

## Data Sheet

Pressure switch  
Type **KP**

The KP pressure switches can be used as safety switches against too low a suction pressure and / or too high a discharge pressure in refrigeration and air conditioning systems. They can also be used to start / stop compressors and fans for air-cooled condensers.

They are available in both single and dual versions and include a single pole double throw (SPDT) switch.

**Features:**

- Ultra-short bounce time thanks to snap-action function (reduces wear to a minimum and increases reliability)
- Available with gold-plated contacts
- SPDT switch design Offers open or close switching action on pressure rise or fall
- Fail safe double bellows Prevent refrigerant loss and system contamination - standard on KP 7 and KP 17 pressure switches
- Convenient manual trip feature To test electrical contact function - no tools needed
- Pressure wire connectors For easy electrical wiring
- No spade or lug terminals required
- Integral 1/2 NPSM swivel cable connector Allows direct attachment of 1/2 in male pipe thread connector
- Lockplate Prevents tampering with range and differential settings
- Universal mounting hole patterns

**Product specification**

**Technical data**

**Table 1: Technical data**

| Features                  | Values                                    |
|---------------------------|---|
| Ambient temperature       | -40 – 149 °F (175 °F for maximum 2 hours) |
| Maximum working pressure  | LP: MWP = 245 psig                        |
|                           | HP: MWP = 465 psig                        |
| Maximum test pressure     | LP: p <sub>e</sub> = 285 psig             |
|                           | HP: p <sub>e</sub> = 510 psig             |
| Switch                    | Single pole changeover switch (SPDT)      |
| Contact load              | 120 V AC: 16 FLA, 96 LRA                  |
|                           | 240 V AC: 8 FLA, 48 LRA                   |
|                           | 240 V DC: 12 W pilot duty                 |
| Terminal D, dual switches | 240 V, 50 VA                              |

**Cable entry**

Integral 1/2 in female NPSM swivel cable connector allows direct attachment of 1/2 in male pipe thread connector.

**Enclosure**

~NEMA 1

This grade of enclosure 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.

~ NEMA 2

This grade of enclosure 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

**Table 2: Materials in contact with the medium**

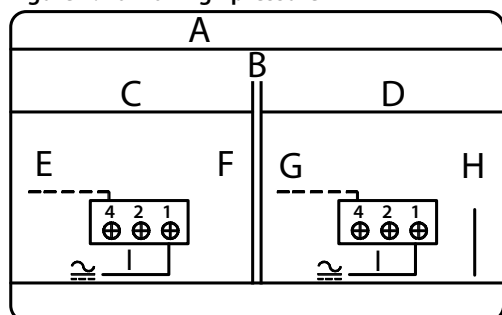
| Control type                                | Material  |
|---|---|
| KP 1, KP 2, KP 5, KP 7, KP 15, KP 17, KP 25 | Tin bronze, no. CW452K, EN 1652 Nickel plated free cutting steel, no. 1.0737 / 1.0718 to EN 10277 |
| KP with cap. tube                           | Copper SF-Cu, no. 2.0090 to DIN 1787  |

**Electrical wiring**

**Table 3: Electrical wiring**

| Load | Signal option | Bellows movement on pressure rise | Bellows movement on pressure drop |
|------|---------------|-----------------------------------|-----------------------------------|
|      |               |                                   |                                   |

