ENGINEERING
TOMORROW

Catalogue | $CO_2$ portfolio

# Components and controls catalogue for **$CO_2$ applications**

**FORWARD**
$CO_2$ REFRIGERATION SOLUTIONS
**NATURALLY**

CO2.danfoss.com

# Contents

# 1. Monitoring and system managing network units

**System manager AK-SM 8xxA network unit specifically designed for convenience store market, medium and hyper supermarkets but also cold room storage plants**

- Simple user interface for fast and easy access to your information
- Refrigeration, HVAC, lighting, energy control, gas detectors via built in control logic
- Support for Danfoss controllers
- Full functional web server built in
- Built in Modbus, Ethernet, Lonworks® RS485- Implementation of IT industry standard security protocols (HTTPS, SSL/TSL 1.2, WPA2 encryption)
- XML compatible, allowing interface for remote access applications

**With LonWorks®**

| Type | Code No | Function | Communication | Controllers | Refrigeration | HVAC | WiFi |
|---|---|---|---|---|---|---|---|
| AK-SM 820A | 080Z4024 | C-store | Modbus / LON / IP | 32 | yes | yes | yes |
| AK-SM 850A | 080Z4021 | Refrigeration | Modbus / LON / IP | 170 | yes | no | yes |
| AK-SM 850A | 080Z4022 | Refrigeration | Modbus / LON / IP | 170 | yes | no | no |
| AK-SM 880A | 080Z4028 | Full | Modbus / LON / IP | 170 | yes | yes | yes |

**Without LonWorks®**

| Type | Code No | Function | Communication | Controllers | Refrigeration | HVAC | WiFi |
|---|---|---|---|---|---|---|---|
| AK-SM 820A | 080Z4044 | C-store | Modbus / IP | 32 | yes | yes | yes |
| AK-SM 850A | 080Z4041 | Refrigeration | Modbus / IP | 170 | yes | no | yes |
| AK-SM 880A | 080Z4048 | Full | Modbus / IP | 170 | yes | yes | yes |

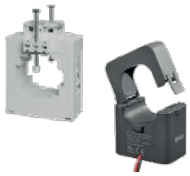
## Extension modules

| Type | Code No | AI | DO | DI max. 80V | DI max. 260V | AO 0-10 Vdc | Stepper outputs | Override switches |
|---|---|---|---|---|---|---|---|---|
| AK-XM 101A | 080Z0007 | 8 | | | | | | |
| AK-XM 102A | 080Z0008 | | | 8 | | | | |
| AK-XM 102B | 080Z0013 | | | | 8 | | | |
| AK-XM 103A | 080Z0032 | 4 | | | | 4 | | |
| AK-XM 204A | 080Z0011 | | 8 | | | | | |
| AK-XM 204B | 080Z0018 | | 8 | | | | | x |
| AK-XM 205A | 080Z0010 | 8 | 8 | | | | | |
| AK-XM 205B | 080Z0017 | 8 | 8 | | | | | x |
| AK-XM 208C | 080Z0023 | 8 | | | | | 4 | |
| AK-XM 107A | 080Z0020 | Pulse counting module ; 8 inputs | | | | | | |
| AK-CM 101C | 080Z0063 | LON RS485 Communication Module | | | | | | |

## Power Supply module 230V / 115V to 24V d.c.

| New PS range | | Supply for controller |
|---|---|---|
| AK-PS 063 STEP3 | 080Z0057 | 15W |
| AK-PS 130 STEP3 | 080Z0058 | 30W |
| AK-PS 250 STEP3 | 080Z0059 | 60W |

## Energy meter



**Energy meter by Gavazzi for System Manager 800A detection and communication**

| Type | Code No | Description |
|---|---|---|
| EM 530 | 080Z2130 | 3PH energy meter CT 5A RS485 |
| EM 511 | 080Z2131 | 1PH energy meter 45A direct conn. RS485 |
| | 080Z2132 | CTD-2X BUS-BAR current transformer 100A |
| | 080Z2133 | CTD-3X BUS-BAR current transformer 200A |
| | 080Z2134 | CTA-6X SPLIT core current transformer 400A |

# 2. Pack controllers

## AK-PC Pack Controllers for $CO_2$ Transcritical Booster

### Pack controllers AK-PC 782AB / 781AB / 772AB

**AK-PC 7xx A/B is complete controling unit for:**

- Capacity control of compressors for MT suction and/or LT suction line
- $CO_2$ gas cooler control and receiver control. Floating reference with regard to outside temperature
- Parallel compression IT on transcritical $CO_2$ system (AK-PC 782 A/B and 772A/B)
- $CO_2$ Multi E jector solution (AK-PC 782 A/B) MT/LT – coordination between controllers
- Heat recovery function

| Type | Code No | Function | Number of compressors (max) | AI | DO |
|---|---|---|---|---|---|
| **Integrated LON RS485 communication** | | | | | |
| AK-PC 782A | 080Z0192 | Medium-large transcritical (MT-LT-IT suction) | 10 × MT ; 8 × IT ; 4 × LT | 11 | 8 |
| AK-PC 772A | 080Z0201 | Small transcritical (MT-LT-IT suction) | 3 × (MT+IT) ; 2 × LT | | |
| AK-PC 781A | 080Z0191 | Medium-large transcritical (single suction) | 10 | | |
| **Integrated LAN with IP communication to AK-SM** | | | | | |
| AK-PC 782B | 080Z0202 | Medium-large transcritical (MT-LT-IT suction) | 10 × MT ; 8 × IT ; 4 × LT | 11 | 8 |
| AK-PC 772B | 080Z0195 | Small transcritical (MT-LT-IT suction) | 3 x (MT+IT) ; 2 x LT | | |
| AK-PC 781B | 080Z0194 | Medium-large transcritical (single suction) | 10 | | |

## AK-PC Pack Controller for Cascade HFC/HC/NH3- $CO_2$ System

### Pack controller AK-PC 783A

AK-PC 783A is complete regulating unit for capacity control of compressors and condensers in refrigeration plants with cascade function.
The controller controls the high-pressure circuit, low-pressure circuit and cascade circuit. The controller is with oil management, simple heat recovery function and coordination between the high-pressure control and low-pressure control.

- Capacity control of up to 12 compressors (Max. 6 on each circuits or 7 MT + 5 LT or 8 MT + 4 LT)
- Up to 3 unloaders for each compressor / Up to 3 screw compressors / Digital scroll compressor
- Control of two cascade circuits in parallel
- Control for $CO_2$ pump system

| Type | Code No | Function | Number of compressors (max) | AI | DO |
|---|---|---|---|---|---|
| **Integrated LON RS485 communication** | | | | | |
| AK-PC 783A | 080Z0193 | Capacity control of MT compressors, condensers, LT compressors and cascade heat exchangers | Up to 12 compressors max. 6 on each circuits or 7 MT + 5 LT or 8 MT + 4 LT | 11 | 8 |

## Extension modules

Variety of AK-XM modules allow to extend the number of inputs and outputs and add extra functionality to the main controller (AK-PC or AK-CC) according to application needs.

| Type | Code No | AI | DO | DI max. 80V | DI max. 260V | AO 0-10Vdc | Stepper outputs | Override switches |
|---|---|---|---|---|---|---|---|---|
| AK-XM 101A | 080Z0007 | 8 | | | | | | |
| AK-XM 102A | 080Z0008 | | | 8 | | | | |
| AK-XM 102B | 080Z0013 | | | | 8 | | | |
| AK-XM 103A | 080Z0032 | 4 | | | | 4 | | |
| AK-XM 204A | 080Z0011 | | 8 | | | | | |
| AK-XM 204B | 080Z0018 | | 8 | | | | | x |
| AK-XM 205A | 080Z0010 | 8 | 8 | | | | | |
| AK-XM 205B | 080Z0017 | 8 | 8 | | | | | x |
| AK-XM 208C | 080Z0023 | 8 | | | | | 4 | |
| **The following extension module can be placed on the PC board in the controller module There is only room for one module** | | | | | | | | |
| AK-OB 110 | 080Z0251 | | | | | 2 | | |

## ADAP-Kool® operation and accessories

| Type | Code No | Description |
|---|---|---|
| **Communication modules for controllers where modules cannot be connected continuously** | | |
| AK-CM 102 | 080Z0064 | Communication module for external extension modules using RJ 45 |
| EKE 1P | 080G0325 | Stepper Valve driver |
| EKE 2U | 080G5555 | Back-up power module |

**Power supply module 230V / 115V to 24Vdc**

| New PS range | | Supply for controller |
|---|---|---|
| AK-PS 063 STEP3 | 080Z0057 | 15W |
| AK-PS 130 STEP3 | 080Z0058 | 30W |
| AK-PS 250 STEP3 | 080Z0059 | 60W |

| Type | Code No | Description |
|---|---|---|
| **External display that can be connected to the controller module** | | |
| MMIGRS2 | 080G0294 | Graphic display with operation buttons for AK-PC 7xx A platform |
| | 080G0075 | 1.5m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |
| | 080G0076 | 3.0m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |

**Operation**
AK-ST 500. ADAP-KOOL® service tool for operation.

Cable between PC and old AK controller USB A-B (standard IT cable) with RS 232

Free software download.

https://www.danfoss.com/en/service-and-support/downloads/dcs/adap-kool-software/ak-st-500/#tab-overview

## Mini pack controller AK-PC 572 for $CO_2$ transcritical booster

The controller is used for capacity regulation of compressors and gas cooler in small $CO_2$ refrigeration applications. The controller can handle simple MT or MT/LT booster systems with up to 5 compressors in total.
Built in LCD graphic display, predefined factory settings and configuration wizard make the operation of the controller simple and intuitive. The controller has built-in modbus data communication. In order to control the high pressure valve and receiver pressure valve, two valve driver modules, type EKE 1P, must be connected (modules ordered separately).

| Type | Code No | Function | Number of compressors (max) | AI/AO | DI/DO | Stepper |
|---|---|---|---|---|---|---|
| **Integrated Modbus communicatiion** | | | | | | |
| AK-PC 572 | 080G0320 | Small transcritical $CO_2$ MT or MT/LT booster" | 3 x MT + 2 x LT | 8 AI / 3 AO | 8 DI / 8 DO | 0 |
| EKE 1P | 080G0325 | Stepper Valve Extension Module for Vhp and Vrec Note: need to order 2 pcs. | | 4 AI | 2 DI / 1 DO | 1 |
| EKE 2U | 080G5555 | Back-up power module | | | | |

| Type | Code No | Description |
|---|---|---|
| **Power supply module 230 V / 115 V to 24 V d.c.** | | |
| AK-PS 250 STEP3 | 080Z0059 | 60 VA ; Supply for controller |
| **External display that can be connected to the controller module** | | |
| MMIGRS2 | 080G0294 | Graphic display with operation buttons |
| | 080G0075 | 1,5 m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |
| | 080G0076 | 3,0 m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |

# 3. Evaporator controllers and stepper valves drivers/SH controllers

**Evaporator controllers for $CO_2$ direct expansion evaporators**
**AK-CC55 cabinet/cold room controllers**



**ADAP-KOOL®** evaporator controls enable optimal functionality of refrigeration system, and, at the same time, save energy and keep food quality in display cases and cold rooms thanks to features like defrost function, adaptive superheat control with electronically operated expansion valve such as AKV P/PS. The EEV control is based on advanced MSS (Minimum Stable Superheat) or ALC (Adaptive Liquid Control) algorithm that allows even better evaporator utilization with highly precise injection control (almost liquid condition with close to zero superheat).

### AK-CC55 Compact

Controlling one evaporator. There are nine applications to select. Regulation can be performed using an AKV P/PS expansion valve or regulation with a solenoid valve together with a thermostatic expansion valve.

### AK-CC55 Single Coil and Single Coil UI

Controlling one evaporator. A setting will configure inputs and outputs for the desired use. There are nine applications to choose based on system requirements. Regulation is performed using an AKV P/PS expansion valve (via SSR) or CCMT expansion valve (via stepper driver EKE).

### AK-CC55 Multi Coil

Controlling one, two or three evaporators. Other software and applications are available for this. The enclosure is equipped with additional connections. There are five applications to choose based on system requirements. Regulation is performed using AKV P/PS expansion valves.

| Type | Code No | Expansion valve | No. of Evaporators | DO | DI | AI | AO for EEV driver |
|---|---|---|---|---|---|---|---|
| AK-CC55 Compact | 084B4081 | AKV P/PS ; TEV | 1 | 3 | 1(2) | 5(4) | no |
| AK-CC55 Single coil | 084B4082 | AKV P/PS ; CCMT | 1 | 5 | 3(2) | 6(7) | yes |
| AK-CC55 Single coil UI | 084B4083 | AKV P/PS ; CCMT | 1 | 5 | 3(2) | 6(7) | yes |
| AK-CC55 Multi coil | 084B4084 | AKV P/PS | 3 | 4 | 3(2) | 6(7) | no |

*Supply voltage 115 V / 230 V, 50/60 Hz*

**AK-CC55 Single coil UI (Locked Software) sw 1.6 (for service purpose on older systems)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| AK-CC55 single coil UI | 084B4057 | AKV P/PS ; CCMT | 1 | 5 | 3(2) | 6(7) | yes |



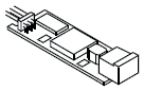
**AK-CC accesories**

| Type | Code No | Description |
|---|---|---|
| AK-UI55 Bluetooth | 084B4075 | External display with Bluetooth operation |
| AK-UI55 Set | 084B4076 | External display with control buttons |
| AK-UI55 Info | 084B4077 | External display |
| | 084B4078 | 3 m ; External display cable with RJ12 connector |
| | 084B4079 | 6 m ; External display cable with RJ12 connector |
| AK-OB55 Lon | 084B4070 | Data communication module Lon. Can be mounted in Single Coil and Multi Coil versions |
| AK-UI55 Mounting Base | 084B4099 | Mounting kit for display types: AK-UI55 Set, AK-UI55 Bluetooth, AK-UI55 Info |

## Evaporator controllers for systems with TEV for $CO_2$ and pump recirculation

### EKC cabinet/cold room controllers

Controls for regulating refrigeration appliances. The controls are capable of regulating one evaporator, depending on the type of controls. The controls have functions for regulating temperature, defrosting, door frame heating and fan operation.



