Pressure controls, type KP

Introduction
KP pressure controls are for use in refrigeration and air conditioning systems to give protection against excessively low suction pressure or excessively high discharge pressure. KP pressure controls are also used for starting and stopping refrigeration compressors and fans on air-cooled condensers. KP pressure controls are fitted with a single-pole double-throw (SPDT) switch. The position of the switch is determined by the pressure control setting and the pressure at the connector. KP pressure controls are available in IP 30 and IP 44 enclosures.

Features
- Ultra-short bounce times
- Reduces wear to a minimum and increases reliability.
- Manual control
- Electrical contact function can be tested without the use of tools.
- KP 2 with low differential for low-pressure regulation
- KP 6 for HP refrigerants (R 410A, CO₂)
- KP 6, 7 and 17 with fail-safe bellows element
- Vibration and shock resistant
- Compact design
- Fully welded bellows element
- High reliability both electronically and mechanically.

Approvals
CE-marked in accordance with LVD 73/23/EC and EN 60947-4-5 for sale in Europe.
KP 1, 2, 6, 7 and KP 17: CE marked in accordance with PED 97/23/EC, category IV, safety equipment and EN 12263, DIN 32733
Germanischer Lloyd, Germany
UL approval for USA and Canada
DNV, Det Norske Veritas, Norway
RINA, Registro Italiano Navale, Italy
BV, Bureau Veritas, France
LR, Lloyd's Register, UK
RMRS, Russian Maritime Register of Shipping, Russia
CCC, China Compulsory Certificate

Materials in contact with the medium

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP 1, 2, 5, 6, 7, 15 and 17</td>
<td>Tinbronze, no. 2.1020 to DIN 17662&lt;br/&gt;Free cutting steel, no. 1.0737 / 1.0718 to DIN 1651</td>
</tr>
<tr>
<td>KP 1A, 5A, 6, 7A and 15A only</td>
<td>Stainless steel 18/8, no. 1.0737 / 1.0718 to DIN 17440&lt;br/&gt;Free cutting steel, no. 1.0719 to DIN 1651&lt;br/&gt;Steel, no. 1.0330 to DIN 1624&lt;br/&gt;Aluminium, no. 3.0255 to DIN 1712</td>
</tr>
</tbody>
</table>
**Technical data**

**Ambient temperature**

\(-40 \rightarrow +65{\degree}C (+80{\degree}C for max. 2 hours).\)

**DIN-approved units:**

\(-25 \rightarrow +65{\degree}C (+80{\degree}C for max. 2 hours).\)

**Max. working pressure**

- **LP:** PB = 17 bar
- **HP:** PB = 35 bar
- **KP 6:** PB = 46.5 bar

**Max. test pressure**

- **LP:** p' = 20 bar
- **HP:** p' = 35 bar
- **KP 6:** p' = 46.5 bar

**Contact load**

- **Alternating current:**
  - AC1: 16 A, 400 V
  - AC3: 16 A, 400 V
  - AC15: 10 A, 400 V
  - Max. starting current (L.R.): 112 A, 400 V

- **Direct current:**
  - DC13: 12 W, 220 V control current

**Properties according to EN 60947:**

- **Wire dimensions**
  - solid/stranded: 0.75 - 2.5 mm\(^2\)
  - flexible, w/out ferrules: 0.7 - 2.5 mm\(^2\)
  - flexible, with ferrules: 0.5 - 1.5 mm\(^2\)
- **Tightning torque max. 2 NM**
- **Rated impulse voltage** 4 kV
- **Pollution degree** 3
- **Short circuit protection, fuse** 20 Amp
- **Insulation** 400 V
- **IP** 30/44

**Cable connection**

The cable entry can be used for 6 → 14 mm dia. cables.

A Pg 13.5 screwed cable entry can also be used for 6 → 14 mm cable. With 8 → 16 mm cable a standard Pg 16 screwed cable entry can be used.

