BD|SENSORS®
pressure measurement

DS 210

Electronic Pressure Switch with Silicon Sensor

- up to 4 independent contacts, configurable
- optional:
  - analogue output
  - Ex-protection (for 2-wire)
- nominal pressure ranges
  from 0 ... 10 mbar
  up to 0 ... 1 bar
  and vacuum –1 ... 0 bar

Description

The electronic pressure switch DS 210 is the successful combination of

- intelligent pressure switch
- digital display.

Compared to the universally used basic type DS 200, the DS 210 has a silicon sensor instead of a stainless steel sensor. Thus, the DS 210 is most suitable for pneumatics and vacuum technology, as well as for measurement of very small pressure. Media to be measured can be gases, compressed air, as well as thin, non-aggressive liquids. As standard the DS 210 offers a PNP contact; optionally, depending on the version, the device could be equipped with max. four contacts as well as an analogue output.

Operation

The rotatable display module shows the system pressure and allows programming. The configuration is menu controlled and easy to handle without previous knowledge.

Applications

- vacuum applications
- pneumatics
- filter technology

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)
- option analogue output:
  - 4 ... 20 mA / 2-wire
    Ex-protection optionally
  - 4 ... 20 mA / 3-wire
    with turn-down 1:5
  - 0 ... 10 V / 3-wire
- special functions (access protection, min. / max. value memory)
- industrial standard in view of accuracy, thermal behaviour and long term stability

CE Ex

DS 210 Electronic Pressure Switch

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Input pressure range											
Nominal pressure gauge [mbar]	-1000 ... 0	10	20	40	60	100	160	250	400	600	1000
Permissible overpressure [mbar]	3000	60	60	300	300	300	1000	1000	1000	3000	3000

Contact [1]			
Standard	1 PNP contact		
Options	2 independent PNP contacts 4 independent PNP contacts (possible with M12x1, 8-pin for 4 ... 20 mA/3-wire; 0 ... 10 V/3-wire on request)		
Max. switching current	4 ... 20 mA / 2- and 3-wire: contact rating 125 mA, short-circuit resistant; $V_{switch} = V_S - 2V$ 0 ... 10 V / 3-wire: contact rating 500 mA, short-circuit resistant		
Accuracy of contacts		IEC 60770	BFSL
	nominal pressure > 100 mbar:	≤ ± 0.35 % FSO	≤ ± 0.175 % FSO
	nominal pressure ≤ 100 mbar:	≤ ± 0.50 % FSO	≤ ± 0.250 % FSO
Repeatability	≤ ± 0.1 % FSO		
Switching frequency	max. 10 Hz		
Switching cycles	> 100 x 10^6		
Delay time	0 ... 100 sec		

[1] 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 voltage signal with plug ISO 4400

Analogue output (optionally) / Supply			
2-wire current signal	4 ... 20 mA / V_S = 18 ... 41 V_{DC} permissible load: $R_{max} = [(V_S - V_{S\,min}) / 0{,}02]\ \Omega$		response time: < 5 msec
2-wire current signal with Ex-protection	4 ... 20 mA / V_S = 17 ... 28 V_{DC} permissible load: $R_{max} = [(V_S - V_{S\,min}) / 0{,}02]\ \Omega$		response time: < 5 msec
3-wire current signal	4 ... 20 mA / V_S = 19 ... 30 V_{DC} adjustable (turn-down of span max. 1:5) [2] permissible load: R_{max} = 500 Ω		response time: < 1 sec
3-wire voltage signal	0 ... 10 V / V_S = 15 ... 36 V_{DC}	permissible load: R_{min} = 10 kΩ	response time: < 5 msec
without analogue output	V_S = 15 ... 36 V_{DC}		
Accuracy		IEC 60770 [3]	BFSL
	nominal pressure > 100 mbar:	≤ ± 0.35 % FSO	≤ ± 0.175 % FSO
	nominal pressure ≤ 100 mbar:	≤ ± 0.50 % FSO	≤ ± 0.250 % FSO

