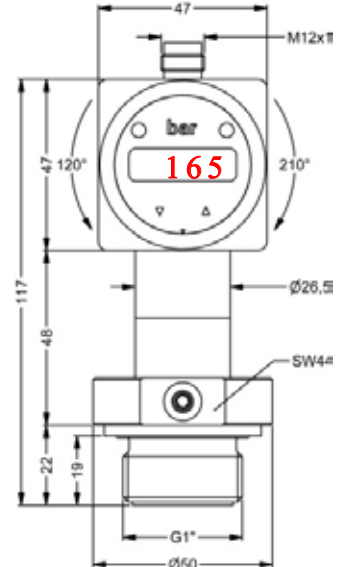


G1/2" flush

## Optional

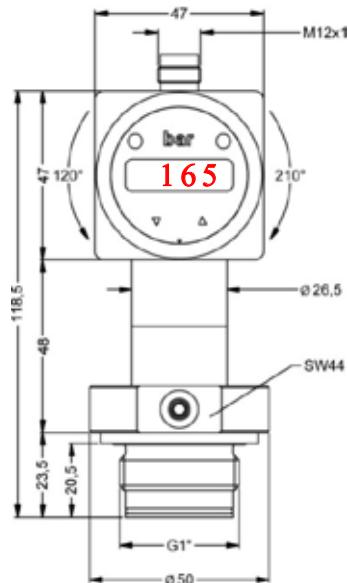
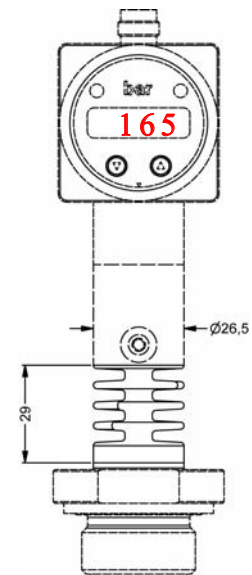


G3/4" flush



G1" flush

## Optional

G1" flush  
with radial o-ringcooling element  
300 °C<sup>10</sup>

⇒ metric threads and other versions on request

<sup>10</sup> for pressure ranges  $P_N \leq 160$  bar

**Ordering code DS 201P**

DS 201P		[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	
<b>Pressure</b>		gauge	7	8	7																
	absolute		7	8	8																
<b>Input</b>		[bar]																			
	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													
	customer				9	9	9	9												consult	
<b>Analogue output</b>		without						0													
	4 ... 20 mA / 2-wire							1													
	0 ... 10 V / 3-wire							3													
	4 ... 20 mA / 3-wire, adjustable							7													
	Intrinsic safety 4 ... 20 mA / 2-wire <sup>1</sup>							E													
	customer							9												consult	
<b>Contact</b>		1 contact <sup>1,2</sup>																		1	
	2 contacts <sup>1,2</sup>																			2	
	4 contacts																			4	
<b>Accuracy</b>		0.5 %																		5	
	customer																			9	
<b>Electrical connection</b>		Male plug M12x1 (5-pin) / plastic version																		N 0 1	
	Male plug M12x1 (8-pin) / plastic version <sup>3</sup>																			M 5 0	
	Male plug M12x1 (5-pin) / metal version																			N 1 1	
	Male and female plug ISO 4400 <sup>2</sup>																			1 0 0	
	Male plug Binder series 723 (5-pin)																			2 0 4	
	Cable outlet incl. cable <sup>4</sup>																			T A 0	
	customer																			9 9 9	
<b>Mechanical connection</b>		G1/2" DIN 3852 with flush diaphragm																			Z 0 0
	G3/4" DIN 3852 with flush diaphragm																				Z 3 0
	G1" DIN 3852 with flush diaphragm																				Z 3 1
	G 1/2" DIN 3852 with rad. o-ring and flush diaphragm																				Z 6 1
	customer																				9 9 9
<b>Diaphragm</b>		Stainless steel 1.4435 (316L)																			1
	customer																				9
<b>Seals</b>		FKM																			1
	FFKM <sup>5</sup>																				7
	customer																				9
<b>Filling Fluids</b>		Silicone oil																			1
	food compatible oil																				2
	customer																				9
<b>Special version</b>		standard																			0 0 0
	with cooling element up to 300°C <sup>6</sup>																				2 0 0
	customer																				9 9 9

<sup>1</sup> with Ex version max. 1 contact is possible

<sup>2</sup> with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible

<sup>3</sup> 4 contacts and M12x1, 8-pin only possible in combination and together with 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request

<sup>4</sup> standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C), others on request

<sup>5</sup> possible for nominal pressure ranges P<sub>N</sub> ≤ 100 bar

<sup>6</sup> cooling element up to 300°C not possible for pressure range P<sub>N</sub> > 160 bar



# DS 217

## Pressure Switch with welded Stainless Steel Sensor

### Characteristics:

- ▶ accuracy according to IEC 60770:  
0.5 % FSO
- ▶ nominal pressure ranges  
from 0 ... 6 bar up to 0 ... 600 bar
- ▶ 1 analogue output and up to  
2 contacts
- ▶ display and housing rotatable
- ▶ suitable for oxygen applications



