

CSV is a direct or servo-operated solenoid valve for liquid, suction, and hot gas lines with common fluorinated refrigerants.

CSV valves are for refrigeration, freezing, and air conditioning plants.

Features

- Designed for media temperatures up to 105 °C / 221 °F
- Supplied as normally closed (NC) with de-energized coil
- Compact construction with small dimensions, low weight for both valve and coil
- Simple and fast mounting of coil - clip-ON / OFF

Data sheet | Solenoid valve, types CSV 2 - CSV 22

- Approvals**
- RoHS II
 - Pressure Equipment Directive 97/23/EC (types CSV 2 – CSV 6)

Technical data

Refrigerant
R22, R134a, R404A, R507, R407C, and R290.
For other refrigerants, contact Danfoss.

Temperature of medium:
-40 – 105 °C / -40 – 221 °F
Maximum 130 °C / 265 °F during defrosting

Maximum working pressure
35 bar / 508 psig

Note: CSV is not suitable for oil application.
For detailed informations please contact Danfoss

Special note for R290: the CSV 2/3/6 ignition risk is evaluated in accordance to ISO 5149 and IEC 60335. See safety note on the bottom.

Rated capacity [KW]

| | R22/R407C | R134a | R404A/R507 | R290 |
|-----------------------|-----------|--------|------------|-------|
| Liquid | | | | |
| CSV 2 | 1.92 | 1.86 | 1.36 | 2.24 |
| CSV 3 | 5.76 | 5.58 | 4.09 | 6.72 |
| CSV 6 | 10.36 | 10.05 | 7.35 | 12.09 |
| CSV 10 | 28.78 | 27.91 | 20.43 | – |
| CSV 15 | 49.88 | 48.38 | 35.41 | – |
| CSV 20 | 95.92 | 93.04 | 68.10 | – |
| CSV 22 | 115.10 | 111.64 | 81.72 | – |
| Suction vapour | | | | |
| CSV 2 | 0.21 | 0.16 | 0.19 | 0.27 |
| CSV 3 | 0.62 | 0.49 | 0.58 | 0.82 |
| CSV 6 | 1.11 | 0.87 | 1.05 | 1.47 |
| CSV 10 | 3.09 | 2.43 | 2.91 | – |
| CSV 15 | 5.35 | 4.21 | 5.04 | – |
| CSV 20 | 10.29 | 8.09 | 9.69 | – |
| CSV 22 | 12.34 | 9.71 | 11.63 | – |
| Hot gas | | | | |
| CSV 2 | 0.94 | 0.69 | 0.74 | 1.05 |
| CSV 3 | 2.82 | 2.08 | 2.22 | 3.14 |
| CSV 6 | 5.08 | 3.75 | 3.99 | 5.66 |
| CSV 10 | 14.12 | 10.41 | 11.09 | – |
| CSV 15 | 24.47 | 18.05 | 19.22 | – |
| CSV 20 | 47.06 | 34.71 | 36.96 | – |
| CSV 22 | 56.46 | 41.64 | 31.05 | – |

Rated liquid and suction vapour capacity is based on:

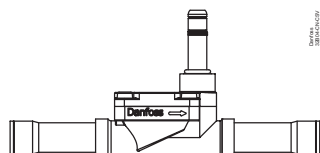
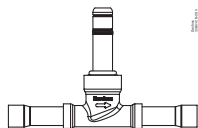
- evaporating temperature $t_e = -10\text{ °C}$
- liquid temperature ahead of valve $t_l = 25\text{ °C}$
- pressure drop in valve $\Delta p = 0.15\text{ bar}$

Rated hot gas capacity is based on:

- condensing temperature $t_c = 40\text{ °C}$
- pressure drop across valve $\Delta p = 0.8\text{ bar}$
- hot gas temperature $t_h = 65\text{ °C}$
- subcooling of refrigerant $\Delta t_{sub} = 4\text{ K}$

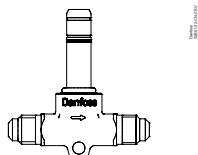
The CSV2/3/6 can be applied on system with R290 as the working fluid.
For countries where safety standards are not an indispensable part of the safety system, Danfoss recommends the installer gets a third party approval of any system containing flammable refrigerant.

Note: Please follow specific selection criteria stated in the data sheet for this particular refrigerants.

Ordering - ODF


| Type | Connections (ODF) | | Opening differential pressure with standard coil Δp [bar] | | K_v m ³ /h | Code no. |
|--------|-------------------|------|-------------------------------------------------------------------|------------------------------------|-------------------------|----------|
| | [in.] | [mm] | Min. | Max. (=MOPD liquid ¹⁾) | | |
| CSV 2 | 1/4 | – | 0 | 26 | 0.1 | 032B2040 |
| | – | 6 | 0 | 26 | 0.1 | 032B2000 |
| CSV 3 | 1/4 | – | 0.05 | 26 | 0.3 | 032B2041 |
| | – | 6 | 0.05 | 26 | 0.3 | 032B2001 |
| | 3/8 | – | 0.05 | 26 | 0.3 | 032B2042 |
| | – | 10 | 0.05 | 26 | 0.3 | 032B2002 |
| CSV 6 | 3/8 | – | 0.05 | 26 | 0.54 | 032B2043 |
| | – | 10 | 0.05 | 26 | 0.54 | 032B2003 |
| | 1/2 | – | 0.05 | 26 | 0.54 | 032B2044 |
| | – | 12 | 0.05 | 26 | 0.54 | 032B2004 |
| CSV 10 | 1/2 | – | 0.05 | 26 | 1.5 | 032B2045 |
| | – | 12 | 0.05 | 26 | 1.5 | 032B2005 |
| CSV 15 | 5/8 | 16 | 0.05 | 26 | 1.5 | 032B2006 |
| | 5/8 | 16 | 0.05 | 26 | 2.6 | 032B2007 |
| | 7/8 | 22 | 0.05 | 26 | 2.6 | 032B2008 |
| CSV 20 | 7/8 | 22 | 0.05 | 26 | 5.0 | 032B2009 |
| | 1 1/8 | – | 0.05 | 26 | 5.0 | 032B2050 |
| CSV 22 | – | 28 | 0.05 | 26 | 5.0 | 032B2010 |
| | 1 1/8 | – | 0.05 | 26 | 6.0 | 032B2051 |
| | – | 28 | 0.05 | 26 | 6.0 | 032B2011 |
| | 1 3/8 | 35 | 0.05 | 26 | 6.0 | 032B2012 |

¹⁾ For detailed MOPD, for media in gas form, please contact Danfoss.