**Enclosure**

- **IP 30 to EN 60529 / IEC 60529**
  - Enclosure IP 30 is obtained when the units without top cover are mounted on a flat surface or bracket. The bracket must be fixed to the unit so that all unused holes are covered.

- **IP 44 to EN 60529 / IEC 60529**
  - Enclosure IP 44 is obtained when the units with top cover are mounted on a flat surface or bracket. The bracket must be fixed to the unit so that all unused holes are covered.

- **KP pressure controls with auto reset** are supplied with top cover. For KP pressure controls with manual reset, the top cover must be separately ordered.

**Contact systems**

- **Low pressure (LP)**
- **High pressure (HP)**
- **Dual pressure (LP/HP)**
- **Dual pressure (HP/HP)**

**IP 55 to EN 60529 / IEC 60529**

IP 55 is obtained when the KP pressure controls are mounted in an IP 55 enclosure, (code no. 060-033066 for single pressure controls and code no. 060-035066 for dual pressure controls). IP 55 enclosure has to be ordered separately.
### Ordering

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Type</th>
<th>Low pressure (LP)</th>
<th>High pressure (HP)</th>
<th>Reset</th>
<th>Contact system</th>
<th>Code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulating range bar</td>
<td>Differential Δp bar</td>
<td></td>
<td>Low pressure LP</td>
<td>High pressure HP</td>
</tr>
<tr>
<td>Low</td>
<td>KP 1</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>SPDT</td>
<td>060-110166(1) 060-111266(3) 060-110666(3)</td>
</tr>
<tr>
<td></td>
<td>KP 1</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>060-111166</td>
<td>060-110966</td>
</tr>
<tr>
<td>Low</td>
<td>KP 1</td>
<td>−0.9 → 7.0</td>
<td>Fixed 0.7</td>
<td>Man.</td>
<td>060-117166(1) 060-117966(3) 060-117766(3)</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>KP 2</td>
<td>−0.2 → 5.0</td>
<td>0.4 → 1.5</td>
<td>Aut.</td>
<td>060-117366</td>
<td>060-118066</td>
</tr>
<tr>
<td>High</td>
<td>KP 5</td>
<td>8 → 32</td>
<td>1.8 → 6.0</td>
<td>Aut.</td>
<td>SPDT + LP</td>
<td>060-124166(3) 060-125466(3)</td>
</tr>
<tr>
<td>High</td>
<td>KP 5</td>
<td>8 → 32</td>
<td>Fixed 3</td>
<td>Man.</td>
<td>060-124566</td>
<td>060-114866(1)</td>
</tr>
<tr>
<td>Dual</td>
<td>KP 15</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>060-126566(3) 060-126466(3)</td>
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</tr>
<tr>
<td>Dual</td>
<td>KP 15</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>060-115366</td>
<td>060-123066(3)</td>
</tr>
<tr>
<td>Dual</td>
<td>KP 15</td>
<td>−0.9 → 7.0</td>
<td>Fixed 0.7</td>
<td>Aut.</td>
<td>060-129566</td>
<td>060-129366(3)</td>
</tr>
<tr>
<td>Dual</td>
<td>KP 15</td>
<td>−0.9 → 7.0</td>
<td>Fixed 0.7</td>
<td>Aut.</td>
<td>060-122066</td>
<td>060-128366</td>
</tr>
</tbody>
</table>

For fluorinated refrigerants and R 717 (NH₃)

