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

Alsense Food Retail – IoT cloud application for supermarkets

Cloud solution from Danfoss climate solutions for supermarkets and food retail applications. Our service offering is a sustainable, scalable and secure portal for optimizing the performance of food retail operations. It's the technology you want to easily reach the efficiencies you need.

With Alsense, you'll be able to easily track refrigeration asset performance, respond to alarms, integrate 24/7 monitoring, reduce energy consumption and much more — all in one integrated, modern platform.
Learn more here:
https://www.danfoss.com/en/products/dcs/monitoring-and-services/alsense-food-retail/#tab-overview

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			Supply for controller
AK-PS 063 STEP3	080Z0057	15W	AK-PS 075	080Z0053	18W
AK-PS 130 STEP3	080Z0058	30W	AK-PS 150	080Z0054	36W
AK-PS 250 STEP3	080Z0059	60W	AK-PS 250	080Z0055	60W

2. Pack controllers

AK-PC Pack Controllers for CO_2 Transcritical Booster

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

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)
- CO_2 Ejectors control (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 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

		Supply for controller
AK-PS 075	080Z0053	18W
AK-PS 150	080Z0054	36W
AK-PS 250	080Z0055	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 × 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

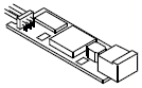


Type	Code No	Description
AK-UI55 Bluetooth	084B4075	External display with Bluetooth operation
AK-UI55 Set	084B4076	External display with control buttons
AK-UI55 Info	084B4077	External display
	084B4078	3 m ; External display cable with RJ12 connector
	084B4079	6 m ; External display cable with RJ12 connector
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 plastic 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					
Power supply module 230 V / 115 V to 24 V dc							
AK-PS 075	080Z0053	18 VA ; Supply for controller					
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					

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 ⁵/₈ × ⁵/₈ in	0.17
CCMT 4	027H7201		0.45
CCMT 8	027H7202		0.8
CCMT 16	027H8231	Weld 1 × 1 in ; Solder ODF 1 ¹/₈ x 1 ¹/₈ in	1.6
CCMT 24	027H8232		2.4
CCMT 30	027H8233		3.0
CCMT 42	027H8234		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		⁵/₈ × ⁵/₈	
	027H7241		⁷/₈ × ⁷/₈	
	027H7273	³/₈ × ³/₈		
CCMT 5L	027H7242	½ × ½		0.5
	027H7243		⁵/₈ × ⁵/₈	
	027H7245		⁷/₈ × ⁷/₈	
	027H7274	³/₈ × ³/₈		
CCMT 8L	027H7275	½ v ½		0.8
	027H7247		⁵/₈ × ⁵/₈	
	027H7250		⁷/₈ × ⁷/₈	
	027H7272	½ × ½		
CCMT 10L	027H7277		⁵/₈ × ⁵/₈	1.1
	027H7278		⁷/₈ × ⁷/₈	
	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 600A-TS	027H9078	Motor with cables		
	027H9123	Motor without cables		

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 (1in)	20 A (¾ in)	25 A (1in)	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 (1in)	40 D (1 ½ in)		25 A (1in)	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 600A	027H9075	With cables			Important: ICAD 600A is for ICM valves and not for ICMTS		
	027H9120	Without cables					

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 valves accessories			
ICAD-UPS	027H0181	Mutli-function tool for manual operation	
	027H0388	Fail safe supply Battery / UPS* 19V dc	

CO_2 Multi Ejectors™

MWP 140 bar / MOPDF 90 bar

The complete Danfoss Multi Ejector™ solution consists of a block of 1-6 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.
- 3 x DST 310 pressure transmitters integrated.

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	042N0156	DIN plug – IP65

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								
17W	018F6732	230V ac 50Hz	35	25	25	25	14	35
19W	018F6905		35	35	35	30	18	35
AC coils – with 1m cable, IP 67								
17W	018F6282	230V ac 50Hz	35	25	25	25	14	35

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

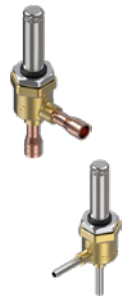
Rated capacities are based on:
Receiver temperature trec = 0 °C / 32 °F
Evaporating temperature Refrigeration te = -10 °C / 14 °F
Evaporating temperature Freezing te = -30 °C / -22 °F
Subcooling = 1°C / 1.8 °F

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



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	042N0156	

Solenoid coil with terminal box IP67

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

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

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

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	042N0156	DIN plug – IP65
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 2050	-1 to +59	100	-30 to +40 °C	060G5750	060G6342	060G6408	060G6810
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

DST P310	-1 to +159	960	-20 to 100 °C	076G1021	UNF - 7/16-20 Male

Packard cable	064G0950	10 m ; Cable for MBS 8250 pressure transmitter
Packard cable	064G0910	10 m ; Cable for MBS 8250 pressure transmitter ; Ind. Package 14 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	Code No	Code No	Probe length mm	Bottom dead zone mm
	1)	2)	3)		
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)