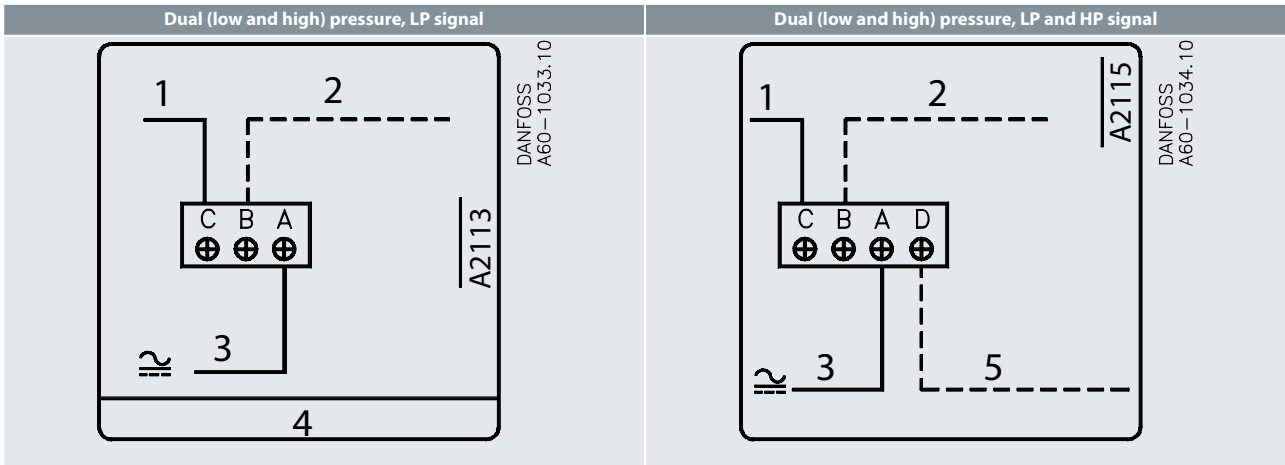
**Figure 1: Low or high pressure**



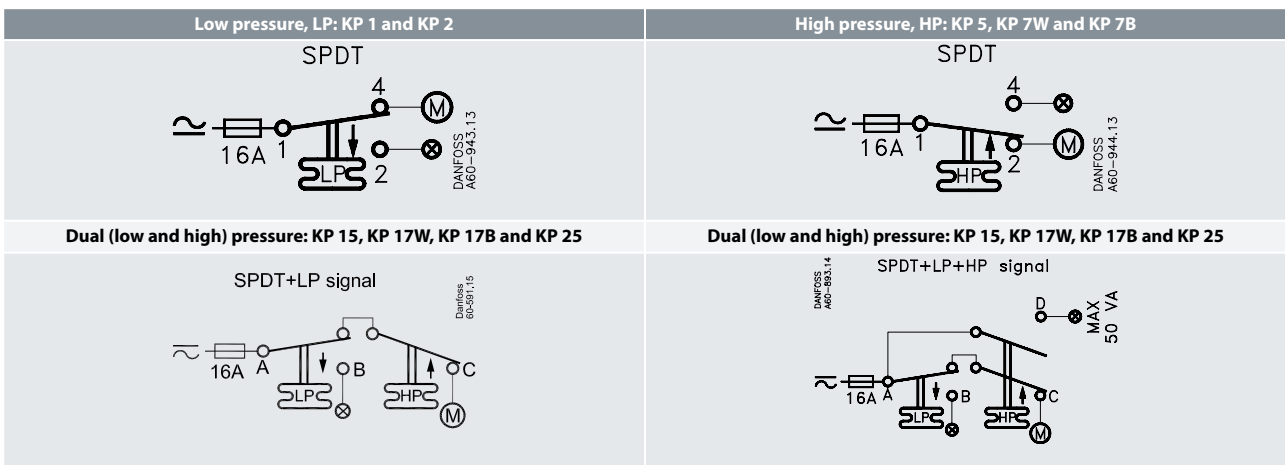
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A60-103210

|   |                                 |
|---|---------------------------------|
| A | SPDT - signal pole double throw |
| B | Pressure / Temperature          |
| C | Rise                            |
| D | Drop                            |
| E | Load Cut-in (term.1-4)          |
| F | Load Cut-out (term.1-2)         |
| G | Load Cut-out (term.1-4)         |
| H | Load Cut-in (term.1-2)          |
| I | Line                            |