Ordering - flare


| Type | Connections (flare) | | Opening differential pressure with standard coil Δp [bar] | | K_v m ³ /h | Code no. |
|-------|---------------------|------|-------------------------------------------------------------------|------------------------------------|-------------------------|----------|
| | [in.] | [mm] | Min. | Max. (=MOPD liquid ¹⁾) | | |
| CSV 2 | 1/4 | – | 0 | 26 | 0.1 | 032B2030 |
| CSV 3 | 1/4 | – | 0.05 | 26 | 0.3 | 032B2031 |
| | 3/8 | – | 0.05 | 26 | 0.3 | 032B2032 |
| CSV 6 | 3/8 | – | 0.05 | 26 | 0.54 | 032B2033 |
| | 1/2 | – | 0.05 | 26 | 0.54 | 032B2034 |

¹⁾ For detailed MOPD, for media in gas form, please contact Danfoss.

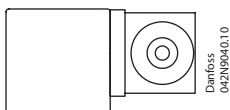
Ordering
Solenoid coil with DIN
Terminal box IP65

Special note for R290
*The 034Z2014 is validated in accordance to ISO 5149, IEC 60335 (ref. IEC/EN 60079-15).
 Ignition risk is evaluated in accordance to ISO 5149 and IEC 60335 (ref. IEC/EN 60079-15).
 See safety note on the bottom.*

Please make sure that there is no spark, arc on the spade connection during the application.
 If coils are below IPx5, they must be protected against ultraviolet, moisture and major impact, especially the connection of coils.

Always install a fuse ahead of the coil to avoid short circuit.
 The coil should be used in area of not more than pollution degree 2.
 Use of socket cable with suitable mechanical lock function to connect with coils.
 Follow the installation guide to mount the coil correctly.

DIN plug



| Type | Power consumption [W] | Frequency [Hz] | Voltage [V AC] | Code no. |
|----------------|-----------------------|----------------|----------------|------------------------|
| CSV 2 – CSV 22 | 6 | 50 | 220 | 034Z2014 ¹⁾ |

¹⁾ The 034Z2014 is exclusively for China market. The coil selection for other regions, please contact Danfoss.

Technical data

Ambient temperature
 -20 – 55 °C / -4 – 131 °F

The 034Z2014 can be applied on system with R290 as the working fluid.

For countries where safety standards are not an indispensable part of the safety system, Danfoss recommends the installer to get a third party approval of the system containing flammable refrigerant.

Note that the 034Z2014 has NOT been verified ATEX or IECEx or IEC 60079 series zone 2 compliant. This product is only validated for system in compliance with ISO5149, IEC 60335 (ref. IEC/EN 60079-15). It is responsibility of the user to verify such compliance. Improper use can cause explosion, fire, leakage potentially causing death, personal injury, or damage to property.

Note: Please follow specific selection criteria stated in the data sheet for this particular refrigerants.

Liquid capacity

| Type | Liquid capacity Q_e [kW] at pressure drop across valve Δp [bar] | | | | |
|------------------|------------------------------------------------------------------------------|--------|--------|--------|--------|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 |
| R22/R407C | | | | | |
| CSV 2 | 1.57 | 2.22 | 2.71 | 3.13 | 3.50 |
| CSV 3 | 4.70 | 6.65 | 8.14 | 9.40 | 10.51 |
| CSV 6 | 8.46 | 11.96 | 14.65 | 16.92 | 18.91 |
| CSV 10 | 23.50 | 33.23 | 40.70 | 46.99 | 52.54 |
| CSV 15 | 40.73 | 57.60 | 70.54 | 81.46 | 91.07 |
| CSV 20 | 78.32 | 110.77 | 135.66 | 156.65 | 175.14 |
| CSV 22 | 93.98 | 132.91 | 162.78 | 187.98 | 210.16 |
| R134a | | | | | |
| CSV 2 | 1.52 | 2.15 | 2.63 | 3.04 | 3.40 |
| CSV 3 | 4.56 | 6.45 | 7.89 | 9.12 | 10.19 |
| CSV 6 | 8.20 | 11.60 | 14.21 | 16.41 | 18.35 |
| CSV 10 | 22.79 | 32.23 | 39.47 | 45.58 | 50.96 |
| CSV 15 | 39.50 | 55.87 | 68.42 | 79.01 | 88.33 |
| CSV 20 | 75.97 | 107.44 | 131.58 | 151.94 | 169.87 |
| CSV 22 | 91.16 | 128.92 | 157.89 | 182.32 | 203.84 |

Capacities are based on:
 – liquid temperature $t_l = 25$ °C ahead of valve
 – evaporating temperature $t_e = -10$ °C, superheat 0 K

Correction factors

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of valve / evaporator.

When the corrected capacity is known, the selection can be made from the table.

Correction factors based on liquid temperature t_l

| t_l [°C] | -10 | 0 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| R22/R407C | 1.31 | 1.22 | 1.13 | 1.09 | 1.04 | 1.00 | 0.96 | 0.91 | 0.86 | 0.82 | 0.77 |
| R134a | 1.37 | 1.27 | 1.16 | 1.11 | 1.05 | 1.00 | 0.95 | 0.89 | 0.84 | 0.78 | 0.73 |

Liquid capacity
(continued)

| Type | Liquid capacity Q_e [kW] at pressure drop across valve Δp [bar] | | | | |
|-------------------|------------------------------------------------------------------------------|-------|--------|--------|--------|
| | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 |
| R404a/R507 | | | | | |
| CSV 2 | 1.11 | 1.57 | 1.93 | 2.22 | 2.49 |
| CSV 3 | 3.34 | 4.72 | 5.78 | 6.67 | 7.46 |
| CSV 6 | 6.01 | 8.49 | 10.40 | 12.01 | 13.43 |
| CSV 10 | 16.68 | 23.59 | 28.89 | 33.36 | 37.30 |
| CSV 15 | 28.91 | 40.89 | 50.08 | 57.83 | 64.65 |
| CSV 20 | 55.60 | 78.64 | 96.31 | 111.21 | 124.33 |
| CSV 22 | 66.72 | 94.36 | 115.57 | 133.44 | 149.20 |
| R290 | | | | | |
| CSV 2 | 1.83 | 2.59 | 3.17 | 3.66 | 4.09 |
| CSV 3 | 5.49 | 7.76 | 9.5 | 10.97 | 12.27 |
| CSV 6 | 9.87 | 13.96 | 17.1 | 19.75 | 22.08 |

Capacities are based on:

- liquid temperature $t_l = 25$ °C ahead of valve
- evaporating temperature $t_e = -10$ °C, superheat 0 K

Correction factors

When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of valve / evaporator.

When the corrected capacity is known, the selection can be made from the table.