### Technical Data

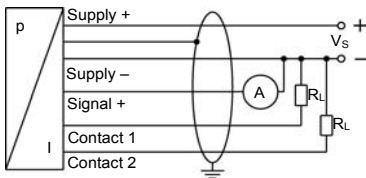
Input pressure range												
Nominal pressure gauge [bar]	6	10	16	25	40	60	100	160	250	400	600	
Overpressure (static) [bar]	12	20	32	50	80	120	200	320	500	800	1 200	
Burst pressure $\geq$ [bar]	30	50	80	125	200	300	500	800	1 400	2 000	3 000	
Vacuum resistance	unlimited											
Contact												
Number / type	standard: 1 PNP contact optionally: max. 2 independent PNP contact; 1 analogue output											
Switching current	standard: contact rating max. 125 mA, short-circuit resistant											
Accuracy of switching points <sup>1</sup>	$\leq \pm 1.5$ % FSO											
Repeatability	$\leq \pm 0.5$ % FSO											
Switching frequency	max. 10 Hz											
Switching cycles	$> 100 \times 10^6$											
Delay time	0 ... 100 sec											
Analogue output (optionally) / Supply												
3-wire current signal	4 ... 20 mA / $V_S = 24 V_{DC} \pm 10$ %											
Accuracy <sup>1</sup>	$\leq \pm 0.5$ % FSO											
Permissible load	3-wire: $R_{max} = 500 \Omega$											
Influence effects	supply: 0.05 % FSO / 10 V load: 0.05 % FSO / k $\Omega$											
Measuring rate	10 Hz											
<sup>1</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)												
Thermal effects (Offset and Span) / Permissible temperatures												
Thermal error	$\leq \pm 0.5$ % FSO / 10 K in compensated range -25 ... 85 °C											
Permissible temperatures	medium: -25 ... 125 °C electronics / environment: -25 ... 85 °C storage: -40 ... 85 °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 (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 / housing	stainless steel 1.4571 (316 Ti) / stainless steel 1.4301 (304)	
Display housing	PA 6.6, polycarbonate	
Seal sensor	none (welded)	
Diaphragm	stainless steel 1.4542 (17-4PH)	
Media wetted parts	pressure port, seal pressure port, diaphragm	
Miscellaneous		
Weight	approx. 160 g	
Display	4-digit, red LED display, digit height 7 mm, digit width 4.85 mm (angle 10°); 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)	
Long term stability	≤ ± 0.3 % FSO / year at reference conditions	
Operational life	100 million load cycles	
CE-conformity	EMC Directive: 2014/30/EU	Pressure Equipment Directive: 2014/68/EU (module A) <sup>2</sup>

<sup>2</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar.

**Wiring diagrams**

3-wire-system (current)



**Pin configuration**

Electrical connections	M12x1 (5-pin) plastic
supply +	1
supply -	3
signal + (only for 3-wire)	2
contact 1	4
contact 2	5
shield	via pressure port

**Connections (dimensions in mm)**

G1/2" EN 837

**Mechanical connections - optional**

G1/4" EN 837

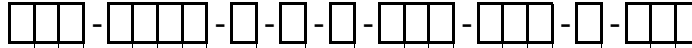
1/4" NPT

**Electronical connections**

M12x1 (5-pin)

## Ordering code DS 217

DS 217



Pressure		7	8	P																
gauge																				
Input	[bar]																			
	6	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															
	customer	9	9	9	9															consult
<b>Analogue output</b>																				
	without analogue output				0															
	4 ... 20 mA / 3-wire				7															
	customer				9															consult
<b>Contact</b>																				
	1 contact																			1
	2 contacts																			2
<b>Accuracy [IEC 60770]</b>																				
standard	0.5 %																			5
	customer																			9
<b>Electrical connection</b>																				
	Male plug M12x1 (5-pin) / plastic version																			N 0 1
	customer																			9 9 9
<b>Mechanical connection</b>																				
	G 1/2" EN837																			2 0 0 2
	G1/4" EN 837																			4 0 0 2
	1/4" NPT																			N 4 0 2
	customer																			9 9 9 9
<b>Special version</b>																				
	standard																			0 0 0
	oxygen application																			0 0 7
	customer																			9 9 9



# DS 230

## Electronic OEM Pressure Switch

### Applications:

- ▶ pneumatics
- ▶ pumps and hydraulic machines

### Characteristics:

- ▶ nominal pressure ranges from 0 ... 2 bar up to 0 ... 400 bar
- ▶ display and housing rotatable
- ▶ up to 2 contacts
- ▶ configurable via display
- ▶ optional: analogue output



