Data sheet



CTM High pressure valve

CTM 6 HP

Improves COP and lowers swept volume of the MT compressors in CO_2 systems with parallel compressors

Description

Danfoss Multi Ejector Solution™, consists of a CTM 6 High Pressure valve and an AK-PC 782A controller. This solution makes CO_2 refrigeration systems economically competitive with the HFC systems at all ambient temperatures by improving COP in comparison to standard parallel compressor systems. CO_2 systems with Multi Ejector Solution™ can be installed in any climate delivering lower energy consumption than i.e. R404A. It removes the CO_2 equator entirely. CTM 6 HP is designed for CO_2 systems with parallel compression to lift a part of the gas from MT suction and mix it with the gas coming from the gas cooler at medium pressure level.

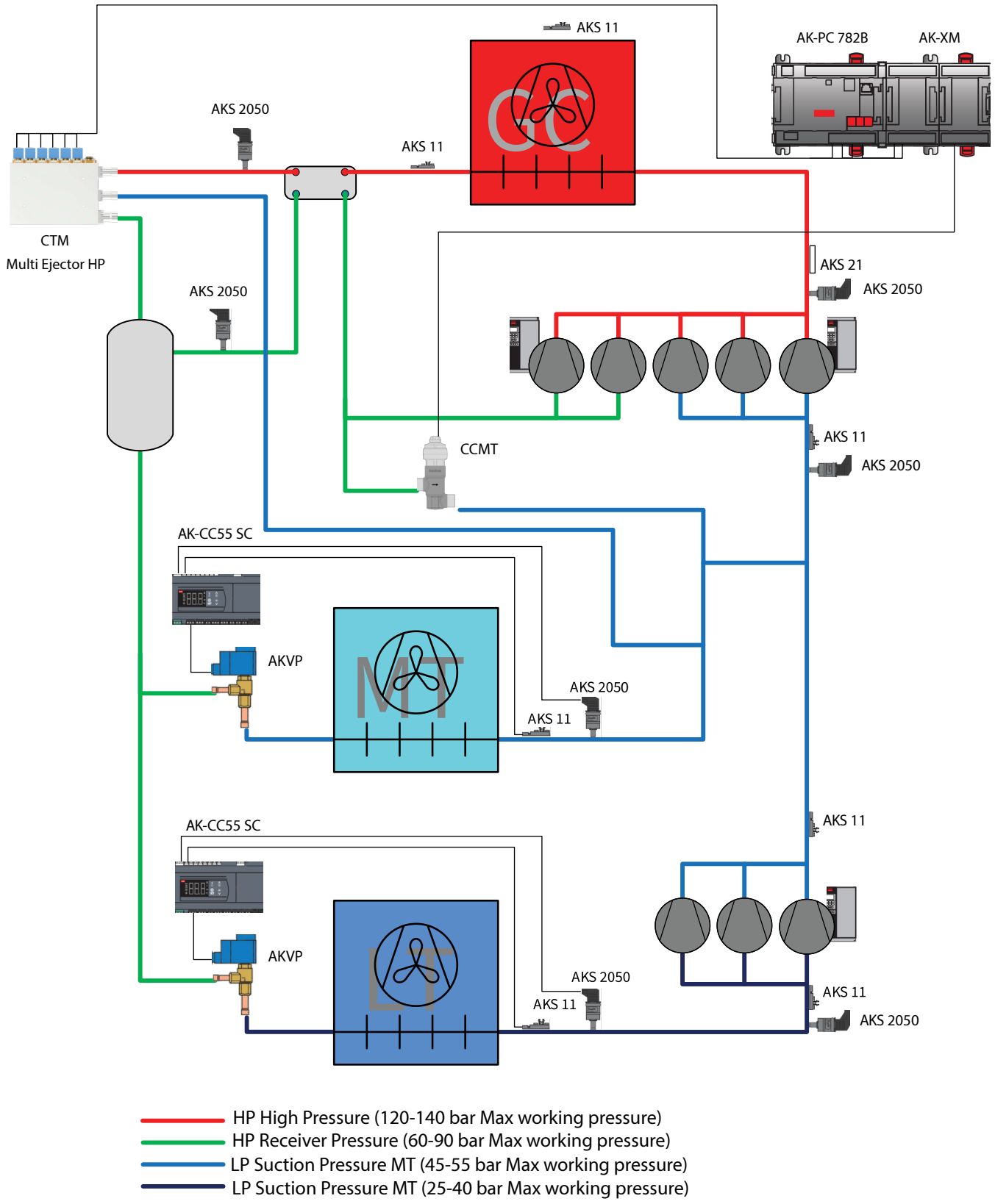
Features & benefits

- First cost savings with reliable and robust design
  - 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
- Fast pay back energy savings by improved COP, enhanced operation of parallel compressors system and required lower swept volume to the MT compressors, resulting in lower energy consumption