Correction factors based on liquid temperature t_l

| t_l [°C] | -10 | 0 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| R404a/R507 | 1.50 | 1.36 | 1.22 | 1.14 | 1.07 | 1.00 | 0.93 | 0.85 | 0.78 | 0.70 | 0.62 |
| R290 | 1.36 | 1.26 | 1.16 | 1.11 | 1.05 | 1 | 0.95 | 0.89 | 0.84 | 0.78 | 0.73 |

Capacity Suction

| Type | Pressure drop Δp [bar] | Suction vapour capacity Q_e [kW] at evaporating temperature t_e [°C] | | | | | | |
|------------------|--------------------------------|--------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|
| | | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
| R22/R407C | | | | | | | | |
| CSV 2 | 0.10 | 0.08 | 0.10 | 0.13 | 0.17 | 0.21 | 0.25 | 0.28 |
| | 0.15 | 0.09 | 0.12 | 0.16 | 0.21 | 0.26 | 0.31 | 0.34 |
| | 0.20 | 0.10 | 0.14 | 0.19 | 0.24 | 0.29 | 0.36 | 0.39 |
| CSV 3 | 0.10 | 0.23 | 0.31 | 0.40 | 0.51 | 0.63 | 0.76 | 0.84 |
| | 0.15 | 0.28 | 0.37 | 0.49 | 0.62 | 0.77 | 0.93 | 1.02 |
| | 0.20 | 0.31 | 0.42 | 0.56 | 0.71 | 0.88 | 1.07 | 1.18 |
| CSV 6 | 0.10 | 0.42 | 0.56 | 0.73 | 0.92 | 1.13 | 1.38 | 1.51 |
| | 0.15 | 0.50 | 0.67 | 0.88 | 1.11 | 1.38 | 1.68 | 1.84 |
| | 0.20 | 0.55 | 0.76 | 1.00 | 1.27 | 1.58 | 1.93 | 2.12 |
| CSV 10 | 0.10 | 1.17 | 1.56 | 2.02 | 2.54 | 3.14 | 3.82 | 4.20 |
| | 0.15 | 1.38 | 1.87 | 2.44 | 3.09 | 3.83 | 4.67 | 5.12 |
| | 0.20 | 1.54 | 2.11 | 2.78 | 3.53 | 4.39 | 5.36 | 5.89 |
| CSV 15 | 0.10 | 2.02 | 2.70 | 3.49 | 4.41 | 5.45 | 6.63 | 7.28 |
| | 0.15 | 2.39 | 3.24 | 4.22 | 5.35 | 6.63 | 8.09 | 8.88 |
| | 0.20 | 2.66 | 3.66 | 4.81 | 6.12 | 7.62 | 9.30 | 10.22 |
| CSV 20 | 0.10 | 3.89 | 5.20 | 6.72 | 8.48 | 10.48 | 12.75 | 13.99 |
| | 0.15 | 4.60 | 6.23 | 8.12 | 10.29 | 12.76 | 15.55 | 17.08 |
| | 0.20 | 5.12 | 7.05 | 9.26 | 11.78 | 14.64 | 17.88 | 19.65 |
| CSV 22 | 0.10 | 4.66 | 6.24 | 8.06 | 10.17 | 12.57 | 15.30 | 16.79 |
| | 0.15 | 5.51 | 7.48 | 9.74 | 12.35 | 15.30 | 18.66 | 20.49 |
| | 0.20 | 6.14 | 8.45 | 11.10 | 14.13 | 17.57 | 21.45 | 23.58 |

Capacities are based on:
 - liquid temperature $t_l = 25$ °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.
 Capacities are based on dry, saturated vapour ahead of valve.
 During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of expansion valve.

When the corrected capacity is known, the selection can be made from the table.

Correction factors for evaporating temperature t_e

| t_l [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R22/R407C | 0.52 | 0.66 | 0.82 | 1.00 | 1.20 | 1.43 | 1.56 |

Capacity Suction
(continued)

| Type | Pressure drop Δp [bar] | Suction vapour capacity Q_e [kW] at evaporating temperature t_e [°C] | | | | | | |
|--------------|--------------------------------|-----------------------------------------------------------------------------|------|------|-------|-------|-------|-------|
| | | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
| R134a | | | | | | | | |
| CSV 2 | 0.10 | 0.06 | 0.08 | 0.11 | 0.14 | 0.17 | 0.21 | 0.23 |
| | 0.15 | 0.06 | 0.09 | 0.13 | 0.16 | 0.21 | 0.26 | 0.28 |
| | 0.20 | 0.07 | 0.10 | 0.14 | 0.19 | 0.24 | 0.29 | 0.33 |
| CSV 3 | 0.10 | 0.17 | 0.24 | 0.32 | 0.41 | 0.51 | 0.63 | 0.70 |
| | 0.15 | 0.19 | 0.28 | 0.38 | 0.49 | 0.62 | 0.77 | 0.85 |
| | 0.20 | 0.21 | 0.31 | 0.43 | 0.56 | 0.71 | 0.88 | 0.98 |
| CSV 6 | 0.10 | 0.31 | 0.43 | 0.57 | 0.73 | 0.92 | 1.14 | 1.26 |
| | 0.15 | 0.35 | 0.50 | 0.68 | 0.88 | 1.12 | 1.38 | 1.53 |
| | 0.20 | 0.37 | 0.56 | 0.77 | 1.00 | 1.28 | 1.59 | 1.76 |
| CSV 10 | 0.10 | 0.85 | 1.19 | 1.58 | 2.04 | 2.56 | 3.16 | 3.49 |
| | 0.15 | 0.97 | 1.40 | 1.89 | 2.46 | 3.10 | 3.84 | 4.25 |
| | 0.20 | 1.04 | 1.55 | 2.13 | 2.79 | 3.55 | 4.41 | 4.88 |
| CSV 15 | 0.10 | 1.48 | 2.06 | 2.74 | 3.53 | 4.44 | 5.48 | 6.05 |
| | 0.15 | 1.68 | 2.42 | 3.28 | 4.26 | 5.38 | 6.66 | 7.37 |
| | 0.20 | 1.80 | 2.68 | 3.69 | 4.84 | 6.15 | 7.64 | 8.45 |
| CSV 20 | 0.10 | 2.84 | 3.97 | 5.27 | 6.79 | 8.54 | 10.54 | 11.64 |
| | 0.15 | 3.24 | 4.66 | 6.30 | 8.19 | 10.35 | 12.81 | 14.17 |
| | 0.20 | 3.46 | 5.16 | 7.09 | 9.30 | 11.82 | 14.68 | 16.26 |
| CSV 22 | 0.10 | 3.41 | 4.76 | 6.33 | 8.15 | 10.25 | 12.65 | 13.97 |
| | 0.15 | 3.88 | 5.60 | 7.56 | 9.82 | 12.42 | 15.40 | 17.00 |
| | 0.20 | 4.15 | 6.19 | 8.51 | 11.16 | 14.19 | 17.62 | 19.50 |

Capacities are based on
- liquid temperature $t_l = 25$ °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.
Capacities are based on dry, saturated vapour ahead of valve.
During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of expansion valve.

