

Pressure Controls

Basic Terms and Technical Information

Characteristics

Pressure controls serve various functions, which may be divided into control and protection functions. Examples for control functions are compressor cycling, pump-down or defrost control. Protection functions include pressure limiting and cut-out against excessive pressures, against loss of charge or for freeze protection. These functions are performed by operating a set of electrical contacts when exceeding a preset lower or upper pressure limit. Depending on whether they are type tested (TÜV approved) or not, they may be referred to by the following terms:

without TÜV approval:	Pressure Control
with TÜV approval:	Pressure Limiter, Pressure Cut-Out or Safety Pressure Cut-Out

Pressure controls with TÜV approval are tested according to EN 12263 as required by DIN 8901 and EN 378.

1. Pressure controls (without TÜV approval)

Pressure controls without type approval may either be of the automatic or manual reset type. Manual reset versions are available for decreasing (manual reset min.) or increasing pressure (manual reset max.).

2. Pressure limiters PSL/PSH

Pressure limiters are of the automatic reset type. Limiters for high pressure applications have a double bellows design to act as fail-safe controls.

3. Pressure cut-outs PZH/PZL

Pressure cut-outs are of the manual reset type where reset is possible from the outside of the control without the need for a tool (external reset). Cut-outs for high pressure applications have a double bellows design to act as fail-safe controls.

4. Safety pressure cut-outs PZHH/PZLL

Pressure cut-outs are of the manual reset type where the reset requires the use of a tool. Typically, the removal of a cover is required in order to press the reset button (internal reset). Cut-outs for high pressure applications have a double bellows design to act as fail-safe controls.

Adjustment of switching points

A pressure gauge should always be used for comparison when adjusting the switching points on pressure controls. The setting scale on the device is intended to serve for orientation, showing the setting range of the upper switching point p_{max} in bar/psig and the value of the pressure differential Δp as difference between upper switching point p_{max} and the lower switching point p_{min} . The upper switching point p_{max} has to be adjusted on the scale, whereas the lower switching point p_{min} is given by adjustment of the desired switching differential Δp .

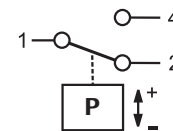
The formula is:

$$\text{Upper switching point} - \text{Differential} = \text{Lower switching point}$$

$$P_{max} - \Delta p = P_{min}$$

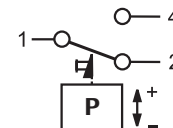
Function of contacts SPDT

On pressure rise above setting 1-2 opens and 1-4 closes. On pressure drop below setting 1-2 closes and 1-4 opens.



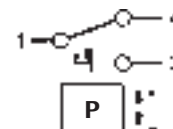
SPDT with manual reset max.

On pressure rise above setting 1-2 opens and 1-4 closes and latches. The device can be manually reset when the pressure has dropped below setting.



SPDT with manual reset min.

On pressure drop below setting 1-2 closes, 1-4 opens and latches. The device can be manually reset when the pressure has risen above setting.



Unit of pressure

All pressures are given in gauge pressure

$$P_{absolute} = P_{gauge} + 1 \text{ bar}$$

$$1 \text{ bar} = 100 \text{ kPa}$$

$$1 \text{ bar} = 14.5 \text{ psi}$$

Pulsation damping

All high pressure controls with connection ($\frac{7}{16}$ "-20UNF. $\frac{1}{4}$ " SAE male) are equipped with a snubber to protect the pressure element from pulsations.

Standards and Regulations

BGV D4 (VBG20)	Accident prevention regulations for refrigeration plant.
DIN 8901	Heat pumps with fluorocarbon refrigerants. Protection of soil, underground and surface water.
EN 60947-1/ EN 60947-5-1	Specifications for low-voltage switchgear.
EN 378	Refrigerating systems and heat pumps - Safety and environmental requirements.
EN 12263:	Refrigerating systems and heat pumps - Safety switching devices for limiting the pressure requirements and tests.

