

Adjustable Single and Dual Pressure Controls for high and low pressure applications.

### Features

- Adjustable pressure range
- Narrow adjustable differential depending on model
- Range and differential pointer in units bar and psig
- Range and differential individually lockable by wire seal
- High rated SPDT contacts for all versions
- Shatter resistant contacts
- Captive terminal and cover screws
- Dual pressostats with two independent SPDT switches
- Manual toggle for system checkout and override
- Standard pressure connection 7/16"-20 UNF for 1/4" SAE male flare connection
- Low pressure and high pressure versions available with TÜV approval according to EN 12263 to meet requirements of DIN 8901 and EN 378
- Automatic and manual reset versions
- Convertible auto/manual reset for dual pressure controls

### Options

- Alternative pressure connectors including 6 mm ODF solder connection
- Gold plated contacts for electronic applications (low voltage/current)
- Factory set to customer specification
- Factory installed wire bridge for reduced installation effort
- Different types of mounting brackets
- Special approvals

### Introduction

The PS1 / PS2 Series is ALCO's range of adjustable pressostats for application in refrigeration and heat pump systems.

In these systems, 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.

Whereas the need for control functions is mainly founded in the desire for acceptable or optimized system performance, protection functions are normally requested by national legislation. National and international standards assist in meeting these legal requirements. Standardization is an ongoing process in the European Community and where this data sheet makes reference to national standards, corresponding European standards are referenced as far as known. The most important standards for safety requirements in refrigeration systems are EN 378<sup>a</sup> and DIN 8901.

<sup>a</sup> DIN 8975







**Single Pressostat PS1**



**Dual Pressostat PS2**

### Standards

-  per Low Voltage Directive
-  per PED Directive, TÜV approved versions only EN12263
- Manufactured and tested to  standards on our own responsibility
-  **LISTED** Underwriter Laboratories
- German Lloyd for use on ships (only when equipped with marine-type cable gland)

DIN 8901 defines safety and environmental requirements for the protection of soil, ground and surface water. In simple terms, when applied to pressure controls, DIN 8901 aims at the prevention of refrigerant charge leaking to the environment. Pressure controls designed and tested according to EN 12263<sup>b</sup> fulfill the requirements of DIN 8901.

DIN 8975 is concerned with control devices in refrigeration plants for protection against unpermissible pressure stresses. It also asks for pressure controls, which are approved in accordance with EN 12263.

The ALCO PS1 / PS2 series includes products, which are designed and tested in accordance with EN 12263 and can therefore be used in order to meet the requirements of DIN 8901 and EN 378.

<sup>b</sup> DIN 32733

**Pressure sensing**

All pressures mentioned in this data sheet are understood as gauge pressures. PS1 / PS2 controls sense pressure by means of bellows which expand or contract when exposed to medium pressure.

High pressure limiters and pressure cut outs with type approval according to EN 12263 feature a double bellows design. The inner bellows serves as the operating bellows and is enclosed by the outer bellows featuring a larger surface area.



Should the inner bellows leak, then the larger surface area of the outer bellows creates a larger force and causes the pressostat to a pre-empted cut out. This represents a fail-safe function.

Standard controls for refrigeration applications are equipped with a bronze bellows and can be used with all common HFC, HCFC refrigerants. For ammonia applications controls with steel bellows are available on request.

**Pressure connectors**

A variety of pressure connectors, including male and female flare type connectors, capillary and solder connectors are available. The standard connector is a 7/16"-20 UNF male flare connector, which, in its high pressure versions, is equipped with a snubber to protect against pressure pulsations.

Refer to the Nomenclature Section of this data sheet for a complete listing of available connector types.

**Electrical contacts**

PS1 / 2 pressure controls are equipped with high rated double snap action contacts for shatter-free and reliable operation.

All contacts throughout this range of controls are designed as Single Pole Double Throw (SPDT) contacts. One contact may be used for control and the other contact for alarm/status indication or auxiliary control. In addition, Dual Pressostats PS2 come with two independently actuated SPDT contacts, providing for even further application flexibility by allowing for a variety of wiring options.

Gold plated contacts are available on request for low electrical loads, for example in electronic signaling applications.

