

ENGINEERING
TOMORROW



R290

R1234ze

R744

R454B

Accelerate **refrigerant transition** and turn down **climate impact**

Danfoss' product portfolio of low-GWP (Global Warming Potential) refrigerants enables you to develop climate-friendly and sustainable solutions, making a positive environmental impact while enhancing resilience and lowering costs.

Update October 2024.

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Danfoss and
low-GWP refrigerants



Main **applications**
and refrigerant types



Global trends
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Products for refrigerants
with a GWP <2500

Danfoss and **low-GWP refrigerants**

Sustainable solutions are in the best interests of all stakeholders in our industry. Sustainability safeguards long-term investments and ensures compliance with Corporate Social Responsibility. Today, when talking about refrigerants and long-term sustainability, Danfoss considers three

main parameters that must be aligned to accomplish a real sustainable balance: **affordability, safety, and environment**. In order to enable the market to achieve the CO₂ reduction targets, Danfoss is actively working on **solutions for alternative refrigerants** with a pragmatic approach,

keeping system efficiency, costs and safety in mind. The company offers a **wide range of products and solutions for low-GWP** synthetic and natural refrigerants for both refrigeration and air-conditioning applications.

Refrigerant tools:



Main applications and refrigerant types



Main applications and refrigerant types

GWP values are decreasing due to phase downs and energy efficiency demands (MEPS) are increasing.

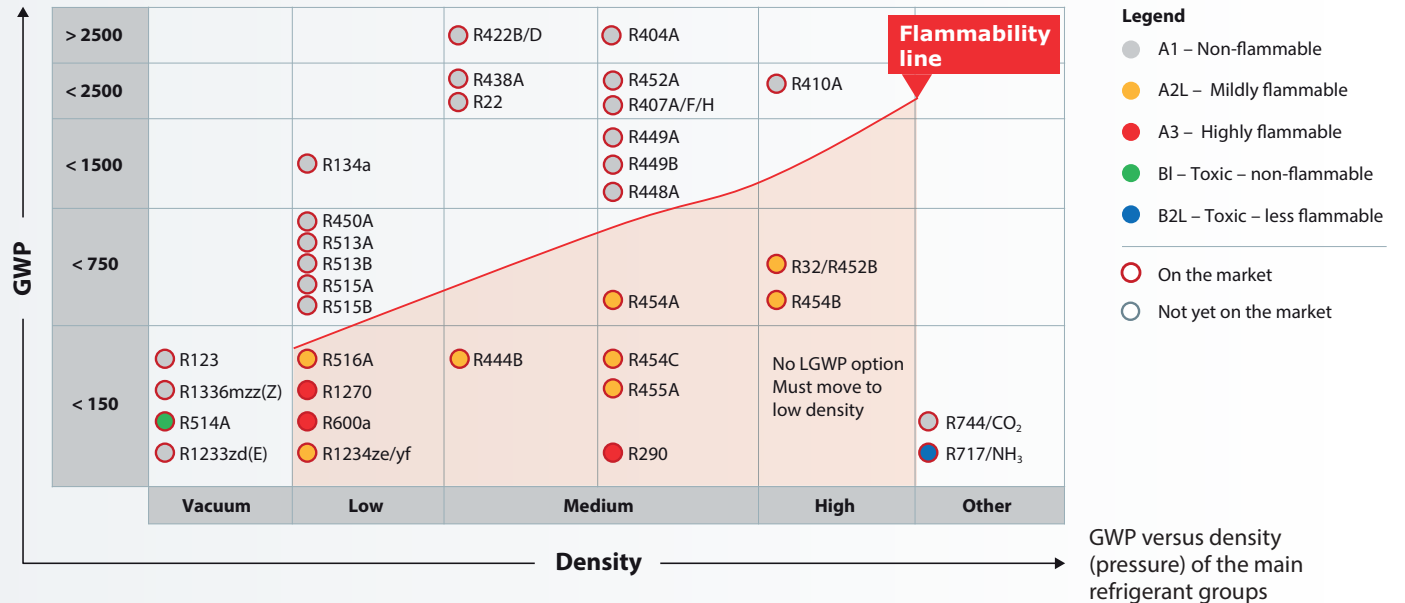
HVAC-R professionals will focus on using components and system designs that allow for the lowest possible charge and on technologies with the best cost/performance ratio for a given refrigerant type.

Choosing a refrigerant is no simple task; it depends on the timing of regional regulations as well as applied standards and building codes. The situation can be further complicated by significant price rises and a shortage of fluorinated refrigerants. But the drive to refrigerant transition means new, more efficient solutions are entering the market. However the transition accelerates especially lately with the aggressive EU phase down. Beyond 2030 more to use refrigerants below GWP 150.

Main refrigerants at play A complex picture in continuous evolution

GWP versus density (pressure) of the main refrigerant groups

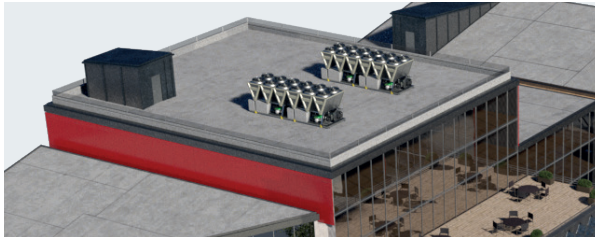
Main refrigerants at play A complex picture in continuous evolution



Carbon-chain-based Refrigerants (HCs, HFCs, HFOs, HCFCs), GWP versus density (pressure) of the main refrigerant groups.

Source: Danfoss

Chillers



Depending on their size and the compressor technology they use, chillers operate with low to high pressure refrigerants and are divided into two categories: low/medium (L/M) and medium/high (M/H) pressure.