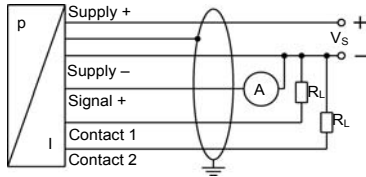
### Technical Data

Input pressure range									
Nominal pressure gauge	[bar]	2	5	10	20	50	100	250	400
Overpressure	[bar]	4	10	20	40	100	200	400	600
Burst pressure	[bar]	7	15	35	70	150	250	450	650
Supply									
Supply voltage $V_s$		24 V <sub>DC</sub> ±10 %							
Current consumption		< 40 mA (without analogue output and without contacts)							
Output signal									
Number, type		standard: 1 PNP contact optional: max. 2 independent PNP contacts; 1 analogue output							
Contact (Standard)									
Switching current		standard: contact rating max. 125 mA, short-circuit resistant							
Accuracy of contacts <sup>1</sup>		≤ ± 1.5 % FSO BFSL							
Repeatability <sup>1</sup>		≤ ± 0.5 % FSO BFSL							
Switching frequency		max. 100 Hz							
Switching cycles		> 100 x 10 <sup>6</sup>							
Functions		hysteresis- / compare mode n/o / n/c							
Delay time		0 ... 99.99 sec							
Analogue output (optionally)									
Signal output		4 ... 20 mA (3-wire)							
Linearity, hysteresis, repeatability		≤ ± 0.5 % FSO BFSL							
Calibration accuracy		≤ ± 1 % FSO BFSL (2 % FSO)							
Permissible load		R <sub>max</sub> = 500 Ω							
Response time		< 10 msec							
<sup>1</sup> depending on nominal pressure range									
Thermal effects (Offset and Span) / Permissible temperatures									
Thermal error for offset		≤ ± 0.5 % FSO / 10 K		in compensated range		-25 ... 85 °C			
Permissible temperatures		medium: -25 ... 125 °C		electronics / environment:		-25 ... 85 °C		storage: -40 ... 85 °C	

<b>Electrical protection</b>	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
<b>Mechanical stability</b>	
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
<b>Materials</b>	
Pressure port / housing	stainless steel 1.4301 (304)
Display housing	PA 6.6, Polycarbonate
Seals (media wetted)	FKM others on request
Diaphragm	ceramic Al <sub>2</sub> O <sub>3</sub> 96 %
Touchpad	polyester
Media wetted parts	pressure port, seals, diaphragm
<b>Miscellaneous</b>	
Display	4-digit, red LED display, digit size 7 mm, digit width 4.85 mm (angle 10 °); range of indication -1999 ... +9999; accuracy 0.3 % ±1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Weight	approx. 180 g
Installation position	any
Ingress protection	IP 65
Operational life	100 million load cycles
CE-conformity	EMC Directive: 2014/30/EU Pressure Equipment Directive: 2014/68/EU (module A) <sup>2</sup>

<sup>2</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

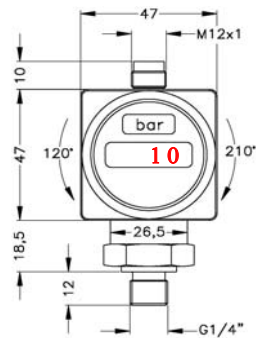
#### Wiring diagram



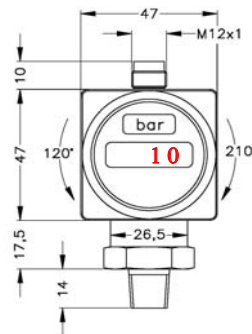
#### Pin configuration

Electrical connection	M12x1 (5-pin), plastic
Supply +	1
Supply -	3
Signal +	2
Contact 1	4
Contact 2	5
Shield	via pressure port

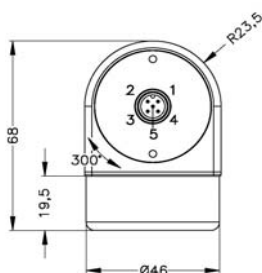
#### Dimensions (in mm)



G1/4" DIN 3852



1/4" NPT



Ordering code DS 230

DS 230



Pressure		7	8	R																
gauge																				
<b>Input</b>	[bar]																			
	2				2	0	0	1												
	5				5	0	0	1												
	10				1	0	0	2												
	20				2	0	0	2												
	50				5	0	0	2												
	100				1	0	0	3												
	250				2	5	0	3												
	400				4	0	0	3												
	customer				9	9	9	9												consult
<b>Analogue output</b>																				
	without analogue output							0												
	4 ... 20 mA / 3-wire							7												
	customer							9												consult
<b>Contact</b>																				
	1 contact																			1
	2 contacts																			2
<b>Calibration accuracy</b>																				
	2 %																			G
	customer																			9
<b>Electrical connection</b>																				
	Male plug M12x1 (5-pin) / plastic version																			N 0 1
	customer																			9 9 9
<b>Mechanical connection</b>																				
	G1/4" DIN 3852																			3 0 0
	1/4" NPT																			N 4 0
	customer																			9 9 9
<b>Seals</b>																				
	FKM																			1
	customer																			9
<b>Special version</b>																				
	standard																			0 0 0
	customer																			9 9 9





# iS 4

## Electronic OEM Pressure Switch Pneumatics with IO-Link Interface

### Applications:

- ▶ Pneumatics
- ▶ Vacuum technology

### Characteristics:

- ▶ nominal pressure ranges from 0 ... 1 bar up to 0 ... 10 bar also -1 ... 0 bar
- ▶ compact design
- ▶ IO-Link according to specification V 1.1