Selection Guide for Pressure Controls

Series	Selection Criteria					
	Design	Number of Contacts (SPDT)	Adjustable	Protection DIN 40050 IEC 529	Rated Operational Current at 230 V AC	
					Inductive Amp. AC 15	Motor Rating UL
PS1	Standard Model	1	yes	IP 44	10 A	24 A
PS2	Dual Pressure Switch	1+1	yes	IP 44	10 A	24 A
PS3 and CS3 (for CO ₂ applications)	Pressure Switch Standard-Types	1	Factory set to fixed values	IP 30 / IP 65	3 A	6 A
	Pressure Switch OEM-Types	1	Fixed values acc. to customer spec. depending on volume	IP 30 / IP 65	3 A	6 A
PS4	Pressure Switch OEM-Types	1	no	IP67 (cable) IP20 (terminals)	6 A	6 A
FD 113	Differential Pressure Switch	1	yes pressure diff. + time delay	IP 30	3 A / 6 A	-

Pressure Controls Series PS1 / PS2

Features

- Adjustable pressure setpoint
- Automatic and manual reset versions
- Flare and solder pressure connections
- Chatter-resistant (bounce-free) contacts
- High operational current, locked rotor max. 144 Amps (LRA)
- Standard SPDT with same operational current rating for both contacts
- Dual pressostat with two separate SPDT for high and low pressure side
- Including sealable blocking plate and mounting screws

Options (minimum lot size 100 pieces)

- Convertible reset to reduce stock
- Further pressure connections
- Factory set to customer specification



PS2

PS1

Standards

- per Low Voltage Directive
- per PED Directive 97/23 EG. TÜV appr. versions only
- Manufactured and tested to standards on our own responsibility
- Underwriter Laboratories (File Nr. E85974)
- German Lloyd for use on ships, when equipped with marine-type cable gland

Technical Data PS1 / PS2

Type of Contacts	1 SPDT for PS1 2 separate SPDT for PS2
Inductive Amp. (AC15) Inductive Amp. (DC13)	10 A / 230V AC 0.1 A / 230V DC
Motor Rating, Full Load Amp. Motor Rating, Locked Rotor Amp.	24 A / 120/240V AC 144 A / 120/240V AC

Protection acc. EN 60529 / IEC 529	IP 44
Ambient Temperature Range Max. Temperature at Pressure Connection	-50°C .. +70°C +70°C
Vibration Resistance (10 to 1000 Hz)	4 g
Cable Entry	Grommet PG 16
Locking Device	Blocking Plate
Mounting Screws	M4 / UNC 8-32

Single Pressure Controls PS1

Type	Part No.	Adjustment Range		Lowest Setpoint bar	Factory Setting bar	Leakage Test Pressure bar	Pressure Connection
		Upper Setpoint bar	Differential bar				
Low Pressure Controls							
PS1-A3A	4 370 700	-0.5 ... 7	0.5 ... 5	-0.9	3.5 / 4.5	24	7/16"-20 UNF
PS1-A3K	4 370 600						capillary/nut
PS1-A3L	4 714 945						cap./solder
PS1-A3U	4 712 201						solder 6 mm
PS1-A3X	4 713 430						solder 1/4"
PS1-R3A	4 350 100	-0.5 ... 7	external reset approx. 1 bar above setpoint	-0.9	3.5	24	7/16"-20 UNF
PS1-R3K	4 713 431						capillary nut
High Pressure Controls							
PS1-A5A	4 350 500	6 ... 31	2 ... 15	3	16 / 20	35	7/16"-20 UNF
PS1-A5K	4 370 400						capillary nut
PS1-A5L	4 715 136						cap./solder
PS1-A5U	4 713 325						solder 6 mm
PS1-A5X	4 713 434						solder 1/4"
PS1-R5A	4 350 700	6 ... 31	ext. manual reset approx. 3 bar below setpoint	-	20	35	7/16"-20 UNF
PS1-R5K	4 370 300						capillary nut