L/M chillers transitioning from R123 can stay non-flammable using HCFO solutions like R1233zd. But this refrigerant is banned in some countries because even though its ozone depletion potential (ODP) is very low, it is still above zero. R134a applications have non-flammable, A1 solutions with GWP less than 640, such as HFO blends R513A, R450A and R515B. A2L classified refrigerants need to be accepted according to applied safety standards and building codes. GWP level can come very close to zero using the pure HFO R1234ze. We expect industry professionals

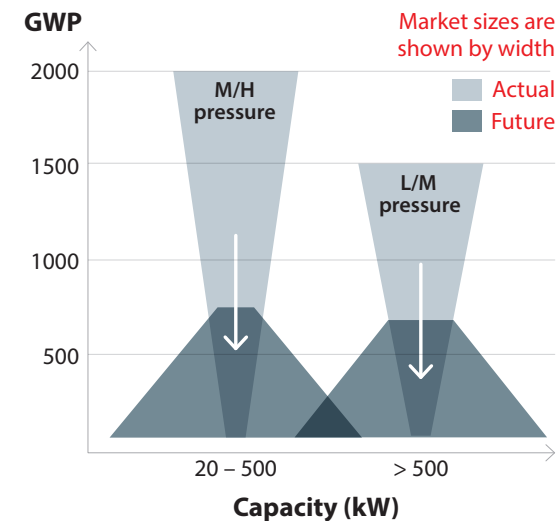
will adopt this ultra-low GWP refrigerant as a long-term solution for these kinds of systems. Especially in the EU the limited quota will push towards ultra-low GWP refrigerants.

For **M/H pressure chillers**, there is no ideal non-flammable alternative for incumbent refrigerants such as R410A. Instead, industry professionals must accept A2L or even A3 solutions like R290. A2L alternatives are in the 500 – 700 GWP range like R32/R452B/R454B.

Their use should be acceptable for systems installed outdoors or in machine rooms, but their placement must always follow local safety standards and building codes. We foresee that the high density/ pressure refrigerant choice will fall into two groups: the majority with a GWP around 500 – 750 and a smaller but still significant group applying A3 refrigerants like R290. In the longer term, we will likely experience lower GWP levels in the main market. It is dependent on refrigerant availability and cost. The F-gas phase-down has so far caused high GWP-related price increases.

Market transition and GWP level per Chiller size

Most of the M/H Chillers will use refrigerants with a GWP around 750, and most L/M chillers will use ultra-low GWP refrigerants.



VRF systems

VRF systems use a relatively large amount of refrigerant per unit, compared to ducted systems, due to their decentralized evaporators and subsequent piping.

Minimizing piping size requires medium to high density refrigerants where the only alternatives to R410A are A2L refrigerants such as R32 or R452B/ R454B. The EU phase down will make a hard time for those refrigerants.

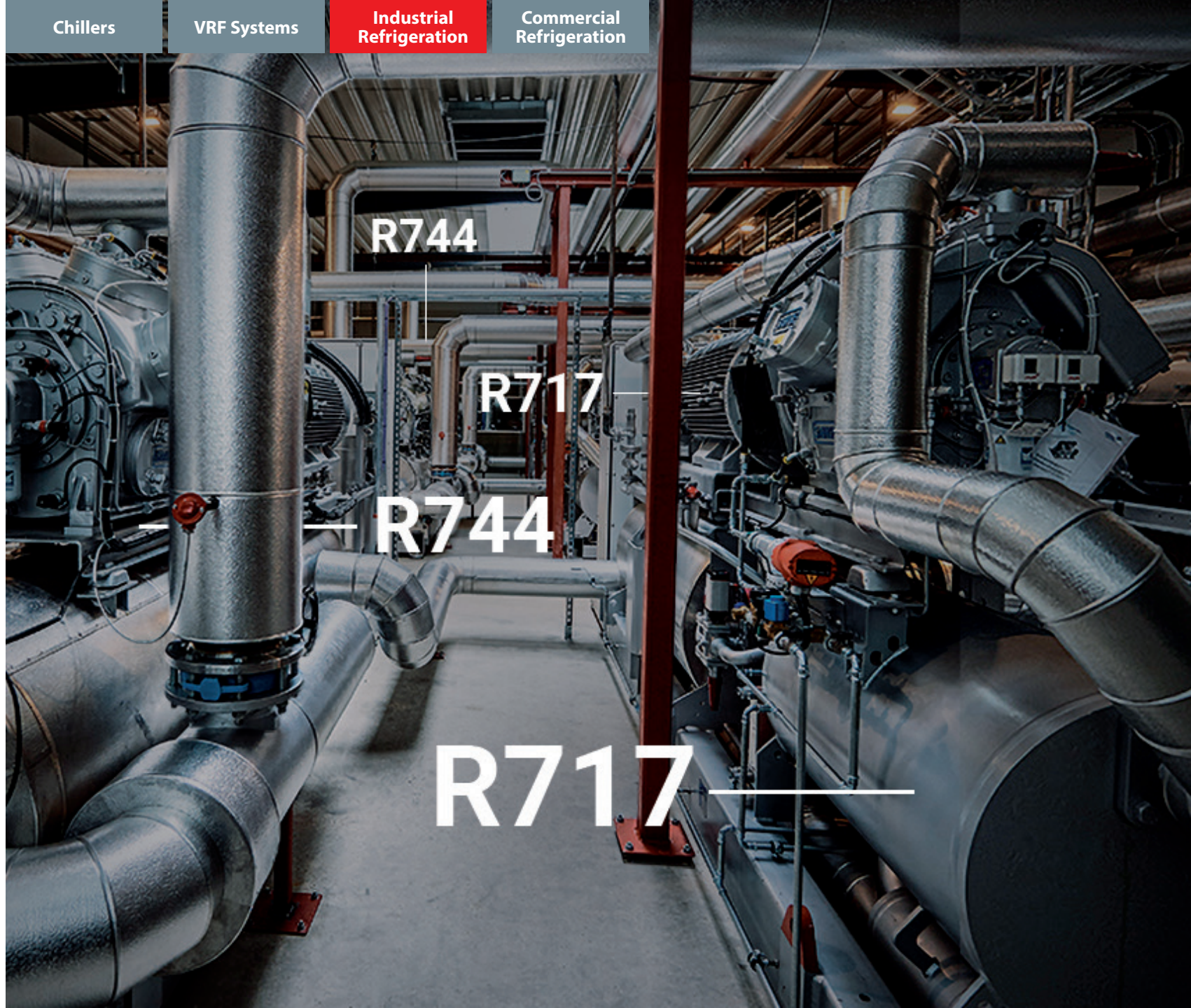
Innovative indirect alternative refrigerants are under constant development – water-based systems are an obvious choice and even CO₂ has been proposed.