  - Savings for end users
  - Fast payback - lower energy consumption: Higher efficiency on the systems, leads to payback time of less than 2 years on average globally
  - The combination of CTM 6 High Pressure lift and the AK-PC 782A/B ensure an easy setup and commissioning, robust control of the system that ensures many years of problem free operation

Applications

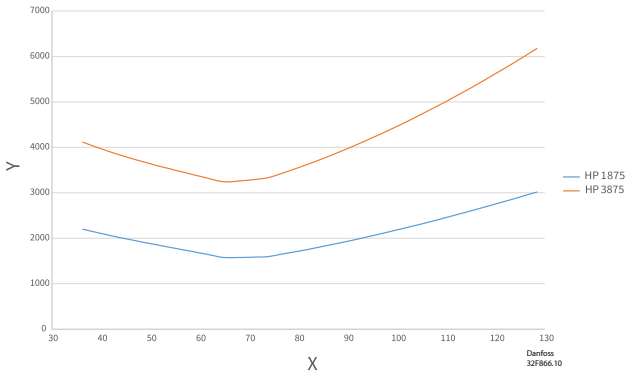
The Multi Ejector is designed to lift a part of the gas from MT suction and mix it with the gas coming from the gas cooler at medium pressure level. Pre-compressed gas is taken from the receiver to parallel compressor which works more efficiently due to lower pressure lift required.

Figure: Application



High pressure lift ejectors design mass flow HP side

Figure: High pressure lift ejectors design mass flow HP side



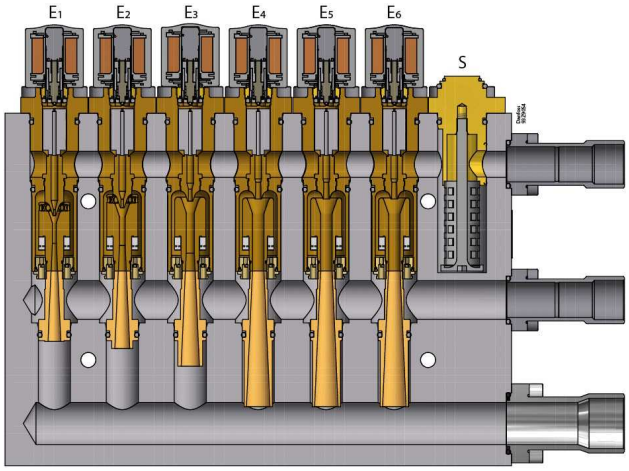
X	Inlet pressure HP side [Bar]
Y	Mass flow HP side [kg/hr]

Flow from the high pressure side (motive flow) for fully open ejector block as a function of temperature out of gas cooler.

