Data sheet

Check valve

NRVT

For high pressure CO_2 application

Description

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.

Features & Benefits

- Stable operation covering full map of compressor
- Fulfills high temperature and pressure requirements for the discharge lines used in transcritical CO_2 systems
    - Rupture proof, optimized TIG weldingSpecially-selected sealing material for CO_2 refrigerant
- Hermetic brass body design
- Compatible to connect both copper/stainless steel tubes

Applications

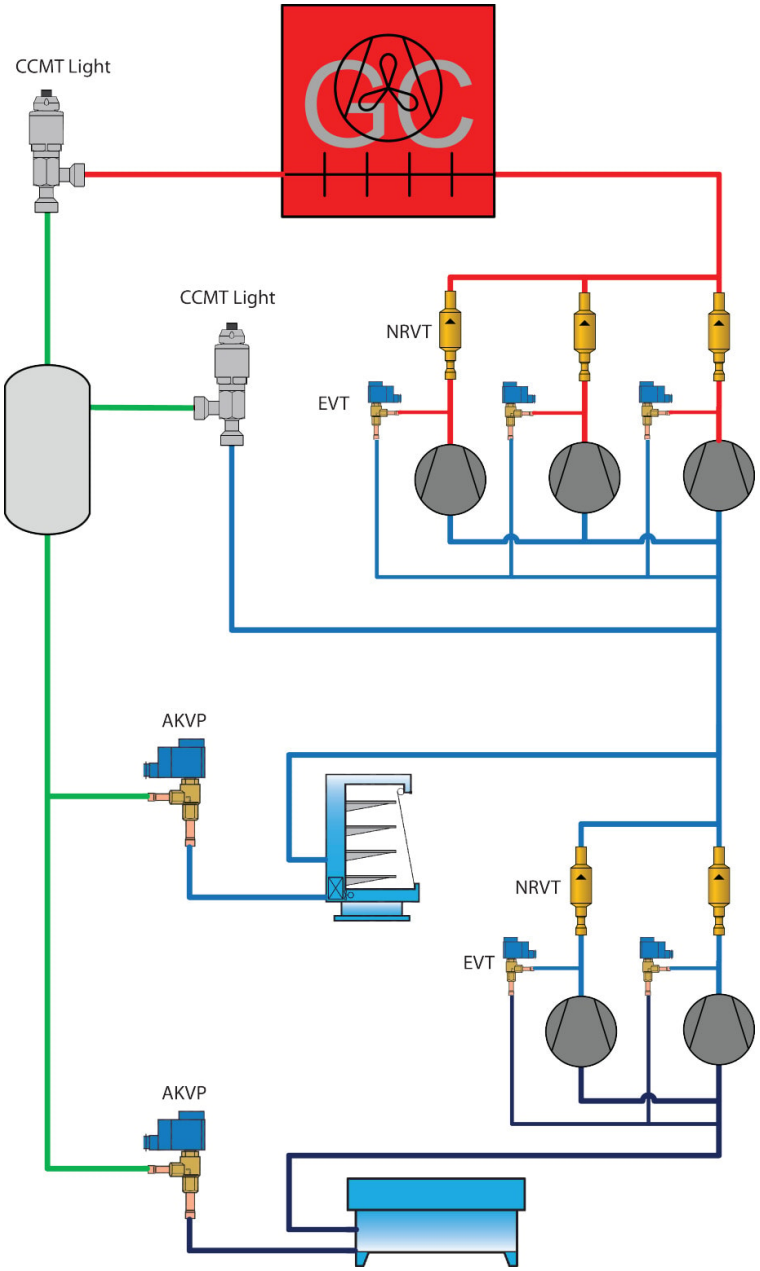
Typical applications for NRVT valves are:

- CO_2 MiniPack
- CO_2 CDU BLDC

Pressure Equalization/ Relief

- To start rotary BLDC compressors, it is necessary to equalize pressure between discharge and suction line.
- In single compressor solution it is possible to manage equalization via high pressure valve and bypass valve
- In system with parallel mounted compressors, **it is necessary to install a check valve on each compressor's discharge line and a solenoid valve to bypass high pressure to the suction line.**

