



DS 401

Intelligent Electronic Pressure Switch in rugged stainless steel housing



- ▶ ceramic sensor
- ▶ up to 2 independent contacts, freely configurable
- ▶ optionally:
 - analogue output
 - Ex-protection (for 2-wire)
 - oxygen application
- ▶ nominal pressure ranges
from 0 ... 600 mbar
up to 0 ... 600 bar

Description

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.

Operation

The display module, which is mounted rotatable in the ball housing, indicates the system pressure and allows programming. The configuration is menu controlled and easy to handle without previous knowledge.

Applications

- ▶ environmental engineering
- ▶ chemical industry and pharmacy
- ▶ oxygen applications

- ▶ 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:
 - 3-wire version:
4 ... 20 mA or 0 ... 10 V
with turn-down 1:6
 - 2-wire version:
4 ... 20 mA
Ex-protection optionally
- ▶ special functions (access protection, min. / max. value memory)
- ▶ industrial standard in view of accuracy, thermal behaviour and long term stability

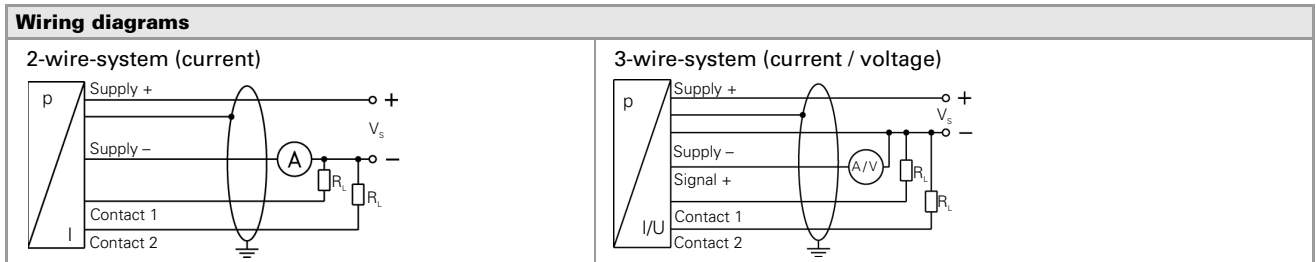
Characteristics



DS 401
Electronic Pressure Switch

Input pressure ranges ¹									
Nominal pressure gauge / abs. [bar]	-1...0	0.6	1	1.6	2.5	4	6	10	16
Level gauge [mH ₂ O]	-	6	10	16	25	40	60	100	160
Permissible overpressure [bar]	3	3	3	7	7	12	12	25	50
Nominal pressure gauge / abs. [bar]	25	40	60	100	160	250	400	600	
Level gauge [mH ₂ O]	250	400	600	-	-	-	-	-	-
Permissible overpressure [bar]	50	120	120	250	500	500	600	750	
¹ nominal pressure range abs. from 0.6 bar									
Contact ²									
Number, type	standard: 1 PNP contact option: 2 independent PNP contacts								
Max. switching current	2-wire: contact rating 125 mA, short-circuit resistant; $V_{\text{Switch}} = V_s - 2V$ 3-wire: contact rating 500 mA, short-circuit resistant								
Accuracy of contacts	IEC 60770: $\leq \pm 0.5\%$ FSO					BFSL: $\leq \pm 0.25\%$ FSO			
Repeatability	$\leq \pm 0.2\%$ FSO								
Switching frequency	2-wire: max. 10 Hz			/ 3-wire: 50 Hz					
Switching cycles	$> 100 \times 10^6$								
Delay time	0 ... 100 s								
² with Ex-protection max. 1 contact possible									
Analogue output (optionally) / Supply									
2-wire current signal	4 ... 20 mA / $V_s = 18 \dots 41 V_{\text{DC}}$ permissible load: $R_{\text{max}} = [(V_s - V_{s,\text{min}}) / 0.02] \Omega$					response time: < 10 ms			
2-wire current signal, Ex-protection	4 ... 20 mA / $V_s = 17 \dots 28 V_{\text{DC}}$ permissible load: $R_{\text{max}} = [(V_s - V_{s,\text{min}}) / 0.02] \Omega$					response time: < 10 ms			
3-wire current signal	4 ... 20 mA / $V_s = 24 V_{\text{DC}} \pm 10\%$ adjustable (turn-down of span 1:6) ³ permissible load: $R_{\text{max}} = 500 \Omega$					response time: < 30 ms			
3-wire voltage signal	0 ... 10 V / $V_s = 24 V_{\text{DC}} \pm 10\%$ adjustable (turn-down of span 1:6) ³ permissible load: $R_{\text{min}} = 10 \text{ k}\Omega$					response time: < 30 ms			
Without analogue output	$V_s = 15 \dots 36 V_{\text{DC}}$								
Accuracy	IEC 60770 ⁴ : $\leq \pm 0.5\%$ FSO					BFSL: $\leq \pm 0.25\%$ FSO			
³ with turn-down of span the analogue signal is adjusted automatically to the new measuring range									
⁴ accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)									
Thermal errors (offset and span) / Permissible temperatures									
Thermal errors	$\leq \pm 0.2\%$ FS / 10 K in compensated range -25 ... 85 °C								
Permissible temperatures ⁵	medium: -25 ... 135 °C			electronics / environment: -25 ... 85 °C			storage: -40 ... 85 °C		
⁵ for pressure port of PVC the maximum permissible temperature is 50 °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 / housing	Standard: Option for G1/2" open port (up to 60 bar): Options for G 3/4" flush (0.6 bar $\leq P_N \leq 25$ bar):					pressure port	housing		
						stainless steel 1.4571 PVDF ⁶ PVDF ⁶ PVC grey ⁶	stainless steel 1.4301 stainless steel 1.4301 PVDF PVC grey		
Display housing	stainless steel 1.4301 (304)								
Viewing glass	laminated safety glass								
Seals (media wetted)	$P_N < 100$ bar: FKM / $P_N \geq 100$ bar: NBR / others on request								
Diaphragm	ceramics Al ₂ O ₃ 96 %								
Media wetted parts	pressure port, seals, diaphragm								
⁶ not possible with Ex-protection									

Explosion protection (optionally for 4 ... 20 mA / 2-wire)	
Approval AX14-DS 401	zone 0: II 1 G EEx ia IIC T4
Safety technical maximum values	$U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$
Max. switching current ⁷	70 mA
Permissible temperatures for environment	in zone 0: -20 ... 60 °C with p_{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: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H}/\text{m}$
⁷ 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)
Optionally oxygen application ⁸	for $P_N \leq 50 \text{ bar}$: O-ring in V747-75 (with BAM-approval); permissible maximum values are 40 bar / 130° C and 50 bar / 100° C for $P_N > 50 \text{ bar}$: O-ring in FKM 90 (approved by the scientific coal research institute in Ostrava – CZ) up to max. 215 bar / 95 °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 ⁶ pressure cycles
⁸ not possible with flush pressure ports	



Pin configuration		
Electrical connections	M12x1 metal (5-pin)	cable colour (DIN 47100)
Supply +	1	white
Supply -	3	brown
Signal + (only 3-wire)	2	green
Contact 1	4	grey
Contact 2	5	pink
Ground	plug housing / pressure port	yellow / green (shield)

