

# 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 BDESENSORS 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 6000 bar:

- pressure sensors, pressure transducers  
pressure transmitters
- electronic pressure switches
- pressure measuring devices with display and  
switching outputs
- hydrostatic level probes

Two pressure transmitters and a submersible probe, based on a stainless steel silicon sensor were the beginning. Today the range extends to more than 70 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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<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 / 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 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 ball 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 / abs.	[bar]	-1 ... 0	0.10	0.16	0.25	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: contact rating 500 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>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> = 13 ... 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		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						welded version <sup>4</sup> on request			others on request		
		option: NBR;											
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)											
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		in zone 0: -20 ... 60 °C with p <sub>atm</sub> 0.8 bar up to 1.1 bar in zone 1: -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 μH/m											
<sup>5</sup> the real switching current in the application depends on the power supply unit													



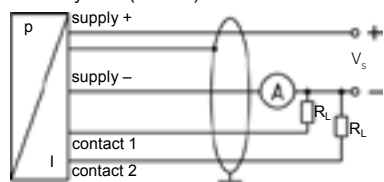
Miscellaneous	
Display	4-digit, 7-segment-LED display, visible range 37.2 x 11 mm; digit height 10 mm, range of indication -1999 ... +9999; accuracy 0.1 % ± 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	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 <sup>6</sup>
Weight	approx. 400 g
Operational life	> 100 x 10 <sup>6</sup> cycles
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>7</sup>

<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  $P_N \pm 1$  bar.

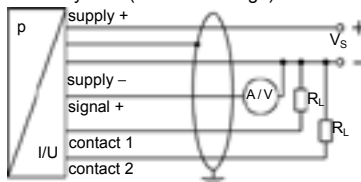
<sup>7</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

#### Wiring diagrams

2-wire-system (current)



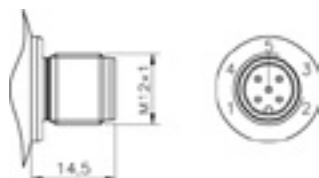
3-wire-system (current / voltage)



#### Pin configuration

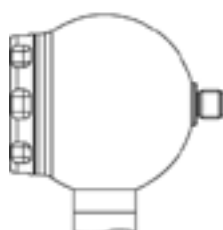
Electrical connection	M12x1 metal (5-pin)
Supply +	1
Supply -	3
Signal + (only 3-wire)	2
Contact 1	4
Contact 2	5
Shield	plug housing / pressure port

#### Electrical connection (dimensions in mm)

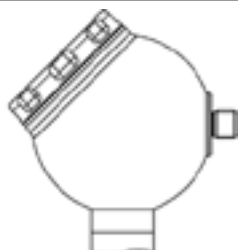


M12x1 (5-pin)

#### Designs<sup>8</sup>

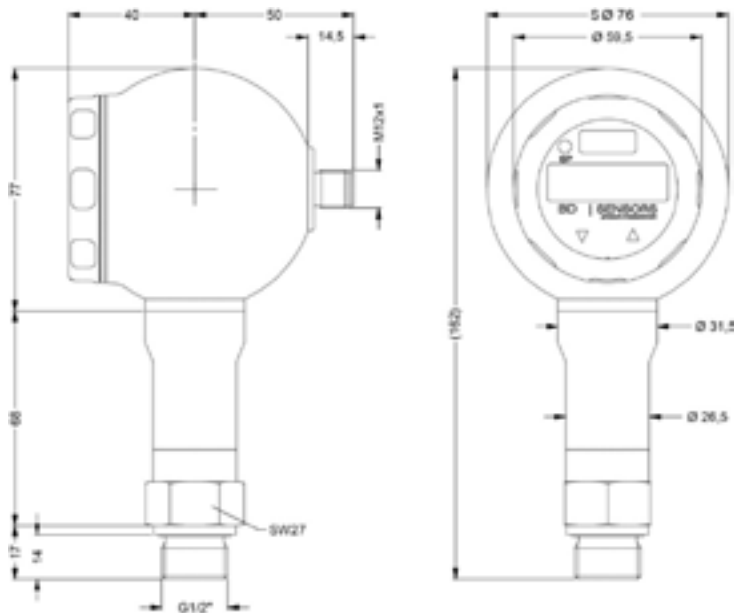


side display



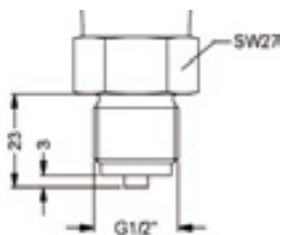
45° display (on request)

<sup>8</sup> all designs in horizontal rotatable housing as standard

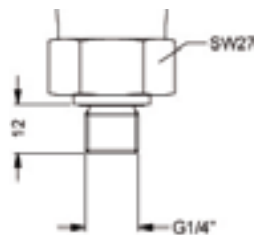
**Mechanical connections (dimensions in mm)****standard**

G1/2" DIN 3852

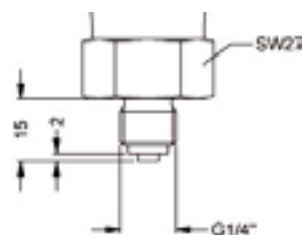
⇒ for nominal pressure  $P_N > 400$  bar increases the length of devices without IS-vesion by 19 mm and of devices with IS-version by 39 mm

**optionally**

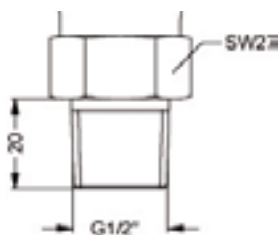
G1/2" EN 837



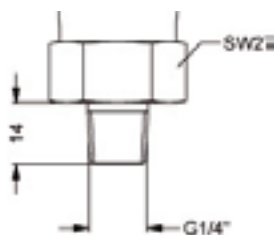
G1/4" DIN 3852



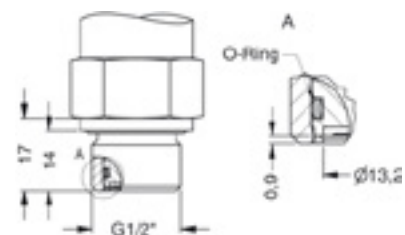
G1/4" EN 837



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

This price list contains product specifications; properties are not guaranteed. Subject to change without notice.



[illegible]

<sup>1</sup> from 60 bar: measurement starts with ambient pressure

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

<sup>3</sup> only possible for nominal pressure ranges  $P_N \leq 40$  bar

<sup>4</sup> welded version only with pressure ports according to EN 837; possible for nominal pressure ranges  $P_N \leq 40$  bar



# 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 / 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 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 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



Input pressure ranges																		
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																	

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: contact rating 500 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

<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 <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> = 13 ... 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	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>3</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	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

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

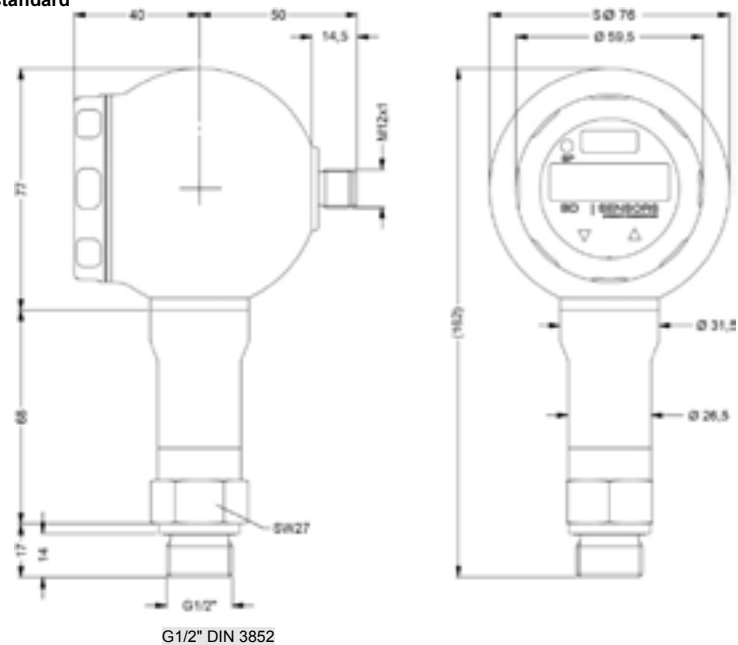
Mechanical stability	
Vibration	10 g RMS (25 ... 2000 Hz) according to DIN EN 60068-2-6
Shock	500 g / 1 msec according to DIN EN 60068-2-27

Materials	
Pressure port / housing	1.4404 (316L) PVDF (for P <sub>N</sub> ≤ 60 bar, G1/2" open port )
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), NBR others on request
Diaphragm	ceramics Al <sub>2</sub> O <sub>3</sub> 96 %
Media wetted parts	pressure port, seals, diaphragm

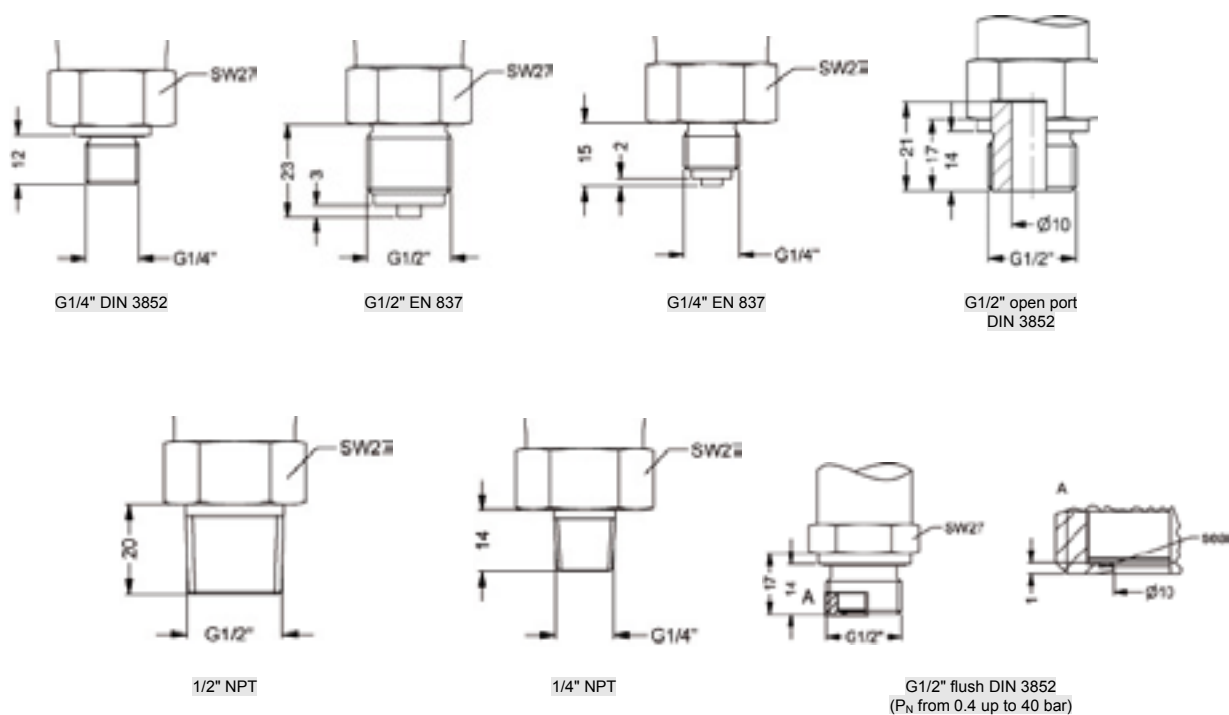
Explosion protection (only for 4 ... 20 mA / 2-wire)	
Approval AX14-DS 401	IBExU06ATEX1050 X zone 0: II 1G Ex ia IIC T4 Ga (connector) / II 1G Ex ia IIB T4 Ga (cable)
Safety technical maximum values	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$
Max. switching current <sup>5</sup>	70 mA
Permissible temperatures for environment	in zone 0: $-20 \dots 60 \text{ }^\circ\text{C}$ with $p_{\text{atm}}$ 0.8 bar up to 1.1 bar in zone 1: $-25 \dots 70 \text{ }^\circ\text{C}$
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>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 % $\pm$ 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Option oxygen application <sup>6</sup>	for $P_N \leq 15 \text{ bar}$ : O-ring in 70 EPDM 281 (with BAM-approval); permissible maximum values are 15 bar / 60° C and 10 bar / 90° C 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 x 10 <sup>6</sup> pressure cycles
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>7</sup>
<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	
Wiring diagrams	
2-wire-system (current) 	3-wire-system (current / voltage) 
Pin configuration	
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
Electrical connections (dimensions in mm)	
Design <sup>8</sup>	
<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 401

