

# Product guide for propane applications



**COPELAND**

## ***Preface***

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This catalogue contains two sections. The first section is related to products which are intended to be applied in systems located in an environment according to ATEX definition (zone 2). These products are manufactured under consideration of appropriate standards and directives.

The second section is only related to products intended to be used in systems with R290 refrigerant but having appropriate solution in order to prevent explosion risk at any time (non-risk zone).

The definition of “non-risk zone” is related to the environment of the installed device and no special product requirement is needed except material compatibility of part in contact with refrigerant.

These products are not ATEX certified may under no circumstance be used within areas with explosive or flammable atmosphere and that the owner, designer and installer are responsible to ensure strict compliance with related regulation and avoid any such risk.

### **Products in section 1:**

**Page 04 – 45**

Products are intended for use in systems located in an environment according definition of ATEX (zone 2)

### **Products in section 2:**

**Page 46 – 58**

Products are intended for use in non explosive environment  
(Products do not comply with ATEX requirements)

## ***General information***

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| Operating instruction  | 35        |
| <b>Hermetic liquid line filter driers ADK-...FLR</b>                                       |           |
| Technical bulletin   | 37        |
| Operating instruction  | 39        |
| <b>Moisture indicator MIA-...-FLR</b>  |           |
| Technical bulletin   | 41        |
| Operating instruction  | 43        |
| <b>Section 2: Product material compatible with R290 only for non-explosive environment</b> | <b>46</b> |
| <b>EC3-P32/P33 superheat controller &amp; standard ECD-002</b>                             |           |
| Technical bulletin   | 48        |
| <b>Electronic expansion valves EXM/L series</b>  |           |
| Technical bulletin   | 50        |
| <b>EXD-HP1/2 stand-alone superheat controller</b>  |           |
| Technical bulletin   | 53        |
| <b>CSS-25U / CSS-32U / CSS-32W compressor soft starter</b>                                 |           |
| Technical bulletin   | 55        |

### ***a. Important considerations***

- The products are intended to be sold in EU and EFTA countries where European directives and standards are in place and considered. Other countries may require additional approval of local authorities/ regulations.
- Documentation is in English language. System manufacturers shall consider this fact. If the transmission of information in local language as per requirement of ATEX directive is needed, system manufacturer is to take care of proper translation.
- The operating instructions results from risk assessment and it must be taken into account during design and manufacturing of system.
- Using inaccurate design operating conditions for selection of products might lead to wrong selection/ results. In this case, the selected products might be oversized or undersized and consequently lead to improper operation of the device in the system.
- Only specified products in this document have been intended for use with R290.
- It is advisable to share the related information with own consultant or notify body in order to make sure the applicability of products for any specific system under consideration of hazardous zone where system supposed to be operated.

### ***b. ATEX zone 2 definition***

| Location of equipment                         | Category | Explosive atmospheres | Explosive gas | Zone |
|---|----------|-----------------------|---------------|------|
| Group II:<br>Intended for use in other places | 3        | Unlikely              | Gas           | 2    |

### ***c. Device classification***

- Non-electrical operating device without potential of electrostatic charge:
  - Thermo expansion valves, sight glasses, solenoid valves body (without coil), filter driers
- Electrical operating device contains a housing with sufficient protection design/construction:
  - Compressor, pressure transmitters, coils of solenoid valves and electronic expansion valves
- Electrical operating device with maximum permitted electrical operating supply voltage/current:
  - Pressure switches and electronic expansion valves

























## d. European directives and standard

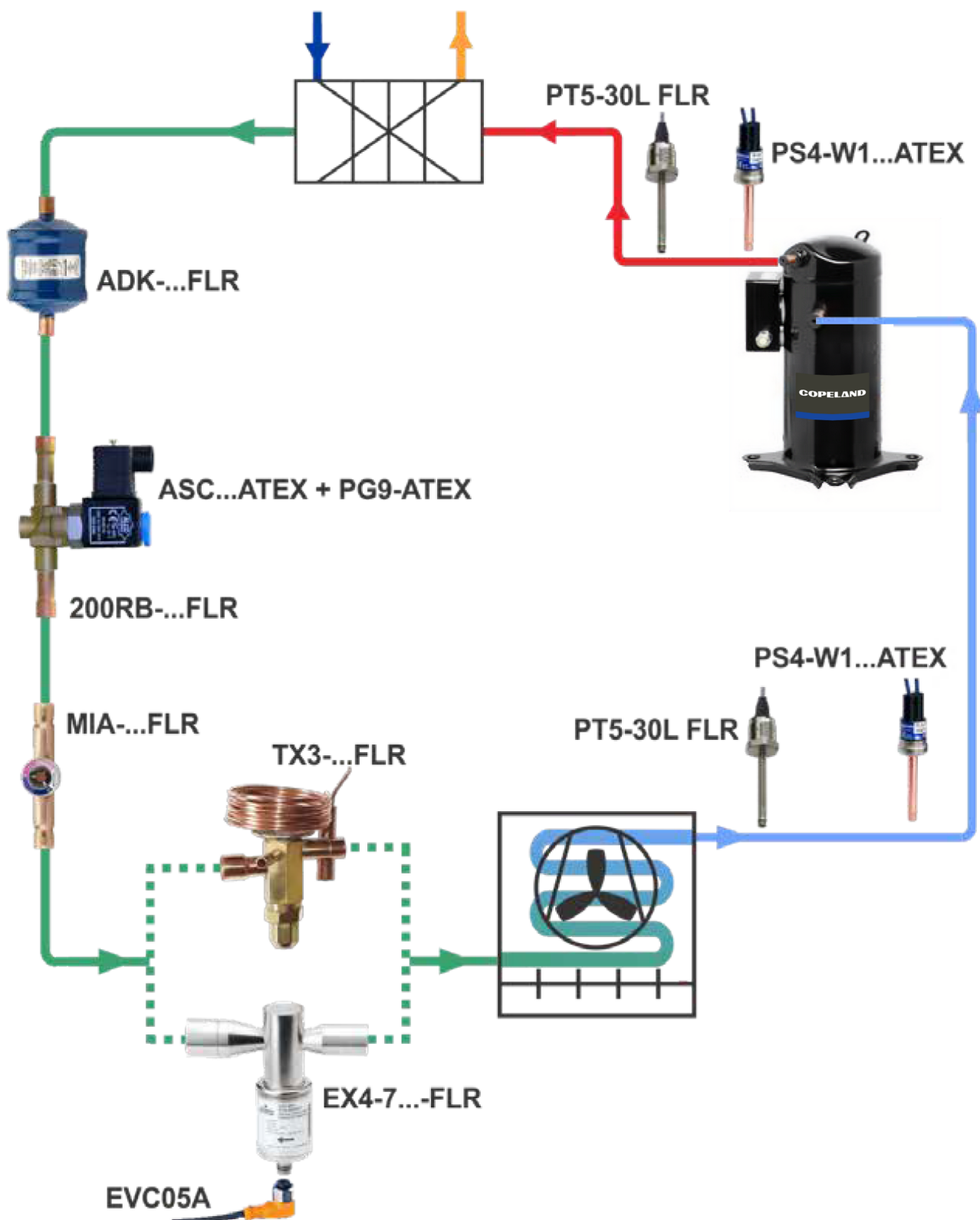
The following directives and standards have been considered for compliance of products in this document:

- PED (pressure equipment directive)
- ATEX 94/9/EC (equipment and protective systems intended for use in potentially explosive atmospheres directive)
- LVD cannot be used when ATEX is used
- EMC (electromagnetic compatibility directive)
- Guidelines on the application of directive ATEX 94/9/EC
- EN60335 (safety of household and similar electrical appliance, Part 1 & 40)
- EN60079 (explosive atmospheres, Part 1, 10-1, 11, 14, 15 and 18)
- EN378 (refrigerating systems and heat pumps - safety and environmental requirements)
- EN12284 (refrigeration systems and heat pumps. Valves: requirements, testing and marking)
- EN12178 (refrigeration systems and heat pumps. Liquid level indicating devices: requirements, testing and marking)
- EN14276-1 (refrigeration systems and heat pumps. Vessels: requirements, testing and marking)
- EN12263 (refrigeration systems and heat pumps. Safety switching devices for limiting pressure: requirements, testing and marking)
- EN16084 (refrigeration systems and heat pumps qualification of tightness of components and joints)

## e. Compliance and marking

| Product type                                    | Directive      |                |                | Marking   |
|---|----------------|----------------|----------------|---|
|   | PED            | EMC            | ATEX           |   |
| Thermo expansion valve : TX3-...-FLR            | Not applicable | Not applicable | Not applicable |   |
| Filter drier : ADK-...-FLR                      |                |                |                |    |
| Sight glass : MIA-...-FLR                       |                |                |                |    |
| Solenoid valve : 200RB-...-FLR                  |                |                |                |    |
| Solenoid valve coil + plug : ASC24V + PG9 ATEX  |                | Not applicable | Applicable     |    |
| Solenoid valve coil + plug : ASC230V + PG9 ATEX |                |                |                |    |
| Pressure transmitter : PT5-...-FLR              |                | Applicable     |                |    |
| Electronic expansion valve : EX4-7...FLR        |                | Not applicable |                |    |
| Electrical plug and cable assembly : EVC05A     |                | Not applicable |                |    |
| Pressure switch : PS4-...ATEX                   | Applicable     | Not applicable | Applicable     |    |

## Section 1: Products for use in zone 2 according ATEX definition





# 1. Products for use in zone 2 according to ATEX definition

## Introduction

Many end-users, equipment and compressor manufacturers are investigating ways to minimize their impact on the environment. Improving system architectures, using a refrigerant with lower global warming potential (GWP) can significantly improve the carbon footprint of an installation. R290 is one of the most-discussed refrigerants which has long been known for its good performance as refrigerant but is flammable and consequently brings about strict considerations for system manufacturers in terms of system design and operation. The specified listed products in this section have been released for use in systems using R290 as a refrigerant by considering information related to each product as follows:

| Product family                   | Product type  | Pages             |
|----------------------------------|---|-------------------|
| Scroll compressor                | ZH*KCU  | 8 - 9             |
|                                  | ZB*KCU  | 10 - 11           |
| Electronic expansion valves      | EX4-7...-FLR  | 12 - 14 & 15 - 17 |
|                                  | EVC05A  | 12 - 14 & 18      |
| Thermo expansion valves          | TX3-P...-FLR  | 19 - 24           |
| Solenoid valves                  | 200-RB3/RB4/RB6...-FLR                                  | 25 - 28           |
| Coil + plug                      | ASC24V + PG9 ATEX                                       | 29                |
|                                  | ASC230V + PG9 ATEX                                      |                   |
| Pressure transmitters            | PT5-30L-FLR   | 30 - 32           |
| Pressure switches                | PS4-W1 808301 0.6/1.8 bar                               | 33 - 35           |
|                                  | PS4-W1 808300 20/26 bar                                 |                   |
| Filter driers                    | ADK-03.../-05.../-08.../-16.../-30.../-41.../-75...-FLR | 36 - 39           |
| Moisture indicator / sight glass | MIA...-FLR  | 40 - 43           |



ZH-KCU Copeland scroll for R290

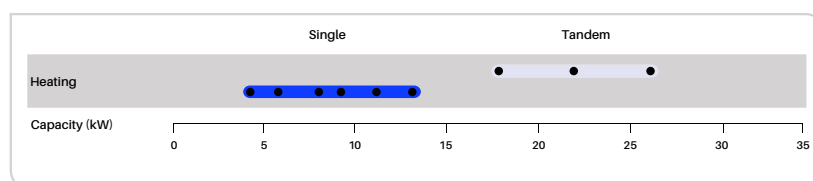
## ZH Copeland scroll for R290 (propane)

Propane (R290) is a flammable natural refrigerant which has long been known for its good performances. It has zero ozone depletion potential, negligible global warming potential, as well as excellent thermodynamic properties. R290 systems require in average half the charge of hydrofluorocarbons (HFCs). Copeland is launching a full line-up of propane Copeland scroll compressors designed for chillers and heat pump applications. This line-up meets Copeland reliability standards and is classified ATEX Group II.

### Features and benefits

- Axial and radial compliance
- Dedicated oil for propane
- ATEX compliance
- IP65 (IEC 60529)
- No sight-glass, no schrader valve
- Hermetic compressor
- Wide operating envelope

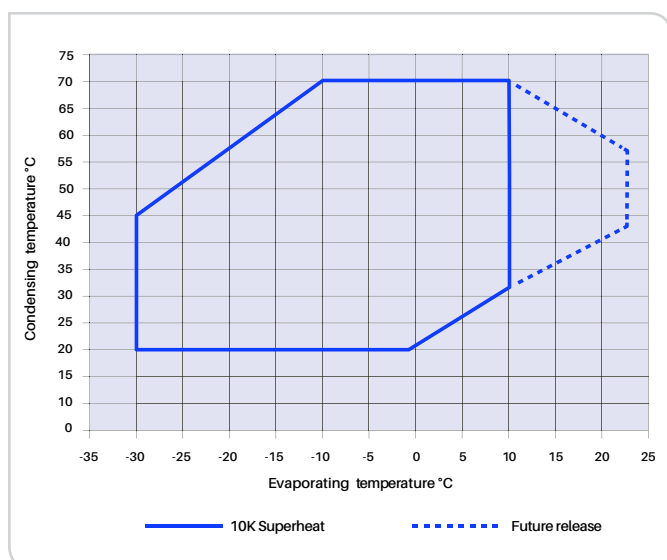
### R290 scroll compressor line-up\*



\*Propane variable speed compressors in development

Conditions heating : evaporating -7°C, condensing 50°C, superheat 10K, subcooling 4K

### Operating envelope R290



### ATEX compressor classification

|       |  |
|-------|--|
| Ex    | ATEX protection against explosion  |
| II    | Group II gas atmosphere other than mines susceptible to fire damp  |
| 3     | Category 3 - Equipment that is intended for use in areas where explosive atmospheres are unlikely to occur in normal operation and if they do occur, are likely to do so infrequently and for a short period only. It must ensure a normal/suitable level of protection for normal operation |
| G     | G - Gas: Explosive atmospheres caused by mixtures of air and gases, vapors, mists  |
| Ex nA | Ex nA - Non sparking. Protection for category 3G devices according to EN 60079-15. Suitable for use in Zone 2  |
| IIA   | Electrical equipment of Group II is subdivided according to the nature of explosive gas atmosphere for which it is intended. A typical Group IIA gas is propane  |
| T2    | T2 - Temperature classification by maximum permissible surface temperature: 300°C  |

### Technical overview

| Model        |              | Displacement<br>(m³/h) | Heating<br>capacity<br>(kW) * | COP | Sound<br>pressure<br>@1 m (dBA)** | Length / width/<br>height<br>(mm) | Net<br>weight<br>(kg) |
|--------------|--------------|------------------------|-------------------------------|-----|-----------------------------------|-----------------------------------|-----------------------|
| 1 Ph         | 3 Ph         |                        |                               |     |                                   |                                   |                       |
| ZH04KCU-PFZN | ZH04KCU-TFMN | 5.8                    | 4.4                           | 3.2 | 60                                | 243 / 242 / 364                   | 23                    |
| ZH06KCU-PFZN | ZH06KCU-TFMN | 8.0                    | 6.2                           | 3.2 | 61                                | 243 / 242 / 406                   | 27                    |
| ZH08KCU-PFZN | ZH08KCU-TFMN | 10.0                   | 7.7                           | 3.3 | 64                                | 243 / 242 / 419                   | 28                    |
| ZH09KCU-PFZN | ZH09KCU-TFMN | 11.7                   | 9.0                           | 3.2 | 62                                | 247 / 241 / 438                   | 38                    |
| ZH11KCU-PFZN | ZH11KCU-TFMN | 14.4                   | 10.9                          | 3.3 | 63                                | 247 / 241 / 438                   | 38                    |
| -            | ZH13KCU-TFMN | 17.1                   | 13.0                          | 3.3 | 64                                | 250 / 246 / 450                   | 40                    |

\*Conditions evaporating -7°C, condensing 50°C, superheat 10K, subcooling 4K

\*\*@ 1m: sound pressure level at 1m distance from the compressor, free field condition

| Condensing temperature<br>°C | R290 Heating capacity in kW<br>evaporating temperature °C |      |      |      |      |      |     |     |     | Compressor model |
|------------------------------|---|------|------|------|------|------|-----|-----|-----|------------------|
|                              | 10  | 5    | 0    | -5   | -10  | -15  | -20 | -25 | -30 |                  |
| 70                           | 6.1   | 5.4  | 4.7  | 4.2  | 3.7  | 0.0  | 0.0 | 0.0 | 0.0 | ZH04KCU-TFMN     |
|                              | 8.4   | 7.4  | 6.5  | 5.7  | 5.1  | 0.0  | 0.0 | 0.0 | 0.0 | ZH06KCU-TFMN     |
|                              | 10.5  | 9.2  | 8.1  | 7.2  | 6.4  | 0.0  | 0.0 | 0.0 | 0.0 | ZH08KCU-TFMN     |
|                              | 12.2  | 10.7 | 9.4  | 8.3  | 7.3  | 0.0  | 0.0 | 0.0 | 0.0 | ZH09KCU-TFMN     |
|                              | 15.1  | 13.3 | 11.7 | 10.3 | 9.1  | 0.0  | 0.0 | 0.0 | 0.0 | ZH11KCU-TFMN     |
|                              | 17.6  | 15.5 | 13.7 | 12.1 | 10.8 | 0.0  | 0.0 | 0.0 | 0.0 | ZH13KCU-TFMN     |
| 65                           | 6.4   | 5.6  | 4.9  | 4.3  | 3.8  | 0.0  | 0.0 | 0.0 | 0.0 | ZH04KCU-TFMN     |
|                              | 8.7   | 7.6  | 6.7  | 5.9  | 5.2  | 0.0  | 0.0 | 0.0 | 0.0 | ZH06KCU-TFMN     |
|                              | 10.9  | 9.5  | 8.3  | 7.3  | 6.4  | 0.0  | 0.0 | 0.0 | 0.0 | ZH08KCU-TFMN     |
|                              | 12.7  | 11.1 | 9.7  | 8.5  | 7.5  | 0.0  | 0.0 | 0.0 | 0.0 | ZH09KCU-TFMN     |
|                              | 15.7  | 13.7 | 12.0 | 10.6 | 9.3  | 0.0  | 0.0 | 0.0 | 0.0 | ZH11KCU-TFMN     |
|                              | 18.2  | 16.0 | 14.1 | 12.4 | 10.9 | 0.0  | 0.0 | 0.0 | 0.0 | ZH13KCU-TFMN     |
| 60                           | 6.6   | 5.8  | 5.1  | 4.4  | 3.8  | 3.3  | 0.0 | 0.0 | 0.0 | ZH04KCU-TFMN     |
|                              | 9.0   | 7.9  | 6.9  | 6.0  | 5.2  | 4.6  | 0.0 | 0.0 | 0.0 | ZH06KCU-TFMN     |
|                              | 11.3  | 9.8  | 8.6  | 7.5  | 6.6  | 5.8  | 0.0 | 0.0 | 0.0 | ZH08KCU-TFMN     |
|                              | 13.2  | 11.5 | 10.0 | 8.7  | 7.6  | 6.7  | 0.0 | 0.0 | 0.0 | ZH09KCU-TFMN     |
|                              | 16.2  | 14.2 | 12.4 | 10.8 | 9.5  | 8.3  | 0.0 | 0.0 | 0.0 | ZH11KCU-TFMN     |
|                              | 18.9  | 16.5 | 14.5 | 12.7 | 11.1 | 9.7  | 0.0 | 0.0 | 0.0 | ZH13KCU-TFMN     |
| 55                           | 6.9   | 6.0  | 5.2  | 4.5  | 3.9  | 3.4  | 2.9 | 0.0 | 0.0 | ZH04KCU-TFMN     |
|                              | 9.4   | 8.2  | 7.1  | 6.2  | 5.4  | 4.7  | 4.0 | 0.0 | 0.0 | ZH06KCU-TFMN     |
|                              | 11.7  | 10.2 | 8.9  | 7.7  | 6.7  | 5.8  | 5.1 | 0.0 | 0.0 | ZH08KCU-TFMN     |
|                              | 13.7  | 11.9 | 10.3 | 9.0  | 7.8  | 6.8  | 5.9 | 0.0 | 0.0 | ZH09KCU-TFMN     |
|                              | 16.8  | 14.7 | 12.8 | 11.1 | 9.7  | 8.4  | 7.3 | 0.0 | 0.0 | ZH11KCU-TFMN     |
|                              | 19.5  | 17.1 | 14.9 | 13.0 | 11.3 | 9.9  | 8.6 | 0.0 | 0.0 | ZH13KCU-TFMN     |
| 50                           | 7.1   | 6.2  | 5.4  | 4.6  | 4.0  | 3.5  | 3.0 | 2.5 | 0.0 | ZH04KCU-TFMN     |
|                              | 9.7   | 8.5  | 7.3  | 6.3  | 5.5  | 4.7  | 4.1 | 3.5 | 0.0 | ZH06KCU-TFMN     |
|                              | 12.1  | 10.5 | 9.1  | 7.9  | 6.9  | 5.9  | 5.1 | 4.4 | 0.0 | ZH08KCU-TFMN     |
|                              | 14.2  | 12.3 | 10.7 | 9.2  | 8.0  | 6.9  | 5.9 | 5.1 | 0.0 | ZH09KCU-TFMN     |
|                              | 17.4  | 15.2 | 13.2 | 11.4 | 9.9  | 8.6  | 7.4 | 6.4 | 0.0 | ZH11KCU-TFMN     |
|                              | 20.2  | 17.6 | 15.3 | 13.3 | 11.6 | 10.0 | 8.7 | 7.5 | 0.0 | ZH13KCU-TFMN     |
| 45                           | 7.4   | 6.4  | 5.5  | 4.8  | 4.1  | 3.5  | 3.0 | 2.6 | 2.1 | ZH04KCU-TFMN     |
|                              | 10.1  | 8.7  | 7.6  | 6.5  | 5.6  | 4.8  | 4.1 | 3.5 | 3.0 | ZH06KCU-TFMN     |
|                              | 12.5  | 10.9 | 9.4  | 8.1  | 7.0  | 6.0  | 5.2 | 4.5 | 3.8 | ZH08KCU-TFMN     |
|                              | 14.7  | 12.7 | 11.0 | 9.5  | 8.2  | 7.0  | 6.0 | 5.2 | 4.4 | ZH09KCU-TFMN     |
|                              | 18.0  | 15.7 | 13.6 | 11.7 | 10.1 | 8.7  | 7.5 | 6.4 | 5.5 | ZH11KCU-TFMN     |
|                              | 20.8  | 18.1 | 15.7 | 13.6 | 11.8 | 10.2 | 8.8 | 7.6 | 6.5 | ZH13KCU-TFMN     |
| 40                           | 7.6   | 6.6  | 5.7  | 4.9  | 4.2  | 3.6  | 3.0 | 2.6 | 2.2 | ZH04KCU-TFMN     |
|                              | 10.4  | 9.0  | 7.8  | 6.7  | 5.7  | 4.9  | 4.2 | 3.6 | 3.0 | ZH06KCU-TFMN     |
|                              | 12.9  | 11.2 | 9.7  | 8.3  | 7.2  | 6.2  | 5.3 | 4.5 | 3.9 | ZH08KCU-TFMN     |
|                              | 15.2  | 13.1 | 11.3 | 9.7  | 8.4  | 7.2  | 6.1 | 5.2 | 4.5 | ZH09KCU-TFMN     |
|                              | 18.6  | 16.1 | 13.9 | 12.0 | 10.3 | 8.9  | 7.6 | 6.5 | 5.5 | ZH11KCU-TFMN     |
|                              | 21.5  | 18.6 | 16.2 | 14.0 | 12.1 | 10.4 | 8.9 | 7.6 | 6.5 | ZH13KCU-TFMN     |
| 35                           | 7.9   | 6.8  | 5.8  | 5.0  | 4.3  | 3.6  | 3.1 | 2.6 | 2.2 | ZH04KCU-TFMN     |
|                              | 10.8  | 9.3  | 8.0  | 6.9  | 5.9  | 5.0  | 4.3 | 3.6 | 3.1 | ZH06KCU-TFMN     |
|                              | 13.3  | 11.5 | 9.9  | 8.6  | 7.3  | 6.3  | 5.4 | 4.6 | 3.9 | ZH08KCU-TFMN     |
|                              | 15.7  | 13.6 | 11.7 | 10.0 | 8.6  | 7.3  | 6.2 | 5.3 | 4.5 | ZH09KCU-TFMN     |
|                              | 19.2  | 16.6 | 14.3 | 12.3 | 10.6 | 9.0  | 7.7 | 6.6 | 5.6 | ZH11KCU-TFMN     |
|                              | 22.1  | 19.2 | 16.6 | 14.3 | 12.3 | 10.6 | 9.0 | 7.7 | 6.6 | ZH13KCU-TFMN     |
| 30                           | 0.0   | 7.0  | 6.0  | 5.1  | 4.4  | 3.7  | 3.1 | 2.7 | 2.2 | ZH04KCU-TFMN     |
|                              | 0.0   | 9.6  | 8.2  | 7.1  | 6.0  | 5.1  | 4.3 | 3.7 | 3.1 | ZH06KCU-TFMN     |
|                              | 0.0   | 11.8 | 10.2 | 8.8  | 7.5  | 6.4  | 5.5 | 4.6 | 3.9 | ZH08KCU-TFMN     |
|                              | 0.0   | 14.0 | 12.0 | 10.3 | 8.8  | 7.5  | 6.3 | 5.4 | 4.5 | ZH09KCU-TFMN     |
|                              | 0.0   | 17.1 | 14.7 | 12.6 | 10.8 | 9.2  | 7.8 | 6.7 | 5.6 | ZH11KCU-TFMN     |
|                              | 0.0   | 19.6 | 17.0 | 14.6 | 12.5 | 10.7 | 9.2 | 7.8 | 6.6 | ZH13KCU-TFMN     |
| 25                           | 0.0   | 0.0  | 6.2  | 5.3  | 4.5  | 3.8  | 3.2 | 2.7 | 2.3 | ZH04KCU-TFMN     |
|                              | 0.0   | 0.0  | 8.5  | 7.2  | 6.2  | 5.2  | 4.4 | 3.7 | 3.2 | ZH06KCU-TFMN     |
|                              | 0.0   | 0.0  | 10.4 | 9.0  | 7.7  | 6.5  | 5.5 | 4.7 | 4.0 | ZH08KCU-TFMN     |
|                              | 0.0   | 0.0  | 12.3 | 10.5 | 9.0  | 7.6  | 6.4 | 5.4 | 4.6 | ZH09KCU-TFMN     |
|                              | 0.0   | 0.0  | 15.1 | 12.9 | 11.0 | 9.4  | 8.0 | 6.8 | 5.7 | ZH11KCU-TFMN     |
|                              | 0.0   | 0.0  | 17.3 | 14.9 | 12.8 | 10.9 | 9.3 | 7.9 | 6.7 | ZH13KCU-TFMN     |
| 20                           | 0.0   | 0.0  | 0.0  | 5.4  | 4.6  | 3.9  | 3.3 | 2.8 | 2.3 | ZH04KCU-TFMN     |
|                              | 0.0   | 0.0  | 0.0  | 7.4  | 6.3  | 5.3  | 4.5 | 3.8 | 3.2 | ZH06KCU-TFMN     |
|                              | 0.0   | 0.0  | 0.0  | 9.1  | 7.8  | 6.6  | 5.6 | 4.8 | 4.0 | ZH08KCU-TFMN     |
|                              | 0.0   | 0.0  | 0.0  | 10.8 | 9.2  | 7.8  | 6.5 | 5.5 | 4.7 | ZH09KCU-TFMN     |
|                              | 0.0   | 0.0  | 0.0  | 13.2 | 11.3 | 9.6  | 8.1 | 6.9 | 5.8 | ZH11KCU-TFMN     |
|                              | 0.0   | 0.0  | 0.0  | 15.2 | 13.0 | 11.1 | 9.4 | 8.0 | 6.8 | ZH13KCU-TFMN     |





ZB\*KCU  
Copeland scroll for R290


## ZB Copeland scroll for R290 (propane)

Copeland is offering a full range of propane Copeland scroll compressors. The new ZB\*KCU Copeland scroll compressor range with R290 is the ideal choice for self-contained medium-temperature applications. These compressors are also suitable for refrigeration chiller and small cascade systems. The complete compressor range of propane scrolls meets Copeland's reliability standards and is **ATEX Group II** classified.

