

## Series P20

### Pressure Controls for Refrigeration, Air-conditioning and Heat-pump Applications

#### Introduction

*The P20 series high and low limit (cut-out) controls for all non-corrosive refrigerants are compact pressure controls ideally suited for commercial or residential packaged air conditioning units, heat pumps, small water chillers, ice cube machines and other applications where a semi fixed setting is acceptable or required and where mounting space is limited. The P20 series includes auto reset as well as manual reset models and is factory set. A special setting tool is available for field adjustability. There are also models available for HP R410a applications. All the HP models are tested and approved according to the PED 97/23EC Cat. IV. Individual packed universal replacement models are provided with a second suffix number "C"*



**P20 Pressure Control**

#### Feature and Benefits

|                                                                                                         |                                                                  |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <input type="checkbox"/> <b>Field proven reliability.</b>                                               | More than half a million in use today.                           |
| <input type="checkbox"/> <b>Reset tab must be released before restart.</b><br>(Trip free manual reset). | Override of control function is not possible.                    |
| <input type="checkbox"/> <b>Compact design.</b>                                                         | Less cabinet space needed.                                       |
| <input type="checkbox"/> <b>Enclosed dust-tight switch.</b>                                             | Prevents contacts pollution.                                     |
| <input type="checkbox"/> <b>SPDT contact with special terminals.</b>                                    | Can be used either as quick or as screw terminals.               |
| <input type="checkbox"/> <b>Test pressure 53 bar.</b>                                                   | Test strength far above severe operating and standby conditions. |
| <input type="checkbox"/> <b>Designed for at least 200000 cycles.</b>                                    | Accurate repeatability and long life.                            |

## Note

The controls are intended to control equipment under normal operating conditions. Where failure or malfunctioning of the controls could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory systems) intended to warn of or protect against failure or malfunctioning of the controls must be incorporated into and maintained as part of the control system.

## Description

The P20 series are available in three categories (see type number selection table):

- 1) **Universal replacement models.** These models are individually packed and can be purchased in any quantity. The models are provided with an extra second suffix number "C"  
The models are field adjustable by use of the special wrench WRN12-1 (must be ordered separately)
- 2) **Basic models.** These are factory set but can be adjusted by use of a special wrench (see accessories). They can be purchased in bulkpack of 50 pcs each.
- 3) **Special (OEM) models.** For yearly order quantities above 1000 pcs these models can have optional constructions like:
  - screwdriver adjustment (Not PED approved)
  - 120 cm capillary
  - range -0.6 to 7 bar
  - range 14 to 42 bar (R410a applications)
  - other pressure connection style

The minimum shipping quantity from factory is 250 pieces per model (5 boxes). Please contact your Johnson Controls representative.

## Installation

The P20 controls can be installed in any convenient location provided that the ambient conditions are suitable for the IP00 enclosure, within the specified limits regarding temperature and humidity and normal pollution situation. Each control is provided with 2 mounting screws (6-32UNC x 4.5 mm thread). For easy mounting different types of mounting brackets are available (see accessories).

## Adjustment

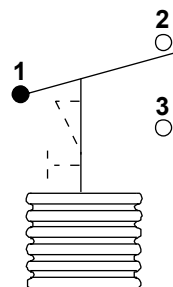
All models are factory set. Models can be field adjusted by use of a special wrench (see accessories). The differential is not adjustable but can be selected from the "Differential Specifications" matrices (see page 4).

## Range

The indicated range means from the "minimal low switchpoint" up to the maximum "high switchpoint". This means that the "differential" cannot be at the outside of the indicated range.