When the corrected capacity is known, the selection can be made from the table.

Correction factors for evaporating temperature t_e

| t_l [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R134a | 0.45 | 0.61 | 0.79 | 1.00 | 1.25 | 1.53 | 1.69 |

Capacity Suction
(continued)

| Type | Pressure drop Δp [bar] | Suction vapour capacity Q_e [kW] at evaporating temperature t_e [°C] | | | | | | |
|-------------------|--------------------------------|--------------------------------------------------------------------------|------|-------|-------|-------|-------|-------|
| | | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
| R404a/R507 | | | | | | | | |
| CSV 2 | 0.10 | 0.08 | 0.10 | 0.13 | 0.16 | 0.20 | 0.24 | 0.27 |
| | 0.15 | 0.09 | 0.12 | 0.16 | 0.20 | 0.24 | 0.30 | 0.33 |
| | 0.20 | 0.10 | 0.14 | 0.18 | 0.23 | 0.28 | 0.34 | 0.37 |
| CSV 3 | 0.10 | 0.23 | 0.30 | 0.39 | 0.49 | 0.60 | 0.73 | 0.80 |
| | 0.15 | 0.27 | 0.37 | 0.47 | 0.59 | 0.73 | 0.89 | 0.98 |
| | 0.20 | 0.31 | 0.42 | 0.54 | 0.68 | 0.84 | 1.02 | 1.12 |
| CSV 6 | 0.10 | 0.41 | 0.55 | 0.70 | 0.88 | 1.08 | 1.31 | 1.44 |
| | 0.15 | 0.49 | 0.66 | 0.85 | 1.07 | 1.32 | 1.60 | 1.76 |
| | 0.20 | 0.56 | 0.75 | 0.97 | 1.22 | 1.51 | 1.84 | 2.02 |
| CSV 10 | 0.10 | 1.15 | 1.51 | 1.94 | 2.43 | 3.00 | 3.64 | 3.99 |
| | 0.15 | 1.37 | 1.83 | 2.35 | 2.96 | 3.65 | 4.44 | 4.88 |
| | 0.20 | 1.55 | 2.08 | 2.69 | 3.39 | 4.20 | 5.11 | 5.61 |
| CSV 15 | 0.10 | 1.99 | 2.63 | 3.36 | 4.22 | 5.20 | 6.31 | 6.92 |
| | 0.15 | 2.38 | 3.17 | 4.08 | 5.13 | 6.33 | 7.70 | 8.45 |
| | 0.20 | 2.68 | 3.60 | 4.66 | 5.88 | 7.28 | 8.86 | 9.73 |
| CSV 20 | 0.10 | 3.83 | 5.05 | 6.47 | 8.11 | 9.99 | 12.14 | 13.31 |
| | 0.15 | 4.58 | 6.09 | 7.84 | 9.87 | 12.18 | 14.81 | 16.25 |
| | 0.20 | 5.16 | 6.92 | 8.96 | 11.31 | 13.99 | 17.04 | 18.71 |
| CSV 22 | 0.10 | 4.60 | 6.06 | 7.76 | 9.74 | 11.99 | 14.56 | 15.97 |
| | 0.15 | 5.49 | 7.30 | 9.41 | 11.84 | 14.61 | 17.78 | 19.51 |
| | 0.20 | 6.19 | 8.31 | 10.76 | 16.79 | 16.79 | 20.45 | 22.46 |

Capacities are based on
- liquid temperature $t_l = 25$ °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.

Capacities are based on dry, saturated vapour ahead of valve.

During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of expansion valve.

When the corrected capacity is known, the selection can be made from the table.

Correction factors for evaporating temperature t_e

| t_l [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R404a/R507 | 0.48 | 0.63 | 0.80 | 1.00 | 1.23 | 1.49 | 1.63 |

Capacity Suction
(continued)

| Type | Pressure drop Δp [bar] | Suction vapour capacity Q_e [kW] at evaporating temperature t_e [°C] | | | | | | |
|-------------|--------------------------------------|-----------------------------------------------------------------------------|------|------|------|------|------|------|
| | | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
| R290 | | | | | | | | |
| CSV 2 | 0.10 | 0.11 | 0.14 | 0.18 | 0.22 | 0.27 | 0.33 | 0.36 |
| | 0.15 | 0.13 | 0.17 | 0.22 | 0.27 | 0.33 | 0.4 | 0.43 |
| | 0.20 | 0.15 | 0.2 | 0.25 | 0.31 | 0.38 | 0.46 | 0.5 |
| CSV 3 | 0.10 | 0.34 | 0.43 | 0.55 | 0.67 | 0.82 | 0.98 | 1.07 |
| | 0.15 | 0.4 | 0.52 | 0.66 | 0.82 | 0.99 | 1.19 | 1.3 |
| | 0.20 | 0.45 | 0.59 | 0.75 | 0.94 | 1.14 | 1.37 | 1.5 |
| CSV 6 | 0.10 | 0.61 | 0.78 | 0.98 | 1.21 | 1.47 | 1.76 | 1.92 |
| | 0.15 | 0.72 | 0.94 | 1.19 | 1.47 | 1.79 | 2.15 | 2.34 |
| | 0.20 | 0.81 | 1.06 | 1.36 | 1.68 | 2.05 | 2.47 | 2.69 |

Capacities are based on:
- liquid temperature $t_l = 25$ °C ahead of evaporator.

The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.
Capacities are based on dry, saturated vapour ahead of valve.
During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors

When sizing valves, the evaporator capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of expansion valve.

When the corrected capacity is known, the selection can be made from the table.

Correction factors for evaporating temperature t_e

| t_l [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|-------------|------|------|------|------|------|------|------|
| R290 | 0.51 | 0.65 | 0.82 | 1.00 | 1.21 | 1.44 | 1.57 |

Capacity Suction (continued)

Hot gas defrosting

With hot gas defrosting it is not normally possible to select a valve from condensing temperature t_c and evaporating temperature t_e .

This is because the pressure in the evaporator as a rule quickly rises to a value near that of the condensing pressure. It remains at this value until the defrosting is finished.

In most cases therefore, the valve will be selected from condensing temperature t_c and pressure drop Δp across the valve. as shown in the example for heat recovery.

Heat recovery

The following is given:

- Refrigerant = R22/R407C
- Evaporating temperature $t_e = -30\text{ °C}$
- Condensing temperature $t_c = 40\text{ °C}$
- Hot gas temperature ahead of valve $t_h = 85\text{ °C}$
- Heat recovery condenser yield $Q_h = 8\text{ kW}$

The capacity table for R22/R407C with $t_c = 40\text{ °C}$ gives the capacity for an CSV 15 as 12.47 kW, when pressure drop Δp is 0.2 bar.

