Data sheet



Electric regulating valve
CCM

Expansion and gas bypass valve for CO_2

Description

The CCM is an electrically operated valve designed specifically for operation in CO_2 systems. The valve is capable of functioning both as an expansion valve, and as a gas bypass valve with back-pressure regulation in subcritical applications.
The pressure rating allows for operation in environments where system standby capability is required without the need for auxiliary cooling systems during servicing or power outages.

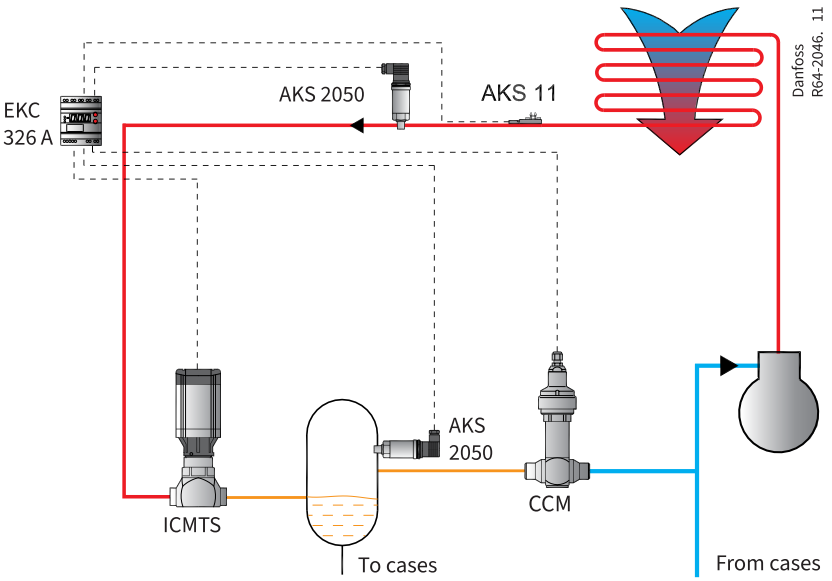
Features & benefits

- Up to 90 bar (1305 psi) working pressure to accommodate CO_2 system pressures during standstill conditions
- Precise positioning for optimal control of intermediate pressures in transcritical CO_2 systems or liquid injection in heat exchangers
- MOPD up to 50 bar (725 psi)
- Combined stainless steel butt weld/solder connections for installation in copper piped systems (K65 alloy or standard) as well as steel piped systems
- Standard M12 connector for simple and flexible connection to the motor driver
- For manual operation and service of the CCM an AST-g service driver is available. For further information please contact Danfoss (Commercial Refrigeration and AirConditioning Controls)
- UL recognized

Applications

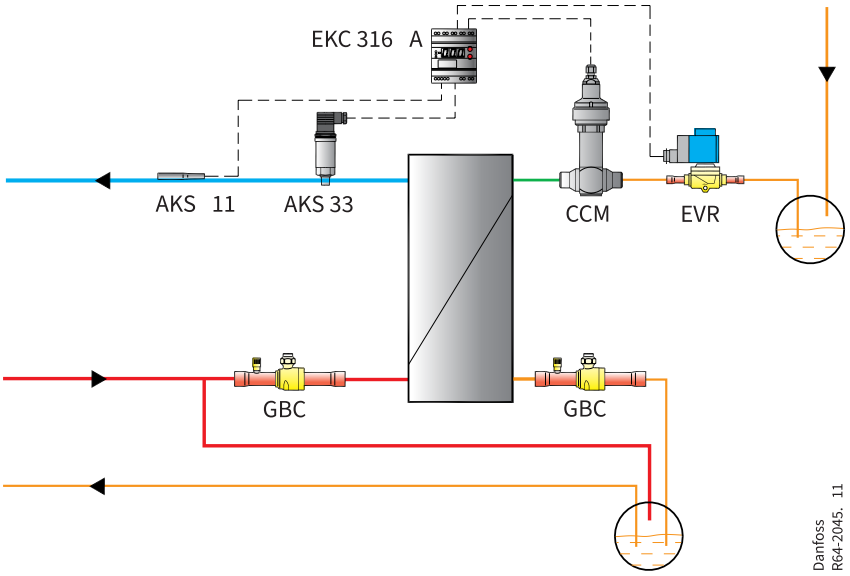
The CCM can be used in a variety of applications within CO_2 refrigeration systems. Typically it is used as a gas bypass valve in a transcritical CO_2 booster system or as an expansion valve.