[illegible][illegible]

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

<sup>2</sup> G1/2" flush up to 25 bar and nominal pressure abs. on request

<sup>3</sup> possible for nominal pressure ranges  $P_N \leq 160$  bar

<sup>4</sup> PVDF only with G1/2" DIN 3852 open pressure port (up to 60 bar); Ex-protection not possible. (min. permissible temperature -30°C)

<sup>5</sup> oxygen application with FKM-seal up to 25 bar or with EPDM-seal up to 15 bar possible

*This document contains product specifications; properties are not guaranteed. Detailed information about options are defined in the datasheet. Subject to change without notice.*



# 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. 4 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> / abs.	[bar]	-1...0	0.10	0.16	0.25	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 500 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>5</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> = 13 ... 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	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>	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
Tolerance band	[% FSO]	≤ ± 0.75	≤ ± 1
in compensated range	[°C]	-20 ... 85	0 ... 70

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: NBR; 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 (max. permissible inductivity: 4.7 mH)
Permissible temperatures for environment	-20 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 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**

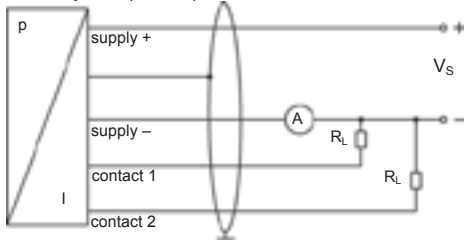
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % $\pm$ 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	2-wire signal output current: max. 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 x 10 <sup>6</sup> cycles
CE-conformity	EMC Directive: 2004/108/EC      Pressure Equipment Directive: 97/23/EC (module A) <sup>8</sup>

<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  $P_N \leq 1 \text{ bar}$ .

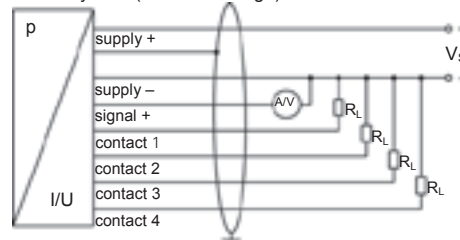
<sup>8</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

**Wiring diagrams**

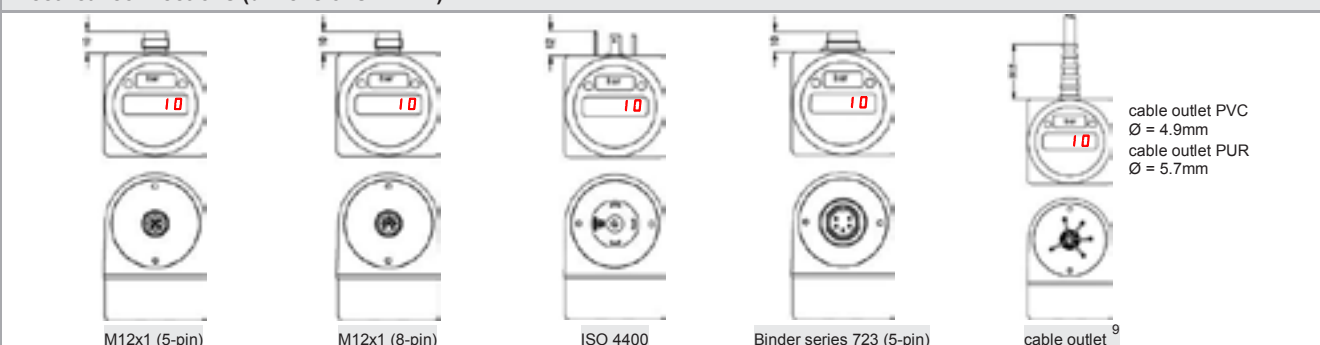
2-wire-system (current)



3-wire-system (current / voltage)

**Pin configuration**

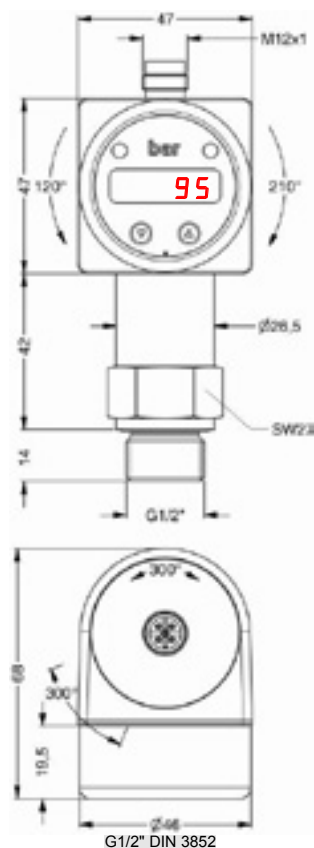
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	ye/gn (yellow/green)

**Electrical connections (dimensions in mm)**

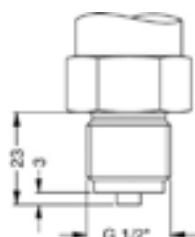
<sup>9</sup> different cable types and lengths available; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)

### Mechanical connections (dimensions in mm)

#### standard



#### optionally



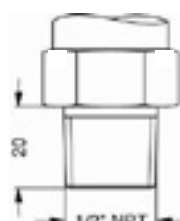
G1/2" EN 837



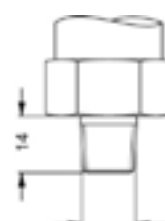
G1/4" DIN 3852



G1/4" EN 837



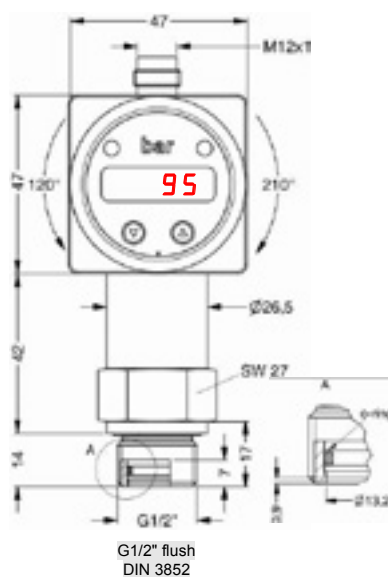
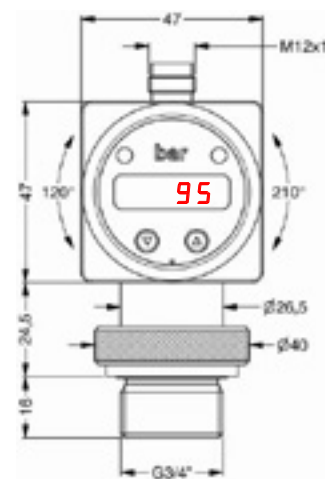
1/2" NPT



1/4" NPT

⇒ 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

G1/2" flush  
DIN 3852G3/4" flush DIN 3852  
(absolute pressure on request)

⇒ metric threads and other versions on request

## DS 200

DS 200										<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>											
Pressure																																										
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										7	8	1																														
Input		[mH <sub>2</sub> O]	[bar]																																							
		1	0.10					1	0	0	0																															
		1.6	0.16					1	6	0	0																															
		2.5	0.25					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																															
Analogue output																																										
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>2</sup>																														E												
customer																														9												
Contact																																										
1 contact <sup>2,3</sup>																														1												
2 contacts <sup>2,3</sup>																														2												
4 contacts <sup>4</sup>																														4												
Accuracy																																										
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												
Electrical connection																																										
Male plug M12x1 (5-pin) / plastic version																														N	0	1										
Male plug M12x1 (8-pin) / plastic version <sup>4</sup>																														M	5	0										
Male plug M12x1 (5-pin) / metal version																														N	1	1										
Male and female plug ISO 4400 <sup>3</sup>																														1	0	0										
Male plug Binder series 723 (5-pin)																														2	0	0										
Cable outlet incl. cable <sup>5</sup>																														T	A	0										
customer																														9	9	9										
Mechanical connection																																										
G1/2" DIN 3852																														1	0	0										
G1/2" EN 837																														2	0	0										
G1/4" DIN 3852																														3	0	0										
G1/4" EN 837																														4	0	0										
G1/2" DIN 3852 with flush sensor <sup>6</sup>																														F	0	0										
G3/4" DIN 3852 with flush sensor <sup>6</sup>																														K	0	0										
1/2" NPT																														N	0	0										
1/4" NPT																														N	4	0										
customer																														9	9	9										
Seals																																										
FKM																														1												
without (welded version) <sup>7</sup>																														2												
NBR																														5												
customer																														9												
Special version																																										
standard																														0	0	0										
customer																														9	9	9										

<sup>1</sup> from 60 bar: measurement starts with ambient pressure

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

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

<sup>4</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>5</sup> standard: 2 m PVC cable without ventilation tube, others on request

<sup>6</sup> not possible for nominal pressure  $P_N > 40$  bar; also not possible for vacuum ranges; for G3/4" flush nominal pressure abs. on request

<sup>7</sup> welded version only with pressure ports according to EN 837; possible for nominal pressure ranges  $P_N \leq 40$  bar

*This document contains product specifications; properties are not guaranteed. Detailed information about options are defined in the datasheet. Subject to change without notice.*