**Setpoints**

PS1 / PS2 are adjustable controls with internal adjustment spindles for range and differential<sup>c</sup>. By turning the range spindle, the *upper setpoint* is defined and by adjusting the differential spindle, the differential and hence the *lower setpoint* is defined.

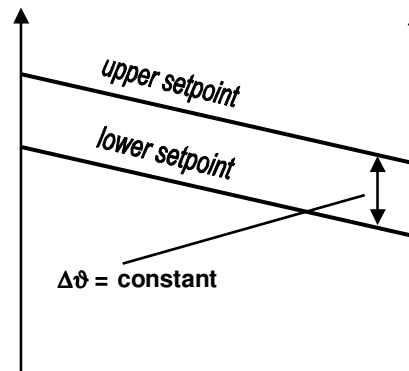
The dependency between upper and lower setpoint is always as follows:

$$\text{lower setpoint} = \text{upper setpoint} - \text{differential}$$

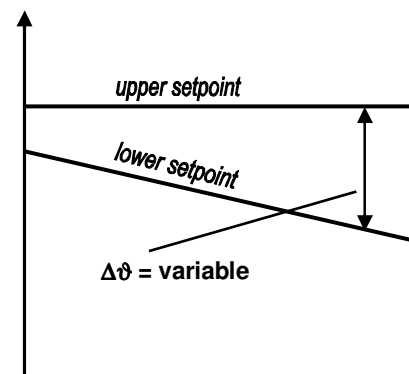
The following two rules should be kept in mind:

- An adjustment of the range spindle always affects both, upper and lower setpoint.
- An adjustment of the differential spindle affects the lower setpoint, only.

The following diagrams depict this dependency:



*Effect of turning range spindle*



*Effect of turning differential spindle*

The controls are equipped with display scale and pointers to indicate the approximate settings. The display scales are printed in relative pressure units "bar" and "psi".

For precise setting of the controls, external gauges must be used.

<sup>c</sup> Manual reset controls have a fixed differential and no differential spindle

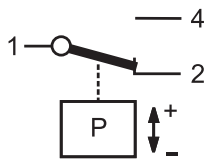
**Contact function**

Contacts on Single Pressostats PS1 are labeled 1-2-4 where '1' refers to the common pole, '2' refers to the lower setpoint and '4' refers to the upper setpoint. This is true for all types of controls, irrespective whether they are low pressure controls, high pressure controls, manual or automatic reset types.

The contact function for automatic and manual reset versions is as described below.

**Automatic reset**

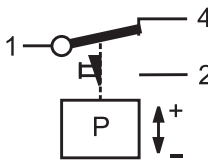
On pressure rise above the upper setpoint, contacts 1-2 open and contacts 1-4 close. On decreasing pressure below lower setpoint contacts 1-4 open and contacts 1-2 close.



**Automatic reset contact function**

**Manual reset low pressure**

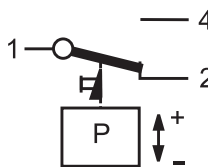
On decreasing pressure below the lower setpoint, contacts 1-4 open, contacts 1-2 close and latch. Only on pressure rise above upper setpoint and after pressing the manual reset button contacts 1-2 will open and contacts 1-4 will close again.



**Manual reset low pressure contact function**

**Manual reset high pressure**

On increasing pressure above the upper setpoint, contacts 1-2 open, contacts 1-4 close and latch. Only on falling pressure below lower setpoint and after pressing the manual reset button, contacts 1-4 will open and contacts 1-2 will close again.



**Manual reset high pressure contact function**

For operational safety, all PS1 / PS2 with manual reset are designed as *trip-free* controls, i.e. pressing the manual reset button while the pressure has not reached its reset threshold will not operate the electrical contacts.

The contact function for controls with internal and external manual reset is alike. The only difference between the two is that for internal manual reset the cover has to be undone, whereas the external reset controls can be reset without removing the cover.

As Dual Pressostats PS2 have two complete sets of contacts, their function is the same as on Single Pressostats PS1 with the only difference that the contact labels are preceded by an additional index. One side of the control is labeled 11-12-14 whereas the second side is 21-22-24.

The contact function of controls with convertible reset is as described above but depends on the actual position of the convertible reset toggle, i.e. automatic or manual reset position.

**Installation and maintenance**

Controls come with a lockplate which may be used to protect the settings by wire-seal if desired. Range and differential spindle may be sealed independent from each other.