Industrial Refrigeration

From a glance, Industrial Refrigeration seems to be an easy sector regarding low GWP refrigerants, but we still see potential safety pitfalls as well as room for innovation.

Ammonia has continued to be the dominant refrigerant for Industrial Refrigeration applications over the years. The main reason for that, is it's excellent thermodynamic properties. Further it's a natural refrigerant and it has minimal impact on the environment. Both the Ozone Depletion Potential (ODP) and the Global Warming potential (GWP) are 0 which is excellent. The costs are relatively low and it's widely available. NH₃ is categorized as toxic and flammable. This means that specific design requirements are needed and some specific design and safety standards have to be followed. In order to mitigate risks, there is a growing interest for innovative ways to reduce charge sizes, for example when combining NH₃ with CO₂. In some cases CO₂ takes on the role of thermal carrier.



Commercial Refrigeration



Commercial Refrigeration applications are very diverse regarding systems types and refrigerants used. It includes cold rooms, glass door merchandizers, and display and islands cabinets, either in centralized or plug-ins –hermetic or autonomous cooling circuits with condensing units.

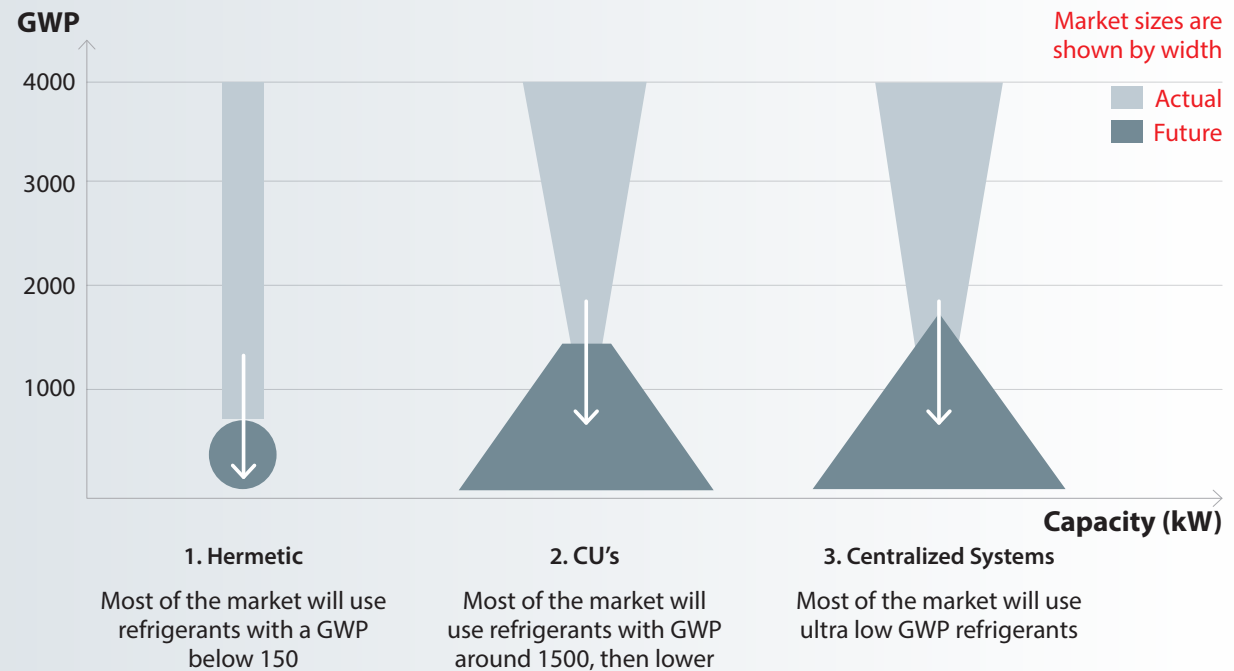
Commercial Refrigeration applications are grouped into three main categories.

**1.
Hermetically
sealed
applications**

**2.
Condensing
units**

**3.
Centralized
DX systems**

Market transition and GWP levels for Commercial Refrigeration applications



Commercial Refrigeration

1. Hermetically sealed applications

Hermetically sealed applications today use various refrigerants with GWP up to 1500. They are suited for using low GWP refrigerants, which are safe due to their low charge amounts.

Many of these systems already use hydrocarbons like R600a and R290 and the EU phasedown has required GWP values below 150 since 2016. The IEC 60335-2-89 standard allows up to 500g of A3 refrigerant and up to 1.2 kg of A2L refrigerant.

1.
Hermetically
sealed
applications

2.
Condensing
units

3.
Centralized
DX systems



Commercial Refrigeration

2. Condensing units

Systems with condensing units have a refrigerant charge that is typically between 1 and 20 kg and safety on flammability is imperative as many of these systems can be accessed by the public.

R404A systems have been used for many years but this will come to an end. In the EU no such systems are sold anymore and in the light of the 2030 ban on systems above GWP 150, new alternatives will prevail. Systems using R454C or R1234yf are already on the market and CO₂ condensing units are increasingly entering. Smaller systems can use R290 but carefully specified due to charge limitations still to be below 150g.



1.
Hermetically
sealed
applications

2.
Condensing
units

3.
Centralized
DX systems

Commercial Refrigeration

3. Centralized DX systems

Centralized DX systems are by far the highest refrigerant-consuming applications due to their large charge sizes and high leakage rates. During the last twenty years, CO₂ has become a viable refrigerant and can be used in different system setups:

Transcritical systems where CO₂ is used in all circuits (MT and LT). CO₂ transcritical systems have also been driving the development of integrated heating and cooling systems, linking the refrigerant choice to the type of system.

