Danfoss Multi Ejector Solution™, consists of a CTM 6 Low Pressure valve and an AK-PC 782A controller. This solution makes CO₂ refrigeration systems economically competitive with the HFC systems at all ambient temperatures by improving COP in comparison to standard booster systems.

CO₂ systems with Multi Ejector Solution™ can be installed in any climate delivering lower energy consumption than i.e. R404A. CTM 6 LP is designed for CO₂ booster systems 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
- **First Cost savings**
  - Lower cost compared to parallel compression transcritical CO₂ packs due to lower swept volume of compressors. (i.e. smaller compressors or less number of compressors)
- **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**
- **MBS 8250 pressure transmitters integrated**
- **Brings first cost savings**
  - High pressure valve becomes redundant
  - Enables 15 - 35% savings on compressor swept volume, compared to booster systems without Multi Ejector systems

- **Fast Pay Back – Energy saving**
  - Improved COP, enhanced operation of parallel compressors and lower swept volume to the MT compressors, resulting in lower energy consumption
  - Savings for end users
- **Fast payback – lower energy consumption**
  - Less compressors and higher efficiency on the systems, leads to payback time of less than 2 years on average globally
- **The combination of CTM 6 Low Pressure and the AK-PC 782A ensure an easy setup and commissioning, robust control of the system that ensures many years of problem free operation**
Data sheet | Multi Ejector, type CTM 6 Low Pressure

Approvals
- Pressure Equipment Directive 2014/68/EU (PED)
- UL Recognized

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 ºC – +50 ºC / +14 °F – 122 ºF
- Ambient temp. range: -10 ºC – +50 ºC / +14 °F – 122 ºF
- Humidity: 0 − 100% R.H. (0-97% R.H. non-condensation condition if IP level is below IPX5).

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.

Connector positions
Can be interchanged (see drawing below)

Mounting order of ejectors:
Ejectors with the highest capacities (longest ejectors) must be placed closest to the suction connector C.
Any blank ejector should be placed after the ejectors.

Pressure transmitter
MB5 8250 (064G1136)

For mounting / service of ejectors
- Pressure transmitter
- Strainer
- A: Gas cooler outlet - Ball valve - inlet connector
  Combi brazing 7/8 inch ODF - weld 3/8 inch (EN10220)
- B: Inlet measurement port G 7/8 inch - 20 UNF
- C: Suction connector, MT evaporator outlet - Ball valve - suction connector.
  Combi brazing 7/8 inch ODF - weld 3/8 inch (EN10220)
- D: Suction measurement port G 7/8 inch - 20 UNF
- E: Common outlet connector - Ball valve - Receiver
  Combi brazing 1 inch ODF - weld 1 1/8 inch (EN10220)
- F: Outlet measurement port G 7/8 inch - 20 UNF
Ordering Multi Ejector

### Multi Ejector CTM 6

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity - Mass flow</th>
<th>Capacity - Mass flow</th>
<th>Code no.</th>
<th>Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTM 6 LP 935</td>
<td>935 kg/h</td>
<td>2061 lb/h</td>
<td>032F5678</td>
<td></td>
</tr>
<tr>
<td>CTM 6 LP 1435</td>
<td>1435 kg/h</td>
<td>3164 lb/h</td>
<td>032F5693</td>
<td></td>
</tr>
<tr>
<td>CTM 6 LP 1935</td>
<td>1935 kg/h</td>
<td>4266 lb/h</td>
<td>032F5679</td>
<td></td>
</tr>
</tbody>
</table>

1) R744 at 90 bar / 35 °C
2) R744 at 1305 psi / 95 °F

(LP = Low Pressure lift)

(The above code numbers are without coils which should be ordered separately – see coil ordering below).

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**Approvals (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)

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**Ordering coils / accessories**

**DIN spade connection**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Frequency</th>
<th>Power consumption</th>
<th>Code no. Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS230CS</td>
<td>230</td>
<td>50 Hz</td>
<td>8 W / 60 Hz / 7 W</td>
<td>042N7601 with DIN plug</td>
</tr>
<tr>
<td>AZ120CS</td>
<td>110 - 120</td>
<td>50 Hz</td>
<td>8.5 W / 60 Hz / 7 W</td>
<td>042N4202</td>
</tr>
</tbody>
</table>

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.