The required valve of capacity is calculated as:

$$Q_{table} = f_{evaporator} \times f_{hot_temperature} \times Q_h$$

The correction factor for $t_e = -30\text{ °C}$ is given in the table as 0.95.

The correction for hot gas temperature $t_h = 85\text{ °C}$ has been calculated as 4% which corresponds to a factor of 1.04.

Q_h must be corrected with factors found:
 $8 \times 0.95 \times 1.04 = 7.91\text{ kW}$

With $\Delta p = 0.2\text{ bar}$, $Q_{table} = 12.47\text{ kW}$

With $\Delta p = 0.1\text{ bar}$, $Q_{table} = 8.85\text{ kW}$

A CSV 10 (8.78 kW) would also be able to give the required capacity, but with Δp at approx. 0.3 bar. The CSV 10 is therefore too small. The CSV 15 is big enough to provide sufficient capacity at Δp of approx. 0.1 bar could be obtained.

Result: An CSV 15 is the correct valve for the given conditions.

Capacity Hot gas

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] | | | | |
|------|---------------------------------------------|--------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Evaporating temp. $t_e = -10$ °C. Hot gas temp. $t_h = t_c + 25$ °C. Subcooling $\Delta t_{sub} = 4$ K | | | | |
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R134a

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 2 | 0.1 | 0.23 | 0.25 | 0.26 | 0.26 | 0.26 |
| | 0.2 | 0.32 | 0.34 | 0.36 | 0.37 | 0.37 |
| | 0.3 | 0.39 | 0.42 | 0.44 | 0.45 | 0.45 |
| | 0.4 | 0.45 | 0.48 | 0.50 | 0.52 | 0.51 |
| | 0.8 | 0.60 | 0.66 | 0.69 | 0.72 | 0.72 |
| | 1.6 | 0.77 | 0.87 | 0.93 | 0.97 | 0.99 |
| CSV 3 | 0.1 | 0.69 | 0.74 | 0.77 | 0.78 | 0.78 |
| | 0.2 | 0.97 | 1.03 | 1.08 | 1.10 | 1.10 |
| | 0.3 | 1.18 | 1.26 | 1.31 | 1.34 | 1.34 |
| | 0.4 | 1.34 | 1.44 | 1.51 | 1.55 | 1.54 |
| | 0.8 | 1.81 | 1.97 | 2.08 | 2.15 | 2.15 |
| | 1.6 | 2.32 | 2.60 | 2.80 | 2.92 | 2.96 |
| CSV 6 | 0.1 | 1.25 | 1.33 | 1.38 | 1.41 | 1.40 |
| | 0.2 | 1.75 | 1.86 | 1.94 | 1.99 | 1.98 |
| | 0.3 | 2.12 | 2.26 | 2.37 | 2.42 | 2.41 |
| | 0.4 | 2.42 | 2.59 | 2.72 | 2.78 | 2.78 |
| | 0.8 | 3.26 | 3.54 | 3.75 | 3.86 | 3.87 |
| | 1.6 | 4.18 | 4.67 | 5.04 | 5.26 | 5.32 |
| CSV 10 | 0.1 | 3.47 | 3.69 | 3.84 | 3.92 | 3.90 |
| | 0.2 | 4.85 | 5.17 | 5.40 | 5.51 | 5.49 |
| | 0.3 | 5.88 | 6.28 | 6.57 | 6.72 | 6.70 |
| | 0.4 | 6.71 | 7.20 | 7.55 | 7.73 | 7.71 |
| | 0.8 | 9.06 | 9.85 | 10.41 | 10.73 | 10.75 |
| | 1.6 | 11.60 | 12.98 | 13.99 | 14.61 | 14.78 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25$ °C, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R134a | 0.88 | 0.92 | 0.96 | 1.00 | 1.04 | 1.08 | 1.09 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] Evaporating temp. $t_e = -10^\circ\text{C}$. Hot gas temp. $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ | | | | |
|------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R134a

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 15 | 0.1 | 6.01 | 6.39 | 6.66 | 6.79 | 6.75 |
| | 0.2 | 8.41 | 8.97 | 9.36 | 9.56 | 9.52 |
| | 0.3 | 10.19 | 10.89 | 11.40 | 11.65 | 11.62 |
| | 0.4 | 11.63 | 12.48 | 13.08 | 13.40 | 13.37 |
| | 0.8 | 15.71 | 17.07 | 18.05 | 18.60 | 18.64 |
| | 1.6 | 20.11 | 22.50 | 24.26 | 25.33 | 25.62 |
| CSV 20 | 0.1 | 11.57 | 12.29 | 12.80 | 13.06 | 12.99 |
| | 0.2 | 16.18 | 17.24 | 18.00 | 18.38 | 18.30 |
| | 0.3 | 19.59 | 20.95 | 21.91 | 22.41 | 22.34 |
| | 0.4 | 22.37 | 23.99 | 25.15 | 25.76 | 25.70 |
| | 0.8 | 30.21 | 32.82 | 34.71 | 35.77 | 35.85 |
| | 1.6 | 38.68 | 43.27 | 46.64 | 48.70 | 49.27 |
| CSV 22 | 0.1 | 13.88 | 14.75 | 15.37 | 15.67 | 15.58 |
| | 0.2 | 19.41 | 20.69 | 21.6 | 22.06 | 21.96 |
| | 0.3 | 23.51 | 25.41 | 26.30 | 26.90 | 26.80 |
| | 0.4 | 26.85 | 28.79 | 30.18 | 30.92 | 30.84 |
| | 0.8 | 36.26 | 39.39 | 41.65 | 42.92 | 43.01 |
| | 1.6 | 46.41 | 51.93 | 55.97 | 58.45 | 59.12 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R134a | 0.88 | 0.92 | 0.96 | 1.00 | 1.04 | 1.08 | 1.09 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] | | | | |
|------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Evaporating temp. $t_e = -10^\circ\text{C}$. Hot gas temp. $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ | | | | |
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R404a/R507