# 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. 4 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 500 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> = 13 ... 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>	≤ ± 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: Option for G1/2" open port (up to 60 bar): Options for G3/4" flush (0.6 bar ≤ P <sub>N</sub> ≤ 25 bar):	pressure port	housing
		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), NBR others on request		
Diaphragm	ceramics Al <sub>2</sub> O <sub>3</sub> 96 %		
Media wetted parts	pressure port, seals, diaphragm		

**Explosion protection (only for 4 ... 20 mA / 2-wire)**

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 (max. permissible inductivity: 4.7 mH)
Permissible temperatures for environment	-20 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H}/\text{m}$

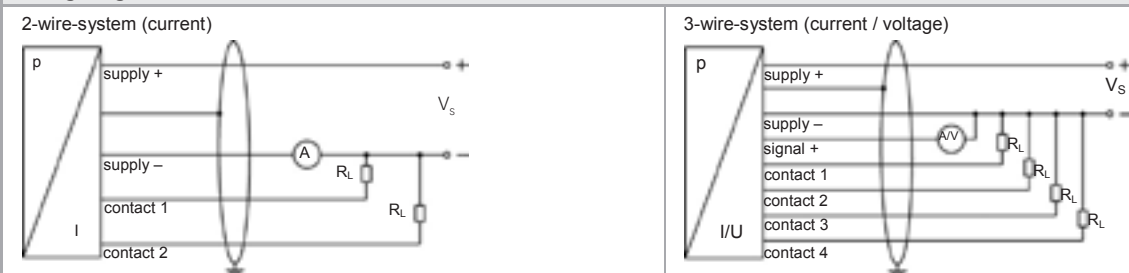
<sup>6</sup> the real switching current in the application depends on the power supply unit

**Miscellaneous**

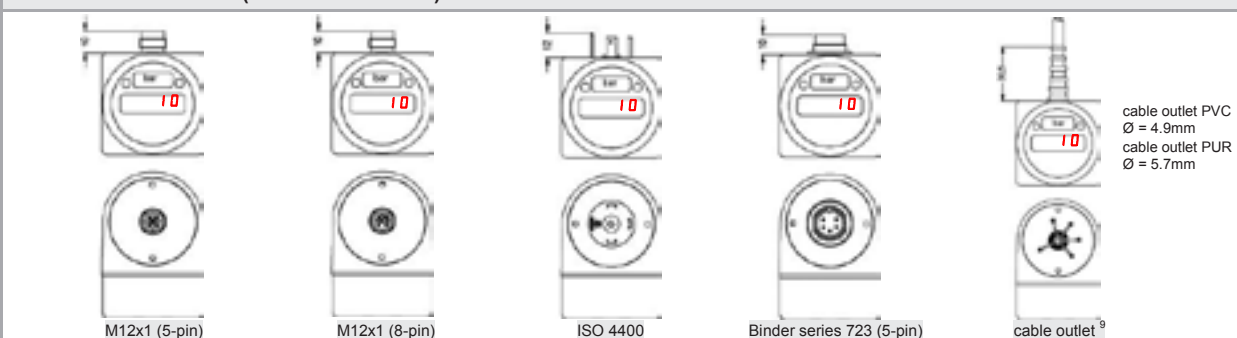
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % $\pm$ 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Option oxygen application <sup>7</sup>	for $P_N \leq 15 \text{ bar}$ : O-ring in 70 EPDM 281 (with BAM-approval); permissible maximum values are 15 bar / 60° C and 10 bar / 90° C 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 x 10 <sup>6</sup> cycles
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>8</sup>

<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

**Wiring diagrams****Pin configuration**

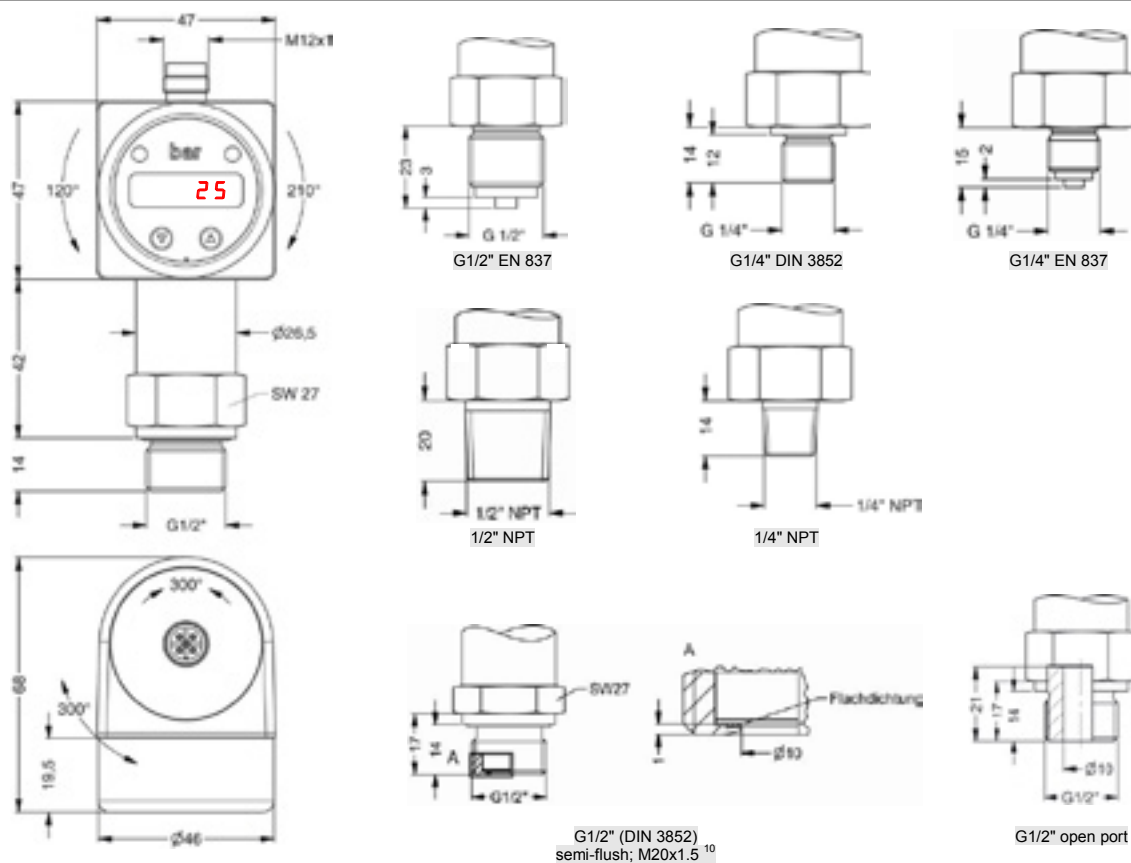
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	ye/gn (yellow/green)

**Electrical connections (dimensions in mm)**

<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)

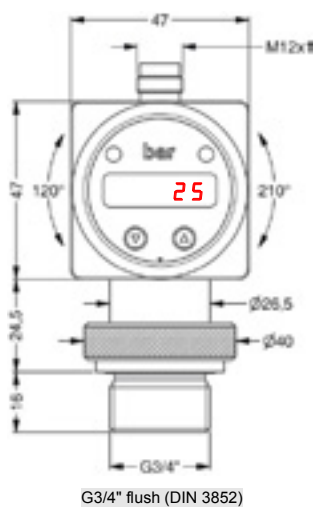


**Mechanical connections (dimensions in mm)**



⇒ metric threads and others on request

optionally for  $P_N$  from 0.6 up to 60 bar gauge



<sup>10</sup> possible for nominal pressure ranges  $P_N \leq 40$  bar

[illegible]

<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  $P_N \geq 0.6$  bar up to  $P_N \leq 25$  bar gauge, absolute on request

<sup>6</sup> possible for nominal pressure ranges  $P_N \geq 0.6$  bar up to  $P_N \leq 60$  bar gauge

<sup>7</sup> possible for nominal pressure ranges  $P_N \leq 160$  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 or with EPDM-seal up to 15 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]	14	35	35	70	140	140	350	350	700	1200	1200
Burst pressure $\geq$	[bar]	35	85	85	175	350	350	850	850	1750	2800	2800
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; $V_{\text{switch}} = V_S - 2V$ 0 ... 10 V / 3-wire: contact rating 500 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: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0.02 A] \Omega$ response time: $< 10 \text{ msec}$
2-wire current signal with IS-protection	4 ... 20 mA / $V_S = 13 \dots 28 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0.02 A] \Omega$ response time: $< 10 \text{ msec}$
3-wire current signal	4 ... 20 mA / $V_S = 19 \dots 30 V_{DC}$ permissible load: $R_{\text{max}} = 500 \text{ k}\Omega$ adjustable (turn-down of span up to 1:5) <sup>3</sup>
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{\text{min}} = 10 \text{ k}\Omega$
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	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C_i \approx 0 \text{ nF}$ , $L_i \approx 0 \text{ }\mu\text{H}$
Max. switching current <sup>4</sup>	70 mA (max. permissible inductivity: 4.7 mH)
Permissible temperatures for environment	-20 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H/m}$

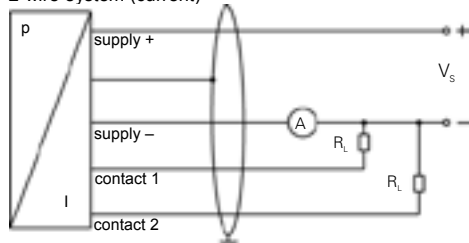
<sup>4</sup> the real switching current in the application depends on the power supply unit

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)
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>5</sup>

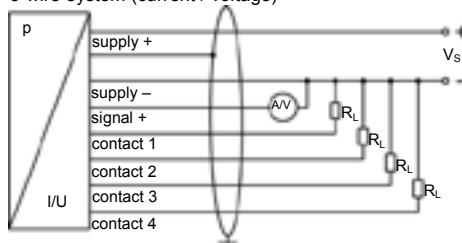
<sup>5</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

#### 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	cable colours (DIN 47100)
Supply +	1	1	1	1	wh (white)
Supply -	3	3	3	2	bn (brown)
Signal + (only 3-wire)	2	2	2	3	gn (green)
Contact 1	4	4	4	3	gy (grey)
Contact 2	5	5	5	-	pk (pink)
Contact 3	-	-	6	-	-
Contact 4	-	-	7	-	-
Shield	via pressure port	plug housing / pressure port	via pressure port	ground contact	ye/gn (yellow/green)

#### Electrical connections (dimensions in mm)



M12x1 (5-pin)



M12x1 (8-pin)