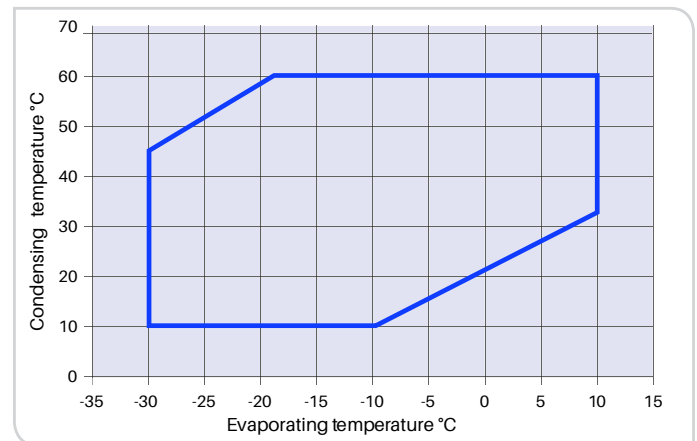
Propane (R290) is a flammable natural refrigerant which has long been known for its good performance. It has zero ozone depletion potential, negligible global warming potential (GWP), as well as excellent thermodynamic properties. R290 systems require in average half the charge of hydro-fluorocarbons (HFCs).

These features make R290 suitable for the upcoming F-gas regulations.

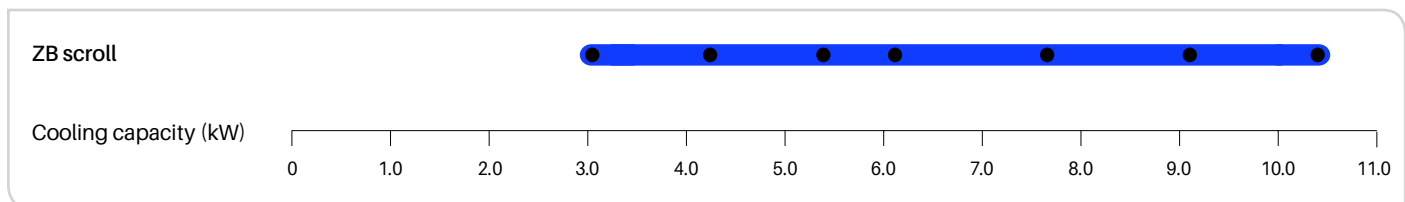
### Features and benefits

- ATEX compliance
- IP65 (IEC 60529) terminal box
- Fully hermetic design, no sight-glass, no schrader valve
- Wide operating envelope
- Dedicated oil for propane
- Ideal for self-contained medium temperature display cases
- Suitable for refrigeration chiller and small cascade systems
- Light weight, compactness and high efficiency
- Axial and radial compliance
-  II 3G Ex nA IIA T2

### Operating envelope R290



### ZB\*KCU compressor range



EN12900 evaporating -10°C, condensing 45°C, superheat 10K, subcooling 0K

### Technical overview


| Model   | Nominal (hp) | Displacement (m <sup>3</sup> /h) | Cooling capacity (kW) | Stub suction (inch) | Stub discharge (inch) | Oil quantity (l) | Length / width / height (mm) | Net weight (kg) | Motor version / code | Maximum operating current (A) | Locked rotor current (A) | Sound pressure @ 1 m (dBA) *** |
|---------|--------------|----------------------------------|-----------------------|---------------------|-----------------------|------------------|------------------------------|-----------------|----------------------|-------------------------------|--------------------------|--------------------------------|
|         |              |                                  |                       |                     |                       |                  |                              |                 | 3 Ph**               | 3 Ph**                        | 3 Ph**                   |                                |
| ZB12KCU | 2.0          | 5.8                              | 2.8                   | 3/4                 | 1/2                   | 1.3              | 243/243/364                  | 25.9            | TFM                  | 4.1                           | 26                       | 60                             |
| ZB17KCU | 2.5          | 8.0                              | 3.9                   | 3/4                 | 1/2                   | 1.5              | 243/242/387                  | 27.2            | TFM                  | 5.2                           | 32                       | 61                             |
| ZB20KCU | 3.5          | 10.0                             | 5.0                   | 3/4                 | 1/2                   | 1.5              | 243/242/400                  | 28.1            | TFM                  | 6.8                           | 46                       | 62                             |
| ZB25KCU | 4.0          | 11.7                             | 5.7                   | 3/4                 | 1/2                   | 1.9              | 247/241/451                  | 39.5            | TFM                  | 8.2                           | 64                       | 65                             |
| ZB31KCU | 5.0          | 14.4                             | 7.0                   | 3/4                 | 1/2                   | 1.9              | 247/241/451                  | 37.3            | TFM                  | 10.1                          | 64                       | 65                             |
| ZB37KCU | 6.0          | 17.1                             | 8.3                   | 3/4                 | 1/2                   | 1.9              | 250/246/438                  | 39.5            | TFM                  | 11.8                          | 74                       | 65                             |
| ZB49KCU | 8.0          | 21.4                             | 10.4                  | 1 1/4               | 1 1/4                 | 1.9              | 246/256/442                  | 39.5            | TFM                  | 15.9                          | 102                      | 68                             |

| Condensing temperature<br>°C | Cooling capacity in kW<br>evaporating temperature °C |      |      |      |      |      |     |     |     | Compressor model |
|------------------------------|--|------|------|------|------|------|-----|-----|-----|------------------|
|                              | 10   | 5    | 0    | -5   | -10  | -15  | -20 | -25 | -30 |                  |
| 60                           | 4.8  | 4.0  | 3.3  | 2.8  | 2.3  | 1.8  | 1.5 | 0.0 | 0.0 | ZB12KCU-TFMN     |
|                              | 6.5  | 5.5  | 4.5  | 3.7  | 3.1  | 2.5  | 2.0 | 0.0 | 0.0 | ZB17KCU-TFMN     |
|                              | 8.2  | 6.8  | 5.7  | 4.7  | 3.8  | 3.0  | 2.4 | 0.0 | 0.0 | ZB20KCU-TFMN     |
|                              | 9.6  | 8.1  | 6.7  | 5.5  | 4.5  | 3.7  | 0.0 | 0.0 | 0.0 | ZB25KCU-TFMN     |
|                              | 11.8   | 9.9  | 8.2  | 6.8  | 5.6  | 4.5  | 0.0 | 0.0 | 0.0 | ZB31KCU-TFMN     |
|                              | 13.8   | 11.6 | 9.7  | 8.0  | 6.6  | 5.3  | 0.0 | 0.0 | 0.0 | ZB37KCU-TFMN     |
| 55                           | 17.2   | 14.5 | 12.1 | 10.0 | 8.2  | 6.7  | 0.0 | 0.0 | 0.0 | ZB49KCU-TFMN     |
|                              | 5.1  | 4.3  | 3.6  | 3.0  | 2.5  | 2.0  | 1.6 | 1.2 | 0.0 | ZB12KCU-TFMN     |
|                              | 7.0  | 5.9  | 4.9  | 4.1  | 3.3  | 2.7  | 2.2 | 1.7 | 0.0 | ZB17KCU-TFMN     |
|                              | 8.8  | 7.4  | 6.2  | 5.1  | 4.1  | 3.3  | 2.6 | 2.0 | 0.0 | ZB20KCU-TFMN     |
|                              | 10.4   | 8.7  | 7.3  | 6.0  | 4.9  | 4.0  | 3.2 | 0.0 | 0.0 | ZB25KCU-TFMN     |
|                              | 12.7   | 10.7 | 8.9  | 7.4  | 6.0  | 4.9  | 3.9 | 0.0 | 0.0 | ZB31KCU-TFMN     |
| 50                           | 14.8   | 12.5 | 10.5 | 8.7  | 7.1  | 5.8  | 4.7 | 0.0 | 0.0 | ZB37KCU-TFMN     |
|                              | 18.5   | 15.7 | 13.1 | 10.9 | 9.0  | 7.3  | 5.8 | 0.0 | 0.0 | ZB49KCU-TFMN     |
|                              | 5.5  | 4.6  | 3.9  | 3.2  | 2.6  | 2.1  | 1.7 | 1.3 | 1.0 | ZB12KCU-TFMN     |
|                              | 7.5  | 6.3  | 5.3  | 4.4  | 3.6  | 2.9  | 2.4 | 1.9 | 1.5 | ZB17KCU-TFMN     |
|                              | 9.4  | 8.0  | 6.6  | 5.5  | 4.5  | 3.6  | 2.9 | 2.2 | 1.7 | ZB20KCU-TFMN     |
|                              | 11.1   | 9.3  | 7.8  | 6.4  | 5.3  | 4.3  | 3.4 | 2.7 | 0.0 | ZB25KCU-TFMN     |
| 45                           | 13.6   | 11.4 | 9.6  | 7.9  | 6.5  | 5.3  | 4.2 | 3.3 | 0.0 | ZB31KCU-TFMN     |
|                              | 15.8   | 13.4 | 11.2 | 9.3  | 7.7  | 6.3  | 5.1 | 4.0 | 0.0 | ZB37KCU-TFMN     |
|                              | 19.8   | 16.8 | 14.1 | 11.7 | 9.7  | 7.9  | 6.4 | 5.0 | 0.0 | ZB49KCU-TFMN     |
|                              | 5.8  | 4.9  | 4.1  | 3.4  | 2.8  | 2.3  | 1.8 | 1.5 | 1.1 | ZB12KCU-TFMN     |
|                              | 8.0  | 6.7  | 5.6  | 4.7  | 3.9  | 3.1  | 2.5 | 2.0 | 1.6 | ZB17KCU-TFMN     |
|                              | 10.1   | 8.5  | 7.1  | 5.9  | 4.8  | 3.9  | 3.1 | 2.5 | 1.9 | ZB20KCU-TFMN     |
| 40                           | 11.8   | 9.9  | 8.3  | 6.9  | 5.7  | 4.6  | 3.7 | 2.9 | 2.3 | ZB25KCU-TFMN     |
|                              | 14.4   | 12.2 | 10.2 | 8.5  | 7.0  | 5.7  | 4.6 | 3.6 | 2.8 | ZB31KCU-TFMN     |
|                              | 16.7   | 14.2 | 12.0 | 10.0 | 8.3  | 6.8  | 5.5 | 4.3 | 3.4 | ZB37KCU-TFMN     |
|                              | 21   | 17.8 | 15.0 | 12.5 | 10.4 | 8.5  | 6.9 | 5.5 | 4.2 | ZB49KCU-TFMN     |
|                              | 6.2  | 5.2  | 4.4  | 3.6  | 3.0  | 2.4  | 2.0 | 1.6 | 1.2 | ZB12KCU-TFMN     |
|                              | 8.5  | 7.2  | 6.0  | 5.0  | 4.1  | 3.4  | 2.7 | 2.2 | 1.7 | ZB17KCU-TFMN     |
| 35                           | 10.6   | 9.0  | 7.5  | 6.3  | 5.2  | 4.2  | 3.4 | 2.7 | 2.0 | ZB20KCU-TFMN     |
|                              | 12.5   | 10.5 | 8.8  | 7.3  | 6.0  | 4.9  | 3.9 | 3.1 | 2.4 | ZB25KCU-TFMN     |
|                              | 15.2   | 12.9 | 10.8 | 9.0  | 7.4  | 6.1  | 4.9 | 3.9 | 3.0 | ZB31KCU-TFMN     |
|                              | 17.7   | 15.0 | 12.7 | 10.6 | 8.8  | 7.2  | 5.9 | 4.7 | 3.7 | ZB37KCU-TFMN     |
|                              | 22.2   | 18.8 | 15.9 | 13.3 | 11.0 | 9.1  | 7.3 | 5.9 | 4.6 | ZB49KCU-TFMN     |
|                              | 6.5  | 5.5  | 4.6  | 3.9  | 3.2  | 2.6  | 2.1 | 1.7 | 1.3 | ZB12KCU-TFMN     |
| 30                           | 8.9  | 7.6  | 6.3  | 5.3  | 4.4  | 3.6  | 2.9 | 2.3 | 1.8 | ZB17KCU-TFMN     |
|                              | 11.2   | 9.5  | 8.0  | 6.6  | 5.5  | 4.5  | 3.6 | 2.9 | 2.2 | ZB20KCU-TFMN     |
|                              | 13.2   | 11.1 | 9.3  | 7.8  | 6.4  | 5.2  | 4.2 | 3.3 | 2.6 | ZB25KCU-TFMN     |
|                              | 16.0   | 13.6 | 11.4 | 9.5  | 7.9  | 6.4  | 5.2 | 4.2 | 3.2 | ZB31KCU-TFMN     |
|                              | 18.5   | 15.8 | 13.3 | 11.2 | 9.3  | 7.6  | 6.2 | 5.0 | 3.9 | ZB37KCU-TFMN     |
|                              | 23.3   | 19.8 | 16.7 | 14.0 | 11.7 | 9.6  | 7.8 | 6.3 | 4.9 | ZB49KCU-TFMN     |
| 25                           | 6.9  | 5.8  | 4.9  | 4.1  | 3.4  | 2.8  | 2.2 | 1.8 | 1.4 | ZB12KCU-TFMN     |
|                              | 9.4  | 7.9  | 6.7  | 5.6  | 4.6  | 3.8  | 3.0 | 2.4 | 1.9 | ZB17KCU-TFMN     |
|                              | 11.7   | 9.9  | 8.4  | 7.0  | 5.8  | 4.7  | 3.8 | 3.1 | 2.4 | ZB20KCU-TFMN     |
|                              | 0.0  | 11.7 | 9.8  | 8.2  | 6.7  | 5.5  | 4.4 | 3.5 | 2.8 | ZB25KCU-TFMN     |
|                              | 0.0  | 14.3 | 12.0 | 10.0 | 8.3  | 6.8  | 5.5 | 4.4 | 3.5 | ZB31KCU-TFMN     |
|                              | 0.0  | 16.5 | 14.0 | 11.7 | 9.8  | 8.1  | 6.6 | 5.3 | 4.2 | ZB37KCU-TFMN     |
| 20                           | 0.0  | 20.7 | 17.5 | 14.7 | 12.2 | 10.1 | 8.3 | 6.7 | 5.3 | ZB49KCU-TFMN     |
|                              | 0.0  | 6.1  | 5.1  | 4.3  | 3.6  | 2.9  | 2.4 | 1.9 | 1.5 | ZB12KCU-TFMN     |
|                              | 0.0  | 8.3  | 7.0  | 5.8  | 4.8  | 3.9  | 3.2 | 2.6 | 2.0 | ZB17KCU-TFMN     |
|                              | 0.0  | 10.4 | 8.7  | 7.3  | 6.1  | 5.0  | 4.0 | 3.2 | 2.6 | ZB20KCU-TFMN     |
|                              | 0.0  | 0.0  | 10.3 | 8.6  | 7.1  | 5.8  | 4.7 | 3.7 | 2.9 | ZB25KCU-TFMN     |
|                              | 0.0  | 0.0  | 12.6 | 10.5 | 8.7  | 7.2  | 5.8 | 4.7 | 3.7 | ZB31KCU-TFMN     |
|                              | 0.0  | 0.0  | 14.6 | 12.2 | 10.2 | 8.4  | 6.9 | 5.6 | 4.5 | ZB37KCU-TFMN     |
|                              | 0.0  | 0.0  | 18.3 | 15.3 | 12.8 | 10.6 | 8.7 | 7.0 | 5.6 | ZB49KCU-TFMN     |
|                              | 0.0  | 0.0  | 5.4  | 4.5  | 3.7  | 3.1  | 2.5 | 2.0 | 1.6 | ZB12KCU-TFMN     |
|                              | 0.0  | 0.0  | 7.3  | 6.1  | 5.0  | 4.1  | 3.4 | 2.7 | 2.2 | ZB17KCU-TFMN     |
|                              | 0.0  | 0.0  | 9.1  | 7.6  | 6.3  | 5.2  | 4.2 | 3.4 | 2.7 | ZB20KCU-TFMN     |
|                              | 0.0  | 0.0  | 0.0  | 9.0  | 7.4  | 6.1  | 4.9 | 3.9 | 3.1 | ZB25KCU-TFMN     |
|                              | 0.0  | 0.0  | 0.0  | 11.0 | 9.1  | 7.5  | 6.1 | 4.9 | 3.9 | ZB31KCU-TFMN     |
|                              | 0.0  | 0.0  | 0.0  | 12.7 | 10.6 | 8.8  | 7.2 | 5.9 | 4.7 | ZB37KCU-TFMN     |
|                              | 0.0  | 0.0  | 0.0  | 16.0 | 13.3 | 11.0 | 9.1 | 7.4 | 5.9 | ZB49KCU-TFMN     |

## Electronic expansion valves EX4-7-...FLR versions and M12 connector EVC05A

Copeland's EX4-7-...FLR are stepper motor driven valves for precise control of refrigerant mass flow in air conditioning, refrigeration, heat pumps, close control, and industrial process cooling applications.

### Features

- Fully hermetic design
- Stepper motor driven
- Very fast full stroke time
- High resolution and excellent repeatability
- Bi-flow versions with positive shut-off in both flow directions
- Positive shut-off function to eliminate the use of an additional solenoid valve
- Linear flow capacity
- Extremely wide capacity range (10 ... 100%)
- Continuous modulation of mass flow
- Direct coupling of motor and valve for high reliability (no gear mechanism)
- Ceramic slide and port for accurate flow and minimal wear
- Corrosion resistant stainless steel body and connections
-  II 3G Ex nA IIA T3 Gc X
- The qualification /certification of EX4-7-...FLR is valid only in conjunction with EVC05A (M12 connector)





EX4-...FLR

EX7-...FLR



EVC05A

### Features EVC05A (ifm electronic GmbH)

- Vibration and shock resistance
- Protection: BVS 08 ATEX E 109 U  
IECEX BVS 08.0041 U
- Markings:  II 3G Ex nA IIC Gc
-  II 2D Ex tD IIIC Db IP65/ IP67

### Cable and connector assembly

| Type   | Part no. | Length | Connector type to valve | Connector type to driver board or controller |
|--------|----------|--------|-------------------------|--|
| EVC05A | 800439   | 5 m    | M12                     | Loose wires                                  |

### Selection table

| Type       | Part no. | Flow pattern           | Nominal capacity range [kW] | Inlet connection | Outlet connection | Electrical connector |
|------------|----------|------------------------|-----------------------------|------------------|-------------------|----------------------|
| EX4-I21FLR | 800430   | Uni-flow               | 2...17                      | 3/8" ODF         | 5/8" ODF          | Special M12 plug     |
| EX4-M21FLR | 800431   |                        |                             | 10 mm ODF        | 16 mm ODF         |                      |
| EX5-U21FLR | 800432   |                        | 5...51.6                    | 5/8" (16 mm) ODF | 7/8" (22 mm) ODF  |                      |
| EX6-I21FLR | 800433   |                        | 12...124                    | 7/8" ODF         | 1-1/8" ODF        |                      |
| EX6-M21FLR | 800434   |                        |                             | 22 mm ODF        | 28 mm ODF         |                      |
| EX7-I21FLR | 800440   |                        | 30...340                    | 1-1/8" ODF       | 1-1/8" ODF        |                      |
| EX7-M21FLR | 800441   |                        |                             | 28 mm ODF        | 28 mm ODF         |                      |
| EX4-U31FLR | 800435   | Bi-flow<br>(heat pump) | 2...17                      | 5/8" (16 mm) ODF | 5/8" (16 mm) ODF  |                      |
| EX5-U31FLR | 800436   |                        | 5...51.6                    | 7/8" (22 mm) ODF | 7/8" (22 mm) ODF  |                      |
| EX6-I31FLR | 800437   |                        | 1 ...124                    | 1-1/8" ODF       | 1-1/8" ODF        |                      |
| EX6-M31FLR | 800438   |                        |                             | 28 mm ODF        | 28 mm ODF         |                      |
| EX7-I31FLR | 800442   |                        | 30...340                    | 1-1/8" ODF       | 1-1/8" ODF        |                      |
| EX7-M31FLR | 800443   |                        |                             | 28 mm ODF        | 28 mm ODF         |                      |



**Note:** The valves are delivered without cable/connector assembly (order separately). Nominal capacity at +38°C liquid temperature, +4°C evaporating temperature and 1K subcooling. For other operating condition, see the next page.

