

A single-source supplier with total engineered solutions and a trusted partner with long experience and expertise in precision cooling applications. Danfoss has what it takes to help you design, build and install the system that will keep your customers satisfied.

**EXPERIENCE**

- 80 years of recognised experience in the HVAC/R field



**INNOVATION**

- Wide range of hi-tech, electronic "smart" components
- Continuous development of new products and solutions from world-class R&D



**COMPREHENSIVE**

- Total package – total energy efficient designs
- The support of dedicated Field System Engineers (FSEs) with testing, product selection, installation and training



ENGINEERING  
TOMORROW



## A world leader in climate and energy technology

The Danfoss Group operates globally with the primary aims of making modern living possible for our stakeholders and being a leader in refrigeration, heating, power electronics, and mobile hydraulics.

We employ 24,000 people, 6,000 of whom work in Denmark at 11 different locations.

We produce approximately 250,000 components each day at our 76 factories in 25 countries.

We promise leadership in our businesses through reliability, excellence, and innovation – driving true customer satisfaction and solutions within climate and energy.

**Extensive experience in all key HVAC/R segments**

Danfoss plays a leading role in research, development and production in a wide spectrum of industries, and has been a key player in the HVAC/R field for more than 75 years. Our Refrigeration & Air Conditioning Division designs, produces and markets a comprehensive range of automated solutions and compressors for a wide variety of HVAC/R segments, including

- Commercial Air Conditioning
- Residential Air Conditioning
- Heat Pumps
- Commercial Refrigeration
- Household, Light Commercial and Mobile Refrigeration
- Wholesalers & Installers
- Industrial Refrigeration
- Food Retail

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Enhance your **cooling systems' efficiency** with **complete solutions** from your **trusted partner**.

**One**  
supplier fulfilling all your  
Close Control A/C needs

Reduce the number of suppliers and thus reduce the cost of management without jeopardizing your systems quality.

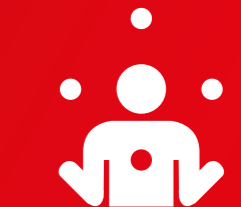
Danfoss is the single-source supplier who provides complete solutions to satisfy customers' needs for mission critical operations. As the reputable expert in the A/C field, Danfoss understands the challenges faced in the purchasing/procurement departments.

Danfoss, as your reputable and experienced partner, understands your business challenges and responds to the needs for the successful running of mission critical operations.



**EASE**

- 1 contact point
- Dedicated customer service
- Long term relationship thinking
- Easy product selection process



**FLEXIBILITY**

- Global organization which responds to your local needs



**RELIABILITY**

- Reliable, highest quality products - tested through and through
- Dependable and solid business partner



**AVAILABILITY**

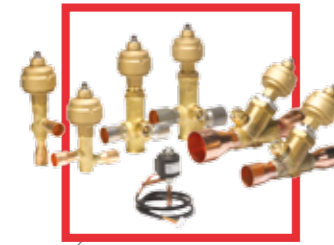
- Our global platform guarantees both availability and reliability which helps you to reduce inventory and freight costs

# The most extensive range of Close Control A/C components:



## Thermostatic Expansion Valves

Regulate the injection of refrigerant liquid into evaporators. Injection is controlled by the refrigerant superheat. The range comprises a variety of valves designed for specific applications.



## Electronic Expansion Valves

The ETS series comprises a complete range of electrically operated expansion valves for precise liquid injection into evaporators. For the highest precision and reliability, it is recommended to use the Danfoss Superheat Controllers range.



## Filter driers

Our range of both hermetic and exchangeable core filter driers protects your air conditioning system from moisture, acids and dirt.



## Solenoid valves

Direct or servo-operated valves for liquid, suction and hot gas lines with fluorinated refrigerants. Delivered as a parts program, so you can design your valves according to your requirements.



## Pressure switches

Small, light and robust, these disc-type pressure control units manage high or low pressure safety cuts and/or fan cycling. Available with automatic or manual reset in a wide variety of pressure settings.



