

Catalogue

# Safety relief valves for Industrial Refrigeration

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# Safety relief valves

## Type SFA 15 and SFA 15-50

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# Safety relief valves

## Type SFA 15 and SFA 15-50



SFA 15 and SFA 15-50 are standard, **back pressure dependent** safety relief valves in angle-way execution, specially designed for protection of vessels and other components against excessive pressure.

SFA 15-50 has a 50% reduced capacity compared to SFA 15.

The valve is designed to meet the strict quality demands and safety requirements for refrigeration installations, specified by the international classification societies.

The spring housing is closed tightly to avoid refrigerant leakage.

The inlet flow diameters of the valves are:

- 13 mm (1/2 in) for both SFA 15 and SFA 15-50

The valves can be delivered with set pressures between 10 and 40 bar g (145 and 580 psi g).

Standard pressure setting valves having "TÜV Pressure Setting Certificate" with each valve, are also available.

### Features

- Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) within a temperature range of -50 – 100 °C\* / -58 – 212 °F\*
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

### Technical data

- *Refrigerants*  
Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) within a temperature range of -50 – 100 °C / -58 – 212 °F.  
Flammable hydrocarbons are not recommended. For further information please contact your local Danfoss Sales Company.
- *Pressure*  
Pressure setting range: 10 – 40 bar g / 145 – 580 psi g. For further information please contact your local Danfoss Sales Company.  
Important: The SFA safety relief valve is dependent on the back pressure (if the back pressure is higher than the atmospheric pressure, the opening pressure will be higher than stated set pressure).  
Special circumstances such as vibrations (which should be avoided) and oscillating pressure may require an increased difference between the operational pressure and the closing pressure.
- *Pressure setting*  
The operating pressure of the plant should be at least 15% below the set pressure. This allows a perfect re-seating of the safety relief valve after having been activated.
- *Temperature range*  
-50 – 100 °C / -58 – 212 °F

\* Below -30 °C / -22 °F full tightness can only be guaranteed when refrigerant pressure is equal to or lower than 0.5 x P<sub>set</sub>

## Safety relief valves, type SFA 15 and SFA 15-50

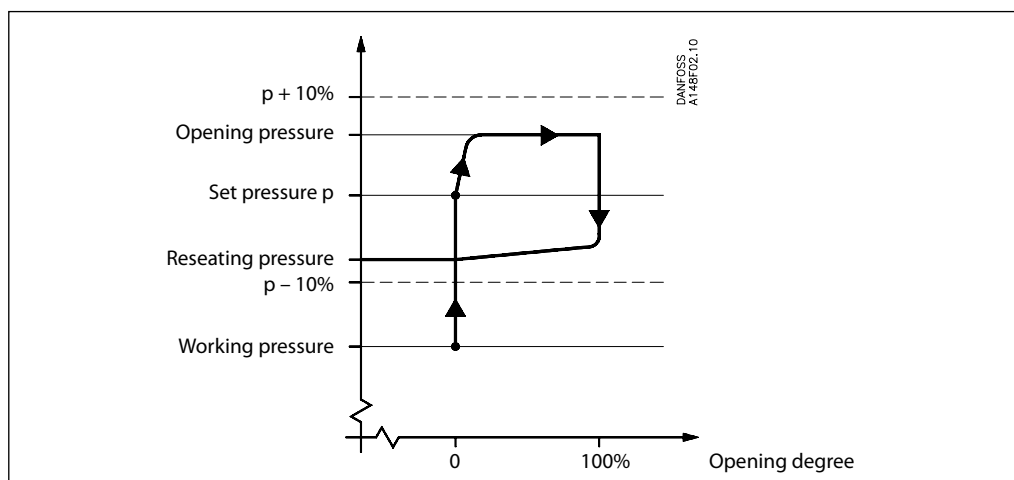


### Pressure Equipment Directive (PED)

The SFA valves are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation Instruction

| SFA valves     |                  |
|----------------|------------------|
| Nominal bore   | 13 mm (0.512 in) |
| Classified for | Fluid group I    |
| Category       | IV               |

## Design



SFA is designed as a direct loaded safety valve recommended particularly for refrigeration applications. On a rise in pressure above the set pressure, the safety relief valve will initially start opening slightly, to minimise the outlet of

refrigerant. If the pressure continues to increase, the valve will open fully. The safety relief valve will be fully open before the pressure is 10% higher than set pressure, and fully closed before the pressure is 10% below set pressure.