**Quick selection** (included 1.5 bar pressure drop for liquid line components and distributor)

| Condensing temperature °C | Cooling capacity in kW<br>evaporating temperature °C |      |      |      |      |      |      |      |      |      |      | Valve type |
|---------------------------|--|------|------|------|------|------|------|------|------|------|------|------------|
|                           | 15   | 10   | 5    | 0    | -5   | -10  | -15  | -20  | -25  | -30  | -35  |            |
| 75                        | 17   | 17   | 16,9 | 16,6 | 16,4 | 16   | 15,6 | 15,2 | 14,8 | 14,3 | 13,8 | EX4...FLR  |
|                           | 52   | 52   | 51   | 51   | 50   | 49   | 47   | 46   | 45   | 43   | 42   | EX5...FLR  |
|                           | 124  | 124  | 123  | 121  | 119  | 117  | 114  | 111  | 108  | 104  | 100  | EX6...FLR  |
|                           | 342  | 341  | 338  | 333  | 328  | 321  | 313  | 305  | 296  | 286  | 276  | EX7...FLR  |
| 70                        | 17,6   | 17,7 | 17,6 | 17,5 | 17,2 | 17   | 16,7 | 16,3 | 15,9 | 15,4 | 15   | EX4...FLR  |
|                           | 54   | 54   | 53   | 53   | 52   | 52   | 51   | 49   | 48   | 47   | 45   | EX5...FLR  |
|                           | 128  | 129  | 128  | 127  | 126  | 124  | 121  | 119  | 116  | 112  | 109  | EX6...FLR  |
|                           | 353  | 354  | 352  | 350  | 345  | 340  | 334  | 326  | 318  | 309  | 300  | EX7...FLR  |
| 65                        | 17,9   | 18   | 18,1 | 18   | 17,9 | 17,7 | 17,4 | 17,1 | 16,7 | 16,4 | 15,9 | EX4...FLR  |
|                           | 54   | 55   | 55   | 55   | 54   | 54   | 53   | 52   | 51   | 50   | 48   | EX5...FLR  |
|                           | 130  | 131  | 132  | 131  | 130  | 129  | 127  | 125  | 122  | 119  | 116  | EX6...FLR  |
|                           | 358  | 361  | 362  | 361  | 358  | 354  | 349  | 342  | 335  | 327  | 319  | EX7...FLR  |
| 60                        | 17,8   | 18,1 | 18,3 | 18,3 | 18,2 | 18,1 | 17,9 | 17,7 | 17,4 | 17   | 16,7 | EX4...FLR  |
|                           | 54   | 55   | 55   | 56   | 55   | 55   | 54   | 54   | 53   | 52   | 51   | EX5...FLR  |
|                           | 130  | 132  | 133  | 133  | 133  | 132  | 131  | 129  | 127  | 124  | 121  | EX6...FLR  |
|                           | 357  | 363  | 366  | 366  | 365  | 363  | 359  | 354  | 348  | 341  | 334  | EX7...FLR  |
| 55                        | 17,5   | 17,9 | 18,2 | 18,3 | 18,4 | 18,3 | 18,2 | 18   | 17,8 | 17,5 | 17,2 | EX4...FLR  |
|                           | 53   | 54   | 55   | 56   | 56   | 56   | 55   | 55   | 54   | 53   | 52   | EX5...FLR  |
|                           | 127  | 130  | 132  | 134  | 134  | 134  | 133  | 131  | 130  | 128  | 125  | EX6...FLR  |
|                           | 350  | 359  | 364  | 367  | 368  | 367  | 365  | 361  | 357  | 351  | 344  | EX7...FLR  |
| 50                        | 16,9   | 17,5 | 17,9 | 18,1 | 18,3 | 18,4 | 18,3 | 18,2 | 18   | 17,8 | 17,5 | EX4...FLR  |
|                           | 51   | 53   | 54   | 55   | 56   | 56   | 56   | 55   | 55   | 54   | 53   | EX5...FLR  |
|                           | 123  | 127  | 130  | 132  | 133  | 134  | 133  | 133  | 131  | 130  | 128  | EX6...FLR  |
|                           | 338  | 350  | 358  | 363  | 367  | 368  | 367  | 365  | 361  | 356  | 351  | EX7...FLR  |
| 45                        | 15,9   | 16,7 | 17,3 | 17,7 | 18   | 18,2 | 18,2 | 18,2 | 18,1 | 17,9 | 17,7 | EX4...FLR  |
|                           | 48   | 51   | 53   | 54   | 55   | 55   | 55   | 55   | 55   | 54   | 54   | EX5...FLR  |
|                           | 116  | 122  | 126  | 129  | 131  | 132  | 133  | 132  | 132  | 130  | 129  | EX6...FLR  |
|                           | 318  | 335  | 346  | 355  | 360  | 364  | 365  | 364  | 362  | 358  | 354  | EX7...FLR  |
| 40                        | 14,6   | 15,6 | 16,4 | 17   | 17,5 | 17,7 | 17,9 | 17,9 | 17,9 | 17,8 | 17,7 | EX4...FLR  |
|                           | 44   | 47   | 50   | 52   | 53   | 54   | 54   | 54   | 54   | 54   | 54   | EX5...FLR  |
|                           | 106  | 114  | 120  | 124  | 127  | 129  | 130  | 131  | 130  | 130  | 129  | EX6...FLR  |
|                           | 292  | 313  | 329  | 341  | 350  | 355  | 358  | 359  | 359  | 357  | 353  | EX7...FLR  |
| 35                        | 12,8   | 14,2 | 15,3 | 16,1 | 16,7 | 17,1 | 17,4 | 17,5 | 17,6 | 17,6 | 17,5 | EX4...FLR  |
|                           | 39   | 43   | 46   | 49   | 51   | 52   | 53   | 53   | 53   | 53   | 53   | EX5...FLR  |
|                           | 93   | 104  | 111  | 117  | 122  | 125  | 127  | 128  | 128  | 128  | 127  | EX6...FLR  |
|                           | 256  | 285  | 306  | 322  | 334  | 343  | 348  | 351  | 352  | 352  | 350  | EX7...FLR  |
| 30                        | 10,3   | 12,3 | 13,8 | 14,9 | 15,7 | 16,2 | 16,7 | 16,9 | 17,1 | 17,1 | 17,1 | EX4...FLR  |
|                           | 31   | 37   | 42   | 45   | 48   | 49   | 51   | 51   | 52   | 52   | 52   | EX5...FLR  |
|                           | 75   | 90   | 100  | 108  | 114  | 118  | 121  | 123  | 124  | 125  | 125  | EX6...FLR  |
|                           | 206  | 247  | 276  | 298  | 314  | 325  | 333  | 339  | 342  | 343  | 343  | EX7...FLR  |
| 20                        |  | 5,3  | 8,7  | 10,7 | 12,1 | 13,1 | 13,8 | 14,3 | 14,7 | 14,9 | 15,1 | EX4...FLR  |
|                           |  | 16   | 26   | 32   | 37   | 40   | 42   | 44   | 45   | 45   | 46   | EX5...FLR  |
|                           |  | 39   | 63   | 78   | 88   | 95   | 101  | 104  | 107  | 109  | 110  | EX6...FLR  |
|                           |  | 107  | 174  | 214  | 242  | 262  | 277  | 287  | 295  | 299  | 302  | EX7...FLR  |

Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity.

### Technical data EX4-7-...FLR valves

|   |  |
|---|--|
| MOPD (maximum operating pressure differential)                    | 30 bar   |
| Max. working pressure, PS   | 35 bar   |
| Max. system test pressure   | 38.5 bar   |
| Ambient temperature<br>Storage temperature                        | -20...+60°C<br>-40...+70°C   |
| Medium inlet temperature<br>Bi-flow version:<br>Uni-flow version: | TS: -40...+80°C<br>TS: -50...+100°C  |
| Vibration for non-connected and fastened valve                    | 4 g<br>(0 to 1000 Hz, 1 octave /min.)  |
| Material  | stainless steel body and fittings  |
| Marking   |  acc. to directive 94/9/EC<br> II 3G Ex nA IIA T3 Gc X |

|   |   |
|---|---|
| Protection accordance to IEC 529, DIN 40050 | IP67 with M12 connector EVC05A                              |
| Humidity                                    | 5 to 95% r.H.   |
| Connections                                 | ODF stainless steel fittings                                |
| Shock                                       | 20 g at 11 ms<br>80 g at 1 ms                               |
| Net weight (kg)                             | 0.5 kg (EX4), 0.52 kg (EX5),<br>0.60 kg (EX6), 1.1 kg (EX7) |
| Package and delivery (individual)           | without electrical connector                                |
| Accessories                                 | M12 connector EVC05A  |



### Electrical data EX4-7-...-FLR valves

|                                       |   |
|---------------------------------------|---|
| Stepper motor type                    | Bi-polar, phase current by chopper control (constant current) |
| Electrical connection                 | 4 pin terminal via plug                                       |
| Nominal supply voltage to the valve U | 24 VDC  |
| Driver supply voltage range           | 18 ... 36 VDC   |
| Phase current, operating              | EX4-6-...FLR: 500 mA<br>EX7-...FLR: 750 mA                    |
| Holding current                       | EX4-6-...FLR: 100 mA<br>EX7-...FLR: 250 mA                    |

|                              |   |
|------------------------------|---|
| Step mode                    | 2 phase full step, half step or microstep                   |
| Step angle                   | 1.8° per step ±8%   |
| Stepping rate                | 500 Hz  |
| Total number of steps        | EX4-6-...FLR: 750 full steps<br>EX7-...FLR: 1600 full steps |
| Winding resistance per phase | EX4-6-...FLR: 13 Ohm ±10%<br>EX7-...FLR: 8 Ohm ±10%         |
| Full travel time             | EX4-6-...FLR: 1.5 seconds<br>EX7-...FLR: 3.2 seconds        |
| Reference position           | Mechanical stop at fully closed position                    |

### Technical data EVC05A (ifm electronic GmbH)

|                     |  |
|---------------------|--|
| Operating voltage   | 36 VDC in conjunction with EX4-7-...FLR    |
| Current rating      | 800 mA in conjunction with EX4-7-...FLR    |
| Design              | angled                                     |
| Ambient temperature | -20...+60°C                                |
| Protection          | IP 67                                      |
| Approval            | BVS 08 ATEX E 109 U<br>IECEx BVS 08.0041 U |

|                                   |   |
|-----------------------------------|---|
| Material body                     | housing: TPU orange;<br>sealing: Viton  |
| Material nut                      | Stainless steel 316L / 1.4404   |
| Tightening torque for knurled nut | 1.2...1.5 Nm  |
| Weight                            | 0.18 Kg   |
| Connection                        | PUR cable / 5 m;<br>4 x 0.34 mm² (42 x Ø 0.1 mm);<br>Ø 4.9 mm; halogen-free   |
| Marking                           |  II 3G Ex nA IIC Gc<br> II 2D Ex tD IIIC Db IP65/IP67 |




## General information

EX4-7-...FLR are stepper motor driven valves for precise control of refrigerant mass flow, released for R290 in refrigeration, air conditioning, heat pumps, industrial cooling process and close control systems.

### Warning

The qualification /certification of EX4-7-...FLR is valid only in conjunction with EVC05A (plug & cable assembly).

The listed products are electrical devices and are in compliance with EN60079-0/-15 and directive 94/9/EC therefore rated / marked as:  II 3G Ex nA IIA T3 Gc X

### Safety instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Good ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Do not release any refrigerant into the atmosphere!
- Ensure that the system piping is grounded.
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Do not operate valve connected directly to supply voltage. Use suitable stepper motor driver.
- Do not operate system before all cable connections are completed.
- Do not operate the valve when the compressor is not running.
- Do not operate the valve when system is under vacuum except for closure of valve before refrigerant charging.
- Before installation or service disconnect all voltages from system and device.
- Do not use any other fluid media without prior approval of Copeland.
- Ensure that design, installation and operation are according to European and national standards/ regulations.

## Mounting location

- The motor needs to be pointed downward or sideways (Fig. 1).
- For best result, locate the valve as close as possible to the distributor or inlet of evaporator.

## Installation

- Direction of refrigerant flow must match with arrow on the label (except bi-flow valves).
- Check for sufficient refrigerant charge/subcooling and make sure no flash gas is present at the inlet of valve before attempting to check valve operation.
- Install a Copeland sight glass MIA...-FLR and an ADK....-FLR filter before the valve.

### Warning

- All valves are delivered at half open. Do not charge system before closure of valve. See operating instructions of used driver/controller.
- The interior parts of valve must be protected against moisture and water at any time. It is not permitted to use water, steam or any other solvent to the inside of valve for cleaning purpose.

## Recommended external pipe connection:

| Nominal pipe connection | Outside diameter |           |
|-------------------------|------------------|-----------|
|                         | Min. (mm)        | Max. (mm) |
| 3/8"                    | 9.47             | 9.55      |
| 5/8" / 16 mm            | 15.80            | 16.05     |
| 7/8" / 22 mm            | 21.95            | 22.25     |
| 1-1/8"                  | 28.50            | 28.63     |
| 10 mm                   | 9.95             | 10.05     |
| 28 mm                   | 27.95            | 28.05     |

## Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.
- Do not exceed the max. body temperature of 120 °C!
- Use flux and silver rod having a minimum of 30% silver.

## Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar

### **⚠ Warning**

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

### ***Tightness test***

- Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify leakages of external joints. The allowable leakage rate must be according system manufacturer's specification.

### **⚠ Electrical connection warning**

- Entire electrical connections have to comply with local regulations.
- Improper wiring will result wrong direction of rotation, no rotation of stepper motor or controller malfunction.

### ***Wiring / mounting of plug: (Fig. 4-6)***

- 2 = white, 4 = black, 3 = blue, 1 = brown
- Use only ATEX approved prewired M12 connector assembly EVC05A for connection to the valve.
- See also EVC05A operating instructions for plug mounting and required protection.
- There is no specific requirement for positioning of plug on pins (see Fig. 5).
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.
- During operation the connector EVC05A must be protected by an appropriate housing against external mechanical damage or shock (min. required protection up to a mechanical action of 7 J - in accordance with EN60079-0).
- Cable end of EVC05A must be connected to a driver/ controller which is ATEX approved or located out of hazard zone.
  - If driver/controller is located out of hazard zone, appropriate ATEX approved cable gland shall be used in boundary of hazard zone and out of hazard zone.
  - If the cable needs to be extended in hazard zone, it is mandatory to use ATEX approved type coupling or junction box.
- Supply voltage to the valve shall never exceed 36 VDC at any time.

### ***Wiring / mounting to driver / controller***

- See the wiring diagram of used driver or controller.

### **⚠ Operation**

- See operating instructions of used electronic driver/ controller.
- Perform a functional test of electrical circuit before charging the system with refrigerant.

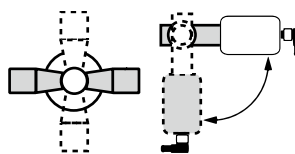
### **⚠ Service maintenance**

- Defective EX4-7-...FLR valves must be replaced, they cannot be repaired.
- **Disconnect electrical power to driver/ controller before service.**
- **Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.**
- For motor check:
  - Remove cable plug from valve under no voltage.
  - Use an Ohm meter with suitable range.
  - Measure windings resistance per phase at opposite placed pins acc. Fig. 6 and data as in the table below.
- **The lowest pressure inside system must be at least 0.4 bar higher than ambient pressure at any time. Failure to do so could accumulate air inside the system and create an explosive mixture over time.**

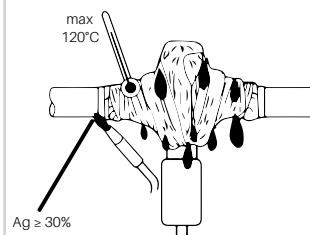
### ***Technical data***

| Type                                  | EX4-6-...FLR   | EX7-...FLR          |
|---------------------------------------|--|---------------------|
| Max. allowable working pressure PS    | 35 bar   |                     |
| Operating temp. at motor              | Uni-flow versions: -50°C...+100°C<br>Bi-flow versions: -40°C...+80°C |                     |
| Connection                            | see Fig. 3   |                     |
| Refrigerant: R290                     | ✓  | ✓                   |
| Nominal supply voltage to the valve U | 24 VDC   | 24 VDC              |
| Max. current $i_{max}$                | 0.5 A  | 0.75 A              |
| Winding resistance per phase          | $13 \Omega \pm 10\%$   | $8 \Omega \pm 10\%$ |
| CE Marking acc. to directive 94/9/E   | Yes  | Yes                 |

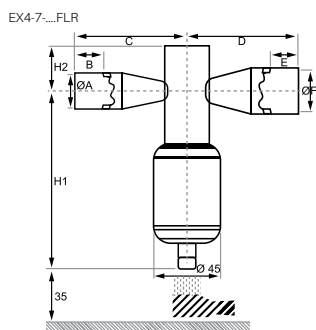
**Fig. 1**



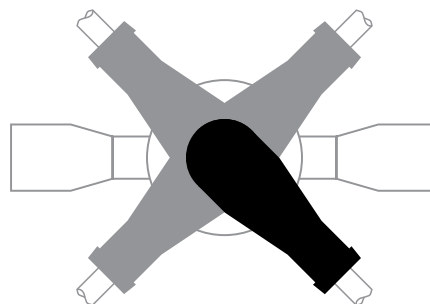
**Fig. 2**



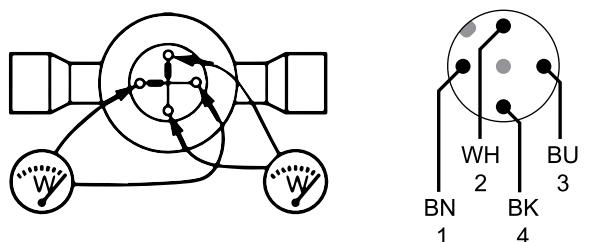
**Fig. 3**



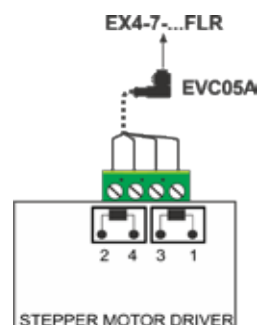
**Fig. 4**



**Fig. 5**



**Fig. 6**



| EXV        | Flow pattern | Part. no. | Ø A x Ø F(ODF)           | B  | C  | D  | E  | H1  | H2 |
|------------|--------------|-----------|--------------------------|----|----|----|----|-----|----|
| EX4-I21FLR | Uni-flow     | 800430    | 3/8" x 5/8"              | 8  | 45 | 55 | 11 | 113 | 25 |
| EX4-M21FLR |              | 800431    | 10 x 16 mm               | 8  | 45 | 55 | 11 | 113 | 25 |
| EX5-U21FLR |              | 800432    | 5/8" x 7/8" (16 x 22 mm) | 11 | 55 | 65 | 16 | 113 | 25 |
| EX6-I21FLR |              | 800433    | 7/8" x 1-1/8"            | 16 | 65 | 75 | 19 | 113 | 25 |
| EX6-M21FLR |              | 800434    | 22 x 28 mm               | 16 | 65 | 75 | 19 | 113 | 25 |
| EX7-I21FLR |              | 800440    | 1-1/8" x 1-1/8"          | 20 | 78 | 83 | 20 | 158 | 42 |
| EX/-M21FLR |              | 800441    | 28 x 28 mm               | 20 | 78 | 83 | 20 | 158 | 42 |
| EX4-U31FLR | Bi-flow      | 800435    | 16 x 16 mm (5/8" x 5/8") | 11 | 55 | 55 | 11 | 113 | 25 |
| EX5-U31FLR |              | 800436    | 7/8" x 7/8" (22 x 22 mm) | 16 | 65 | 65 | 16 | 113 | 25 |
| EX6-I31FLR |              | 800437    | 1-1/8" x 1-1/8"          | 19 | 75 | 75 | 19 | 113 | 25 |
| EX6-M31FLR |              | 800438    | 28 x 28 mm               | 19 | 75 | 75 | 19 | 113 | 25 |
| EX7-I31FLR |              | 800442    | 1-1/8" x 1-1/8"          | 20 | 83 | 83 | 20 | 158 | 42 |
| EX7-M31FLR |              | 800443    | 28 x 28 mm               | 20 | 83 | 83 | 20 | 158 | 42 |

### Sequence for driving of stepper motor and valve

| Direction  | Reverse direction  | Number of steps | Identification code of pins for electrical connections to third party drivers/controllers |   |   |   |
|--|--|-----------------|---|---|---|---|
|  |  |                 | 2   | 4 | 3 | 1 |
|  |  |                 | Current direction   |   |   |   |
| <div style="text-align: center;"> ↓<br/>Valve is opening<br/><br/>↓ </div> | <div style="text-align: center;"> ↑<br/>Valve is closing<br/><br/>↑ </div> | Step 1          | +   | - | + | - |
|  |  | Step 2          | -   | + | + | - |
|  |  | Step 3          | -   | + | - | + |
|  |  | Step 4          | +   | - | - | + |
|  |  | Remark          | The sequence is repeated from step 5 to 8 similar to step 1 to 4                          |   |   |   |
|  |  | Step 5          | +   | - | + | - |
|  |  | Step 6          | -   | + | + | - |
|  |  | Step 7          | -   | + | - | + |
|  |  | Step 8          | +   | - | - | + |
|  |  | Remark          | The sequence is repeated from step 9 to 12 similar to step 1 to 4                         |   |   |   |
|  |  |                 |   |   |   |   |
|  |  |                 |   |   |   |   |

## Functions and features

- Use in hazardous areas according to the classification **II3G** (Group II, category 3G, apparatus for gas atmosphere). Complies with the requirements of the standard EN 60079-15.
- Use in hazardous areas according to the classification **II3G** (Group II, category 20, apparatus for dust atmosphere). Complies with the requirements of the standards IEC 60079-0 and IEC 60079-31.
- EC component certificate: BVS 08ATEX E 109 U
- IEC Ex component certificate: IECEx BVS 08.0041 U
- Marking:



II3G Ex nA IIC Gc

(see table operating temperature range)

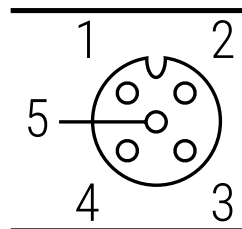
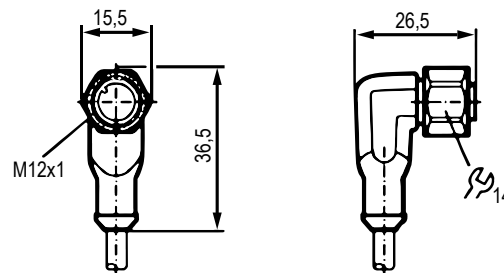


II20 Ex tb IIIC Db IP65/IP67

### Operating temperature range

-20...+60°C

for connection cables and jumpers with angled M12 plug and angled M12 sockets



|   |          |
|---|----------|
| 1 | BN       |
| 2 | WH       |
| 3 | BU       |
| 4 | BK       |
| 5 | not used |

## Wiring

### Core colors

- BK black
- BN brown
- BU blue
- WH white

## Installation / set-up

The M12 connectors must only be installed connected and set up by qualified staff. The qualified staff must have knowledge of protection classes, regulations- and provisions for apparatus in hazardous areas.

Check whether the classification (see "marking" above and marking on the M12 connector) is suitable for the application.

## Installation remarks / installation

- Adhere to the relevant national regulations and provisions.
- Avoid electrostatic charging on plastic units and cables.
- Protect the M12 connectors efficiently against damage.
- The cables must be firmly laid and effectively protected against damage.
- The relevant installation regulations must be adhered to.
- For the technical data please refer to the data sheet. (see technical bulletin EX4-7-...-FLR).
- Avoid direct radiation with high UV components (sunlight); mount the unit in a protected place.
- M12 plugs may only be opened or closed in a sufficiently clean environment.
- Connectors must always be closed with a counterpart. They may be left open in the field only briefly for servicing purposes.

**Caution: Not for interrupting current!**

## Special conditions for safe operation

- The M12 connectors were tested in accordance with table 8 of EN 60079-0/table 5 of EN 61241-0 for group II and for a low mechanical risk with impact energy of 4 joules.
- Do not separate the connectors when energized.
- Secure the connector by tightening the nut sufficiently. Tightening torque approx. 1.2 Nm to 1.5 Nm. This tightening torque is ensured as follows:
  - Hand-fasten the coupling nut (0.4 to 0.5 Nm).
  - Then turn by 3 notches using a screwdriver across the flats 14.
- The connector conforms to the requirements for an M12 connector in EN 61076-2-101. The counterpart must also conform to this standard.
- Always refer to the operating-instructions as space restrictions may not allow markings to be applied to the unit.

## Maintenance / repair

The unit must not be modified nor can it be repaired. In case of a fault please contact the manufacturer.

The data sheets, the EC component certificates or IEC ex component certificates are available from the manufacturer on request.

## Thermo - expansion valves TX3-...FLR

Copeland's **TX3-...FLR** series of thermo-expansion valves are designed for commercial refrigeration and heat pump applications operated with R290.

The **TX3-...FLR** is ideal for those applications requiring compact size combined with stable and accurate control over wide load and evaporating temperature ranges.

### Features

- Brazing connections with straight through configuration
- Stainless steel power element resists corrosion
- Large diaphragm provides smoother and consistent valve control
- External equalizer
- External superheat adjustment
- Packaging units with 24 pieces, no single packs



TX3-...FLR

### Selection table

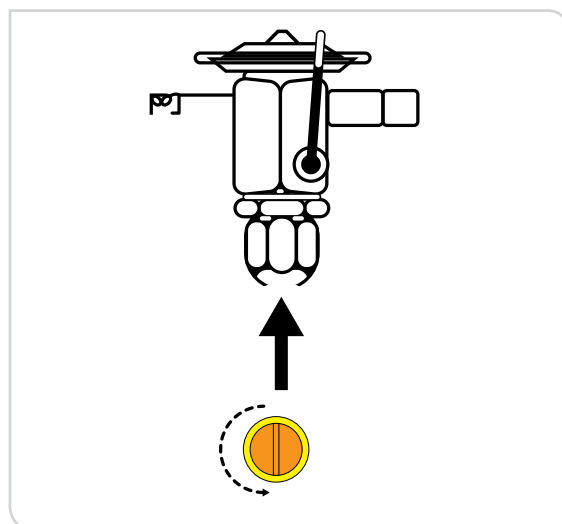
| Nominal capacity [kW] | Without MOP |          | With MOP    |          | Connection size | Inlet x Outlet |
|-----------------------|-------------|----------|-------------|----------|-----------------|----------------|
|                       | Type        | Part no. | Type        | Part no. | Equalizer       |                |
| 3.7                   | TX3-P23 FLR | 801981M  | TX3-P33 FLR | 801988M  | Ext. 1/4"       | 1/4" x 3/8"    |
| 5.4                   | TX3-P24 FLR | 801982M  | TX3-P34 FLR | 802013M  | Ext. 1/4"       | 3/8" x 1/2"    |
| 8.0                   | TX3-P25 FLR | 801983M  | TX3-P35 FLR | 802014M  | Ext. 1/4"       | 3/8" x 1/2"    |
| 11.0                  | TX3-P26 FLR | 801984M  | TX3-P36 FLR | 802015M  | Ext. 1/4"       | 3/8" x 1/2"    |
| 13.5                  | TX3-P27 FLR | 801985M  | TX3-P37 FLR | 802016M  | Ext. 1/4"       | 1/2" x 5/8"    |
| 16.1                  | TX3-P28 FLR | 801986M  | TX3-P38 FLR | 802017M  | Ext. 1/4"       | 1/2" x 5/8"    |
| 22.0                  | TX3-P29 FLR | 801987M  | TX3-P39 FLR | 802018M  | Ext. 1/4"       | 1/2" x 5/8"    |

Nominal capacity at +38°C liquid temperature, +4°C evaporating temperature and 1K subcooling. For other operating condition, see the next page.

