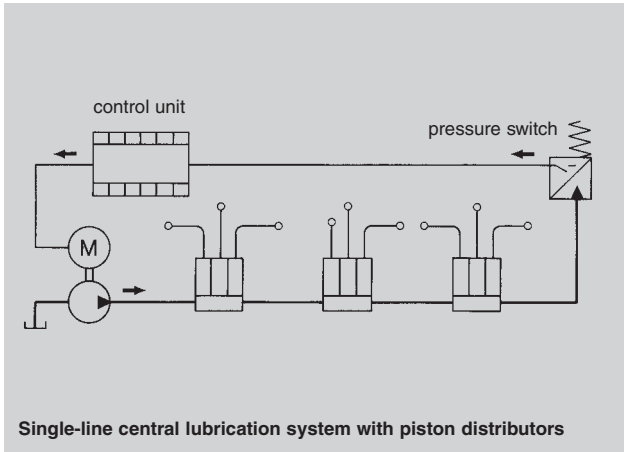


Pressure Switches

1-1701-US

for central lubrication, hydraulic and compressed air systems



Pressure switches are responsible for monitoring the pressure a system needs in order to function. The pressure switch is an important monitoring element in central lubrication systems. It is used to keep an eye on the following:

- the functions of the pump unit (pressure build-up and relief)
- the functioning of the directional control valve in the case of zoned central lubrication systems
- filter functions (clogging)
- the tubing
- air in the central lubrication system (leaks, seals).

The amount of time elapsing between the point at which the pump unit or directional control valve is actuated in order to fill the central lubrication system and the point at which the pressure switch responds is an important indicator of whether the central lubrication system is working faultlessly. In the opposite case, the time elapsing between the point at which the unit is switched off and the point

at which minimal pressure is reached is an important indicator of the system's pressure relief. So, preferentially, the pressure switch should be located at the end of a total-loss central lubrication system.

The electrical signal from the pressure switch is evaluated by the central lubrication system's control unit or the machine's control system and can, for example, be used for maintenance-related jobs or to shut down the machine.

A number of pressure switches are available for this task. They are listed in the following overview.

Important criteria for the selection are:

- the hydraulic characteristics of the pressure switch
- the electrical data
- the fluid
- demands made on switching frequency and service life.

Group	Type	Switching pressure range	Switching pressure	Electrical limit values	Type of contact or signal output	Fig.
DS-W	Membrane of NBR or FPM	1 ... 30	nonadjustable	30 - 250 V AC	microswitch changeover contact	1
DS-EP-40-D-2 with display of pressure and switching states by LED's	Stainless steel pressure sensor with piezoresistive sensor element	0.6 ... 40	2 switching pressures separately adjustable ¹⁾	10 - 32 V DC	electronic PNP transistor switching stages	2
176-...-...	Membrane of NBR	0.2 ... 45	nonadjustable	max. 42 V 30 VA	mechanical snap-action contact NO or NC type	3, 4
		1 ... 50	adjustable	5 - 24 V DC gold contact 1 W	changeover contact	5

¹⁾ Each of the 2 outputs has an adjustable switching and release point.



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Pressure switch, Group DS-W

(Nonadjustable pressure switch)

The pressure switches comprising this Group are designed for wall mounting. The switching element (changeover contact) is installed in an impervious plastic housing. When the switching pressure is reached, it is actuated by a pin connected to a spring-loaded membrane. The switching pressure is set at the factory and is nonadjustable.

The electric power is connected via standardized connectors; conforming either to DIN 43650-AM3 (3-pole cube plug) or to DIN 43651 (circular connectors conforming to car makers' regulations).

Cables are connected to swivel in 4 directions in the case of connection conforming to DIN 43 650 and in 7 directions in the case of connection conforming to DIN 43651.

When inductive loads are switched off, interference suppression circuits (RC elements or varistors) can limit voltage peaks and thus increase the contacts' service life (spark quenching).

Please note! An incorrectly dimensioned interference suppression circuit can cause greater wear than none at all. The following guideline value applies to the dimensioning: 1 µF per ampere of switching current for the capacitor C and resistor R, roughly equal to the DC resistance of the switched coil. However, it is always absolutely necessary to test the interference suppression circuit with measurements.

The DIN 43235 standards sheet provides information on the exact calculations to be performed for overvoltage limitation elements in DC networks.

When the pressure-switch signal is evaluated by external control systems (PLC or the like), pay attention to the limit values indicated for the switching contact. If the switch is to be operated outside its limit values, please indicate the same when ordering.