# Pressure switch, Type KP



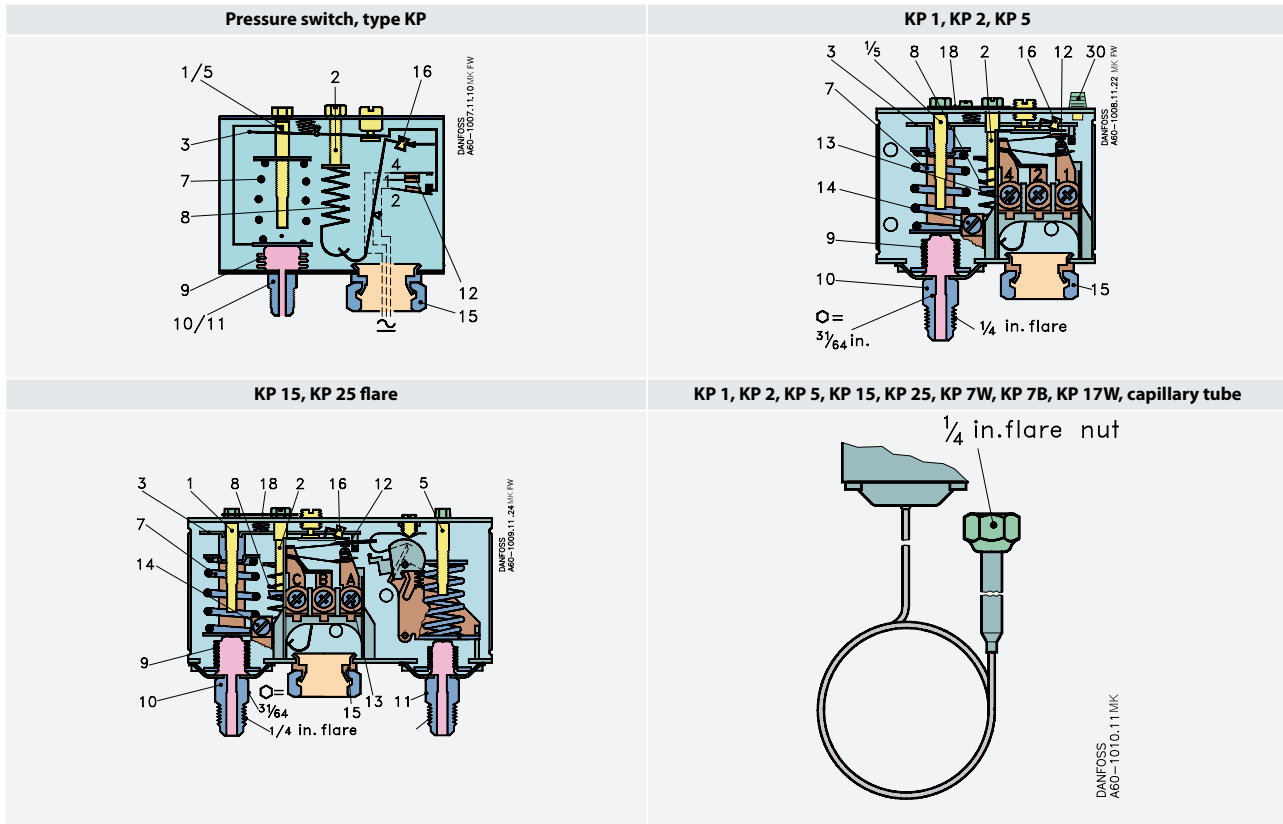
- |                       |                       |
|-----------------------|-----------------------|
| 1. Load               | 4. Wiring instruction |
| 2. LP - signal option | 5. HP - signal option |
| 3. Line               |                       |



Metric conversions  
 1 psi = 0.07 bar  
 $5/9 (t_1 \text{ } ^\circ\text{F} - 32) = t_2 \text{ } ^\circ\text{C}$

## Design

Table 4: Design



|     |                                     |     |                |
|-----|-------------------------------------|-----|----------------|
| 1.  | Low pressure setting spindle, (LP)  | 12. | Switch         |
| 2.  | Differential setting spindle        | 13. | Terminals      |
| 3.  | Main arm                            | 14. | Earth terminal |
| 5.  | High pressure setting spindle, (HP) | 15. | Cable entry    |
| 7.  | Main spring                         | 16. | Tumbler        |
| 8.  | Differential spring                 | 18. | Locking plate  |
| 9.  | Bellows                             | 19. | Arm            |
| 10. | LP connection                       | 30. | Reset button   |
| 11. | HP connection                       |     |                |