## Contact functions

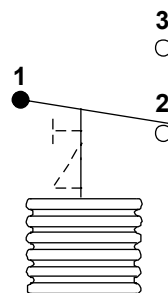
### Low Pressure version



1 - 2 open on pressure decrease

Fig.1

### High Pressure version



1 - 2 open on pressure increase

Fig. 2

## Accessories (see page 6 and 7).

The following accessories are available:

- Adjusting wrench WRN12-1 for adjustment of all models. (Fig. 8)
- Clip-on terminal cover. (Fig. 9)
- Mounting plate BKT116-1 for single P20. (Fig. 10)
- Mounting bracket 210-25R for single P20, angled version. (Fig. 11)
- Mounting bracket BKT275-1 for two P20 controls, angled version. (Fig. 12)

## Type number selection

In the model number the following information is given:

**P20EA-9650K**

**E** = Auto reset

**F** = Manual reset lockout low

**G** = Manual reset lockout high

**A** = Basic and universal models (only adjustable with special wrench)

**L** = Provided with bellows for R410a application (HP only)

Pressure connection style (see page 6)

**1** = style 45A

**5** = style 50, 51 or customer special

**6** = style 13

**9** = style 34

Pressure differential. This is indicated in the "Differential Specification" matrices (see page 4,5). The differential code is indicated by two characters. Each differential code compares with a digit as indicated below. (Not valid for manual reset models).

| Differential digit in model number |    | Differential code |                   |
|------------------------------------|----|-------------------|-------------------|
| 1                                  | AL | ↙ ↘               | LP models         |
| 2                                  | BL |                   |                   |
| 3                                  | CL |                   |                   |
| 4                                  | DL |                   |                   |
| 5                                  | AM | ↙ ↘               | HP models         |
| 6                                  | BM |                   |                   |
| 7                                  | CM |                   |                   |
| 8                                  | DM |                   |                   |
| 6                                  | BR | ↙ ↘               | HP (R410a) models |
| 7                                  | CR |                   |                   |
| 8                                  | DR |                   |                   |

This is the model number suffix that indicates the selected switch point (see "Differential Specification" matrices, page 4 - horizontal line). The figures given at the intersection of this horizontal line and the selected differential column indicates the pressure differential that belongs to the selected switch point. The model suffix is indicated in the "Differential Specification" matrices (see page 4,5).

The above mentioned model P20EA-9650K indicates:

Auto reset

Basic model (special adjustment tool WRN12-1 needed)

Connection style 13

Differential AM equals 1.2 bar

High switch point 16 bar.

**Differential specification matrix for LP models, values in bar.**

| Low switch point | Differential code |        |        |        | Model suffix |
|------------------|-------------------|--------|--------|--------|--------------|
|                  | AL (1)            | BL (2) | CL (3) | DL (4) |              |
| 0.5              | 0.9               | 1.5    | 2.0    | 2.6    | A            |
| 1                | 0.9               | 1.5    | 2.0    | 2.6    | B            |
| 1.5              | 0.9               | 1.5    | 2.0    | 2.7    | C            |
| 2                | 0.9               | 1.5    | 2.1    | 2.7    | D            |
| 2.5              | 0.9               | 1.5    | 2.1    | 2.8    | E            |
| 3                | 0.9               | 1.5    | 2.1    | 2.8    | F            |
| 3.5              | 0.9               | 1.5    | 2.1    | 2.8    | G            |
| 4                | 0.9               | 1.5    | 2.1    | 2.9    | H            |
| 4.5              | 0.9               | 1.5    | 2.1    | 2.9    | K            |
| 5                | 0.9               | 1.5    | 2.1    | 3.0    | L            |
| 5.5              | 1.0               | 1.6    | 2.2    | 3.0    | M            |
| 6                | 1.0               | 1.6    | 2.2    | 3.0    | N            |
| 6.5              | 1.0               | 1.6    | 2.2    | 3.1    | P            |
| 7                | 1.0               | 1.6    | 2.2    | 3.1    | Q            |
| 7.5              | 1.0               | 1.6    | 2.2    | X      | R            |
| 8                | 1.0               | 1.6    | X      | X      | S            |