**Plug for DIN spade connection**

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Frequency</th>
<th>Code no. Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN plug (LED)</td>
<td>230</td>
<td>50 / 60 Hz</td>
<td>042N0265</td>
</tr>
<tr>
<td>DIN plug</td>
<td>Max. 250</td>
<td>50 / 60 Hz</td>
<td>042N0156</td>
</tr>
</tbody>
</table>

1) Only for AS230CS.

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**Coolselector®2**

Valve sizing using calculation software

It is strongly recommended to use Coolselector®2 to find the correct valve for your application. The software can be downloaded from the Danfoss website.

You can download it from [http://coolselector.danfoss.com](http://coolselector.danfoss.com)
### Data sheet | Multi Ejector, type CTM 6 Low Pressure

#### Spare parts

<table>
<thead>
<tr>
<th>Part</th>
<th>Type</th>
<th>Description</th>
<th>Code no. Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ejectors</td>
<td>CTM ELP 60</td>
<td>60 [kg/h] 132.3 [lb/h], 1. Completely assembled ejector with O-rings already mounted</td>
<td>032F9106</td>
</tr>
<tr>
<td></td>
<td>CTM ELP 125</td>
<td>125 [kg/h] 275.5 [lb/h], 1. Completely assembled ejector with O-rings already mounted</td>
<td>032F9107</td>
</tr>
<tr>
<td></td>
<td>CTM ELP 250</td>
<td>250 [kg/h] 551.0 [lb/h], 1. Completely assembled ejector with O-rings already mounted</td>
<td>032F9108</td>
</tr>
<tr>
<td></td>
<td>CTM ELP 500</td>
<td>500 [kg/h] 1102 [lb/h], 1. Completely assembled ejector with O-rings already mounted</td>
<td>032F9109</td>
</tr>
<tr>
<td></td>
<td>CTM Blank ejector</td>
<td>– [kg/h] – [lb/h], 1. Completely assembled blank ejector with O-rings already mounted</td>
<td>032F9112</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part</th>
<th>Type</th>
<th>Description</th>
<th>Code no. Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strainer</td>
<td>CTM strainer</td>
<td>1. Mesh only 2. 2 sets of 2 O-rings</td>
<td>032F9113</td>
</tr>
<tr>
<td>O-rings</td>
<td>CTM O-rings</td>
<td>1. 2 sets of 2 O-rings for strainer 2. 6 sets of 3 O-rings for ejectors</td>
<td>032F9114</td>
</tr>
<tr>
<td>Connectors</td>
<td>DN 20 Connector + O-ring</td>
<td></td>
<td>032F9116</td>
</tr>
<tr>
<td></td>
<td>DN 25 Connector + O-ring</td>
<td></td>
<td>032F9117</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part</th>
<th>Type</th>
<th>Description</th>
<th>Code no. Single pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure transmitter</td>
<td>MBS 8250</td>
<td>Pressure transmitter with O-ring</td>
<td>064G1136</td>
</tr>
<tr>
<td>Cable</td>
<td>–</td>
<td>10 meter cable for pressure transmitter</td>
<td>064G0950</td>
</tr>
</tbody>
</table>
The Multi Ejector function is shortly described below.

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 vapour from the MT suction (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.
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 MT compressor which works more efficiently due to lower pressure lift required.
Danfoss offers a wide range of market leading Pack Controllers. Being the flagship and best in class controller for transcritical CO₂ packs controls, the AK-PC 782A 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. 12 compressors) and high pressure system
- 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, customised control and monitoring of auxiliary function

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 minimize 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.
- Pressure transmitter output calibrated for perfect fit to the application.
- Pulse snubber ensures protection against liquid hammering, cavitation or pressure peaks.
Material specification

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing:</td>
<td>Aluminium AW-6082 T6</td>
</tr>
<tr>
<td>Connections:</td>
<td>Stainless steel AISI 304</td>
</tr>
<tr>
<td>Ejectors:</td>
<td>Brass</td>
</tr>
<tr>
<td>Screws:</td>
<td>Stainless steel A2-70</td>
</tr>
</tbody>
</table>

Dimensions and weights

CTM 6

Weight: 9.1 Kg / 20.1 lb