Indirect systems where a chiller-like rack using HFCs, HCs, or NH₃ cools the CO₂ in

a receiver, which is then circulated in the MT circuit, cooling the MT circuit. LT is also covered by CO₂ and condenses either directly to the chiller on top or the CO₂ MT circuit.

Cascade systems where CO₂ is used only in the LT circuit and cascaded into the MT circuit which uses HFC. This type of system still uses around 80% of the HFC refrigerant used in a conventional system.

Geographical location affects the energy efficiency of any system due to outdoor ambient temperature. Transcritical CO₂ systems have been known to be

extraordinary sensitive to outdoor temperatures. This type of system still uses around 80% of the HFC refrigerant used in a conventional system, and is therefore not a good choice.



1.
Hermetically
sealed
applications

2.
Condensing
units

3.
Centralized
DX systems

WE KNOW

R3FR1G3R4NTS



The tendency of the industry is to move increasingly toward natural refrigerant solutions when it is technologically safe & economically feasible. Synthetic refrigerants are still likely to play an important role in both the refrigeration and air conditioning, where the trend is also moving toward new low-GWP substances that cause a minimal environmental impact.

CO₂ (R744)

- The CO₂'s GWP value equal to 1.
- Lends itself well to food retail applications, where the impact, in case of leaks, is minimal and where its thermodynamic properties make it the ideal media for heat recovery.
- Transcritical CO₂ cycles reject a large proportion of the cycle heat at high temperatures which makes it suitable for heat pumps. But be aware of the return temperature which has to be below 40 degree Celsius.
- In industrial refrigeration, CO₂ provides a means to reduce the charge of Ammonia, increasing the efficiency and decreasing the footprint of freezing equipment. Larger CO₂ systems are also becoming a trend especially when ammonia needs to be avoided.
- In transport refrigeration and electronics cooling, CO₂ provides a non-flammable, environmentally benign solution.

Ammonia (NH₃- R717)

- GWP and ODP (Ozone Depletion Potential) equal to zero, cost (per kg) considerably lower than the cost of HFCs.
- Ammonia is one of the most energy efficient refrigerants in applications ranging from high to low temperatures. With the increasing focus on energy consumption, ammonia is a sustainable choice for the future. Ammonia has better heat transfer properties than most of chemical refrigerants and therefore plant construction and operating costs will be lower.

WE KNOW

R3FR1G3R4NTS



Hydrocarbons (R290, R600, R600A)

- Provides high energy-efficiency, good volumetric capacity and large operating envelopes compared to HFCs.
- Charge limits are increasing for hermetic systems and outdoor systems like monoblock heat pumps going up to 5 kg. Chillers placed outside is another growing application.
- Allows for very low evaporating temperatures without overheating the compressor when used in heat pumps (with HFCs you need to supplement with an electrical heating element for the really cold days or more expensive vapor /liquid injection cycles).

Medium GWP HFC / HFO blends

- A transitional solution that can be used in retrofitting high-GWP HFC systems. Medium GWP solutions, <1500, and non-flammable are particularly indicated where indoor system charge can be an issue and alternative system architecture too expensive.
- In the EU most applications will need to go below GWP 150. This will be the end of the transitional phase and new blends below GWP have to be qualified.

Mildly flammable HFC & HFO

- The low GWP and low flammability makes these refrigerants suitable for relatively large systems.
- Especially interesting for air conditioning where there is a lack of non-flammable (A1) natural alternatives.
- The low GWP thresholds in the EU will force manufacturers to focus long term on solutions that can ensure availability of refrigerants. That means pure HFO or natural refrigerants.

Global trends by region

| | | Air Conditioning & Heat Pump | | | | | | | | | | | | | | | | | |
|----------------------------------|--------------------|---|------|------|----------------------|------|------|------------------------|------|------|------------------------------------|------|------|----------------------------------|------|------|-----------------------|------|------|
| | | Residential A/C incl reversible systems | | | Rooftop units Scroll | | | Commercial A/C Scrolls | | | Commercial A/C Screw / Centrifugal | | | Res. & Commercial Heat Pumps W/W | | | Industrial Heat pumps | | |
| | | 1-10 kW | | | 10-30 kW | | | 30-400 kW | | | 400 kW - 5 MW | | | 1-10 MW | | | 1-10 MW | | |
| Refrigerant | Capacity Region/Yr | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 |
| CO2 (R744) | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |
| NH3 (R717) | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |
| HC e.g. R290 | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |
| HFC (A1) High-GWP* | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |
| HFC/HFO (A1 & A2L) Mid-GWP* | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |
| HFC/HFO (A1 & A2L) Low-GWP* <300 | NAM | | | | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | | | | |

Source: Danfoss, January 2020.

* GWP classification is somewhat dependent on current solution & operating pressure baseline.
 General guidance: High > 1000, Mid 300-1000, Low < 300.

■ Main refrigerant ■ Limited use and only niche applications
■ Regular use Not applicable or unclear situation

Global trends by region

| | | Refrigeration | | | | | | | | | | | | | | |
|---------------------------|-----------|----------------------------------|------|------|--------------------------------|------|------|------------------|------|------|---|------|------|--------------------------|------|------|
| | | Domestic-Household Refrigeration | | | Light Commercial Refrigeration | | | Condensing Units | | | Centralised Commercial racks (Supermarkets) | | | Industrial Refrigeration | | |
| | | Capacity 50-300 W | | | 0.15 - 5 kW | | | 3-20 kW | | | 20-500 kW | | | 1-10 MW | | |
| Refrigerant | Region/Yr | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 | 2022 | 2025 | 2028 |
| CO2 (R744) | NAM | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | |
| NH3 (R717) | NAM | | | | | | | | | | | | | | ** | ** |
| | EU | | | | | | | | | | | | | | ** | ** |
| | China | | | | | | | | | | | | | | ** | ** |
| | ROW | | | | | | | | | | | | | | ** | ** |
| HC e.g. R290 | NAM | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | |
| HFC (A1) | NAM | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | |
| HFC/HFO (GWP < 150) (A2L) | NAM | | | | | | | | | | | | | | | |
| | EU | | | | | | | | | | | | | | | |
| | China | | | | | | | | | | | | | | | |
| | ROW | | | | | | | | | | | | | | | |

Source: Danfoss, January 2020.