### Guideline

TX3-...FLR will be delivered with sufficient higher superheat setting to make sure match of valve with poor performance of evaporator. The setting can be lowered for high efficient evaporators capable to operate at lower superheat. The following table can be used as guideline:

| Evaporating temperature | Readjustment, turn |
|-------------------------|--------------------|
| -40                     | -1                 |
| -35                     | -1                 |
| -30                     | -1-1/8             |
| -25                     | -1-1/8             |
| -20                     | -1-1/8             |
| -15                     | -1-1/8             |
| -10                     | -1                 |
| -5                      | -3/4               |
| 0                       | -1/2               |
| 5                       | -1/8               |
| 10                      | -1/3               |





**Quick selection** (included 1.5 bar pressure drop for liquid line components and distributor)

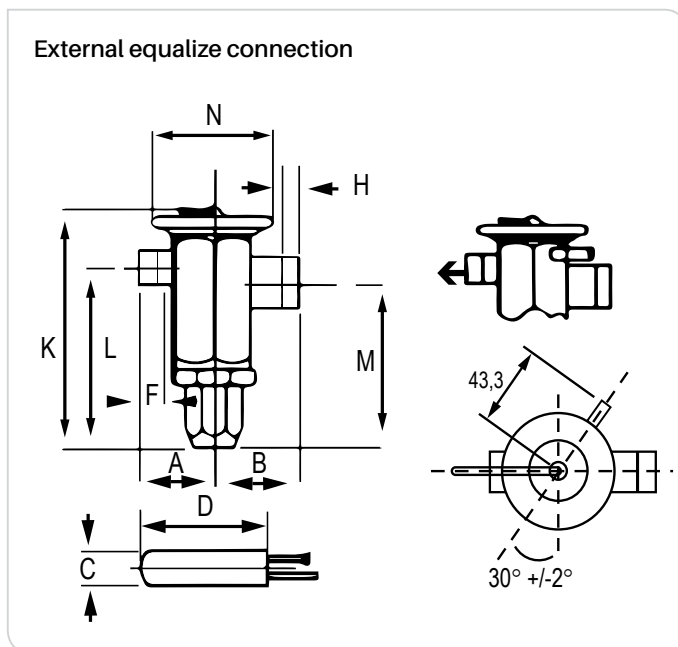
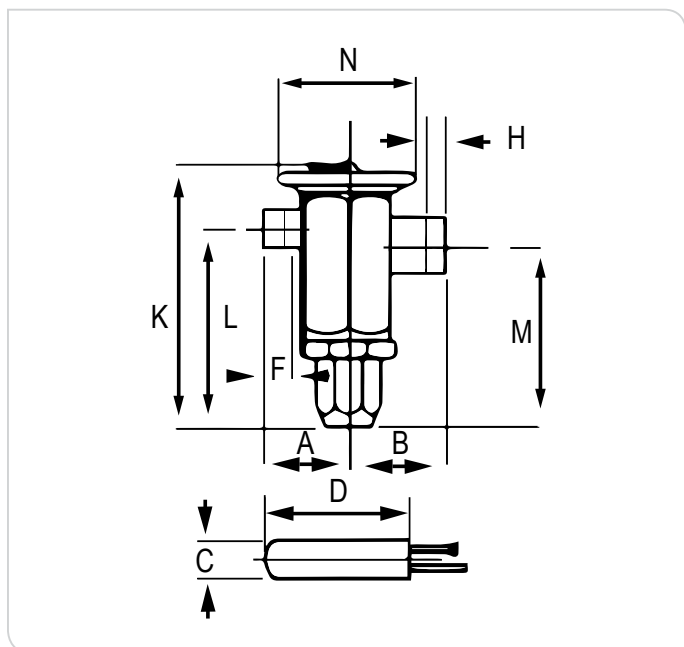
| Condensing temperature °C | R290 Cooling capacity in kW evaporating temperature °C |      |      |      |      |      |      |      |      |      |      |     | Valve type    |
|---------------------------|--|------|------|------|------|------|------|------|------|------|------|-----|---------------|
|                           | 15   | 10   | 5    | 0    | -5   | -10  | -15  | -20  | -25  | -30  | -35  | -40 |               |
| 75                        | 3.3  | 3.3  | 3.2  | 3.2  | 3.1  | 3.1  | 2.6  | 2.2  | 1.9  | 1.6  | 1.3  | 1.0 | TX3-P23/33FLR |
|                           | 4.8  | 4.7  | 4.7  | 4.6  | 4.5  | 4.4  | 3.8  | 3.2  | 2.7  | 2.2  | 1.8  | 1.5 | TX3-P24/34FLR |
|                           | 7.2  | 7.1  | 7.0  | 6.9  | 6.8  | 6.6  | 5.7  | 4.8  | 4.0  | 3.4  | 2.8  | 2.2 | TX3-P25/35FLR |
|                           | 9.8  | 9.8  | 9.7  | 9.5  | 9.3  | 9.1  | 7.8  | 6.6  | 5.5  | 4.6  | 3.8  | 3.1 | TX3-P26/36FLR |
|                           | 12.1   | 12.0 | 11.8 | 11.6 | 11.4 | 11.1 | 9.5  | 8.1  | 6.8  | 5.6  | 4.6  | 3.8 | TX3-P27/37FLR |
|                           | 14.4   | 14.2 | 14.1 | 13.8 | 13.6 | 13.2 | 11.3 | 9.6  | 8.1  | 6.7  | 5.5  | 4.5 | TX3-P28/38FLR |
|                           | 19.6   | 19.5 | 19.2 | 18.9 | 18.5 | 18.1 | 15.5 | 13.1 | 11.0 | 9.2  | 7.5  | 6.1 | TX3-P29/39FLR |
| 65                        | 3.2  | 3.2  | 3.2  | 3.2  | 3.2  | 3.1  | 2.7  | 2.3  | 1.9  | 1.6  | 1.3  | 1.1 | TX3-P23/33FLR |
|                           | 4.6  | 4.7  | 4.7  | 4.6  | 4.6  | 4.5  | 3.9  | 3.3  | 2.8  | 2.3  | 1.9  | 1.6 | TX3-P24/34FLR |
|                           | 7.0  | 7.0  | 7.0  | 6.9  | 6.8  | 6.7  | 5.8  | 5.0  | 4.2  | 3.5  | 2.9  | 2.4 | TX3-P25/35FLR |
|                           | 9.6  | 9.6  | 9.6  | 9.5  | 9.4  | 9.2  | 8.0  | 6.8  | 5.8  | 4.8  | 4.0  | 3.3 | TX3-P26/36FLR |
|                           | 11.7   | 11.7 | 11.7 | 11.6 | 11.5 | 11.3 | 9.7  | 8.3  | 7.1  | 5.9  | 4.9  | 4.0 | TX3-P27/37FLR |
|                           | 13.9   | 14.0 | 14.0 | 13.8 | 13.7 | 13.4 | 11.6 | 9.9  | 8.4  | 7.0  | 5.8  | 4.8 | TX3-P28/38FLR |
|                           | 19.0   | 19.1 | 19.1 | 18.9 | 18.7 | 18.4 | 15.9 | 13.6 | 11.5 | 9.6  | 8.0  | 6.5 | TX3-P29/39FLR |
| 55                        | 3.3  | 3.3  | 3.4  | 3.4  | 3.4  | 3.4  | 2.9  | 2.5  | 2.2  | 1.8  | 1.5  | 1.3 | TX3-P23/33FLR |
|                           | 4.7  | 4.8  | 4.9  | 4.9  | 4.9  | 4.9  | 4.3  | 3.7  | 3.1  | 2.7  | 2.2  | 1.8 | TX3-P24/34FLR |
|                           | 7.1  | 7.2  | 7.3  | 7.4  | 7.4  | 7.3  | 6.4  | 5.5  | 4.7  | 4.0  | 3.3  | 2.8 | TX3-P25/35FLR |
|                           | 9.7  | 9.9  | 10.0 | 10.1 | 10.1 | 10.0 | 8.8  | 7.6  | 6.5  | 5.5  | 4.6  | 3.8 | TX3-P26/36FLR |
|                           | 11.9   | 12.2 | 12.3 | 12.4 | 12.4 | 12.3 | 10.7 | 9.3  | 7.9  | 6.7  | 5.6  | 4.7 | TX3-P27/37FLR |
|                           | 14.2   | 14.5 | 14.7 | 14.7 | 14.7 | 14.6 | 12.8 | 11.0 | 9.4  | 8.0  | 6.7  | 5.5 | TX3-P28/38FLR |
|                           | 19.4   | 19.8 | 20.0 | 20.1 | 20.1 | 20.0 | 17.4 | 15.1 | 12.9 | 10.9 | 9.1  | 7.6 | TX3-P29/39FLR |
| 50                        | 3.4  | 3.6  | 3.6  | 3.7  | 3.7  | 3.7  | 3.3  | 2.8  | 2.5  | 2.1  | 1.8  | 1.5 | TX3-P23/33FLR |
|                           | 5.0  | 5.1  | 5.3  | 5.3  | 5.4  | 5.4  | 4.7  | 4.1  | 3.5  | 3.0  | 2.5  | 2.1 | TX3-P24/34FLR |
|                           | 7.5  | 7.7  | 7.9  | 8.0  | 8.1  | 8.1  | 7.1  | 6.2  | 5.3  | 4.5  | 3.8  | 3.2 | TX3-P25/35FLR |
|                           | 10.2   | 10.6 | 10.8 | 11.0 | 11.1 | 11.1 | 9.7  | 8.5  | 7.3  | 6.2  | 5.2  | 4.4 | TX3-P26/36FLR |
|                           | 12.5   | 13.0 | 13.2 | 13.4 | 13.5 | 13.5 | 11.9 | 10.4 | 8.9  | 7.6  | 6.4  | 5.3 | TX3-P27/37FLR |
|                           | 14.9   | 15.4 | 15.8 | 16.0 | 16.1 | 16.1 | 14.2 | 12.3 | 10.6 | 9.1  | 7.6  | 6.4 | TX3-P28/38FLR |
|                           | 20.4   | 21.1 | 21.5 | 21.8 | 22.0 | 22.0 | 19.4 | 16.8 | 14.5 | 12.4 | 10.4 | 8.7 | TX3-P29/39FLR |
| 40                        | 3.0  | 3.2  | 3.4  | 3.5  | 3.6  | 3.6  | 3.2  | 2.8  | 2.5  | 2.1  | 1.8  | 1.5 | TX3-P23/33FLR |
|                           | 4.3  | 4.7  | 4.9  | 5.1  | 5.2  | 5.3  | 4.7  | 4.1  | 3.6  | 3.1  | 2.6  | 2.2 | TX3-P24/34FLR |
|                           | 6.5  | 7.0  | 7.3  | 7.6  | 7.8  | 7.9  | 7.0  | 6.2  | 5.3  | 4.6  | 3.9  | 3.3 | TX3-P25/35FLR |
|                           | 8.9  | 9.6  | 10.1 | 10.4 | 10.7 | 10.8 | 9.6  | 8.4  | 7.3  | 6.3  | 5.3  | 4.5 | TX3-P26/36FLR |
|                           | 10.9   | 11.7 | 12.3 | 12.7 | 13.0 | 13.2 | 11.8 | 10.3 | 9.0  | 7.7  | 6.5  | 5.5 | TX3-P27/37FLR |
|                           | 13.0   | 14.0 | 14.7 | 15.2 | 15.5 | 15.8 | 14.0 | 12.3 | 10.7 | 9.2  | 7.8  | 6.5 | TX3-P28/38FLR |
|                           | 17.8   | 19.1 | 20.0 | 20.7 | 21.2 | 21.5 | 19.1 | 16.8 | 14.6 | 12.5 | 10.6 | 8.9 | TX3-P29/39FLR |
| 30                        | 2.1  | 2.6  | 2.9  | 3.1  | 3.2  | 3.4  | 3.0  | 2.7  | 2.4  | 2.1  | 1.8  | 1.5 | TX3-P23/33FLR |
|                           | 3.1  | 3.7  | 4.1  | 4.4  | 4.7  | 4.9  | 4.4  | 3.9  | 3.4  | 3.0  | 2.5  | 2.1 | TX3-P24/34FLR |
|                           | 4.6  | 5.5  | 6.2  | 6.7  | 7.0  | 7.3  | 6.6  | 5.9  | 5.1  | 4.5  | 3.8  | 3.2 | TX3-P25/35FLR |
|                           | 6.4  | 7.6  | 8.5  | 9.1  | 9.6  | 10.0 | 9.0  | 8.0  | 7.0  | 6.1  | 5.2  | 4.4 | TX3-P26/36FLR |
|                           | 7.8  | 9.3  | 10.4 | 11.2 | 11.8 | 12.2 | 11.0 | 9.8  | 8.6  | 7.5  | 6.4  | 5.4 | TX3-P27/37FLR |
|                           | 9.3  | 11.1 | 12.4 | 13.3 | 14.0 | 14.6 | 13.1 | 11.7 | 10.3 | 8.9  | 7.6  | 6.4 | TX3-P28/38FLR |
|                           | 12.7   | 15.1 | 16.9 | 18.2 | 19.2 | 19.9 | 18.0 | 16.0 | 14.0 | 12.2 | 10.4 | 8.8 | TX3-P29/39FLR |
| 20                        |  | 1.2  | 1.9  | 2.3  | 2.6  | 2.9  | 2.7  | 2.4  | 2.2  | 1.9  | 1.6  | 1.4 | TX3-P23/33FLR |
|                           |  | 1.7  | 2.7  | 3.4  | 3.8  | 4.1  | 3.8  | 3.5  | 3.1  | 2.7  | 2.4  | 2.0 | TX3-P24/34FLR |
|                           |  | 2.5  | 4.1  | 5.1  | 5.7  | 6.2  | 5.8  | 5.3  | 4.7  | 4.1  | 3.6  | 3.0 | TX3-P25/35FLR |
|                           |  | 3.5  | 5.6  | 6.9  | 7.8  | 8.5  | 7.9  | 7.2  | 6.4  | 5.7  | 4.9  | 4.2 | TX3-P26/36FLR |
|                           |  | 4.3  | 6.9  | 8.5  | 9.6  | 10.4 | 9.7  | 8.8  | 7.9  | 6.9  | 6.0  | 5.1 | TX3-P27/37FLR |
|                           |  | 5.1  | 8.2  | 10.1 | 11.4 | 12.4 | 11.5 | 10.5 | 9.4  | 8.2  | 7.1  | 6.1 | TX3-P28/38FLR |
|                           |  | 6.9  | 11.2 | 13.8 | 15.6 | 16.9 | 15.8 | 14.3 | 12.8 | 11.3 | 9.7  | 8.3 | TX3-P29/39FLR |

Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity.

**Technical data**

|                              |               |
|------------------------------|---------------|
| Compatibility                | R290          |
| Maximum working pressure PS: | 35 bar        |
| Factory test pressure PT:    | 38.5 bar      |
| Burst pressure               | 175 bar       |
| Medium temperature range     | -45°C...+75°C |
| Maximum bulb temperature     | +71°C         |

|               |                       |
|---------------|-----------------------|
| Seat leakage  | ≤ 1% nominal capacity |
| Connection    | ODF, copper           |
| Charges       | CFC free              |
| Protection    | salt spray test       |
| Weight        | ~ 0.5 kg (individual) |
| Pack quantity | 24 (no single pack)   |

**Dimensions (mm)****Body**

| Type         | Connection size [inch] |        | Roughing in dimensions [mm] |      |     |      |      |      |      |      |
|--------------|------------------------|--------|-----------------------------|------|-----|------|------|------|------|------|
|              | Inlet                  | Outlet | A                           | B    | F   | H    | N    | K    | L    | M    |
| TX3-...3-FLR | 1/4"                   | 3/8"   | 43.3                        | 44.1 | 7.9 | 7.9  | 44.5 | 86.5 | 64.7 | 54.4 |
| TX3-...4-FLR | 3/8"                   | 1/2"   | 44.1                        | 44.1 | 7.9 | 9.5  |      |      |      |      |
| TX3-...5-FLR | 3/8"                   | 1/2"   | 44.1                        | 44.1 | 7.9 | 9.5  |      |      |      |      |
| TX3-...6-FLR | 3/8"                   | 1/2"   | 44.1                        | 44.1 | 7.9 | 9.5  |      |      |      |      |
| TX3-...7-FLR | 1/2"                   | 5/8"   | 44.1                        | 44.5 | 9.5 | 12.7 |      |      |      |      |
| TX3-...8-FLR | 1/2"                   | 5/8"   | 44.1                        | 44.5 | 9.5 | 12.7 |      |      |      |      |
| TX3-...9-FLR | 1/2"                   | 5/8"   | 44.1                        | 44.5 | 9.5 | 12.7 |      |      |      |      |

**Bulb**

| Dimensions of bulb [mm] |      | Capillary tube length |
|-------------------------|------|-----------------------|
| D (length)              | Ø C  |                       |
| 53.2                    | 12.8 | 1.5 m                 |

## General information

TX3-...FLR are thermo-expansion valves for superheat control.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

TX3-...FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

## Safety instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure and temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Observe and avoid mechanical damage of component housing.
- Ensure that design, installation and operation are according to European and national standards / regulations.

## Installation (Fig. 1, 2)

- Valves may be installed in any position, but should be located as close as possible to the distributor or evaporator inlet.
- Attach the remote bulb to the suction line (Fig. 2) as close to the evaporator outlet as possible. Securely fasten the bulb with straps provided. Insulate bulb with a suitable material. Ensure that the capillary is mounted without tension, always leave the capillary a bit loose and it should not be strangulated. Maintain also a clearance from the capillary to other objects. The capillary should not be in contact with other objects.

Fig. 1

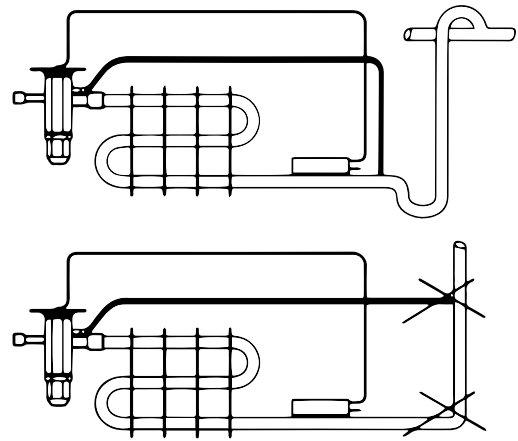
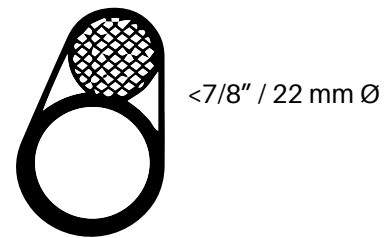


Fig. 2



- Connect equalizer line (1/4" or 6 mm tube) to valve and suction line. Be sure that it cannot siphon oil from the suction line (Fig. 1).
- The expansion valve must be free of all contaminants. Install a Copeland filter drier before the valve.

## Recommended external pipe connections:

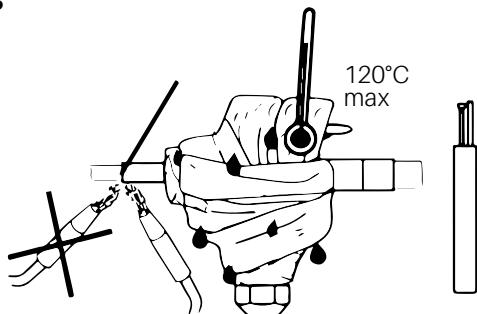
| Nominal pipe connection | Outside diameter |          |
|-------------------------|------------------|----------|
|                         | Min. (mm)        | Max.(mm) |
| 1/4"                    | 6.30             | 6.38     |
| 3/8"                    | 9.47             | 9.55     |
| 1/2"                    | 12.62            | 12.73    |
| 5/8"                    | 18.80            | 15.90    |
| 7/8"                    | 22.15            | 22.25    |
| 1-1/8"                  | 28.50            | 28.63    |
| 6 mm                    | 5.95             | 6.05     |
| 10 mm                   | 9.95             | 10.05    |
| 12 mm                   | 11.96            | 12.05    |
| 16 mm                   | 15.95            | 16.05    |
| 22 mm                   | 21.95            | 22.06    |
| 28 mm                   | 27.95            | 28.05    |

### Brazing (Fig. 3)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.

**Do not exceed max. body temperature of 120°C!**

Fig. 3



- Be sure liquid line is connected to inlet of TX3-... FLR (marked "IN" on valve body).
- Minimize vibrations in the piping lines by appropriate solutions.

### Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

### ⚠ Warning

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

### Tightness test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer's specification.

### Operation

- Check for sufficient refrigerant charge and be sure no flash gas is present before attempting to check the expansion valve operation.
- Check/measure superheat.

### Superheat adjustment (Fig. 4)

TX3-...FLR are factory set to a standard setting (s. technical bulletin). If the superheat must be adjusted proceed as follows:

1. Remove seal cap from bottom of valve.
2. Turn adjustment screw clockwise to increase and counterclockwise to decrease superheat.

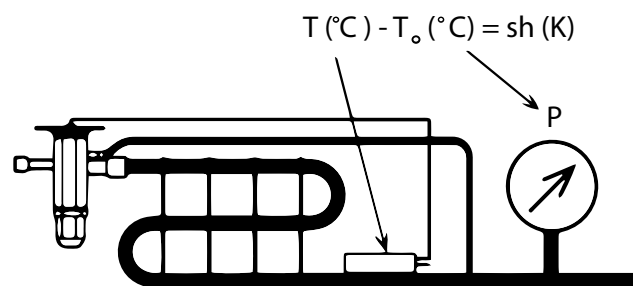
**Warning:** There are approx. 13 turns on the adjustment stem (from left to right stop). When stop is reached any further turning will damage valve. Changes in superheat (K) per stem turn depending on evaporating temperature and refrigerant; see below. 30 minutes are required for the system to stabilize after the adjustment is made.

### Superheat change (K) per stem turn

| Evaporating temperature |       |       |       |       |     |      |      |
|-------------------------|-------|-------|-------|-------|-----|------|------|
|                         | -40°C | -30°C | -20°C | -10°C | 0°C | 10°C | 20°C |
| R 290                   | 4.8   | 3.6   | 2.7   | 2.1   | 1.7 | 1.4  | 1.1  |

3. Determine superheat according to Fig. 4.
4. Replace and tighten seal cap (hand-tighten with more than 2 Nm).
5. Check for external leakage.

Fig. 4





### **Service/maintenance**

- Defective TX3-...FLR must be replaced; they cannot be repaired.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

### **Technical data of TX3 -...FLR**

| Charge | Recommended evaporating temperature |
|--------|-------------------------------------|
| Liquid | -40°C...+20°C                       |

- Max. allowable working pressure PS:.....35 bar
- Test pressure PT:.....38.5 bar
- Released / compatible for:.....R290, mineral, alkyl benzene and ester lubricants

***TX3 types, not listed in the following table, are not released for use with flammable refrigerants!***

| Type       | Part no. |
|------------|----------|
| TX3-P23FLR | 801981M  |
| TX3-P24FLR | 801982M  |
| TX3-P25FLR | 801983M  |
| TX3-P26FLR | 801984M  |
| TX3-P27FLR | 801985M  |
| TX3-P28FLR | 801986M  |
| TX3-P29FLR | 801987M  |
| TX3-P33FLR | 801988M  |
| TX3-P34FLR | 802013M  |
| TX3-P35FLR | 802014M  |
| TX3-P36FLR | 802015M  |
| TX3-P37FLR | 802016M  |
| TX3-P38FLR | 802017M  |
| TX3-P39FLR | 802018M  |



## Solenoid valves series 200RB...-FLR

200RB...-FLR are normally closed solenoid valves for various application duties.



### Features

- Normally closed
- Pilot operated requires minimum operating pressure differential
- Compact size
- Extended fittings: No disassembly necessary for brazing
- ATEX compliance coil and plug in 24VAC/50Hz and 230VAC/50Hz - as a kit available



200RB...-FLR + ASC... + PG9 ATEX

### Coil and plug

-  II 3G Ex nA IIA T3 Gc U
-  II 2G IIC T6 Gb

### Selection table valves

| Type               | Part no. | Kv-value [m3/h] | Capacity [kW]<br>liquid line duty | Connections solder / ODF |        |
|--------------------|----------|-----------------|-----------------------------------|--------------------------|--------|
|                    |          |                 |                                   | [mm]                     | [inch] |
| 200RB 3T3-FLR (mm) | 801323   | 0.4             | 7.3                               | 10                       |        |
| 200RB 3T3-FLR      | 801445   |                 |                                   |                          | 3/8"   |
| 200RB 4T10-FLR     | 801446   | 0.9             | 17.3                              | 10                       |        |
| 200RB 4T4-FLR      | 801447   |                 |                                   |                          | 1/2"   |
| 200RB 4T3-FLR      | 801448   |                 |                                   |                          | 3/8"   |
| 200RB 4T12-FLR     | 801449   |                 |                                   | 12                       |        |
| 200RB 6T4-FLR      | 801450   | 1.6             | 30.4                              |                          | 1/2"   |
| 200RB 6T12-FLR     | 801451   |                 |                                   | 12                       |        |
| 200RB 6T5-FLR      | 801452   |                 |                                   | 16                       | 5/8"   |

**Note:** Nominal capacity at +38°C condensing temperature +4°C evaporating temperature, 1 K subcooling and 0.15 bar pressure drop.