| Type | Code No | Supply voltage | Selectable applications | DO | DI | AI |
|---|---|---|---|---|---|---|
| EKC 202D | 084B8536 | 230V ac | 3 | 4 | 2 | 3 |
| AK-CC 210 | 084B8520 | | 10 | 4 | 2 | 3 |
| AK-CC 250A | 084B8528 | | 10 (with integrated Modbus) | 4 | 2 | 3 |
| AK-CC 210 | 084B8534 | 115V ac | 10 | 4 | 2 | 3 |
| EKA 178A | 084B8564 | Data communication module MODBUS | | | | |
| **EKC 22x controllers for panel mounting** | | | | | | |
| EKC 223 | 084B4054 | 230V ac | 4 | 3 | 2 | 2 |
| EKC 224 | 084B4056 | | 4 | 4 | 2 | 2 |
| EKC 223 | 084B4053 | 115V ac | 4 | 3 | 2 | 2 |
| EKC 224 | 084B4055 | | 4 | 4 | 2 | 2 |
| EKA 206 | 084B4088 | Data communication module TTL-RS-485 MODBUS | | | | |
| | 080N0327 | Interface cable for RS-485 adapter | | | | |
| **EKC, AK-CC Cabinet/Cold Room Controllers for DIN-rail mounting** | | | | | | |
| EKC 302D | 084B4164 | 230V ac | 3 (with integrated Modbus) | 4 | 2 | 3 |
| AK-CC 350 | 084B4165 | | 10 (with integrated Modbus) | 4 | 2 | 3 |

### AK-RC Cold Room Controller IP65 protection mounting on panel outside the room

The AK-RC is a control panel for cold rooms, specially designed for safety, protection, control and ease of installation. It allows the user to control all the components on a refrigeration system: temperature, evaporator fans, defrosting elements and room light. Controllers code numbers include in a package following sensors: 1 x 1,5m and 1 x 3m NTC 10K.

| Type | Code No | Function | DO | Circuit breaker protection | Power supply |
|---|---|---|---|---|---|
| AK-RC 204B | 080Z5001 | Control single-phase including two sensors | 4 | no | 230V ac |
| AK-RC 205C | 080Z5002 | | 5 | yes | 230V ac |
| AK-RC 305W | 080Z5003 | Advanced controller | 5 | no | 100-240V ac |

| | | | Qty |
|---|---|---|---|
| EKS 221 | 084N3210 | 3.5m NTC 10K / Thermo plastic rubber probe | 1 |
| | 084N3209 | 8.5m NTC 10K / Thermo plastic rubber probe | 1 |
| | 084N3206 | 3.5m NTC 10K / Thermo plastic rubber probe | 150 |
| | 084N3208 | 8.5m NTC 10K / Thermo plastic rubber probe | 50 |
| | 084N3200 | 3.5m NTC 10K / Stainless steel probe | 150 |

## Stepper motor valves drivers and Superheat controllers

Drivers can be used where there are requirements to accurate control of superheat.

**The main advantages of this controller are:**

- The evaporator is charged optimally – even when there are great variations of load and suction pressure.
- Energy savings – the adaptive regulation of the refrigerant injection ensures optimum utilisation of the evaporator and hence a high suction pressure.
- The superheat is regulated to the lowest possible value
- Power Supply Type 24V ac/dc
- Battery Backup input 18-24V dc

| Type | Code No | No of temp. sensors | NTC 10K | Pt 1000 | DI Dry | AI external reference | Modbus |
|---|---|---|---|---|---|---|---|
| **Superheat controllers and drivers** | | | | | | | |
| EKE 1A | 080G5300 | 1 | yes | no | 3 | Voltage | no |
| EKE 1B | 080G5350 | 2 | yes | no | - | Voltage | yes |
| EKE 1C | 080G5400 | 3 | yes | yes | 2 | Voltage / mA | yes |
| EKE 1P | 080G0325 | Pure driver with 0-10V external reference signal | | | | | |
| EKE 2U | 080G5555 | Back-up power module | | | | | |

| **External display that can be connected to the controller module** | | |
|---|---|---|
| MMIGRS2 | 080G0294 | Graphic display with operation buttons for AK-PC 7xx A platform |
| | 080G0075 | 1.5 m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |
| | 080G0076 | 3.0 m ; Cable between graphic display type MMIGRS2 and controller (RJ11 plug) |
| MMIMYK | 080G0073 | Gateway interface |

### EKE 100 range

- Temperature sensors support: NTC 10K and Pt 1000.
- Pressure sensors support: ratiometric 0.5 to 4.5V, 4-20mA.
- Integrated Modbus communication protocol on all units.
- Software Koolprog for setting controller use gateway Koolkey.

| Type | Code No | Stepper valve support | Temp. sensors | Pressure sensors | DI Dry | AI external reference | Display | IP |
|---|---|---|---|---|---|---|---|---|
| **Superheat controllers and drivers** | | | | | | | | |
| EKE 100 1V | 080G5050 | 1 | 1 | 1 | 1 | Voltage | no | 00 |
| | 080G5051 | | | | | Voltage | no | 20 |
| | 080G5052 | | | | | Voltage | Integrated | 20 |
| EKE 100 2V | 080G5055 | 2 | 2 | 2 | 2 | Voltage | no | 00 |
| | 080G5056 | | | | | Voltage | no | 20 |
| | 080G5057 | | | | | Voltage | Integrated | 20 |

| | | Supply for controller |
|---|---|---|
| AK-PS 063 STEP3 | 080Z0057 | 15 W |
| AK-PS 130 STEP3 | 080Z0058 | 30 W |
| AK-PS 250 STEP3 | 080Z0059 | 60 W |

EKE 100 idle operation < 1W (without valve)
Requested total power supply depend on valve/s.
CCMT L: 10W
CCMT 2 - CCMT 8: 5 W
CCMT 16 - CCMT 42: 15 W
CTR 20: 10W
When using two valves sum the power consumption of each valve

# 4. High pressure electronic expansion valves

The CCMT is an electronically operated valve designed specifically for $CO_2$ systems and can function either as an expansion valve, a pressure regulator for the gas cooler, or a gas bypass valve with back-pressure regulation in transcritical applications. Additional features include: compatibility with PAG, POE and PVE oils; combined butt weld and solder connections; and a light weight and compact design. The CTR is an electrically operated 3-way valve designed specifically for operation in $CO_2$ systems with heat reclaim.

The ICMTS is a direct operated motorized valve designed to regulate the flow of transcritical gas or subcritical liquid from the gas cooler in a transcritical $CO_2$ system. The ICMTS is driven by actuator type ICAD 600A-TS.

### CCMT High pressure electronic expansion valves
**for R744 ($CO_2$) / MWP 140 bar / MOPD 90 bar**

| Type | Code No | Connections OD acording to EN 10220 | Flow rate $k_v$ m³/h |
|---|---|---|---|
| **Applications: High Pressure expansion / Gas By-pass / Direct EXpansion evaporator** | | | |
| CCMT 2 | 027H7200 | Weld ½ × ½ in ; Solder ODF ⅝ × ⅝ in | 0.17 |
| CCMT 4 | 027H7201 | | 0.45 |
| CCMT 8 | 027H7202 | | 0.8 |
| CCMT 16 | 027H8231 | Weld 1 × 1 in ; Solder ODF 1 ⅛ x 1 ⅛ in | 1.6 |
| CCMT 24 | 027H8232 | | 2.4 |
| CCMT 30 | 027H8233 | | 3.0 |
| CCMT 42 | 027H8234 | | 4.2 |
| **CCMT 16-42 special version with integrated pressure transmitter** | | | |
| CCMT 16 | 027H7231 | Weld 1 x 1 in ; Solder ODF 1 1/8 x 1 1/8 in | 1.6 |
| CCMT 24 | 027H7232 | | 2.4 |
| CCMT 30 | 027H7233 | | 3.0 |
| CCMT 42 | 027H7234 | | 4.2 |

### CCMT Light High pressure electronic expansion valves
**for R744 ($CO_2$) / MWP 140 bar / MOPD 90 bar**

| Type | Code No | Connections | | Flow rate $k_v$ m³/h |
|---|---|---|---|---|
| **Applications: High pressure expansion / gas by-pass expansion evaporator** | | | | |
| CCMT 3L | 027H7239 | ½ × ½ | | 0,.6 |
| | 027H7240 | | ⅝ × ⅝ | |
| | 027H7241 | | ⅞ × ⅞ | |
| | 027H7273 | ⅜ × ⅜ | | |
| CCMT 5L | 027H7242 | ½ × ½ | | 0.5 |
| | 027H7243 | | ⅝ × ⅝ | |
| | 027H7245 | | ⅞ × ⅞ | |
| | 027H7274 | ⅜ × ⅜ | | |
| CCMT 8L | 027H7275 | ½ v ½ | | 0.8 |
| | 027H7247 | | ⅝ × ⅝ | |
| | 027H7250 | | ⅞ × ⅞ | |
| | 027H7272 | ½ × ½ | | |
| CCMT 10L | 027H7277 | | ⅝ × ⅝ | 1.1 |
| | 027H7278 | | ⅞ × ⅞ | |
| | 027H7279 | | | |

## CTR commercial transcritical heat reclaim 3-way valve for R744 ($CO_2$)

### MWP 140 bar / MOPD 3 bar

| Type | Code No | Connections | Flow rate $k_v$ m³/h |
|---|---|---|---|
| CTR 20 | 027H7244 | Weld 1 × 1 in ; Solder ODF 1 1/8 × 1 1/8 in | 20 |

## ICMTS high pressure electronic expansion valves

### for R744 ($CO_2$) / MWP 140 bar / MOPD 90 bar

### Applications: High pressure expansion / Gas by-pass / Direct expansion evaporator

| Type | Code No | Connections | Flow rate $k_v$ m³/h |
|---|---|---|---|
| **To complete ICMTS 20 valves it is necessary to order: valve and motor** | | | |
| ICMTS 20-A33 | 027H1084 | DIN butt weld DN 25 / 1in | 0.19 |
| ICMTS 20-A | 027H1085 | | 0.59 |
| ICMTS 20-B66 | 027H1093 | | 1.6 |
| ICMTS 20-B | 027H1086 | | 2.4 |
| ICMTS 20-C | 027H1087 | | 4.6 |
| **To complete ICMTS 50/80 valves it is necessary to order: function module, SVL-140B housing and motor** | | | |
| ICMTS 50A | 027H3510 | Function module DN 50 | 9.0 |
| ICMTS 80A | 027H3511 | Function module DN 80 | 18.0 |
| ICMTS 80B | 027H3512 | | 27.0 |

| Type | Code No | Housing description | Connections | |
|---|---|---|---|---|
| SVL 140B | 148B5861 | SVL-140B 50 A/D ANG | Butt-weld DN 50 EN 10216-2 | Butt-weld 2" ANSI B36.10 SCH 80 |
| | 148B5862 | SVL-140B 50 A/D STR | | |
| | 148B6861 | SVL-140B 50 SA/SD ANG | Brazing 54mm EN1254-5 | Brazing 2 1/8" ANSI B16.50 |
| | 148B6862 | SVL-140B 50 SA/SD STR | | |
| | 148B5971 | SVL-140B 80 A/D ANG | Butt-weld DN 80 EN 10216-2 | Butt-weld 3" ANSI B36.10 SCH 80 |
| | 148B5972 | SVL-140B 80 A/D STR | | |

| | | | |
|---|---|---|---|
| ICAD 600B-TS | 027H0496 | With display | Ethernet communication |
| | 027H0495 | | RS 485 communication |
| | 027H0499 | Without display | Ethernet communication |
| | 027H0498 | | RS 485 communication |

Important: connection cables are not included.

## CCM medium pressure electronic expansion valves

### for R744 ($CO_2$) / MWP 90 bar / MOPD 50 bar

### Applications: Gas by-pass / Direct expansion evaporator

| Type | Code No | Connections OD according to EN 10220 | Flow rate $k_v$ m³/h |
|---|---|---|---|
| CCM 10 | 027H7188 | Weld ½ x ½ in ; Solder ODF 5/8 x 5/8 in | 0.8 |
| CCM 20 | 027H7187 | | 1.7 |
| CCM 30 | 027H7186 | Weld 1 x 1 in ; Solder ODF 1 1/8 x 1 1/8 in | 2.5 |
| CCM 40 | 027H7185 | | 4.2 |

## ICM electronic expansion valves
### for R744 ($CO_2$) / MWP 65 bar / MOPD 52 bar

### Applications: Gas by-pass / Direct expansion evaporator

| Type | Flow rate $k_v$ m³/h | Connections | | | | | |
|---|---|---|---|---|---|---|---|
| **To complete ICM valves it is necessary to order: valve and motor. See data sheet for all variants** | | | | | | | |
| | | Butt-weld DIN (EN 10220) | | Butt-weld ANSI (B 36.10) | | Solder ANSI B16.22/EN1254-1 | |
| | | 20 D (¾ in) | 25 D (1 in) | 20 A (¾ in) | 25 A (1 in) | 22 SA (⅞ in) | 22 SD (¾ in) |
| ICM 20-A | 0,6 | 027H1030 | 027H1020 | 027H1035 | | 027H1050 | 027H1045 |
| ICM 20-B | 2,4 | 027H1031 | 027H1021 | 027H1036 | | 027H1051 | 027H1046 |
| ICM 20-C | 4,6 | 027H1032 | 027H1022 | | 027H1025 | 027H1052 | 027H1047 |
| | | 25 D (1 in) | 40 D (1 ½ in) | | 25 A (1 in) | 28 SA (1 ⅛ in) | 28 SD (1 ⅛ in) |
| ICM 20-A | 6 | 027H2000 | 027H2016 | | 027H2002 | 027H2010 | 027H2008 |
| | | 32 D (1 ¼ in) | 40 D (1 ½ in) | | 32 A (1 ¼ in) | | 35 SD (1 ⅜ in) |
| ICM 32-A | 9 | 027H3000 | 027H3012 | | 027H3002 | | 027H3006 |
| ICAD 600B | 027H0486 | With display | | | Ethernet communication | | |
| | 027H0485 | | | | RS 485 communication | | |
| | 027H0489 | Without display | | | Ethernet communication | | |
| | 027H0488 | | | | RS 485 communication | | |