** Ammonia/CO₂ cascades will dominate industrial refrigeration

| | |
|---|--|
| ■ Main refrigerant | ■ Limited use and only niche applications |
| ■ Regular use | Not applicable or unclear situation |

Product overview

Products for refrigerants
with a GWP < 2500



Products for refrigerants with a GWP <2500



**Compressors and
Condensing units**



Electronic controllers



**Expansion devices
(electric and mechanical)**



Regulating valves



Other valves



Heat Exchangers



Sensors and switches



Systems protectors



Products for refrigerants with a GWP <2500

Compressors and condensing units



| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|----------------|--------------|------------------|-------------|-------|-------------|-----|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------|-------|------------------|-------|-------|-------|-------------------------|-------------------------|-------|-------|--|--|--|--|--|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A | | | | | |
| Compressors for air conditioning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DSH / DCJ / DSF / DSG/DSN | Scrolls with IDVs for air conditioning | | | ● ⁽⁵⁾ | | | | | ● ⁽²⁾ | | | | | | | | | | | | | ● ⁽²⁾ | | ● ⁽²⁾ | | | | | | | | | | | | |
| HLJ / SH | Scrolls for air conditioning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PSH | Scrolls heating optimized | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SY / SZ | Scrolls for air conditioning | | | | | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| VZH | Inverter scrolls for air conditioning | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TT, TG, VTX | Turbocor oil-free centrifugal compressors | | | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Compressors for refrigeration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MTZ | Maneurop reciprocating compressor for medium temp. | | | | | ● | | | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | | | |
| NTZ | Maneurop reciprocating compressor for low temp. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MLZ | Scroll compressor for medium temperature | | | | | ● | | | | ● | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LLZ | Scroll compressor for low temperature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B, U, HY, F, L, P, X, S | Light commercial AC compressors for LBP/MBP | | | | | ● | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NV, NM, NU | Variable speed reciprocating compressor for LBP/MBP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DL, DM, DK | Light commercial AC/DC compressors for mobile cooling | | | | | ● | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HGX / HAX LG | BOCK® semi-hermetic reciprocating compressor for low and medium temp | | | | | ● | ● | ● | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HG / HC | BOCK® semi-hermetic reciprocating compressor for low and medium temp | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HGX CO ₂ | BOCK® semi-hermetic reciprocating compressor for low and medium temp | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

* Qualification in progress

⁽¹⁾ Models and map restrictions might apply – contact Danfoss⁽²⁾ Only DSH for R452B/4B and DSF for R32⁽³⁾ Optyma™ Plus only⁽⁴⁾ Light commercial only⁽⁵⁾ Only DSG for R1234ze and R515B

For any refrigerants not listed and for the detailed information per product, please contact Danfoss or check in Coolselector: coolselector.danfoss.com



Products for refrigerants with a GWP <2500

Compressors and condensing units



| Product | | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|---|---------------------|----------------|--------------|---------|-------------|-------|-------------|-----|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------|------------------|-------|-------|-------|-------|-------|-------|-------------------------|-------------------------|-------|-------|
| | | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A |
| BOCK® SHGX | Condensing Units for medium teperature refrigeration | | | | | ● | | | ● | ● | | | | | | | | | | ● | ● | | | | | | | | | | | |
| Optyma™ | Condensing Units for medium temperature refrigeration | | | ●* | | ● | ● | | ● | ● | | | | | | | | | | | ● ⁽⁴⁾ | ● ⁽⁴⁾ | | ● | | | | | | | | |
| Optyma™ | Condensing Units for low temperature refrigeration | | | | | | ● | | | | | | | | | | | | | | ● | | | | | | | | | | | |
| Optyma™ Slim Pack, Optyma™ Plus | Condensing Units for medium temperature refrigeration | | | ● | | ● | | | ● | | | | | | | | | | | | ● | | ● | ● | | | | ●* | | | | |
| Optyma™ Slim Pack, Optyma™ Plus | Condensing Units for low temperature refrigeration | | | | | | | | | | | | | | | | | | | | ● ⁽³⁾ | ● ⁽³⁾ | | ● | ● | | | | | | | |
| Optyma™ Plus INVERTER | Condensing Units for medium temperature refrigeration | | | | | | | | ● | | | | | | | | | | | | | | | | | | | | | | | |
| Optyma™ iCO ₂ | Condensing Units for medium temperature refrigeration | | | | | | | | | | | | | | | | | | | | | | | | | | | | ●* | | | |

* Qualification in progress

⁽¹⁾ Models and map restrictions might apply – contact Danfoss

⁽²⁾ Only DSH for R452B/4B and DSF for R32

⁽³⁾ Optyma™ Plus only

⁽⁴⁾ Light commercial only

⁽⁵⁾ Only DSG for R1234ze and R515B

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Products for refrigerants with a GWP <2500