### Selection table coil + plug

| Type               | Part no. | Description                                  |
|--------------------|----------|--|
| ASC24V + PG9 ATEX  | 801123   | Kit consisting of coil, plug and clip (blue) |
| ASC230V + PG9 ATEX | 801124   | Kit consisting of coil, plug and clip (blue) |

### Technical data valve

|                                    |                |
|------------------------------------|----------------|
| Max. allowable working pressure PS | 31 bar         |
| Test pressure PT                   | 34.1 bar       |
| Operating temperature range TS     | -40°C...+120°C |
| Max. ambient temperature           | -40°C...+50°C  |

### Technical data coil + plug

|                           |                               |  |
|---------------------------|-------------------------------|--|
| Supply voltage            | ASC3-EX24VAC<br>ASC3-EX230VAC | 24VAC ±10%<br>230VAC ±10%  |
| Frequency                 |                               | 50 Hz  |
| Ambient temperature range |                               | -10°C...+50°C  |
| Protection class          |                               | IP65   |
| Plug                      |                               | PG9-ATEX (H.T.P. S.r.l.)   |
| Cable length              |                               | 3 m  |
| Marking (Coil & Plug)     |                               |  II 3G Ex nA IIA T3 Gc U,<br> II 2G IIC T6 Gb,<br>CE |

*Quick selection (0.15 bar pressure drop)*

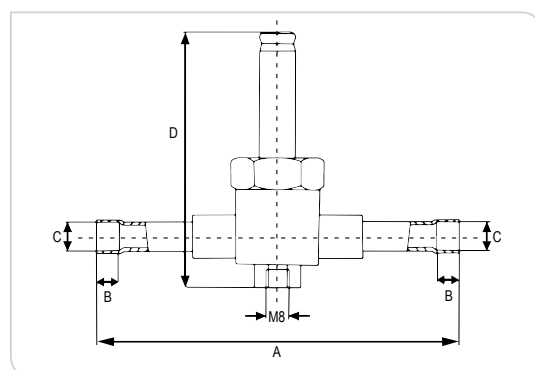
| Condensing temperature °C | Capacity in kW<br>evaporating temperature °C |      |      |      |      |      |      |      |      |      |      |      |      | Valve type   |
|---------------------------|--|------|------|------|------|------|------|------|------|------|------|------|------|--------------|
|                           | 15   | 10   | 5    | 0    | -5   | -10  | -15  | -20  | -25  | -30  | -35  | -40  | -45  |              |
| 70                        | 4.6  | 4.5  | 4.4  | 4.2  | 4.1  | 4.0  | 3.8  | 3.7  | 3.5  | 3.4  | 3.3  | 3.1  | 3.0  | 200RB3...FLR |
|                           | 10.9   | 10.6 | 10.3 | 10.0 | 9.7  | 9.4  | 9.0  | 8.7  | 8.4  | 8.0  | 7.7  | 7.4  | 7.0  | 200RB4...FLR |
|                           | 19.2   | 18.6 | 18.1 | 17.5 | 17.0 | 16.4 | 15.9 | 15.3 | 14.7 | 14.1 | 13.5 | 12.9 | 12.4 | 200RB6...FLR |
| 65                        | 5.1  | 5.0  | 4.9  | 4.7  | 4.6  | 4.4  | 4.3  | 4.2  | 4.0  | 3.9  | 3.7  | 3.6  | 3.4  | 200RB3...FLR |
|                           | 12.1   | 11.8 | 11.5 | 11.2 | 10.8 | 10.5 | 10.2 | 9.9  | 9.5  | 9.2  | 8.8  | 8.5  | 8.2  | 200RB4...FLR |
|                           | 21.2   | 20.7 | 20.2 | 19.6 | 19.0 | 18.5 | 17.9 | 17.3 | 16.7 | 16.1 | 15.5 | 14.9 | 14.3 | 200RB6...FLR |
| 60                        | 5.6  | 5.5  | 5.3  | 5.2  | 5.1  | 4.9  | 4.8  | 4.6  | 4.5  | 4.3  | 4.2  | 4.1  | 3.9  | 200RB3...FLR |
|                           | 13.3   | 12.9 | 12.6 | 12.3 | 12.0 | 11.6 | 11.3 | 11.0 | 10.6 | 10.3 | 9.9  | 9.6  | 9.3  | 200RB4...FLR |
|                           | 23.3   | 22.7 | 22.2 | 21.6 | 21.0 | 20.5 | 19.9 | 19.3 | 18.7 | 18.1 | 17.5 | 16.9 | 16.2 | 200RB6...FLR |
| 55                        | 6.1  | 5.9  | 5.8  | 5.7  | 5.5  | 5.4  | 5.2  | 5.1  | 5.0  | 4.8  | 4.7  | 4.5  | 4.4  | 200RB3...FLR |
|                           | 14.4   | 14.1 | 13.7 | 13.4 | 13.1 | 12.8 | 12.4 | 12.1 | 11.7 | 11.4 | 11.0 | 10.7 | 10.3 | 200RB4...FLR |
|                           | 25.2   | 24.7 | 24.1 | 23.6 | 23.0 | 22.4 | 21.8 | 21.2 | 20.6 | 20.0 | 19.4 | 18.8 | 18.1 | 200RB6...FLR |
| 50                        | 6.5  | 6.4  | 6.3  | 6.1  | 6.0  | 5.8  | 5.7  | 5.6  | 5.4  | 5.3  | 5.1  | 5.0  | 4.8  | 200RB3...FLR |
|                           | 15.5   | 15.2 | 14.8 | 14.5 | 14.2 | 13.8 | 13.5 | 13.1 | 12.8 | 12.4 | 12.1 | 11.7 | 11.4 | 200RB4...FLR |
|                           | 27.2   | 26.6 | 26.1 | 25.5 | 24.9 | 24.3 | 23.7 | 23.1 | 22.5 | 21.9 | 21.2 | 20.6 | 20.0 | 200RB6...FLR |
| 45                        | 7.0  | 6.9  | 6.7  | 6.6  | 6.4  | 6.3  | 6.2  | 6.0  | 5.9  | 5.7  | 5.6  | 5.4  | 5.2  | 200RB3...FLR |
|                           | 16.6   | 16.2 | 15.9 | 15.6 | 15.2 | 14.9 | 14.6 | 14.2 | 13.9 | 13.5 | 13.1 | 12.8 | 12.4 | 200RB4...FLR |
|                           | 29.1   | 28.5 | 27.9 | 27.4 | 26.8 | 26.2 | 25.6 | 24.9 | 24.3 | 23.7 | 23.1 | 22.4 | 21.8 | 200RB6...FLR |
| 40                        | 7.5  | 7.3  | 7.2  | 7.0  | 6.9  | 6.7  | 6.6  | 6.4  | 6.3  | 6.1  | 6.0  | 5.8  | 5.7  | 200RB3...FLR |
|                           | 17.6   | 17.3 | 17.0 | 16.6 | 16.3 | 16.0 | 15.6 | 15.3 | 14.9 | 14.5 | 14.2 | 13.8 | 13.5 | 200RB4...FLR |
|                           | 31.0   | 30.4 | 29.8 | 29.2 | 28.6 | 28.0 | 27.4 | 26.8 | 26.2 | 25.5 | 24.9 | 24.3 | 23.6 | 200RB6...FLR |
| 30                        | 8.3  | 8.2  | 8.1  | 7.9  | 7.8  | 7.6  | 7.5  | 7.3  | 7.2  | 7.0  | 6.9  | 6.7  | 6.5  | 200RB3...FLR |
|                           | 19.7   | 19.4 | 19.1 | 18.7 | 18.4 | 18.0 | 17.7 | 17.3 | 16.9 | 16.6 | 16.2 | 15.8 | 15.5 | 200RB4...FLR |
|                           | 34.7   | 34.1 | 33.5 | 32.9 | 32.3 | 31.6 | 31.0 | 30.4 | 29.8 | 29.1 | 28.5 | 27.8 | 27.2 | 200RB6...FLR |
| 25                        | 8.8  | 8.6  | 8.5  | 8.3  | 8.2  | 8.0  | 7.9  | 7.7  | 7.6  | 7.4  | 7.3  | 7.1  | 7.0  | 200RB3...FLR |
|                           | 20.8   | 20.4 | 20.1 | 19.7 | 19.4 | 19.0 | 18.7 | 18.3 | 18.0 | 17.6 | 17.2 | 16.8 | 16.5 | 200RB4...FLR |
|                           | 36.5   | 35.9 | 35.3 | 34.7 | 34.1 | 33.4 | 32.8 | 32.2 | 31.5 | 30.9 | 30.2 | 29.6 | 28.9 | 200RB6...FLR |
| 20                        | 9.1  | 8.9  | 8.8  | 8.6  | 8.5  | 8.3  | 8.2  | 8.0  | 7.9  | 7.7  | 7.5  | 7.4  |      | 200RB3...FLR |
|                           | 21.5   | 21.1 | 20.8 | 20.4 | 20.1 | 19.7 | 19.3 | 19.0 | 18.6 | 18.2 | 17.8 | 17.5 |      | 200RB4...FLR |
|                           | 37.7   | 37.1 | 36.5 | 35.8 | 35.2 | 34.6 | 33.9 | 33.3 | 32.6 | 32.0 | 31.3 | 30.7 |      | 200RB6...FLR |

Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity. For other pressure drop than 0.15, please use the below correction factors.

| Correction factors $K_{\Delta P}$ |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| $\Delta P$ , bar                  | 0.05 | 0.1  | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.40 | 0.45 | 0.50 | 0.55 | 0.60 | 0.65 | 0.70 |
| $K_{\Delta P}$                    | 1.73 | 1.22 | 1.0  | 0.87 | 0.77 | 0.71 | 0.65 | 0.61 | 0.58 | 0.55 | 0.52 | 0.50 | 0.48 | 0.46 |

*Dimensions (mm)*

| Type               | A   | B  | Connection / ODF | D    |
|--------------------|-----|----|------------------|------|
| 200RB 3T3-FLR (mm) | 126 | 8  | 10 mm            | 88.3 |
| 200RB 3T3-FLR      | 126 | 8  | 3/8"             | 88.3 |
| 200RB 4T10-FLR     | 126 | 8  | 10 mm            | 88.3 |
| 200RB 4T4-FLR      | 126 | 10 | 1/2"             | 88.3 |
| 200RB 4T3-FLR      | 126 | 8  | 3/8"             | 88.3 |
| 200RB 4T12-FLR     | 126 | 10 | 12 mm            | 88.3 |
| 200RB 6T4-FLR      | 126 | 10 | 1/2"             | 88.3 |
| 200RB 6T12-FLR     | 126 | 10 | 12 mm            | 88.3 |
| 200RB 6T5-FLR      | 126 | 13 | 16 mm & 5/8"     | 88.3 |



## General information

200RB...-FLR are solenoid valves for open or close of refrigerant flow.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

200RB...-FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

## Safety instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant/lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.

**WARNING:** Do not use a solenoid valve as a safety shut-off valve or for service purpose.

- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect voltage from system and device.
- Observe and avoid mechanical damage of component housing.
- Ensure that design, installation and operation are according to European and national standards / regulations

## Installation

- Do not dent, bend, or use the enclosing tube as a lever. A damaged enclosing tube may result in coil burnout, inoperative valve or leakage.
- Direction of flow must match with arrow on valve body.

## Recommended external pipe connection

| Nominal pipe connection | Outside diameter |           |
|-------------------------|------------------|-----------|
|                         | Min. (mm)        | Max. (mm) |
| 3/8"                    | 9.47             | 9.55      |
| 1/2"                    | 12.62            | 12.73     |
| 5/8"                    | 15.80            | 15.90     |
| 10 mm                   | 9.95             | 10.05     |
| 12 mm                   | 11.96            | 12.05     |
| 16 mm                   | 15.95            | 16.05     |

## Mounting location (Fig. 1, 2)

- Allow sufficient clearance above the valve for removal of coil.
- Valves may be mounted in horizontal or vertical lines (Fig. 1). Up-side down position is not allowed and can cause mal-function (Fig. 2).

Fig. 1

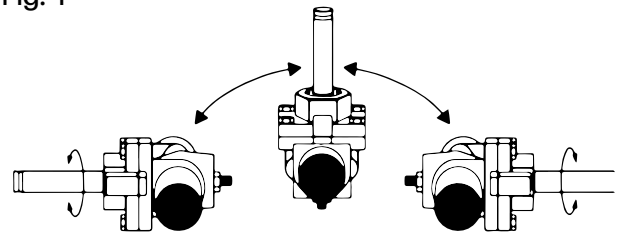
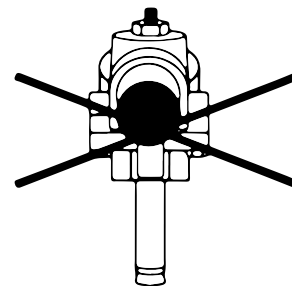


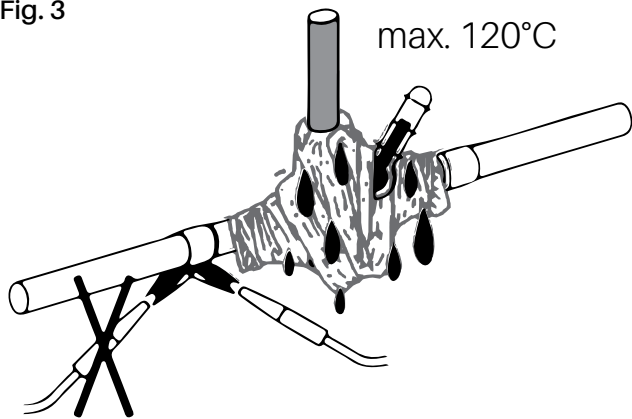
Fig. 2



## Brazing (Fig. 3)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- **Do not disassemble valve for brazing.**
- To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.
- **Do not exceed max. body temperature of 120°C.**

Fig. 3



- Internal parts must be protected from foreign material and moisture. A Copeland filter drier is recommended to be installed.
- Minimize vibrations in the piping lines by appropriate solutions.

### Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 34.1 bar.

### ⚠ Warning

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

### Tightness test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer's specification.

### Operation

- Before operation let the parts cool down to a temperature < 40°C.
  - Cycle valve several times. A distinct "click" should be heard each time the solenoid coil is energized.
- Note:** Copeland solenoid valves are equipped with a continuous-duty coil, which when energized for an extended period of time becomes hot. This is normal.



### Service/maintenance

- Defective 200RB...-FLR must be replaced; they cannot be repaired.
- Before any service disconnect electrical power of the coil and use permanent magnet to keep the valve open while emptying the system.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.
- Warning: Never remove energized coil from valve. This applies also for testing purposes.

### Technical data of 200RB... -FLR

- Max. allowable working pressure PS: .....31 bar
- Test pressure PT: .....34.1 bar
- Operating temperature range TS: .....-40°C...+120°C
- Max. ambient temperature: .....-40°C...+50°C
- Released / compatible for: .....R290, mineral-, alkyl benzene and ester lubricants
- Standards: .....EN 12284

**200RB types, not listed in the following table, are not released for use with flammable refrigerants!**

| Type               | Part no. |
|--------------------|----------|
| 200RB 3T3-FLR (mm) | 801323   |
| 200RB 3T3-FLR      | 801445   |
| 200RB 4T10-FLR     | 801446   |
| 200RB 4T4-FLR      | 801447   |
| 200RB 4T3-FLR      | 801448   |
| 200RB 4T12-FLR     | 801449   |
| 200RB 6T4-FLR      | 801450   |
| 200RB 6T12-FLR     | 801451   |
| 200RB 6T5-FLR      | 801452   |

## General information

ASC-230VAC /ASC-24VAC + PG9 ATEX is a coil and plug for use with propane.

## Types and markings

We generate two kits contain coil (old coil from Bobinage France), electrical plug and blue clip.

| Kit 1                     |                           |
|---------------------------|---------------------------|
| Coil: ASC-230VAC ATEX     | ⚠ II 3G Ex nA IIA T3 Gc U |
| Electrical plug: PG9-ATEX | ⚠ II 2G IIC T6 Gb         |

| Kit 1                     |                           |
|---------------------------|---------------------------|
| Coil: ASC-230VAC ATEX     | ⚠ II 3G Ex nA IIA T3 Gc U |
| Electrical plug: PG9-ATEX | ⚠ II 2G IIC T6 Gb         |

These components must be installed in an appropriate housing to protect them from mechanical damage or shock.

## ⚠ Safety instructions

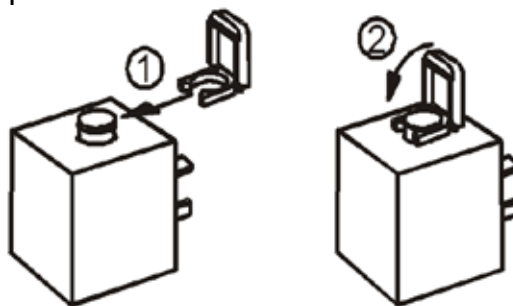
**WARNING:** It is not permitted to disconnect the plug from coil while the power is ON during operation or standby.

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability, sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and
- Eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not exceed the specified maximum ratings for voltage.
- Before installation or service disconnect voltage from system and device.
- Do not energize coil unless it is attached to the valve.
- Observe and avoid mechanical damage of component housing.
- Installation of Coil: (Fig. 1)
- Place coil over the enclosing tube. Coil may be rotated 360° for ease of wiring.
- Press coil housing down firmly, secure (1) and close (2) the coil retainer

## ⚠ Electrical connection

- Entire electrical connections have to comply with local regulations.
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.
- Make sure a fuse installed ahead of coil at appropriate location (non ATEX environment or explosive protective switch box).

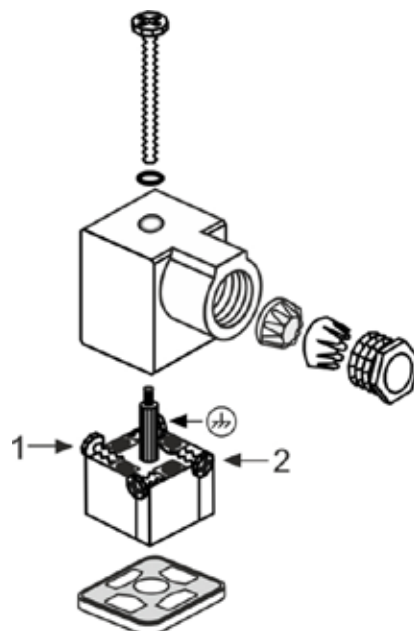
Fig. 1



## Wiring

1. Cable with three wires has to be connected to terminal 1 and 2 and (ground) on the plug terminal box.
2. Place the delivered gasket on the coil and insert the already wired PG9-ATEX Plug on the coil. Tighten screw (little gasket!) with 0.1 Nm. Pay attention to small gasket under the screw. (Fig. 2)

Fig. 2



## Operation

- **Note:** ASC coils are intended for continuous-duty, which when energized for an extended period of time, it becomes hot. This is normal.
- Before energizing the valve be sure that the source voltage and frequency matches that on the coil label.

## Technical data

- Supply voltage variation: .....230 VAC  $\pm$  10%  
24 VAC  $\pm$  10%
- Frequency: .....50 Hz
- Ambient temperature range: .....-10... +50°C
- Protection class: .....IP65



## Operating instructions

Solenoid field attachable connector

**H.T.P. High Tech Products Srl**  
Via Lesina, 45  
24030 Brembate di Sopra (BG) – Italy  
Tel. +39.035.692509  
VAT: IT02622450167  
[www.webhtp.eu](http://www.webhtp.eu) - [info@webhtp.eu](mailto:info@webhtp.eu)  
Sede Legale:  
Via G. Quarenghi, 11 – 24122  
BERGAMO (BG) - ITALY

Connectors DIN EN175301-803 G1-G2 series

Connectors DIN EN175301-803 M1-M2 series

Connectors DIN EN175301-803 P1-P2 series



II 2 GD IIC T6 Gb



II 2D Ex tb IIIC T85°C Db IP65/IP67

## SECURITY WARNING:

Before doing any of the above described operation, please make sure that cable is not under power supply and there are not current sources nearby. The connectors must be protected to reduce the risk of impact.

- Before to proceed with the following steps, please be assured that the installation-operating zone is free from dust.
- Dust presence may affect "IP" protection performances.
- Double check the following product ratings: V max, I max, temp max
- If needed, peel the cable jacket and the wires using suitable tools.
- Unscrew the cable gland, the grommet and the washer from the connector and put them on the cable you want to connect
- Using a screwdriver, open the connector inserting the tool into the opposite lid.
- Connect the wires according to the electrical plan to the wire clamps on the connector terminal block. **MAKE SURE THE WIRES ARE CONNECTED CORRECTLY BY CHECKING THAT THE POLES INDICATION (1,2,.. GND) WHICH IS PRINTED ABOVE THE CONNECTOR FITS WITH WIRE COLOR AND/OR CONNECTION ACCORDING TO THE INSTALLATION DRAWING.**
- Close the connector, be assured the gland is suitably tight.
- Connect the connector to the solenoid, putting between the solenoid and the coil the gasket, which is included in the package.
- Fit the fixing screw (included in the package) and screw it tightly to the solenoid using the suitable screwdriver.
- Now it's possible to give power and check the solenoid operation.

**IF, FOR ANY REASON, YOU NEED TO UNCOUPLE THE CONNECTOR FROM THE SOLENOID MAKE PREVIOUSLY SURE THE POWER IS OFF**


This connector complies with the applicable norms (for its protection class only) contained in European directive 94/9/CE



## PT5-...-FLR pressure transmitter

Pressure transmitters convert a pressure into a linear electrical output signal.



### Features

- Thin-film stainless steel sensor with output signal 4 to 20 mA and 2-wire connection
- Specially calibrated pressure ranges with +1% accuracy performance
- Fully hermetic
- Protection class IP65
- Minimum lot size 20 pieces
-  II 3G Ex nC IIB T4 Gc X



PT5-...FLR

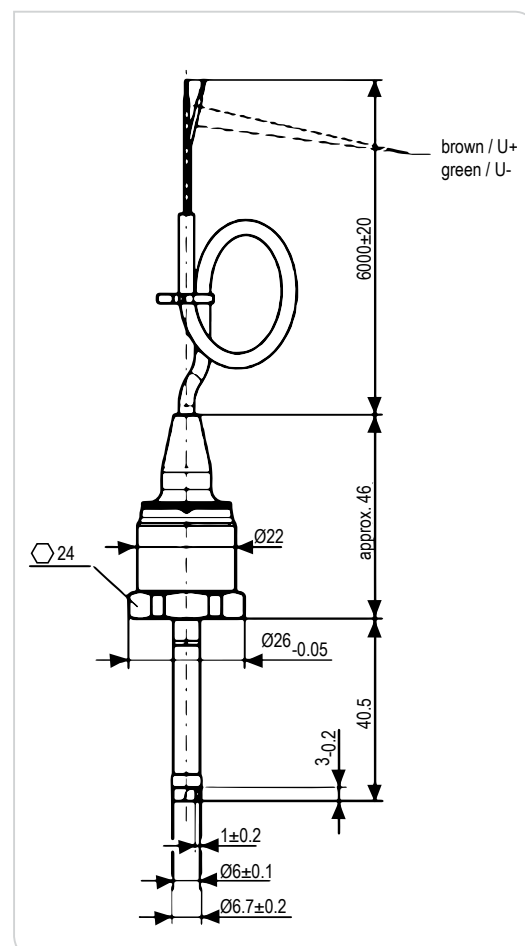
### Selection table

| Type        | Part no.<br>multi pack | Pressure<br>connection    | Cable<br>length | Marking   |
|-------------|------------------------|---------------------------|-----------------|---|
| PT5-30L-FLR | 802389M                | 6 mm tube x<br>40 mm long | 6.0 m           |  Mark acc. 2004/108/EC, EN61326 emission (Group 1, Class B) & immunity (industrial locations)<br> II 3G Ex nC IIB T4 Gc X |

### Technical data

|   |   |
|---|---|
| Supply voltage (polarity protected)   | Nominal : 24VDC<br>Range : 7...30VDC                      |
| Permissible noise & ripple<br>Influence of supply voltage                     | $< 1 V_{p-p}$<br>$< 0,02 \% FS/V$                         |
| Output signal   | Maximum $\leq 24$ mA<br>4...20 mA                         |
| Load resistance   | $R_L \leq \frac{U_b - 7.0V}{0.02A}$                       |
| Response time   | $\leq 5$ ms   |
| Pressure sensing range  | 0...30 bar corresponding to 4...20 mA                     |
| Max. working pressure PS  | 35 bar  |
| Test pressure PT  | 38.5 bar  |
| Temperatures:<br>Transport and storage<br>Operating ambient housing<br>Medium | -20...+80°C<br>-20...+80°C<br>-40...+100°C                |
| Sensor lifetime   | 30 million load cycles with 1.3 times of nominal pressure |
| Protection class (EN 60529)   | IP65  |
| Vibration at 10...2000Hz  | 20 g according to IEC 60068-2-6                           |
| Materials housing, pressure connector and diaphragm with medium contact       | Stainless steel 316L, 1.4534                              |


### Dimensions (mm)



## General information

Pressure transmitters convert a pressure into a linear electrical output signal.