Technical data

Contact load, max.	125 VA
Switching voltage, min. / max.	30 V AC / 250 V AC
Switching current, min. / max.	0.1 A / 0.3 A
Perm. operating pressure	cf. table
Rated switching pressure	cf. table
Operating temperature, max.	+60 °C
Type of contact	changeover
Switching frequency	30/min
Mechanical life	more than 10 ⁷ switching operations
Type of enclosure (with line socket) ¹⁾	IP 65
Housing material	polyamide
Switch module	Cu Zn 40 Pb 2
Membrane	NBR ²⁾
Fluid	mineral oils and oiled compressed air
Mounting position	any

The results of a prototype test by the BERLIN BRANDENBURG Technical Inspectorate are available for this Group.

Order No. plug connector ⁴⁾ to DIN 43650-AM 3	Rated switching pressure non- adjustable [bars]	Perm. operating pressure ³⁾
DS-W1-2	1 +0.3 -1.5	45
DS-W2-2	2 +0.5 -1.5	
DS-W3-2	3 -0.5 -1.5	
DS-W5-2	5 ± 0.5	
DS-W8-2	8 +0.5 -1.5	
DS-W12-2	12 +0.5 -1.5	
DS-W20-2	20 +0.5 -1.5	
DS-W25-2	25 +0.5 -1.5	
DS-W30-2	30 +0.5 -1.5	
DS-WA3-2	3 falling	45

¹⁾ If sealed by conduit-thread clamping screw to DIN 46320.

²⁾ Also available as special model in FPM.

³⁾ A safety valve has to be provided for in the system to keep the maximum permissible pressure from being exceeded.

⁴⁾ Sockets must be ordered separately.

Pressure switch DS-W.-2

Plug connector to DIN 43650-AM3

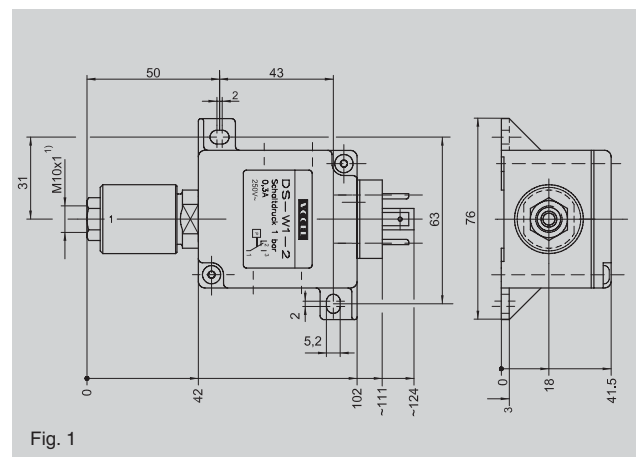


Fig. 1

¹⁾ Ports tapped for solderless ø6 mm diam. tube connection

Electronic pressure switch Group DS-EP-40-D-2

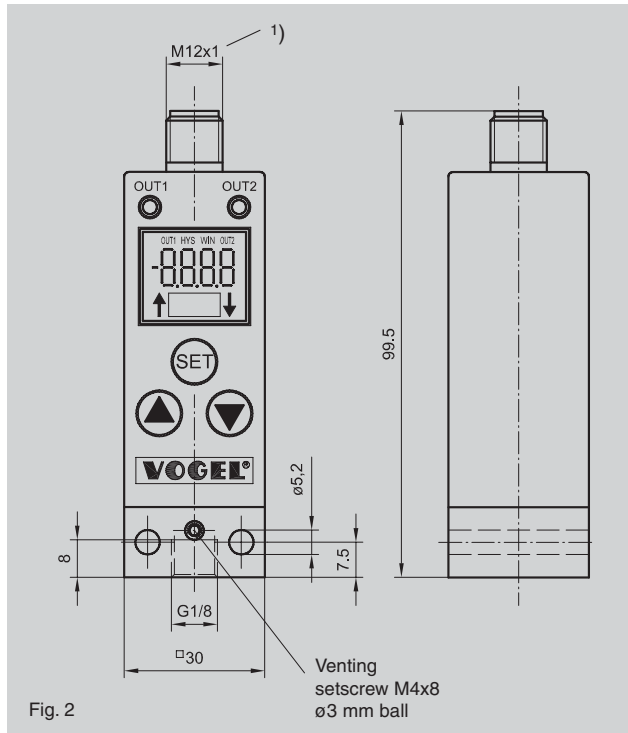
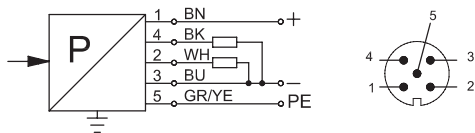


Fig. 2

1) DIN-EN 60947/IEC 947

Electrical connection



Pin	Function	Color coding *)
1	(+)	brown (BN)
2	Output 2	white (WH)
3	(-)	blue (BU)
4	Output 1	black (BK)
5	PE	green/yellow (GR/YE)

*) If a precut cable with socket is used (cf. accessories).