[2] with turn-down of span the analogue signal is adjusted automatically to the new measuring range
[3] accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)

Thermal error (offset and span) / Permissible temperatures				
Nominal pressure P_N [mbar]	-1000 ... 0	≤ 100	≤ 400	> 400
Tolerance band [% FSO]	≤ ± 0.75	≤ ± 1.5	≤ ± 1	≤ ± 0.75
TC, average [% FSO / 10 K]	0.08	0.15	0.12	0.08
in compensated range [°C]	0 ... 60			
Permissible temperatures	medium: -25 ... 90 °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	5 g RMS (20 ... 2000 Hz)
Shock	100 g / 11 msec

Materials	
Pressure port	stainless steel 1.4571 (316Ti)
Housing	stainless steel 1.4301 (304)
Display housing	PA 6.6, Polycarbonate
Seals (media wetted)	FKM
Sensor	stainless steel 1.4305 (303), RTV, ceramics Al_2O_3, silicon
Media wetted parts	pressure port, seals, sensor

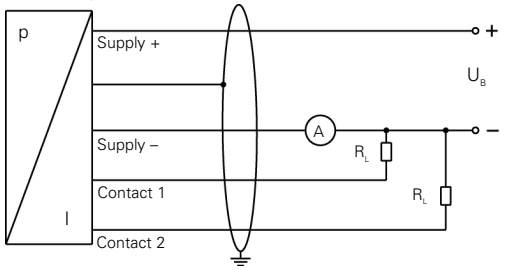
Explosion protection (for 2-wire current signal with Ex-protection)	
Approval AX11-DS 210	zone (0) 1: II (1) 2 G Ex ia IIC T4
Safety technical maximum values	U_i = 28 V, I_i = 93 mA, P_i = 660 mW
Max. switching current [4]	70 mA (max. permissible inductivity: 4.7 mH)
Permissible temperatures for environment	-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 µH/m

[4] the real switching current in the application depends on the power supply unit

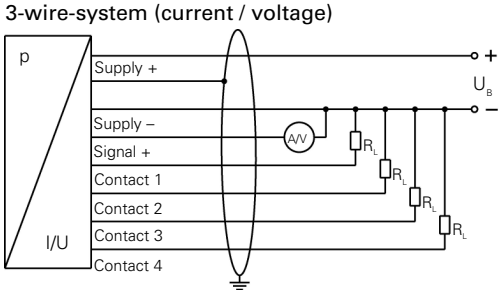
Miscellaneous	
Display	4-digit, red 7-segment-LED display, digit height 7 mm, range of indication -1999 ... +9999; accuracy 0.1 % ± 1 digit; digital damping 0.3 ... 30 sec (programmable); measured value update 0.0 ... 10 sec (programmable)
Current consumption (without contacts)	2-wire signal output current: 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 10^6 cycles

Wiring diagrams

2-wire-system (current)



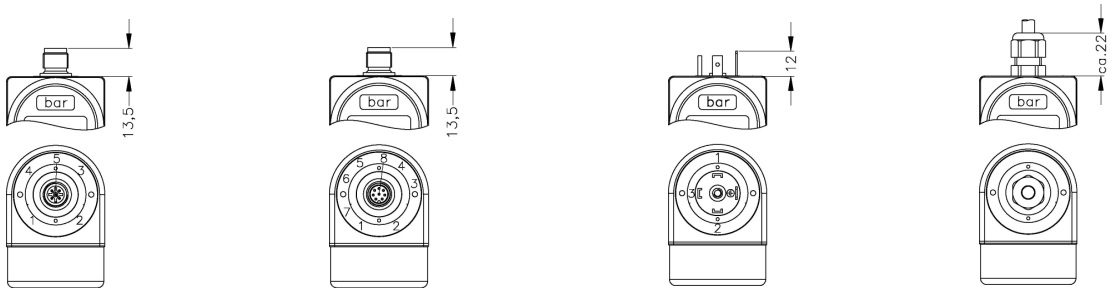
3-wire-system (current / voltage)