**Differential specification matrix for HP models, values in bar.**

| High switch point | Differential code |        |        |        | Model suffix |
|-------------------|-------------------|--------|--------|--------|--------------|
|                   | AM (5)            | BM (6) | CM (7) | DM (8) |              |
| 8                 | 1.0               | X      | X      | X      | A            |
| 9                 | 1.1               | X      | X      | X      | B            |
| 10                | 1.1               | 2.8    | X      | X      | C            |
| 11                | 1.1               | 2.8    | 4.2    | X      | D            |
| 12                | 1.1               | 2.9    | 4.3    | X      | E            |
| 13                | 1.2               | 2.9    | 4.3    | 6.1    | F            |
| 14                | 1.2               | 2.9    | 4.4    | 6.2    | G            |
| 15                | 1.2               | 3.0    | 4.4    | 6.3    | H            |
| 16                | 1.2               | 3.1    | 4.5    | 6.4    | K            |
| 17                | 1.2               | 3.1    | 4.6    | 6.5    | L            |
| 18                | 1.3               | 3.1    | 4.6    | 6.5    | M            |
| 19                | 1.3               | 3.1    | 4.7    | 6.6    | N            |
| 20                | 1.3               | 3.2    | 4.7    | 6.7    | P            |
| 21                | 1.3               | 3.2    | 4.8    | 6.8    | Q            |
| 22                | 1.3               | 3.3    | 4.9    | 6.9    | R            |
| 23                | 1.4               | 3.3    | 4.9    | 7.0    | S            |
| 24                | 1.4               | 3.3    | 5.0    | 7.1    | T            |
| 25                | 1.4               | 3.4    | 5.0    | 7.2    | U            |
| 26                | 1.4               | 3.4    | 5.1    | 7.3    | V            |
| 27                | 1.4               | 3.5    | 5.2    | 7.4    | W            |
| 28                | 1.5               | 3.5    | 5.2    | 7.5    | X            |
| 29                | 1.5               | 3.5    | 5.2    | 7.6    | Y            |

**Differential tolerances\*:**

|                  |                  |
|------------------|------------------|
| <b>AL ± 50 %</b> | <b>CL ± 26 %</b> |
| <b>BL ± 34 %</b> | <b>DL ± 20 %</b> |
| <b>AM ± 30 %</b> | <b>CM ± 21 %</b> |
| <b>BM ± 24 %</b> | <b>DM ± 18 %</b> |

\* But not less than 0.4 bar.

**Switch point tolerances LP models ± 3 % but not less than 0.2 bar.****Switch point tolerances HP models ± 2 % but not less than 0.4 bar.**

### Differential specification matrix for R410a/HP models, values in bar.

| High switch point | Differential code |        |        | Model suffix |
|-------------------|-------------------|--------|--------|--------------|
|                   | BR (6)            | CR (7) | DR (8) |              |
| 18                | 3,8               | X      | X      | A            |
| 19                | 3,8               | X      | X      | B            |
| 20                | 3,8               | 6,0    | X      | C            |
| 21                | 3,8               | 6,0    | X      | D            |
| 22                | 3,8               | 6,1    | 7,8    | E            |
| 23                | 3,8               | 6,1    | 7,9    | F            |
| 24                | 3,8               | 6,1    | 8,0    | G            |
| 25                | 3,9               | 6,2    | 8,0    | H            |
| 26                | 3,9               | 6,2    | 8,1    | I            |
| 27                | 3,9               | 6,2    | 8,2    | J            |
| 28                | 3,9               | 6,3    | 8,3    | K            |
| 29                | 3,9               | 6,3    | 8,3    | L            |
| 30                | 3,9               | 6,3    | 8,4    | M            |
| 31                | 3,9               | 6,3    | 8,4    | N            |
| 32                | 3,9               | 6,4    | 8,5    | O            |
| 33                | 4,0               | 6,4    | 8,6    | P            |
| 34                | 4,0               | 6,4    | 8,7    | Q            |
| 35                | 4,0               | 6,4    | 8,7    | R            |
| 36                | 4,0               | 6,5    | 8,8    | S            |
| 37                | 4,0               | 6,5    | 8,9    | T            |
| 38                | 4,0               | 6,5    | 9,0    | U            |
| 39                | 4,0               | 6,5    | 9,0    | V            |
| 40                | 4,0               | 6,5    | 9,1    | W            |
| 41                | 4,0               | 6,5    | 9,2    | X            |
| 42                | 4,0               | 6,5    | 9,2    | Y            |