ISO 4400



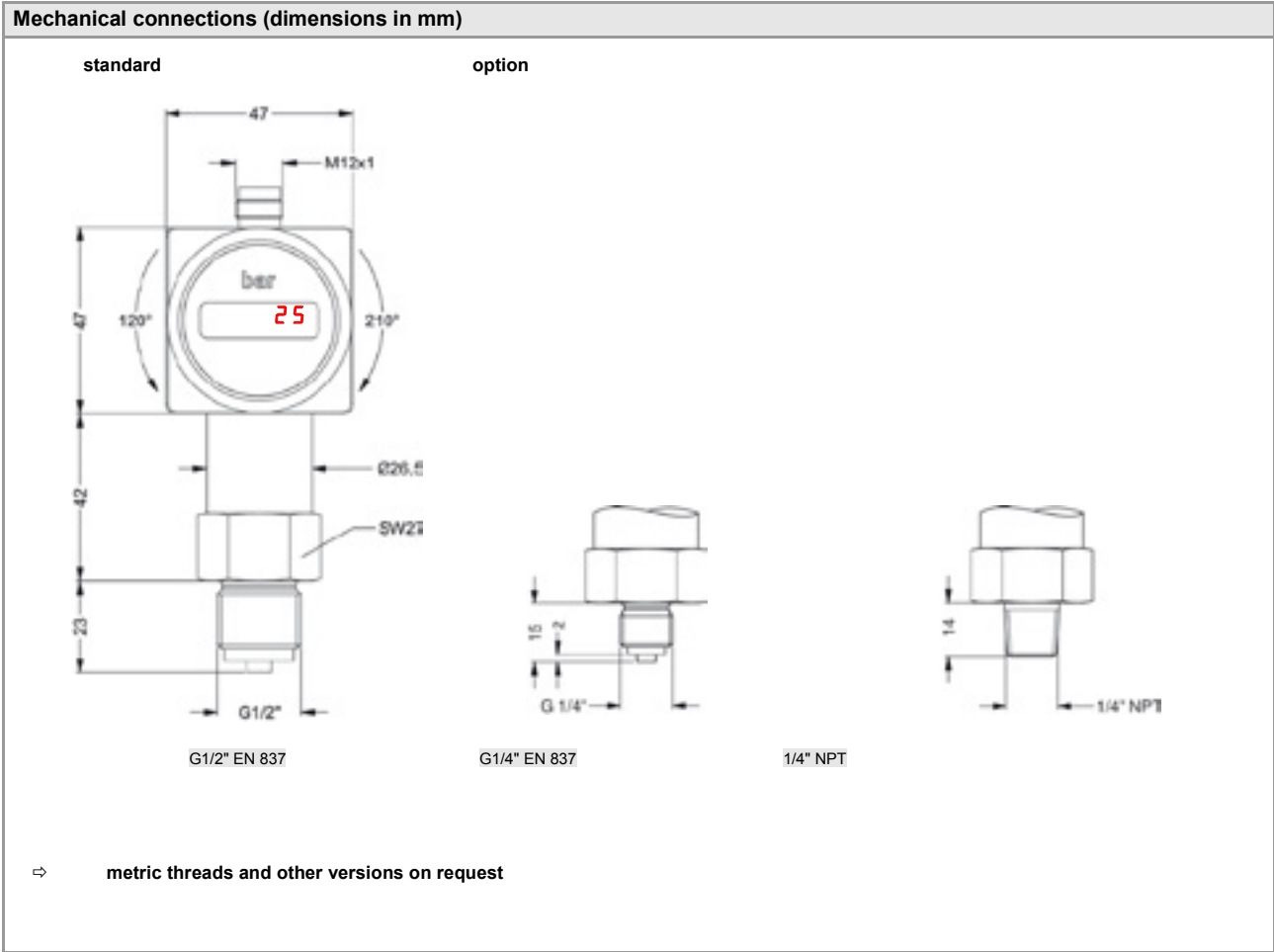
Binder series 723 (5-pin)



cable outlet <sup>6</sup>

PVC-cable  
Ø=4.9mm,  
PUR-cable  
Ø=5.7mm

<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)



This document contains product specifications; properties are not guaranteed. Subject to change without notice.

DS 202		<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	-	<div></div>	-	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	
Pressure																							
gauge in bar <sup>1</sup>		7	8	4																			
Input		[bar]																					
6.0					6	0	0	1															
10					1	0	0	2															
16					1	6	0	2															
25					2	5	0	2															
40					4	0	0	2															
60					6	0	0	2															
100					1	0	0	3															
160					1	6	0	3															
250					2	5	0	3															
400					4	0	0	3															
600					6	0	0	3															
customer					9	9	9	9													consult		
Analogue output																							
without									0														
4 ... 20 mA / 2-wire									1														
0 ... 10 V / 3-wire									3														
4 ... 20 mA / 3-wire									7														
Intrinsic safety 4 ... 20 mA / 2-wire <sup>2</sup>									E														
customer									9											consult			
Contact																							
1 contact <sup>2</sup>									1														
2 contacts									2														
4 contacts									4														
Accuracy																							
standard		0.5 %							5														
customer									9												consult		
Electrical connection																							
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>4</sup>														1	0	0							
Male plug Binder series 723 (5-pin)														2	0	0							
Cable outlet incl. cable <sup>5</sup>														T	A	0							
customer														9	9	9					consult		
Mechanical connection																							
G1/2" EN 837														2	0	0							
G1/4" EN 837														4	0	0							
1/4" NPT														N	4	0							
customer														9	9	9					consult		
Seals																							
without (welded version)																	2						
customer																	9						consult
Special version																							
standard																		0	0	0			
oxygen application																		0	0	7			
customer																		9	9	9			consult

<sup>1</sup> from 60 bar: measurement starts with ambient pressure

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

<sup>5</sup> different cable types and lengths deliverable, standard: 2 m PVC cable without ventilation tube, optionally cable with ventilation tube





# 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. 4 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; $V_{\text{switch}} = V_S - 2V$ 0 ... 10 V / 3-wire: contact rating 500 mA, short-circuit resistant
Accuracy of contacts <sup>3</sup>	standard: $\leq \pm 0.35 \% \text{ FSO}$ nominal pressure $\leq 100 \text{ mbar}$ : $\leq \pm 0.5 \% \text{ FSO}$
Repeatability	$\leq \pm 0.1 \% \text{ FSO}$
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 / $V_S = 18 \dots 41 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0,02 \text{ A}] \Omega$ response time: $< 10 \text{ msec}$
2-wire current signal with Ex-protection	4 ... 20 mA / $V_S = 17 \dots 28 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0,02 \text{ A}] \Omega$ response time: $< 10 \text{ msec}$
3-wire current signal	4 ... 20 mA / $V_S = 19 \dots 30 V_{DC}$ adjustable (turn-down of span max. 1:5) <sup>2</sup> permissible load: $R_{\text{max}} = 500 \Omega$ response time: $< 3 \text{ sec}$
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: $< 3 \text{ msec}$
without analogue output	$V_S = 15 \dots 36 V_{DC}$
Accuracy	standard: $\leq \pm 0.35 \% \text{ FSO}$ nominal pressure $\leq 100 \text{ mbar}$ : $\leq \pm 0.5 \% \text{ FSO}$

<sup>2</sup> with turn-down of span the analogue signal is adjusted automatically to the new measuring range

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

Thermal effects (Offset and Span)				
Nominal pressure $P_N$	[mbar]	-1000 ... 0	$\leq 100$	$\leq 400$
Tolerance band	[% FSO]	$\leq \pm 0.75$	$\leq \pm 1.5$	$\leq \pm 1$
in compensated range	[°C]	-20 ... 85	0 ... 50	0 ... 70

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	$U_i = 28 \text{ V}$ , $I_i = 93 \text{ mA}$ , $P_i = 660 \text{ mW}$ , $C \approx 0 \text{ nF}$ , $L_i \approx 0 \mu\text{H}$
Max. switching current <sup>4</sup>	70 mA (max. permissible inductivity: 4.7 mH)
Permissible temperatures for environment	-20 ... 70 °C
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H}/\text{m}$

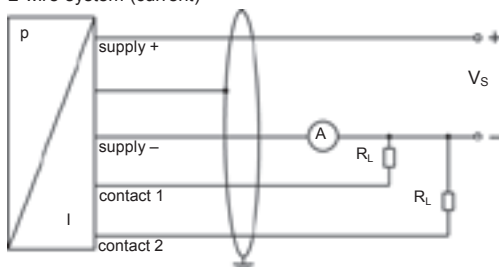
<sup>4</sup> the real switching current in the application depends on the power supply unit

**Miscellaneous**

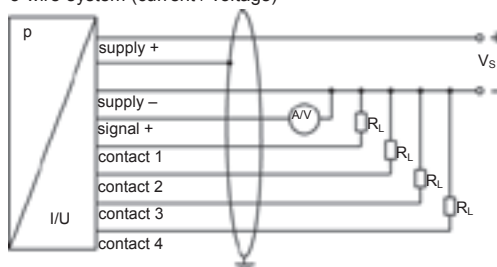
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % ± 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)	
Current consumption (without contacts)	2-wire signal output current:	max. 25 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 x 10 <sup>6</sup> cycles	
CE-conformity	EMC Directive: 2004/108/EC	

**Wiring diagrams**

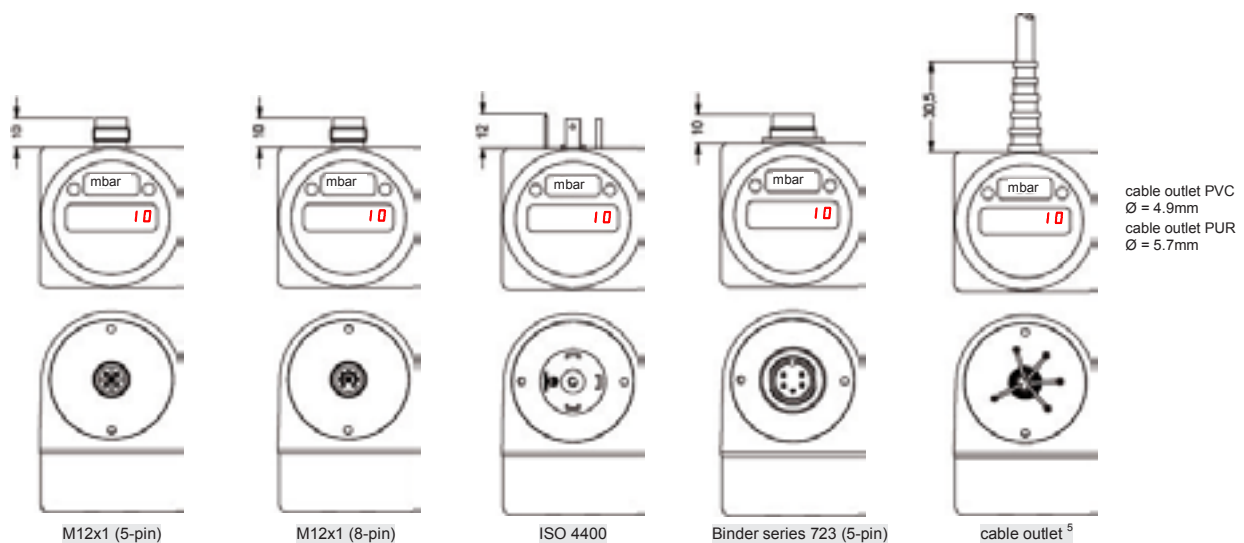
2-wire-system (current)



3-wire-system (current / voltage)