Figure: Application 1



A gas bypass valve is typically used to regulate the intermediate pressure in a transcritical CO_2 refrigeration system. By venting flashgas generated after the transcritical expansion, the pressure can be kept at a safe level for all components situated in the liquid lines of a transcritical CO_2 system. For use in the gas bypass application the EKC326A controller is recommended.

Figure: Application 2



A liquid expansion valve is typically used for injection in plate heat exchangers of CO_2/CO_2 cascades, or as an expansion valve for CO_2 evaporators. For the liquid injection applications CCM is used with EKC 316A controller.

Ordering

Product code numbers

Type	Kv value [m^3/h]	Connection type	Connection Weld size [in]	Connection Solder size [in]	Packing format	Code number
CCM 40	4.870	Solder, ODF	1 in	1 1/8 in	Industrial pack	027H7177
CCM 30	2.780	Solder, ODF	1 in	1 1/8 in	Industrial pack	027H7178
CCM 20	1.850	Solder, ODF	3/4 in	7/8 in	Industrial pack	027H7179
CCM 40	4.870	Solder, ODF	1 in	1 1/8 in	Single pack	027H7185
CCM 30	2.780	Solder, ODF	1 in	1 1/8 in	Single pack	027H7186
CCM 20	1.850	Solder, ODF	3/4 in	7/8 in	Single pack	027H7187
CCM 10	0.700	Solder, ODF	1/2 in	5/8 in	Single pack	027H7188

Connection Weld size - OD according to EN 10220

Table: Ordering

Cable	Cable length (L)	Insulation	Packing format	Code no.
PVC - black	2 + 0.089 m / 6.6 +0.3 ft	SR-PVC	Single pack	034G7073
	8 + 0.3 m / 26.2 +1 ft	SR-PVC	Single pack	034G7074

Accessories code numbers

Table: Accessories

Type	Description	Code number
AST-G	Manual valve driver for service	034G0013

Spare parts code numbers

Table: Spareparts

Type	Description	Code number
AST	Actuator for CCM CO2 valve	027H7184
–	O-ring spare part kit for CCM/CCMT (2 O-rings)	027H723

Product details

General data

Technical data

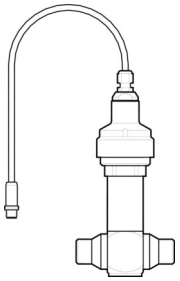


Table: Technical data

Parameter	CCM
Compatibility	R744
MOPD	50 bar (725 psi)
Max. working pressure (PS/MWP)	90 bar (1305 psi)
Refrigerant temperature range[1]	–40 to 60 °C (–40 to 140 °F)
Ambient temperature	–40 to 60 °C (–40 to 140 °F)
Material of construction	Stainless steel

[1] Measured at inlet of the valve

Electrical data

Table: Electrical data

Parameter	CCM	
Motor enclosure	IP 67	
Stepper motor type	Bi-polar - permanent magnet	
Step mode	2 phase full step	
Phase resistance	52 Ω ±10%	
Phase inductance	85 mH	
Holding current	Depends on application Full current allowed (100% duty cycle)	
Step angle	7.5° (motor), 0.9° (lead screw), Gearing ration 8.5:1. (38/13)2:1	
Nominal voltage	(Constant voltage drive) 12 V dc -4% +15%, 150 steps/sec.	
Phase current	(Using chopper drive) 100 mA RMS -4% +15%,	
Max. total power	Voltage / current drive: 5.5 / 1.3 W (UL: NEC class 2)	
Step rate	150 steps/sec. (constant voltage drive) 0-150 steps/sec. 150 recommended (chopper current drive)	
Total steps	CCM 10, 20, 30 CCM 40	2625 [+160 / -0] steps 3530 [+160 / -0] steps
Total stroke	13 mm / 16 mm (0.5 in. / 0.6 in.)	
Full travel time	CCM 10, 20, 30 CCM 40	17 sec. 23 sec.
Lifting height	CCM 10, 20, 30 CCM 40	13 mm (0.5 in.) 16 mm (0.6 in.)
Reference position	Overdriving against the full close position	
Electrical connection	4 wire 0.5 mm^2 (0.02 in^2), 0.3 m (1 ft) long cable	