### Technical Data



Input pressure range					
Nominal pressure gauge	[bar]	-1 ... 0	1	3.5	10
Overpressure	[bar]	2	2	7	13

Output signal / Supply	
Standard	IO-Link (measured value and status transmission) / $V_S = 18 \dots 30 V_{DC}$ SIO (switching output), status indication via LED (green)
IO-Link	V 1.1 / Slave / Smart Sensor Profile
Data transfer	COM2 38.4 kbit/s
Mode	SIO / IO-Link (COMx)
Standard	IEC 61131-2, IEC 61131-9

Performance	
Accuracy <sup>1</sup>	$\leq \pm 0.5 \% \text{ FSO}$
Switching current (SIO-Mode)	max. 200 mA
Switching frequency	max. 200 Hz
Switching cycles	$> 100 \times 10^6$
Long term stability	$\leq \pm 0.3 \% \text{ FSO} / \text{year}$ at reference conditions
Turn-on time	SIO-Modus: ca. 20 ms
Response time	SIO-Modus: $< 4 \text{ ms}$
Measuring rate	400 Hz

<sup>1</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

Thermal effects (Offset and Span) / Permissible temperatures		
Tolerance band	$\leq \pm 2 \% \text{ FSO}$	in compensated range 0 ... 50 °C
TC, average	$\leq \pm 0.4 \% \text{ FSO} / 10 \text{ K}$	in compensated range 0 ... 50 °C
Permissible temperatures	medium / electronics / environment: -25 ... 85 °C	storage: -40 ... 85 °C

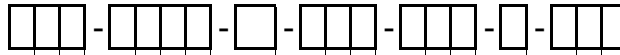
Electrical protection	
Short-circuit protection	permanent
Reverse polarity protection	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326

<b>Mechanical stability</b>		
Vibration	10 g RMS (20 ... 2000 Hz)	according to DIN EN 60068-2-6
Shock	100 g / 11 msec	according to DIN EN 60068-2-27
<b>Materials</b>		
Pressure port	aluminium	
Housing	PA 6.6 black	
Seal (media wetted)	NBR	
Sensor	silicon, RTV	
Media wetted parts	pressure port, seal, sensor	
<b>Miscellaneous</b>		
Media	compressed air, non-aggressive gases	
Weight	approx. 25 g	
Operational life	100 million load cycles	
Installation position	any	
Ingress protection	IP 54	
CE-conformity	EMC Directive: 2014/30/EU	
<b>Wiring diagram</b>		
<b>Pin configuration</b>		
Electrical connection	M8x1 / metal (4-pin)	
(L+) Supply +	1	
(L-) Supply -	3	
C/Q IO-Link (COMx) / SIO	4	
Shield	housing	
<b>Dimensions (mm / in)</b>		

IO-Link interface										
<b>1. General device information</b>			<b>4. Process data</b>							
Baud rate	COM2 (38.4 kbit/s)		The process data length of the sensor is 16 bits. The switch state (BCD1) as well as the current measured values are transmitted. The 14 bits of the measured value are scaled according to the measuring range.							
Input process data length	2 byte									
Minimum cycle time	5 ms									
IO-Link version	V 1.1									
SIO mode	yes	Signed Bit		15 bit	14 ... 2	1	0			
<b>2. SIO mode (standard IO mode)</b>			<b>5. Error message</b>							
In this mode the sensor operates like a normal pressure sensor with standard output signals. The digital output is always on Pin 4 of the connector plug.			<b>Error Codes</b>				<b>Description</b>			
			0x8011				Index not available			
			0x8012				Subindex not available			
			0x8023				Access Denied			
			0x8030				Parameter Value out of Range			
			0x8033				Parameter length overrun			
0x8034				Parameter length underrun						
<b>3. IO-Link mode (communication mode)</b>			<b>6. Event codes</b>							
The pressure sensor switches into IO-Link communication mode when operating under an IO-Link master. IO-Link communication is only possible via Pin connector.					<b>Event-Codes IO-Link 1.1</b>	<b>Event-Codes IO-Link 1.0</b>	<b>Device status</b>	<b>Type</b>		
			No malfunction		0x0000	0x0000	0	Notification		
			General malfunction-unknown error		0x1000	0x1000	4	Error		
			Process variable range over-run - Process Data uncertain		0x8C10	0x8C10	2	Warning		
			Process variable range under-run. Process Data uncertain		0x8C30	0x8C10	2	Warning		
<b>7. Parameter data</b> (The parameter data for the pressure sensor correspond to the Smart Sensor profile.)										
<b>Index hex</b>	<b>Subindex hex</b>	<b>Object name</b>	<b>Single Value</b>				<b>Default</b>	<b>Comment</b>		
0x02	0x00	System Commands	0x81 = delete Min-/Max-Wert 0x82 = res 0xA0 = Set0					The action is executed by writing in the subindex		
0x03	0x00	Data Storage Index	0x01: Upload Start 0x02: Upload End 0x03: Download Start 0x04: Download End 0x05: Datastorage Break							
0x0C	0x00	Device Access Lock	0x00: Unlocked 0x01: IO-Link Lock 0x02: Datastorage Lock 0x04: Parameterization Lock 0x08: User Interface Lock 0x03: IO-Link Lock + Datastorage Lock 0x05: IO-Link Lock + Parameterization Lock 0x09: IO-Link Lock + User Interface Lock 0x06: Datastorage Lock + Parameterization Lock 0x0A: Datastorage Lock + User Interface Lock 0x07: Datastorage Lock + IO-Link Lock + Parameterization Lock 0x0B: Datastorage Lock + IO-Link Lock + User Interface Lock				0x00: Unlocked			
0x24	0x00	Device Status	0x00 Device is operating properly 0x02 Out-of-Specification 0x04 Failure							
0x3D	0x02	Switch Point mode	0x80: Hysteresis NO 0x81: Hysteresis NC 0x82: Window NO 0x83: Window NC				0x80: HNo			
<b>Index hex</b>	<b>Subindex hex</b>	<b>Object name</b>	<b>Access</b>	<b>Length</b>	<b>Value Range</b>	<b>Gradient</b>	<b>Unit</b>	<b>Default</b>		
0x3C	0x01	SetPoint 1 = SP	R/W	2 Byte	Process Data			100%		
0x3C	0x02	SetPoint 2 = rP	R/W	2 Byte	Process Data			0%		
0xD0	0x00	Delay Switching Time	R/W	2 Byte	0 ... 500	0.1	sec	0		
0xD1	0x00	Delay Back Switching Time	R/W	2 Byte	0 ... 500	0.1	sec	0		
0xD5	0x00	Min Pressure Value	R	2 Byte	Process Data					
0xD6	0x00	Max Pressure Value	R	2 Byte	Process Data					
0xD7	0x00	Measure damping	R/W	2 Byte	0...1000 in 10 ms steps	1	ms	0		