A front access manual toggle is provided for checking out control operation. On low pressure controls this toggle may be used to override the low pressure signal during system evacuation, avoiding the need to undo the electrical wiring for this purpose.

All PS1 / PS2 controls come with heavy duty terminal blocks which are finger-proof and feature wire clamps plus non-loosable terminal screws for ease of wiring.

Available accessories include mounting brackets of various types, including flat and angle brackets. A universal mounting bracket which matches the most common whole patterns encountered in the field is also available.

The standard mounting holes for mounting brackets are equipped with a universal thread to fit both, M4 and UNC 8-32 screws. The standard wholesale package includes two mounting screws. Several hole patterns for surface mounting are provided.

**Nomenclature**

The following two charts explain the nomenclature of the PS1/PS2 controls for ease of reference. The basic structure is that of a three digit *Product Name* followed by a three digit code, describing *Function*, *Pressure Range* and *Pressure Connector*.

Customized versions, which deviate from standard catalogue products are available on request and use a different *Product Name*. They are called *PSA* in the case of Single Pressostats and *PSB* in the case of Dual Pressostats.

**Type code**

**PS1 -**

**Product Name**  
**PS1** = adjustable single pressostat  
**PSA** = customer special version

**Function**  
**A** = Pressure control, automatic  
**B** = Pressure cut out, external manual reset EN 12263  
**R** = Pressure control; external manual reset  
**S** = Safety pressure cut out, internal man. reset, EN 12263  
**W** = Pressure limiter, automatic, DIN / EN 12263

*Manual Reset*  
*Function types B, R, S in combination with Pressure Range 1 or 3 have a low pressure manual reset function.*  
*Function types B, R, S in combination with Pressure Range 4 or 5 have a high pressure manual reset function.*

**Pressure Connector**  
**A** = 7/16"-20 UNF male  
**C** = R 1/4" male, stainless steel with steel bellows  
**K** = 1 m cap tube and schrader valve opener, 7/16"-20 UNF flare nut  
**L** = 1/4"-ODM solder with 1 m cap tube  
**U** = 6 mm ODF solder, 80 mm length  
**X** = 1/4"-ODF solder, 80 mm length

**Pressure Range**  
**1** = -0,75 ... 3 bar  
**2** = -0,8 ... 1.5 bar  
**3** = -0,5 ... 7 bar  
**4** = 1 ... 20 bar  
**5** = 6 ... 31 bar

## Type code

**PS2 -**

### Product Name

**PS2** = adjustable dual pressostat  
**PSB** = customer special version

### Pressure Connector

**A** = 7/16"-20 UNF male  
**C** = R 1/4" male, stainless steel with steel bellows  
**K** = 1 m cap tube and schrader valve opener, 7/16"-20 UNF flare nut  
**L** = 1/4"-ODM solder with 1 m cap tube  
**U** = 6 mm ODF solder, 80 mm length  
**X** = 1/4"-ODF solder, 80 mm length

### Function

**A** = both sides: automatic pressure controls  
**B** = both sides: cut out, external manual reset, EN 12263  
**C** = left side: pressure limiter, automatic, EN 12263  
right side: cut out, external manual reset, EN 12263  
**G** = left side: cut out, external manual reset, EN 12263  
right side: safety cut out, internal manual reset, EN 12263  
**L** = left side: automatic pressure control, right side: external manual reset.  
**M** = left side: automatic pressure control, right side: convertible from R to A.  
**R** = both sides: external manual reset  
**S** = both sides: safety cut out, internal manual reset, EN 12263  
**T** = left side: pressure limiter, automatic, EN 12263  
right side: safety cut out, internal manual reset, EN 12263  
**W** = both sides: pressure limiter, automatic, EN 12263

### Manual Reset

*Cut outs with manual reset function and in combination with the low pressure side of pressure ranges 7 and 9 have a low pressure reset function.*

*Cut outs with manual reset function and in combination with the high pressure side of pressure ranges 7 and 9 have a high pressure reset function.*

### Pressure Range

<b>7</b> =	-0.5 ... 7 bar	6 ... 31 bar
<b>8</b> =	6 ... 31 bar	6 ... 31 bar
<b>9</b> =	-0.75 ... 3 bar	6 ... 31 bar