Differential tolerances\*:

BR  $\pm 0,9$  bar

CR  $\pm 1,1$  bar

DR  $\pm 1,5$  bar

Switch point tolerances R410a/HP models  $\pm 0,7$  bar.

### Type number selection table

#### Universal replacement models

| Range(*)<br>(bar) | Differential<br>code      | Pressure<br>connector | Contact<br>function | Factory<br>set at | Max.<br>working<br>pressure | Order number |
|-------------------|---------------------------|-----------------------|---------------------|-------------------|-----------------------------|--------------|
| 0.5 - 10          | CL                        | style 50              | Fig. 1              | 3 bar             | 20 bar                      | P20EA-9530FC |
| 0.5 - 10          | CL                        | style 13              | Fig. 1              | 3 bar             | 20 bar                      | P20EA-9630FC |
| 7 - 29            | CM                        | style 51              | Fig. 2              | 28 bar            | 38 bar                      | P20EA-9570XC |
| 7 - 29            | CM                        | style 13              | Fig. 2              | 28 bar            | 38 bar                      | P20EA-9670XC |
| 14 - 42           | CR                        | style 13              | Fig. 2              | 37 bar            | 48 bar                      | P20EL-9670TC |
| 0.5 - 10          | man. reset <sup>(1)</sup> | style 50              | Fig. 1              | 3 bar             | 20 bar                      | P20FA-9510FC |
| 0.5 - 10          | man. reset <sup>(1)</sup> | style 13              | Fig. 1              | 3 bar             | 20 bar                      | P20FA-9610FC |
| 7 - 29            | man. reset <sup>(2)</sup> | style 50              | Fig. 2              | 28 bar            | 38 bar                      | P20GA-9550XC |
| 7 - 29            | man. reset <sup>(2)</sup> | style 13              | Fig. 2              | 28 bar            | 38 bar                      | P20GA-9650XC |
| 14 - 42           | man. reset <sup>(2)</sup> | style 13              | Fig. 2              | 37 bar            | 48 bar                      | P20GL-9650TC |

## Type number selection table (continued)

| Range(*)<br>(bar) | Differential<br>code | Pressure<br>connector | Contact<br>function | Factory<br>set at | Max.<br>working<br>pressure | Order number |
|-------------------|----------------------|-----------------------|---------------------|-------------------|-----------------------------|--------------|
|-------------------|----------------------|-----------------------|---------------------|-------------------|-----------------------------|--------------|

## Low pressure, auto reset models

|          |    |           |        |      |        |                 |
|----------|----|-----------|--------|------|--------|-----------------|
| 0.5 - 10 | AL | style 13  | Fig. 1 | (**) | 20 bar | P20EA-9610 (**) |
| 0.5 - 10 | BL | style 45A | Fig. 1 | (**) | 20 bar | P20EA-9120 (**) |
| 0.5 - 10 | BL | style 13  | Fig. 1 | (**) | 20 bar | P20EA-9620 (**) |
| 0.5 - 10 | CL | style 45A | Fig. 1 | (**) | 20 bar | P20EA-9130 (**) |
| 0.5 - 10 | CL | style 13  | Fig. 1 | (**) | 20 bar | P20EA-9630 (**) |
| 0.5 - 10 | DL | style 13  | Fig. 1 | (**) | 20 bar | P20EA-9640 (**) |
| 0.5 - 10 | AL | style 34  | Fig. 1 | (**) | 20 bar | P20EA-9910 (**) |
| 0.5 - 10 | BL | style 34  | Fig. 1 | (**) | 20 bar | P20EA-9920 (**) |
| 0.5 - 10 | CL | style 34  | Fig. 1 | (**) | 20 bar | P20EA-9930 (**) |
| 0.5 - 10 | DL | style 34  | Fig. 1 | (**) | 20 bar | P20EA-9940 (**) |