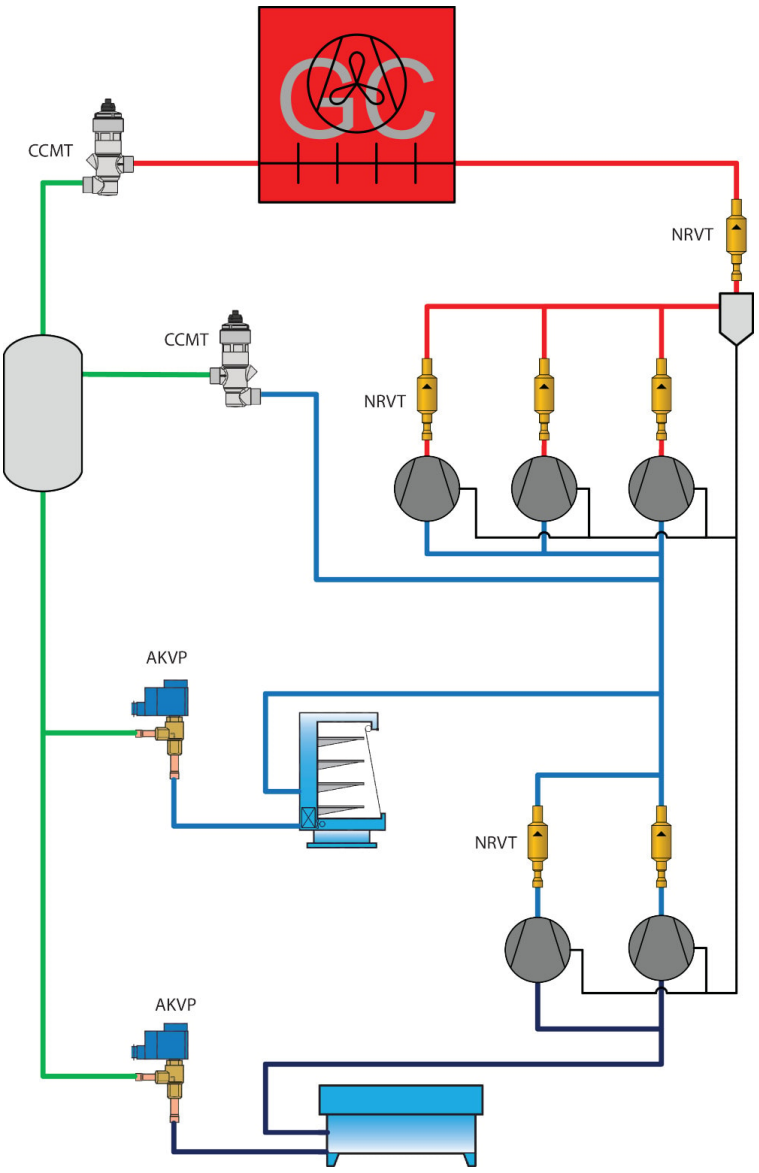
Figure: Pressure Equalization/ Relief



Discharge line – compressors mounted in parallel

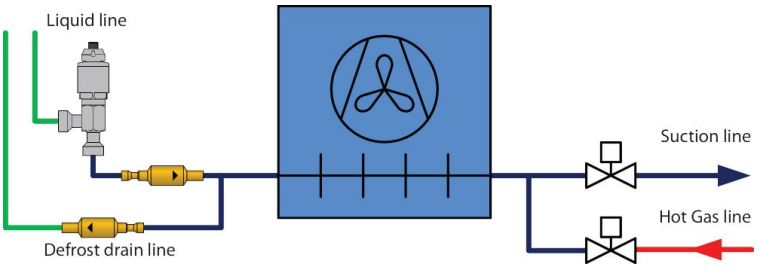
- If using an individual oil separator for each compressor – for **protection against back condensation of refrigerant** in the separator with the compressor shut-off.
- If the **cylinder heads** of the compressors **can cool down** below the condensing temperature at standstill
- Check valve for a common oil separator (installation position towards the condenser):
  – If there is a **danger of back condensation from the condenser** or liquid receiver
  – Systems with long shut-off periods