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 2 | 0.1 | 0.26 | 0.27 | 0.27 | 0.26 | 0.23 |
| | 0.2 | 0.37 | 0.38 | 0.38 | 0.36 | 0.32 |
| | 0.3 | 0.45 | 0.46 | 0.46 | 0.44 | 0.40 |
| | 0.4 | 0.52 | 0.53 | 0.53 | 0.51 | 0.46 |
| | 0.8 | 0.72 | 0.74 | 0.74 | 0.71 | 0.64 |
| | 1.6 | 0.97 | 1.01 | 1.02 | 0.99 | 0.89 |
| CSV 3 | 0.1 | 0.79 | 0.81 | 0.80 | 0.77 | 0.69 |
| | 0.2 | 1.11 | 1.14 | 1.13 | 1.08 | 0.97 |
| | 0.3 | 1.36 | 1.39 | 1.38 | 1.32 | 1.19 |
| | 0.4 | 1.56 | 1.59 | 1.59 | 1.52 | 1.37 |
| | 0.8 | 2.15 | 2.22 | 2.22 | 2.13 | 1.93 |
| | 1.6 | 2.91 | 3.03 | 3.06 | 2.96 | 2.68 |
| CSV 6 | 0.1 | 1.42 | 1.45 | 1.44 | 1.38 | 1.24 |
| | 0.2 | 2.00 | 2.05 | 2.03 | 1.95 | 1.75 |
| | 0.3 | 2.44 | 2.50 | 2.48 | 2.38 | 2.14 |
| | 0.4 | 2.80 | 2.87 | 2.86 | 2.74 | 2.47 |
| | 0.8 | 3.88 | 3.99 | 3.99 | 3.84 | 3.47 |
| | 1.6 | 5.24 | 5.46 | 5.50 | 5.33 | 4.83 |
| CSV 10 | 0.1 | 3.96 | 4.04 | 4.01 | 3.83 | 3.45 |
| | 0.2 | 5.56 | 5.68 | 5.65 | 5.41 | 4.87 |
| | 0.3 | 6.78 | 6.93 | 6.90 | 6.61 | 5.95 |
| | 0.4 | 7.78 | 7.97 | 7.94 | 7.61 | 6.86 |
| | 0.8 | 10.77 | 11.09 | 11.09 | 10.66 | 9.63 |
| | 1.6 | 14.55 | 15.16 | 15.29 | 14.79 | 13.42 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R404A/R507 | 0.86 | 0.91 | 0.96 | 1.00 | 1.04 | 1.08 | 1.10 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] | | | | |
|------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Evaporating temp. $t_e = -10^\circ\text{C}$. Hot gas temp. $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ | | | | |
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R404a/R507

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 15 | 0.1 | 6.86 | 7.00 | 6.95 | 6.64 | 5.98 |
| | 0.2 | 9.65 | 9.85 | 9.79 | 9.37 | 8.44 |
| | 0.3 | 11.75 | 12.02 | 11.96 | 11.45 | 10.31 |
| | 0.4 | 13.49 | 13.82 | 13.76 | 13.19 | 11.89 |
| | 0.8 | 18.66 | 19.23 | 19.22 | 18.48 | 16.69 |
| | 1.6 | 25.21 | 26.28 | 26.50 | 25.64 | 23.27 |
| CSV 20 | 0.1 | 13.19 | 13.45 | 13.36 | 12.78 | 11.49 |
| | 0.2 | 18.55 | 18.95 | 18.83 | 18.03 | 16.22 |
| | 0.3 | 22.59 | 23.11 | 22.99 | 22.03 | 19.83 |
| | 0.4 | 25.95 | 26.58 | 26.47 | 25.37 | 22.86 |
| | 0.8 | 35.89 | 36.97 | 36.96 | 35.55 | 32.10 |
| | 1.6 | 48.49 | 50.55 | 50.96 | 49.31 | 44.74 |
| CSV 22 | 0.1 | 15.82 | 16.14 | 16.03 | 15.33 | 13.79 |
| | 0.2 | 22.26 | 22.74 | 22.59 | 21.63 | 19.46 |
| | 0.3 | 27.11 | 27.73 | 27.59 | 26.43 | 23.80 |
| | 0.4 | 31.14 | 31.89 | 31.75 | 30.45 | 27.43 |
| | 0.8 | 43.07 | 44.36 | 44.35 | 42.65 | 38.52 |
| | 1.6 | 58.18 | 60.65 | 61.16 | 59.18 | 53.69 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R404A/R507 | 0.86 | 0.91 | 0.96 | 1.00 | 1.04 | 1.08 | 1.10 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] | | | | |
|------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Evaporating temp. $t_e = -10^\circ\text{C}$. Hot gas temp. $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ | | | | |
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R22/R407C

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 2 | 0.1 | 0.31 | 0.33 | 0.34 | 0.34 | 0.34 |
| | 0.2 | 0.44 | 0.46 | 0.48 | 0.48 | 0.48 |
| | 0.3 | 0.54 | 0.57 | 0.59 | 0.59 | 0.58 |
| | 0.4 | 0.62 | 0.65 | 0.67 | 0.68 | 0.67 |
| | 0.8 | 0.85 | 0.91 | 0.94 | 0.96 | 0.94 |
| | 1.6 | 1.15 | 1.24 | 1.30 | 1.33 | 1.31 |
| CSV 3 | 0.1 | 0.94 | 0.99 | 1.02 | 1.03 | 1.01 |
| | 0.2 | 1.32 | 1.39 | 1.44 | 1.45 | 1.43 |
| | 0.3 | 1.61 | 1.70 | 1.76 | 1.78 | 1.75 |
| | 0.4 | 1.85 | 1.95 | 2.02 | 2.05 | 2.02 |
| | 0.8 | 2.56 | 2.72 | 2.82 | 2.87 | 2.83 |
| | 1.6 | 3.45 | 3.71 | 3.89 | 3.98 | 3.94 |
| CSV 6 | 0.1 | 1.69 | 1.78 | 1.84 | 1.86 | 1.82 |
| | 0.2 | 2.38 | 2.51 | 2.59 | 2.62 | 2.57 |
| | 0.3 | 2.90 | 3.06 | 3.16 | 3.20 | 3.15 |
| | 0.4 | 3.33 | 3.52 | 3.64 | 3.69 | 3.63 |
| | 0.8 | 4.60 | 4.89 | 5.08 | 5.16 | 5.09 |
| | 1.6 | 6.20 | 6.68 | 7.00 | 7.16 | 7.10 |
| CSV 10 | 0.1 | 4.70 | 4.94 | 5.10 | 5.16 | 5.07 |
| | 0.2 | 6.61 | 6.96 | 7.20 | 7.27 | 7.15 |
| | 0.3 | 8.05 | 8.49 | 8.78 | 8.89 | 8.74 |
| | 0.4 | 9.25 | 9.77 | 10.11 | 10.24 | 10.08 |
| | 0.8 | 12.78 | 13.58 | 14.12 | 14.34 | 14.15 |
| | 1.6 | 17.23 | 18.54 | 19.45 | 19.89 | 19.71 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R22/R407C | 0.92 | 0.95 | 0.98 | 1.00 | 1.02 | 1.04 | 1.05 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] Evaporating temp. $t_e = -10^\circ\text{C}$. Hot gas temp. $t_h = t_c + 25^\circ\text{C}$. Subcooling $\Delta t_{\text{sub}} = 4\text{ K}$ | | | | |
|------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R22/R407C