Technical data

General characteristics

Rated pressure range	0 - 40 bars
Permissible overpressure	100 bars
Rupture pressure	> 150 bars
Display format	4-place, 7-segment-LCD
Display resolution	0.1 bar
Switching state display	2xLED
Ambient temperature	- 10 to + 80 °C
Fluid temperature	- 10 to + 60 °C
Service life	100x10 ⁶ pressure changes
Pressure port	G 1/8, stainless steel 1.4571
Housing material	aluminum
Mounting position	any
Vibration resistance	~ 10 g/0 - 500 Hz
EMC	EN50081-1, EN 50082-2

Deviation from upper limit of effective range

Overall accuracy	< ± 1%
Switching point accuracy	< ± 1%
Linearity	< 0.2% ± 1 Digit
Temperature drift - zero point	< ± 0.4%
Temperature drift - span	< ± 0.4%

Electrical characteristics

Rated input voltage	24 VDC
Operating voltage	10 - 32 VDC
Current consumption without load current	< 50 mA
Number of signal outputs	2
Type of signal outputs	PNP- transistor stages
Loading capacity per output	max. 0.5 mA
Protection against polarity reversal, short circuits	yes and overloads
Electrical connection	M12x1plug, 5-pole type

Programmable settings

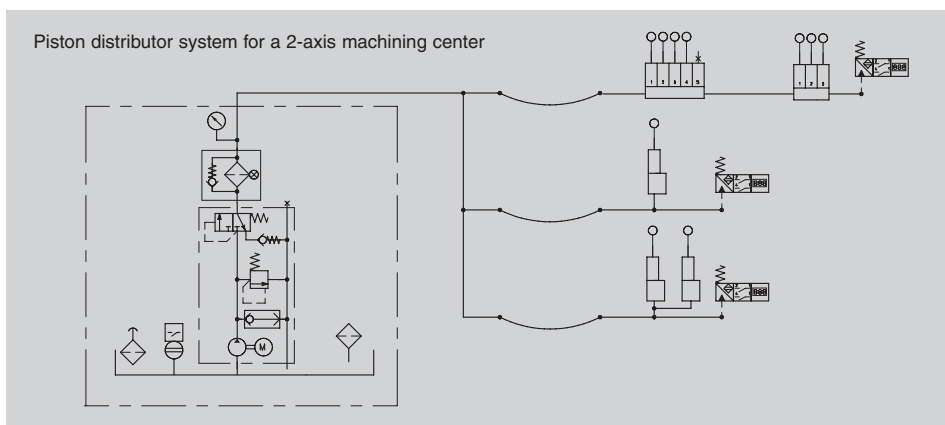
Switching point per output	0 - 40 bars
Release point per output	0 - 40 bars
Setting increment	0.2 bar steps
Switching function per output	NC or NO type
Damping / filter time	5 ms - 0.64 s
ON and OFF delay	0 - 20 s
Pressure units	bars, Psi, MPa
Mode per output	standard mode hysteresis mode window mode

Accessories:

- Connection cable with socket (straight), 5-pole type, length 5 m, **Order No. DS-E.U3**
- Socket (angled), **Order No. 179-990-660**

Practical example

The piston distributors for the individual axes are connected by hoses (cf. example). It is advisable to install a pressure switch at the end of each branch line in order to have any hose defect signaled at an early point in time.



Pressure switches, Group 176-...-...

Version with screw-type terminal screwed directly into the tubing.

Circuit closer (NO type) Order No.	Circuitopener (NC type) Order No.	Changeover Order No.	Rated switching pressure [bars]	Fig.
			nonadjustable	
176-110-101	-		0.2 ^{+0.2} _{-0.1}	3
176-110-100	176-120-100		0.5 ^{+0.3} _{-0.1}	3
176-110-102	176-120-102		1 ± 0.2	3
176-110-120	-		1.2 ± 0.5	3
176-110-200	176-120-200		2 ± 0.5	3
176-110-250	-		2.5 ± 0.5	3
176-110-300	-		3 ± 0.5	3
176-110-401	176-120-400		4 ± 0.5	3
176-110-450	-		4.5 ± 0.	3
-	176-120-500		5 ± 0.5	3
176-110-800	176-120-800		8 ± 0.5	3
176-111-201	176-121-202		12 ^{+0.5} _{-1.5}	3
176-112-000	176-122-000		20 ± 1	3
176-112-200	-		22 ⁺² ₋₁	3
176-112-800	176-122-800		28 ⁺² ₋₁	3
176-114-500	176-124-500		45 ± 2	3