Figure: A diagram of Discharge line – compressors mounted in parallel



Hot Gas Defrost

Figure: A diagram of Hot Gas Defrost



Ordering

Product code numbers

Type	Code number	Inlet connection type	Inlet size [in]	Kv value [m³/h]	MinODP [bar]	Max. Working Pressure [bar]	Max. Working Pressure [psig]	Temperature range [°C] [min]	Temperature range [°C] [max]	Temperature range [°F] [min]	Temperature range [°F] [max]
NRVT 10s	020-6401	Solder, ODF	3/8 in	1.200	0.050	140.0	2031	-40	150	-40	302
NRVT 12s	020-6402	Solder, ODF	1/2 in	2.100	0.050	140.0	2031	-40	150	-40	302
NRVT 16s	020-6403	Solder, ODF	5/8 in	3.500	0.050	140.0	2031	-40	150	-40	302
NRVT 10sH	020-6411	Solder, ODF	3/8 in	1.200	0.250	140.0	2031	-40	150	-40	302
NRVT 12sH	020-6412	Solder, ODF	1/2 in	2.100	0.250	140.0	2031	-40	150	-40	302
NRVT 16sH	020-6413	Solder, ODF	5/8 in	3.500	0.250	140.0	2031	-40	150	-40	302

Product details

General data

Table: Technical data

Technical data	Values
Refrigerants	R 744 (CO_2)
Refrigerant oil	POE, PAG
Max. working pressure	140 bar / 2031 psig
Media temperature range	-40 °C – 150 °C / -40 °F – 302 °F
Flow direction	Single-flow
Valve direction	Sraightway
Serviceable	non-serviceable

Identification

Relevant product data is available on the product and box label. An example of a box label and product label are shown, including an explanation of the content.

Table 2: Box label & product label (example)

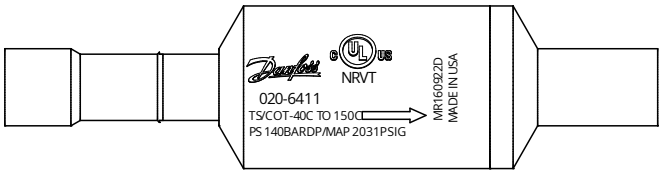
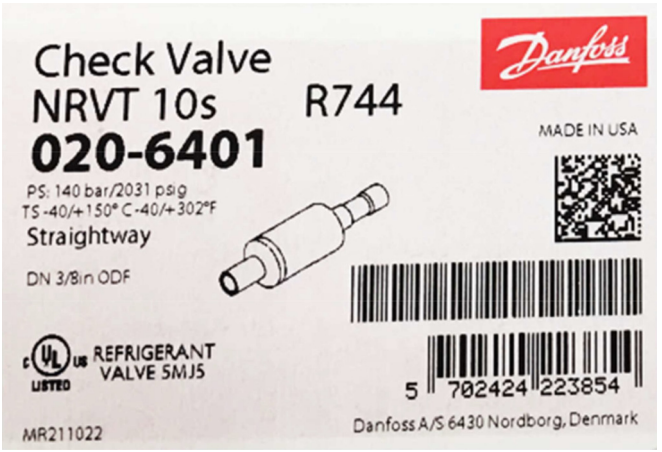
Product engraving	Packaging label
	

Table: Product engraving

Information	Explanation
Danfoss	Danfoss Logo
NRVT	Product type
020-6411	Code number for ordering
PS 140 BAR DP/MAP 2031 PSIG	Max. working pressure
TS/COT -40C TO 150C	Media temperature range
MR	Place of manufacture
160922D	Production date: DDMMYYS
	DD=Day
	MM=Month
	YY=Year
	S=Shift of production (D=Day, N=Night)
MADE IN USA	Country of origin
UL logo	Approval