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Type</th>
<th>Low pressure (LP)</th>
<th>High pressure (HP)</th>
<th>Reset</th>
<th>Contact system</th>
<th>Code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulating range bar</td>
<td>Differential Δp bar</td>
<td></td>
<td>LP/HP</td>
<td>1 m cap. tube with M10 × 0.75</td>
</tr>
<tr>
<td>Low</td>
<td>KP 1A</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>SPDT</td>
<td>060-116266 060-116066(3)</td>
</tr>
<tr>
<td>Low</td>
<td>KP 1A</td>
<td>−0.9 → 7.0</td>
<td>Fixed 0.7</td>
<td>Man.</td>
<td>060-115366</td>
<td>060-123066(3)</td>
</tr>
<tr>
<td>High</td>
<td>KP 5A</td>
<td>8 → 32</td>
<td>1.8 → 6.0</td>
<td>Aut.</td>
<td>060-117366</td>
<td>060-129566</td>
</tr>
<tr>
<td>High</td>
<td>KP 5A</td>
<td>8 → 32</td>
<td>Fixed 3</td>
<td>Man.</td>
<td>060-129666</td>
<td>060-129466</td>
</tr>
<tr>
<td>Dual</td>
<td>KP 15A</td>
<td>−0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td>Aut.</td>
<td>SPDT + LP and HP signal</td>
<td>060-129666</td>
</tr>
<tr>
<td>Dual</td>
<td>KP 15A</td>
<td>−0.9 → 7.0</td>
<td>Fixed 0.7</td>
<td>Aut.</td>
<td>060-120666</td>
<td>060-128366</td>
</tr>
</tbody>
</table>

### Accessories for KP pressure controls with M10 × 0.75 connections:

- Weld connections: M10 × 0.75 nut and 26 × 150 mm seamless steel pipe,
- Steel cap. tube: 1 m with 2 × M10 × 0.75 nts,
- Steel cap. tube: 1 m with 1 × M10 × 0.75 and G ¼ nut,
- Adaptor: M 10 × 0.75 ¼ to ¼ NPT int. thread,
- IP 55 enclosure for single pressure controls,
- IP 55 enclosure for dual pressure controls,

For other accessories: see “Spare parts and accessories”, RXSAB302

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1) Pressure controls with gold-plated contacts
2) Conv.: optional automatic or manual reset
3) Enclosure IP 44
Ordering (continued)

Pressure control setting with convertible reset

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Type</th>
<th>Low pressure (LP)</th>
<th>High pressure (HP)</th>
<th>Reset</th>
<th>Contact system</th>
<th>Code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulating range</td>
<td>Differential Δp</td>
<td>Regulating range</td>
<td>Differential Δp</td>
<td>LP/HP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bar</td>
<td>bar</td>
<td>bar</td>
<td>bar</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>KP1</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td></td>
<td>Aut.</td>
<td>SPDT</td>
</tr>
<tr>
<td>Low</td>
<td>KP1</td>
<td>–0.9 → 7</td>
<td>Fixed 0.7</td>
<td></td>
<td>Man.</td>
<td>SPDT</td>
</tr>
<tr>
<td>Low</td>
<td>KP1</td>
<td>–0.5 → 3.0</td>
<td>Fixed 0.7</td>
<td></td>
<td>Aut.</td>
<td>SPDT</td>
</tr>
<tr>
<td>Low</td>
<td>KP2</td>
<td>–0.2 → 5</td>
<td>0.4 → 1.5</td>
<td></td>
<td>Aut.</td>
<td>SPDT</td>
</tr>
<tr>
<td>High</td>
<td>KP6W</td>
<td>8 → 42</td>
<td>4 → 10</td>
<td>Aut.</td>
<td>SPDT</td>
<td>060-519066</td>
</tr>
<tr>
<td>High</td>
<td>KP6B</td>
<td>8 → 42</td>
<td>Fixed 4</td>
<td>Man.</td>
<td>SPDT</td>
<td>060-519166</td>
</tr>
<tr>
<td>High</td>
<td>KP7W</td>
<td>8 → 32</td>
<td>4 → 10</td>
<td>Aut.</td>
<td>SPDT</td>
<td>060-119066</td>
</tr>
<tr>
<td>High</td>
<td>KP7B</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Man.</td>
<td>SPDT</td>
<td>060-119166</td>
</tr>
<tr>
<td>High</td>
<td>KP7S</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Man.</td>
<td>SPDT</td>
<td>060-119266</td>
</tr>
<tr>
<td>Dual</td>
<td>KP7S</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Man. / Man.</td>
<td>SPST</td>
<td>060-120066</td>
</tr>
<tr>
<td>Dual</td>
<td>KP17W</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Aut. / Aut.</td>
</tr>
<tr>
<td>Dual</td>
<td>KP17W</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Aut. / Aut.</td>
</tr>
<tr>
<td>Dual</td>
<td>KP17B</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Aut. / Man.</td>
</tr>
<tr>
<td>Dual</td>
<td>KP17WB</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Aut./Conv.</td>
</tr>
</tbody>
</table>