**Ordering code iS 4**

iS 4



<b>Pressure</b>											
	gauge	6	8	S							
<b>Input</b>											
	[bar]										
	1.0				1	0	0	1			
	3.5				3	5	0	1			
	10				1	0	0	2			
	-1 ... 0				X	1	0	2			
	customer				9	9	9	9		consult	
<b>Signal output</b>											
	IO-Link / SIO							IO			
<b>Electrical connection</b>											
	M8x1 (4-pin) / metal							Q	0	0	
	customer							9	9	9	
										consult	
<b>Mechanical connection</b>											
	G1/8" internal thread							Q	0	0	
	M5 internal thread with slot for O-ring <sup>1</sup>							R	0	0	
	customer							9	9	9	
										consult	
<b>Seals</b>											
	NBR								5		
	customer								9		
										consult	
<b>Special version</b>											
	standard								0	0	0
	customer								9	9	9
											consult

<sup>1</sup> suitable for flange installation



# DS 4

## Electronic OEM Pressure Switch Pneumatics

### Applications:

- ▶ Pneumatics
- ▶ Vacuum technology

### Characteristics:

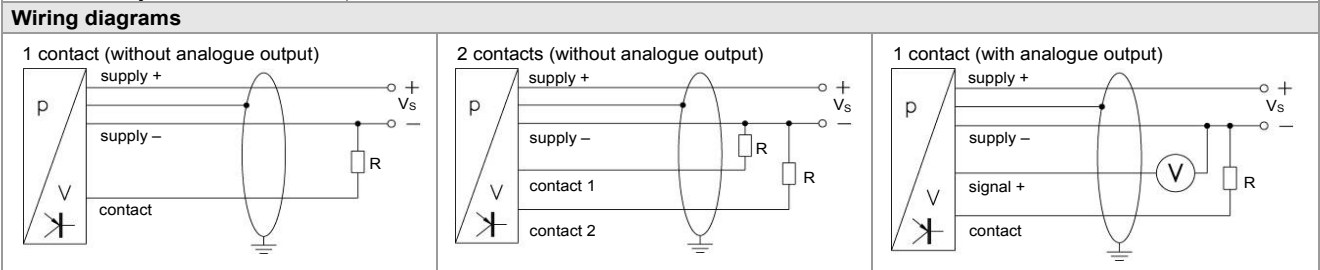
- ▶ nominal pressure ranges from 0 ... 1 bar up to 0 ... 10 bar also -1 ... 0 bar
- ▶ 1 or 2 contacts
- ▶ compact design
- ▶ configurable via PC or programming device P6