**Technical data**

**Environmental conditions**

Ambient temperatures storage and transportation:	-50 °C to +70 °C
operation:	-50 °C to +70 °C
Medium temperature range at pressure connector TS:	-50 °C to +70 °C
Dust and water protection EN 60529 / IEC 529:	IP44 Control mounted flush against wall!
Vibration resistance:	4g @ 10 ... 1000 Hz

**Materials and compatibility**

Housing materials	cover: frame:	Polycarbonate (PC) Steel, with anti corrosion protection
Materials with medium contact pressure conn. (A) / bellows:		brass /bronze
pressure conn. (C) / bellows:		stainless steel / steel
pressure conn. (K,L,U,X) / bellows:		copper / bronze
Medium compatibility		HFC, HCFC

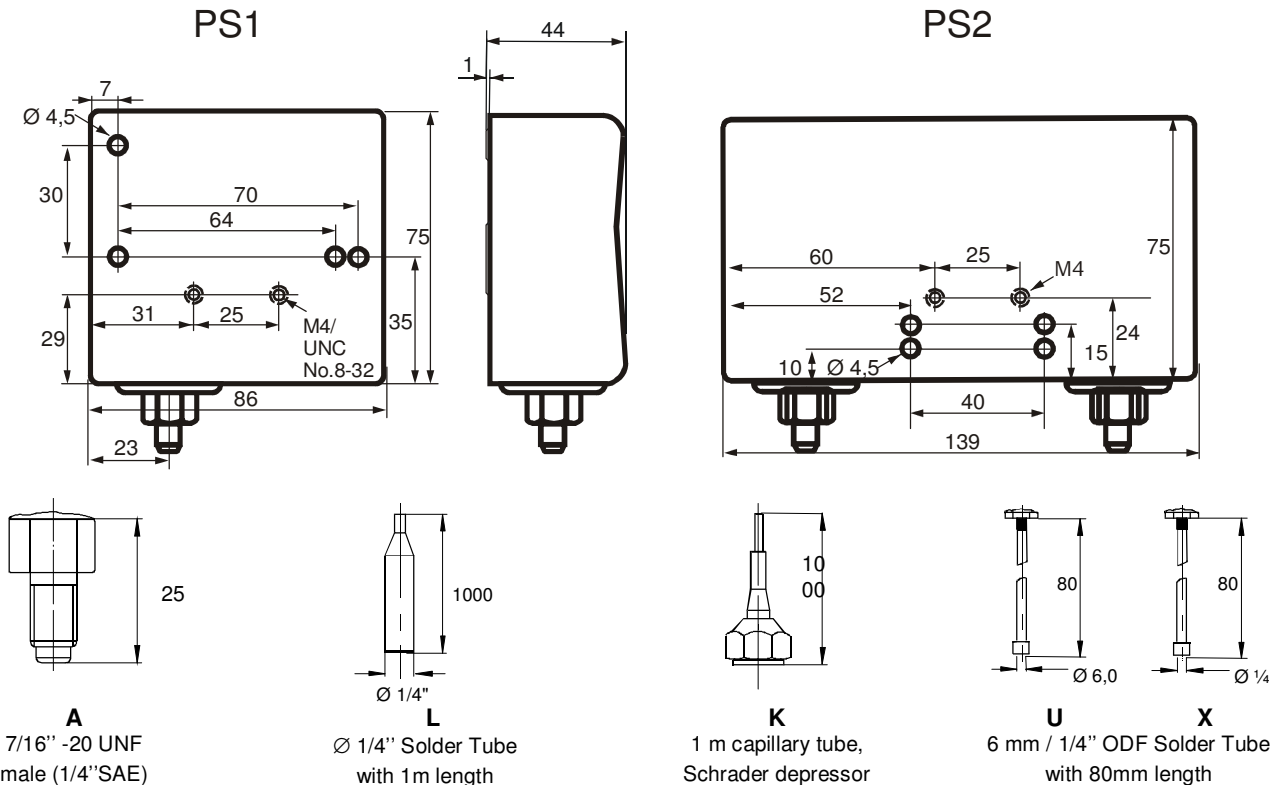
**Electrical contacts**

Type of contacts	- PS1: 1 x SPDT contact - PS2: 2 x SPDT contacts
Contact material	- standard: CuAg3 - options: gold plated contacts
Heating load (AC1):	24A / 230V AC
Inductive load (AC15):	10A / 230V AC
Startup (AC3):	144A / 230V AC
Inductive load (DC 13):	0.1A / 230V DC 3A / 24V DC 6A / 12V DC
Motor rating UL (FLA):	24A / 120 / 240V AC
Locked rotor UL (LRA):	144A / 120 / 240V AC