**Pin configuration**

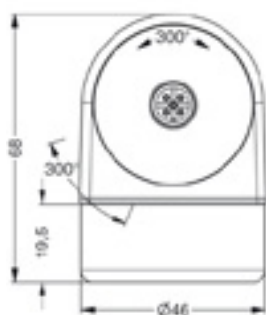
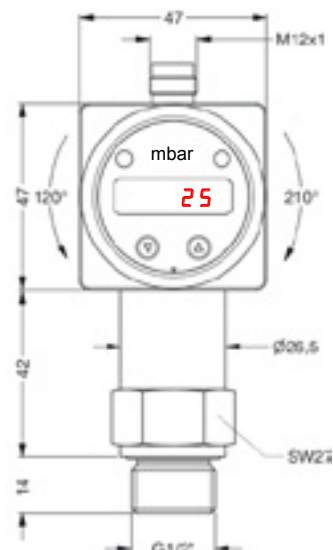
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	ye/gn (yellow / green)

**Electrical connections (dimensions in mm)**

<sup>5</sup> different cable types and lengths available; standard: 2 m PVC cable (without ventilation tube)

**Mechanical connections (dimensions in mm)**

**standard**

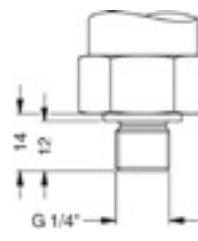


G1/2" DIN 3852

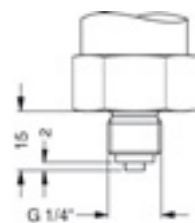
**optionally**



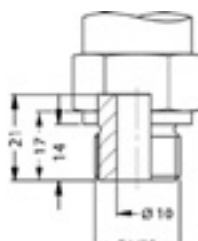
G1/2" EN 837



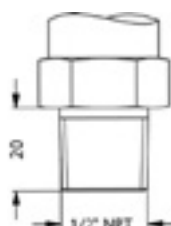
G1/4" DIN 3852



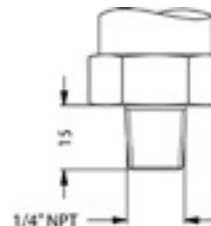
G1/4" EN 837



G1/2" open port



1/2" NPT



1/4" NPT

⇒ metric threads and other versions on request

$$\begin{array}{|c|c|} \hline & \\ \hline \end{array} - \begin{array}{|c|c|c|c|} \hline & & & \\ \hline \end{array} - \begin{array}{|c|} \hline \\ \hline \end{array} - \begin{array}{|c|} \hline \\ \hline \end{array} - \begin{array}{|c|} \hline \\ \hline \end{array} - \begin{array}{|c|c|} \hline & \\ \hline \end{array} - \begin{array}{|c|c|} \hline & \\ \hline \end{array} - \begin{array}{|c|} \hline \\ \hline \end{array} - \begin{array}{|c|c|} \hline & \\ \hline \end{array}$$

<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

**BD|SENSORS** [www.bdsensors.com](http://www.bdsensors.com)



# 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 ... 2200 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 2200 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

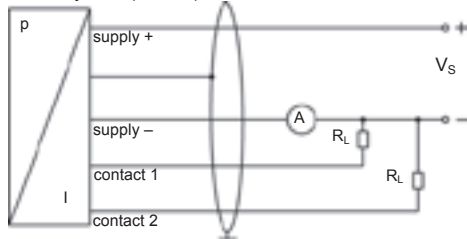
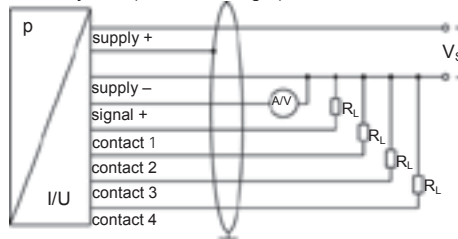


Input pressure range						
Nominal pressure gauge	[bar]	600 <sup>1</sup>	1000	1600	2000	2200
Overpressure	[bar]	800	1400	2200	2800	2800
<sup>1</sup> only available with pressure port G1/2" EN 837						
Contact <sup>2</sup>						
Standard	1 PNP contact					
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire)					
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; V <sub>switch</sub> = V <sub>S</sub> – 2V 0 ... 10 V / 3-wire: contact rating 500 mA, short-circuit resistant					
Accuracy of contacts <sup>3</sup>	standard: ≤ ± 0.35 % 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 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					
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	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>	standard: ≤ ± 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	[% FSO]	≤ ± 0.25 / 10 K				
in compensated range	[°C]	-20 ... 85				
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 % ± 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	> 100 x 10 <sup>6</sup> cycles					
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A)					



## Wiring diagrams

2-wire-system (current)

3-wire-system (current / voltage<sup>5</sup>)<sup>5</sup> max. 2 contacts possible

## 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 (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	ye/gn (yellow / green)

## Electrical connections (dimensions in mm)



M12x1 (5-pin)



M12x1 (8-pin)



ISO 4400



Binder series 723 (5-pin)

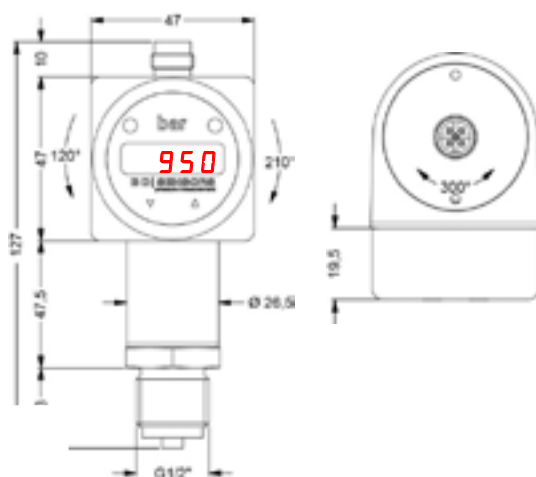
cable outlet<sup>6</sup>

cable outlet PVC  
 $\varnothing = 4.9\text{mm}$   
 cable outlet PUR  
 $\varnothing = 5.7\text{mm}$

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

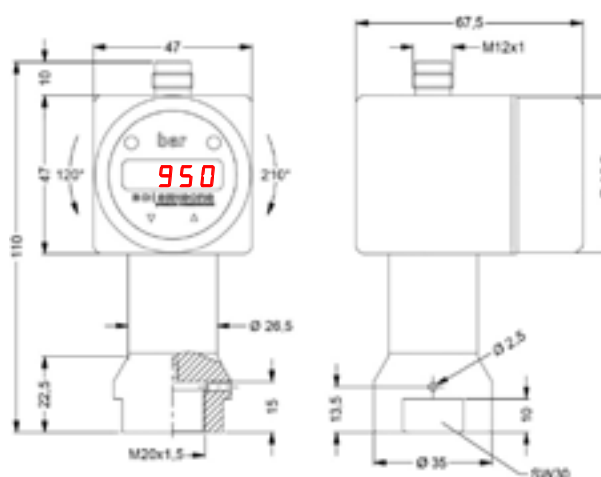
## Mechanical connections (dimensions in mm)

standard



G1/2" DIN 837

option



M 20 x 1,5 internal thread

DS 214		<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	<div></div>	-	<div></div>	<div></div>	-	<div></div>	<div></div>	
Pressure																							
	gauge	7	8	B																			
Input		[bar]																					
	600	1			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															
Analogue output																							
	without							0															
	4 ... 20 mA / 2-wire							1															
	0 ... 10 V / 3-wire							3															
	4 ... 20 mA / 3-wire, adjustable							7															
	customer							9															
Contact																							
	1 contact	2							1														
	2 contacts	2							2														
	4 contacts	3							4														
Accuracy																							
	0.35 %								3														
	customer								9														
Electrical connection																							
	Male plug M12x1 (5-pin) / plastic version									N	0	1											
	Male plug M12x1 (8-pin) / plastic version	3								M	5	0											
	Male plug M12x1 (5-pin) / metal version									N	1	1											
	Male and female plug ISO 4400	2								1	0	0											
	Male plug Binder series 723 (5-pin)									2	0	0											
	Cable outlet incl. cable	4								T	A	0											
	customer									9	9	9											
Mechanical connection																							
	G1/2" DIN 837	5											2	0	0								
	M20x1.5 internal thread												D	2	8								
	customer												9	9	9								
Seals																							
	without (welded version)																2						
	customer																9						
Special version																							
	standard																	0	0	0			
	customer																	9	9	9			

<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  $R_p > 260 \text{ N/mm}^2$  in accordance with DIN 17440. The maximum allowed pressure is 1600 bar!



# DS 400P

## Intelligent Electronic Pressure Switch Stainless Steel

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 / 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)
- ▶ hygienic version

### Optional versions

- ▶ **IS-version**  
**Ex ia = intrinsically safe for gases**
- ▶ 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 / beverage and pharmaceutical industry.

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. 2 contacts and an analogue output complete the profile.

### Preferred areas of use are



Food and Beverage



Pharmaceutical Industry

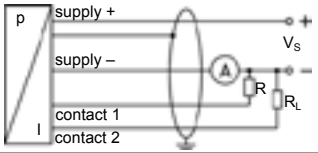
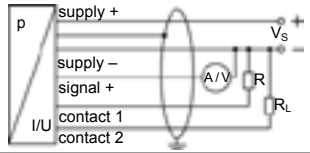
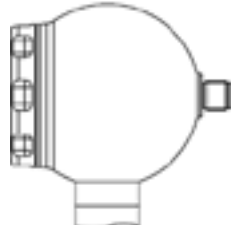
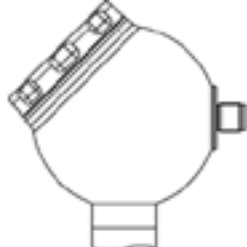


### Material and test certificates

- ▶ inspection certificate 3.1 according to EN 10204
- ▶ test report 2.2 according to EN 10204