### Technical Data

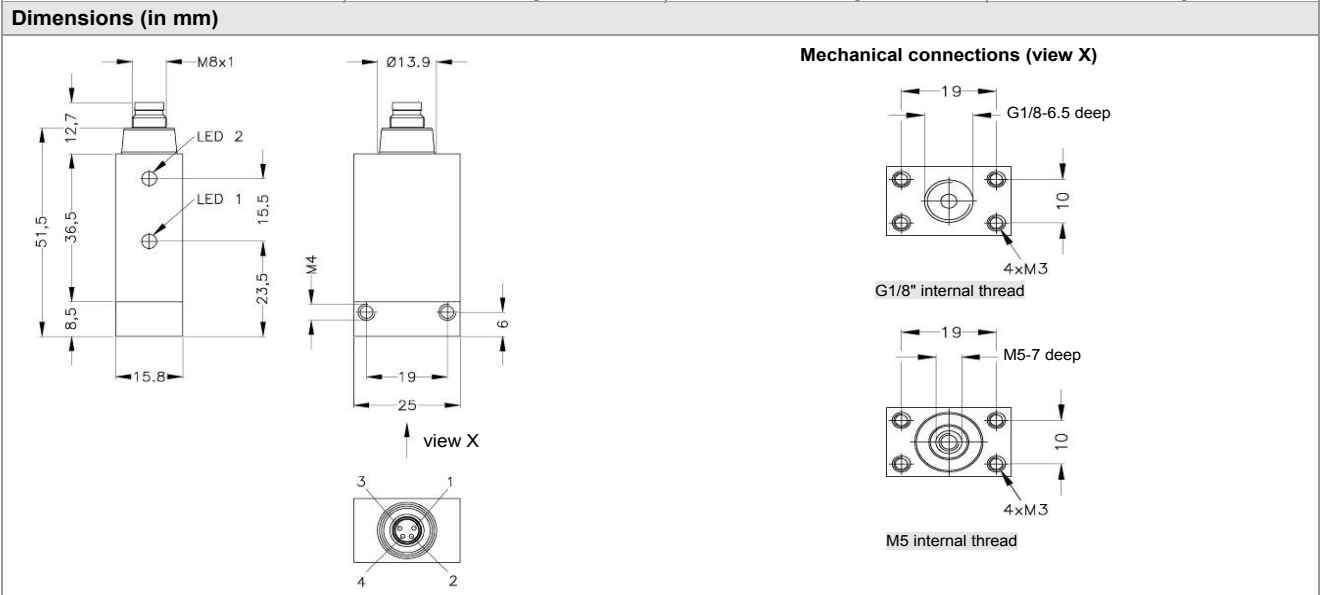
Input pressure range					
Nominal pressure gauge	[bar]	-1 ... 0	1	3.5	10
Overpressure	[bar]	2	2	7	13
Supply					
Supply voltage	$V_S = 12 \dots 30 V_{DC}$				
Current consumption	max. 14 mA (without contacts)				
Output signal					
Contact <sup>1</sup>					
Number		standard: 1	option: 2		
Type		PNP			
Switching performance		max. 300 mA, short-circuit proof			
Accuracy of contacts <sup>2</sup>		$\leq \pm 1 \% \text{ FSO}$			
Repeatability		$\leq \pm 0.2 \% \text{ FSO}$			
Status indication		SP 1: green	SP 2: yellow		
Switching function <sup>3</sup>		standard: n/o	option: n/c		
Switching mode <sup>3</sup>		standard: hysteresis mode	option: window mode		
Switch on point <sup>3</sup>		standard: factory setting 80 % FSO others: specify on order; adjustable range 0 ... 100 % FSO			
Switch off point <sup>3</sup>		standard: factory setting 75 % FSO others: specify on order; adjustable range 0 ... 100 % FSO			
Switch on / switch off delay <sup>3</sup>		standard: off others: specify on order, adjustable range from 10 msec up to 90 sec (step 10 msec)			
Switching frequency		200 Hz (without switching delay)			
Switching cycles		$> 100 \times 10^6$			
Analogue output <sup>1</sup> (optionally)					
Analogue output		1 ... 5 V / 3-wire			
Accuracy		IEC 60770 <sup>3</sup> : $\leq \pm 2 \% \text{ FSO}$			
Permissible load		$R_{min} = 10 \text{ k}\Omega$			
<sup>1</sup> with optional analogue output max. 1 contact possible					
<sup>2</sup> accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)					
<sup>3</sup> Parameters can be programmed by customer either with the programming kit CIS 680 / CIS 681 or with the programming device P6 (available as accessories).					

Thermal effects (Offset and Span) / Permissible temperatures		
Tolerance band	$\leq \pm 2\%$ FSO	in compensated range 0 ... 50 °C
TC, average	$\leq \pm 0.4\%$ FSO / 10 K	in compensated range 0 ... 50 °C
Permissible temperatures	medium / electronics / environment: -25 ... 85 °C	storage: -40 ... 85 °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 (20 ... 2000 Hz)	according to DIN EN 60068-2-6
Shock	100 g / 11 msec	according to DIN EN 60068-2-27
Materials		
Pressure port	aluminium	
Housing	PA 6.6 black	
Seal (media wetted)	NBR	
Sensor	silicon, RTV	
Media wetted parts	pressure port, seal, sensor	
Miscellaneous		
Media	compressed air, non-aggressive gases	
Weight	approx. 50 g	
Installation position	any	
Operational life	100 million load cycles	
Ingress protection	IP 54	
CE-conformity	EMC Directive: 2014/30/EU	



**Pin configuration**

Electrical connection	M8x1 / metal (4-pin) 1 contact	M8x1 / metal (4-pin) 2 contacts	M8x1 / metal (4-pin) 1 contact, 1 analogue output
Supply +	1	1	1
Supply -	3	3	3
Signal +	-	-	2
Contact 1	4	4	4
Contact 2	-	2	-
Shield	housing	housing	housing