Important:
- Connection cables are not included.
- ICAD 600B is for ICM valves and NOT for ICMTS

### Accessories

| Type | Code No | Description | Packing format |
|---|---|---|---|
| **CCM / CCMT / CTR valves accessories** | | | |
| Cable PVC | 034G7073 | 2m ; SR-PVC cable with M12 connector | 1 |
| | 034G7074 | 8m ; SR-PVC cable with M12 connector | 1 |
| Packard cable | 064G0950 | 10m ; Cable for DST 310 pressure transmitter | 1 |
| | 064G0910 | | 14 |
| Gasket | 027H7230 | O-ring spare part kit for CCM / CCMT 2 – CCMT 42 | 1 |
| AST-G | 034G0013 | Service Driver; used to manually open or close valve | |
| **ICMTS/ICM valves accessories** | | | |
| | 027H0180 | Mutli-function tool for manual operation ICM 20-32 | |
| | 027H0181 | Mutli-function tool for manual operation ICM 40-65 | |
| ICAD-UPS | 027H0388 | Fail safe supply Battery / UPS* 19V dc | |

| Length | Code No | Description |
|---|---|---|
| **ICAD B cable set** | | |
| 1,5 m | 027H0464 | 3x cables (power supply, control signal and data communication) |
| 3 m | 027H0465 | |
| 10 m | 027H0466 | |
| 15 m | 027H0467 | |
| **ICAD A and ICAD B cable set** | | |
| 1,5 m | 027H0426 | 2x cables (power supply and control signal) |
| 3 m | 027H0438 | |
| 10 m | 027H0427 | |
| 15 m | 027H0435 | |
| | 027H0428 | Service kit ICAD 600B (10 pcs of o-rings for magnetic coupling) |
| | 027H0429 | Service kit ICAD 1200B and ICAD 600B-TS (10 pcs of o-rings for magnetic coupling) |
| | 027H0468 | ICAD-B Protective cover |

## $CO_2$ Multi Ejectors™

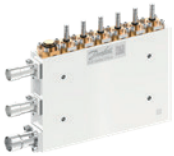
### MWP 140 bar / MOPDF 90 bar

The complete Danfoss Multi Ejector™ solution consists of a block of 4-6 fixed capacity ejector cartridges of different size and an AK-PC 782AB controller. The capacity is matched by using different binary combinations of the ejector cartridges activated by switching on/off the respective solenoid coils.
An ejector is a device that uses expansion energy of high pressure gas to compress/pump another fluid (gas or liquid).

- High Pressure (HP) gas ejector block is designed for transcritical $CO_2$ systems with parallel compressors. Allows compressing part of the MT suction gas directly to the liquid receiver. The IT compressors load is increased and MT compressors load decreased.
- Low Pressure (LP) gas ejector block is designed for transcritical $CO_2$ systems without parallel compressors. Under special conditions all MT suction gas i is pre-compressed in the ejector block and the pressure at the MT compressors inlet is increased.
- Liquid ejector block (LE) is designed for the systems with evaporators controlled by AK-CC55 and Adaptive Liquid Control superheat algorithm. The LE ejector removes liquid separated in MT suction accumulator and pumps it into the $CO_2$ liquid receiver. Intended for use in Danfoss CALM ($CO_2$ Adaptive liquid Management) systems which allows MT compressors to operate at a higher suction pressure.

Fully integrated solution not requiring any additional components like check valves or motorized ball valves.

- Fully serviceable – wide range of spare parts and accessories.
- Easily accessible strainer / filter for fast maintenance.



| Type | Code No | Description | Capacity kg/h [1] | Block |
|---|---|---|---|---|
| HP 1875 | 032F5673 | CTM High Pressure lift Gas $CO_2$ ejector | 1.875 | CTM 6 |
| HP 2875 | 032F5698 | | 2.875 | |
| HP 3875 | 032F5674 | | 3.875 | |
| LP 935 | 032F5678 | CTM Low Pressure lift Gas $CO_2$ ejector | 935 | CTM 6 |
| LP 1435 | 032F5693 | | 1.435 | |
| LP 1935 | 032F5679 | | 1.935 | |
| LE 200 | 032F5683 | CTM Liquid $CO_2$ ejector | 200 | CTM 1 |
| LE 400-1 | 032F5684 | | 400 | |
| LE 400-2 | 032F5694 | | 400 | CTM 2 |
| LE 600 | 032F5685 | | 600 | |
| LE 800 | 032F5695 | | 800 | |
| HP 1875 LE400 | 032F5675 | CTM Combi HP/LE $CO_2$ ejector | 2.275 | CTM 6 |
| HP 2875 LE200 | 032F5676 | | 3.075 | |
| HP 2875 LE400 | 032F5677 | | 3.275 | |

*1) Motive pressure at 90 bar(a) ; temperature out of gas cooler 35 °C; Pressure in the receiver 35 bar(a)*

**Coils**

| | | |
|---|---|---|
| AS230CS | 042N7601 | Coil 230V / 50Hz / 8W with DIN plug |
| AZ120CS | 042N4202 | Coil 110-120V / 50Hz / 8,5W with DIN plug |
| DIN plug (LED) | 042N0265 | Only for AS230CS |
| DIN plug | 042N1256 | DIN plug – IP67 |

# 5. Subcritical expansion valves

**AKV 10P / AKV 10PS pulse width modulation electronic expansion valves for R744 ($CO_2$)**
**MWP 90 bar / MOPD 35 bar**

ADAP-KOOL® valves, AKV 10P and AKV 10 PS are electronically operated expansion valves designed for refrigeration plants. The AKV 10P and AKV 10PS valves are normally controlled by a controller from Danfoss range of ADAP- KOOL® controllers, that ensures a precise liquid injection into evaporators.
Precise control of liquid injection

- Optimum utilization of the evaporator
- Increased energy efficiency and COP
- Enables energy saving minimum stable superheat and adaptive defrost algorithms due to turbulent flow
- Provides excellent distribution and oil return
- Soft pulse operation makes possible to have a low noise valve
- Fully Serviceable valve

| Type | Code No [in] | | Code No [mm] | | Flow rate $k_v$ m³/h | Rated capacity R744 kW | |
|---|---|---|---|---|---|---|---|
| **Direct operated valve AKV 10P** | | | | | | **Refrigeration** | **Freezing** |
| AKV 10P0 | 068F5210 | 3/8 × 1/2 | 068F5200 | 10 × 12 | 0.003 | 0.40 | 0.63 |
| AKV 10P1 | 068F5211 | 3/8 × 1/2 | 068F5201 | 10 × 12 | 0.009 | 1.17 | 1.84 |
| AKV 10P2 | 068F5212 | 3/8 × 1/2 | 068F5202 | 10 × 12 | 0.016 | 2.06 | 3.25 |
| AKV 10P3 | 068F5213 | 3/8 × 1/2 | 068F5203 | 10 × 12 | 0.024 | 3.14 | 4.87 |
| AKV 10P4 | 068F5214 | 3/8 × 1/2 | 068F5204 | 10 × 12 | 0.046 | 6.10 | 9.64 |
| AKV 10P5 | 068F5215 | 3/8 × 1/2 | 068F5205 | 10 × 12 | 0.064 | 8.49 | 13.41 |
| AKV 10P6 | 068F5216 | 3/8 × 1/2 | 068F5206 | 10 × 12 | 0.114 | 15.14 | 23.90 |
| AKV 10P7 | 068F5217 | 1/2 × 5/8 | 068F5207 | 12 × 16 | 0.214 | 24.58 | 38.80 |
| AKV 10P8 | 068F5218 | 1/2 × 5/8 | 068F5208 | 12 × 16 | 0.250 | 33.26 | 52.43 |
| **Servo operated valve AKV 10PS** | | | | | | **Refrigeration** | **Freezing** |
| AKV 10PS4 | 068F4044 | 3/8 × 1/2 | 068F4034 | 10 × 12 | 0.046 | 6.10 | 9.64 |
| AKV 10PS5 | 068F4045 | 3/8 × 1/2 | 068F4035 | 10 × 12 | 0.064 | 8.49 | 13.41 |
| AKV 10PS6 | 068F4046 | 3/8 × 1/2 | 068F4036 | 10 × 12 | 0.114 | 15.14 | 23.90 |
| AKV 10PS7 | 068F4047 | 1/2 × 5/8 | 068F4037 | 12 × 16 | 0.214 | 24.58 | 38.80 |
| AKV 10PS8 | 068F4048 | 1/2 × 5/8 | 068F4039 | 12 × 16 | 0.250 | 33.26 | 52.43 |

*Important note: Filter < 40 micron strainer is required in front of AKV 10 PS*

Rated capacities are based on:
Receiver temperature trec = 0 °C / 32 °F
Evaporating temperature Refrigeration te = -10 °C / 14 °F
Evaporating temperature Freezing te = -30 °C / -22 °F
Subcooling = 1°C / 1.8 °F

| | | | MOPD | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AKV 10P | | | | | AKV 10PS |
| **Power** | **Code No** | **Supply voltage** | **0 to 3** | **4** | **5** | **6** | **7 to 8** | **4 to 8** |
| **AC coils – with terminal box, IP 67** | | | | | | | | |
| 17 W | 018F6732 | 230 V ac 50Hz | 35 | 25 | 25 | 25 | 14 | 35 |
| **AC coils – with 1m cable, IP 67** | | | | | | | | |
| 17 W | 018F6282 | 230 V ac 50Hz | 35 | 25 | 25 | 25 | 14 | 35 |

| | | | AKV 10P | | | | | | AKV 10PS |
|---|---|---|---|---|---|---|---|---|---|
| **Power** | **Code No** | **Supply voltage** | **0 to 2** | **3** | **4** | **5** | **6** | **7 to 8** | **4 to 8** |
| **AC coils – with terminal box, IP 67** | | | | | | | | | |
| 19W | 018F6905 | 230 V ac 50Hz | 70 | 55 | 40 | 55 | 30 | 18 | 55 |

## TE2 Thermostatic expansion valves
### for R744 ($CO_2$) / MWP 90bar / MOPD 60bar

With this new TE2 version for $CO_2$, the use of a manual TXV together with a simpler case controller, create the unique possibility for building a $CO_2$ system, with a lower initial investment.

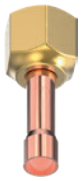
- Equally applicable in MT and LT applications
- Supplied with MOP (Max. Operating Pressure)
- Interchangeable orifice assembly
- Stainless steel 1.5 capillary tube
- Connection Flare x Solder
- To enable system thightness it is mandatory to use Danfoss solder adapter

| Type | Code No [in] | | Code No [mm] | | Range N °C | MOP °C |
|---|---|---|---|---|---|---|
| TE2 | 068Z2900 | 3/8 × ½ | 068Z2901 | 10 × 12 | - 40 to 0 | 5 |

| Orifice no | Code No | Rated capacity R744 kW | |
|---|---|---|---|
| | | Refrigeration | Freezing |
| CZ | 068Z2100 | 1.44 | 1.66 |
| CY | 068Z2101 | 1.97 | 2.23 |
| CX | 068Z2102 | 2.19 | 2.42 |
| C0 | 068Z2103 | 3.46 | 4.23 |
| 01 | 068-2091 | 5.58 | 6.75 |
| 02 | 068-2092 | 10.6 | 11.6 |
| 03 | 068-2093 | 15 | 16.4 |

Rated capacities are based on:
Receiver temperature trec = 0 °C / 32 °F
Evaporating temperature Refrigeration te = -10 °C / 14 °F
Evaporating temperature Freezing te = -30 °C / -22 °F
Subcooling = 1°C / 1.8 °F

**Solder adaptor without orifice assembly and filter**



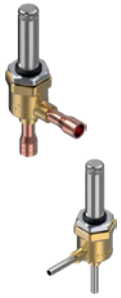
| Code No | Connection ODF solder |
|---|---|
| 068-2060 | 3/8 in |
| 068-2062 | ¼ in |
| 068-2061 | 10 mm |
| 068-2063 | 6 mm |

# 6. Solenoid valves

## EVT Solenoid Valves for R744 ($CO_2$) / MWP 140 bar

EVT high pressure range is a direct or servo operated valve specially designed for $CO_2$ transcritical refrigeration systems. They can be applied in following applications:

- EVT 1.2 direct operated for oil return, pressure equalization/relief control, high pressure hot gas bypass/dump and hot gas defrost.
- EVT 2.0 and 3.0 servo operated for high pressure hot gas bypass/dump and hot gas defrost application.



| Type | Code No | Connection | | MWP bar | Flow rate $k_v$ m³/h | MOPD Min | MOPD Max |
|---|---|---|---|---|---|---|---|
| | | ODF Cooper | ODM SS | | | | |
| EVT 1.2 | 068F0600 | ⅜ in | - | 140 | 0.05 | 0 bar | 110 bar |
| | 068F0622 | - | 6mm | | | | |
| EVT 2.0 | 068F0601 | ⅜ in | - | | 0.10 | 2 bar | |
| | 068F0628 | - | 6mm | | | | |
| EVT 3.0 | 068F0611 | ⅜ in | - | | 0.23 | | |
| | 068F0620 | - | 6mm | | | | |

### Coils for EVT

**Solenoid coil with DIN spade and protection cap IP20**

| | | |
|---|---|---|
| BE230AS | 018F6176 | Coil 230V / 50Hz / 12W |
| DIN plug | 042N1256 | |

**Solenoid coil with terminal box IP67**

| | | |
|---|---|---|
| BE230AS | 018F6701 | Coil 230V / 50Hz / 12W |

## EVUL Solenoid Valves for R744 ($CO_2$) / MWP 90 bar

EVUL solenoid valves are specially designed to fit into compact systems. The valves are compact and lightweight. They are fully hermetic and of stainless steel construction for excellent leak protection. You will find the EVUL solenoid valves sturdy and easy to fit into most applications.