PT5-...-FLR meets explosion protection requirements for electrical equipment, equipment group II, equipment categories 3G, in ignition protection class "nC" as hermetically sealed device in explosion group IIB and temperature class T4. They are marked with:

 II 3G Ex nC IIB T4 Gc X

PT5-...-FLR must be installed in an appropriate housing to protect them from mechanical damage, shock and light.

## Safety instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect all voltages from system and device.
- Observe and avoid mechanical damage of housing in order to maintain protection class.
- Ensure that design, installation and operation are according to European and national standards / regulations.

## Installation (Fig. 1)

- Mounting directions per Fig. 1 in order to prevent the collection of contaminant in pressure sensing element.

## Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.
- Use of flux and silver rod having a minimum of 30% silver.

Fig. 1

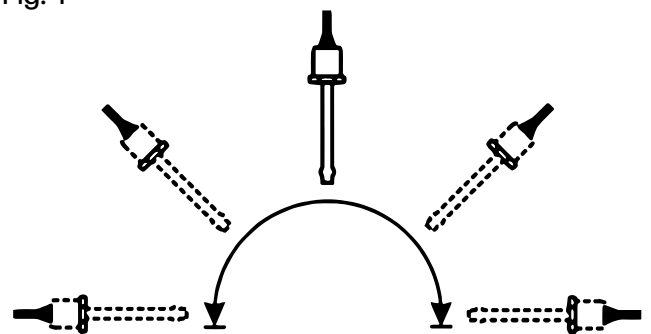
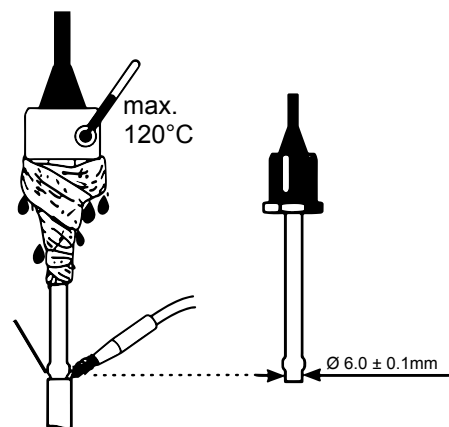


Fig. 2



## Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

**⚠ Warning**

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

**Tightness test**

Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer's specification.

**⚠ Electrical connection**

- Entire electrical connections have to comply with local regulations.
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.

**Wiring**

- PT5-...-FLR are in compliance with European EMC directive and bear CE-marking.
- Connection cables should not be extended beyond standard 6 m length, otherwise entire system needs to be verified from the system manufacturer for free system signal emissions and immunity for conformity to EMC directive and standards.
- Signal line should not be installed parallel with power lines to avoid electrical interference.
- Ensure polarity for connection of 2-wire cable to controller:
- +24V DC to be connected to brown wire
- Output signal / 0V to be connected to green wire

**⚠ Operation**

- Perform a functional test of electrical circuit before charging the system with refrigerant.



**⚠ Service maintenance**

- Defective PT5-...-FLR must be replaced; they cannot be repaired.
- Disconnect electrical power before service.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

**Technical data of PT5 -...-FLR:**

- Max. allowable working pressure PS: .....35 bar
- Test pressure PT: .....38.5 bar
- Supply voltage: .....7V...30V DC, class 2
- Output signal: .....4 mA...20 mA
- Protection class (EN 60529): ..... IP65
- Medium temperature: .....-40°C...+100°C
- Ambient temperature: .....-20°C...+80°C
- Released / compatible for: .....R290; mineral-, alkyl benzene and ester lubricants
- Cable length (2 wire): .....6.0 m

**Marking**

-  Mark according 2004/108/EC, EN61326 emission (Group 1, Class B) and immunity (industrial locations)
-  II 3G Ex nC IIB T4 Gc X

***PT5 types not listed in the following table are not released for use with flammable refrigerants!***



| Type        | Range      | Part no. |
|-------------|------------|----------|
| PT5-30L-FLR | 0...30 bar | 802389M  |
|             |            |          |
|             |            |          |
|             |            |          |

## PS4-...ATEX pressure switch with fixed setting

### Features

- High and low pressure switches
- With molded cable
- Protection IP67
- TÜV approved
- Minimum lot size 100 pieces
- Other settings are not available

### Marking

-  ENEC05 and CE0035 according to PED 97/23/EC
-  II 3G ExnA IIA T2Gc U





PS4-...ATEX

### Selection table

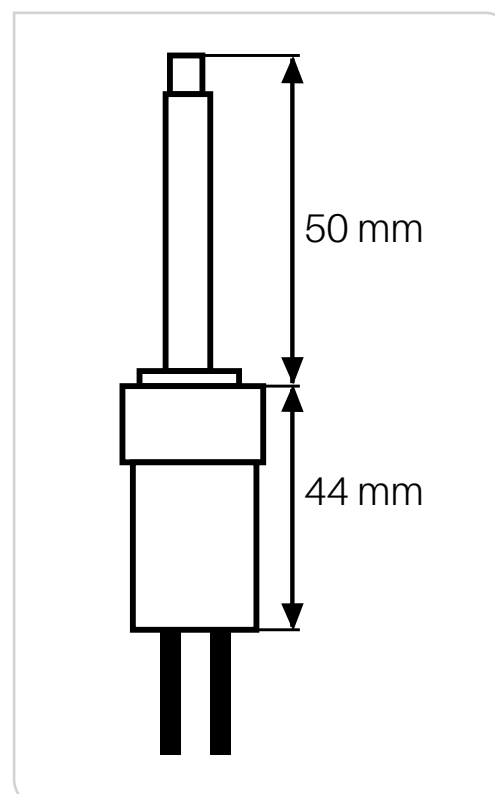
| Type  | Part no.          |                  | Setting [bar] |        | EN 12263 | Contact function         | Application   | Pressure connection |
|---|-------------------|------------------|---------------|--------|----------|--------------------------|---------------|---------------------|
|   |                   |                  | Cut out       | Cut-in |          |                          |               |                     |
| <b>Low pressure switches with automatic reset; open on falling pressure</b> |                   |                  |               |        |          |                          |               |                     |
| PS4-W1  | 808301<br>808303* | 0.6/1.8 bar ATEX | 0.6           | 1.8    | PSL      | open on falling pressure | low pressure  | 6 mm                |
| <b>High pressure switches with automatic reset; open on rising pressure</b> |                   |                  |               |        |          |                          |               |                     |
| PS4-W1  | 808300<br>808302* | 20/26 bar ATEX   | 20            | 26     | PSH      | open on rising pressure  | high pressure | 6 mm                |


Note: \*) Singlepack

### Technical data

|   |  |
|---|--|
| Max. allowable working pressure PS:<br>PS4-W1 808301 0.6/1.8 bar ATEX<br>PS4-W1 808300 20/26 bar ATEX | 17 bar<br>37.2 bar   |
| Test pressure PT:<br>PS4-W1 808301 0.6/1.8 bar ATEX<br>PS4-W1 808300 20/26 bar ATEX                   | 30 bar<br>41 bar   |
| Electrical rating:  | 50 mA max. at 24 VDC   |
| Vibration resistance (10 ... 250 Hz)  | 4 g  |
| Electrical connection<br>Cable version<br>Cable color   | 18 AWG 0.8 mm <sup>2</sup> , 600 V (max. 125°C)<br>LP: (blue) HP: (black)  |
| Type of electrical contact:   | Single pole single throw (SPST)  |
| Protection class (EN60259)  | IP67   |
| Temperature range:  | Medium: -35°C...+135°C<br>Ambient: -30°C...+65°C<br>Storage: -30°C...+80°C   |
| Cable length  | 3 m  |
| Marking   |  ENEC05 and CE0035<br>acc. to PED 97/23/EC<br> II 3G ExnA IIA T2Gc U |

### Dimensions (mm)



 It is mandatory to protect pressure switch against supply voltage higher than 30 VDC and operating current over 50 mA at any time.

## General information

The pressure controls PS4-...ATEX are intended to monitor the pressure and to act as a safety device.

The listed products are electrical operated switches with ignition source and are in compliance with EN 60079 / directive 94/9/EC therefore rated / marked as:

 II 3G ExnA IIA T2Gc U

PS4-...ATEX must be installed in an appropriate housing to protect them from mechanical damage or shock.

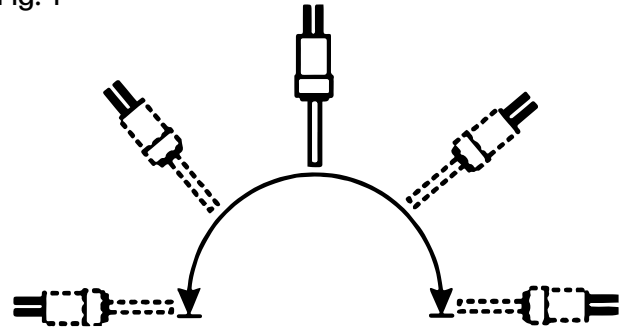
## Safety instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Make sure that the high pressure switch is installed on high pressure side and low pressure switch on low pressure side of system. Failure to do will result in system without protection against high and low pressure and consequently risk of explosion and human injury.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect voltage from system and device.
- Observe and avoid mechanical damage of housing in order to maintain protection class.
- Ensure that design, installation and operation are according European ATEX Directive, as well as the according national standards / regulations are respected.

## Installation (Fig. 1)

- PS4-...ATEX pressure controls should not be exposed to gas pulsations. When pulsations can be expected, use a pulsation damper or a capillary tube connection (min. 1m).
- Mounting directions per Fig. 1 in order to prevent the collection of contaminant in pressure sensing element.

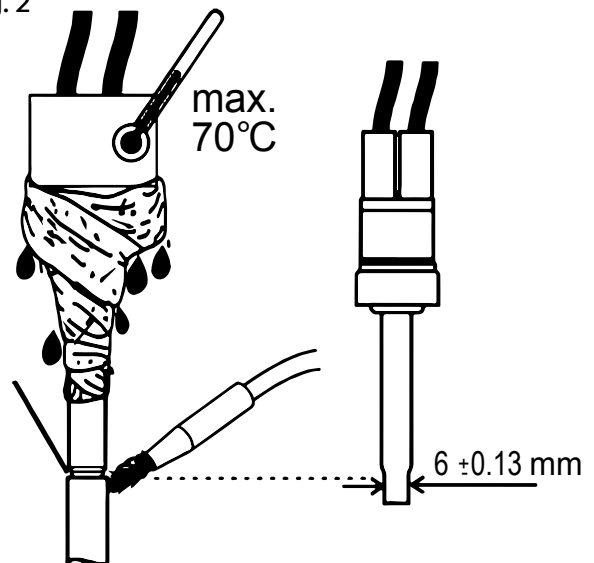
Fig. 1



## Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.

Fig. 2



## ***Pressure test***

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- The max. system test pressure shall be 30 bar for low pressure side and 41 bar for high pressure side.

## ***Warning***

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

## ***Tightness test***

Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer's specification.

## ***Electrical connection***

- Entire electrical connections have to comply with local regulations.
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.

## ***Operation***

- Perform a functional test of electrical circuit before charging the system with refrigerant.


## ***Service / maintenance***

- Defective PS4-...ATEX must be replaced; they cannot be repaired.
- Disconnect electrical power before service.
- The lowest pressure inside system must be at least 0.4 bar higher than ambient pressure at any time. Failure to do so could accumulate air inside the system and create an explosive mixture over time.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

## ***Technical data of PS4 -...ATEX:***

- Max. allowable working pressure PS: .....(see table below)
- Test pressure PT: .....(see table below)
- Protection class: .....(EN 60529): IP67
- Ambient temperature (housing): .....-30°C...+65°C
- Storage / transportation temperature: .....-30°C...+80°C
- Medium temperature: .....-35°C...+135°C
- Released / compatible for: .....R290, mineral- and alkyl benzene, ester lubricants
- Electrical rating: .....50 mA max. at 24 VDC max
- Function: .....Pressure limiter, type approval EN 12263, PSL/PSH
- Pressure controls PS4-...ATEX are factorypreset to specific switch points (see label). The set points cannot be modified.
- Type of electrical contact: Single pole single throw (SPST)

## ***Marking***

- ENEC05 and CE0035 according to PED 97/23/EC
-  II 3G ExnA IIA T2Gc U

***PS4 types, not listed in the following table, are not released for use with flammable refrigerants!***

| Type   | Part no. | Settings         | PS       | PT     |
|--------|----------|------------------|----------|--------|
| PS4-W1 | 808301   | 0.6/1.8 bar ATEX | 17 bar   | 30 bar |
| PS4-W1 | 808303*  | 0.6/1.8 bar ATEX | 17 bar   | 30 bar |
| PS4-W1 | 808300   | 20/26 bar ATEX   | 37.2 bar | 41 bar |
| PS4-W1 | 808302*  | 20/26 bar ATEX   | 37.2 bar | 41 bar |

**Note:** \*) Singlepack



## Hermetic liquid line filter driers ADK-...FLR

ADK-...FLR filter driers are used for protection of systems against contaminant.

### Features

- Solid block
- Hermetic design
- Rugged steel shells
- Corrosion resistant epoxy paint
- Cushioned flow for non-turbulent performance
- High water adsorption capacity
- High acid adsorption capacity
- High filtration capacity / efficiency
- No CE marking according art. 3.3 PED 97/23 EC
- Max. working pressure PS: 35 bar



ADK-...FLR

### Selection table

| Type            | Part. no | Connection ODF | Flow capacity [kW] pressure drop |          |
|-----------------|----------|----------------|----------------------------------|----------|
|                 |          |                | 0.07 bar                         | 0.14 bar |
| ADK-032S FLR    | 803650   | 1/4"           | 9.6                              | 14.1     |
| ADK-036MMS FLR  | 803651   | 6 mm           | 8.8                              | 13.1     |
| ADK-052S FLR    | 803652   | 1/4"           | 11.8                             | 18.7     |
| ADK-056MMS FLR  | 803653   | 6 mm           | 10.9                             | 16.4     |
| ADK-053S FLR    | 803654   | 3/8"           | 17.9                             | 26.4     |
| ADK-0510MMS FLR | 804066   | 10 mm          | 17.9                             | 26.4     |
| ADK-082S FLR    | 804067   | 1/4"           | 13.1                             | 19.0     |
| ADK-086MMS FLR  | 804068   | 6 mm           | 11.7                             | 17.5     |
| ADK-083S FLR    | 804069   | 3/8"           | 18.0                             | 26.4     |
| ADK-0810MMS FLR | 804070   | 10 mm          | 18.0                             | 26.4     |
| ADK-084S FLR    | 804071   | 1/2"           | 29.3                             | 44.2     |
| ADK-0812MMS FLR | 804072   | 12 mm          | 28.8                             | 43.2     |
| ADK-163S FLR    | 804073   | 3/8"           | 20.5                             | 29.3     |
| ADK-1610MMS     | 804074   | 10 mm          | 20.5                             | 29.3     |
| ADK-164S FLR    | 804075   | 1/2"           | 39.4                             | 54.7     |
| ADK-1612MMS FLR | 804076   | 12 mm          | 35.4                             | 53.1     |
| ADK-165S FLR    | 804077   | 5/8" / 16 mm   | 54.4                             | 79.3     |
| ADK-304S FLR    | 804078   | 1/2"           | 39.5                             | 56.5     |
| ADK-305S FLR    | 804079   | 5/8" / 16 mm   | 57.8                             | 79.9     |
| ADK-307S FLR    | 804080   | 7/8" / 22 mm   | 72.6                             | 114.5    |
| ADK-417S FLR    | 804081   | 5/8" / 16 mm   | 85.3                             | 128.0    |
| ADK-757S FLR    | 804082   | 7/8" / 22 mm   | 115.5                            | 173.3    |

### Correction factors ADK

Use following simplified formula for operating conditions other than -15°C / +30°C

$$Q_n = Q_o \times K_t$$

$Q_n$  : Nominal flow capacity

$Q_o$  : Required cooling capacity

$K_t$  : Correction factor for evaporating and liquid temperature

| Liquid temperature<br>°C | Correction factor $K_t$<br>evaporating temperature [°C] |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------|---|------|------|------|------|------|------|------|------|------|------|------|
|                          | 20  | 15   | 10   | 5    | 0    | -5   | -10  | -15  | -20  | -25  | -30  | -35  |
| 70                       | 1.58  | 1.62 | 1.66 | 1.71 | 1.77 | 1.83 | 1.89 | 1.96 | 2.03 | 2.11 | 2.20 | 2.29 |
| 65                       | 1.43  | 1.46 | 1.50 | 1.54 | 1.58 | 1.63 | 1.68 | 1.73 | 1.79 | 1.86 | 1.92 | 2.00 |
| 60                       | 1.30  | 1.33 | 1.37 | 1.40 | 1.44 | 1.48 | 1.52 | 1.56 | 1.61 | 1.66 | 1.72 | 1.78 |
| 55                       | 1.20  | 1.23 | 1.26 | 1.29 | 1.32 | 1.35 | 1.39 | 1.42 | 1.46 | 1.51 | 1.55 | 1.60 |
| 50                       | 1.12  | 1.14 | 1.17 | 1.19 | 1.22 | 1.25 | 1.28 | 1.31 | 1.34 | 1.38 | 1.42 | 1.46 |
| 45                       | 1.05  | 1.07 | 1.09 | 1.11 | 1.13 | 1.16 | 1.19 | 1.21 | 1.24 | 1.28 | 1.31 | 1.34 |
| 40                       | 0.98  | 1.00 | 1.02 | 1.04 | 1.06 | 1.08 | 1.11 | 1.13 | 1.16 | 1.19 | 1.22 | 1.25 |
| 35                       | 0.93  | 0.95 | 0.96 | 0.98 | 1.00 | 1.02 | 1.04 | 1.06 | 1.08 | 1.11 | 1.14 | 1.16 |
| 30                       | 0.88  | 0.90 | 0.91 | 0.93 | 0.94 | 0.96 | 0.98 | 1.00 | 1.02 | 1.04 | 1.07 | 1.09 |
| 25                       | 0.84  | 0.85 | 0.86 | 0.88 | 0.89 | 0.91 | 0.93 | 0.95 | 0.96 | 0.98 | 1.00 | 1.03 |
| 20                       | -   | 0.81 | 0.82 | 0.84 | 0.85 | 0.87 | 0.88 | 0.90 | 0.91 | 0.93 | 0.95 | 0.97 |

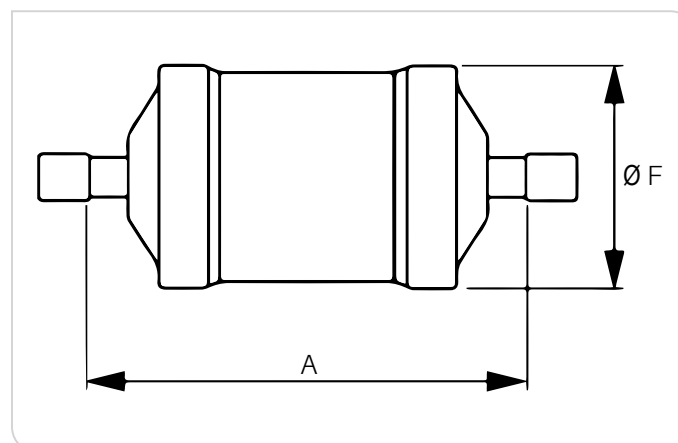
### Technical data

|                          |             |
|--------------------------|-------------|
| Max. working pressure PS | 35 bar      |
| Test pressure PT         | 38.5 bar    |
| Medium temperature TS    | -45...+65°C |
| Ambient temperature      | -45...+65°C |
| Fluid group              | II          |
| Solder connections       | Copper, ODF |

|            |                            |
|------------|----------------------------|
| Shell      | Steel                      |
| Paint      | Epoxy powder paint         |
| Protection | 500+ Hours salt spray test |
| Package    | Individual packaged        |
| Standards  | EN 14276-1                 |
| Marking    | HP                         |

### Dimensions (mm)

| Type            | Connection<br>ODF | [mm]  |      |
|-----------------|-------------------|-------|------|
|                 |                   | A     | Ø F  |
| ADK-032S-FLR    | 1/4"              | 70.1  | 44.0 |
| ADK-036MMS-FLR  | 6 mm              | 70.1  | 44.0 |
| ADK-052S-FLR    | 1/4"              | 85.3  | 63.5 |
| ADK-056MMS-FLR  | 6 mm              | 85.3  | 63.5 |
| ADK-053S-FLR    | 3/8"              | 84.8  | 63.5 |
| ADK-0510MMS-FLR | 10 mm             | 84.8  | 63.5 |
| ADK-082S-FLR    | 1/4"              | 102.7 | 63.5 |
| ADK-086MMS-FLR  | 6 mm              | 102.6 | 63.5 |
| ADK-083S-FLR    | 3/8"              | 102.1 | 63.5 |
| ADK-0810MMS-FLR | 10 mm             | 102.1 | 63.5 |
| ADK-084S-FLR    | 1/2"              | 102.5 | 63.5 |
| ADK-0812MMS-FLR | 12 mm             | 102.6 | 63.5 |
| ADK-163S-FLR    | 3/8"              | 126.6 | 63.5 |
| ADK-1610MMS-FLR | 10 mm             | 126.6 | 63.5 |
| ADK-164S-FLR    | 1/2"              | 127.0 | 63.5 |
| ADK-1612MMS-FLR | 12 mm             | 127.0 | 63.5 |
| ADK-165S-FLR    | 5/8" / 16 mm      | 127.6 | 63.5 |
| ADK-304S-FLR    | 1/2"              | 193.6 | 76.2 |
| ADK-305S-FLR    | 5/8" / 16 mm      | 194.2 | 76.2 |
| ADK-307S-FLR    | 7/8" / 22 mm      | 193.6 | 76.2 |
| ADK-417S-FLR    | 5/8" / 16 mm      | 199.9 | 88.9 |
| ADK-757S-FLR    | 7/8" / 22 mm      | 337.4 | 88.9 |



## General information

ADK-...FLR filter driers are used for protection of systems against contaminant.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

ADK-...FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

## ⚠ Safety instructions

- Read operating instructions thoroughly. Nonobservance can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with the skin from contaminated refrigerant/lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere.
- Do not exceed the specified maximum ratings for pressure and temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Do not use on any other fluid media without prior approval of Copeland. Use of fluids not listed could result in chemical deterioration of the desiccant in filter drier.
- Ensure that design, installation and operation are according to European and national standards / regulations.

## Mounting location

- Filter driers may be installed in any position within the liquid line. Direction of refrigerant flow must be observed.
- For best results locate the filter drier as close as possible to the inlet of expansion device. If using a liquid line solenoid valve and/or moisture indicator. Locating filter drier upstream will provide protection for the solenoid valve and the moisture indicator will measure the effectiveness of the drier.
- Protect the filter drier against sunrays and vibration.

## Installation

- Do not remove seal caps until ready for installation in order to minimize entering of moisture and dirt.

**⚠ Avoid damaging the connections!**

- Direction of refrigerant flow must match with arrow on the label. Reverse flow reduces the filtering ability and increases the pressure drop through the filter drier.

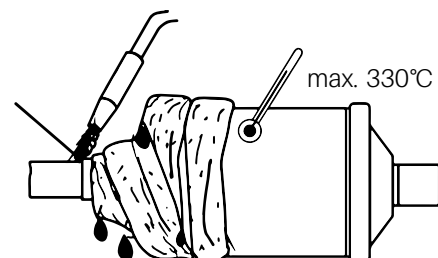
## Recommended external pipe connection:

| Nominal pipe connection | Outside diameter |           |
|-------------------------|------------------|-----------|
|                         | Min. (mm)        | Max. (mm) |
| 1/4"                    | 6.30             | 6.38      |
| 3/8"                    | 9.47             | 9.55      |
| 1/2"                    | 12.62            | 12.73     |
| 5/8"                    | 15.80            | 15.90     |
| 7/8"                    | 22.15            | 22.25     |
| 1-1/8"                  | 28.50            | 28.63     |
| 6 mm                    | 5.95             | 6.05      |
| 10 mm                   | 9.95             | 10.05     |
| 12 mm                   | 11.96            | 12.05     |
| 16 mm                   | 15.95            | 16.05     |
| 22 mm                   | 21.95            | 22.06     |
| 28 mm                   | 27.95            | 28.05     |

## Brazing (Fig. 1)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.

Fig. 1



### Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

### Warning

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

### Tightness test

Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer's specification.

### Operation

- After leakage test start system and after sufficient running time check color of moisture indicator for moisture level. We recommend the use of Copeland moisture indicators.
- In systems with excessive moisture it may be necessary to replace the filter drier for several times in order to bring moisture in the system to a safe level.

### Service / maintenance

- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.
- Disconnect electrical power before service.
- Always install a new filter drier when existing ones become saturated with moisture and foreign materials.
- Do not attempt to dry out a used filter drier.