| | | | | | | |
|--------|-----|-------|-------|-------|-------|-------|
| CSV 15 | 0.1 | 8.15 | 8.57 | 8.85 | 8.94 | 8.78 |
| | 0.2 | 11.46 | 12.07 | 12.47 | 12.61 | 12.40 |
| | 0.3 | 13.96 | 14.72 | 15.23 | 15.41 | 15.16 |
| | 0.4 | 16.03 | 16.93 | 17.53 | 17.75 | 17.47 |
| | 0.8 | 22.15 | 23.53 | 24.47 | 24.86 | 24.52 |
| | 1.6 | 29.87 | 32.14 | 33.72 | 34.47 | 34.17 |
| CSV 20 | 0.1 | 15.67 | 16.48 | 17.01 | 17.19 | 16.89 |
| | 0.2 | 22.04 | 23.21 | 23.98 | 24.25 | 23.84 |
| | 0.3 | 26.84 | 28.31 | 29.28 | 29.63 | 29.15 |
| | 0.4 | 30.82 | 32.55 | 33.71 | 34.13 | 33.59 |
| | 0.8 | 42.60 | 45.26 | 47.06 | 47.80 | 47.16 |
| | 1.6 | 57.44 | 61.81 | 64.84 | 66.29 | 65.70 |
| CSV 22 | 0.1 | 18.81 | 19.77 | 20.42 | 20.62 | 20.27 |
| | 0.2 | 26.45 | 27.85 | 28.78 | 29.10 | 28.61 |
| | 0.3 | 32.21 | 33.97 | 35.14 | 35.55 | 34.98 |
| | 0.4 | 36.98 | 39.06 | 40.44 | 40.95 | 40.31 |
| | 0.8 | 51.12 | 54.31 | 56.48 | 57.36 | 56.59 |
| | 1.6 | 68.93 | 74.17 | 77.81 | 79.54 | 78.84 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25^\circ\text{C}$, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R22/R407C | 0.92 | 0.95 | 0.98 | 1.00 | 1.02 | 1.04 | 1.05 |

Capacity Hot gas
(continued)

| Type | Pressure drop across valve Δp [bar] | Hot gas capacity Qh [kW] | | | | |
|------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------|----|----|----|----|
| | | Evaporating temp. $t_e = -10$ °C. Hot gas temp. $t_h = t_c + 25$ °C. Subcooling $\Delta t_{sub} = 4$ K | | | | |
| | | Condensing temperature t_c [°C] | | | | |
| | | 20 | 30 | 40 | 50 | 60 |

R290

| | | | | | | |
|-------|-----|------|------|------|------|------|
| CSV 2 | 0.1 | 0.35 | 0.36 | 0.37 | 0.36 | 0.35 |
| | 0.2 | 0.49 | 0.51 | 0.51 | 0.51 | 0.49 |
| | 0.3 | 0.6 | 0.62 | 0.63 | 0.62 | 0.6 |
| | 0.4 | 0.69 | 0.71 | 0.72 | 0.72 | 0.69 |
| | 0.8 | 0.94 | 0.98 | 1 | 1 | 0.96 |
| | 1.6 | 1.26 | 1.33 | 1.37 | 1.37 | 1.33 |
| CSV 3 | 0.1 | 1.05 | 1.08 | 1.1 | 1.08 | 1.04 |
| | 0.2 | 1.48 | 1.52 | 1.54 | 1.53 | 1.47 |
| | 0.3 | 1.8 | 1.86 | 1.88 | 1.86 | 1.79 |
| | 0.4 | 2.06 | 2.13 | 2.16 | 2.15 | 2.07 |
| | 0.8 | 2.83 | 2.95 | 3.01 | 2.99 | 2.89 |
| | 1.6 | 3.77 | 3.99 | 4.11 | 4.12 | 4 |
| CSV 6 | 0.1 | 1.89 | 1.95 | 1.97 | 1.95 | 1.87 |
| | 0.2 | 2.66 | 2.74 | 2.78 | 2.75 | 2.64 |
| | 0.3 | 3.24 | 3.34 | 3.39 | 3.36 | 3.23 |
| | 0.4 | 3.71 | 3.84 | 3.9 | 3.86 | 3.72 |
| | 0.8 | 5.1 | 5.31 | 5.42 | 5.39 | 5.2 |
| | 1.6 | 6.78 | 7.17 | 7.4 | 7.42 | 7.2 |

An increase in hot gas temperature t_h of 10 K, based on $t_h = t_c + 25$ °C, reduces valve capacity approx. 2% and vice versa. A change in evaporating temperature t_e changes valve capacity; see correction factor table below.

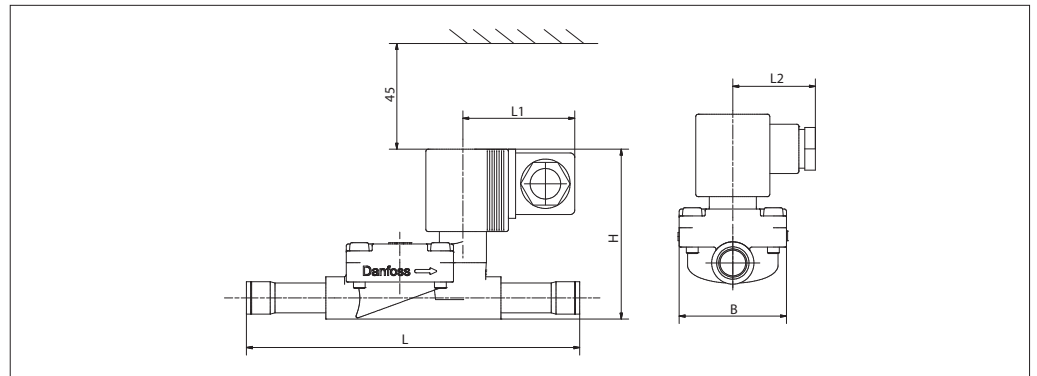
Correction factors

When sizing valves, the required Capacity-Hot gas must be multiplied by a correction factor depending on evaporating temperature t_e .