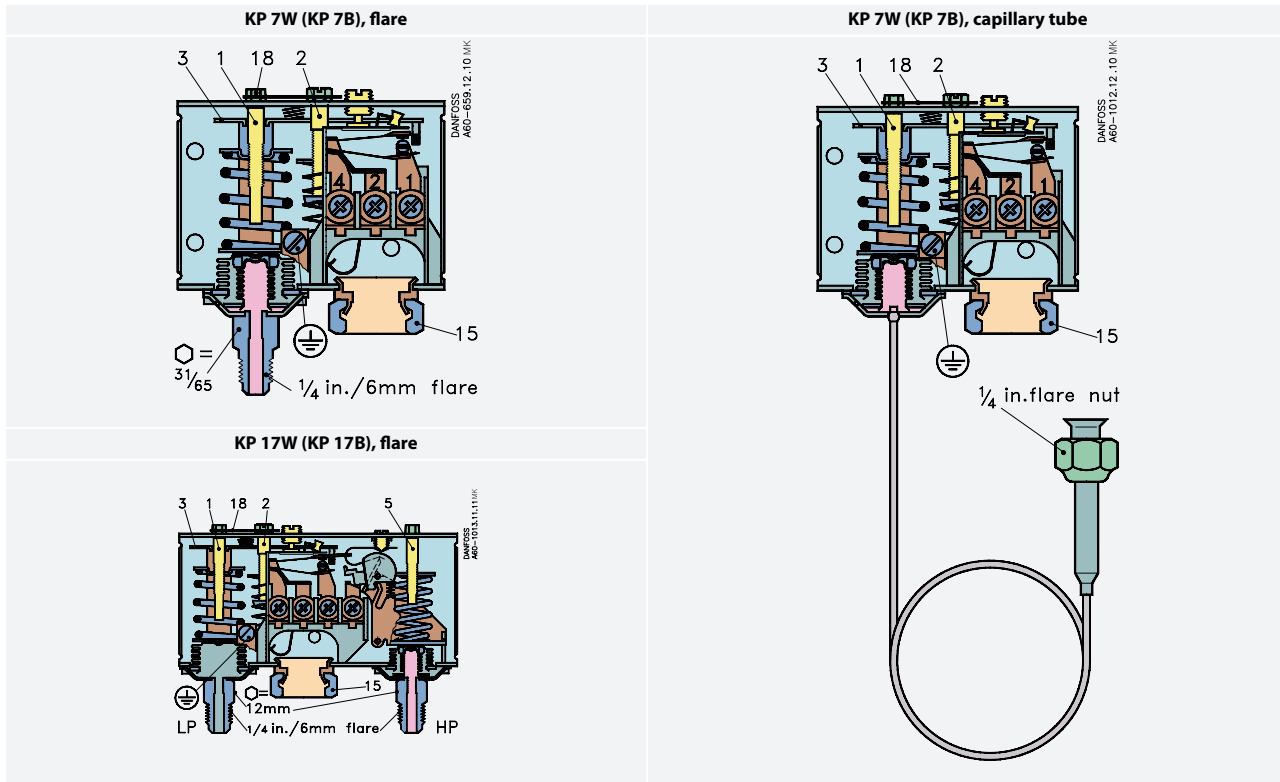
The switch in the KP has a snap-action function where the bellows move only when the cut-in or cut-out value is reached.

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

### The design of the KP gives 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

## Pressure switch, Type KP



|    |                                |     |                                |
|----|--------------------------------|-----|--------------------------------|
| 1. | Pressure setting spindle, (LP) | 5.  | Pressure setting spindle, (HP) |
| 2. | Differential setting spindle   | 15. | Cable entry                    |
| 3. | Main arm                       | 18. | Locking plate                  |

The KP with designations W or B have been tested and approved by TÜV (Germany) in accordance with EN 12263.