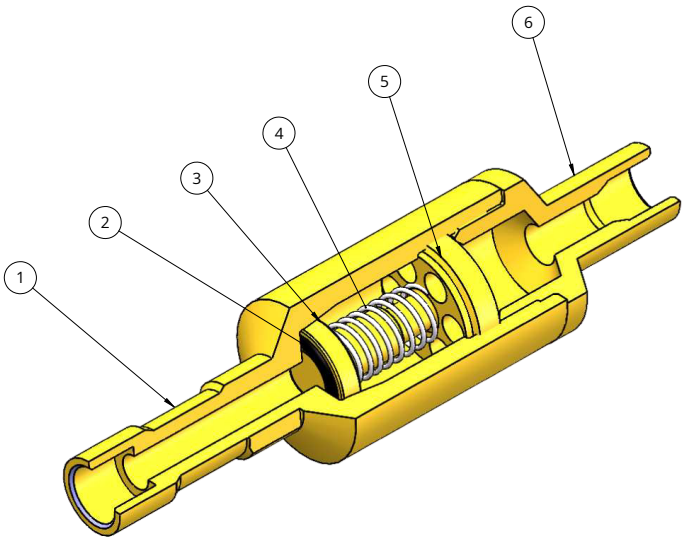
Table: Packaging label

Information	Explanation
Check valve	Product Description
NRVT 10s	Product type and size
020-6401	Code number
R744	Refrigerant
Straightway	Direction
DN 3/8 in ODF	Connection
PS 140bar/MWP 2031psig	Max Working Pressure
TS -40/+150°C -40 + 302°F	Media temperature range
MR	Place of manufacture
211022	Production date: DDMMYY
MADE IN USA	County of origin
Data Matrix	Content of traceability data matrix code (IDKey)
EAN code	Barcode for individual code no. identification according to EAN standard
Danfoss A/S, 6430 Nordborg, Denmark	Address

Design

The pressure of the fluid passing through a refrigeration system opens the valve, while any reverse flow closes the valve. In NRVT check valve a sealing disc is activated by the spring to close or open the valve, and the force of the spring determines the Min. opening pressure. When the refrigerant flows through the valve and the differential pressure of the flow is higher than the Min. opening pressure, the piston will move towards the stop face and compress the spring, then the valve will open.

Figure: Design and materials



Materials

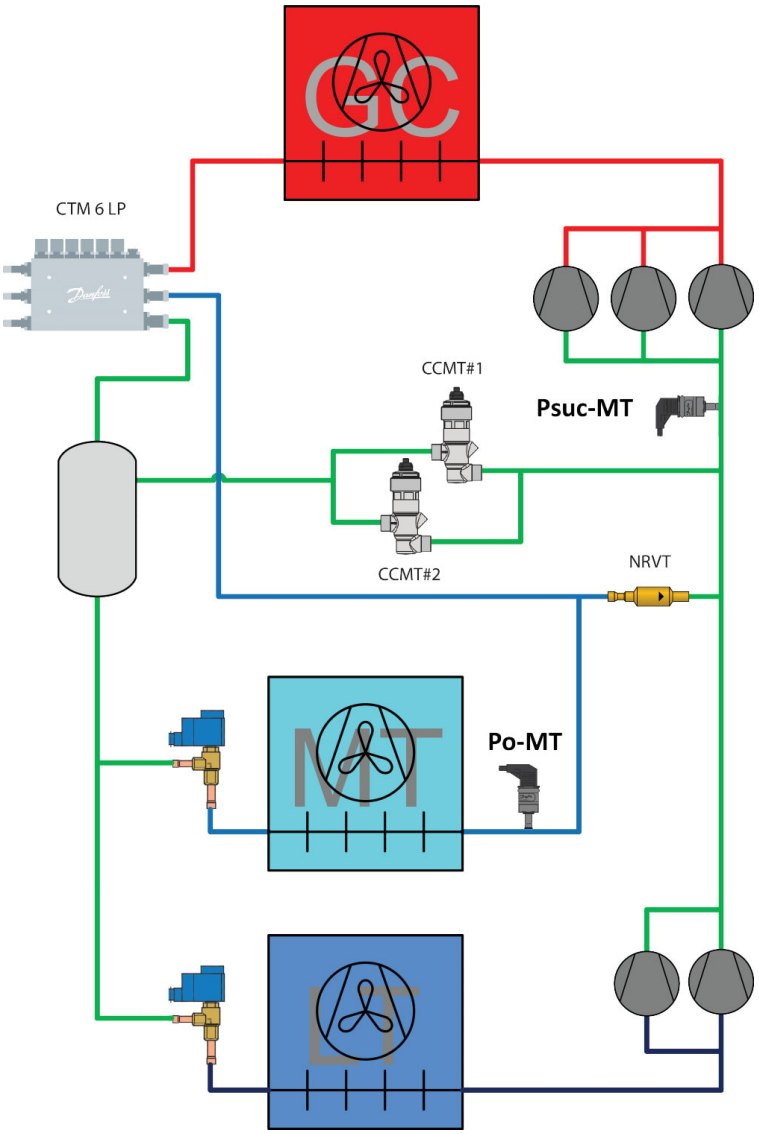
Position	Description	Material
1	Valve body	Brass
2	Piston	Brass
3	Spring	Stainless steel
4	Piston guide	Brass
5	Stop face	Brass
6	Tailpiece	Brass