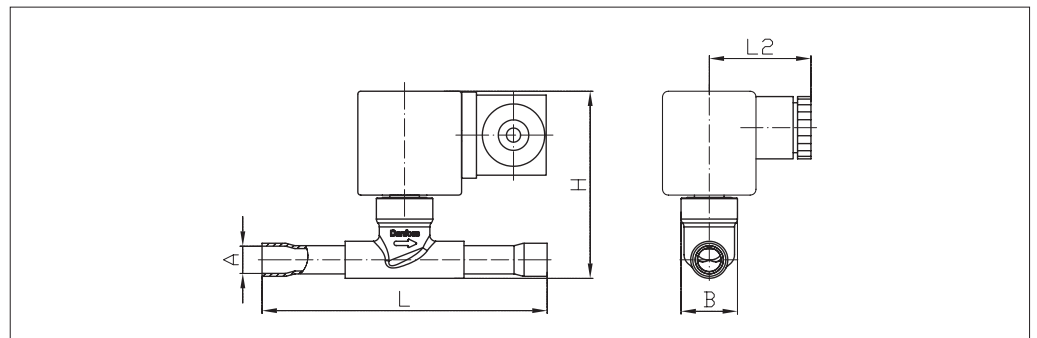
Correction factors for evaporating temperature t_e

| t_e [°C] | -40 | -30 | -20 | -10 | 0 | 10 | 15 |
|------------|------|------|------|------|------|------|------|
| R290 | 0.88 | 0.92 | 0.96 | 1.00 | 1.04 | 1.07 | 1.09 |

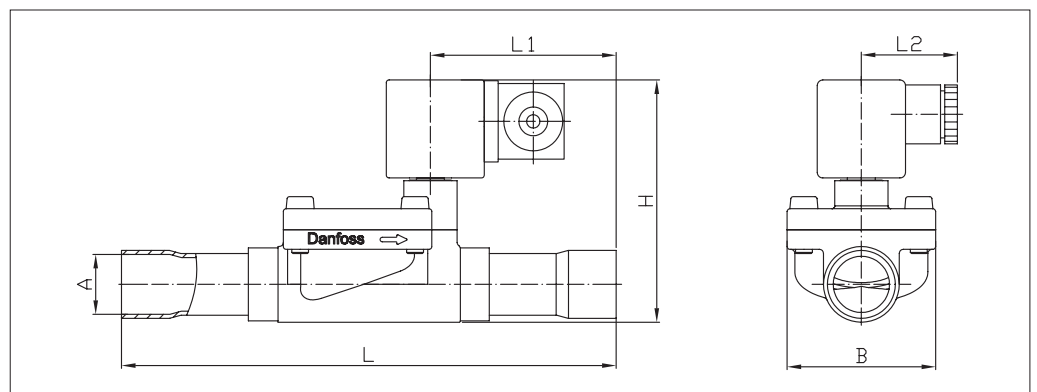
**Dimensions [mm]
and weights [kg]**



CSV 2 – CSV 6

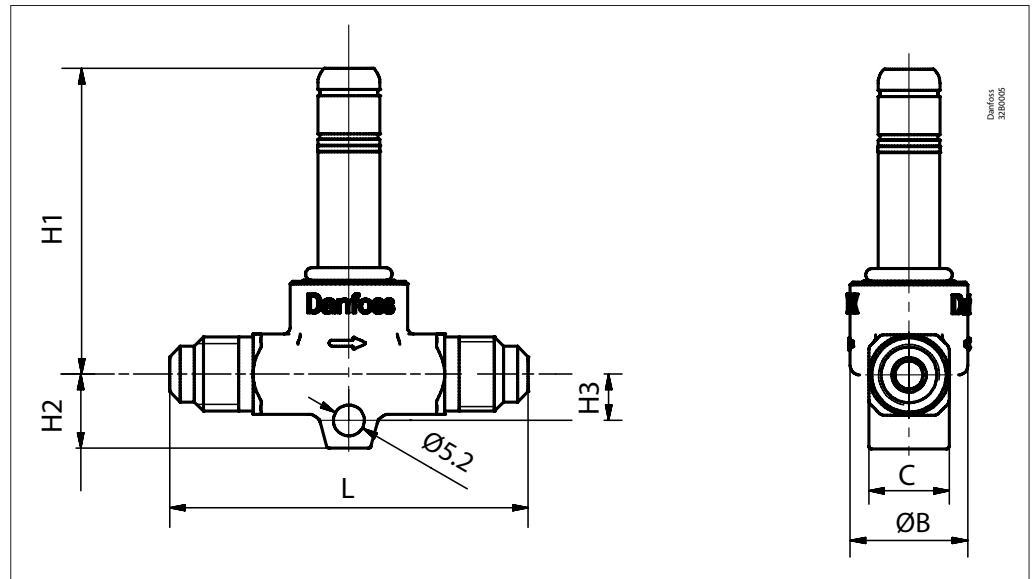


CSV 10 – CSV 22



| Type | Connection (ODF) | | B [mm] | H [mm] | L [mm] | L1 [mm] | L2 [mm] | Weight [Kg] |
|--------|------------------|------|--------|--------|--------|---------|---------|-------------|
| | [in] | [mm] | | | | | | |
| CSV 2 | 1/4 | 6 | 19 | 56 | 82 | – | 34 | 0.1 |
| CSV 3 | 1/4 | 6 | 19 | 65 | 92 | – | 34 | 0.1 |
| | 3/8 | 10 | 19 | 65 | 96 | – | 34 | 0.1 |
| CSV 6 | 3/8 | 10 | 19 | 65 | 96 | – | 34 | 0.1 |
| | 1/2 | 12 | 19 | 65 | 112 | – | 34 | 0.1 |
| CSV 10 | 1/2 | 12 | 46 | 73 | 142 | 50 | 34 | 0.2 |
| | 5/8 | 16 | 46 | 73 | 142 | 50 | 34 | 0.2 |
| CSV 15 | 5/8 | 16 | 46 | 74 | 167 | 62 | 34 | 0.4 |
| | 7/8 | 22 | 46 | 76 | 167 | 62 | 34 | 0.4 |
| CSV 20 | 7/8 | 22 | 53 | 82 | 177 | 64 | 34 | 0.6 |
| | 1 1/8 | 28 | 53 | 84 | 196 | 74 | 34 | 0.6 |
| CSV 22 | 1 1/8 | 28 | 62 | 87 | 240 | 91 | 34 | 0.9 |
| | 1 3/8 | 35 | 62 | 89 | 240 | 91 | 34 | 0.9 |
| Coil | – | – | – | – | – | – | – | 0.1 |

**Dimensions [mm]
and weights [kg]**
(continued)



| Type | Connection (flare) | | B [mm] | H [mm] | L [mm] | C [mm] | H1 [mm] | H2 [mm] | H3 [mm] | Weight [Kg] |
|-------|--------------------|------|--------|--------|--------|--------|---------|---------|---------|-------------|
| | [in] | [mm] | | | | | | | | |
| CSV 2 | 1/4 | 6 | 19 | 63 | 58 | 13 | 49 | 12 | 7.5 | 0.085 |
| CSV 3 | 1/4 | 6 | 19 | 69 | 58 | 13 | 55 | 12 | 7.5 | 0.096 |
| | 3/8 | 10 | 19 | 69 | 76 | 15 | 54 | 13 | 8.5 | 0.128 |
| CSV 6 | 3/8 | 10 | 19 | 70 | 76 | 15 | 55 | 13 | 8.5 | 0.128 |
| | 1/2 | 12 | 19 | 70 | 76 | 15 | 55 | 13 | 8.5 | 0.137 |