Versions with designation W will cut in automatically when the pressure has fallen to the setpoint minus the differential.

Versions with designation B can be cut in manually using the external reset button when:

KP 1 – the pressure has increased to 10 psi above the setpoint.

KP 7 – the pressure has fallen 58 psi below the setpoint.

KP 7 and KP 17 are equipped with fail-safe double bellows; a regulation bellows and an outer bellows. The double bellows system protects against loss of system charge in the event of a bellows rupture.

A rupture in the outer bellows will cause the control to trip approximately 43 psi lower than the actual control setting. This feature provides a warning without a loss of charge.

All KP pressure switches, 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 kept constant provided the permissible ambient temperatures are not exceeded.

## 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.

### Maximum working pressure

The Maximum working pressure is determined by the pressure that can be safely allowed in the refrigerating system or any of the units within it. The maximum working pressure is designated MWP.

### 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  $P_e$ .

### “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 switches with automatic reset – LP:** Set the LP start pressure on the “CUT-IN” scale (range scale). One rotation of the low pressure spindle  $\sim 10$  psi. Set the LP differential on the “DIFF” scale. One rotation of the differential spindle  $\sim 3$  psi. The LP cut-out pressure is the LP cut-in pressure minus the differential.

#### NOTE:

The LP cut-out pressure must be above absolute vacuum  $p_e = 30$  in Hg. If compressor will not stop at low cut-out pressure, check whether the differential value is set at too high a value!

Metric conversions 1 psi = 0.07 bar

**Pressure switches with automatic reset – HP:** Set the HP cut-out pressure on the “CUT-OUT” scale. One rotation of the HP spindle  $\sim 33$  psi. Set the HP differential on the “DIFF” scale.

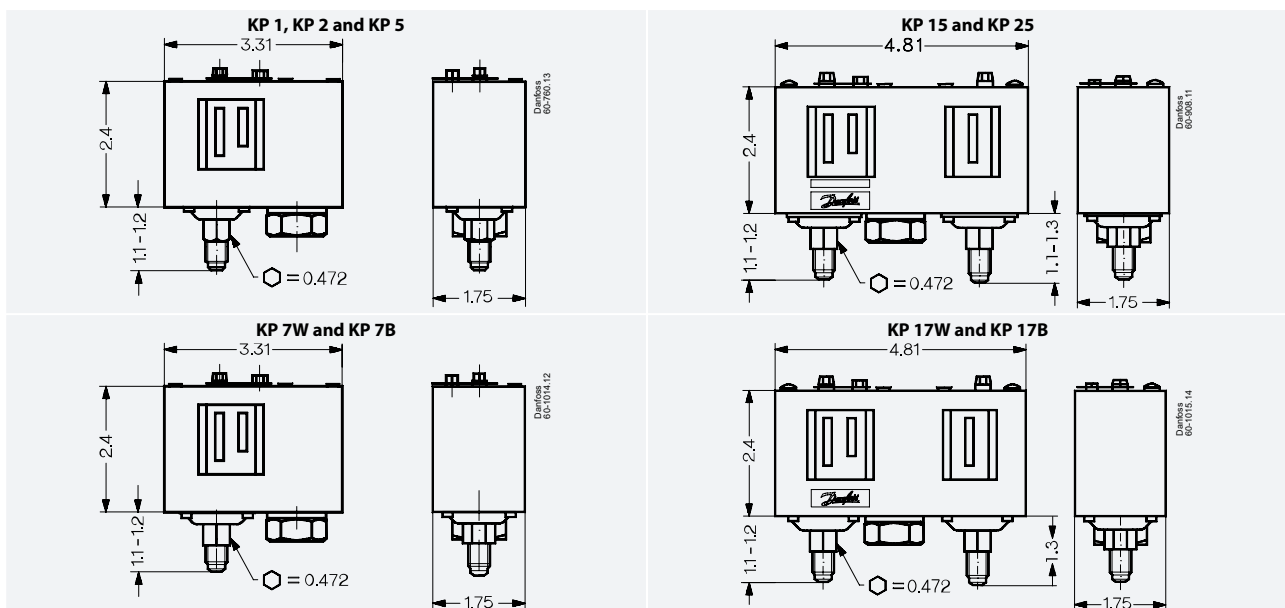
One rotation of the differential spindle  $\sim 4$  psi. The HP cut-in pressure is the HP cut-out pressure minus the differential. Pressure switches with manual reset. Set the cut-out pressure on “CUT-OUT” scale (range scale). Low pressure controls can be manually reset when the pressure is equal to the cut-out pressure plus the differential.