Ordering

Product code numbers

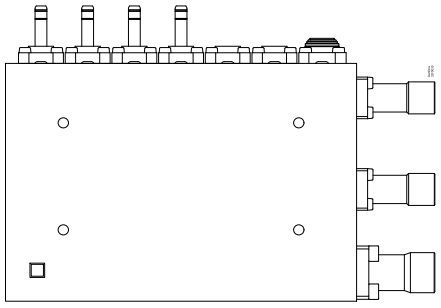
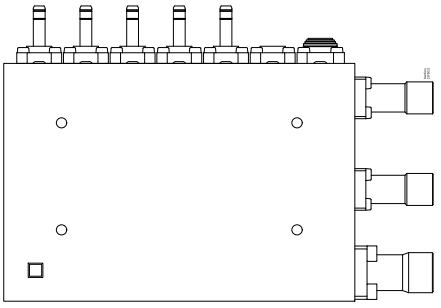
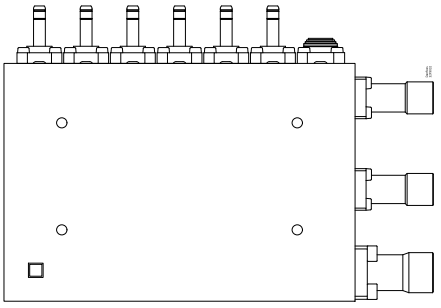
Valve configuration
Figure: Valve configuration



E	Ejector
S	Strainer

Type	Product Name	Mass flow Ejector 1[kg/h]	Mass flow Ejector 2[kg/h]	Mass flow Ejector 3 [kg/h]	Mass flow Ejector 4 [kg/h]	Mass flow Ejector 5 [kg/h]	Mass flow Ejector 6 [kg/h]	Capacity – Mass flow [kg/h]	Capacity Mass flow [lb/h]	Code number
CTM 6	CTM High pressure valve	125	250	500	1000	0	0	1875	4134	032F5673
CTM 6	CTM High pressure valve	125	250	500	1000	1000	1000	3875	8543	032F5674
CTM 6	CTM High pressure valve	125	250	500	1000	1000	0	2875	6338	032F5698

Multi Ejector
Table: Multi Ejector

CTM 6 HP 1875	CTM 6 HP 2875	CTM 6 HP 3875
		

(1) R744 at 90 bar / 35 °C

(2) R744 at 1305 psi / 95 °F

Notes:

HP = High Pressure lift
No coils included.
The above code numbers are without coils which should be ordered separately – see coil ordering below.
Depending on system size, more than one Multi Ejector might be needed. Multiple Multi Ejector piping connection: parallel manifolds.
For calculation, refer to CoolSelector 2 software available on Danfoss website.

Accessories code numbers



042N4202

Solenoid coil, AZ120CS, DIN Spade, Multi pack

Electrical connection: DIN Spade, Frequency [Hz]: 50/60 Hz, Enclosure rating IP: IP00

Related products

032F5673 032F5674 032F5698



064G0950

Accessories, sensors, Cable

Used for product: AKS/MBS, Parts included: Round packard w.10,0m cable, Packing format: Multi pack, Quantity per packing format: 12

Related products

032F5673 032F5674 032F5698



032F9114

Spare part, CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve

Product Type: Spare part, Used for product: CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve, O-ring

Related products

032F5673 032F5674 032F5698



032F9102

Ejector, CTM Combi valve; CTM High pressure valve

Ejector, Used for product: CTM Combi valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



032F9103

Ejector, CTM Combi valve; CTM High pressure valve

Ejector, Used for product: CTM Combi valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



032F9112

Ejector, CTM Low pressure valve; CTM High pressure valve

Ejector, Used for product: CTM Low pressure valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



032F9105

Ejector, CTM Combi valve; CTM High pressure valve

Ejector, Used for product: CTM Combi valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



032F9117

Connector, CTM Low pressure valve; CTM Combi valve; CTM High pressure valve

Connector, Used for product: CTM Low pressure valve; CTM Combi valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



032F9113

Spare part, CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve

Product Type: Spare part, Used for product: CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve, Strainer

Related products

032F5673 032F5674 032F5698



042N0265

Spare part, 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Cable plug

Product Type: Spare part, Used for product: 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Type designation: Cable plug, Cable plug

Related products

032F5673 032F5674 032F5698



042N7601

Solenoid coil, AS230CS, DIN Spade, Supply voltage [V] AC: 230, Multi pack

Electrical connection: DIN Spade, Supply voltage [V] AC: 230, Frequency [Hz]: 50/60 Hz, Enclosure rating IP: IP00