**Approvals**

EN 12263 (TÜV) required by DIN 8901 and DIN 8975:	specific models (approval pending)
Low Voltage Directive 73/23/EWG 93/68/EWG; EN 60947-1, EN 60947-5-1	all models (CE-Label)
Germanic Lloyd:	standard models when used with marine cable glands (accessory)
UL / CSA:	all models

**Physical dimensions and drawings**



**D A T A S H E E T**

Pressure Controls Type	PCN	Adjustment Upper Setpoint bar	Range Differential Setpoint bar	Lowest Setpoint bar	Factory Setting	Leakage Test Pressure bar	Pressure Connection
<b>Single Pressure Controls PS1</b>							
<b>Low Pressure Controls</b>							
<b>PS1-A3A</b>	<b>4 370 700</b>	-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 tube 1/4"
PS1-R3A	4 350 100	-0.5 ... 7	<i>external reset approx. 1bar above setpoint</i>	-0.9	3.5	24	7/16"-20 UNF
PS1-R3K	4 713 431						capillary nut
<b>High Pressure Controls</b>							
<b>PS1-A5A</b>	<b>4 350 500</b>	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 tube 1/4"
<b>PS1-R5A</b>	<b>4 350 700</b>	6 ... 31	<i>external reset approx. 3bar below setpoint</i>	-	20	35	7/16"-20 UNF
PS1-R5K	4 370 300						capillary/nut
PS1-R5X	4 713 436						solder tube 1/4"
<b>Single Pressure Controls PS1 TÜV (EN 12263)</b>							
<b>Pressure Limiter for low pressure protection EN 12263 PSL (automatic reset)</b>							
<b>PS1-W3A</b>	<b>4 368 300</b>	-0.5 ... 7	0.5 ... 5	-0.9	3.5 / 4.5	24	7/16"-20 UNF
PS1-W3K	4 321 400						capillary/nut
PS1-W3U	4 713 437						solder 6 mm



**D A T A S H E E T**

Pressure Controls Type	PCN	Adjustment Upper Setpoint bar	Range Differential Setpoint bar	Lowest Setpoint bar	Factory Setting	Leakage Test Pressure bar	Pressure Connection
<b>Single Pressure Controls PS1 TÜV (EN 12263)</b>							
<b>Pressure Cut Out for low pressure protection EN 12263 PZL (external reset)</b>							
PS1-B3A	4 470 400	-0.5 ... 7	<i>external reset approx. 1bar above setpoint</i>	-0.9	3.5	24	7/16"-20 UNF
PS1-B3U	4 715 141						solder 6 mm
<b>Pressure Limiter for high pressure protection EN 12263 PSH (automatic reset)</b>							
PS1-W5A	4 353 300	6 ... 31	2 ... 15	3	16 / 20	35	7/16"-20 UNF
PS1-W5K	4 359 100						capillary/nut
PS1-W5L	4 715 143						cap./solder
PS1-W5U	4 713 439						solder 6 mm
<b>Pressure Cut Out for high pressure protection EN 12263 PZH (external manual reset)</b>							
PS1-B5A	4 353 300	6 ... 31	<i>external reset approx. 3bar below setpoint</i>	-	20	35	7/16"-20 UNF
PS1-B5L	4 715 144						cap./solder
PS1-B5U	4 712 332						solder 6 mm
PS1-B5X	4 713 441						solder tube 1/4"
<b>Safety Pressure Cut Out for high pressure protection EN 12263 PZHH (internal manual reset)</b>							
PS1-S5A	4 368 400	6 ... 31	<i>internal reset approx. 3bar below setpoint</i>	-	21	35	7/16"-20 UNF
PS1-S5L	4 715 145						cap./solder
PS1-S5U	4 711 591						solder 6 mm
PS1-S5X	4 713 442						solder tube 1/4"