Pressure and temperature data

Low Pressure lift Multi Ejector / cold & warm ambient temperature

- Optimal solution for **smaller** commercial refrigeration systems
- In colder ambient conditions system operates as a standard booster system
- Ejector is simply controlling the high pressure as a high pressure valve according to the optimal COP Gas Cooler pressure algorithm
- Pressure in the receiver as pressure difference between the receiver and Po-MT evaporator suction pressure
- Receiver pressure controlled by first gas by-pass valve CCMT#1, second gas by-pass valve CCMT#2 is closed
- **Check valve on MT evaporator suction line is open**
- In warmer ambient conditions temperature out of the gas cooler is high and corresponding optimal pressure in gas cooler is high too, so ejector can lift **all gas mass flow from MT evaporators** through the ejector to the receiver
- **Check valve in suction line between compressors and MT evaporators is closed due to pressure difference**
- The pressure in the receiver is result of the ejector performance.
- Both gas by-pass valves CCMT#1 & CCMT#2 are open to minimize pressure loses
- MT compressors are controlled based on Po-MT pressure sensor and Psuc-MT is protection

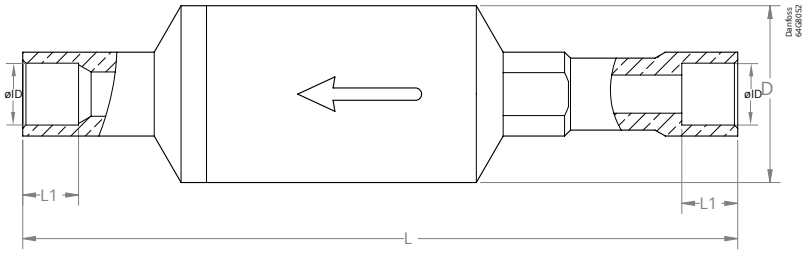
Figure: Low Pressure lift Multi Ejector / cold & warm ambient temperature



Dimensions & weights

You will find downloadable dimension drawings for individual code numbers on Danfoss store as part of the Visuals tab for individual code numbers.

Figure: Dimensions and Weights



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
Manufacturer's Declaration	Danfoss MD 033F4003.AB	Danfoss	PED
Export Control Declaration	Check valve and Shut-off ball valve	Danfoss	
UA Declaration	Danfoss UA 2023-01-10 Valves PL01 PL40	Danfoss	PED
Manufacturer's Declaration	Danfoss MD 033F4010	Danfoss	EU RoHS

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

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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.

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