High pressure switches can be manually reset when the pressure is equal to the cut-out pressure minus the differential.

Cut-in and cut-out pressures for both the LP and HP sides of the system should always be checked with an accurate pressure gauge.

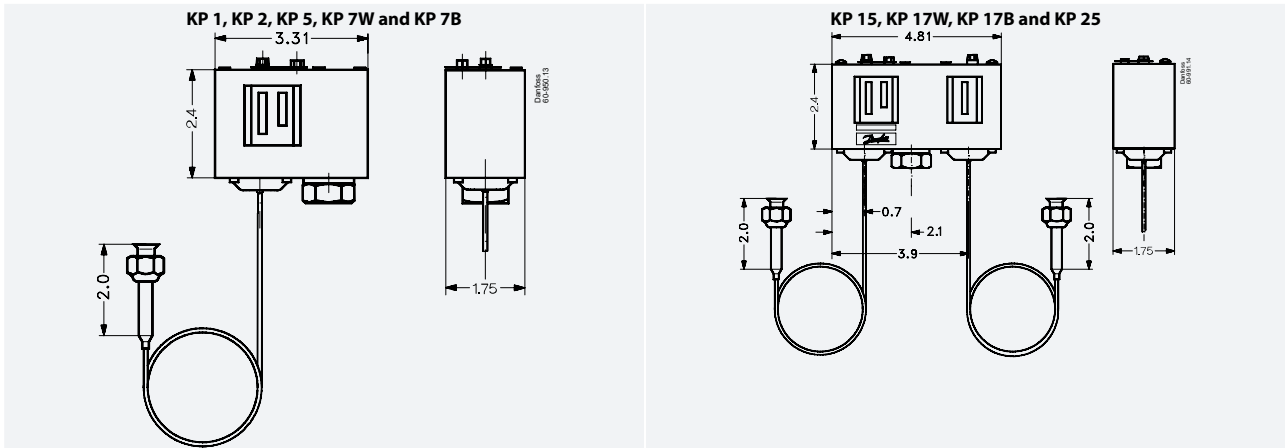
### Dimensions [in] and weight [lb]

Table 5: Flare connection



Pressure switch, Type KP

Table 6: Capillary tube connection



**Net weight:**

KP 1, KP 2, KP 5 and KP 7:

approx. 0.7 lbs.

KP 15, KP 17 and KP 25:

approx. 1.1lbs.