Single Pressure Controls Series PS1 TÜV / EN 12263

Type	Part No.	Adjustment Range		Lowest Setpoint bar	Factory Setting bar	Leakage Test Pressure bar	Pressure Connection
		Upper Setpoint bar	Differential bar				
Pressure Limiter for Low Pressure Protection PSL - Automatic Reset							
PS1-W3A	4 368 300	-0.5 ... 7	0.5 ... 5	-0.9	3.5 / 4.5	24	7/16"-20 UNF
PS1-W3U	4 713 437						solder 6 mm
Pressure Cut Out for Low Pressure Protection PZL - External Reset							
PS1-B3A	4 470 400	-0.5 ... 7	external reset approx. 1 bar above setpoint	-0.9	3.5	24	7/16"-20 UNF
PS1-B3U	4 715 141						solder 6 mm
Pressure Limiter for High Pressure Protection PSH - Automatic Reset							
PS1-W5A	4 353 200	6 ... 31	2 ... 15	3	16 / 20	35	7/16"-20 UNF
PS1-W5K	4 359 100						capillary/nut
PS1-W5U	4 713 439						solder 6 mm
Pressure Cut Out for High Pressure Protection PZH - External Manual Reset							
PS1-B5A	4 353 300	6 ... 31	external reset approx. 3 bar below setpoint	-	20	35	7/16"-20 UNF
PS1-B5U	4 712 332						solder 6 mm
Safety Pressure Cut Out for High Pressure Protection PZHH - Internal Manual Reset							
PS1-S5A	4 368 400	6 ... 31	internal reset approx. 3 bar below setpoint	-	21	35	7/16"-20 UNF
PS1-S5U	4 711 591						solder 6 mm

Dual Pressure Controls Series PS2



PS2

Type	Part No.	Adjustment Range				Factory Setting		Leakage Test Pressure		Pressure Connection
		Upper Setpoint		Differential				left bar	right bar	
		left bar	right bar	left bar	right bar	left bar	right bar			
Combined Low and High Pressure Controls										
PS2-A7A	4 353 400	-0.5 ... 7	6 ... 31	0.5 ^a ... 5	ca. 4 fix	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-A7K	4 350 900									capillary/nut
PS2-A7L	4 713 565									cap./solder
PS2-A7U	4 713 415									solder 6 mm
PS2-A7X	4 713 416									solder 1/4"
PS2-L7A	4 351 100	-0.5 ... 7	6 ... 31	0.5 ^a ... 5	external reset approx. 4 bar under setpoint	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-L7K	4 370 500									capillary/nut
PS2-L7U	4 713 417									solder 6 mm
PS2-R7A	4 351 300	-0.5 ... 7	6 ... 31	external reset approx. 1 bar above setpoint	external reset approx. 4 bar below setpoint	3.5	20	24	35	7/16"-20 UNF
PS2-R7K	4 713 421									capillary/nut
PS2-R7U	4 713 419									solder 6 mm

Combined Low and High Pressure Controls. High Side Convertible From Automatic to Manual Reset										
PS2-M7A	4 361 300	-0.5 ... 7	6 ... 31	0.5a ... 5	-	3.5 / 4.5	21	24	35	7/16"-20 UNF

Dual Pressure Controls Series PS2 TÜV / EN 12263

Combined Pressure Limiter for Low Pressure / High Pressure Protection PSL / PSH - automatic / automatic										
PS2-W7A	4 360 100	-0.5 ... 7	6 ... 31	0.5 ^a ... 5	ca. 4 fix	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-W7L	4 450 300									cap./solder
PS2-W7U	4 712 436									solder 6 mm

Combined Pressure Limiter / Pressure Cut-Out for Low Pressure / High Pressure Protection PSL / PZH - automatic / external manual reset										
PS2-C7A	4 353 500	-0.5 ... 7	6 ... 31	0.5 ^a ... 5	external reset approx. 4 bar below setpoint	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-C7L	4 715 131									cap./solder