### Technical data of ADK-...FLR

- Max. allowable working pressure PS: .....35 bar
- Test pressure PT: .....38.5 bar
- Temperature Range TS: .....-45°C...+65°C
- Released / compatible for: .....R290, mineral- and alkyl benzene, ester lubricants
- Standards: .....EN 14276-1

**ADK types not listed in the following table are not released for use with flammable refrigerants!**

| Type            | Part no. |
|-----------------|----------|
| ADK-032S-FLR    | 803 650  |
| ADK-036MMS-FLR  | 803 651  |
| ADK-052S-FLR    | 803 652  |
| ADK-056MMS-FLR  | 803 653  |
| ADK-053S-FLR    | 803 654  |
| ADK-0510MMS-FLR | 804 066  |
| ADK-082S-FLR    | 804 067  |
| ADK-086MMS-FLR  | 804 068  |
| ADK-083S-FLR    | 804 069  |
| ADK-0810MMS-FLR | 804 070  |
| ADK-084S-FLR    | 804 071  |
| ADK-0812MMS-FLR | 804 072  |
| ADK-0163S-FLR   | 804 073  |
| ADK-0160MMS-FLR | 804 074  |
| ADK-164S-FLR    | 804 075  |
| ADK-0162MMS-FLR | 804 076  |
| ADK-165S-FLR    | 804 077  |
| ADK-304S-FLR    | 804 078  |
| ADK-305S-FLR    | 804 079  |
| ADK-307S-FLR    | 804 080  |
| ADK-417S-FLR    | 804 081  |
| ADK-757S-FLR    | 804 082  |

## Moisture indicator MIA...-FLR

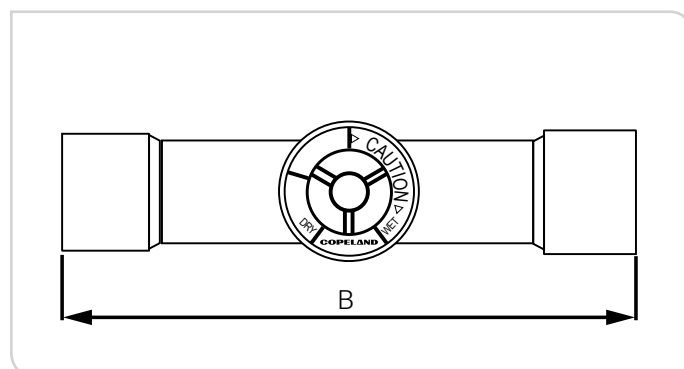
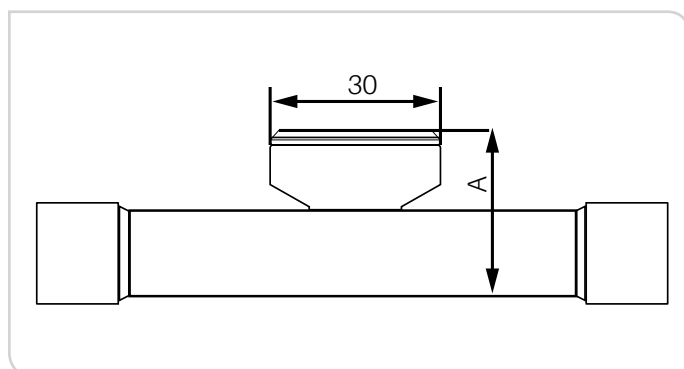
### Features

- Fully hermetic
- Lower pressure drop
- Corrosion free stainless steel body
- Crystal Indicator element for long lifetime and reliability
- Easily determination of moisture content
- Sensitive indicator with calibrated four colors. Conforms to requirement of most compressor manufacturers
- Large clear viewing area
- ODF extended tube configurations suitable for all commercial applications



MIA Moisture Indicator

### Selection and dimensions (mm)



| Type        | Part no. | For tube outside diameter | Height A [mm] | Length B [mm] | Weight [g] |
|-------------|----------|---------------------------|---------------|---------------|------------|
| MIA014-FLR  | 805895   | 1/4"                      | 25.7          | 98.0          | 60         |
| MIA038-FLR  | 805896   | 3/8"                      | 28.5          | 109.0         | 70         |
| MIA012-FLR  | 805897   | 1/2"                      | 31.8          | 113.0         | 75         |
| MIA058-FLR  | 805898   | 5/8"                      | 31.8          | 108.5         | 85         |
| MIA078-FLR  | 805899   | 7/8"                      | 37.8          | 122.5         | 150        |
| MIA 118-FLR | 805900   | 1 1/8"                    | 43.5          | 122.5         | 190        |

| Type         | Part no. | For tube outside diameter | Height A [mm] | Length B [mm] | Weight [g] |
|--------------|----------|---------------------------|---------------|---------------|------------|
| MIA M06-FLR  | 805901   | 6 mm                      | 25.9          | 98.0          | 60         |
| MIA M10-FLR  | 805894   | 10 mm                     | 28.5          | 109.0         | 70         |
| MIA M12-FLR  | 805902   | 12 mm                     | 28.5          | 113.0         | 75         |
| MIA M28-FLR  | 805903   | 28 mm                     | 43.5          | 122.5         | 190        |
| MIA M10S-FLR | 805904   | 10 mm                     | 28.7          | 119           | 75         |
| MIA M12S-FLR | 805905   | 12 mm                     | 28.5          | 113           | 75         |



### Technical data

|                             |  |
|-----------------------------|--|
| Maximum working pressure PS | 35 bar   |
| Test pressure PT            | 49.5 bar   |
| Medium compatibility        | R290, mineral-, alkyl benzene and ester lubricants |
| Connections                 | ODF extended copper tubes, solder connections only |

|   |  |
|---|--|
| Pressure drop   | negligible   |
| Operating temperature TS  | -40...+100°C   |
| External leakage<br>(100% - production tested with helium - spectrometer) | 5.0 x 10 <sup>-6</sup> mbar l/sec<br>= 4.9 x 10 <sup>-6</sup> cc/sec |
| Standards   | EN 12178   |

### Determining the moisture content with the color code

| Refrigerant | Liquid temperature °C | Moisture content in mg water per kg refrigerant (ppm) |        |         |             |
|-------------|-----------------------|---|--------|---------|-------------|
|             |                       | Blue  | Purple | Fuchsia | Rose        |
|             |                       | Dry   |        | Caution | Caution wet |
| R290        | 25                    | 2   | 4      | 9       | 14          |
|             | 38                    | 5   | 8      | 18      | 29          |
|             | 52                    | 10  | 16     | 36      | 59          |

Note: In area "Caution" and "Caution wet" filter drier should be changed.





## General information

MIA...-FLR are sight glasses with moisture indicator.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

MIA...-FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

## ⚠ Safety instructions

- Read operating instructions thoroughly. Nonobservance can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure and temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that design, installation and operation are according to European and national standards / regulations.

## Mounting location

- MIA...-FLR has to be installed only in the liquid line, otherwise the humidity reading can show wrong values.
- MIA...-FLR is bi-directional and may be installed in any position which allows visual access to the indicator window itself.
- The moisture indicator is normally located after the filter drier and before the expansion valve.

## Installation

- Do not remove seal caps until ready for installation in order to minimize entering of moisture and dirt.

**⚠ Avoid damaging the connections!**

- The MIA...-FLR is fully hermetic and cannot be disassembled.

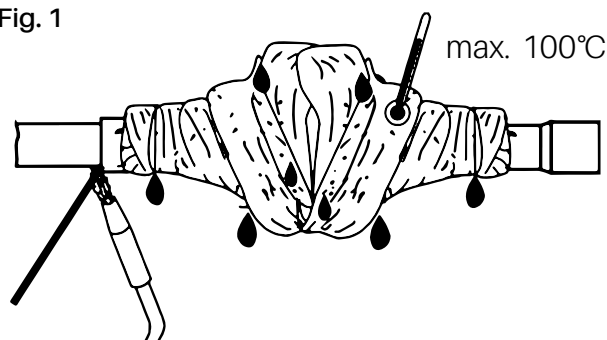
## Recommended external pipe connection:

| Nominal pipe connection | Outside diameter |           |
|-------------------------|------------------|-----------|
|                         | Min. (mm)        | Max. (mm) |
| 1/4 "                   | 6.30             | 6.38      |
| 3/8 "                   | 9.47             | 9.55      |
| 1/2 "                   | 12.62            | 12.73     |
| 5/8 "                   | 15.80            | 16.05     |
| 7/8 "                   | 22.15            | 22.25     |
| 1-1/8 "                 | 28.50            | 28.63     |
| 6 mm                    | 5.95             | 6.05      |
| 10 mm                   | 9.95             | 10.05     |
| 12 mm                   | 11.96            | 12.05     |
| 28 mm                   | 27.95            | 28.05     |

## Brazing (Fig. 1)

- Perform and consider the brazing joint as per EN 14324.
  - Before and after brazing clean tubing and brazing joints.
  - To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.
- Do not exceed the maximum temperature of 100°C.**

Fig. 1



- To avoid overheating it is advised to make the joint at one end and cool the indicator completely before repeating the procedure on the other end connection.
- Minimize vibrations in the piping lines by appropriate solutions.

Fig. 2

| Refrigerant | Liquid temperature<br>°C | ppm        |        |                   |                    |
|-------------|--------------------------|------------|--------|-------------------|--------------------|
|             |                          | Blue / dry | Purple | Fuchsia / caution | Rose / caution wet |
| R290        | 25                       | 2          | 4      | 9                 | 14                 |
|             | 38                       | 5          | 8      | 18                | 29                 |
|             | 52                       | 10         | 16     | 36                | 59                 |

### Pressure test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

### Warning

- Failure to do so could result in loss of refrigerant and personal injury.
- The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

### Tightness test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer's specification.

### Humidity reading (Fig. 2)

- The humidity content in mg water per kg refrigerant (ppm) can be identified by the color code in Fig. 2.
- A minimum period of 12 hours is recommended after installation before attempting to determine system moisture content.
- In case of indicator is showing fuchsia or rose color the change of the filter drier is required.

### Service maintenance

- Defective MIA...-FLR must be replaced; they cannot be repaired.
- Disconnect electrical power before service.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

### Technical data of MIA... -FLR

- Max. allowable working pressure PS: .....35 bar
- Test pressure PT: .....49.5 bar
- Medium temperature TS: .....-40°C...+100 °C
- Released / compatible for: .....R290, mineral- and alkyl benzene, ester lubricants
- Standards: .....EN 12178

**MIA types not listed in following table are not released for use with flammable refrigerants!**

| Type         | Part no. |
|--------------|----------|
| MIA 014-FLR  | 805895   |
| MIA 038-FLR  | 805896   |
| MIA 112-FLR  | 805897   |
| MIA 058-FLR  | 805898   |
| MIA 078-FLR  | 805899   |
| MIA 118-FLR  | 805900   |
| MIA M6-FLR   | 805901   |
| MIA M10-FLR  | 805894   |
| MIA M12-FLR  | 805902   |
| MIA M28-FLR  | 805903   |
| MIA M10S-FLR | 805904   |
| MIA M12S-FLR | 805905   |






## 2. Products for non explosive environment

### Product material compatible with R290 only for non explosive environment

| Content  | Page |
|--|------|
| Products   |      |
| <b>Superheat controllers EC3-P32*/EC3-P33* and ECD-002*</b>  |      |
| Technical bulletin   | 48   |
| <b>Electronic expansion valves EXM/L series</b>              |      |
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| <b>Stand-alone superheat/economizer controller EXD-HP1/2</b> |      |
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| <b>Oil management OM3-020P TraxOil</b>                       |      |
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| <b>Compressor soft starter CSS-25U/CSS-32U/CSS-32W</b>       |      |
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 \*) These devices have potential ignition source and do not comply with ATEX requirements. Installation only in “non explosive location”.



## Ec3-P32 / -P33 superheat controller & standard ECD-002

EC3-P32 / -P33 are stand-alone universal superheat controllers.

EC3-P32 offers remote access with built-in TCP/IP ethernet communications and webserver functionality. Any standard webbrowser (e.g. Internet Explorer or Mozilla Firefox) can be used for monitoring or parameter setting. EC3-P33 has no network communication.

### Features EC3-P33 / EC3-P32

- Superheat control in conjunction with Copeland stepper motor driven electrical control valves EX4-7...-FLR
- Selectable refrigerants: R290, R1234Ze, R1234yf, R32, R1270 (the valves compatibility release for R290 and R32 for time being)
- Low superheat alarm and MOP function
- Feed through of 4...20 mA signal from evaporator pressure sensor to analogue output. This may also be connected to pressure input of any other controller to avoid need for multiple pressure sensors
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Intelligent alarm management in order to protect the compressor i.e. fail safe operation
- Integral rechargeable battery to close electrical control valve in case of power loss
- Electrical connection via plug-in type screw terminals
- Aluminum housing for DIN rail mounting

### Additional features EC3-P32 only

- High superheat alarm
- Low pressure switch function/alarm
- Freeze protection function/alarm
- Pump down function

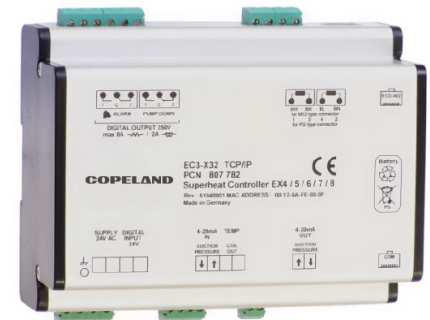
### Selection table

| Description                  | Type    | Part no. |
|------------------------------|---------|----------|
| Superheat controller         | EC3-P33 | 807858   |
| Terminal kit EC3-P33         | K03-X33 | 807645   |
| Display / keypad unit (opt.) | ECD-002 | 807657   |
| Superheat controller         | EC3-P32 | 807857   |
| Terminal kit EC3-P32         | K03-X32 | 807644   |

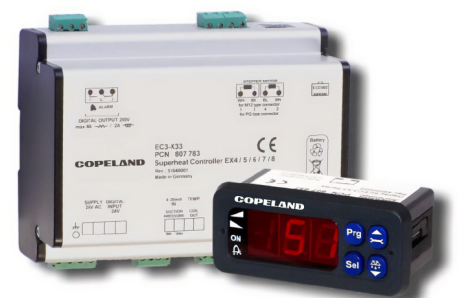
**⚠** These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

### Selection table accessories

| Description          |                     | Type        | Part no. |
|----------------------|---------------------|-------------|----------|
| Temperature sensor   | Cable length 3.0 m  | ECN-N30     | 804496   |
|                      | Cable length 6.0 m  | ECN-N60     | 804497   |
|                      | Cable length 12.0 m | ECN-N99     | 804499   |
| Pressure transmitter | 0...30 bar          | PT5-30L FLR | 802389M  |

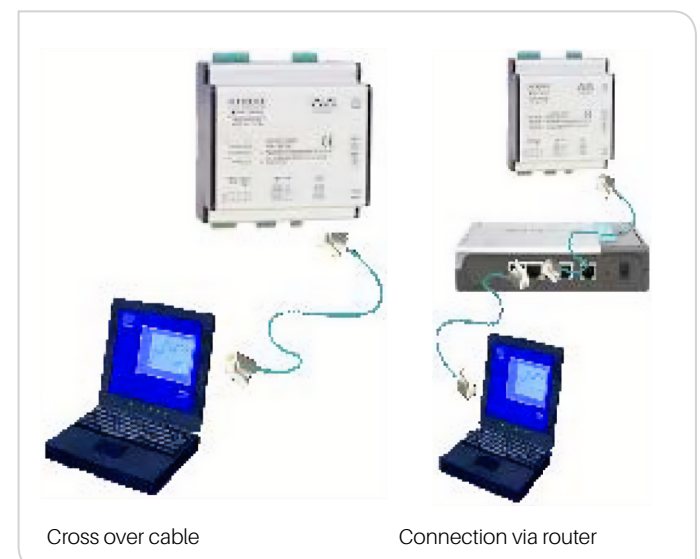
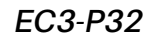


EC3-P32



EC3-P33 with ECD-002

**EC3-P33**





## Technical data

### EC3-P32 / -P33

|   |   |
|---|---|
| Supply voltage                          | 24VAC ±10%, 50/60Hz   |
| Digital input                           | 24 V AC ±10%, 50-60HZ<br>24 V DC ±10%   |
| Power consumption                       | 25VA max. including connected<br>ECV and display / keyboard   |
| Internal battery<br>charging time       | Approximately 2 hours if battery is fully empty   |
| Plug-in connector size                  | Removable screw version<br>wire size 0.14...1.5 mm <sup>2</sup>   |
| Ground connection                       | 6.3 mm spade earth connector  |
| Marking                                 | <b>CE</b>   |
| Protection class                        | IP 20 (DIN EN60529)   |
| Vibration                               | 4 g, 10-1000 Hz   |
| Temperature<br>storage<br>operating     | -20...+65°C<br>0...+60°C<br>1...+25°C for optimum battery life  |
| Applied detective<br>EMC<br>LVD<br>ROHS | EN 61326, EN 50081, EN 61000-6-2,<br>EN 61000-4-2, EN 61000-4-3, EN 61000-4-4,<br>EN 61000-4-5, EN 61000-4-6, EN 61000-4-11 |
| Humidity                                | 0...80% r.h. non condensing   |
| Weight                                  | ~ 800 g   |
| Mounting                                | DIN rail mounted  |



ECD-002

### ECD-002 Display Unit

|                                    |  |
|------------------------------------|--|
| Supply                             | From EC3 series controller<br>via connecting cable   |
| LED indicators                     | Valve opening, valve<br>closing, alarm, demand   |
| Display LED                        | Numeric segmental display,<br>2½-digits, red, with automatic<br>decimal point between ±19.9,<br>switchable between °C and °F |
| Connecting cable                   | ECC-Nxx or standard CAT5 patch<br>cord with RJ45 connectors  |
| Temperature storage<br>operating   | -20...+65°C<br>0...+60°C   |
| Humidity                           | 0...80% r.h. non condensing  |
| Protection class<br>(DIN EN 60529) | IP65 (mounting in front<br>panel with gasket)  |
| Weight                             | ~ 52 g   |
| Mounting                           | Panel mount (71 x 29 mm cutout)  |

**⚠ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".**

## Electronic expansion valves EXM/L series

### EXM/EXL

EXM/EXL unipolar stepper motor driven electronic expansion valves are for precise control of refrigerant mass flow in heat pumps, heating units, air conditioning and close control applications. The valve is not released for refrigeration applications such as cold room and refrigeration display cabinet.

### Features

- Hermetic design
- Continuous, linear modulation of mass flow
- Bi-flow with same capacity in normal and reverse flow direction
- High MOPD: 40 bar in normal flow direction
- Unipolar stepper motor
- Removable coils in two versions: 12VDC/24VDC
- Fine resolution: 500 pulses (half steps) or 250 full steps
- Protection class of molded coil is IP65 (acc. EN 60529) excluding the cable end terminals (JST).
- Reliability: 225 million pulses at 40 bar differential pressure
- Bulk packing, boxes of 10 pieces



EXM/EXL with Coil

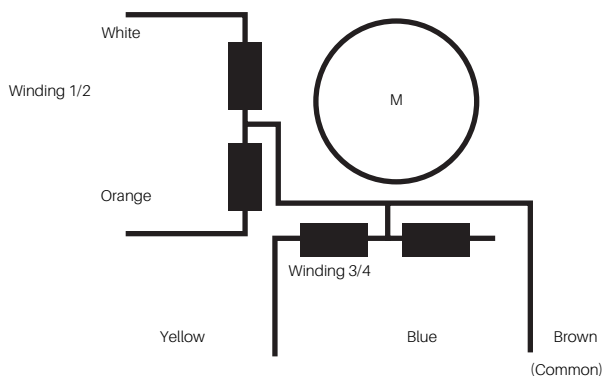
| Valve series | Description     | Type    | Part No. | Nominal capacity (kW)<br>R290 | Connections<br>size / style |
|--------------|-----------------|---------|----------|-------------------------------|-----------------------------|
| EXM          | Valve less coil | EXM-B0A | 800399M  | 1.6                           | 1/4" ODM                    |
|              |                 | EXM-B0B | 800400M  | 4.9                           |                             |
|              |                 | EXM-B0D | 800401M  | 10.3                          |                             |
|              |                 | EXM-B0E | 800402M  | 12.1                          |                             |
|              | Coil 12VDC      | EXM-125 | 800403M  | -                             | -                           |
|              | Coil 24VDC      | EXM-24U | 800415M  | -                             | -                           |
| EXL          | Valve less coil | EXL-B1F | 800405M  | 15.0                          | 1/4" ODF                    |
|              |                 | EXL-B1G | 800406M  | 20.3                          | 8 mm ODM                    |
|              | Coil 12VDC      | EXL-125 | 800407M  | -                             | -                           |
|              |                 | EXL-24U | 800416M  | -                             | -                           |

**Note:** Nominal capacities at +38°C condensing temperature, +4 °C evaporating temperature and 1K subcooling.

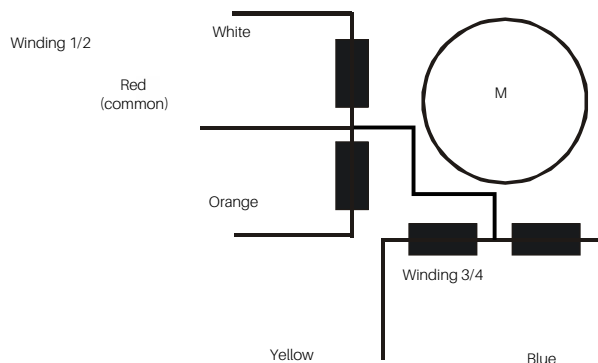
**⚠** These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

### Wiring

EXM-125/EXL-125 (12 VDC, 5 wires coil)



EXM-24U/EXL-24U (24 VDC, 5 wires coil)



| Winding number                                   | Wire color             | Recommended half step pulsing/switching mode |     |     |     |     |     |     |     |   |  |
|--|------------------------|--|-----|-----|-----|-----|-----|-----|-----|---|--|
|  |                        | 1  | 2   | 3   | 4   | 5   | 6   | 7   | 8   | Remark  |  |
| 1/2  | White                  | ON   | ON  | OFF | OFF | OFF | OFF | OFF | ON  | 1) The pulse sequence 1 to 8 will be repeated for further pulses in order to open the valve.<br>2) The pulse sequence 8 to 1 will be repeated for further pulses in order to close the valve. |  |
|  | Orange                 | OFF  | OFF | OFF | ON  | ON  | ON  | OFF | OFF |   |  |
| 3/4  | Yellow                 | OFF  | ON  | ON  | ON  | OFF | OFF | OFF | OFF |   |  |
|  | Blue                   | OFF  | OFF | OFF | OFF | OFF | ON  | ON  | ON  |   |  |
| Commons  | 12V: Brown<br>24V: Red | ON   | ON  | ON  | ON  | ON  | ON  | ON  | ON  |   |  |
| Valve movement mode (pulsing/switching sequence) |                        |  |     |     |     |     |     |     |     |   |  |
| Valve open: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8        |                        |  |     |     |     |     |     |     |     |   |  |
| Valve close: 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1       |                        |  |     |     |     |     |     |     |     |   |  |