**Metric conversions:**

1 in = 25.5 mm

1 lb = 0.454 kg

Table 7: KP switches, rear side

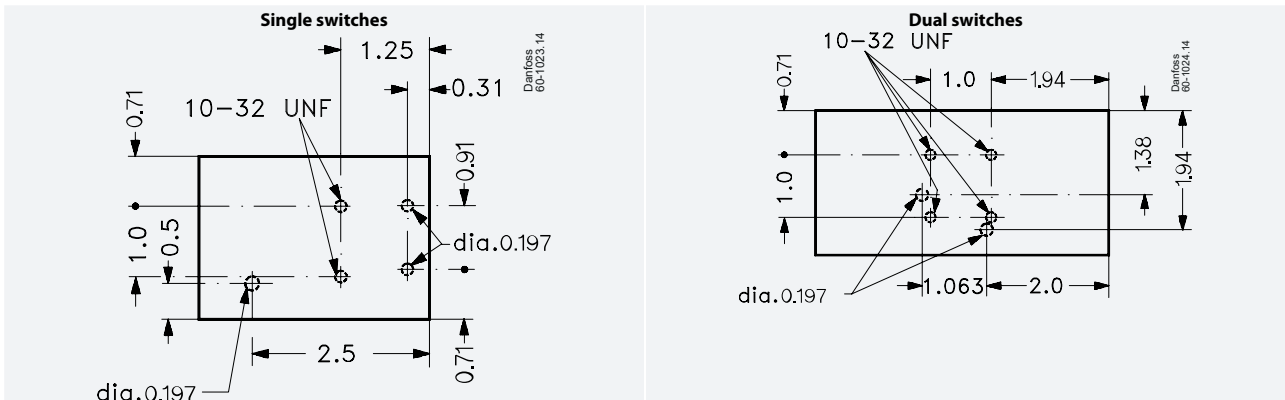
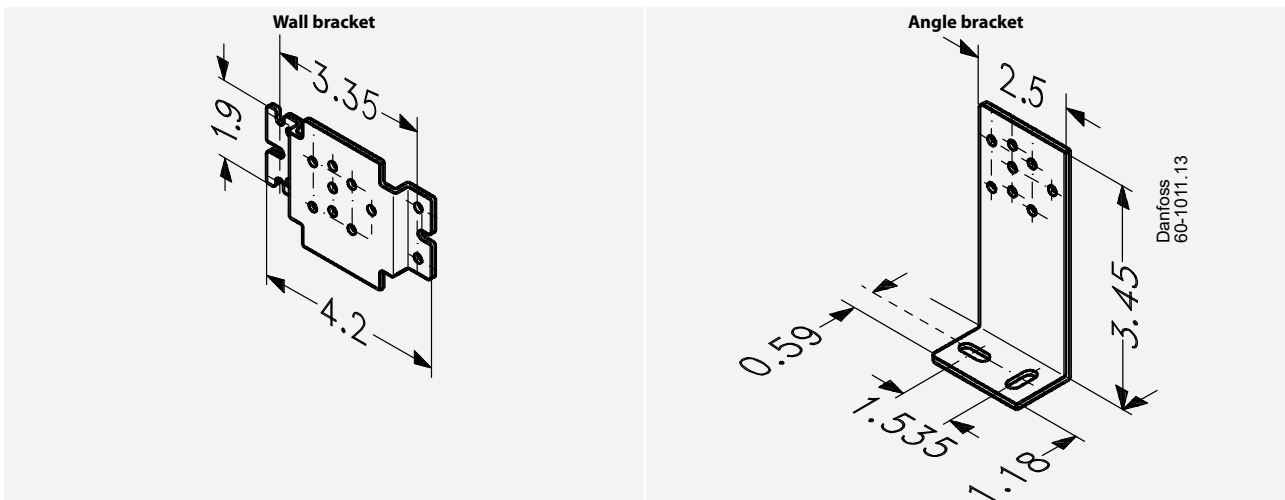
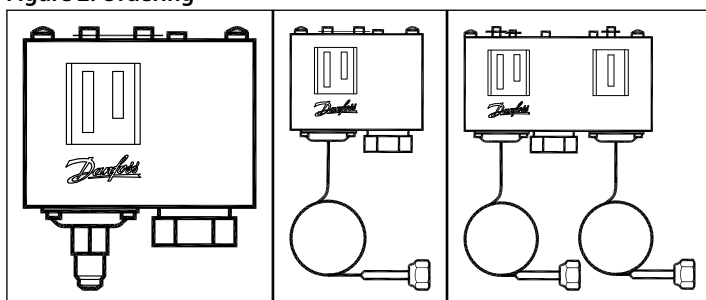


Table 8: Bracket dimensions



## Ordering

Figure 2: Ordering



For R22, R134a, R404A, R407A, R407C, R407F, R422B, R422D, R448A, R449A, R450A, R452A, R507A, R513A

For complete list of approved refrigerants, visit [www.products.danfoss.com](http://www.products.danfoss.com) and search for individual code numbers, where refrigerants are listed as part of technical data.