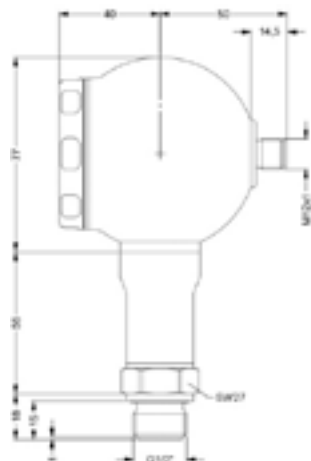
74-05

Input pressure range <sup>1</sup>																	
Nominal pressure gauge / abs.	[bar]	-1 ... 0	0.1	0.16	0.25	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: contact rating 125 mA, short-circuit resistant; V <sub>switch</sub> = V <sub>S</sub> – 2V 0 ... 10 V / 3-wire: contact rating 500 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 1: 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> = 13 ... 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	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 1: 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 silicon 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 silicon 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		silicon oil															
Optional		food compatible oil (with FDA approval) (Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662)											others on request				
Materials																	
Pressure port / Housing		stainless steel 1.4404 (316 L)											others on request				
Viewing glass		laminated safety glass															
Seals																	
Standard		FKM (recommended for medium temperatures ≤ 200 °C)															
Optional		FFKM (recommended for medium temperatures > 200 °C) Clamp, dairy pipe, Varivent®: without											others on request				
Diaphragm		stainless steel 1.4435 (316L)															
Media wetted parts		pressure port, seal, 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
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	in zone 0: -20 ... 60 °C with $p_{\text{atm}}$ 0.8 bar up to 1.1 bar in zone 1: -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, 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 x 10 <sup>8</sup> cycles
CE-conformity	EMC Directive: 2004/108/EC
Wiring diagrams	
<p>2-wire-system (current)</p> 	<p>3-wire-system (current / voltage)</p> 
Pin configuration	
Electrical connection	M12x1 metal (5-pin)
Supply +	1
Supply -	3
Signal + (only 3-wire)	2
Contact 1	4
Contact 2	5
Shield	plug housing / pressure port
Designs <sup>9</sup>	
Electrical connections (dimensions in mm)	
 <p>side display</p>	 <p>45° display (others on request)</p>
 <p>14,5</p>	 <p>M12x1 (5-pin)</p>
<sup>9</sup> all designs in horizontal rotatable housing as standard	

### Mechanical connections (dimensions in mm)

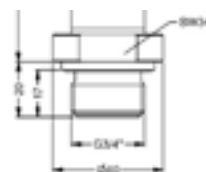
### Standard



G1/2" flush DIN 3852  
(PN ≥ 1 bar)

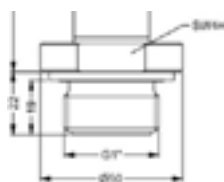


**Option**

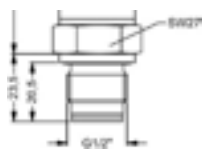


G 3/4" flush DIN 3852

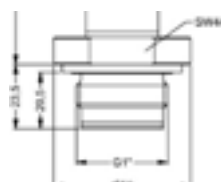
**Option**



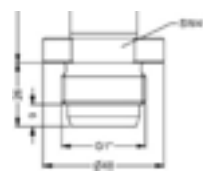
G1" flush DIN 3852



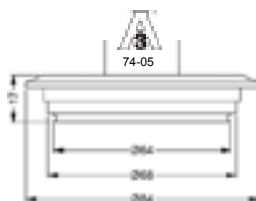
G1/2" flush  
with radial o-ring



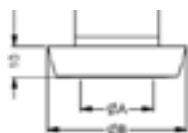
G1" flush  
with radial o-ring ( $P_N \leq 2$  bar)



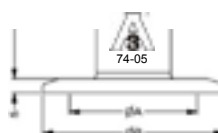
G1" cone



Varivent®  
PN ≤ 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
PN [bar]	≤ 40	≤ 40	≤ 25

dimension in mm				
size	¾"	DN 25	DN 32	DN 50
A	14	23	32	45
B	25	50.5	50.5	64
PN [bar]	≤ 8	≤ 16	≤ 16	≤ 16

⇒ metric threads and other versions on request

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 globe housing (side display)							K	H												
	Stainless steel globe 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											
	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 version									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					
	FFKM															7					consult
	customer															9					consult
<b>Filling Fluids</b>																					
	Silicon oil															1					
	food compatible oil (FDA)															2					
	customer															9					consult
<b>Special version</b>																					
	standard																	0	0	0	
	with cooling element up to 300°C																	2	0	0	
	customer																	9	9	9	consult

<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

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)

### 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. 4 contacts and an analogue output complete the profile.

### Preferred areas of use are



Food and Beverage



Pharmaceutical Industry

### Material and test certificates

- ▶ inspection certificate 3.1 according to EN 10204
- ▶ test report 2.2 according to EN 10204





Input pressure range <sup>1</sup>																
Nominal pressure (P <sub>N</sub> ) gauge / abs.	[bar]	-1 ... 0	0.10	0.16	0.25	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 500 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> = 13 ... 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: -40 ... 125 °C for filling fluid silicon 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 silicon 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		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		silicon oil														
Options		food compatible oil (with FDA approval) (Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662) others on request														
Materials																
Pressure port / Housing		stainless steel 1.4404 (316 L) others on request														
Display housing		PA 6.6, Polycarbonate														
Seals (media wetted) Standard Option		FKM (recommended for medium temperatures ≤ 200 °C) FFKM (recommended for medium temperatures > 200 °C) Clamp, dairy pipe, Varivent®: without others on request														
Diaphragm Standard Option		stainless steel 1.4435 (316 L) Hastelloy® C-276 (2.4819) Tantalum on request														
Media wetted parts		pressure port, seal, diaphragm														

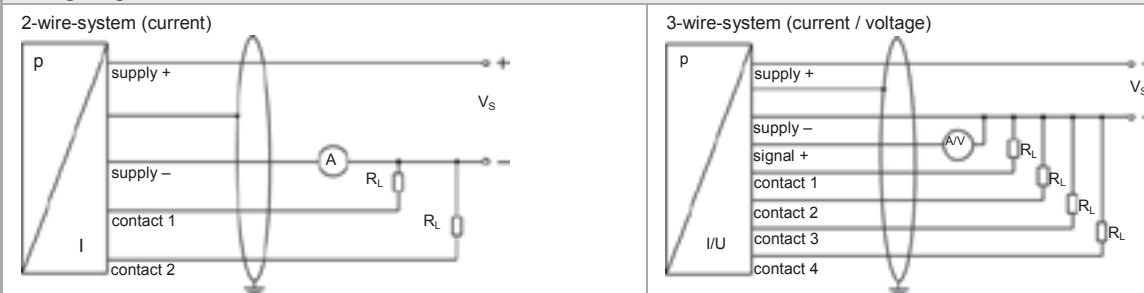
**Explosion protection (only for 4 ... 20 mA / 2-wire)**

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 (max. permissible inductivity: 4.7 mH)
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 $\mu\text{H}/\text{m}$

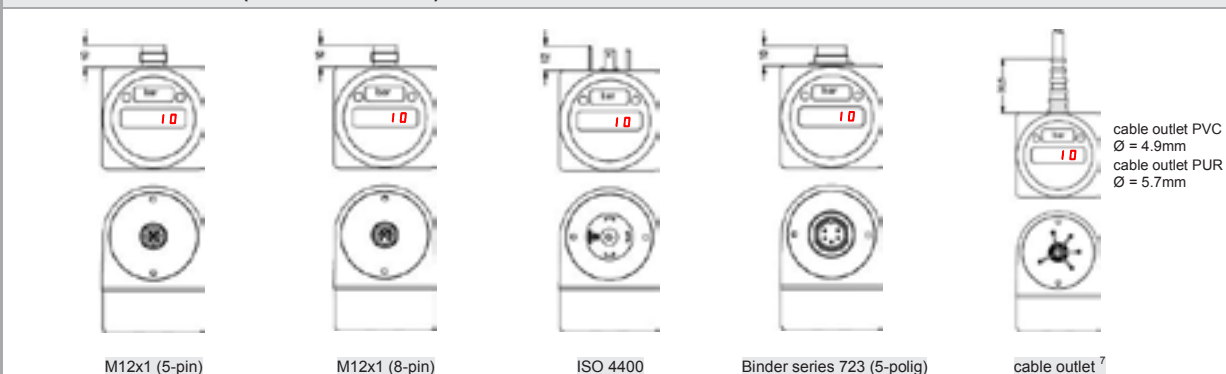
<sup>8</sup> the real switching current in the application depends on the power supply unit

**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 x 10 <sup>6</sup> cycles
CE-conformity	EMC Directive: 2004/108/EC

**Wiring diagrams****Pin configuration**

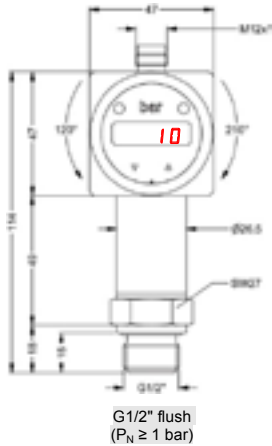
Electrical connection	M12x1 plastic (5-pin)	M12x1 metal (5-pin)	M12x1 plastic (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable colours (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/pressure port	via pressure port	ground contact	plug housing/pressure port	ye/gn (yellow / green)

**Electrical connections (dimensions in mm)**

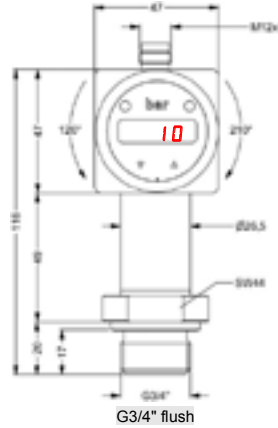
<sup>7</sup> different cable types and lengths available, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)

### Mechanical connections (dimensions in mm)

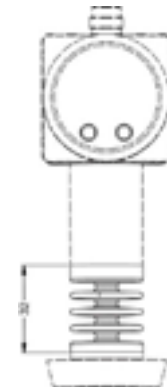
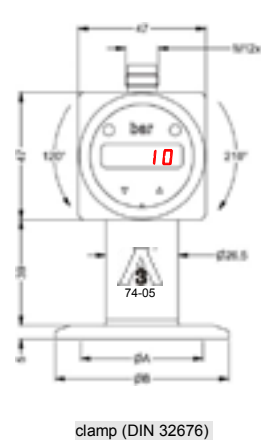
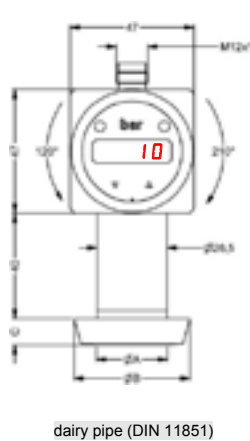
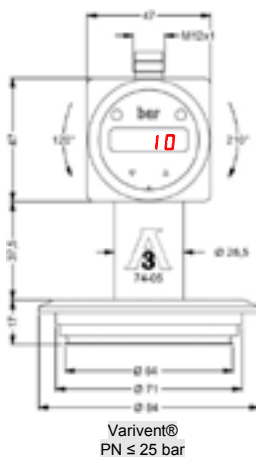
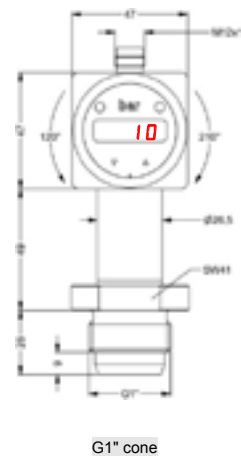
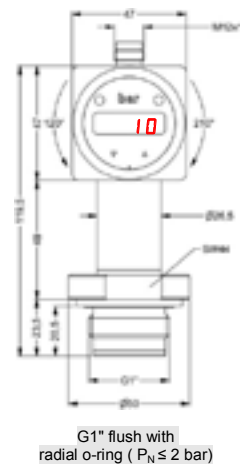
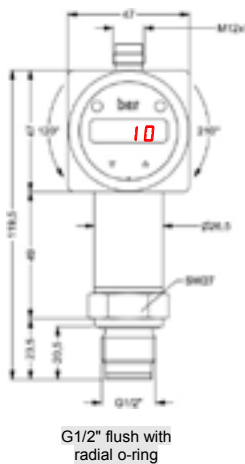
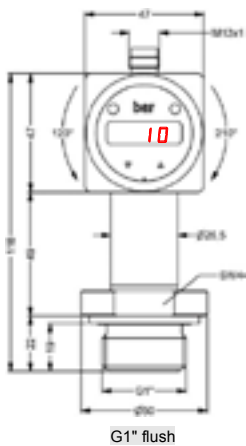
#### Standard



#### Option



#### Option



	dimension in mm		
size	DN 25	DN 40	DN 50
A	23	32	45
B	44	56	68.5
PN [bar]	≤ 40	≤ 40	≤ 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
PN [bar]	≤ 8	≤ 16	≤ 16	≤ 16

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

[illegible]

<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 only for  $P_N \geq 1$  bar

<sup>6</sup> possible only for  $P_N \leq 2$  bar

<sup>7</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.