Related products

032F5673 032F5674 032F5698



042N0156

Spare part, 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Cable plug

Product Type: Spare part, Used for product: 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Type designation: Cable plug, Cable plug

Related products

032F5673 032F5674 032F5698



032F9116

Connector, CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve

Connector, Used for product: CTM Low pressure valve; CTM Combi valve; CTM High pressure valve; CTM Liquid valve

Related products

032F5673 032F5674 032F5698



032F9104

Ejector, CTM Combi valve; CTM High pressure valve

Ejector, Used for product: CTM Combi valve; CTM High pressure valve

Related products

032F5673 032F5674 032F5698



064G1136

Pressure transmitter, MBS 8250, -1 bar - 159 bar, -14.5 psi - 2306.1 psi

Pressure reference: Gauge (relative), Output signal: Ratio metric, Electrical connection: Round Packard Metri-Pack, Pressure connection type: UNF, Pressure connection size: 7/16-20, Specification key: MBS 8250-9716-C2BC08-1

Related products

032F5673 032F5674 032F5698

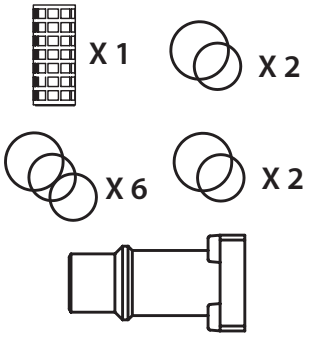
(1) The three pins on the coil can be fitted with spade tabs, 6.3 mm wide (to DIN 46247). The two current carrying pins can also be fitted with spade tabs, 4.8. mm wide. Max. lead cross section: 1.5 mm2. Voltage variation: V AC -15% - 10%, If DIN plug is used (DIN 43650) the leads must be connected in the socket. The socket is fitted with a Pg 11 screwed entry for 6 – 12 mm.

Spare parts code numbers

Ejectors



Strainer, O-rings and connectors





042N1256

Spare part, 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Cable plug

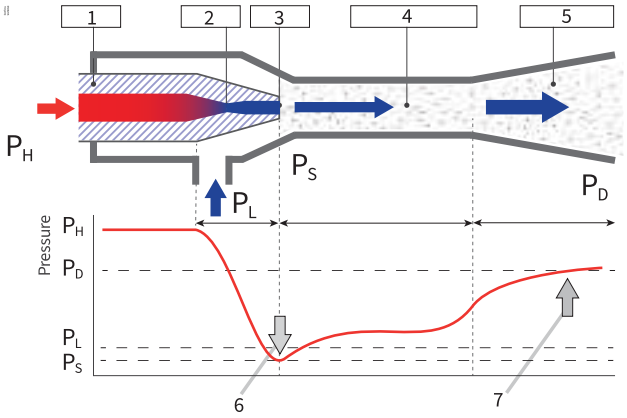
Product Type: Spare part, Used for product: 042N Coil Type B; 018F Coil Type B; 018Z Coil Type B, Type designation: Cable plug, Cable plug

Related products

032F5673 032F5674 032F5698

Functions

The Multi Ejector function
Figure: The Multi Ejector function



1	Nozzle
2	Throat
3	Exit
4	Mixing chamber
5	Diffuser
6	Intake due to pressure differential
7	Pressure increase due to reducing flow velocity

An ejector is a device that uses expansion energy to compress another fluid. In this case with the transcritical system there is up to 20% of the compressor work that can theoretically be recovered in the expansion.

In this case with the Multi Ejector system the work is coming from the CO_2 leaving the gas cooler. The high-pressure CO_2 (PH) is entering the nozzle where the expansion is taking place. At the exit of the nozzle the speed is very high and as a consequence of that the pressure is low.

This low pressure is used to drag liquid from the MT suction accumulator (PL). From there the two flows are mixed in the mixing chamber where the pressure will be lower than at the drive inlet due to the mixing of vapour from a higher pressure.