DGS Danfoss gas sensor

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	Note
DGS-SC HFC	080Z2803	grp 1	-35 to +60°C	500 ppm	No	5m sensor cable 2 × 5m sensor cable
	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					
	080Z2802					

DGS-SC HFC	080Z2809	grp 1	-35 to +60°C	500 ppm	Yes	5m sensor cable
	080Z2810	grp 2				
	080Z2811	grp 3				
DGS-PE	080Z2812	R290 (propane)	-30 to +60°C	800 ppm		
DGS-IR CO2	080Z2807	R744 (CO2)	-35 to +50°C	5000 ppm		
	080Z2808					

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

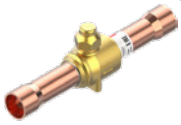
Code No.	Type
080Z2172	AK-PHOTO OD
080Z2177	AK-PHOTO-ID
080Z2171	EMHS-3-1

8. Line components

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** 				
GBCT 6s	009L6415	GBCT 6s	009L6581	¼ in	0.9	140
GBCT 10s	009L6416	GBCT 10s	009L6581	3/8 in	3.7	
GBCT 12s	009L6417	GBCT 12s	009L6585	½ in	5.4	
GBCT 16s	009L6418	GBCT 16s	009L6586	5/8 in	10.4	
GBCT 18s	009L6419	GBCT 18s	009L6588	¾ in	16.6	
GBCT 22s	009L6420	GBCT 22s	009L6589	7/8 in	23.7	
GBCT 28s	009L6406	GBCT 28s	009L6451	1 1/8 in	42.3	
GBCT 35s	009L6410	GBCT 35s	009L6453	1 3/8 in	67.1	
GBCT 42s	009L6411	GBCT 42s	009L6454	1 5/8 in	83.1	
GBCT 54s	009L6412	GBCT 54s	009L6456	2 1/8 in	171.3	

GBCH 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** 					
GBC 6s H	009L7415	GBC 6s H	009L7581	¼ in	-	1.78	90
	009L7395		009L7580	-	6 mm		
GBC 10s H	009L7416	GBC 10s H	009L7582	3/8 in	-	6.31	
	009L7396		009L7583	-	10 mm		
GBC 12s H	009L7417	GBC 12s H	009L7585	½ in	-	12.87	
	009L7397		009L7584	-	12 mm		
GBC 16s H	009L7418	GBC 16s H	009L7586	5/8 in	16 mm	11.77	
GBC 18s H	009L7419	GBC 18s H	009L7588	¾ in	-		
	009L7399		009L7587	-	18 mm		
GBC 22s H	009L7420	GBC 22s H	009L7589	7/8 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	75

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	3/8 in	0.02	0.19	1.1	140
NRVT 12s	020-6402	½ in	0.01	0.05	2.2	
NRVT 16s	020-6403	5/8 in	0.01	0.04	3.8	
NRVT with Hard spring						
NRVT 10sH	020-6411	3/8 in	0.30	1.43	1.0	140
NRVT 12sH	020-6412	1/ in	0.20	1.00	2.1	
NRVT 16sH	020-6413	5/8 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	3/8 in	-	0.4 bar	1 bar	0,9	90
	020-4300	-	10 mm				

Hermetic filter drier
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 drier
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 drier
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	

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 when equilizing high pressures with 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

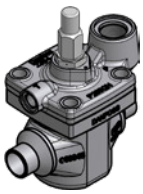
ICS with CVP for regulating the pressure

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

Including one blanking plug (A+B)

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

Including one blanking plug (A+B)

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

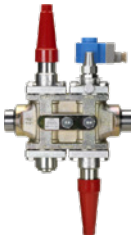
**When mounted in CVH house*

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

SVA-140B Shut-off valve
for R744 (CO_2) / MWP140 bar / MOPD 110 bar

The new 140 bar manual valve range for Industrial CO_2 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 (CO_2) 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

SVA-140B	Butt-weld DIN (D) (EN 10216-2)		Buttweld ANSI (A) (B36.10 SCH 80)	
Nom size	ANG	STR	ANG	STR
DN 50 / 2"	148B6817	148B6818	148B6817	148B6818
DN 65 / 2½"	148B6821	148B6822	148B6819	148B6820
DN 80 / 3"	148B6823	148B6824	148B6823	148B6824
DN 100 / 4"	148B6825	148B6826	148B6825	148B6826

FIA 140B Strainer
for R744 (CO_2) / MWP 140 bar

- Applicable to: R744 (CO_2) Sub and Trans critical
- Max. working pressure: 140 bar (2030 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
- Two types of strainer inserts are available:
- A plain insert of stainless steel
- A 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

To complete FIA-140B Strainer it is necessary to order: Strainer housing and strainerinsert.