## Low pressure, manual reset models

|          |                           |          |        |      |        |                 |
|----------|---------------------------|----------|--------|------|--------|-----------------|
| 0.5 - 10 | man. reset <sup>(1)</sup> | style 13 | Fig. 1 | (**) | 20 bar | P20FA-9610 (**) |
|----------|---------------------------|----------|--------|------|--------|-----------------|

## High pressure, auto reset models

|        |    |           |        |      |        |                |
|--------|----|-----------|--------|------|--------|----------------|
| 7 - 29 | AM | style 13  | Fig. 2 | (**) | 38 bar | P20EA-9650(**) |
| 7 - 29 | BM | style 45A | Fig. 2 | (**) | 38 bar | P20EA-9160(**) |
| 7 - 29 | BM | style 13  | Fig. 2 | (**) | 38 bar | P20EA-9660(**) |
| 7 - 29 | CM | style 45A | Fig. 2 | (**) | 38 bar | P20EA-9170(**) |
| 7 - 29 | CM | style 13  | Fig. 2 | (**) | 38 bar | P20EA-9670(**) |
| 7 - 29 | DM | style 13  | Fig. 2 | (**) | 38 bar | P20EA-9680(**) |
| 7 - 29 | AM | style 34  | Fig. 2 | (**) | 38 bar | P20EA-9950(**) |
| 7 - 29 | BM | style 34  | Fig. 2 | (**) | 38 bar | P20EA-9960(**) |
| 7 - 29 | CM | style 34  | Fig. 2 | (**) | 38 bar | P20EA-9970(**) |
| 7 - 29 | DM | style 34  | Fig. 2 | (**) | 38 bar | P20EA-9980(**) |

## High pressure, manual reset models

|        |                           |           |        |      |        |                |
|--------|---------------------------|-----------|--------|------|--------|----------------|
| 7 - 29 | man. reset <sup>(2)</sup> | style 45A | Fig. 2 | (**) | 38 bar | P20GA-9150(**) |
| 7 - 29 | man. reset <sup>(2)</sup> | style 50  | Fig. 2 | (**) | 38 bar | P20GA-9550(**) |
| 7 - 29 | man. reset <sup>(2)</sup> | style 13  | Fig. 2 | (**) | 38 bar | P20GA-9650(**) |
| 7 - 29 | man. reset <sup>(2)</sup> | style 34  | Fig. 2 | (**) | 38 bar | P20GA-9950(**) |

## High pressure, auto reset models for R410a applications

|       |    |           |        |      |        |                |
|-------|----|-----------|--------|------|--------|----------------|
| 14-42 | BR | style 13  | Fig. 2 | (**) | 48 bar | P20EL-9660(**) |
| 14-42 | BR | style 45A | Fig. 2 | (**) | 48 bar | P20EL-9160(**) |
| 14-42 | BR | style 34  | Fig. 2 | (**) | 48 bar | P20EL-9960(**) |
| 14-42 | CR | style 13  | Fig. 2 | (**) | 48 bar | P20EL-9670(**) |
| 14-42 | CR | style 45A | Fig. 2 | (**) | 48 bar | P20EL-9170(**) |
| 14-42 | CR | style 34  | Fig. 2 | (**) | 48 bar | P20EL-9970(**) |
| 14-42 | DR | style 13  | Fig. 2 | (**) | 48 bar | P20EL-9680(**) |
| 14-42 | DR | Style 45a | Fig. 2 | (**) | 48 bar | P20EL-9180(**) |
| 14-42 | DR | style 34  | Fig. 2 | (**) | 48 bar | P20EL-9980(**) |