| Type | Code No | Connection | | MWP bar | Flow rate $k_v$ m³/h | MOPD Min | MOPD Max |
|---|---|---|---|---|---|---|---|
| EVUL 1 | 032F9506 | ¼ in | – | 90 | 0.1 | 0.02 bar | 36 bar |
| | 032F9508 | – | 6mm | | | | |
| EVUL 2 | 032F9510 | ¼ in | – | | 0.2 | | |
| | 032F9516 | – | 6mm | | | | |
| EVUL 3 | 032F9511 | ¼ in | – | | 0.3 | | |
| | 032F9517 | – | 6mm | | | | |
| EVUL 4 | 032F9512 | ¼ in | – | | 0.5 | | |
| | 032F9518 | – | 6mm | | | | |
| EVUL 5 | 032F9513 | ⅜ in | – | | 0.65 | | |
| | 032F9519 | – | 10mm | | | | |
| EVUL 6 | 032F9514 | ½ in | – | | 0.75 | | |
| | 032F9521 | – | 12mm | | | | |
| EVUL 8 | 032F9515 | ½ in | – | | 0.9 | | |
| | 032F9522 | – | 12mm | | | | |

## EVU Solenoid Valves for R744 ($CO_2$) / MWP 70 bar

EVU solenoid valves are designed to fit into compact refrigeration systems. Available in direct and servo operated versions, they can be applied in liquid, suction, and hot gas lines. They feature:

- Semi-hermetic construction.
- Metallic sealing between armature tube and valve body.
- Bi-metal connections to the brass housing.

| Type | Code No | Connection | | MWP bar | Flow rate $k_v$ m³/h | MOPD Min | MOPD Max |
|---|---|---|---|---|---|---|---|
| EVU 1 | 032F9524 | ¼ in | – | 70 | 0.10 | 0 bar | 24 bar |
| EVU 2 | 032F9529 | – | 6mm | | 0.20 | 0.02 bar | 36 bar |
| EVU 3 | 032F9525 | ¼ in | – | | 0.30 | | |
| | 032F9530 | – | 6mm | | | | |
| EVU 4 | 032F9531 | – | 10mm | | 0.50 | | |
| EVU 5 | 032F9526 | ⅜ in | – | | 0.65 | | |
| | 032F9532 | – | 10mm | | | | |
| EVU 6 | 032F9527 | ⅜ in | – | | 0.80 | | |
| | 032F9528 | ½ in | – | | | | |
| | 032F9533 | – | 12mm | | | | |

### Coils for EVUL and EVU

| Type | Code No | Description |
|---|---|---|
| AS230CS | 042N7601 | Coil 230V / 50Hz / 8W with DIN spade |
| DIN plug | 042N1256 | DIN plug – IP67 |
| AU230CS | 042N7651 | Coil 230V / 50Hz / 7W with 1 m cable, IP 67 |

# 7. Sensors

## Pressure transmitters

ADAP-KOOL® sensors, AKS 2050 ratiometric pressure transmitters convert measured pressure to a linear output and are designed specifically for $CO_2$ pressure ranges.

DST P310 with integrated pulse-snubber is designed for use in hydraulic applications with severe media influences like cavitation, liquid hammer or pressure peaks, and offers a reliable pressure measurement, even under harsh environmental conditions.

| Type | Operating range (bar) | MWP bar | Compensated temp. range (°C) | G3/8A | ¼ in NPT | ⅜ solder | ¼ in female flare* |
|---|---|---|---|---|---|---|---|
| AKS 32R | -1 to +59 | 100 | -30 to +40 °C | | | | 060G6810 |
| AKS 2050 | -1 to +59 | 100 | -30 to +40 °C | 060G5750 | 060G6342 | 060G6408 | |
| AKS 2050 | -1 to +99 | 150 | -30 to +40 °C | 060G5751 | 060G6343 | | |
| AKS 2050 | -1 to +159 | 250 | 0 to + 80 °C | 060G5752 | 060G6344 | | |

** with valve depressor*

| | |
|---|---|
| 060G1034 | DIN Plug with 5m cable (EN175301-803), mounted on pressure transmitter obtains IP67 |
| 060G0007 | DIN Plug PG11 (EN175301-803), obtains IP65 |
| 060G0008 | DIN Plug PG9 (EN175301-803), obtains IP65 |

| | |
|---|---|
| 017-436866 | Connector with nipple; G 3/8 connector, nipple and washer (10 mm o.d. × 6.5 mm i.d.) for brazing |
| 017-422966 | Connector with nipple; G 3/8 connector, nipple and washer (10 mm o.d. × 6.5 mm i.d.) for welding |

**Slim-line pressure transmitters with pulse-snubber; connector type Packard**

| | | | | | |
|---|---|---|---|---|---|
| DST P310 | -1 to +159 | 250 | -40 to 125 °C | 076G1021 | |
| DST P310 | -1 to +159 | 250 | -40 to 125 °C | | 076G1023 |

**Packard cable for DST P310 pressure transmitter**

| | |
|---|---|
| 064G0950 | 10 m ; multi pack |
| 064G0910 | 10 m ; Ind. Package 14 pcs |
| 060G8246 | 5 m ; multi pack |
| 060G8245 | 5 m ; Ind. Package 20 pcs |

## Temperature sensors Pt 1000

| Type | Code No | Purpose | Sensor range °C | Length m | Pack qty. | Pack format |
|---|---|---|---|---|---|---|
| AKS 11 | 084N0003 | Superheat and air sensor for control & monitoring | -50 to +100 °C | 3.5 | 70 | M-Pack |
| | 084N0005 | | | 5.5 | 60 | |
| | 084N0008 | | | 8.5 | 50 | |
| | 084N0027 | | | 3.5 | 110 | I-Pack |
| | 084N0028 | | | 5.5 | 70 | |
| | 084N0029 | | | 8.5 | 50 | |
| AKS 12 | 084N0036 | Air temperature sensor for monitoring | -40 to +100 °C | 1.5 | 50 | M-Pack |
| | 084N0046 | | | 5.5 | 30 | |
| | 084N0035 | | | 1.5 | 30 | I-Pack |
| | 084N0039 | | | 3.5 | 30 | |
| | 084N0038 | | | 5.5 | 30 | |
| AKS 21M | 084N2003 | Multipurpose sensor | -70 to +180 °C | 2.5 | 72 | M-Pack |
| AK-HS 1000 | 084N1007 | HACCP sensor | -50 to +50 | 5.5 | 20 | M-Pack |

## Temperature sensors NTC 10K for EKE, MCX, AK-RC

**EKS 221 is an NTC cable sensor with nominal resistance 10.000 ohm at 25°C**

| Type | Code No | Purpose | Sensor range °C | Length m | Pack qty. | Pack format |
|---|---|---|---|---|---|---|
| EKS 221 | 084N3210 | Temperature sensor NTC 10k, Thermo plastic rubber | -50 to 120 °C | 3.5 | 20 | M-Pack |
| | 084N3209 | | | 8.5 | 20 | |
| | 084N3206 | | | 3.5 | 150 | I-Pack |
| | 084N3207 | | | 5.5 | 80 | |
| | 084N3208 | | | 8.5 | 50 | |
| EKS 221 | 084N3200 | Temperature sensor NTC 10k , Steel AISI 304 | -50 to 110 °C | 1.5 | 150 | I-Pack |

## Temperature sensors NTC 5K for EKC

**EKS 211 is an NTC cable sensor with nominal resistance 5.000 ohm at 25°C**

| Type | Code No | Purpose | Sensor range °C | Length m | Pack qty. | Pack format |
|---|---|---|---|---|---|---|
| EKS 211 | 084N1220 | Temperature sensor NTC 5K PBT (Thermo-Plastic Polyester) | -40 to 80°C | 1.5 | 20 | M-Pack |
| | 084N1221 | | | 3.5 | 20 | |
| | 084B4403 | | | 1.5 | 150 | I-Pack |
| | 084B4404 | | | 3.5 | 75 | |

## Liquid level sensors

The AKS 4100 / AKS 4100U liquid level sensor is designed specifically to measure refrigerant liquid levels in a wide range of refrigeration applications. The coaxial version is designed for use with R744 ($CO_2$). Can be connected directly to AK-PC 7xx pack controller and used for liquid refrigerant level measurement (for example for flooded evaporator control system).

| Type | Code No 1) | Code No 2) | Code No 3) | Probe length mm | Bottom dead zone mm |
|---|---|---|---|---|---|
| AKS 4100 - Coaxial D22 | 084H4572 | 084H4573 | 084H4574 | 280 | 60 |
| AKS 4100 - Coaxial D14 | 084H4510 | 084H4560 | 084H4503 | 500 | 170 |
| | 084H4511 | 084H4561 | 084H4504 | 800 | |
| | 084H4512 | 084H4562 | 084H4505 | 1000 | |
| | 084H4513 | 084H4563 | 084H4506 | 1200 | |
| | 084H4514 | 084H4564 | 084H4507 | 1500 | |
| | 084H4515 | 084H4565 | 084H4508 | 1700 | |
| | 084H4516 | 084H4566 | 084H4509 | 2200 | |

1) With HMI English (default), German, French and Spanish
2) With HMI English (default), Japanese, Chinese and Russian
3) Code no. without HMI

| 1) | 2) | |
|---|---|---|
| 084H4540 | 084H4590 | AKS 4100/4100 HMI Service/Display unit with rear cover and mounting bracket |
| 084H4548 | 084H4598 | AKS 4100/4100 HMI Display (usualy spare part) |

## Danfoss DGS gas detectors

DGS detectors can be used in stand-alone or integrated systems, where continuous realtime, automatic monitoring with DanfossADAP-KOOL® Refrigeration Control & Monitoring System and/or Building Management Systems is applied.

DGS supports our customers in complying with environmental F-Gas Regulations and Health & Safety requirements.

**Integrated MODBUS communication**
**Enclosure rate IP 65**

| Type | Code No | Refrigerant | Temperature range (°C) | Alarm threshold | Bell & Light |
|---|---|---|---|---|---|
| DGS-SC HFC | 080Z2803 | grp 1 | -35 to +60°C | 500 ppm | No |
| | 080Z2804 | grp 2 | | | |
| | 080Z2805 | grp 3 | | | |
| DGS-PE | 080Z2806 | R290 (propane) | -30 to +60°C | 800 ppm | |
| DGS-IR CO2 | 080Z2800 | R744 (CO2) | -35 to +50°C | 5000 ppm | |
| | 080Z2801 [1] | | | | |
| | 080Z2802 [2] | | | | |
| DGS-SC HFC | 080Z2809 | grp 1 | -35 to +60°C | 500 ppm | Yes |
| | 080Z2810 | grp 2 | | | |
| | 080Z2811 | grp 3 | | | |
| DGS-PE | 080Z2812 | R290 (propane) | -30 to +60°C | 800 ppm | |
| DGS-IR $CO_2$ | 080Z2807 | R744 (CO2) | -35 to +50°C | 5000 ppm | |
| | 080Z2808 [1] | | | | |

[1] 5m sensor cable
[2] 2x5m sensor cable
HFC grp 1: R1234ze, R454C, **R1234yf**, R452A, R454A, R455A, R454B, R513A
HFC grp 2: R407F, R416A, R417A, R407A, R422A, R427A, R449A, R437A, **R134a**, R438A, R422D
HFC grp 3: R448A, R125, R404A, R32, R507A, R434A, R410A, R452B, **R407C**, R143B
**Bold = calibration gas**

**Spare sensors**

| Code No. | Description |
|---|---|
| 080Z2815 | Spare sensor HFC grp 1 |
| 080Z2816 | Spare sensor HFC grp 2 |
| 080Z2817 | Spare sensor HFC grp 3 |
| 080Z2818 | Spare sensor R290 (porpane) |
| 080Z2813 | Spare sensor R744 ($CO_2$) |
| 080Z2814 | Spare sensor R744 (CO2) - 5m |

**Accessories**

| Code No. | Description |
|---|---|
| 080Z2820 | Hand-held Service Tool |
| 080Z2819 | Strobe & Horn |
| 148H6226 | Splash guard |
| 148H6236 | Duct set |
| 148H6232 | Calibration adaptor |
| 148H6238 | Remote kit |

## Miscelaneous sensors

| Code No. | Type |
|---|---|
| 080Z2172 | AK-PHOTO OD |
| 080Z2177 | AK-PHOTO-ID |
| 080Z2171 | EMHS-3-1 |

# 8. Line components

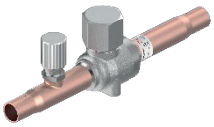
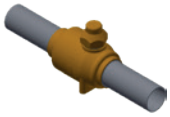
Danfoss ball valves, type GBC, are manually operated shut-off valves suitable for bi-directional flow. The GBC valves are used in liquid, suction and hot gas lines. The design, the welding and the sealing material vouch for a safe construction suited for even the most demanding requirements.