		Ordering code DS 4																					
DS 4		□□□			- □□□□□				- □□		- □□□□□			- □□□□□			- □□□□□		- □□□□□				
<b>Pressure</b>																							
	gauge	6	8	0																			
<b>Input</b>																							
	[bar]																						
	1.0	1	0	0	1																		
	3.5	3	5	0	1																		
	10	1	0	0	2																		
	-1 ... 0	X	1	0	2																		
	customer	9	9	9	9																	consult	
<b>Number of contacts</b>																							
	1 contact																			1			
	2 contacts <sup>1</sup>																			2			
<b>Analogue output</b>																							
	without analogue output																			0			
	1 ... 5 V / 3-wire <sup>1</sup>																			C			
<b>Electrical connection</b>																							
	M8x1 (4-pin) / metal																			Q	0	0	
	customer																			9	9	9	consult
<b>Mechanical connection</b>																							
	G1/8" internal thread																			Q	0	0	
	M5 internal thread with slot for O-ring <sup>2</sup>																			R	0	0	
	customer																			9	9	9	consult
<b>Seals</b>																							
	NBR																			5			
	customer																			9	consult		
<b>Setting code</b>																							
	BD SENSORS standard <sup>3</sup>																			0	0	0	
	setting according to customer <sup>3</sup>																			9	9	9	consult
<b>Special version</b>																							
	standard																			0	0	0	
	customer																			9	9	9	consult

<sup>1</sup> with optional analogue output max. 1 contact possible

<sup>2</sup> suitable for flange installation

<sup>3</sup> Parameters can be programmed by customer either with the programming kit CIS 680 / CIS 681 or with the programming device P6 (available as accessories).



# DS 6

## Electronic OEM Pressure Switch

### Applications:

- ▶ mechanical engineering / hydraulics
- ▶ measuring, control and process technology

### Characteristics:

- ▶ nominal pressure ranges from 0 ... 2 bar up to 0 ... 400 bar
- ▶ 1 or 2 contacts
- ▶ configurable via PC or programming device P6
- ▶ optional: oil- and fat free version

### Technical Data



Input pressure range									
Nominal pressure gauge	[bar]	2	5	10	20	50	100	200	400
Nominal pressure abs.	[bar]	2	5	10	20	50	100	200	400
Overpressure	[bar]	7	12	25	50	120	250	400	600
Supply									
Supply voltage $V_s$		12 ... 30 $V_{DC}$							
Current consumption		max. 14 mA (without contacts)							
Contacts									
Number		standard: 1				optional: 2			
Type		PNP							
Switching performance		max. 300 mA, short-circuit proof							
Accuracy of contacts		IEC 60770: $\leq \pm 1\%$ FSO							
Repeatability		$\leq \pm 0.2\%$ FSO							
Minimum hysteresis of contacts		$\leq \pm 0.5\%$ FSO							
Status indication		SP 1: green				SP 2: yellow			
Switching function <sup>1</sup>		standard: n/o				optional: n/c			
Switching mode <sup>1</sup>		standard: hysteresis mode				optional: window mode			
Switch on point <sup>1</sup>		standard: factory setting 80 % FSO others: specify on order; adjustable range 5 ... 100 % FSO							
Switch off point <sup>1</sup>		standard: factory setting 75 % FSO others: specify on order; adjustable range 5 ... 100 % FSO							
Switch on / switch off delay <sup>1</sup>		standard: off others: specify on order, adjustable range from 10 msec up to 90 sec (step 10 msec)							
Switching frequency		200 Hz (without switching delay)							
Switching cycles		$> 100 \times 10^6$							
<sup>1</sup> Parameters can be programmed by customer either with the programming kit CIS-G or with the programming device P6 (available as accessories).									
Thermal effects (Offset and Span) / Permissible temperatures									
Thermal error		$\leq \pm 0.3\%$ FSO / 10 K				in compensated range -25 ... 85 °C			
Permissible temperatures		medium / electronics / environment: -25 ... 85 °C				storage: -40 ... 85 °C			

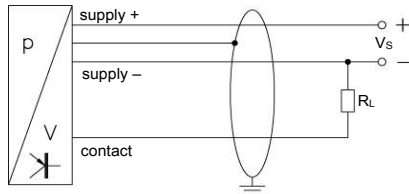


Electrical protection		
Short-circuit protection	permanent	
Reverse polarity protection	no damage, but also no function	
Electromagnetic compatibility	emission and immunity according to EN 61326	
Mechanical stability		
Vibration	10 g RMS (20 ... 2000 Hz)	according to DIN EN 60068-2-6
Shock	100 g / 11 msec	according to DIN EN 60068-2-27
Materials		
Pressure port	stainless steel 1.4301 (304)	
Housing	stainless steel 1.4305 (303)	
Seals (media wetted)	standard: FKM	option: EPDM
Diaphragm	ceramic Al <sub>2</sub> O <sub>3</sub> 96 %	
Media wetted parts	pressure port, seals, diaphragm	
Miscellaneous		
Weight	approx. 90 g	
Installation position	any	
Operational life	100 million load cycles	
Ingress protection	IP 67	
CE-conformity	EMC Directive: 2014/30/EU	Pressure Equipment Directive: 2014/68/EU (module A) <sup>2</sup>