After the mixing the flow enters the diffuser where the flow is slowed down. The shape of the diffuser enables the conversion from kinetic energy (velocity) to potential energy (pressure). After the diffuser the flow is returned to the receiver.

Product details

General data

Table: Technical data

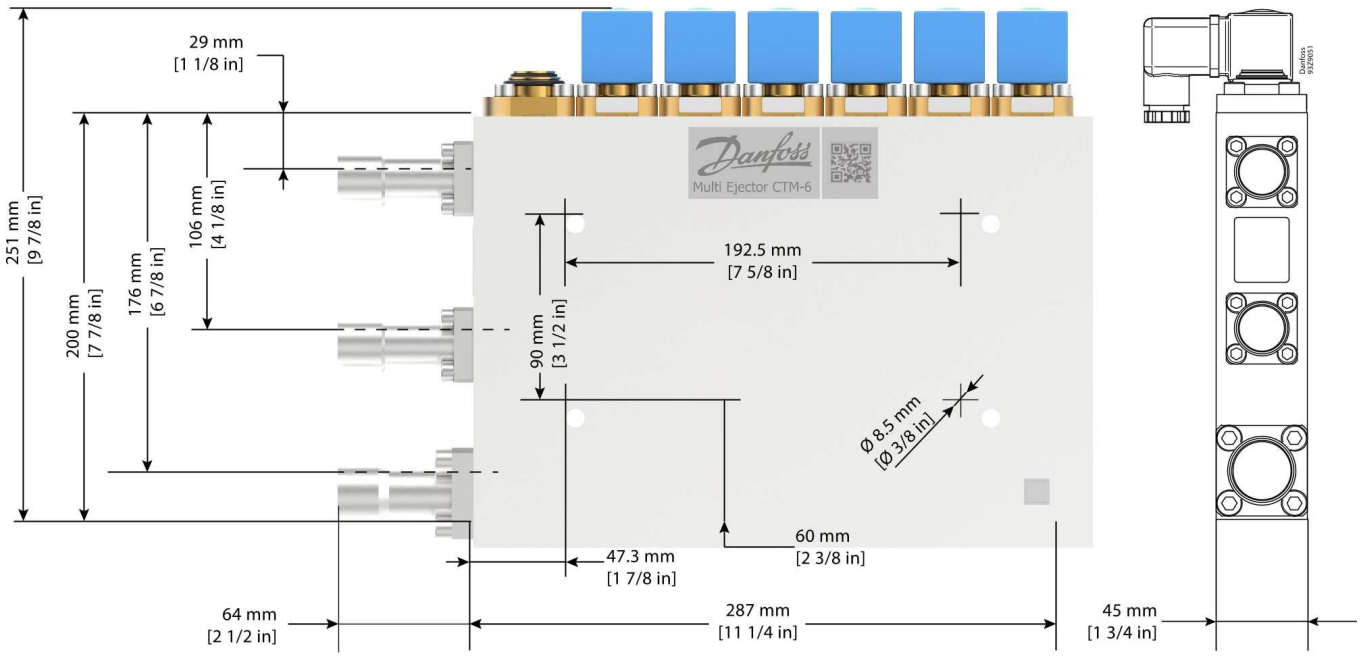
Refrigerant	R744 with oil
Maximum working pressure	140 bar / 2031 psi
Max. test pressure	1.43 x 140 bar / 1.43 x 2031 psi
Max. OPD	90 bar / 1305 psi (for single-voltage coil, 50 Hz)
Min. OPD	< 0.1 bar / 1.45 psi
Max. pres. dif. E and C connections	20 bar / 290 psi
Media temp. range	-10 – 50 °C / 14 – 122 °F
Ambient temp. range	-10 – 50 °C / 14 – 122 °F
Humidity	0 – 100% R.H. (0 – 97% R.H. non-condensation condition if IP level is below IPX5)