## GBCT Shut-off ball valves
### for R744 ($CO_2$) / MWP 140 bar

| Type | Code No | Type | Code No | Connection ODF x ODF | Flow rate $k_v$ m³/h | MWP bar |
|---|---|---|---|---|---|---|
| **Without access port**  | | **With access port**  | | | | |
| **Solder ODF/ODF, copper connections** | | | | | | |
| GBCT 6s | 009L6415 | GBCT 6s | 009L6581 | ¼ in | 0.9 | 140 |
| GBCT 10s | 009L6416 | GBCT 10s | 009L6581 | ⅜ in | 3.7 | |
| GBCT 12s | 009L6417 | GBCT 12s | 009L6585 | ½ in | 5.4 | |
| GBCT 16s | 009L6418 | GBCT 16s | 009L6586 | ⅝ in | 10.4 | |
| GBCT 18s | 009L6419 | GBCT 18s | 009L6588 | ¾ in | 16.6 | |
| GBCT 22s | 009L6420 | GBCT 22s | 009L6589 | ⅞ in | 23.7 | |
| GBCT 28s | 009L6406 | GBCT 28s | 009L6451 | 1 ⅛ in | 42.3 | |
| GBCT 35s | 009L6410 | GBCT 35s | 009L6453 | 1 ⅜ in | 67.1 | |
| GBCT 42s | 009L6411 | GBCT 42s | 009L6454 | 1 ⅝ in | 83.1 | |
| GBCT 54s | 009L6412 | GBCT 54s | 009L6456 | 2 ⅛ in | 171.3 | |

| Type | Code No | Connections NPS in | Connection ODF x ODF | Flow rate $k_v$ m³/h | MWP bar |
|---|---|---|---|---|---|
| **Butt weld, stainless steel connections. With access port.** | | | | | |
| GBCT 10 D | 009L6701 | - | 10.2 | 3.5 | 140 |
| GBCT 13 D | 009L6702 | - | 13.5 | 4.2 | |
| GBCT 17 D | 009L6703 | - | 17.2 | 8.9 | |
| GBCT 21 D | 009L6704 | - | 21.3 | 18 | |
| GBCT 27 D | 009L6705 | - | 26.9 | 36 | |
| GBCT 34 D | 009L6706 | 1 | 33.7 | 64 | |
| GBCT 42 D | 009L6707 | 1.25 | 42.4 | 96 | |
| GBCT 48 D | 009L6708 | 1.5 | 48.3 | 169 | |
| GBCT 60 D | 009L6709 | 2 | 60.3 | 202 | |

## GBC 90 bar Shut-off ball valves
### for R744 ($CO_2$) / MWP 90 bar

| Type | Code No | Type | Code No | Connection ODF x ODF | | Flow rate $k_v$ m³/h | MWP bar |
|---|---|---|---|---|---|---|---|
| **Without access port** | | **With access port** | | | | | |
|  | |  | | | | | |
| **Solder ODF/ODF, Cu-plated stainless steel connections** | | | | | | | |
| GBC 6s H | 009L5415 | GBC 6s H | 009L5581 | ¼ in | - | 1.8 | 90 |
| | 009L5395 | | 009L5580 | - | 6 mm | | |
| GBC 10s H | 009L5416 | GBC 10s H | 009L5582 | ⅜ in | - | 7.0 | |
| | 009L5396 | | 009L5583 | - | 10 mm | | |
| GBC 12s H | 009L5417 | GBC 12s H | 009L5585 | ½ in | - | 8.0 | |
| | 009L5397 | | 009L5584 | - | 12 mm | | |
| GBC 16s H | 009L5418 | GBC 16s H | 009L5586 | ⅝ in | 16 mm | 12.4 | |
| **Solder ODF/ODF, copper connections** | | | | | | | |
| GBC 18s H | 009L7419 | GBC 18s H | 009L7588 | ¾ in | - | 31.07 | 90 |
| | 009L7399 | | 009L7587 | - | 18 mm | | |
| GBC 22s H | 009L7420 | GBC 22s H | 009L7589 | ⅞ in | 22 mm | 24.47 | |
|  | | | | | | | |
| **Without access port, butt weld, Stainless steel connections** | | | | | | | |
| GBC 28s H | 009L7406 | - | - | 28 mm | | 96.72 | 90 |
| GBC 35s H | 009L7410 | - | - | 35 mm | | 106.95 | 75 |
| GBC 42s H | 009L7411 | - | - | 42 mm | | 150.98 | |

## NRVT check valves
### for R744 ($CO_2$) / MWP 140 bar

NRVT piston type check valves is designed for installation in discharge line to prevent refrigerant migration to protect compressor and enable the pressure equalization of rotary compressor before startup. In the meanwhile this valve can be used in other installation positions of $CO_2$ systems such as hot gas and suction lines.

| Type | Code No | Connection ODF x ODF | Diff. pressure to start open bar | Fully open bar | Flow rate $k_v$ m³/h | MWP bar |
|---|---|---|---|---|---|---|
| **NRVT with Soft spring** | | | | | | |
| NRVT 10s | 020-6401 | ⅜ in | 0.02 | 0.19 | 1.1 | 140 |
| NRVT 12s | 020-6402 | ½ in | 0.01 | 0.05 | 2.2 | |
| NRVT 16s | 020-6403 | ⅝ in | 0.01 | 0.04 | 3.8 | |
| **NRVT with Hard spring** | | | | | | |
| NRVT 10sH | 020-6411 | ⅜ in | 0.30 | 1.43 | 1.0 | 140 |
| NRVT 12sH | 020-6412 | 1/ in | 0.20 | 1.00 | 2.1 | |
| NRVT 16sH | 020-6413 | ⅝ in | 0.26 | 0.83 | 3.5 | |

## NRV 10s H internal relief check valves
### for R744 ($CO_2$) / MWP 90 bar

NRV 10s H check valves for R744 ($CO_2$) can work as an internal relief valve when installed in parallel with GBCH shut off ball valves or service shut off valves, at the inlet and outlet of components to be serviced. The NRV 10s H can also be used in hot gas defrosting lines.

| Type | Code No | Connection ODF x ODF | | Diff. pressure to start open bar | pressure dropPacross valve | Flow rate $k_v$ m³/h | MWP bar |
|---|---|---|---|---|---|---|---|
| NRV 10s H | 020-4000 | ⅜ in | - | 0.4 bar | 1 bar | 0,9 | 90 |
| | 020-4300 | - | 10 mm | | | | |

## Hermetic filter driers
### for R744 ($CO_2$)

ELIMINATOR® driers have a solid core with binding material held to an absolute minimum. For $CO_2$ applications Danfoss offer one type of ELIMINATOR® core. Type DMSC and DMT driers have a core composition of 100% Molecular Sieve.

## DMT hermetic filter driers
### for R744 ($CO_2$) / MWP 140 bar

| Type | Size cu.in. | Connection in | Code No | MWP bar |
|---|---|---|---|---|
| DMT 082s | 08 | ¼ in | 023Z8415 | 140 |
| DMT 083s | 08 | 3/8 in | 023Z8416 | |
| DMT 084s | 08 | ½ in | 023Z8417 | |
| DMT 133s | 13 | 3/8 in | 023Z8418 | |
| DMT 134s | 13 | ½ in | 023Z8419 | |

## DMSC hermetic filter driers
### for R744 ($CO_2$) / MWP 52 bar

| Type | Size cu.in. | Connection in | Code No | Connection mm | Code No | MWP bar |
|---|---|---|---|---|---|---|
| DMSC 032s | 03 | ¼ in | 023Z8512 | 6 mm | 023Z8501 | 52 |
| DMSC 033s | 03 | 3/8 in | 023Z8500 | - | | |
| DMSC 052s | 05 | - | | 6 mm | 023Z8504 | |
| DMSC 053s | 05 | 3/8 in | 023Z8503 | 10 mm | 023Z8502 | |
| DMSC 083s | 08 | - | | 10 mm | 023Z8505 | |
| DMSC 084s | 08 | ½ in | 023Z8513 | 12 mm | 023Z8506 | |

## DCR filter driers with exchangeable cores
### for R744 ($CO_2$) / MWP 90 bar

| Type | Code No | Number of cores | Solder ODF in | Butt weld mm | Cover type | Packaging | MWP bar |
|---|---|---|---|---|---|---|---|
| DCR 04811B | 023U1008 | 1 | ODF 1 3/8" | - | Plug 1/4" NPT | 1 | 90 |
| DCR 04811dB | 023U1011 | | - | DN 32 | | | |
| DCR 04807B | 023U1014 | | ODF 7/8" | | | | |
| DCR 04807dB | 023U1017 | | - | DN 20 | | | |
| DCR 09613B | 023U0996 | 2 | ODF 1 5/8" | - | | | |
| DCR 09613dB | 023U0999 | | - | DN 40 | | | |
| DCR 09617B | 023U1002 | | ODF 2 1/8" | - | | | |
| DCR 09617dB | 023U1005 | | - | DN 50 | | | |
| DCR 09617dB | 023U1202 | | - | DN 50 | Plug G1/2 | | |
| DCR 04811B | 023U1009 | 1 | ODF 1 3/8" | - | Plug 1/4" NPT | 18 | 90 |
| DCR 04811dB | 023U1012 | | - | DN32 | | | |
| DCR 04807B | 023U1015 | | ODF 7/8" | | | | |
| DCR 04807dB | 023U1018 | | - | DN 20 | | | |
| DCR 09613B | 023U0997 | 2 | ODF 1 5/8" | - | | 12 | |
| DCR 09613dB | 023U1000 | | - | DN 40 | | | |
| DCR 09617B | 023U1003 | | ODF 2 1/8" | - | | | |
| DCR 09617dB | 023U1006 | | - | DN 50 | | | |
| DCR 09617dB | 023U1203 | | - | DN 50 | Plug G1/2 | | |

## Inserts

| Type | M-Pack 3 pcs. with gasket [1] | Industrial pack 8 pcs. | | Description |
|---|---|---|---|---|
| | | with gasket [1] | without gasket | |
| 48-DM | 023U1391 | 023U1392 | 023U1393 | 100% molecular sieve |
| 48-DC | 023U4380 | 023U4381 | 023U4382 | 80% molecular sieve & 20% Al2O3 |
| 48-DA | 023U5380 | 023U5381 | 023U5382 | 30% molecular sieve & 70% Al2O3 |
| 48-F | - | 023U1921 | - | Felt-gasket 15 µm |

# 9. Pressure switches

## CKB Pressure switches
### for R744 ($CO_2$) / MWP 143 bar

Safety pressure switch CKB are compact disc type pressure switches with fixed set-points for long-standing use in all $CO_2$ refrigeration systems. CKB safety pressure switch is used to protect compressor and the system against too high pressure.

CKB safety pressure switch provides excellent performance, ensuring minimal drift of setting and extremely stable operation over the entire lifetime. It provides automatic or manual reset limit protection. PED 2014/68/EU approved; EN 12263.

| Type | Code No | Set pressure bar | Reset type | Contact system | Connection | MWP bar |
|---|---|---|---|---|---|---|
| PSH | 061Z1001 | 40 | Automatic | SPDT | $^{7}/_{16}$ – 20UNF fema le thread with Schrader opener | 143 |
| | 061Z1002 | 46 | | | | |
| | 061Z1003 | 48 | | | | |
| | 061Z1012 | 50 | | | | |
| | 061Z1007 | 54 | | | | |
| | 061Z1004 | 105 | | | | |
| | 061Z1016 | 106 | | | | |
| | 061Z1005 | 108 | | | | |
| | 061Z1011 | 110 | | | | |
| | 061Z1019 | 114 | | | | |
| | 061Z1017 | 117 | | | | |
| | 061Z1021 | 123 | | | | |
| PZH | 061Z2001 | 40 | Manual | | | |
| | 061Z2007 | 46 | | | | |
| | 061Z2002 | 108 | | | | |
| | 061Z2003 | 110 | | | | |
| | 061Z2008 | 118 | | | | |
| | 061Z2006 | 130 | | | | |
| PZHH | 061Z3001 | 120 | Manual with tool | | | |
| | 061Z3002 | 130 | | | | |
| **With extended pressure connector** | | | | | | |
| PSH | 061Z4007 | 40 | Automatic | SPDT | $^{7}/_{16}$ – 20UNF female thread with Schrader opener | 143 |
| | 061Z4008 | 48 | | | | |
| PZH | 061Z5002 | 40 | Manual | | | |
| | 061Z5003 | 46 | | | | |
| | 061Z5004 | 50 | | | | |
| PZHH | 061Z6003 | 130 | Manual with tool | | | |

| | |
|---|---|
| 060G1034 | DIN Plug with 5m cable (EN175301-803), mounted on pressure transmitter obtains IP67 |

| | |
|---|---|
| 060G0007 | DIN Plug PG11 (EN175301-803), obtains IP65 |
| 060G0008 | DIN Plug PG9 (EN175301-803), obtains IP65 |

## KP 6 Pressure switches

### MWP 46.5 bar

KP pressure switche can be used as a protection in suction line of LT compressor in $CO_2$ systems (booster & cascade).
PED 2014/68/EU approved; EN 12263
KP 6W cut in again automatically when the pressure has fallen to the set value minus the differential.
KP 6B can be cut in manually with the external reset button when the in KP6 has fallen 4 bar under the set value.

| Type | Code No | Pressure settings bar | | Reset | Contact system | Connection | MWP bar |
|---|---|---|---|---|---|---|---|
| | | Regulating range | Differential | | | | |
| KP 6W | 060-519066 | 8 - 42 | 4 - 10 | Auto | SPDT | ¼ in. 6 mm flare | 46.5 |
| KP 6B | 060-519166 | 8 - 42 | 4 | Man (Max) | | | |

# 10. Industrial refrigeration control valves for $CO_2$ systems

### ICSH Two-step opening of hot gas lines

**when defrosting or suction lines when equilizing high pressures for $CO_2$ (R744) / MWP 65 bar**

ICSH is used in hot gas lines for the opening of hot gas defrost flow to the evaporator in 2 steps. Both steps are activated by a controller or a PLC energizing the magnetic coils in a time delay sequence.

- Step 1 (approx. 20% of full flow) is to allow a smooth pressure build-up in the evaporator
- The subsequent step 2 opens the flow to 100% to get the full defrost capacity.