*This document contains product specifications; properties are not guaranteed. Detailed information about options are defined in the datasheet. Subject to change without notice.*



# 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 nec-  
essary. This can be the case, for example, with  
higher viscous or slightly contaminated fluids.  
For usage with higher media temperature op-  
tionally a cooling element up to 300 °C is avail-  
able.

### 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: 0 ... 10 V / 3-Leiter: contact rating 125 mA, short-circuit resistant; $V_{\text{switch}} = V_S - 2V$ contact rating 500 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: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0.02 A] \Omega$ response time: < 10 msec
2-wire current signal with Ex-protection	4 ... 20 mA / $V_S = 13 \dots 28 V_{DC}$ permissible load: $R_{\text{max}} = [(V_S - V_{S \text{ min}}) / 0.02 A] \Omega$ 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: $R_{\text{max}} = 500 \Omega$ response time: < 0.5 sec
3-wire voltage signal	0 ... 10 V / $V_S = 15 \dots 36 V_{DC}$ permissible load: $R_{\text{min}} = 10 k\Omega$ 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 silicon 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 silicon 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	silicon oil
Optional	food compatible oil with FDA approval (Mobil DTE FM 32; Category Code: H1; NSF Registration No.: 130662) others on request

Materials	
Pressure port	stainless steel 1.4404 (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

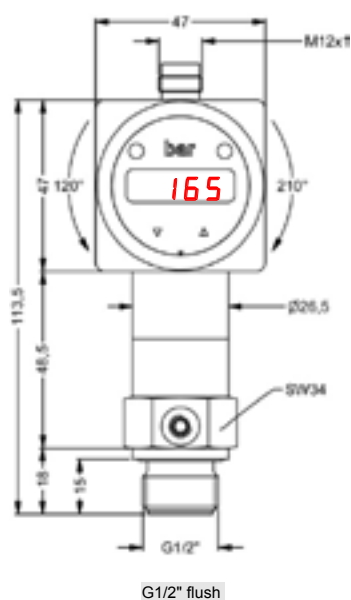
<sup>6</sup> for pressure ranges  $P_N \leq 100$  bar

Explosion protection (only for 4 ... 20 mA / 2-wire)						
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. permissible inductivity: 4.7 mH)					
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						
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)					
Weight	min. 200 g (depending on mechanical connection)					
Operational life	> 100 x 10 <sup>6</sup> cycles					
CE-conformity	EMC Directive: 2004/108/EC			Pressure Equipment Directive: 97/23/EC (module A) <sup>8</sup>		
ATEX Directive	94/9/EC					
<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 (DIN 47100)
Supply +	1	1	1	1	3	wh (white)
Supply -	3	3	3	2	4	bn (brown)
Signal + (only for 3-wire)	2	2	2	3	5	gn (green)
Contact 1	4	4	4	3	2	gy (grey)
Contact 2	5	5	5	-	1	pk (pink)
Contact 3	-	-	6	-	-	-
Contact 4	-	-	7	-	-	-
Shield	via pressure port	plug housing/ pressure port	via pressure port	ground contact	plug housing/ pressure port	ye/gn (yellow/green)
Electrical connections (dimensions in mm)						
M12x1 (5-pin)	M12x1 (8-pin)	ISO 4400	Binder series 723 (5-pin)	cable outlet <sup>9</sup>		
						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, permissible temperature depends on kind of cable; standard: 2 m PVC cable (without ventilation tube, permissible temperature: -5 ... 70 °C)						

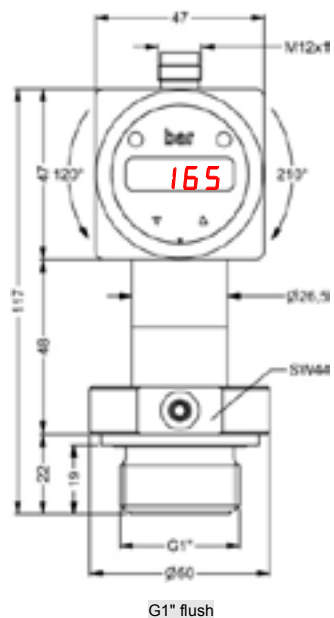
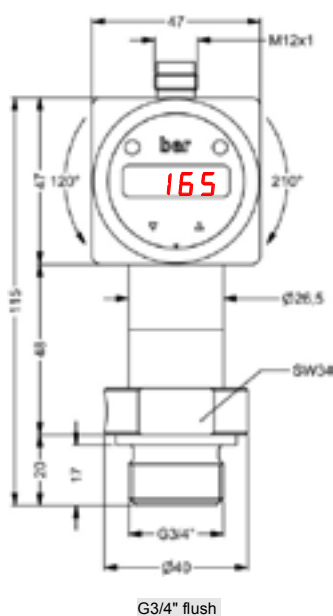


## Mechanical connection (dimensions in mm)

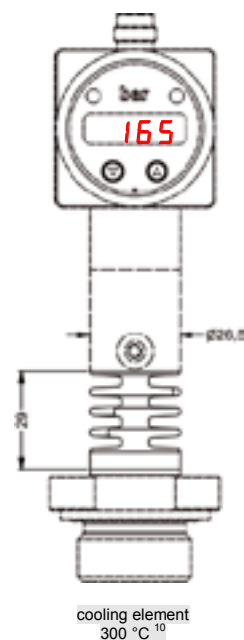
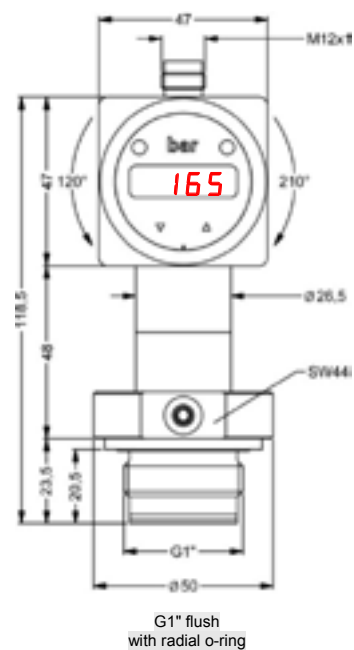
## Standard



## Optional



## Optional



⇒ metric threads and other versions on request

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



[illegible]

<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  $P_N \leq 100$  bar

<sup>6</sup> cooling element up to 300°C not possible for pressure range  $P_N > 160$  bar



# DS 217

## Pressure Switch with welded Stainless Steel Sensor

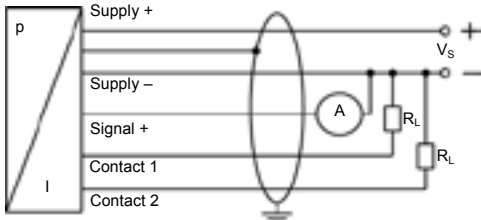
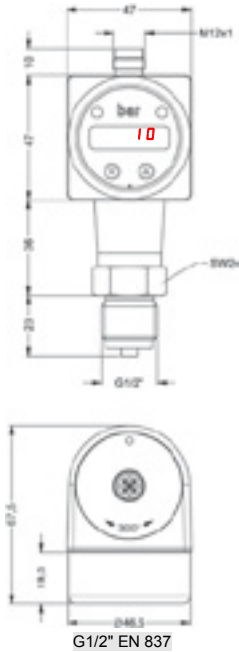

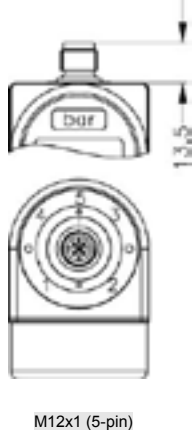
### Characteristics:

- ▶ 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]	14	35	35	70	140	140	350	350	700	1 200	1 200
Burst pressure ≥	[bar]	28	70	70	140	280	280	700	700	1 400	1 500	1 500
Vacuum resistance	unlimited											
Contact												
standard	1 PNP contact											
option	max. 2 independent PNP contact; 1 analogue output											
Switching current	standard: contact rating max. 500 mA, short-circuit resistant											
Accuracy of switching points <sup>1</sup>	≤ ± 1.5 % FSO											
Repeatability	≤ ± 0.5 % FSO											
Switching frequency	max. 10 Hz											
Switching cycles	> 100 x 10 <sup>6</sup>											
Delay time	0 ... 100 sec											
Analogue output (optionally) / Supply												
3-wire current signal	4 ... 20 mA / V <sub>S</sub> = 24 V <sub>DC</sub> ± 10 %											
Accuracy <sup>1</sup>	≤ ± 0.5 % FSO											
Permissible load	3-wire: R <sub>max</sub> = 500 Ω											
Influence effects	supply: 0.05 % FSO / 10 V								load:		0.05 % FSO / kΩ	
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	≤ ± 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	
CE-conformity	EMC Directive: 2004/108/EC	Pressure Equipment Directive: 97/23/EC (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)		
<div><div><p>G1/2" EN 837</p><p>G1/4" EN 837</p></div><div><p>Mechanical connections - optional</p><p>1/4" NPT</p></div><div><p>Electronical connections</p><p>M12x1 (5-pin)</p></div></div>		

DS 217		<div></div>	<div></div>	<div></div>	- <div></div>	<div></div>	<div></div>	<div></div>	- <div></div>	<div></div>	<div></div>	- <div></div>	<div></div>	<div></div>	- <div></div>	<div></div>	<div></div>	<div></div>
Pressure	gauge	7	8	P														
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
Analogue output																		
	without analogue output							0										
	4 ... 20 mA / 3-wire							7										
	customer							9										consult
Contact																		
	1 contact							1										
	2 contacts							2										
Accuracy	[IEC 60770]																	
standard	0.5 %							5										
	customer							9										consult
Electrical connection																		
	Male plug M12x1 (5-pin) / plastic version								N	0	1							
	customer								9	9	9							consult
Mechanical connection																		
	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						consult
Special version																		
	standard												0	0	0			
	oxygen application												0	0	7			</



# 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 <sub>s</sub>	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. 500 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								
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>Materials</b>	
Pressure port	stainless steel 1.4301
Housing	stainless steel 1.4301
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
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>2</sup>
<sup>2</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar	
<b>Wiring diagram</b>	
<b>Pin configuration</b>	
Electrical connection	M12x1 (5-pin), plastic
Supply +	1
Supply -	3
Signal +	2
Contact 1	4
Contact 2	5
Shield	via pressure port
<b>Dimensions (in mm)</b>	

This document contains product specifications; properties are not guaranteed. Subject to change without notice.