**Quick selection** (included 1.5 bar pressure drop for liquid line components and distributor)

| Condensing temperature (°C) | Capacity (kW)<br>evaporating temperature (°C) |            |           |           |            |             |             |             |             |             | Valve type |
|-----------------------------|---|------------|-----------|-----------|------------|-------------|-------------|-------------|-------------|-------------|------------|
|                             | R290<br>15                                    | R290<br>10 | R290<br>5 | R290<br>0 | R290<br>-5 | R290<br>-10 | R290<br>-15 | R290<br>-20 | R290<br>-25 | R290<br>-30 |            |
| 70                          | 1.5   | 1.5        | 1.5       | 1.5       | 1.4        | 1.4         | 1.4         | 1.3         | 1.3         | 1.3         | EXM-B0A    |
|                             | 4.5   | 4.5        | 4.5       | 4.5       | 4.4        | 4.3         | 4.2         | 4.1         | 4           | 3.9         | EXM-B0B    |
|                             | 9.6   | 9.6        | 9.5       | 9.4       | 9.3        | 9.1         | 8.9         | 8.7         | 8.4         | 8.2         | EXM-B0D    |
|                             | 11.3  | 11.3       | 11.3      | 11.1      | 11         | 10.8        | 10.5        | 10.2        | 10          | 9.6         | EXM-B0E    |
|                             | 14.1  | 14.1       | 14        | 13.8      | 13.6       | 13.4        | 13.1        | 12.7        | 12.4        | 12          | EXL-B1F    |
|                             | 19  | 19         | 18.9      | 18.7      | 18.4       | 18.1        | 17.7        | 17.2        | 16.7        | 16.2        | EXL-B1G    |
| 65                          | 1.5   | 1.5        | 1.5       | 1.5       | 1.5        | 1.5         | 1.5         | 1.4         | 1.4         | 1.4         | EXM-B0A    |
|                             | 4.7   | 4.7        | 4.7       | 4.7       | 4.6        | 4.6         | 4.5         | 4.4         | 4.3         | 4.2         | EXM-B0B    |
|                             | 9.8   | 9.9        | 9.9       | 9.9       | 9.8        | 9.6         | 9.5         | 9.3         | 9           | 8.8         | EXM-B0D    |
|                             | 11.6  | 11.7       | 11.7      | 11.6      | 11.5       | 11.4        | 11.2        | 10.9        | 10.7        | 10.4        | EXM-B0E    |
|                             | 14.4  | 14.5       | 14.5      | 14.4      | 14.3       | 14.1        | 13.9        | 13.6        | 13.3        | 12.9        | EXL-B1F    |
|                             | 19.5  | 19.6       | 19.6      | 19.5      | 19.4       | 19.1        | 18.8        | 18.4        | 17.9        | 17.4        | EXL-B1G    |
| 60                          | 1.5   | 1.6        | 1.6       | 1.6       | 1.6        | 1.5         | 1.5         | 1.5         | 1.5         | 1.4         | EXM-B0A    |
|                             | 4.7   | 4.8        | 4.8       | 4.8       | 4.8        | 4.7         | 4.7         | 4.6         | 4.5         | 4.4         | EXM-B0B    |
|                             | 9.9   | 10         | 10.1      | 10.1      | 10.1       | 10          | 9.9         | 9.7         | 9.5         | 9.3         | EXM-B0D    |
|                             | 11.7  | 11.9       | 11.9      | 12        | 11.9       | 11.8        | 11.6        | 11.5        | 11.2        | 11          | EXM-B0E    |
|                             | 14.5  | 14.7       | 14.8      | 14.8      | 14.8       | 14.6        | 14.4        | 14.2        | 13.9        | 13.6        | EXL-B1F    |
|                             | 19.7  | 19.9       | 20.1      | 20.1      | 20         | 19.8        | 19.5        | 19.2        | 18.9        | 18.4        | EXL-B1G    |
| 55                          | 1.5   | 1.6        | 1.6       | 1.6       | 1.6        | 1.6         | 1.6         | 1.6         | 1.5         | 1.5         | EXM-B0A    |
|                             | 4.6   | 4.8        | 4.8       | 4.9       | 4.9        | 4.8         | 4.8         | 4.7         | 4.7         | 4.6         | EXM-B0B    |
|                             | 9.8   | 10         | 10.2      | 10.2      | 10.2       | 10.2        | 10.1        | 10          | 9.8         | 9.7         | EXM-B0D    |
|                             | 11.6  | 11.8       | 12        | 12.1      | 12.1       | 12          | 11.9        | 11.8        | 11.6        | 11.4        | EXM-B0E    |
|                             | 14.4  | 14.7       | 14.9      | 15        | 15         | 15          | 14.8        | 14.6        | 14.4        | 14.2        | EXL-B1F    |
|                             | 19.4  | 19.9       | 20.1      | 20.3      | 20.3       | 20.2        | 20.1        | 19.8        | 19.5        | 19.2        | EXL-B1G    |
| 50                          | 1.5   | 1.5        | 1.6       | 1.6       | 1.6        | 1.6         | 1.6         | 1.6         | 1.6         | 1.5         | EXM-B0A    |
|                             | 4.5   | 4.7        | 4.8       | 4.8       | 4.9        | 4.9         | 4.9         | 4.8         | 4.8         | 4.7         | EXM-B0B    |
|                             | 9.5   | 9.8        | 10.1      | 10.2      | 10.3       | 10.3        | 10.2        | 10.2        | 10          | 9.9         | EXM-B0D    |
|                             | 11.2  | 11.6       | 11.9      | 12        | 12.1       | 12.1        | 12.1        | 12          | 11.9        | 11.7        | EXM-B0E    |
|                             | 13.9  | 14.4       | 14.7      | 14.9      | 15         | 15.1        | 15          | 14.9        | 14.7        | 14.5        | EXL-B1F    |
|                             | 18.8  | 19.5       | 19.9      | 20.2      | 20.4       | 20.4        | 20.3        | 20.2        | 19.9        | 19.6        | EXL-B1G    |
| 45                          | 1.4   | 1.5        | 1.5       | 1.6       | 1.6        | 1.6         | 1.6         | 1.6         | 1.6         | 1.6         | EXM-B0A    |
|                             | 4.3   | 4.5        | 4.6       | 4.7       | 4.8        | 4.8         | 4.9         | 4.8         | 4.8         | 4.8         | EXM-B0B    |
|                             | 9   | 9.5        | 9.8       | 10        | 10.2       | 10.2        | 10.2        | 10.2        | 10.1        | 10          | EXM-B0D    |
|                             | 10.6  | 11.2       | 11.6      | 11.8      | 12         | 12.1        | 12.1        | 12.1        | 12          | 11.8        | EXM-B0E    |
|                             | 13.2  | 13.9       | 14.3      | 14.7      | 14.9       | 15          | 15          | 15          | 14.9        | 14.7        | EXL-B1F    |
|                             | 17.9  | 18.7       | 19.4      | 19.8      | 20.1       | 20.3        | 20.3        | 20.2        | 20.1        | 19.9        | EXL-B1G    |
| 40                          | 1.3   | 1.4        | 1.5       | 1.5       | 1.5        | 1.6         | 1.6         | 1.6         | 1.6         | 1.6         | EXM-B0A    |
|                             | 3.9   | 4.2        | 4.4       | 4.6       | 4.7        | 4.8         | 4.8         | 4.8         | 4.8         | 4.8         | EXM-B0B    |
|                             | 8.3   | 8.9        | 9.3       | 9.7       | 9.9        | 10          | 10.1        | 10.1        | 10.1        | 10          | EXM-B0D    |
|                             | 9.8   | 10.5       | 11        | 11.4      | 11.7       | 11.9        | 12          | 12          | 11.9        | 11.9        | EXM-B0E    |
|                             | 12.2  | 13         | 13.7      | 14.2      | 14.5       | 14.7        | 14.8        | 14.9        | 14.8        | 14.7        | EXL-B1F    |
|                             | 16.4  | 17.6       | 18.5      | 19.2      | 19.6       | 19.9        | 20.1        | 20.1        | 20          | 19.9        | EXL-B1G    |
| 35                          | 1.1   | 1.3        | 1.4       | 1.4       | 1.5        | 1.5         | 1.5         | 1.5         | 1.5         | 1.5         | EXM-B0A    |
|                             | 3.5   | 3.8        | 4.1       | 4.3       | 4.5        | 4.6         | 4.7         | 4.7         | 4.7         | 4.7         | EXM-B0B    |
|                             | 7.3   | 8.1        | 8.7       | 9.2       | 9.5        | 9.7         | 9.9         | 10          | 10          | 9.9         | EXM-B0D    |
|                             | 8.6   | 9.6        | 10.3      | 10.8      | 11.2       | 11.5        | 11.7        | 11.8        | 11.8        | 11.7        | EXM-B0E    |
|                             | 10.7  | 11.9       | 12.8      | 13.4      | 13.9       | 14.3        | 14.5        | 14.6        | 14.6        | 14.6        | EXL-B1F    |
|                             | 14.5  | 16.1       | 17.3      | 18.2      | 18.8       | 19.3        | 19.6        | 19.7        | 19.8        | 19.7        | EXL-B1G    |

**Technical data**

|   |   |
|---|---|
| MOPD<br>(maximum operating pressure differential) | 40 bar in normal flow<br>33 bar in reverse flow |
| Max. working pressure PS                          | 45 bar  |
| External leakage                                  | ≤ 3 gram / year                                 |
| Temperature range TS                              |   |
| Liquid refrigerant                                | -30...+70°C                                     |
| Ambient   | -30...+60°C                                     |
| Relative humidity                                 | 95%   |
| Air seat leakage at 10 bar differential pressure  | Typically 150 cm <sup>3</sup> /min.             |

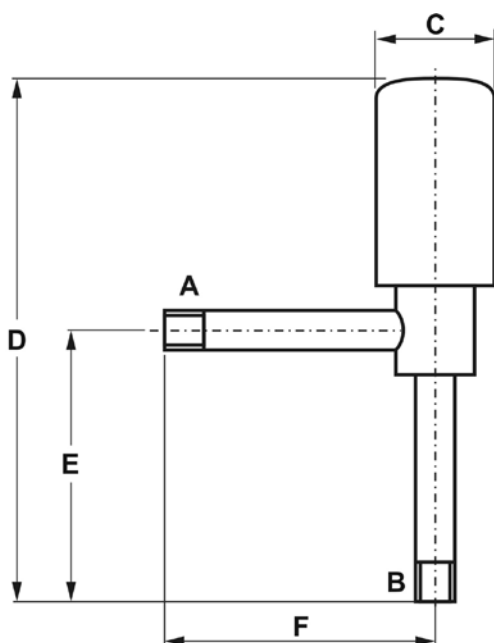
|                      |   |
|----------------------|---|
| Bi-flow direction    | Normal: connection A to B<br>Reverse: connection B to A   |
| Valve installation   | Coil upside or to vertical within ± 90°                   |
| Package and delivery | 10 pieces   |
| CE marking           | Not required  |
| Connections, A and B | EXM: 1/4" ODM<br>EXL: 1/4" ODF and 8 mm ODM               |
| Weight               | Valve EXM: 65 g, EXL: 76 g<br>Coil EXM: 124 g, EXL: 156 g |

**⚠ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".**

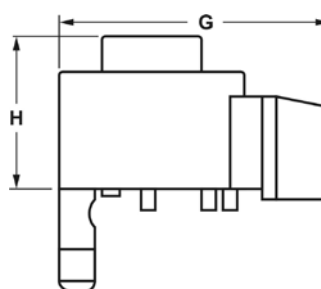
**Electrical data**

|                              |  |
|------------------------------|--|
| Stepper motor type           | Uni-polar, constant voltage                      |
| Electrical connection        | 12 VDC coil: 5 wires<br>24 VDC coil: 5 wires     |
| Supply voltage               | 12 VDC coil: 12V ± 10%<br>24 VDC coil: 24V ± 10% |
| Phase current, operating     | 12 VDC coil: 260 mA<br>24 VDC coil: 130 mA       |
| Winding resistance per phase | 12 VDC coil: 46 Ohm<br>24 VDC coil: 185 Ohm      |
| Insulation resistance        | Min. 100 MΩ at 500 VDC                           |
| Cable length                 | 1 meter  |

|                          |   |
|--------------------------|---|
| Step mode                | Half step = one pulse                                       |
| Total number of pulses   | 500 half step (250 full step)                               |
| Pulsing rate             | 30...90 pulses (half step) per sec                          |
| Full travel time         | 16.6 seconds at 30 pulse/sec<br>5.5 seconds at 90 pulse/sec |
| Reference position       | Mechanical stop at fully close position at 520 pulses       |
| Valve starts to open at: | 32 pulses ± 20 pulses                                       |
| Insulation class         | E   |
| Protection class coil    | IP65 excluding cable and terminal (JST)                     |

**Dimensions (mm)**

| Valve series | Description type     |             | C (mm) | D (mm) | E (mm) | F (mm) |
|--------------|----------------------|-------------|--------|--------|--------|--------|
|              | Diameter             | Length (mm) |        |        |        |        |
| EXM-...      | 1/4 " ODM            | 8           | 17.3   | 78     | 36     | 36.3   |
| EXL-...      | 1/4 " ODF / 8 mm ODM | 8           | 21.8   | 90     | 42     | 42     |



| Coil    | E (mm) | F (mm) |
|---------|--------|--------|
| EXM-... | 52.5   | 32     |
| EXL-... | 59     | 34     |

## EXD-HP1/2 stand-alone superheat controller

### EXD-HP1/2

are stand-alone universal superheat controllers for heat pumps, heating units, air conditioning and precision cooling such as telecom and shelter applications.

### Features

- Self-adapting superheat control in conjunction with Copeland stepper motor driven electronic expansion valves EXM/EXL
- Discharge hot gas temperature control by wet refrigerant vapor/vapor injection to compressor
- EXD-HP1: controller with one EXV output
- EXD-HP2: controller with two independent EXV outputs
- Controllers as slave with Modbus (RTU) communication capability. All data (read/write) accessible by any third party controller having modbus communication (RTU)
- Upload/download key (accessory) for transmission of parameter settings among controllers with the same setting
- Low pressure switch and freeze protection function
- Manual positioning of valve(s)
- Limitation of evaporating pressure (MOP)
- Low/high superheat alarm
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Integrated display (3-digits LEDs) and key board
- Electrical connection via plug-in type screw terminals (included with controller)
- DIN rail mounting housing
- OEM product: Box order quantities: 20 pieces (Multi-pack)



### Selection table

| Type   | Description                                      | Part No.                       |                 |
|--|--|--------------------------------|-----------------|
|  |  | Multipack                      | Single pack     |
| Controllers                                  |  |                                |                 |
| EXD-HP1                                      | with 1 EXV output                                | 807836M                        | -               |
| EXD-HP2                                      | with 2 EXV outputs                               | 807837M                        | -               |
| Valves/coils                                 |  |                                |                 |
| EXM-B0A                                      | Electronic expansion valve                       | 800399M                        | -               |
| EXM-B0B                                      |  | 800400M                        | -               |
| EXM-B0D                                      |  | 800401M                        | -               |
| EXM-B0E                                      |  | 800402M                        | -               |
| EXM-125                                      | Coil 12 VDC                                      | 800403M                        | -               |
| EXL-B1F                                      | Electronic expansion valve                       | 800405M                        | -               |
| EXL-B1G                                      |  | 800406M                        | -               |
| EXL-125                                      | Coil 12 VDC                                      | 800407M                        | -               |
| Temperature sensor                           |  |                                |                 |
| ECP-P30                                      | Temperature sensor with 3 m cable                | -                              | 804495          |
| Pressure sensor                              |  | Suction pressure (refrigerant) |                 |
| PT5-07M/PT5-07T                              | -0.8...7 bar (R22, R134a, R407C)                 | 802350M / 802370M              | 802350 / 802370 |
| PT5-18M/PT5-18T                              | 0 ...18 bar (R410A, R32 /suction pressure)       | 802351M / 802371M              | 802351 / 802371 |
| PT5-30M/PT5-30T                              | 0 ...30 bar (R410A, R32 / intermediate pressure) | 802352M / 802382M              | 802352 / 802382 |
| Plug and cable assembly for pressure sensors |  |                                |                 |
| PT4-M15                                      | 1.5 m cable length                               | 804803M                        | 804803          |
| PT4-M30                                      | 3.0 m cable length                               | 804804M                        | 804804          |

**Note:** For further detail please see technical bulletin of EXM/L and PT5...FLR.

**⚠ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".**

**Technical data****EXD-HP1/2**

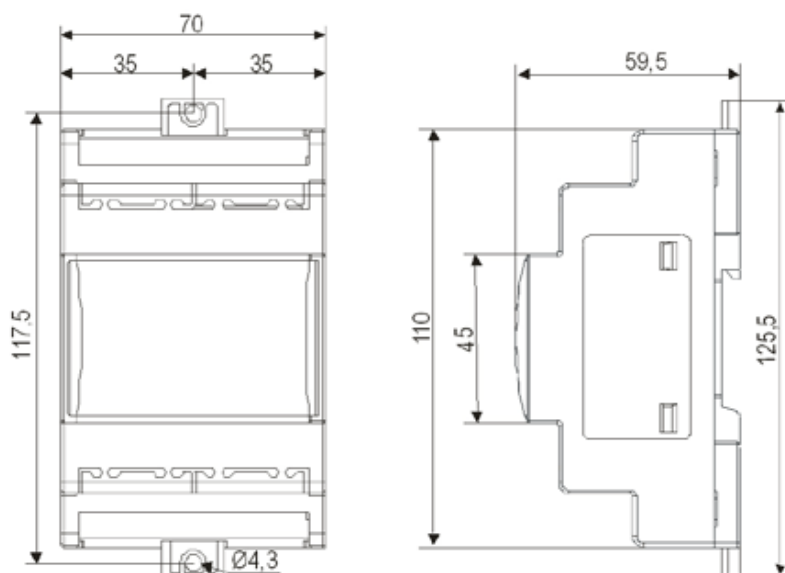
|                        |   |                                      |                            |
|------------------------|---|--------------------------------------|----------------------------|
| Supply voltage         | 24 VAC/DC $\pm 10\%$  | Protection class                     | IP 20                      |
| Power consumption      | EXD-HP1: Max. 15VA<br>EXD-HP2: Max. 20VA  | Housing                              | Self-extinguishing ABS     |
| Digital inputs         | EXD-HP1: Two, each potential free<br>EXD-HP2: Three each potential free             | Mounting                             | DIN rail mounted           |
| Relay output           | SPDT contacts, AgSnO<br>Inductive (AC15) 24 V AC : 1 A<br>Resistive: 24 VAC/DC: 4 A | Temperatures<br>storage<br>operating | -20...+65°C<br>-10...+60°C |
| Plug-in connector size | Removable screw version<br>wire size 0.14 ... 1.5 mm <sup>2</sup>                   | Relative humidity                    | 0...85% RH non condensing  |
| Applied directive      | LVD, EMC, RoHS,   | Weight                               | 175 g                      |
| Compliance with        | DIN EN60335-1<br>DIN EN 55014-1, DIN EN 55014-2                                     | Marking                              | <b>CE</b>                  |

**Input sensors, output valves**

| Description  | Specification   |
|--|---|
| Temperature input                                  | ECP-P30 (3 meter cable length)<br>Range: -30°C...+150°C |
| Pressure sensor input                              | PT5<br>Signal: 4...20 mA                                |
| Electronic expansion valves (stepper motor) output | EXM and EXL series                                      |

**MOPD table**

| Description | Min. | Max. | Default |
|-------------|------|------|---------|
|             | (°C) |      |         |
| R410A       | -40  | +45  | +15     |
| R32         | -40  | +30  | +15     |
| R407C       | -40  | +48  | +15     |
| R22         | -40  | +50  | +13     |
| R134a       | -40  | +66  | +15     |
| R290        | -40  | +50  | +15     |

**Dimensions (mm)**



## CSS-25U / CSS-32U / CSS-32W compressor soft start

The first VDE certified **compressor soft starter** for safety of household. It is used for switching, protection and starting current limitation of single phase compressors in residential heat pumps, refrigeration and air-conditioning applications.

### Features

- For motors with maximum operating current up to 25A / 32A
- Limitation of starting current to less than 45A; PCN 805209 less than 30A
- Self adjusting for use in 50 Hz or 60 Hz supply
- Self adjusting to motor current - no manual adjustment or calibration necessary
- Alarm relay output
- Start capacitor for improved motor acceleration is switched off after start
- Low voltage shutdown
- Locked rotor recognition and shutdown
- Delay function to limit number of motor starts per hour
- Thyristor protected contactor for long life
- No extra motor contactor needed
- Self diagnostics
- Mounting clip for easy installation allows DIN rail mounting in two directions
- Easy wiring by cage type screw terminals  
CSS-...U: 4mm<sup>2</sup> cross section terminals  
CSS-...W: 6mm<sup>2</sup> cross section terminals




CSS-32U Soft Starter



CSS-32W Soft Starter

### Selection table

| Type    | Part no. | Description   | Screw terminals   | Nom. compr. current | Max. start current |
|---------|----------|---|-------------------|---------------------|--------------------|
| CSS-32U | 805204   | Compressor Soft Starter incl. mounting clip                       | 4 mm <sup>2</sup> | 32A max             | 45 A               |
| CSS-32U | 805204M  | Box with <b>20 pieces.</b> mounting clips                         | 4 mm <sup>2</sup> | 32A max             | 45 A               |
| CSS-32W | 805211   | Compressor Soft Starter incl. mounting clip                       | 6 mm <sup>2</sup> | 32A max             | 45 A               |
| CSS-32W | 805211M  | Box with <b>20 pieces.</b> mounting clips                         | 6 mm <sup>2</sup> | 32A max             | 45 A               |
| CSS-25U | 805205   | Compressor Soft Starter incl. mounting clip                       | 4 mm <sup>2</sup> | 25A max             | 45 A               |
| CSS-25U | 805205M  | Box with <b>20 pieces.</b> mounting clips                         | 4 mm <sup>2</sup> | 25A max             | 45 A               |
| CSS-25U | 805209   | Compressor Soft Starter I <sub>max</sub> 30 A incl. mounting clip | 4 mm <sup>2</sup> | 25A max             | 30 A               |
| CSS-25U | 805209M  | Box with <b>20 pieces.</b> mounting clips                         | 4 mm <sup>2</sup> | 25A max             | 30 A               |

 These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

### Accessory

| Type    | Part no. | Description  |
|---------|----------|--|
| K00-003 | 807663   | 3-pol screw connector to alarm output for wires up to 2.5 mm <sup>2</sup> ; bag with 50 pieces |

## Technical data

|                            |  |
|----------------------------|--|
| Operating voltage          | 230V 50 / 60 Hz nominal  |
| Nominal compressor current | CSS-32U / - 32W : 32A max.<br>CSS-25U : 25A max.                           |
| Maximum start current      | CSS-32U / -32W : 45A<br>CSS-25U (805 205) : 45A<br>CSS-25U (805 209) : 30A |
| Operating temperature      | -20...+55°C non condensing   |
| Storage temperature        | -20...+65°C non condensing   |
| Start capacitor            | 200...240 µF   |
| Time delay after stop      | 0.5...5 Min  |

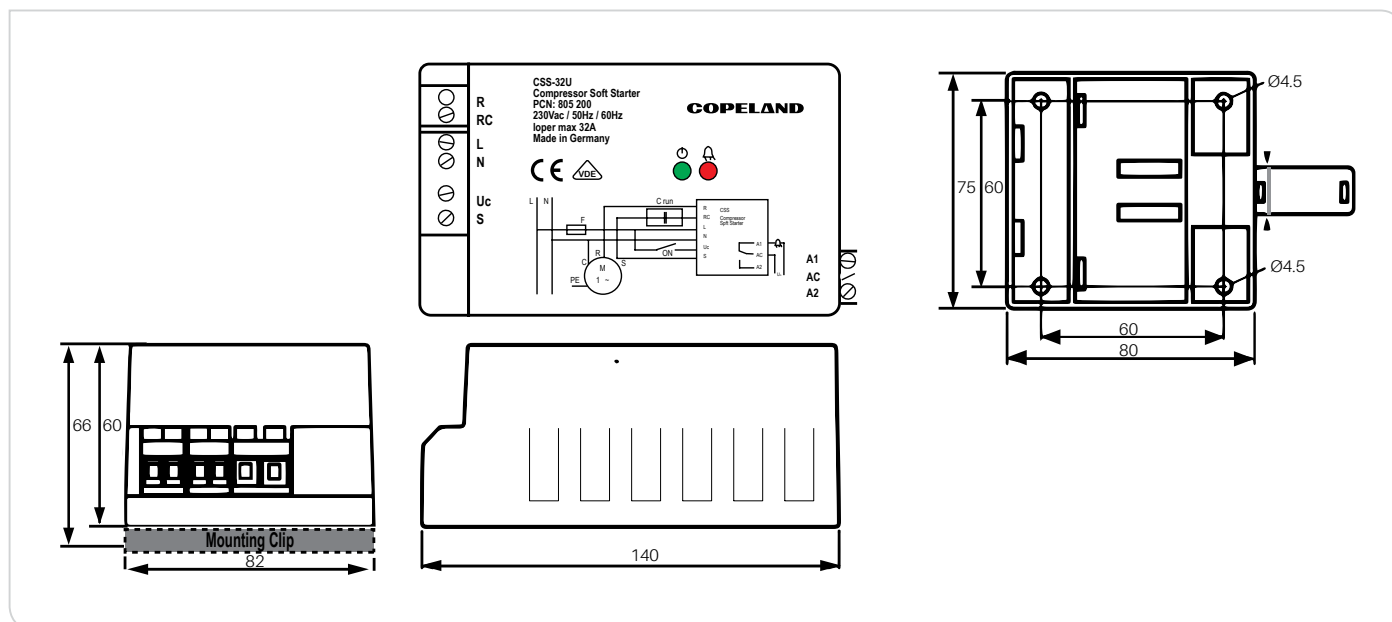
|                                   |                            |
|-----------------------------------|----------------------------|
| Alarm relay. AgNi (SPDT)          | 250V~ / 3A                 |
| Resistive (AC1) max.              | 30V= / 3A                  |
| Flexible cable cross section      |                            |
| CSS-32U/-25U all terminals        | 0.25...4 mm <sup>2</sup>   |
| CSS-32W (R, RC, L terminals)      | 0.25...6 mm <sup>2</sup>   |
| Flexible cable cross section      |                            |
| alarm output connector K00-003    | 0.25...2.5 mm <sup>2</sup> |
| Max. vibration (at 10 to 1000 Hz) | 4 g                        |
| Weight                            | 430 g                      |
| Protection acc. IEC 529           | IP20                       |

## Standards

|                 |   |
|-----------------|---|
| EN 60947-1      | Low voltage switch gear and control gear  |
| EN 60947-4-2    | Contactors and motor-starters - AC semiconductor motor controllers and starters |
| EMC 2004/108/EC | Electromagnetic compatibility (EMC) directive                                   |
| LVD 2006/95/EC  | Low voltage directive   |

|                 |   |
|-----------------|---|
| EN 60335-1      | Safety of household and similar electrical appliances -   |
| EN 60335-2-40   | Part 2-40 Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers |
| ROHS 2002/95/EC | Restriction of Hazardous Substances Directive   |
| Marking         | CE VDE Reg.-Nr. D967 / D663   |

## Dimensions (mm)







A large, modern interior space featuring a wall with vertical wooden slats. The word "COPELAND" is mounted on the wall in large, bold, black capital letters. To the right, a blue wall displays the text "ENGINEERED FOR SUSTAINABILITY" in gold, slanted capital letters. The floor is made of light-colored tiles.

# COPELAND

ENGINEERED FOR  
SUSTAINABILITY

## About Copeland

Copeland, a global provider of sustainable climate solutions, combines category-leading brands in compression, controls, software and monitoring for heating, cooling and refrigeration. With best-in-class engineering and design and the broadest portfolio of modulated solutions, we're not just setting the standard for compressor leadership; we're pioneering its evolution. Combining our technology with our smart energy management solutions, we can regulate, track and optimize conditions to help protect temperature-sensitive goods over land and sea, while delivering comfort in any space. Through energy-efficient products, regulation-ready solutions and expertise, we're revolutionizing the next generation of climate technology for the better.

**For more details, see [copeland.com/en-gb](https://copeland.com/en-gb)**

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