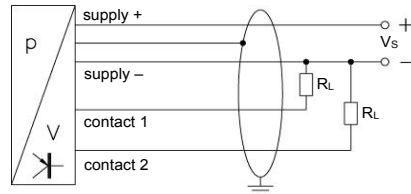
<sup>2</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

#### Wiring diagrams

1 contact



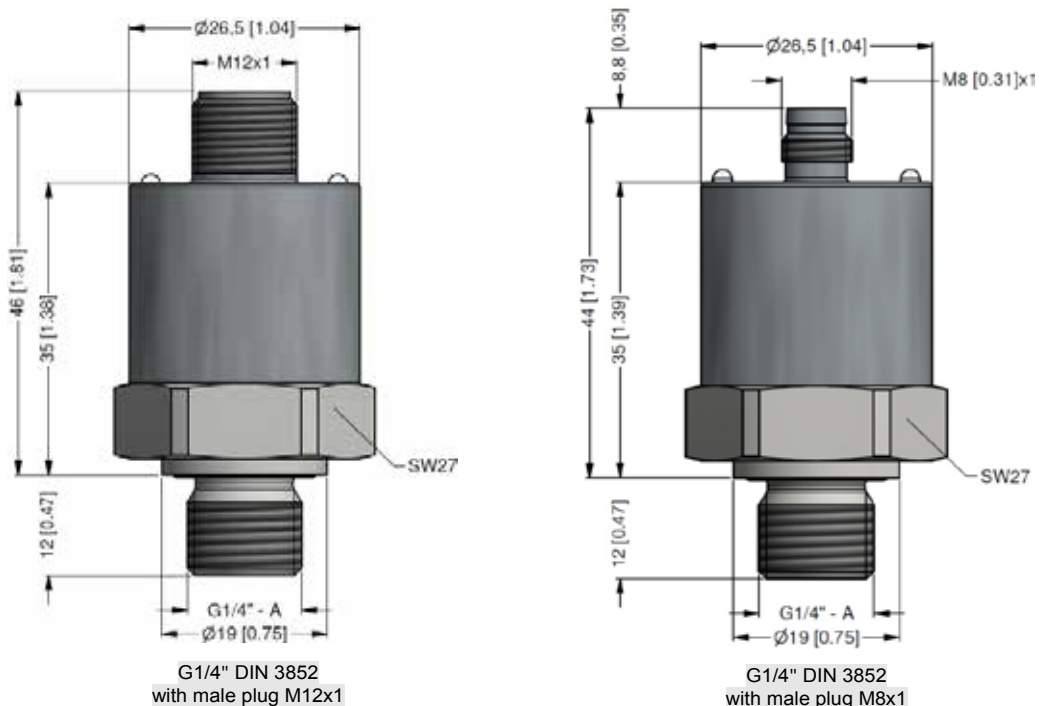
2 contacts



#### Pin configuration

Electrical connection	M12x1 (4-pin), metal		M8x1 (4-pin), metal	
Supply +	1		1	
Supply -	3		3	
Contact 1	4		4	
Contact 2	2		2	
Shield	plug housing		plug housing	

#### Dimensions (mm / in)



Ordering code DS 6																				
DS 6		[ ]	[ ]	[ ]	-	[ ]	[ ]	[ ]	[ ]	-	[ ]	[ ]	[ ]	[ ]	-	[ ]	[ ]	[ ]	[ ]	[ ]
<b>Pressure</b>																				
	gauge	6	8	5																
	absolute	6	8	6																
<b>Input</b>																				
	[bar]																			
	2			2	0	0	1													
	5			5	0	0	1													
	10			1	0	0	2													
	20			2	0	0	2													
	50			5	0	0	2													
	100			1	0	0	3													
	200			2	0	0	3													
	400			4	0	0	3													
	customer			9	9	9	9													
<b>Number of contacts</b>																				
	1 contact							1												
	2 contacts							2												
<b>Analogue output</b>																				
	without analogue output							0												
<b>Electrical connection</b>																				
	M12x1 (4-pin), metal																			
	M8x1 (4-pin), metal																			
	customer																			
<b>Mechanical connection</b>																				
	G1/4" DIN 3852																			
	customer																			
<b>Seals</b>																				
	FKM																			
	EPDM																			
	customer																			
<b>Setting code</b>																				
	BD SENSORS standard <sup>1</sup>																			
	setting according to customer <sup>1</sup>																			
<b>Special version</b>																				
	standard																			
	oil and grease free																			
	customer																			

<sup>1</sup> Parameters can be programmed by customer either with the programming kit CIS-G or with the programming device P6 (available as accessories).

## COMPETENCE

Industrial pressure measurement technology from 0.1 mbar up to 8000 bar

- > pressure transmitters, electronic pressure switches or hydrostatic level probes
- > OEM or high-end products
- > standard products or customized solutions

BD|SENSORS has the right pressure measuring device at the right price.

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