Material specification
Table: Material specification

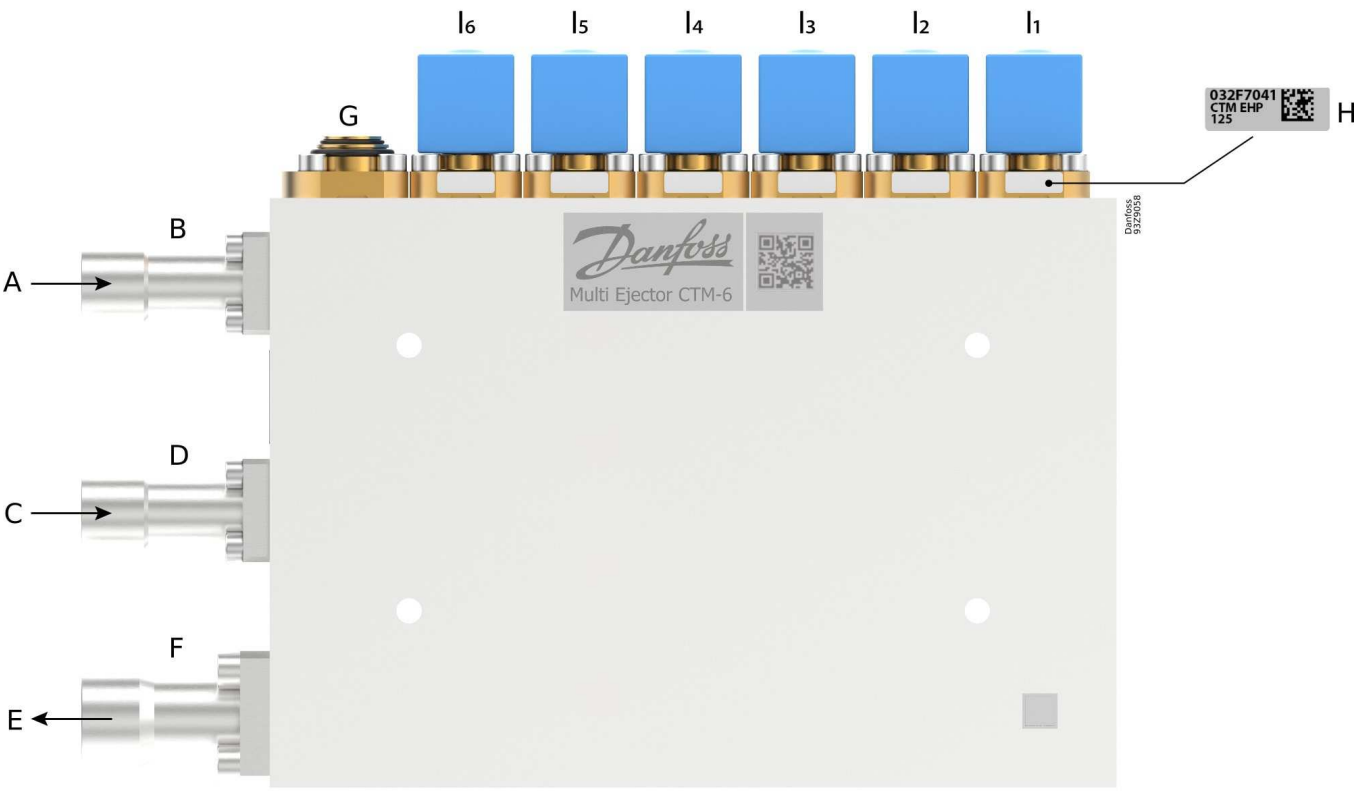
Housing	Aluminium AW-6082 T6
Connections	Stainless steel AISI 304
Ejectors	Brass
Screws	Stainless steel A2-70

Dimensions

figure: Dimensions



Connector positions
Figure: Connector positions



A	Gas cooler outlet - inlet connector Combi brazing ⅞ in ODF - weld ¾ inch (EN10220)
B	High pressure inlet
C	Suction connector. MT evaporator outlet - inlet connector. Combi brazing ⅞ in ODF - weld ¾ in (EN10220)
D	Suction inlet
E	Common outlet connector - receiver Combi brazing 1⅛ in ODF - weld 1 in (EN10220)
F	Receiver
G	Strainer
H	Label
I	Ejector

Mounting order of ejectors:
Any blank ejector (if present) should be placed closest to the suction connector C.
Ejectors with the lowest capacities (shortest ejectors) must be placed farthest from the suction connector C.