Stepper motor switch sequence

Table: Stepper motor switch sequence

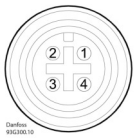
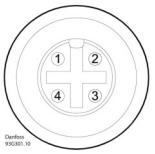
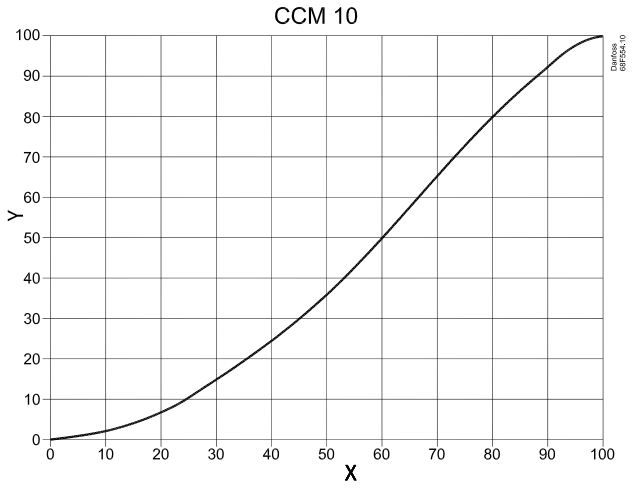
CCM valve Connector				Cable plug
	4	Black	4	
	3	White	3	
	2	Green	2	
	1	Red	1	
	Connection 1	Wire Color	Connection 2	
	Pin Out			

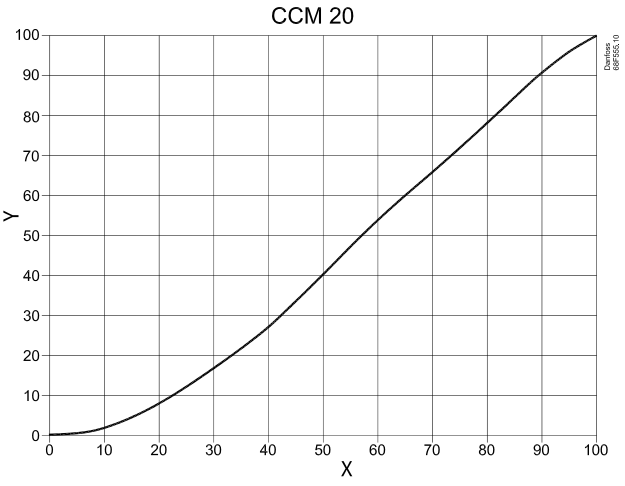
Table: Stepper motor switch sequence

	STEP	Coil I (B)		Coil II (A)		
		Red	Green	White	Black	
CLOSING	1	+	-	+	-	OPENING
	2	+	-	-	+	
	3	-	+	-	+	
	4	-	+	+	-	
	1	+	-	+	-	

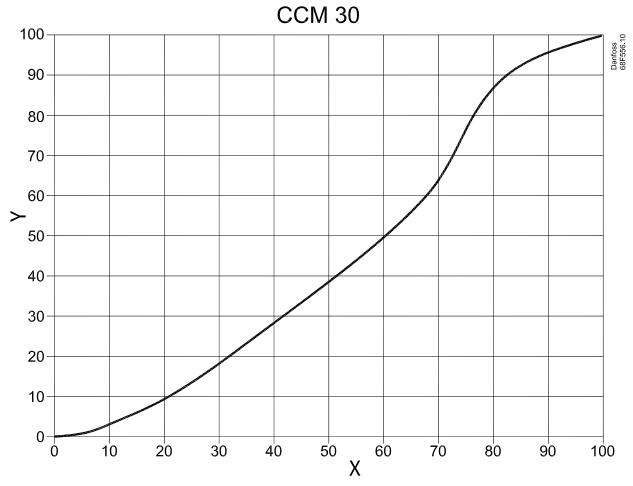
Flow characteristics



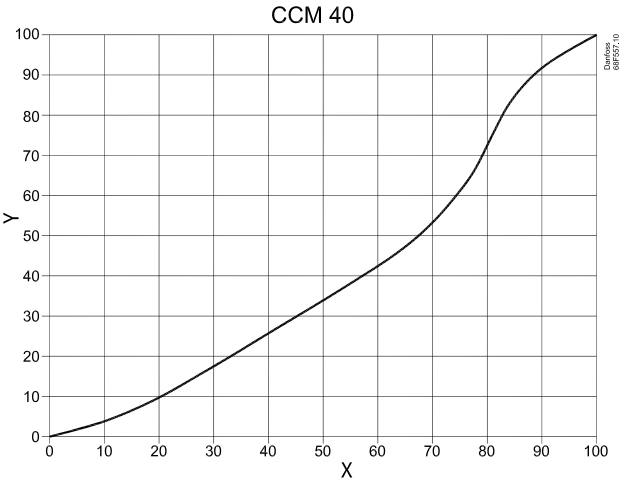
X	Opening %
Y	% of capacity full open



X	Opening %
Y	% of capacity full open



X	Opening %
Y	% of capacity full open



X	Opening %
Y	% of capacity full open

Valve selection based on capacity calculation

As for extended capacity calculations and valve selection based on capacities and refrigerants, please refer to Coolselector®2. Rated and extended capacities are calculated with the Coolselector®2 calculation engine to ARI standards with the ASEREP equations based on laboratory measurements of selected valves.