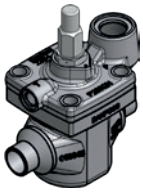
Can also be applied for soft opening of suction line after defrosting. See data sheet for all variants

- Max. working pressure: 65 bar (943 psi)
  Temperature range: -60 °C / +120 °C (-76 °F / +248 °F).

| Type | Flow rate $k_v$ m³/h | Connections | | | |
|---|---|---|---|---|---|
| | | Butt-weld DIN (EN 10220) | | Butt-weld ANSI (B 36.10) | |
| | | 25 D (1in) | 32 D (1¼in) | 25 A (1in) | 32 A (1¼in) |
| ICSH 25-25 | 11.5 | 027H2309 | | 027H2308 | |
| ICSH 32 | 17.0 | | 027H3309 | | 027H3378 |

### ICS with CVP for regulating the pressure

**in hot gas drain lines or when regulating suction pressures in $CO_2$ (R744) / MWP 65 bar**



CVP is a constant-pressure pilot valve with 2 setting ranges for $CO_2$ covering settings of 4 to 52 bar. This pilot valve is used for maintaining a constant pressure on the inlet side of the main valve. When a CVP is mounted in a CVH housing, it can be used as a separate constant-pressure valve or a pressure relief valve (e.g. to prevent hydraulic overpressure in an entrapped liquid). Can also be applied for soft opening of suction line after defrosting. See data sheet for all variants

- Max. working pressure: 65 bar (943 psi)
- Temperature range: -60 °C / +120 °C (-76 °F / +248 °F)

**To complete ICS+CVP it is necessary to order: ICS housing and pilot valve CVP**

| Type | Flow rate $k_v$ m³/h | Connections | | | | | |
|---|---|---|---|---|---|---|---|
| | | Butt-weld DIN (EN 10220) | | Butt-weld ANSI (B 36.10) | | Solder ANSI B 16.22 / EN 1254-1 | |
| | | 20 D (3/4in) | 25 D (1in) | 20 A (3/4in) | 25 A (1in) | 22 SA (7/8in) | 22 SD (3/4in) |
| ICS 25-5 | 1.7 | 027H2028 | 027H2020 | 027H2029 | 027H2021 | 027H2025 | 027H2023 |
| ICS 25-10 | 3.5 | 027H2038 | 027H2030 | 027H2039 | 027H2031 | 027H2035 | 027H2033 |
| ICS 25-15 | 6.0 | 027H2048 | 027H2040 | 027H2049 | 027H2041 | 027H2045 | 027H2043 |
| ICS 25-20 | 8.0 | 027H2058 | 027H2050 | 027H2059 | 027H2051 | 027H2055 | 027H2053 |
| ICS 25-25 | 11.5 | 027H2068 | 027H2060 | - | 027H2061 | 027H2065 | 027H2063 |

| | | 32 D (1 1/4in) | 32 A (1 1/4in) | 35 SD (1 3/8in) |
|---|---|---|---|---|
| ICS 32 | 17 | 027H3020 | 027H3021 | 027H3023 |

| Type | Flow rate $k_v$ m³/h* | Pressure range | Code number |
|---|---|---|---|
| CVP-M | 0,4 | 4 - 28 bar | 027B0921 |
| CVP-H | 0,4 | 25 - 52 bar | 027B0922 |

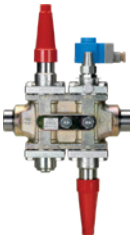
**When mounted in CVH house*

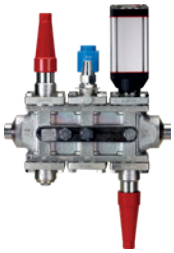
| Type | Flow rate $k_v$ m³/h | Pressure range | Code number |
|---|---|---|---|
| | | ASME B 36.10M, SCH 80 | |
| | | 10 A (3/8 in) | 15 A (½in) |
| CVH | 1.7 | 027F1047 | 027F1090 |

## ICF valve stations for DX systems,
### for R744 ($CO_2$) / MWP 52 bar

ICF valve station incorporates several functions in one housing, which can replace a series of conventional mechanical, electro-mechanical and electronically operated valves. ICF houses come with 2, 4 and 6 stations. This brings simplicity and value to the design, installation, service and maintenance. The ICF valve stations are designed for low and intermediate pressures. See data sheet for all variants.

- Application 5: Liquid injection (expansion) with motor valve
- Application 12: Liquid injection (expansion) with PWM





| | | Station number | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Housing** | **DIN Butt-weld (EN 10220)** | **M1** | **M2** | **M3** | **M4** | **M5** | **M6** | **Code No** | **Flow rate $k_v$ m³/h** |
| ICF 20-4 | 20D | Stop valve | Standard filter | AKV PWM Expansion | Stop valve | – | – | 027L3089 | 0.25 |
| ICF-20-6 | 25D | Stop valve | Standard filter | Solenoid valve | Manual opening | Motor valve | Stop valve | 027L3388 | 0.20 |
| ICF-20-6 | 25D | Stop valve | Standard filter | Solenoid valve | Manual opening | Motor valve | Stop valve | 027L3036 | 0.59 |
| ICF-20-6 | 32D | Stop valve | Standard filter | Solenoid valve | Manual opening | Motor valve | Stop valve | 027L3374 | 1.4 |
| ICF-25-6 | 40D | Stop valve | Standard filter | Solenoid valve w/m | Blank top cover | Motor valve | Stop valve | 027L4170 | 2.0 |
| ICF-20-6 | 32D | Stop valve | Standard filter | Solenoid High cap w/m | Blank top cover | Motor valve | Stop valve | 027L3390 | 2.0 |
| ICF-25-6 | 40D | Stop valve | Standard filter | Solenoid valve w/m | Blank top cover | Motor valve | Stop valve | 027L4174 | 5.0 |

## ICF valve stations for liquid drain lines
### for R744 ($CO_2$) / MWP 52 bar / MOPD 36 bar

ICF valve station incorporates several functions in one housing, which can replace a series of conventional mechanical, electro-mechanical and electronically operated valves. ICF houses come with 2, 4 and 6 stations. This brings simplicity and value to the design, installation, service and maintenance. The ICF valve stations are designed for low and intermediate pressures. See data sheet for all variants.

Liquid drain method is the most energy efficient method. The method ensures that only liquid condensate is drained back to the suction accumulator and minimizing the hot gas consumption.

Application 102D2: Liquid drain with ICFD float valve.

| | | Station number | | | | |
|---|---|---|---|---|---|---|
| **Housing** | **DIN Butt-weld (EN 10220)** | **M1** | **M2** | **M3** | **M4** | **Code No** |
| ICF 20-4 | 20D | Stop valve | Float valve | Solenoid valve | Stop valve | 027L3601 |
| ICF 20-4 | 25D | Stop valve | Float valve | Solenoid valve | Stop valve | 027L3602 |
| ICF 20-4 | 32D | Stop valve | Float valve | Solenoid valve | Stop valve | 027L3612 |

# 11. Industrial refrigeration line components for $CO_2$ systems

**SVL Flexline 140B parts program**
**for R744 ($CO_2$) / MWP140 bar**

The SVL Flexline 140 bar range for Industrial CO2 Trans-critical Systems is based on the successful modular Standard SVL platform. The same flexibility, simplicity and efficiency are features offered in this new series. See data sheet for all variants.

- Applicable to: R744 (CO2) Sub and Trans critical
- Max. working pressure: 140 bar (2030 psi)
- Max. differential pressure: 110 bar (1595 psi)
- Temperature range: -40 °C to +150 °C (-40 °F to + 302 °F)
- Fast and easy valve overhaul service. It is easy to replace the top part and no welding is needed FIA-140B
- Strainer inserts are available as pleated insert with extra large surface, which ensures long intervals between cleaning and low pressure drop
- A large capacity filter bag can be inserted for cleaning plant during commissioning

**Parts program** **To complete SVA-140B shut-off valve it is necessary to order: Housing and Function module**
**To complete FIA-140B strainer it is necessary to order: Housing, Function module and strainer insert**

## Housing

| Housing size | ANG | | | | STR | | | |
|---|---|---|---|---|---|---|---|---|
| | ANSI | DIN | SA | SD | ANSI | DIN | SA | SD |
| DN 50 / 2" | 148B5861 | 148B5861 | 148B6861 | 148B6861 | 148B5862 | 148B5862 | 148B6862 | 148B6862 |
| DN 65 / 2½" | 148B6908 | 148B6910 | 148B6912 | 148B6914 | 148B6909 | 148B6911 | 148B6913 | 148B6915 |
| DN 80 / 3" | 148B5971 | 148B5971 | | | 148B5972 | 148B5972 | | |
| DN 100 / 4" | 148B6918 | 148B6918 | | | 148B6919 | 148B6919 | | |
| DN 125 / 5" | 148B6922 | 148B6920 | | | 148B6923 | 148B6921 | | |
| DN 150 / 6" | 148B6924 | 148B6924 | | | 148B6925 | 148B6925 | | |

Code numbers may cover more connection types (e.g. A/D) where standards and tolerances allow for it.

## Function modules

| Housing size | SVA-140B [1] | | FIA-140B | |
|---|---|---|---|---|
| DN 50 / 2" | 148B6927 |  | 148B6932 |  |
| DN 65 / 2½" | | | | |
| DN 80 / 3" | 148B6928 | | 148B6933 | |
| DN 100 / 4" | 148B6929 | | 148B6934 | |
| DN 125 / 5" | 148B6930 | | 148B6935 | |
| DN 150 / 6" | 148B6931 | | 148B6936 | |

[1] All SVA-140B top completes are supplied with cap assembled. A handwheel is available as spare parts for the DN 125-150.

**Stainer elements for FIA in 140 bar and 65 bar**

| FIA insert | Pleated strainer insert | | | Filter bag |
|---|---|---|---|---|
| Nom. size | 150µ 100 mesh | 250µ 72 mesh | 500 µ 38 mesh | 50µ |
| 50 | 148H3180 | 148H3185 | 148H3190 | 148H3151 |
| 65 | 148H3180 | 148H3185 | 148H3190 | 148H3151 |
| 80 | 148H3181 | 148H3186 | 148H3191 | 148H3152 |
| 100 | 148H3182 | 148H3187 | 148H3192 | 148H3153 |
| 125 | 148H3183 | 148H3188 | 148H3193 | 148H3154 |
| 150 | 148H3226 | 148H3293 [1] | | 148H3155 |

[1] 60 mesh.

## Accessories for FIA

| For FIA size | Code No | Description |
|---|---|---|
| 65-100 | 148H3447 | Magnet insert |
| 125-150 | 148H3448 | |
| 50-150 | 148H3450 | Blind nut with gasket |

## SVL 65 parts program valves
### for R744 ($CO_2$) / MWP 65 bar

SVL 65 parts program you can build all the functions Shut-Off, Stop/Check, Check, Regulating valve and stainers into one shared valve house. The characteristics of the 65 bar parts program makes it perfectly suited for the requirements of sub critical $CO_2$ (R744) systems. See data sheet for all variants.

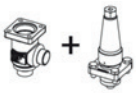
**Parts program** **To complete any 65 bar valve function it is necessary to order: Housing and Function module.**

### Housing

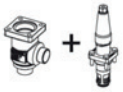
| Butt-weld DIN (EN 10220) | | | Butt-weld ANSI (B 36.10) | | |
|---|---|---|---|---|---|
| Size | ANG | STR | Size | ANG | STR |
| DN 6 | 148B6689 | 148B6693 | ¼" | 148B6687 | 148B6691 |
| DN 10 | 148B6690 | 148B6694 | ⅜" | 148B6688 | 148B6692 |
| DN 15 | 148B6622 | 148B6642 | ½" | 148B6612 | 148B6632 |
| DN 20 | 148B6623 | 148B6643 | ¾" | 148B6613 | 148B6633 |
| DN 25 | 148B6624 | 148B6644 | 1 | 148B6614 | 148B6634 |
| DN 32 | 148B6625 | 148B6645 | 1 ¼" | 148B6615 | 148B6635 |
| DN 40 | 148B6626 | 148B6646 | 1 ½" | 148B6616 | 148B6636 |
| DN 50 | 148B6627 | 148B6647 | 2" | 148B6617 | 148B6637 |
| DN 65 | 148B6628 | 148B6648 | 2½" | 148B6618 | 148B6638 |
| DN 80 | 148B6629 | 148B6649 | 3" | 148B6619 | 148B6639 |
| DN 100 | 148B6630 | 148B6650 | 4" | 148B6620 | 148B6640 |
| DN 125 | 148B6631 | 148B6651 | 5" | 148B6621 | 148B6641 |

| SD Solder DIN (EN 1254-1) | | | SA Solder ANSI (B 16.22) | | |
|---|---|---|---|---|---|
| Size | ANG | STR | Size | ANG | STR |
| 6 | 148B6722 | 148B6743 | ¼" | 148B6711 | 148B6732 |
| 10 | 148B6723 | 148B6744 | ⅜"" | 148B6712 | 148B6733 |
| 16 | 148B6724 | 148B6745 | ⅝" | 148B6713 | 148B6734 |
| 22 | 148B6725 | 148B6746 | ⅞" | 148B6714 | 148B6735 |
| 28 | 148B6726 | 148B6747 | 1 ⅛" | 148B6715 | 148B6736 |
| 35 | 148B6727 | 148B6748 | 1 ⅜"" | 148B6716 | 148B6737 |
| 42 | 148B6728 | 148B6749 | 1 ⅝" | 148B6717 | 148B6738 |
| 54 | 148B6718 | 148B6739 | 2 1⅛" | 148B6718 | 148B6739 |
| 64 | 148B6729 | 148B6750 | 2 5⅝" | 148B6719 | 148B6740 |
| 76,1 | 148B6730 | 148B6751 | 3 ⅛" | 148B6720 | 148B6741 |
| 108 | 148B6731 | 148B6752 | 4 ⅛" | 148B6721 | 148B6742 |

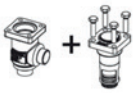
**SVA-S, L & 65BT:**



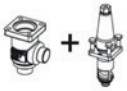
**SCA-X:**



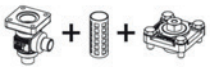
**CHV-X:**



**REG-S & REG-L:**



**FIA:**



## Function modules

| Housing size | SVA-S | SVA-L | SCA-X | CHV-X | REG-SA | REG-SB | FIA |
|---|---|---|---|---|---|---|---|
| 6 | 148B6695 | - | - | - | - | - | - |
| 10 | | - | - | - | 148B5761 | 148B5764 | - |
| 15 | 148B6652 | 148B6659 | 148B5769 | 148B5776 | 148B5762 | 148B5765 | 148B5783 |
| 20 | 148B6652 | 148B6659 | 148B5769 | 148B5776 | 148B5762 | 148B5765 | 148B5783 |
| 25 | 148B6653 | 148B6660 | 148B5770 | 148B5777 | 148B5763 | 148B5766 | 148B5784 |
| 32 | 148B6653 | 148B6660 | 148B5770 | 148B5777 | 148B5763 | 148B5766 | 148B5784 |
| 40 | 148B6653 | 148B6660 | 148B5770 | 148B5777 | 148B5763 | 148B5766 | 148B5784 |
| 50 | 148B6654 | - | 148B5771 | 148B5778 | - | 148B5767 | 148B5785 |
| 65 | 148B6655 | - | 148B5772 | 148B5779 | - | 148B5768 | 148B5786 |
| 80 | 148B6656 | - | 148B5773 | 148B5780 | - | - | 148B5787 |
| 100 | 148B6657 | - | 148B5774 | 148B5781 | - | - | 148B5788 |
| 125 | 148B6658 | - | 148B5775 | 148B5782 | - | - | 148B5789 |