Combined Pressure Limiter Safety Pressure Cut Out for low pressure / high pressure protection EN 12263 PSL / PZH (automatic / automatic convertible to external manual reset)										
PS2-N7A	4 715 756	-0.5 ... 7	6 ... 31	0.5a ... 5	-	3.5 / 4.5	21	24	35	7/16"-20 UNF

^a) lowest possible setpoint: -0.9 bar

Dual Pressure Controls PS2 TÜV / EN 12263

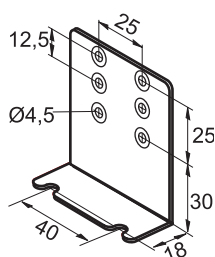
Type	Part No.	Adjustment Range				Factory Setting		Leakage Test Pressure		Pressure Connection
		Upper Setpoint		Differential				left bar	right bar	
		left bar	right bar	left bar	right bar					
		left bar	right bar	left bar	right bar					
Combined Pressure Limiter / Safety Pressure Cut-Out for Low Pressure / High Pressure Protection PSL / PZHH - automatic / internal manual reset										
PS2-T7A	4 368 500	-0.5 ... 7	6 ... 31	0.5 ^{a)} ... 5	internal reset approx. 4 bar below setpoint	3.5 / 4.5	21	24	35	⁷ / ₁₆ "-20 UNF
PS2-T7U	4 713 424									solder 6 mm

Combined Pressure Cut-Out for Low Pressure / High Pressure Protection PZL / PZH external manual reset / external manual reset										
PS2-B7A	4 360 200	-0.5 ... 7	6 ... 31	external reset approx. 1 bar above setpoint	external reset approx. 4 bar below setpoint	3.5	20	24	35	$\frac{7}{16}$ "-20 UNF
PS2-B7K	4 446 600									capillary/nut
PS2-B7L	4 446 700									cap./solder
PS2-B7U	4 449 400									solder 6 mm

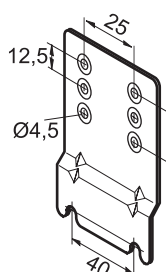
Combined Pressure Cut-Out / Safety Pressure Cut-Out for High Pressure Protection PZH / PZHH external manual reset / internal manual reset										
PS2-G8A	4 368 600	6 ... 31	6 ... 31	external reset approx. 4 bar below setpoint	internal reset approx. 4 bar below setpoint	20	21	35	35	$\frac{7}{16}$ "-20 UNF
PS2-G8U	4 713 427									solder 6 mm
PS2-G8X	4 713 428									solder $\frac{1}{4}$ "

^{a)} lowest possible setpoint: -0.9 bar

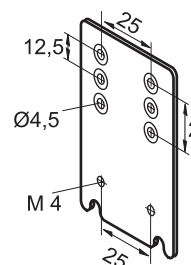
Accessories



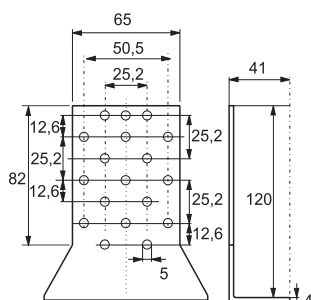
Mounting bracket angle
Part No.: 803 799



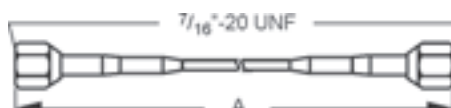
Mounting plate for units with hood
Part No.: 803 801



Extension bracket
Part No.: 803 800



Universal mounting bracket
Part No.: 803 798



Capillary Tube with two flare nuts $\frac{7}{16}$ "-20 UNF. R 1/4"
1.5m
Part No.: 803 804

Copper Gasket Set for R 1/4" ($\frac{7}{16}$ "-20 UNF. female)
100 pcs package
Part No.: 803 780