## High pressure, manual reset models for R410a applications

|       |                           |           |        |      |        |                |
|-------|---------------------------|-----------|--------|------|--------|----------------|
| 14-42 | man. reset <sup>(2)</sup> | style 13  | Fig. 2 | (**) | 48 bar | P20GL-9650(**) |
| 14-42 | man. reset <sup>(2)</sup> | style 45A | Fig. 2 | (**) | 48 bar | P20GL-9150(**) |
| 14-42 | man. reset <sup>(2)</sup> | style 34  | Fig. 2 | (**) | 48 bar | P20GL-9950(**) |

(\*) Minimum low switch point to maximum high switch point.

(1) Reset possible  $\geq 3$  bar above low switch point(2) Reset possible  $\geq 7$  bar below high switch point.

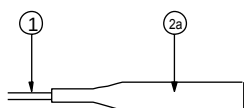
(\*\*) When ordering specify setting by adding the model suffix.

## Repair and replacement

Repair is not possible. In case of an improperly functioning control, please check with your nearest supplier. When contacting the supplier

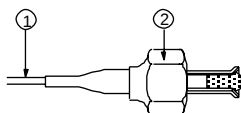
for a replacement you should state the type/model number of the control. This number can be found on the data plate

## Pressure connections



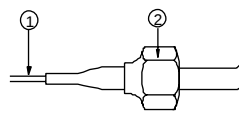
**Fig. 3**

**Style 34**



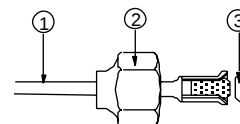
**Fig. 4**

**Style 45A** (incl. valve depressor mounted into capillary flare section)



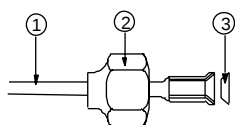
**Fig. 5**

**Style 13** (without valve depressor)



**Fig. 6**

**Style 50** (incl. valve depressor mounted into machined flare)

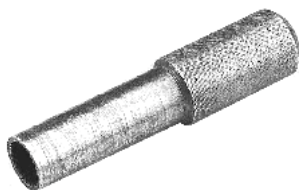


**Fig. 7**

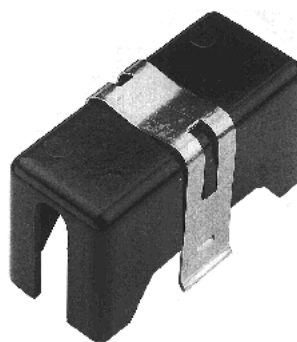
**Style 51** (machined flare excl. valve depressor)

1. 90 cm capillary.
2. 7/16 - 20 UNF flare nut.
- 2a. 1/4" tube ODM for braze connection.
3. copper seal ring

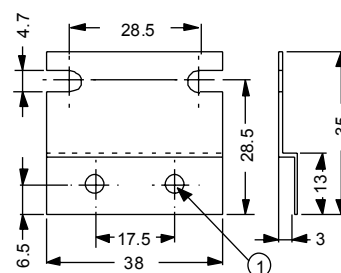
## Accessories (optional, has to be ordered separately)