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	white
Supply –	3	3	3	2	brown
Signal + (only 3-wire)	2	2	2	3	green
Contact 1	4	4	4	3	grey
Contact 2	5	5	5	-	pink
Contact 3	-	-	6	-	-
Contact 4	-	-	7	-	-
Ground	via pressure port	plug housing / pressure port	via pressure port	ground contact	yellow / green (shield)

Electrical connections (dimensions in mm)

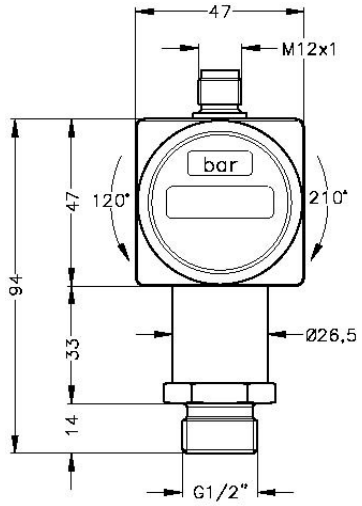


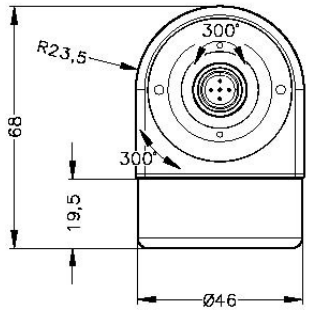
M12x1 (5-pin) | M12x1 (8-pin) | ISO 4400 | cable gland [5]

[5] *different cable types and lengths available; standard: 2 m PVC cable (without ventilation tube)*

Mechanical connections (dimensions in mm)

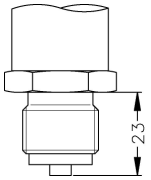
Standard



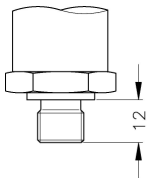


G1/2“ DIN 3852
M20x1.5

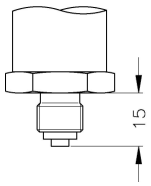
Options



G1/2“ EN 837
M20x1.5



G1/4“ DIN 3852
M10x1
M12x1
M12x1.5



G1/4“ EN 837

⇨ Ex-protection: total length increases by 20 mm!

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Ordering code DS 210

DS 210 ☐☐☐-☐☐☐☐-☐-☐-☐-☐☐☐-☐☐☐-☐-☐☐☐

	Code	
Pressure		
gauge	7 8 A	
Input [mbar]		
10	0 1 0 0	
20	0 2 0 0	
40	0 4 0 0	
60	0 6 0 0	
100	1 0 0 0	
160	1 6 0 0	
250	2 5 0 0	
400	4 0 0 0	
600	6 0 0 0	
1000	1 0 0 1	
-1000 … 0	X 1 0 2	
customer	9 9 9 9	on request
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 [1]	E	
customer	9	on request
Contact		
1 contact [1, 2]	1	
2 contacts [1, 2]	2	
4 contacts [3]	4	
Accuracy		
standard for $P_N > 0{,}1$ bar 0,35 %	3	
standard for $P_N \leq 0{,}1$ bar 0,5 %	5	
customer	9	on request
Electrical connection		
M12x1 (5-pin) / plastic version	N 0 0	
M12x1 (8-pin) / plastic version [3]	M 5 0	
M12x1 (5-pin) / metal version	N 1 0	
Male and female plug ISO 4400 [2]	1 0 0	
Cable gland incl. cable [4]	4 0 0	
customer	9 9 9	on request
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	
customer	9 9 9	on request
Seals		
FKM	1	
customer	9	on request
Special version		
standard	0 0 0	
customer	9 9 9	on request

[1] with Ex version max. 1 contact is possible
[2] with connector ISO 4400 and output 2-wire version only max. 1 contact possible; with 3-wire version no contact possible
[3] 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
[4] different cable types and lengths deliverable, standard: 2 m PVC cable without ventilation tube, optionally cable with ventilation tube

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