Pressure controls with EN 12263 and DIN 32733 approval

For ammonia

<table>
<thead>
<tr>
<th>Pressure</th>
<th>Type</th>
<th>Low pressure (LP)</th>
<th>High pressure (HP)</th>
<th>Reset</th>
<th>Contact system</th>
<th>Code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulating range</td>
<td>Differential Δp</td>
<td>Regulating range</td>
<td>Differential Δp</td>
<td>LP/HP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>bar</td>
<td>bar</td>
<td>bar</td>
<td>bar</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>KP1A</td>
<td>–0.2 → 7.5</td>
<td>0.7 → 4.0</td>
<td></td>
<td>Aut.</td>
<td>SPDT</td>
</tr>
<tr>
<td>Low</td>
<td>KP1A</td>
<td>0.9 → 7</td>
<td>Fixed 0.7</td>
<td></td>
<td>Man.</td>
<td>SPDT</td>
</tr>
<tr>
<td>High</td>
<td>KP7ABS</td>
<td>8 → 32</td>
<td>Fixed 4</td>
<td>Man./Man.</td>
<td>SPST</td>
<td>060-120566</td>
</tr>
</tbody>
</table>

1) Meets the requirements in VBG 20 dealing with safety equipment and excess pressures. Moved the requirements in VBG 20 dealing with safety equipment and excess pressures.

2) KP 1, 2, 6, 7 and KP 17 are CE marked acc. to PED, Pressure Equipment Directive.

W = Wächter (pressostat), B = Begrenzer (pressure control with ext. reset), S = Sicherheitsdruckbegrenzer (pressure control with int. reset).

3) Enclosure IP 44

4) factory setting: LP side: Range 1 bar Pe, Diff. 4 bar; HP side: Range 18 bar Pe, Diff. 4 bar fixed

5) Conv.: optional automatic or manual reset
Design / Function

1. Low pressure (LP) setting spindle
2. Differential setting spindle, LP
3. Main arm
4. High pressure (HP) setting spindle
5. Main spring
6. Differential spring
7. Bellows
8. LP connection
9. HP connection
10. Switch
11. Terminals
12. Earth terminal
13. Locking plate
14. Arm
15. Cable entry
16. Tumbler
17. 30. Reset button

The switch in the KP has a snap-action function and the bellows moves only when the cut-in or cut-out value is reached.

The bellows becomes connected to the low or high pressure side of the plant through connection (10) or (11).

The design of the KP affords the following advantages:
- high contact load
- ultra-short bounce time
- high resistance to pulsation
- vibration resistance up to 4 g in the range 0-1000 Hz
- long mechanical and electrical life
Design
(continued)

KP1, KP1A, KP2, KP6, KP6A, KP7 and KP17 units with designation W, B or S have been tested and approved by TÜV, Rheinland in accordance with DIN 32733 and EN 12263

W = Wächter (pressure control)
B = Begrenzer (pressure control with external reset)
S = Sicherheitsdruckbegrenzer (pressure control with internal reset).

KP6, KP6A, KP7 and KP17 have a double bellows: an outer bellows and a regulating bellows. When system pressure exceeds the set value, the KP will automatically stop the plant. The double bellows system prevents loss of charge in the event of bellows rupture.

A rupture in the inner bellows will cause the control cut-out pressure to fall about 3 times less the set value, thus the refrigeration plant compressor will stop.