<b>DS 230</b>						[ ] [ ] [ ] - [ ] [ ] [ ] [ ] - [ ] - [ ] - [ ] - [ ] [ ] [ ] - [ ] [ ] [ ] - [ ] - [ ] [ ] [ ]
<b>Pressure</b>						
	gauge	7	8	R		
<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
<b>Analogue output</b>						
	without analogue output			0		
	4 ... 20 mA / 3-wire			7		
	customer			9		
<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



# 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

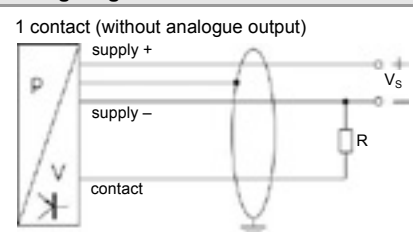
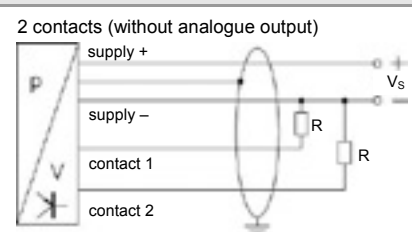
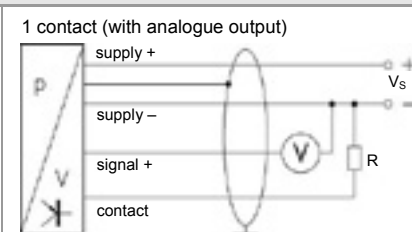
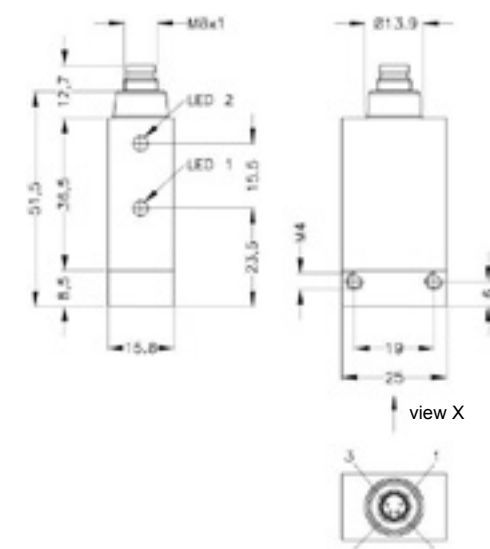
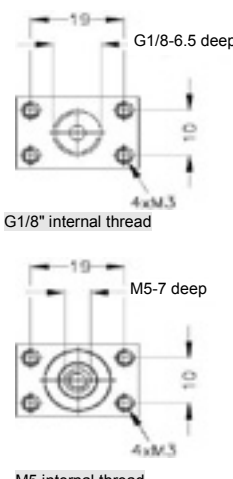


### Technical Data

Input pressure range					
Nominal pressure gauge	[bar]	-1 ... 0	1	3.5	10
Overpressure	[bar]	2	2	7	13
Supply					
Supply voltage V <sub>S</sub>	12 ... 30 V <sub>DC</sub>				
Current consumption	max. 14 mA (without contacts)				
Output signal					
Contact <sup>1</sup>					
Number	standard: 1		optional: 2		
Type	PNP				
Switching performance	max. 300 mA, short-circuit proof				
Accuracy of contacts <sup>2</sup>	≤ ± 1 % FSO				
Repeatability	≤ ± 0.2 % FSO				
Status indication	SP 1: green		SP 2: yellow		
Switching function <sup>3</sup>	standard: n/o		optional: n/c		
Switching mode <sup>3</sup>	standard: hysteresis mode		optional: 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 x 10 <sup>6</sup>				
Analogue output <sup>1</sup> (optionally)					
Analogue output	1 ... 5 V / 3-wire				
Accuracy	IEC 60770 <sup>3</sup> : ≤ ± 2 % FSO				
Permissible load	R <sub>min</sub> = 10 kΩ				

<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	$\pm 2\%$ FSO in compensated range 0 ... 50 °C		
TC, average	$\pm 0.4\%$ 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)		
Shock	100 g / 11 msec		
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. 25 bis 35 g		
Installation position	any		
Ingress protection	IP 54		
CE-conformity	EMC Directive: 2004/108/EC		
Wiring diagrams			
			
Pin configuration			
Electrical connection	M8x1 (4-pin) 1 contact	M8x1 (4-pin) 2 contacts	M8x1 (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	-
Dimensions (in mm)			
		<p><b>Mechanical connections (view X)</b></p>  <p>G1/8-6.5 deep</p> <p>G1/8" internal thread</p> <p>M5-7 deep</p> <p>M5 internal thread</p>	

## DS 4

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Pressure																								
	gauge	6	8	0																				
Input																								
	[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
Number of contacts																								
	1 contact								1															
	2 contacts <sup>1</sup>								2															
Analogue output																								
	without analogue output								0															
	1 ... 5 V / 3-wire <sup>1</sup>								C															
Electrical connection																								
	M8x1 (4-pin)								Q	0	0													
	customer								9	9	9													consult
Mechanical connection																								
	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
Seals																								
	NBR														5									
	customer														9									consult
Setting code																								
	BD SENSORS standard <sup>3</sup>														0	0	0							
	setting according to customer <sup>3</sup>														9	9	9							consult
Special version																								
	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
  - oxygen application



### Technical Data

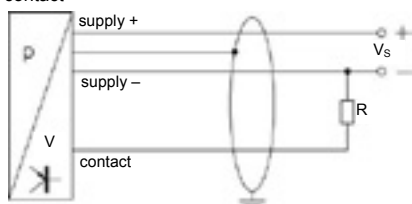
Input pressure range									
Nominal pressure gauge	[bar]	2	5	10	20	50	100	200	400
Nominal pressure abs.	[bar]	2	5	10	20	50	100	200	400
Overpressure	[bar]	7	12	25	50	120	250	400	600
Supply									
Supply voltage V <sub>S</sub>	12 ... 30 V <sub>DC</sub>								
Current consumption	max. 14 mA (without contacts)								
Contacts									
Number	standard: 1				optional: 2				
Type	PNP								
Switching performance	max. 300 mA, short-circuit proof								
Accuracy of contacts	IEC 60770: ≤ ±1 % FSO								
Repeatability	≤ ± 0.2 % FSO								
Minimum hysteresis of contacts	≤ ± 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 x 10 <sup>6</sup>								
<sup>1</sup> Parameters can be programmed by customer either with the programming kit CIS 685 / CIS 686 or with the programming device P6 (available as accessories).									
Thermal effects (Offset and Span) / Permissible temperatures									
Thermal error	≤ ± 0.3 % FSO / 10 K				in compensated range -25 ... 85 °C				
Permissible temperatures	medium / 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 (20 ... 2000 Hz)
Shock	100 g / 11 msec
<b>Materials</b>	
Pressure port	stainless steel 1.4305
Housing	stainless steel 1.4305, POM black
Seals (media wetted)	Standard: FKM optional: EPDM, NBR
Diaphragm	ceramic Al <sub>2</sub> O <sub>3</sub> 96 %
Media wetted parts	pressure port, seals, diaphragm
<b>Miscellaneous</b>	
Option oxygen application	for $P_N \leq 15$ bar: O-ring in 70 EPDM 281 (with BAM-approval); permissible maximum values are 15 bar / 60° C and 10 bar / 90° C for $P_N \leq 25$ bar: O-ring in FKM Vi 567 (with BAM-approval); permissible maximum values are 25 bar / 150° C
Weight	approx. 90 g
Installation position	any
Ingress protection	IP 67
CE-conformity	EMC Directive: 2004/108/EC Pressure Equipment Directive: 97/23/EC (module A) <sup>2</sup>

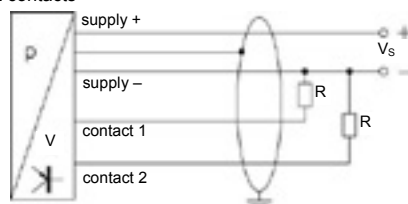
<sup>2</sup> This directive is only valid for devices with maximum permissible overpressure > 200 bar

#### Wiring diagrams

1 contact



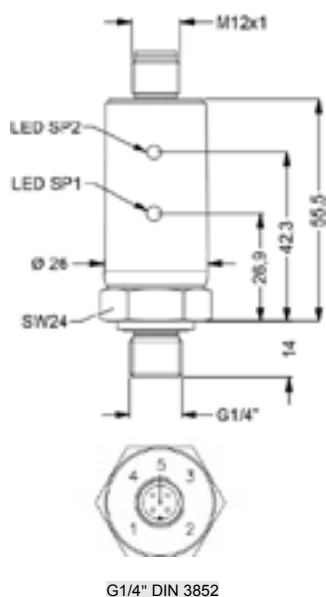
2 contacts



#### Pin configuration

Electrical connection	M12x1 (5-pin)
Supply +	1
Supply -	3
Contact 1	4
Contact 2	5
Shield	plug housing

#### Dimensions (in mm)



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Pressure																		
	gauge	6	8	5														
	absolute	6	8	6														
Input																		
	[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										consult
Number of contacts																		
	1 contact							1										
	2 contacts							2										
Analogue output																		
	without analogue output							0										
Electrical connection																		
	M12x1 (5-pin)							N	1	1								
	customer							9	9	9								consult
Mechanical connection																		
	G1/4" DIN 3852								3	0	0							
	customer								9	9	9							consult
Seals																		
	FKM									1								
	EPDM									3								
	NBR									5								
	customer									9								consult
Setting code																		
	BD SENSORS standard <sup>1</sup>									0	0	0						
	setting according to customer <sup>1</sup>									9	9	9						consult
Special version																		
	standard												0	0	0			
	oxygen application <sup>2</sup>												0	0	7			
	oil and grease free												0	0	8			
	customer												9	9	9			consult

<sup>1</sup> Parameters can be programmed by customer either with the programming kit CIS 685 / CIS 686 or with the programming device P6 (available as accessories).

<sup>2</sup> oxygen application with FKM-seal up to 25 bar or with EPDM-seal up to 15 bar possible, flush version on request

## COMPETENCE

Industrial pressure measurement technology from 0.1 mbar up to 6000 bar

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

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pressure measurement at the highest level

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	medical technology
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	pharmaceutical industry
	marine / shipbuilding / offshore
	heavy industry
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	aggressive media
	colours
	gases
	fuels and oils
	pasty and viscous media
	oxygen
	water



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