**Stainer elements for FIA in 140 bar and 65 bar**

| FIA insert | Pleated Strainer insert | | | Filter bag |
|---|---|---|---|---|
| Nom. Size | 150µ 100 mesh | 250µ 72mesh | 500µ 38 mesh | 50µ |
| 15-20 | 148H3303 | 148H3363 | - | - |
| 25-40 | 148H3304 | 148H3269 | - | - |
| 50 (65 bar) | 148H3179 | 148H3184 | 148H3189 | 148H3150 |
| 50 (140 bar) | 148H3180 | 148H3185 | 148H3190 | 148H3151 |
| 65 | 148H3180 | 148H3185 | 148H3190 | 148H3151 |
| 80 | 148H3181 | 148H3186 | 148H3191 | 148H3152 |
| 100 | 148H3182 | 148H3187 | 148H3192 | 148H3153 |
| 125 | 148H3183 | 148H3188 | 148H3193 | 148H3154 |
| DN 150 / 6" | 148H3226 | 148H3293(1) | | 148H3155 |
| DN 200 / 8" | 148H3297 | 148H3294(1) | | 148H3156 |

## Accessories for FIA

| For FIA size | Code No | Description |
|---|---|---|
| DN 15-20 | 148H3301 | Removable element µ150 for startup* |
| DN 25-40 | 148H3302 | |
| DN 65-100 | 148H3447 | Magnet insert |
| DN 125-200 | 148H3448 | Magnet insert |
| DN 50-300 | 148H3450 | Blind nut with gasket |
| DN 50-300 | 148B3745 | Purge valve complete |

*Strainer element µ150 with removable element µ50 for the first start up

## SNV-ST 140B Service valve
### for R744 (CO2) / MWP 140 bar

SNV stop gauge are designed as service valves with a very sturdy construction. SNV-ST are made in steel approved for low temperature operations. The new SNV-ST for 140B is specifically designed to meet the increasing market demand for higher pressures in sub and transcritical applications. Ready for $CO_2$ and future high-pressure refrigerants with maximum working pressure of 140 Bar.

| Type | Code No | Bottom branch | "Bottom lenght" | Side branch | Equipment |
|---|---|---|---|---|---|
| SNV-ST | 148B0082 | ¼ MPT | Standard | ¼ FPT | Cap |
| | 148B0084 | G ½ | | G ½ | |

## SNV-ST and SNV-SS 65B Service valve
### for R744 ($CO_2$) / MWP 65 bar

SNV stop gauge are designed as service valves with a very sturdy construction. SNV-ST are made in steel approved for low temperature operations, SVA-SS are stainless steel versions. SNV-ST and SNV-SS are available in cutting ring, welded and threaded connection as well as extended branch length configuration.

| Type | Code No | Bottom branch | Bottom lenght | Side branch | Version |
|---|---|---|---|---|---|
| SNV-ST | 148B6400 | CD10 | Standard | CD10 | Cap |
| | 148B4723 | W½ | 100 mm / 4 in | CD10 | |
| | 148B4571 | W½ | 125 mm / 5 in | G½ | |
| SNV-SS | 148B3750 | ⅜ MPT | - | 3/8 FPT | |
| | 148B3986 | ⅜ MPT | - | 3/8 FPT | |
| | 148B4771 | ¼ MPT | - | ¼ FPT | |
| | 148B4783 | ¼ MPT | - | ¼ FPT | |
| | 148B4693 | CD10 | - | CD10 | |
| | 148B4581 | W½ L50 | 50 mm / 2 in | G½ | |
| | 148B4582 | W½ L150 | 150 mm / 6 in | G½ | |
| | 148B6545 | G½ | - | G½ | Manometer connection |

# 12. Optyma™ $iCO_2$ Condensing units

| Model | Code No | El. code (1) | Comp. Load | Tamb (°C) | Cooling capacity (kW) (2) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Evaporating temperature (°C) | | | |
| | | | | | -15 | -10 | -5 | 0 |
| OP-MPAM005CO | 114X6001 | G | Max speed | 38 | 3.14 | 3.82 | 4.20 | 4.61 |
| | | | | 32 | 3.89 | 4.58 | 5,11 | 5.59 |
| | | | | 27 | 4.46 | 5.16 | 5,76 | 6.30 |
| | | | Min speed | 38 | 1.02 | 1.24 | 1.40 | 1.50 |
| | | | | 32 | 1.26 | .,49 | 1.66 | 1.79 |
| | | | | 27 | 1.45 | 1.68 | 1.87 | 2.05 |

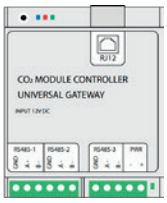
(1) E - Compressor 400V/3~/50Hz, fan 230V/1~/50H

(2) Nominal conditions (EN13215), Evaporating temperatures at Mid point, Superheat 10K, Subcooling 0K

| Model | Code No | El. code (1) | Comp. Load | Tamb (°C) | Cooling capacity (kW) (2) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Evaporating temperature (°C) | | | |
| | | | | | -15 | -10 | -5 | 0 |
| OP-UPAC015COP04E | 114X6003 | E | 90 rps | 38 | 10.18 | 16.31 | 17.77 | 19.08 |
| | | | | 32 | 10.71 | 17.15 | 18,.5 | 20.00 |
| | | | | 27 | 11.16 | 17.98 | 19.67 | 21.17 |
| | | | 40 rps | 38 | 3.85 | 6.49 | 7.22 | 7.90 |
| | | | | 32 | 4.12 | 6.99 | 7.79 | 8.60 |
| | | | | 27 | 4.36 | 7.44 | 8.32 | 9.22 |

(1) E - Compressor 400V/3~/50Hz, fan 230V/1~/50Hz

(2) Nominal conditions (EN13215), Evaporating temperatures at Mid point, Superheat 10K, Subcooling 0K




| Code No | Note |
|---|---|
| 118U5498 | Module controller assembly for managing and connecting OP-UPAC015COP04E to the AK-CC55 Single Coil variants, with dedicated function for oil return." |

# 13. Heat recovery units

The Danfoss Heat Recovery Unit helps to eliminate the technical challenges of managing heat recovery. The HRU is an integrated solution managing and buffering the heat from the $CO_2$ refrigeration pack – to be reused for space heating, hot tap water, or even sold to neighbors or district heating grids.

**Application A1**

Number of buffer tanks: 2
Connection to external heat sourse: Indirect connection.
Possibility of heat resale.

| Heating demand | | | Heat reclaim capacity | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | up to 100 | up to 150 | up to 300 | up to 400 | kW | Capacity [2] |
| Capacity [1] | min. Flow | max. Flow | 0.025 | 0.035 | 0.06 | 0.1 | m³/h | min. Flow |
| kW | m³/h | m³/h | 2.15 | 3.23 | 6.45 | 8.6 | m³/h | max. Flow |
| up to 22 | 0.2 | 0.62 | 146B9108 | 146B9109 | – | – | | |
| up to 54 | 0.43 | 1.55 | 146B9120 | 146B9121 | 146B9122 | 146B9123 | | |
| up to 85 | 0.65 | 2.44 | 146B9126 | 146B9127 | 146B9128 | 146B9129 | | |
| up to 135 | 1.5 | 3.87 | 146B9132 | 146B9133 | 146B9134 | 146B9135 | | |
| up to 216 | 2.5 | 6.2 | 146B9138 | 146B9139 | 146B9140 | 146B9141 | | |
| up to 337 | 4 | 9.66 | 146B9144 | 146B9145 | 146B9146 | 146B9147 | | |
| up to 540 | 4 | 15.49 | 146B9150 | 146B9151 | 146B9152 | 146B9153 | | |

(1) Capacity based on 30K temperature difference

(2) Capacity based on 40K temperature difference

**Application A2**

Number of buffer tanks: 2
Connection to external heat sourse: Indirect connection.

| Heating demand | | | Heat reclaim capacity | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | up to 100 | up to 150 | up to 300 | up to 400 | kW | Capacity [2] |
| Capacity [1] | min. Flow | max. Flow | 0.025 | 0.035 | 0.06 | 0.1 | m³/h | min. Flow |
| kW | m³/h | m³/h | 2.15 | 3.23 | 6.45 | 8.6 | m³/h | max. Flow |
| up to 135 | 1,5 | 3,87 | 146B9164 | 146B9165 | - | - | | |
| up to 216 | 2,5 | 6,2 | 146B9168 | 146B9169 | 146B9170 | - | | |
| up to 337 | 4 | 9,66 | 146B9173 | 146B9174 | 146B9175 | 146B9176 | | |
| up to 540 | 4 | 15,49 | 146B9179 | 146B9180 | 146B9181 | 146B9182 | | |

(1) Capacity based on 30K temperature difference

(2) Capacity based on 40K temperature difference

**Application A3**

Number of buffer tanks: 2
Connection to external heat sourse: Direct connection.
Possibility of heat resale.

| Heating demand | | | Heat reclaim capacity | | | | | |
|---|---|---|---|---|---|---|---|---|
| Capacity [1] | min. Flow | max. Flow | up to 100 | up to 150 | up to 300 | up to 400 | kW | Capacity [2] |
| kW | m³/h | m³/h | 0.025 | 0.035 | 0.06 | 0.1 | m³/h | min. Flow |
| | | | 2.15 | 3.23 | 6.45 | 8.6 | m³/h | max. Flow |
| up to 22 | 0.2 | 0.62 | 146B9191 | 146B9192 | – | – | | |
| up to 54 | 0.43 | 1.55 | 146B9203 | 146B9204 | 146B9205 | 146B9206 | | |
| up to 85 | 0.65 | 2.44 | 146B9209 | 146B9210 | 146B9211 | 146B9212 | | |
| up to 135 | 1.5 | 3.87 | 146B9215 | 146B9216 | 146B9217 | 146B9218 | | |
| up to 216 | 2.5 | 6.2 | 146B9221 | 146B9222 | 146B9223 | 146B9224 | | |
| up to 337 | 4 | 9.66 | 146B9227 | 146B9228 | 146B9229 | 146B9230 | | |
| up to 540 | 4 | 15.49 | 146B9233 | 146B9234 | 146B9235 | 146B9236 | | |

(1) Capacity based on 30K temperature difference

(2) Capacity based on 40K temperature difference

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**Application A4**

Number of buffer tanks: 2
Connection to external heat sourse: Direct connection.

| Heating demand | | | Heat reclaim capacity | | | | | |
|---|---|---|---|---|---|---|---|---|
| Capacity [1] | min. Flow | max. Flow | up to 100 | up to 150 | up to 300 | up to 400 | kW | Capacity [2] |
| kW | m³/h | m³/h | 0.025 | 0.035 | 0.06 | 0.1 | m³/h | min. Flow |
| | | | 2.15 | 3.23 | 6.45 | 8.6 | m³/h | max. Flow |
| up to 135 | 1.5 | 3.87 | 146B9247 | 146B9248 | – | – | | |
| up to 216 | 2.5 | 6.2 | 146B9251 | 146B9252 | 146B9253 | – | | |
| up to 337 | 4 | 9.66 | 146B9256 | 146B9257 | 146B9258 | 146B9259 | | |
| up to 540 | 4 | 15.49 | 146B9262 | 146B9263 | 146B9264 | 146B9265 | | |

(1) Capacity based on 30K temperature difference

(2) Capacity based on 40K temperature difference

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**Application A6**

Number of buffer tanks: 1
Connection to external heat sourse: Indirect connection.

| Heating demand | | | Heat reclaim capacity | | |
|---|---|---|---|---|---|
| Capacity [1] | min. Flow | max. Flow | up to 100 | kW | Capacity [2] |
| kW | m³/h | m³/h | 0.025 | m³/h | min. Flow |
| | | | 2.15 | m³/h | max. Flow |
| up to 22 | 0.2 | 0.62 | 146B9400 | | |
| up to 54 | 0.43 | 1.55 | 146B9401 | | |
| up to 85 | 0.65 | 2.44 | 146B9402 | | |

(1) Capacity based on 30K temperature difference

(2) Capacity based on 40K temperature difference

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**Application A7**

Number of buffer tanks: 1
Connection to external heat sourse: Direct connection.

| Heating demand | | | Heat reclaim capacity | | |
|---|---|---|---|---|---|
| Capacity [1] | min. Flow | max. Flow | up to 100 | kW | Capacity [2] |
| kW | m³/h | m³/h | 0.025 | m³/h | min. Flow |
| | | | 2.15 | m³/h | max. Flow |
| up to 22 | 0.2 | 0.62 | 146B9400 | | |
| up to 54 | 0.43 | 1.55 | 146B9401 | | |
| up to 85 | 0.65 | 2.44 | 146B9402 | | |

(1) Capacity based on 30K temperature difference

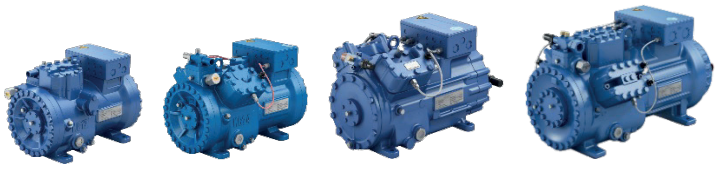
(2) Capacity based on 40K temperature difference

# 14. $CO_2$ compressors

### $CO_2$ BOCK® transcritical and subcritical compressors

- Highest efficiency levels (level depend on operating point)
- Wide operating envelope and frequency range (high and low evaporating temperatures, lower pressure ratio – low possible condensing temperature for energy savings)
- High reliability level (use of oil pump with optimized oil management design, holistic drive gear design optimized for high refrigerant/oil solubility)
- Low oil carry over rate (increased reliability and efficiency) <0,2 % (MT) from total mass flow at 50 Hz
- Small capacity steps (transcritical compressors – for better part and full load adaption)
- Excellent running behavior (low pulsation and vibration – wide capacity range with 4- & 6-cylinder design)
- Safety first! All compressors equipped with pressure relief valves LP & HP (scope of supply)
- Compact dimensions and low weight (small compressor sizes)
- Serviceable compressor in the field (changeable motor, valve plate…)