**Single Pressure Controls PS1 for dedicated applications**

Pressure Controls Type	PCN	Adjustment Upper Setpoint bar	Range Differential Setpoint bar	Application	Remark
PS1-__	<i>on request and dep. on exact</i>	-0.75 ... 3	0.25 ... 2	<i>narrow differentials inside specified pressure range</i>	<i>leakage test pressure 13 bar</i>
PS1-__		-0.8 ... 1.5	0.2 ... 1		<i>leakage test pressure 13 bar</i>
PS1-__		1 ... 20	0.5 ... 7		<i>leakage test pressure 23 bar</i>
PS1-__		4 ... 12	0.5 ... 7		<i>leakage test pressure 16 bar</i>
PS1-__		-0.5 ... 8	0.5 ... 5		<i>leakage test pressure 13 bar</i>



**D A T A S H E E T**

Dual Pressure Controls		Adjustment		Range		Factory Setting		Leakage Test Pressure		Pressure Connection
Type	PCN	left bar	right bar	left bar	right bar	left bar	right bar	left bar	right bar	
<b>Dual Pressure Controls PS2</b>										
<b>Combined Low and High Pressure Controls</b>										
PS2-A7A	4 353 400	-0.5 ... 7	6 ... 31	0.5 <sup>a</sup> ... 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 tube 1/4 "
PS2-L7A	4 351 100	-0.5 ... 7	6 ... 31	0.5 <sup>a</sup> ... 5	<i>Ext. reset approx. 4bar below setpoint</i>	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-L7X	4 713 418									solder tube 1/4 "
PS2-R7A	4 351 300	-0.5 ... 7	6 ... 31	<i>Ext. reset Approx. 1bar above setpoint</i>	<i>Ext. reset approx. 4bar below setpoint</i>	3.5	20	24	35	7/16"-20 UNF
PS2-R7K	4 713 421									capillary nut
PS2-R7U	4 713 419									solder 6 mm
<b>Dual Pressure Controls PS2 TÜV (EN 12263)</b>										
<b>Combined Pressure Limiter for low Pressure / high pressure protection EN 12263; PSL / PSH (automatic / automatic)</b>										
PS2-W7A	4 360 100	-0.5 ... 7	6 ... 31	0.5 <sup>a</sup> ... 5	ca. 4 fix	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-W7K	4 450 200									capillary/nut
PS2-W7L	4 450 300									cap./solder
PS2-W7U	4 712 436									solder 6 mm
PS2-W7X	4 713 429									solder tube 1/4 "
<b>Combined Pressure Limiter / Pressure Cut Out for low Pressure / high pressure protection EN 12263; PSL / PZH (automatic / external manual reset)</b>										
PS2-C7A	4 353 500	-0.5 ... 7	6 ... 31	0.5 <sup>a</sup> ... 5	<i>Ext. reset approx. 4bar below setpoint</i>	3.5 / 4.5	20	24	35	7/16"-20 UNF
PS2-C7K	4 348 400									capillary/nut
PS2-C7L	5 715 131									cap./solder
PS2-C7U	4 713 422									solder 6 mm
PS2-C7X	4 713 423									solder tube 1/4 "

<sup>a</sup> lowest possible setpoint: -0.9 bar

**D A T A S H E E T**

Dual Pressure Controls		Adjustment		Range		Factory Setting		Leakage Test Pressure		Pressure Connection
Type	PCN	left bar	right bar	left bar	right bar	left bar	right bar	left bar	right bar	

**Dual Pressure Controls PS2 TÜV (EN 12263)**

**Combined Pressure Limiter / Safety Pressure Cut Out for low Pressure / high pressure protection  
EN 12263 PSL / PZHH (automatic / internal manual reset)**

PS2-T7A	4 368 500	-0.5 .. 7	6 ... 31	0.5 <sup>a</sup> ... 5	<i>Int. reset approx. 4bar below setpoint</i>	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  
EN 12263 PZL / PZH (external manual reset / external manual reset)**

PS2-B7A	4 360 200	-0.5 .. 7	6 ... 31	<i>Ext. reset approx. 1bar above setpoint</i>	<i>Ext. reset approx. 4bar below setpoint</i>	3.5	20	24	35	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 / high pressure protection  
EN 12263 PZH / PZHH (external manual reset / internal manual reset)**