Version with tab connectors

Order No.	Rated switching pressure [bars]	Fig.
	nonadjustable	
176-120-101	0.5 ^{+0.3} _{-0.1}	4
176-120-301	3 ± 0.5	4
176-120-801	8 ± 0.5	4
176-121-001	10 ± 1	4

Version with gold contacts

Order No.	Rated switching pressure [bars]	Fig.
	adjustable	
176-170-400	1 to 10	5
176-175-000	10 to 50	5

Technical data

Order No.	176-11-... , 176-12-...
Contact load	30 VA
Switching voltage, max	42 V
Switching current, max	2.5 A
Min. switching current with 12 V DC	50 mA
Permissible operating pressure	50 bars
with type 176-114-500 and 176-124-500	80 bars
Rated switching pressure	cf. table
Type of contact	NO or NC
Switching frequency	60/min
Mechanical service life	10 ⁶ switching operations
Type of enclosure	IP 65, IP 00 terminals
Operating temperature, max	+80 °C
Fluids	mineral oils and oiled compressed air
Mounting position	any
NB: overpressure safety	P_{max} static: 300 bars
	P_{max} dynamic: 200 bars
	maximum pressure-change speed: 1 bar/msec
	vibration resistance: 10 g at 5-200 Hz sinusoidal

Order No.	176-170-400, 176-175-000
Switching capacity	gold contact 1W
Switching voltage, min. / max	5 V DC / 24 V DC
Switching current, min. / max	5 mA / 50 mA
Rated switching pressure	cf. table
176-170-400 set for	4 ± 0.5 bars
176-175-000 set for	12 ^{+0.5} _{-1.5} bars
Release difference	20%
Permissible operating pressure	100 bars
with 176-175-000	300 bars
Type of contact	changeover
Switching frequency	200/min
Mechanical service life	10 ⁶ operations
Type of enclosure	IP 65, terminals IP 00
Operating temperature, max	+80 °C
Fluids	mineral oils and oiled compressed air
Mounting position	any

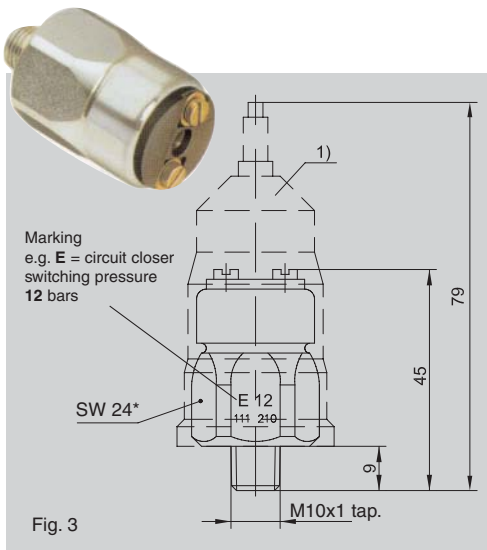


Fig. 3

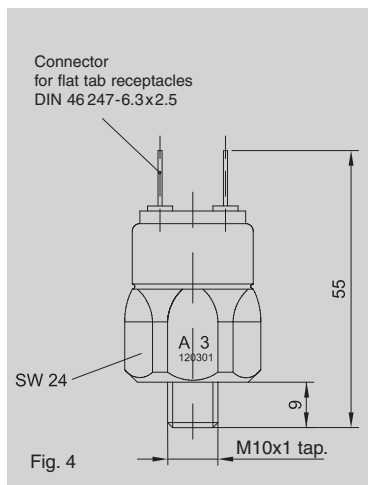


Fig. 4

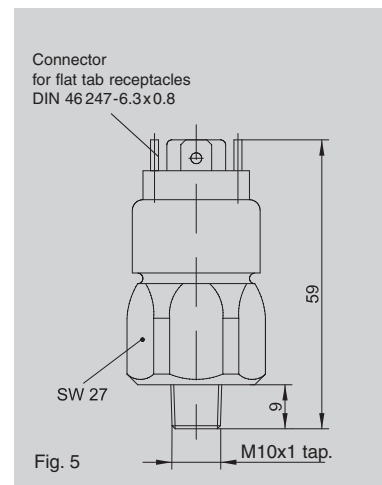


Fig. 5

1) Protective cap, order No. 898-420-001, has to be ordered separately

Please note:
See leaflet 1-1730-US for respective sockets.



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