Electronic controllers



| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|--|---------------------|--------------|---------|-------------|-------|-------------|-----|--------------|-------|-------|------------------|------------------|------------------|------------------|-------|-------|-------|-------|-------|-------|------------------|-------|------------------|------------------|------------------|------------------|-------------------------|-------------------------|-------|-------|--|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A | |
| AK-PC 781A/783A | Advanced pack controllers | | • | | • | • | • | • | • | • | | • | | | •** | •** | | | | •** | | • | | | | | • | | • | • | | |
| AK-PC 351/551 651 | Standard pack controllers | | | | •** | • | • | • | • | • | | • | | • | | •** | •** | | | •** | | | | | | • | | • | • | | | |
| AK-PC 572/772A/782A | Advanced pack controllers | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | | | |
| AK-CC 55 | Case controller for electronic expansion valves | | | | •** | • | • | • | • | • | | • | | • | | •** | •** | | | •** | | | | | | • | | • | • | | | |
| AK-CC 210 | Case controller for thermostatic expansion valves | | | | | | | | • | • | | | | | | | | | | | | | | | | | | • | • | | | |
| EKC 202, 22x | | | | | | | | | | • | • | | | | | | | | | | | | | | | | | • | • | | | |
| AK-CC 250/350 | | | | | | | | | | | • | • | | | | | | | | | | | | | | | | • | • | | | |
| AK-RC | Cold room controllers | | | | | | | • | • | • | | | | | | | | | | | | | | | | | | | | | | |
| MCX | Programmable controllers | | • | • | • | • | • | • | • | • | • | | • | | • | • | | | • | • | • | | • | | | • | | • | • | | | |
| EIM 336 | Electronic superheat controllers & stepper valves drivers | | • | • | • | • | • | • | • | • | • | | • | | • | • | • | • | • | • | • | | • | | | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • | • | | |
| EKE 100, EKE 1x, EKF | | | • | • | • | • | • | • | • | • | • | • | • ⁽¹⁾ | • | • ⁽¹⁾ | • | • | • | • | • | • | • | • | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • | • | | |
| EKF | | Stepper valve drier | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EKE 100 | Super heat controllers group, available in 1- and 2-valves version | | • | • | • | • | • | • | • | • | • | • ⁽¹⁾ | • | • ⁽¹⁾ | • | • | • | • | • | • | • | • ⁽¹⁾ | • | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • | • | | |
| EKE 347 | Liquid level controllers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EKE 400 | Evaporator controller | | • | • | • | • | • | • | • | • | • | • ⁽²⁾ | • | • ⁽²⁾ | • | • | • | • | • | • | • | • ⁽²⁾ | • | • ⁽²⁾ | | | • | | • | | | |
| ERC 11x, ERC 21x, EET, ERC (VCD) | For commercial refrigeration | | • | • | • | • | • | • | • | | | | | | • | • | • | | • | • | • | | | | • | • | • | • | • | | | |
| ALSMART® | Programmable controller | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |

** Only in the latest versions of the controller software

⁽¹⁾ Parameters for other refrigerants can be entered manually, please refer to refrigerant constants for ADAP-KOOL⁽²⁾ Can be defined by the user⁽⁴⁾ Approved for R407A onlyFor any refrigerants not listed and for the detailed information per product, please contact Danfoss or check in Coolselector: coolselector.danfoss.com



Products for refrigerants with a GWP <2500

Expansion devices

(electric and mechanical)

| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---------------------|----------------|--------------|---------|-------------|-------|-------------|-----|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) |

Electronic expansion valves

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|--|---------|----|----|---|---|------------------|---|------------------|------------------|---|---|------------------|------------------|---|---|------------------|------------------|---|------------------|------------------|---|---|---|---|---|---|------------------|---|-------|---|---|---|---|---|----|--|--|
| AKV 15/20 | Pulse width modulating valves | 28 – 46 | | | | ● | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | | | | | | | ● ⁽¹⁾ | ● | ●**** | | | | | | | | |
| AKVA | | 42 | | | | ● | | | | ● | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● | | | | | | | |
| AKVP/PS | | 90 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| ETS 5M | Stepper motor valves | 49 | | ● | ● | ● | ● | ● | | ● | ● | ● | | | | | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | |
| ETS 6 | | 47 | | ● | | ● | ● ⁽²⁾ | ● | | ● | ● | ● | | | | | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| ETS 8M | | 49 | | | ● | ● | ● | ● | | | ● | ● | ● | | | | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ●* | | |
| ETS C-Colibri® | | 50 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| ETS L / ETS P | Single and manifold stepper motor valves | 34 | ●* | ●* | ● | ● | | | | ● | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |

Thermostatic expansion valves

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------|-------------------------------------|------|--|---|---|---|------------------|---|---|---|---|---|--|--|--|--|----|----|---|--|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|
| TU | Stainless steel | 45.5 | | | | | | ● | | | | ● | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | | | |
| TU | | 34 | | ● | ● | ● | ● | ● | | ● | ● | | | | | | ● | ● | | | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | |
| TC | | 45.5 | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | ● | ● | | | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| T2/TE2 | | 34 | | ● | ● | ● | | | ● | ● | | | | | | | ● | ● | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| TD1 | Thermostatic expansion valves | 34 | | ● | | ● | ● ⁽²⁾ | | | ● | ● | | | | | | ●* | ●* | ● | | ●* | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| TG/TGE | | 46 | | | ● | ● | ● ⁽²⁾ | ● | ● | ● | | ● | | | | | | | | | | ●* | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| TE5-TE55 | | 28 | | ● | | ● | | | ● | ● | | | | | | | ● | ● | | | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| TEA/TEAT | Industrial thermostatic exp. valves | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | |

* Qualification in progress

*** Except AKV20 with media temperature constantly below 0 °C

⁽¹⁾ Available for solder versions, the flare versions in progress

⁽²⁾ Approved for R290 only

For any refrigerants not listed and for the detailed information per product, please contact Danfoss or check in Coolselector: coolselector.danfoss.com



Products for refrigerants with a GWP <2500

Regulating valves



| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---------------------|----------------|--------------|---------|-------------|-------|----------------|-----|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) |

Electronic pressure & temperature regulating valves

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|--|-------|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CCM | Electric regulating valves | 90 | | | | ● | | | | | | | | | | | | ● | | | | | | | | | | | ● | | | | | |
| CCMT | | 140 | | ● | | ● | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| CTM | Multi Ejector | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| CTR | 3-Way Heat Reclaim Valve | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| KVSL | Electronic suction modulating valves | 40 | ● | | ● | ● | | ● | ● | | ● | ● | ● | | ● | ● | | ● | ● | | | | | | | ● | | | | | | | | |
| KVSC | | 50 | ●* | ●* | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| ICM / ICAD | Industrial motorized regulating valves | 52/65 | | | ● | ● | | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| ICMTS | High pressure industrial motorized regulating valves | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |

Mechanical pressure & temperature regulating valves

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------|----------------------------------|-------|--|------------------|------------------|---|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|------------------|------------------|---|---|---|---|---|---|---|---|---|
| KVD | Receiver pressure regulators | | | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | | | | | | |
| KVC | Capacity regulators | | | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | | | | | | |
| KVL | Crankcase pressure regulators | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | | |
| KVP | Evaporating pressure regulators | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | | |
| KVR | Condensing pressure regulators | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | | |
| CPCE | Hot gas bypass regulating valves | | | | ● | ● | ● | | ● | ● | ● | | | | ● | ● | ● | ● | ● | | | | ● | ● | ● | ● | | | | | | | | |
| CVC / CVP / CVPP / CVE | Pilot valve for ICS | 65 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| ICS | Mechanical pressure regulators | 52/65 | | ● | ● | ● | ● ⁽²⁾ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| REG-S | Flexline™ regulating valves | 52 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

⁽¹⁾ NRV (E) and GBC (E) series for flammable refrigerants; KVL, KVP, KVR size 12-22 only⁽²⁾ Only R600A

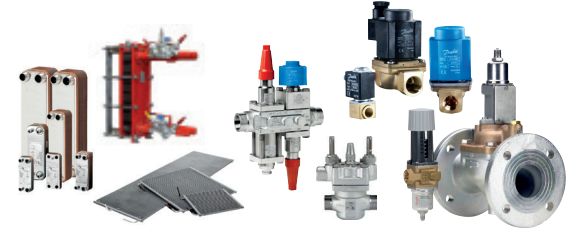
* in development

For any refrigerants not listed and for the detailed information per product, please contact Danfoss or check in Coolselector: coolselector.danfoss.com



Products for refrigerants with a GWP <2500

Other valves and Heat Exchangers



| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------------------------|---------------------------|--------------|------------------|------------------|-------|------------------|------------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------------|------------------|------------------|------------------|------------------|-------|-------|-------------------------|-------------------------|-------|-------|--|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A | |
| Solenoid valves | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EVR v2 | Solenoid valves | 45,2-49 | | • ⁽¹⁾ | • ⁽¹⁾ | • | • ⁽¹⁾ | • ⁽¹⁾ | • | • | • | • | • | • | • | • | • | • | • | • | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • ⁽¹⁾ | • | • | | | | | |
| EVL | | 45 | | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | |
| ICF 20-2 | | 52/65 | | • | • | • | | • | • | • | • | • | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| EVUL | | 90 52 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | |
| ICLX | | Flexline™ solenoid valves | | | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | |
| Valve stations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ICF | Flexline™ valve stations | 52/65 | | • | • | • | | • | • | • | • | • | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | |
| Water regulating valves – pressure operated | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WVFX | Pressure operated water valves | | | • | • | • | • | • | • | • | • | • | | • | • | • | • | • | | | | | | | • | • | • | • | • | | | |
| WVO | | | | • | | • | • | | • | • | • | | • | • | | • | • | • | • | | | | | | • | • | • | • | • | | | |
| WVS | | | | | | • | • | | • | • | | • | • | | • | • | | • | • | | | | | | | • | | | | • | | |
| Heat exchangers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| BPHE | Brazed Plate heat exchangers | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | |
| MPHE | Micro Plate heat exchangers | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | |
| MCHE | Micro Channel heat exchangers | | | • | • | • | • | • | • | | • | | | • | • | • | • | • | • | | | | | | | • | | | | | | |
| SWPHE | Semi-welded plate heat exchangers | | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | | |

⁽¹⁾ EVR v2 2 to 22 with solder connection and without manual stem

Products for refrigerants with a GWP <2500

Sensors and switches



| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|--|----------------|--------------|---------|-------------|-------|-------------|-----|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------------|-------------------------|-------|-------|---|---|---|---|---|---|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A | | | | | | |
| Sensors & transmitters | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AKS 4100 | Liquid level sensors | 100 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | |
| AKS/MBS Pressure | Pressure sensors with 4-20 mA, volt, and radiometric outputs | 160 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | |
| AKS/NVT/EKS Temperature | Temperature sensors | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | |
| DST P110 | High accuracy pressure sensors | 50 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | |
| DST P310 | High accuracy pressure sensors | 160 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | |
| DST GXXX | A2L gas sensors | | | | | | | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DGS | Gas detecting sensors | | | • | • | • | • | • | • | | | | • | | | | | | | | | | | | | | | | | | | | | | | | |
| Switches | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| AKS 38 | Electro-mechanical float switches | 28 | | | • | | | • | • | | | | • | | | | | | | | | • | | | • | | | | | • | • | | | | | | |
| LLS 4000/4001 | | 140 | | | | • | | | | | | | • | | | | | | | | | | | | | | | | | | | | • | | | | |
| KP | Pressure switches | 46 | | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | • | | • | • | • | • | | | | | | • | | | |
| RT | | | | | | • | | | • | • | | | | • | • | | | | | | | | | | | | | | | | | | | • | | | |
| CKB | | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| MP | Differential pressure switches | | | | | • | • | • | • | • | • | | • | • | | | | | | | | | | | | | | | | | | | | | • | | |
| ORD/COM | Pressure differential valve | | | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | | • | | |
| | Compressor oil level regulator | | | • | • | • | • | • | | | | | | | | | | | | | | | | | | | | | | | | | | | | • | |
| RT | Cartridge pressure controls | | | | • | | | • | • | | | | • | • | | | | | | | | | | | | | | | | | | | | | | • | |
| ACB | | 45 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | | | |
| CCB | | 165 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | • |

⁽¹⁾ R290 only



Products for refrigerants with a GWP <2500

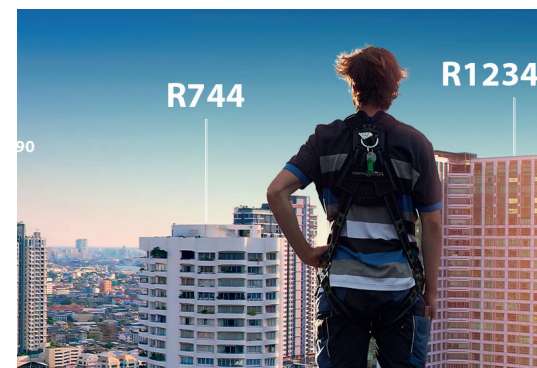
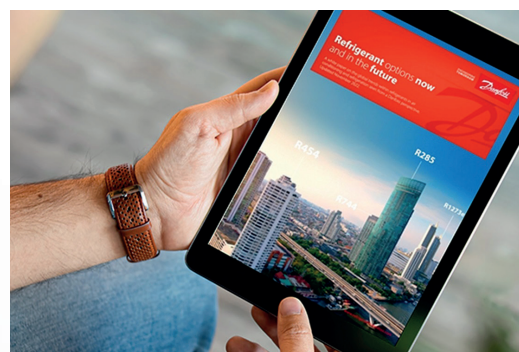
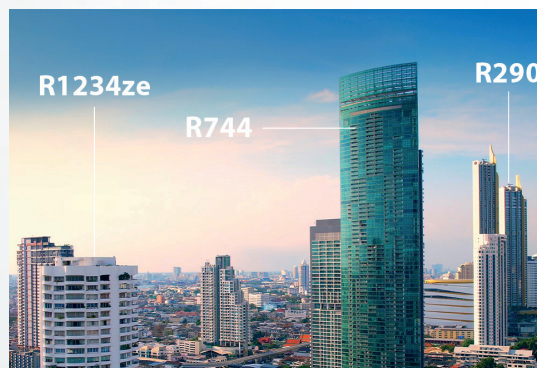
Systems protectors

| Product | Product description | Pressure [bar] | Refrigerants | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------|---|----------------|--------------|---------|-------------|-------|------------------|------------------|--------------|-------|-------|-------|-------|------------------|-------|-------|-------|-------|------------------|-------|------------------|------------------|------------------|------------------|------------------|------------------|-------|-------------------------|-------------------------|-------|-------|---|--|--|
| | | | R1233zd (E) | R1234yf | R1234ze (E) | R134a | R290, R600a | R32 | R407A, R407F | R407C | R407H | R410A | R422B | R422D | R444B | R448A | R449A | R449B | R450A | R452A | R452B | R454A | R454B | R454C | R455A | R513A | R515B | R744 (CO ₂) | R717 (NH ₃) | R1270 | R471A | | | |
| Check valves | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NRV | Piston check valves | 49 | ● | ● | ● | ● | ● ⁽²⁾ | ● ⁽²⁾ | ● | ● | ● | ● | | | | ● | ● | ● | ● | ● | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● | ● | 90 bar | | | | | | |
| NRVA | | 40 | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | |
| CHV-X | Flexline™ check valves | 52/65 | | ● | ● | ● | ● | ● | ● | ● | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| OFC | Check & stop valve for oil free applications | 23 | | | ● | ● | | | | | | | | | | | | | | | | | | | | | ● | ● | | | | | | |
| SCA-X | Flexline™ check & stop valves | 52/65 | | | | ● | ● | | | ● | ● | | ● | | | | | | | | | | | | | | | | ● | ● | | | | |
| Filters & driers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DCR | Filter drier with replaceable solid core | 28/46 | ● | | | ● | | | ● | ● | ● | ● | | | | ● | ● | ● | ● | ● | | | | | | | ● | ● | 90 bar | | | | | |
| FIA | Strainer | 52/65 | ● | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| DCRE | Filter drier w. replaceable solid core for flammables | 50 | | ● | ● | | ● | ● | | | | | | ● | ● | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| DMC / DCC | Receiver filter driers | 42 | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | |
| DML / DCL | Liquid line filter driers | 46 | ● | ● | ● | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | |
| DMB / DCB | Bi-flow filter driers | 46 | ● | ● | ● | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | |
| DAS | Burn-out filter driers | 35 | ● | ● | ● | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● | ● | ● | ● ⁽¹⁾ | ● | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● ⁽¹⁾ | ● | ● | | | | | | |
| DMT | Filter driers for transcritical applications | 140 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| DMSC | Filter drier for subcritical applications | | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| Sight glasses | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SG | Sight glasses for low pressures | 35 | | | | ● | | | ● | ● | | ● | | | | ● | ● | | ● | ● | | | | | | | ● | | | | | | | |
| SGP | Sight glasses for high pressures | 52 | ● | ● | ● | ● | ● ⁽³⁾ | ● ⁽³⁾ | ● | ● | ● | ● | | | | ● | ● | ● | ● | ● | ● ⁽³⁾ | ● ⁽³⁾ | ● ⁽³⁾ | ● ⁽³⁾ | ● ⁽³⁾ | ● ⁽³⁾ | ● | ● | ● | ● | ● | | | |
| LLG | Liquid level glasses | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | |
| Shut-off valves | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GBC | Shut-off ball valves | 45/49 | ● | ● | ● | ● | ● | ● ⁽²⁾ | ● | ● | ● | ● | | | | ● | ● | ● | ● ⁽²⁾ | ● | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● ⁽²⁾ | ● | ● | 90/140 bar | | | | | | |
| GBCH / GBCT | | 90/140 | | | | | | | | | | | | | | | | | | | | | | | | | | | ● | | | | | |
| BML | Shut-off diaphragm valves | 28 | | ● | ● | ● | ● ⁽³⁾ | | | ● | ● | | | | | | | ● | | | | | | | | | ● | ● | | | | | | |
| SNV / SVA | Gauge valves / Flexline™ stop valves | 52/65 | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |

⁽¹⁾ Filter Driers with connection sizes below 25 mm for solder version (copper/cu-plated)
⁽²⁾ NRV (E) and GBC (E) series for flammable refrigerants; KVL, KVP, KVR size 12-22 only
⁽³⁾ Available for solder versions, the flare versions in progress
⁽⁴⁾ Only R600A

For more information, see our website
refrigerants.danfoss.com

Get a complete overview of the refrigerants landscape, and learn about the various regulations and their impact on the industry. Take a deep dive into our white paper, download useful digital tools, and get the latest information on our portfolio of products that are qualified for use with alternative refrigerants.



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, descriptions, 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 product. 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.