Strainer housing 140 bar

SVA-140B	Butt-weld DIN (D) (EN 10216-2)		Buttweld ANSI (A) (B36.10 SCH 80)	
Nom size	ANG	STR	ANG	STR
DN 50 / 2"	148B6833	148B6834	148B6833	148B6834
DN 65 / 2½"	148B6837	148B6838	148B6835	148B6836
DN 80 / 3"	148B6839	148B6840	148B6839	148B6840
DN 100 / 4"	148B6841	148B6842	148B6841	148B6842

Accessories

For FIA size	Code number	Description
65-100	148H3447	Magnet insert
125	148H3448	
15-20	148H3301	Removable element µ150 for start up*
25-40	148H3302	
50-100	148H3450	Blind nut with gasket

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

Stainer elements for FIA in 140 bar and 65 bar

FIA insert	Standard strainer insert				Pleated Strainer insert			Filter bag
Nom. Size	100µ 150 mesh	150µ 100 mesh	250µ 72 mesh	500µ 38 mesh	150µ 100 mesh	250µ 72mesh	500µ 38 mesh	50µ
15-20	148H3122	148H3124	148H3128	148H3128	148H3303	148H3363	-	-
25-40	148H3123	148H3125	148H3127	148H3129	148H3304	148H3269	-	-
50 (65 bar)	148H3157	148H3130	148H3138	148H3144	148H3179	148H3184	148H3189	148H3150
50 (140 bar)	-	148H3131	148H3139	148H3145	148H3180	148H3185	148H3190	148H3151
65	-	148H3131	148H3139	148H3145	148H3180	148H3185	148H3190	148H3151
80	-	148H3119	148H3120	148H3121	148H3181	148H3186	148H3191	148H3152
100	-	148H3132	148H3140	148H3146	148H3182	148H3187	148H3192	148H3153
125	-	148H3133	148H3141	148H3147	148H3183	148H3188	148H3193	148H3154

SVL 65 parts program valves
for R744 (CO2) / 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.

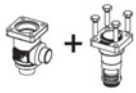
Housing

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

SVA-S, L & 65BT:

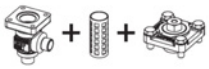
SCA-X:

CHV-X:



REG-S & REG-L:

FIA:



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

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

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™ iCO2 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

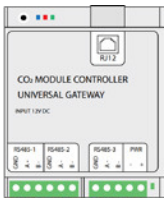
(1) E - Compressor 400V/3~/50Hz, fan 230V/1~/50H

(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 rpm	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 rpm	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]
			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	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

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]
			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	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

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]
			0.025	m³/h	min. Flow
kW	m³/h	m³/h	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

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]
			0.025	m³/h	min. Flow
kW	m³/h	m³/h	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 BOCK® subcritical and transcritical compressors

Subcritical CO_2 BOCK® compressors

Type	Displacement 50 Hz	Nominal capacity LT	Number of cylinders	Pressure LP/HP	Version	ID
HGX12e CO_2	1.6 - 2.8 m³/h	2.7 - 90 kW	2	40/55 bar	S	varies*
HGX22e CO_2	7.5 - 11.2 m³/h		2	40/55 bar	S	varies*
HGX34e CO_2	12.7 - 22.3 m³/h		4	40/55 bar	S	varies*
HGX44e CO_2	27.7 - 49.2 m³/h		4	30/55 bar	S	varies*
HGX12e CO_2 LT	1.7 - 3.5 m³/h	2.7 - 23 kW	2	100/100 bar	ML, S	varies*
HGX24e CO_2 LT	4.6 - 12.7 m³/h		4	100/100 bar	ML, S	varies*

Transcritical CO_2 BOCK® compressors

Type	Displacement 50 Hz	Nominal capacity MT	Number of cylinders	Pressure LP/HP	Version	ID
HGX12 CO_2 T	1.7 - 3.5 m³/h	3 - 85 kW	2	110/150 bar	ML, S, SH	varies*
HGX24 CO_2 T**	4.6 - 9.4 m³/h		4	110/150 bar	ML, S, SH	varies*
HGX34 CO_2 T**	9.9 - 25.5 m³/h		4	110/150 bar	ML, S, SH	varies*
HGX46 CO_2 T**	24.4 - 38.2 m³/h		6	110/150 bar	ML, S, SH	varies*

*Different compressors accessories are available on demand.
**Compressors are available also with high efficiency LSPM motor technology.
Entire CO_2 compressors range is available also with UL approval.

Nominal capacity LT:
Evaporating Temperature at 50 Hz: -35°C, Condensing: -5 °C. Suction gas superheat: 10K, subcooling: 0K

Nominal capacity MT:
Evaporating Temperature at 50 Hz: -10°C, Gas cooler outlet: +35°C/90 bar. 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/ProductGroup.aspx?ItemObjectID=CO2%20

For more information please contact your local Danfoss sales representative.

ENGINEERING
TOMORROW

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:

CLICK HERE

CO_2 solutions for **food retail**

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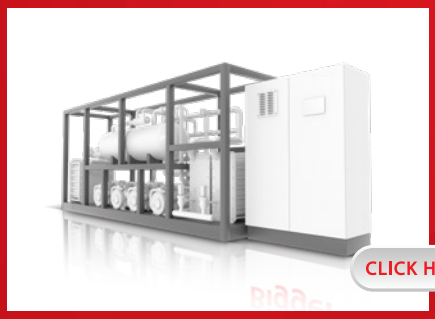
CO_2 solutions for **commercial refrigeration**



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CO_2 solutions for **industrial refrigeration**

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