A rupture in the outer bellows will cause the control cut-out pressure to fall to about 3 bar under the set value, thus providing a fail-safe function.

Versions with designation W or AW cut in again automatically when the pressure has fallen to the set value minus the differential.

Versions with designation B or AB can be cut in manually with the external reset button when the pressure in KP1 has raised 0.7 bar above set value and in KP6 and KP7 has fallen 4 bar under the set value.

Versions with designation S or AS can be cut in manually with the internal reset arm when the pressure has fallen 4 bar under the set value.

All KP pressure controls, including those which are PED-approved, operate independently of changes in the ambient temperature around the control housing. Therefore the set cut-out pressure and differential are held constant provided the permissible ambient temperatures are not exceeded.

1. Pressure setting spindle
2. Differential setting spindle
3. Main arm
5. Pressure setting spindle, DBK
15. Cable entry
18. Locking plate
19. Arm
25. Int. reset arm
30. Ext. reset button
Terminology

Reset
1. Manual reset:
   Units with manual reset can only be reset during operation by activation of the reset button.
2. Automatic reset:
   After operational stop, these units reset automatically.
3. Convertible reset:
   Units with optional reset can be activated by automatic and/or manual reset.

Permissible working pressure
The permissible working pressure is determined by the pressure that can be safely allowed in the refrigerating system or any of the units within it. The permissible working pressure is designated PB (Der zulässige Betriebsüberdruck).

Test pressure
The test pressure is the pressure used in strength tests and/or leakage tests on refrigerating systems or individual parts in systems. The test pressure is designated p'.

"Snap function"
A certain contact force is maintained until irrevocable "snap" is initiated. The time during which the contact force approaches zero is thus limited to a very few milliseconds. Therefore contact bounce cannot occur as a result of, for example, slight vibrations, before the cut-out point. Contact systems with "Snap function" will change over even when micro-welds are created between the contacts during cut-in. A very high force is created during cut-out to separate the contacts. This force immediately shears off all the welds. Thus the cut-out point of the unit remains very accurate and completely independent of the magnitude of the current load.

Setting

Pressure controls with automatic reset - LP:
Set the LP start pressure on the "CUT-IN" scale (range scale).
One rotation of the low pressure spindle ~ 0.7 bar.
Set the LP differential on the "DIFF" scale. One rotation of the differential spindle ~ 0.15 bar.
The LP stop pressure is the LP start pressure minus the differential.

Note:
The LP stop pressure must be above absolute vacuum (p_e = −1 bar)!

If with low stop pressure the refrigeration compressor will not stop, check to ensure that the differential value has not been set too high!

Pressure controls with automatic reset - HP:
Set the HP pressure on the "CUT-OUT" scale. One rotation of the HP spindle ~ 2.3 bar.
Set the HP differential on the "DIFF" scale. One rotation of the differential spindle ~ 0.3 bar.
The HP start pressure is the HP stop pressure minus the differential.
Start and stop pressures for both the LP and HP sides of the system should always be checked with an accurate pressure gauge.

Pressure controls with manual reset
Set the stop pressure on "CUT-OUT" scale (range scale).
Low pressure controls can be manually reset when the pressure is equal to the stop pressure plus the differential.
High pressure controls can be manually reset when the pressure is equal to the stop pressure minus the differential.
Dimensions and weights

Flare connection

KP 1, 2, 5, 6, 7B, 7S and 7W

KP 15 and 17W

M10 × 0.75 connection

KP 1A, 2A and 5A

KP 15A, 7 AS and 7ABS

Solder connection

KP 1, 2, 5, 7B, 7S and 7W

KP 15, 17W

Weld nipple for KP-A

Weight

KP 1, 2, 5 and 7: approx. 0.3 kg
KP 15, 17 and 7BS: approx. 0.5 kg
KP 1A and 5A: approx. 0.3 kg
KP 15A and 7ABS: approx. 0.5 kg

KP with top cover

KP with IP SS enclosure

IP SS enclosure