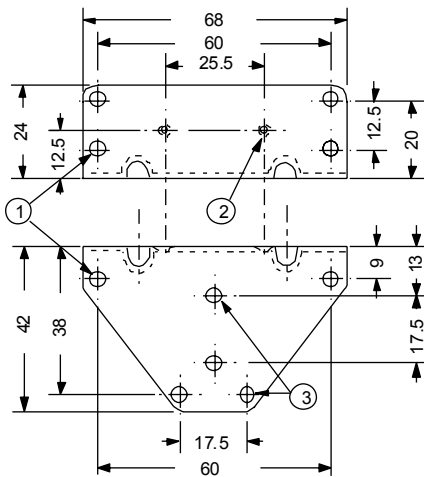
**Fig. 8**  
Adjusting wrench  
WRN12-1



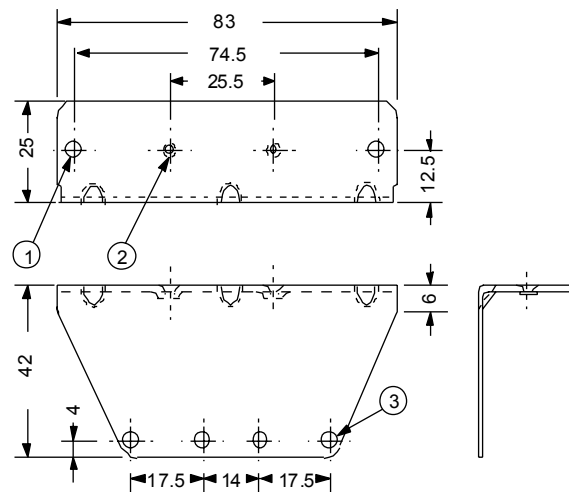
**Fig. 9**  
Clip-on Bakelite terminal  
cover 210-604R



**Fig. 10**  
Mounting plate BKT116-1  
(single)  
1. mounting holes  
For P20 Ø 4mm



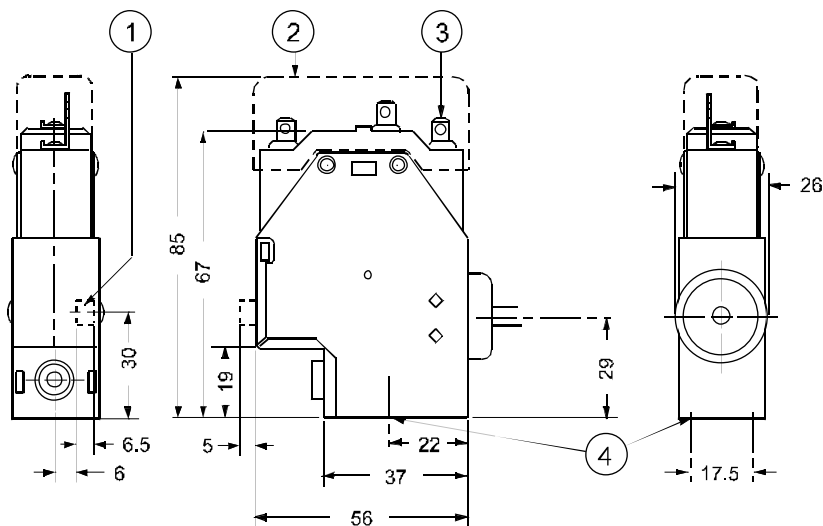
**Fig. 11**  
Mounting bracket 210-25R (single)



**Fig. 12**  
Mounting bracket BKT275-1 (dual)

- 1 Mounting holes  $\varnothing$  4 mm
- 2 Extruded holes 8 - 32 UNC thread
- 3 Mounting holes for P20  $\varnothing$  4 mm