### Transcritical $CO_2$ BOCK® compressors



| Type | Displacement at 50Hz m³/h | Rated capacity S motor kW | Number of cylinders | Pressure LP/HP bar | Motor version | Frequency range Hz | ID |
|---|---|---|---|---|---|---|---|
| HGX12/20-4 $CO_2$ T | 1.7 | 2.97 | 2 | 100/150 | ML, S, SH | 30-70 | varies* |
| HGX12/30-4 $CO_2$ T | 2.8 | 5.21 | | | | | |
| HGX12/40-4 $CO_2$ T | 3.5 | 6.47 | | | | | |
| HGX24/55-4 $CO_2$ T | 4.6 | 9.24 | 4 | 100/150 | ML, S, SH | 30-70 | varies* |
| HGX24/70-4 $CO_2$ T | 6.0 | 12.2 | | | | | |
| HGX24/90-4 $CO_2$ T | 7.6 | 15.8 | | | | | |
| HGX24/110-4 $CO_2$ T | 9.4 | 19.2 | | | | | |
| HGX34/110-4 $CO_2$ T | 9.9 | 21.4 | 4 | 100/150 | ML, S, SH | 20-70 | varies* |
| HGX34/130-4 $CO_2$ T | 11.3 | 24.5 | | | | | |
| HGX34/150-4 $CO_2$ T | 12.9 | 28.4 | | | | | |
| HGX34/170-4 $CO_2$ T | 14.5 | 32.1 | | | | | |
| HGX34/190-4 $CO_2$ T | 16.3 | 36.5 | | | | | |
| HGX34/210-4 $CO_2$ T | 18.2 | 41.0 | | | | | |
| HGX34/230-4 $CO_2$ T | 20.1 | 45.6 | | | | | |
| HGX34/290-4 $CO_2$ T | 25.5 | 57.6 | | | | | |
| HGX46/280-4 $CO_2$ T | 24.4 | 54.8 | 6 | 100/150 | ML, S, SH | 20-70 | varies* |
| HGX46/310-4 $CO_2$ T | 27.2 | 60.6 | | | | | |
| HGX46/345-4 $CO_2$ T | 30.2 | 67.6 | | | | | |
| HGX46/440-4 $CO_2$ T | 38.2 | 84.7 | | | ML | | |
| HGX56/480-4 CO2 T | 41.7 | 91.7 | 6 | 100/150 | ML, S, SH | 20-70 | varies* |
| HGX56/540-4 CO2 T | 47.1 | 107 | | | | | |
| HGX56/610-4 CO2 T | 53.0 | 120 | | | | | |
| HGX56/680-4 CO2 T | 59.1 | 133 | | | | | |

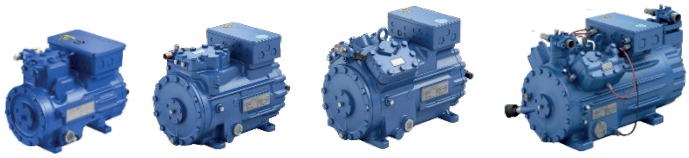
## Compressors with high efficiency LSPM motor technology

| Type | Displacement at 50Hz m³/h | Rated capacity S motor kW | Number of cylinders | Pressure LP/HP bar | Motor version | Frequency range Hz | ID |
|---|---|---|---|---|---|---|---|
| HGX24/55-4 $CO_2$ T | 4.8 | 9.43 | 4 | 100/150 | MLP, SP, SHP | 30-70 | varies* |
| HGX24/70-4 $CO_2$ T | 6.2 | 12.9 | | | | | |
| HGX24/90-4 $CO_2$ T | 7.9 | 16.4 | | | | | |
| HGX24/110-4 $CO_2$ T | 9.7 | 20.3 | | | | | |
| HGX34/110-4 $CO_2$ T | 10.2 | 21.9 | 4 | 100/150 | MLP, SP, SHP | 20-70 | varies* |
| HGX34/130-4 $CO_2$ T | 11.9 | 25.1 | | | | | |
| HGX34/150-4 $CO_2$ T | 13.3 | 29.1 | | | | | |
| HGX34/170-4 $CO_2$ T | 15.0 | 33.0 | | | | | |
| HGX34/190-4 $CO_2$ T | 16.9 | 37.5 | | | | | |
| HGX34/210-4 $CO_2$ T | 18.8 | 42.3 | | | | | |
| HGX34/230-4 $CO_2$ T | 20.8 | 47.0 | | | | | |
| HGX34/290-4 $CO_2$ T | 26.3 | 59.4 | | | | | |
| HGX46/280-4 $CO_2$ T | 25.3 | 56.4 | 6 | 100/150 | MLP, SP, SHP | 20-70 | varies* |
| HGX46/310-4 $CO_2$ T | 28.2 | 62.6 | | | | | |
| HGX46/345-4 $CO_2$ T | 31.2 | 70.0 | | | | | |
| HGX46/440-4 $CO_2$ T | 39.5 | 88.9 | | | MLP | | |

*Different compressors accessories are available on demand.
Entire $CO_2$ compressors range is available also with UL approval.

EN12900 rated capacities at 50Hz:
- Gas cooler pressure 90 bar (a)
- Gas cooler outlet temperature 35°C
- Evaporating temperature -10°C
- Suction gas superheat 10K

## Subcritical $CO_2$ BOCK® compressors



| Type | Displacement at 50Hz m³/h | Rated capacity S motor kW | Number of cylinders | Pressure LP/HP bar | Motor version | Frequency range Hz | ID |
|---|---|---|---|---|---|---|---|
| HGX12e/20-4 $CO_2$ | 1.6 | 2.71 | 2 | 40/55 | S | 30-70 | varies* |
| HGX12e/30-4 $CO_2$ | 2.6 | 4.28 | | | | | |
| HGX12e/40-4 $CO_2$ | 3.6 | 6.09 | | | | | |
| HGX12e/50-4 $CO_2$ | 4.5 | 7.67 | | | | | |
| HGX12e/60-4 $CO_2$ | 5.4 | 9.31 | | | | | |
| HGX12e/75-4 $CO_2$ | 6.4 | 11.1 | | | | | |
| HGX22e/85-4 $CO_2$ | 7.5 | 13.4 | 2 | 40/55 | S | 30-70 | varies* |
| HGX22e/105-4 $CO_2$ | 9.2 | 16.4 | | | | | |
| HGX22e/130-4 $CO_2$ | 11.2 | 20.1 | | | | | |
| HGX34e/145-4 $CO_2$ | 12.7 | 22.3 | 4 | 40/55 | S | 25-70 | varies* |
| HGX34e/170-4 $CO_2$ | 14.9 | 26.4 | | | | | |
| HGX34e/210-4 $CO_2$ | 18.4 | 32.5 | | | | | |
| HGX34e/255-4 $CO_2$ | 22.3 | 39.9 | | | | | |
| HGX44e/320-4 $CO_2$ | 27.7 | 51.0 | 4 | 40/55 | S | 25-70 | varies* |
| HGX44e/390-4 $CO_2$ | 34.2 | 62.8 | | | | | |
| HGX44e/475-4 $CO_2$ | 41.3 | 75.7 | | | | | |
| HGX44e/565-4 $CO_2$ | 49.2 | 90.3 | | | | | |

## LT compressors for high standstill pressure

| Type | Displacement at 50Hz m³/h | Rated capacity S motor kW | Number of cylinders | Pressure LP/HP bar | Motor version | Frequency range Hz | ID |
|---|---|---|---|---|---|---|---|
| HGX12e/20-4 $CO_2$ LT | 1.7 | 2.49 | 2 | 100/100 | ML, S | 30-70 | varies* |
| HGX12e/30-4 $CO_2$ LT | 2.8 | 4.30 | | | | | |
| HGX12e/40-4 $CO_2$ LT | 3.5 | 5.35 | | | | | |
| HGX24e/55-4 $CO_2$ LT | 4.6 | 7.62 | 4 | 100/150 | ML, S | 30-70 | varies* |
| HGX24e/70-4 $CO_2$ LT | 6.0 | 10.2 | | | | | |
| HGX24e/90-4 $CO_2$ LT | 7.7 | 13.2 | | | | | |
| HGX24e/110-4 $CO_2$ LT | 9.4 | 16.5 | | | | | |
| HGX24e/130-4 $CO_2$ LT | 11.5 | 20.6 | | | | | |
| HGX24e/145-4 $CO_2$ LT | 12.7 | 23.1 | | | | | |
| HGX56e/480-4 CO2 LT | 41.7 | 74.5 | 6 | 100/150 | ML, S | 20-70 | varies* |
| HGX56e/540-4 CO2 LT | 47.1 | 87.1 | | | | | |
| HGX56e/610-4 CO2 LT | 53.0 | 96.9 | | | | | |
| HGX56e/680-4 CO2 LT | 59.1 | 109 | | | | | |

For higher LT capacities with high standstill pressure up to LP 100 bar in between HGX 24e and HGX 56e, HGX34 CO2 T and HGX46 CO2 T are available in ML motor version with 12 displacement stages.

*Different compressors accessories are available on demand.
Entire $CO_2$ compressors range is available also with UL approval.

EN12900 rated capacities at 50Hz:
Condensing temperature -5°C
Subcooling 0K
Evaporating temperature -35°C
Suction gas superheat 10K

Read More about our Semi-Hermetic compressor portfolio here
https://www.danfoss.com/en/products/dcs/compressors/compressors-for-refrigeration/semi-hermetic-reciprocating-compressors/#tab-overview

Configure your compressor via our VAP software:
https://vap.bock.de/stationaryapplication/Pages/Index.aspx

For more information please contact your local Danfoss sales representative.

# COM Compressor Oil Management

Danfoss COM active oil level regulators use hall effect sensor and built in magnetic float technology for very precise oil level sensing. This design ensures reliable performance even with foaming or dirty oil and long life of the compressor even under different operating conditions such as defrost cycles and seasonal variations.

The oil-level control system offers oil supply and alarm function enabling safe compressor shut down. With its modular compressor adapters and plug & play cable set, the COM Compressor Oil Management solution is compatible with an extensive range of system designs - ensuring a simplified installation and safe commissioning process.

## COM Base Unit

| Type | Code no. | Description | Supply voltage | MWP bar | MOPD max. | Packaging |
|---|---|---|---|---|---|---|
| COM 10C | 040B0119 | Oil level regulator | 230V | 60 | 40 | 1 |
| | 040B0120 | | 24V | | | |
| COM 20C | 040B0121 | | 230V | 130 | 80 | |
| | 040B0122 | | 24V | | | |
| | 040B0100 | | 230V | | | 6 |

## ORD Differential Pressure Valve / MWP 60 bar

| Type | Code no. | Differential pressure bar | Inlet connection | Outlet connection |
|---|---|---|---|---|
| ORD | 040B0163 | 1.5 | $^5/_8$-18-2B" UNF | $^5/_8$-18-2A" UNF |
| | 040B0164 | 3.5 | | |
| | 040B0165 | 5.0 | | |

## Accessories

### Adapter

| Type | Code no. | Description | Connection type | Connection length | Packaging |
|---|---|---|---|---|---|
| COM-AD-000 | 040B0123 | Adaptor set | Flange | 40.0 | 1 |
| COM-AD 034-14 | 040B0124 | | 3/4-14" NPT | 30.0 | |
| COM-AD-114 | 040B0125 | | 1 1/4-12-2B UNF | 36.0 | |
| COM-AD-134 | 040B0126 | | 1 3/4-12-2B UNF | 40.0 | |
| COM-AD-D06 | 040B0127 | | Flange | 40.0 | |
| COM AD-118-18 | 040B0128 | | 1 1/8" UNEF | 22.5 | |
| COM AD-118-18L | 040B0129 | | 1 1/8" UNEF | 42.5 | |
| COM-AD-118-18 | 040B0130 | Mounting adaptor set | 1 1/8" UNEF | 22.5 | |
| COM-AD-118-18 | 040B0131 | | 1 1/8" UNEF | 22.5 | |
| COM-AD-241 | 040B0145 | Adaptor set | M 24mm | 45.0 | |
| COM-AD-214 | 040B0146 | | 2 1/4-12-2B UNF | 54.0 | |

## Power cable set

| Length m | Code no. | Voltage | Type | Packaging |
|---|---|---|---|---|
| 10 | 040B0153 | Min 24 Vac Max 230 Vac | DIN 43650 | 1 |
| 15 | 040B0155 | | | |
| 20 | 040B0157 | | | |
| 3 | 040B0147 | | | |
| 5 | 040B0151 | | | |
| 6 | 040B0149 | | | |
| 5 | 040B0101 | | | 50 |
| 10 | 040B0102 | | | 35 |
| 15 | 040B0103 | | | 25 |
| 20 | 040B0104 | | | 20 |

## Relay cable set

| Length m | Code no. | Voltage | Current | Type | Packaging |
|---|---|---|---|---|---|
| 3 | 040B0148 | Min 24 Vac Max 230 Vac | 3 A | DIN 43650 | 1 |
| 5 | 040B0152 | | | | |
| 6 | 040B0150 | | | | |
| 10 | 040B0154 | | | | |
| 15 | 040B0156 | | | | |
| 20 | 040B0158 | | | | |
| 5 | 040B0111 | | | | 50 |
| 10 | 040B0112 | | | | 35 |
| 15 | 040B0113 | | | | 25 |
| 20 | 040B0114 | | | | 20 |

## Spare part set

| Code no. | Description | Packaging |
|---|---|---|
| 040B0159 | Spare part set COM10C | 1 |
| 040B0160 | Spare part set COM20C | |
| 040B0161 | Spare part coil 24V ; 50/60Hz | |
| 040B0162 | Spare part coil 230V ; 50/60Hz | |

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**Forward Naturally**
As we transition toward a more environmentally friendly future, your refrigerant choice becomes an important factor for your business and the planet. $CO_2$ is a natural cooling agent that delivers sustainable and energy-efficient refrigeration in everything from warehouses to ice machines. Allowing businesses to move forward naturally.

**$CO_2$ has several unique thermo-physical properties making it an ideal refrigerant:**
- Excellent heat transfer coefficient
- High energy content
- Relatively insensitive to pressure losses
- Very low viscosity of the liquid phase

**In practical applications, $CO_2$ systems deliver a very high-performance output. The main reasons are:**
- Superior heat exchange
- Smaller piping sizes
- Low pumping power as secondary fluid
- Superior heat recovery

Read more about our solutions for Food Retail, Commercial Refrigeration and Industrial Refrigeration:


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