Download Coolselector®2 for free at coolselector.danfoss.com.

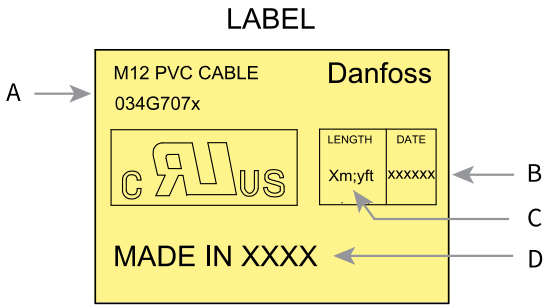
M12 angle cable

M12 angle female connector is intended for use with a standard M12 male connector, available on stepper motor valves.

This cable is designed to offer high flexibility and small outer diameters with tensile strength. The angle way M12 cable consist of paired, twisted wires, which decreases mutual influence between signals transmitted along the cable and reduces influence of external sources of interference. The cables thus provides a higher degree of protection against lost steps compared to other cables.

Identification

Figure: Identification



A	Product type Code no.
B	Manufacturing date
C	Meters/Feets
D	Country

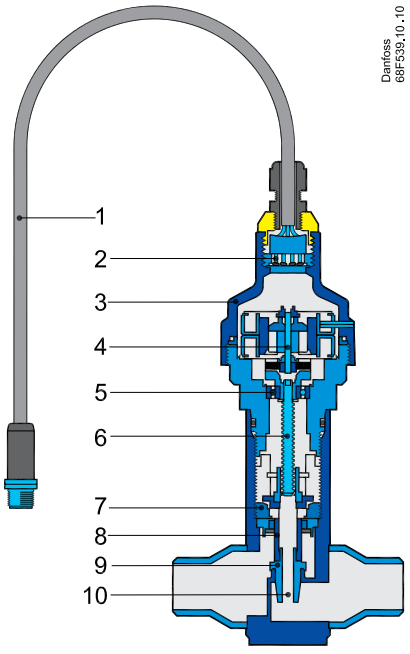
Specification

Table: Specification

Features	Description
Jacket	PVC - black
Cable outer sheath	Oil - resistant
Water proof rating	IP 67
Operating temperature range	-40 – 80 °C
Wire type	Twisted pair, cross section 20 AWG / 0.5 mm2
Cable outer diameter	7.0 mm
Minimum bending radius	10 x cable diameter
Cable combustibility / test	Flame retardant / VW-1 / CSA FT - 1
M12 standard	EN 61076-2-101
Reference standard	UL style 2464 and DIN VDE 0812
LVD directive	73/23/EEC and 93/68/EEC

Design

Figure: Design and materials



1	Cable
2	Glass seal
3	Motor housing
4	Stepper motor
5	Bearing
6	Spindle
7	Insert
8	Valve piston
9	Valve seat
10	Valve port