## Other components

Shut-off valves, ball valves, check valves, oil separators, refrigerant distributors and line heat exchangers. A wide range of proven technology for every need.



## Controllers

Wide range of controllers for close control air-conditioning applications, all of which are based on a global, open and flexible system and can be programmed using standard communication protocols.



## Compressors

Danfoss Performer® SM and SY compressors provide you world-class efficiency ensuring lower running cost and reliable operation. Newly developed 2nd generation VZH inverter compressors gains you advanced precise cooling temperature of  $\pm 0.3^{\circ}\text{C}$  and reduces end-user energy bill by over 30%.

# R410A - Component selection

## Technical Data

| Cooling capacity | Variable speed compressor | Expansion device             |                            | Controller | Filter drier | Ball valve | Check valve | Sight glass   | Solenoid valve |
|------------------|---------------------------|------------------------------|----------------------------|------------|--------------|------------|-------------|---------------|----------------|
|                  |                           | Thermostatic expansion valve | Electronic expansion valve |            |              |            |             |               |                |
| 35.0 kW          | VZH088-BG                 | TGEL 10                      | ETS 6 -40+ ETS 6 coil      | MCX 08M*   | DCL 165s     | GBC 22s    | NRVH 19     | SGP 22s N     | EVRH 10        |
| 50.0 kW          | VZH117-BG                 | TGEL 20                      | ETS 12.5                   | MCX 08M*   | DCL 415s     | GBC 22s    | NRVH 19     | SGP 22s N     | EVRH 15        |
| 90.0 kW          | VZH170-BG                 | TGEL 40                      | ETS 25                     | MCX 08M*   | DCL 759s     | GBC 28s    | NRVH 22     | SGP RI SGP RN | EVRH 20        |

\* + superheat controller EXD316

# R22/R407C - Component selection

## Technical Data

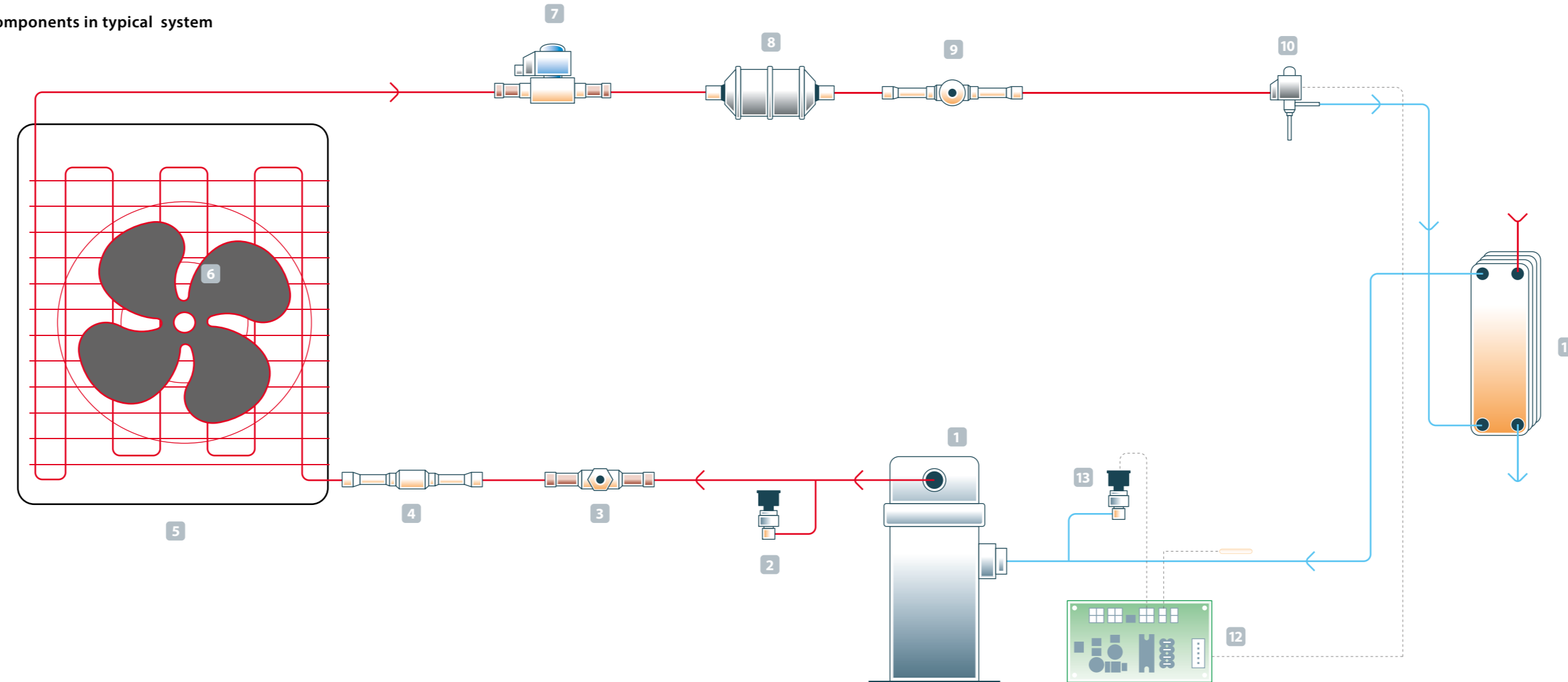
| Cooling capacity | Fixed speed compressor | Expansion device             |                            | Controller | Filter drier | Ball valve | Check valve | Sight glass | Solenoid valve |
|------------------|------------------------|------------------------------|----------------------------|------------|--------------|------------|-------------|-------------|----------------|
|                  |                        | Thermostatic expansion valve | Electronic expansion valve |            |              |            |             |             |                |
| 36.0 kW          | SM 147                 | TGEX 10                      | ETS 6 -40+ ETS 6 coil      | MCX 08M*   | DCL 167s     | GBC 22s    | NRV 19      | SGN 22s     | EVR 10         |
| 45.5 kW          | SY 185                 | TGEX 20                      | ETS 12.5                   | MCX 08M*   | DCL 167s     | GBC 22s    | NRV 19      | SGN 22s     | EVR 15         |