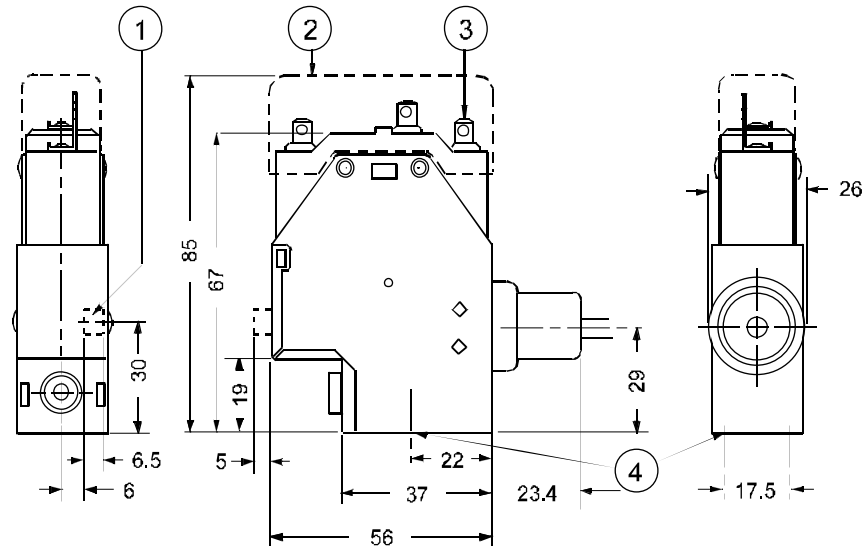
### Dimensions Standard Controls (mm)



- 1 Reset lever, for manual reset models only
- 2 Height of control if 210-604R is used.
- 3 Terminals can be used as quick connectors (6.3 mm) as well as screw connections.
- 4 2 Mounting holes 6 - 32 UNC thread (2 screws 6-32UNC x 4,5 mm provided with each control).

**Fig. 13**

### Dimensions R410a (HP) models(mm)



- 1 Reset lever, for manual reset models only
- 2 Height of control if 210-604R is used.
- 3 Terminals can be used as quick connectors (6.3 mm) as well as screw connections.
- 4 2 Mounting holes 6 - 32 UNC thread (2 screws 6-32UNC x 4,5 mm provided with each control).

Fig. 14

## Specifications

|                                        |                                                                                |              |
|----------------------------------------|--------------------------------------------------------------------------------|--------------|
| <b>Type number</b>                     | See type number selection table (page 5)                                       |              |
| <b>Operating range</b>                 | LP models                                                                      | 0.5 - 10 bar |
|                                        | HP models                                                                      | 7 - 29 bar   |
|                                        | R410a/HP models                                                                | 14 - 42bar   |
| <b>Pressure connections</b>            | 90 cm capillary, styles 13, 34, 45A,50 and 51                                  |              |
| <b>Switch points and differentials</b> | See "Differential specification" matrices (page 4,5)                           |              |
| <b>Adjustment</b>                      | Wrench adjustment                                                              |              |
| <b>Maximum ambient temp.</b>           | +55 °C                                                                         |              |
| <b>Minimum ambient temp.</b>           | -35°C                                                                          |              |
| <b>Ambient humidity</b>                | 10 to 95% RH (non-condensing)                                                  |              |
| <b>Test pressure</b>                   | 53 bar max.                                                                    |              |
| <b>Minimum burst pressure</b>          | 200 bar                                                                        |              |
| <b>Protection class</b>                | IP00                                                                           |              |
| <b>Electrical rating</b>               | 15(8)A 230 V ac                                                                |              |
| <b>Contact</b>                         | SPDT snap-acting switch                                                        |              |
| <b>Wiring connections</b>              | Screw terminals 1 up till 2.5 mm <sup>2</sup> .<br>Quick connector type 6.3 mm |              |
| <b>Material case</b>                   | Cold rolled steel, zinc plated with dichromate dip                             |              |
| <b>capillary</b>                       | Copper                                                                         |              |
| <b>Packaging</b>                       | 50 controls per box                                                            |              |
| <b>Shipping weight</b>                 | 15 kg per box                                                                  |              |
| <b>Dimensions</b>                      | See dimension drawings                                                         |              |

Note: 1 bar = 100 kPa ≈ 14.5 psi.

*The performance specifications are nominal and conform to acceptable industry standards. For applications at conditions beyond these specifications, consult the local Johnson Controls office or representative. Johnson Controls shall not be liable for damages resulting from misapplication or misuse of its products.*



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