Dimensions

Figure: Dimensions

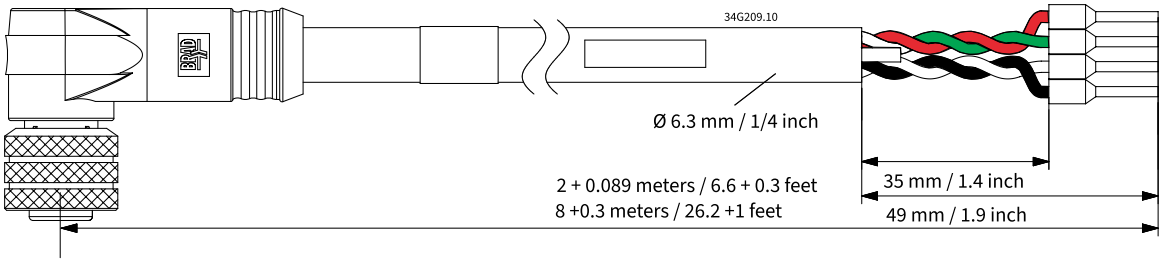


Figure: Dimension and weight

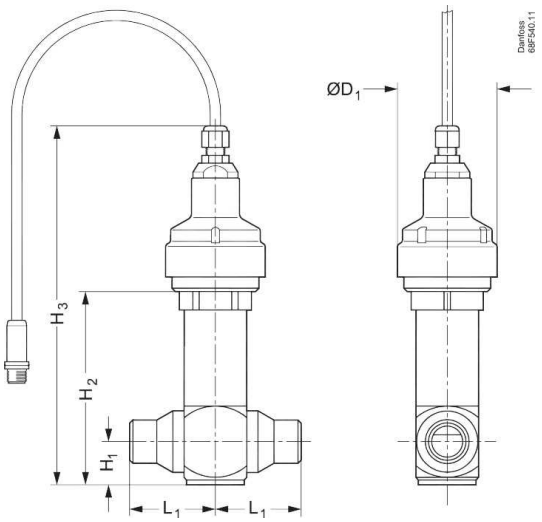


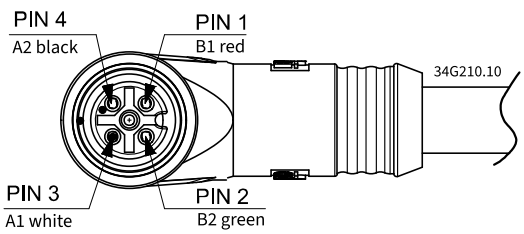
Table: Dimension and weight

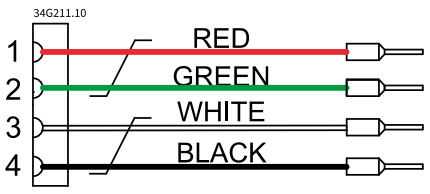
Type	H1		H2		H3		L1		ØD1		Weight	
	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	kg	lb.
CCM	26.2	1	120	4.7	225	8.9	53	2.1	62	2.4	1.8	4

For further information please contact Danfoss.

Connections

Table: Connections





Certificates, declarations and approvals

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

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
Export Control Declaration	Pressure and Temperature regulating valves - Stainless steel	Danfoss	
UA Declaration	Danfoss UA 8501	Danfoss	UA RoHS
UA Declaration	Danfoss UA 8481	Danfoss	UA RoHS
Mechanical Safety Certificate	UL MH7648	UL - Underwriters Laboratories inc.	
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.02-22	LLC CDC EURO TYSK - Ukraine	PED, Pressure
UA Declaration	Danfoss UA 2023-01-10 Valves PL01 PL40	Danfoss	PED, Pressure
Manufacturer's Declaration	Danfoss MD 033F0691.AK	Danfoss	EU RoHS
Manufacturer's Declaration	Danfoss MD 033F0686.AT	Danfoss	PED, Pressure

Contact details

Online support

Danfoss offers a wide range of support along with our products, including digital information, software, mobile apps and expert guidance. See the possibilities below.

The Danfoss Design center

Discover the Design Center, our advanced digital platform that streamlines product selection. With integrated tools and enhanced type pages, it's simpler than ever to access product information and documentation, and to select the right products. Check the availability of Danfoss products at partner locations and enjoy seamless transitions from selection to purchase with our basket-to-basket functionality. Whether you're buying from our distributors or directly from the Product Store, the Design Center simplifies your experience. Learn more at: designcenter.danfoss.com.

The Danfoss product store

The Danfoss Product Store is a one-stop shop available 24/7 for our customers, no matter where you are in the world or what area of industry you work in. Browse our catalog, check product details and documentation, view your prices and product availability, and quickly finalize your purchase. Start browsing at: store.danfoss.com.

Danfoss Partner Portal/Product Data tool

Designed to support you with easy access to product data extracts, essential resources, tools, and information. The Partner Portal provides a centralized hub for product documentation, training materials, marketing assets, and technical support, ensuring you have everything you need to succeed and grow your business with Danfoss. The Partner Portal is available 24/7 at: partner.danfoss.com and is ready to support your business.

Find technical documentation

Find technical documentation you need to get your project up running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more. Start searching now at: documentation.danfoss.com.

Danfoss Learning

Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications industry topics, and trends that will help you do your job better. Find your local Danfoss website here: learning.danfoss.com.

Get local information and support

Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest reginal news, or connect with a nearby expert - all in your own language. Find your local Danfoss website here: danfoss.com.

Danfoss A/S

Climate Solutions . danfoss.com . +45 7488 2222

Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues description, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the products. All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.