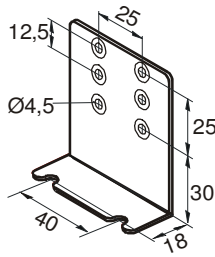
PS2-G8A	4 368 600	6 ... 31	6 ... 31	<i>Ext. reset approx. 4bar below setpoint</i>	<i>Int. reset approx. 4bar below setpoint</i>	20	21	35	35	7/16"-20 UNF
PS2-G8K	4 445 500									capillary/nut
PS2-G8U	4 713 427									solder 6 mm
PS2-G8X	4 713 428									solder tube 1/4"

**Dual Pressure Controls PS2 for dedicated applications**

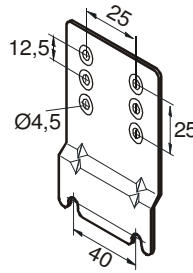
Dual Pressure Controls		Adjustment		Range		Application	Remark
Type	PCN	left bar	right bar	left bar	right bar		
<b>PS2-M7A</b>	<b>4 361 300</b>	-0.5 .. 7	6 ... 31	0.5 <sup>a</sup> ... 5		<i>convertible reset to reduce stock</i>	7/16"-20 UNF
PS2-M_ _	<i>on req.</i>	<i>dep. on</i>	<i>range</i>	<i>from auto to manual</i>			<i>w/o TÜV approval only</i>
PS2-_9_	<i>on req.</i>	-0,75..3	6 ... 31	<i>dep. on function</i>		<i>narrow diff. low pressure</i>	

<sup>a</sup> lowest possible setpoint: -0.9 bar

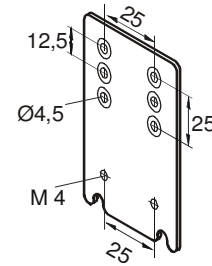
**Accessories**



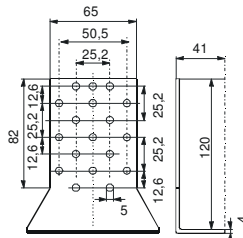
**Mounting bracket angle**  
0 714 144  
(incl. screws)



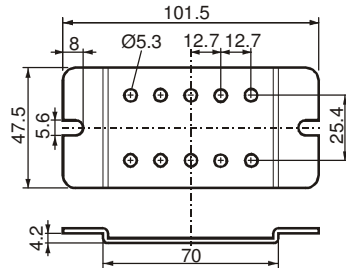
**Mounting plate for units with hood**  
0 714 145  
(incl. screws)



**Extension bracket**  
0 714 146  
(incl. screws)



**Univ. mounting bracket**  
0 714 147  
(incl. screws)



**Horizontal mounting bracket**  
0 716 063  
(incl. screws)

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This document replaces all earlier versions.

		<b>Phone:</b>	<b>Fax:</b>
<b>Emerson Electric GmbH &amp; Co OHG</b>	Benelux	+31 (0)77 324 0 234	+31 (0)77 324 0 235
<b>ALCO CONTROLS</b>	Germany, Austria & Switzerland	+49 (0)6109 6059 -0	+49 (0)6109 6059 40
<b>Postfach 1251</b>	France, Greece, Maghreb	+33 (0)4 78 66 85 70	+33 (0)4 78 66 85 71
<b>Heerstraße 111</b>	Italia	+39 02 961 781	+39 02 961 788 888
<b>D-71332 Waiblingen</b>	Spain & Portugal	+34 93 41 23 752	+34 93 41 24 2
<b>Germany</b>	UK & Ireland	+44 (0) 1635 876 161	+44 (0) 1635 877 111
<b>Phone ...49-7151-509-0</b>	Sweden, Denmark, Norway & Finland	+49 (0)2408 929 0	+49 (0)2408 929 528
<b>Fax ...49-7151-509-200</b>	Eastern Europe & Turkey	+49 (0)2408 929 0	+49 (0)2408 929 525
<a href="http://www.emersonclimate.eu">www.emersonclimate.eu</a>	Poland	+48 (0)22 458 9205	+48 (0)22 458 9255
	Russia & Cis	+7 495 981 9811	+7 495 981 9816
	Balkan	+385 (0) 1560 38 75	+385 (0) 1 560 3879
	Romania	+40 364 73 11 72	+40 364 73 12 98
	Ukraine	+38 44 4 92 99 24	+38 44 4 92 99 28