Table 9: Ordering

| Type                  | Pressure | Low pressure (LP) |                         | High pressure (HP) |                         | Reset        |               | Contact function       | Code no.     |                                     |
|-----------------------|----------|-------------------|-------------------------|--------------------|-------------------------|--------------|---------------|------------------------|--------------|-------------------------------------|
|                       |          | Regulating range  | Differential $\Delta p$ | Regulating range   | Differential $\Delta p$ | Low pressure | High pressure |                        | connection   |                                     |
|                       |          | [inHg] [psig]     | [psi]                   | [psig]             | [psi]                   | [LP]         | [HP]          |                        | 1/4 in flare | Cap. tube w. 1/4 in flare nut 36 in |
| KP 1                  | Low      | 6 in – 108        | 10 – 58                 | –                  | –                       | Auto         | –             | SPDT                   | 060-200191   | –                                   |
| KP 1                  | Low      | 6 in – 108        | 10 – 58                 | –                  | –                       | Auto         | –             | SPDT                   | –            | 060-205191                          |
| KP 1                  | Low      | 27 in – 100       | 10                      | –                  | –                       | Man. (Min.)  | –             | SPDT                   | –            | 060-205291 <sup>(1)</sup>           |
| KP 2                  | Low      | 6 in – 50         | 6 – 32                  | –                  | –                       | Auto         | –             | SPDT                   | –            | 060-206391                          |
| KP 5                  | High     | –                 | –                       | 115 – 465          | 25 – 85                 | –            | Auto          | SPDT                   | 060-201491   | –                                   |
| KP 5                  | High     | –                 | –                       | 115 – 465          | 25 – 85                 | –            | Auto          | SPDT                   | –            | 060-206491                          |
| KP 7W <sup>(2)</sup>  | High     | –                 | –                       | 115 – 465          | 58 – 140                | –            | Auto          | SPDT                   | 060-200391   | –                                   |
| KP 7W <sup>(2)</sup>  | High     | –                 | –                       | 115 – 465          | 58 – 140                | –            | Auto          | SPDT                   | –            | 060-205391                          |
| KP7B <sup>(2)</sup>   | High     | –                 | –                       | 115 – 465          | 58                      | –            | Man. (Max.)   | SPDT                   | 060-200491   | –                                   |
| KP7B <sup>(2)</sup>   | High     | –                 | –                       | 115 – 465          | 58                      | –            | Man. (Max.)   | SPDT                   | –            | 060-205491                          |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Auto          | SPDT/w. L P signal     | 060-200891   | –                                   |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Auto          | SPDT/w. L P signal     | –            | 060-205891                          |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Man. (Max.)   | SPDT/w. L P signal     | –            | 060-205991                          |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Man. (Min.)  | Man. (Max.)   | SPDT/w. L P signal     | –            | 060-206091                          |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Auto          | SPDT/w. LP + HP signal | –            | 060-203191                          |
| KP 15                 | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Man. (Max.)   | SPDT/w. LP + HP signal | 060-202691   | –                                   |
| KP 17W <sup>(2)</sup> | Dual     | 6 in – 108        | 10 – 58                 | 115 – 465          | 58                      | Auto         | Auto          | SPDT/w. LP + HP signal | –            | 060-202991                          |

<sup>(1)</sup> With dial knob

<sup>(2)</sup> With fail safe double bellows

### Metric conversions

1 psi = 0.07 bar

5/9 (t<sub>1</sub> °F - 32) = t<sub>2</sub> °C



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The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

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**Table 10: Certificates, declarations, and approvals**

| Document type                           | Approval authority |
|---|--------------------|
| UL certificate                          | UL                 |
| EAC document                            | EAC                |
| EU declaration                          | Danfoss            |
| CCC declaration                         | Danfoss            |
| Quality - Assurance Certificate         | TUV                |
| Marine safety certificate               | DNV G L ,LR and BV |
| Manufacturer declaration for China ROHS | Danfoss            |

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