\* + superheat controller EXD316

# Application Diagram:

## Close Control Air-Conditioning components in typical system

- 1 Compressors
- 2 Pressure switch
- 3 Ball valve
- 4 Check valve
- 5 Condenser
- 6 Fan
- 7 Solenoid valve
- 8 Filter drier
- 9 Sight glass
- 10 Expansion device
- 11 Evaporator
- 12 Controller
- 13 Pressure sensor



## ETS 6 Electronic Expansion Valve:

|                               |  |
|-------------------------------|--|
| Maximum working pressure      | 47 bar (682 psig)  |
| Compatible refrigerants       | HCF, HCFC (R22, R134a, R404A, R407C, R410A)  |
| Refrigerant oil               | All mineral oils and ester oils (to lubricate ETS 6 valve)   |
| Ambient temperature           | -30°C to 60°C (-22°F to 140°F)   |
| Fluid temperature             | -30°C to 70°C (-22°F to 158°F)   |
| Durability                    | Tested for 60 million total pulses supplied to partially open valve, which is comparable to 150,000 cycles if the valve is operated between 100 to 300 pulses when open. Tested for 30,000 full-stroke cycles, including 20-pulse overdrive at each closing. |
| Ambient humidity              | 95% RH or less   |
| Modulation                    | Permanent magnet type, direct operating stepper motor  |
| Electrical connection         | JST XHP-6 and JST XHP-5  |
| Excitation speed              | Min. 30 pps (pulses per second) to max. 90 pps; 31.3 pps recommended   |
| Operating range               | 0 to 480 pulses, no holding power required   |
| Full motion transit time      | Examples: 16 sec @ 30 pps, 6 sec @ 80 pps  |
| Installation position         | With coil on the upper side and the valve/coil assembly within $\pm 15^{\circ}$ of the vertical axis   |
| Max. coil winding temperature | 115°C (239°F)  |