Accessories

Controller AK-PC 782A/B



Danfoss offers a wide range of market leading Pack Controllers. Being the flag ship and best in class controller for transcritical CO_2 packs controls, the AK-PC 782A/B offers the highest possible efficiency with the Multi Ejector, CTM.

The complete application control features:

- Complete booster pack control of up to 3 suction groups (max. up to 10 MT, 8 IT and 4 LT compressors) and high-pressure system control
- Significant savings with heat recovery for tap water and heat reclaim
- Extensive control of oil flow and pressurization
- Best in class safety monitoring and fail-safe functions
- Minimal energy consumption while ensuring optimal food quality
- Auto-configured, easy-to-use graphical representation with Danfoss system manager
- Independent, customized control and monitoring of auxiliary function

Temperature sensors and pressure transmitters

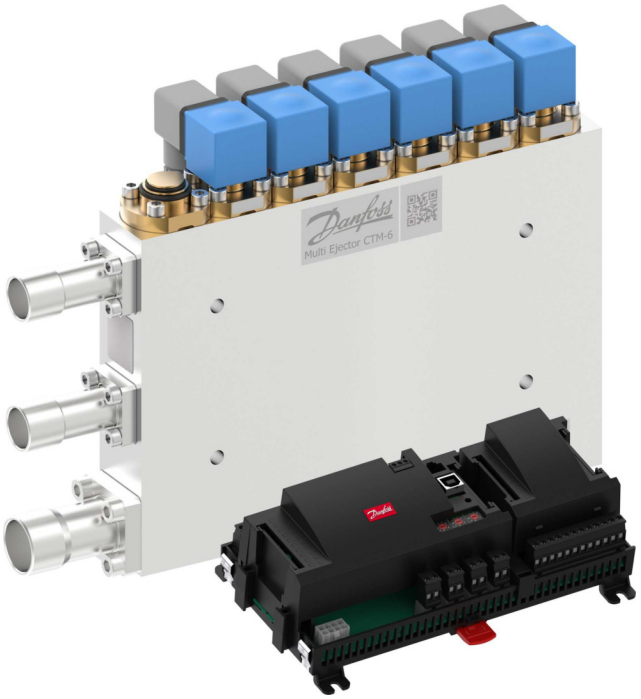


Danfoss offers a comprehensive range of sensors for temperature and pressure sensors developed to meet the requirements of the entire pack application.

The sensor range delivers the following key features and benefits:

- Long term reliability minimizes system downtime.
- Robust construction protects against mechanical shock and vibration.
- Temperature sensor design ensures fast response time and precise measurement.
- Hermetically sealed pressure element ensures no leakage.
- Pulse snubber ensures protection against liquid hammering, cavitation or pressure peaks.

Disclaimer



⚠WARNING:

The CTM Multi Ejector valve is approved for use only with Danfoss pack controller type AK-PC 78x.
Danfoss expressly disclaims, and any responsibility or liability, whether based on contract, breach of warranty, tort, statute or otherwise, shall be excluded, if the CTM Multi Ejector valve is used with any controller other than a Danfoss controller type AK-PC 78x.

For further information on AK-PC, please see separate document.

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
Mechanical Safety Certificate	UL SA45046	UL - Underwriters Laboratories inc.	
Manufacturer's Declaration	Danfoss MD 033F0687.AH	Danfoss	EU RoHS
EU Declaration	Danfoss EU 033F0688.AK	Danfoss	EMC, LVD
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

Coils:
AS230CS: LLC CDC TYSK; The Low Voltage Directive 2014/35/EU (LVD); Electromagnetic Compatibility Directive 2014/30/EU (EMC)

AZ120CS: C UR US; LLC CDC TYSK; The Low Voltage Directive 2014/35/EU (LVD); Electromagnetic Compatibility Directive 2014/30/EU (EMC)

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.