### Connections

Available with the following connections:

- Outside pipe thread T (ISO 228/1)
- Welding fittings (EN 10220)

### Housing

Made of special steel approved for low temperature operation. Spindle, cone, and seat are made of stainless steel, to ensure precise operation even during extraordinary conditions. The gasket of the valve cone is made of a special chloroprene (neoprene) compound.

### Installation

To ensure exact operation of the safety relief valve it should be installed with the spring housing upwards. When the valve is mounted, it is important to avoid the influence of static, dynamic and thermal stress.

A very precise technique has been applied for the production of the seal. However, this seal can still be damaged, if dirt is blown from the pipe system into the valve.

It is recommended that safety relief valves exhaust into the open air with a U-pipe filled with oil on the discharge branch, to prevent dirt from penetrating into the valve. It is also recommended that the valves be installed in pairs in conjunction with the double stop valve type DSV 1 or 2. For further information please see the technical leaflet for DSV.

### Re-calibration / servicing

In certain countries the authorities demand that the valves are checked at least once a year (see local rules).

### Control / Identification

After adjustment of the set pressure at Danfoss, the valves are sealed. For that reason Danfoss can only guarantee correct operation, as long as the seal remains unbroken.

All valves are provided with a metal plate with the following information:

- Flow diameter
- Set pressure
- Date of production
- Production number
- Type approved code.

### Transport / Handling

The valves are fitted with special protection covers and packed into purpose made transportation cartons.

It is important that the cover remains fitted around the valve until it is installed.

To ensure the exact and precise operation of the valve it must be handled with care.

| Safety valve         | Double stop valve |               | Max. pressure    |
|----------------------|-------------------|---------------|------------------|
|                      | CE marked         | Not CE marked |                  |
| SFA 15 and SFA 15-50 | DSV 1             |               | 40 bar (580 psi) |
|                      | DSV 2             |               | 40 bar (580 psi) |
|                      |                   | DSV 15        | 25 bar (363 psi) |

## Safety relief valves, type SFA 15 and SFA 15-50

### Capacity

The design and construction of the safety relief valve has been tested and approved by TÜV. This test comprises control of the function of the valve as well as measuring of the capacity, which is the basis of the curves and tables on the following pages. The values in the table are based on saturated gas.

If e.g. back pressure or superheated gas have to be taken into consideration, the formulas or the Danfoss computation program (Coolselector2™) can be used.

Table 1.

| Valve     | Nominal size |        | Flow diameter | Flow area             | De-rated, certified coefficient of discharge $K_{dr}$ | Effective discharge area $A_0 \times K_{dr}$ |
|-----------|--------------|--------|---------------|-----------------------|-------------------------------------------------------|----------------------------------------------|
|           | Inlet        | Outlet | $d_o$         | $A_0$                 |                                                       |                                              |
| SFA 15    | 15 mm        | 20 mm  | 13 mm         | 133 mm <sup>2</sup>   | 0.73                                                  | 97 mm <sup>2</sup>                           |
|           | 1/2 in       | 3/4 in | 0.512 in      | 0.206 in <sup>2</sup> |                                                       | 0.150 in <sup>2</sup>                        |
| SFA 15-50 | 15 mm        | 20 mm  | 13 mm         | 133 mm <sup>2</sup>   | 0.39                                                  | 52 mm <sup>2</sup>                           |
|           | 1/2 in       | 3/4 in | 0.512 in      | 0.206 in <sup>2</sup> |                                                       | 0.080 in <sup>2</sup>                        |

The discharge capacity of the safety relief valves are based on (ISO 4126-1 / EN 1313 6).

$$q_m = 0.2883 \times C \times A_0 \times K_{dr} \times K_b \sqrt{v}$$

$q_m$  Discharge capacity (kg/h).

$C$  Discharge function depending of the actual refrigerant ( $\kappa$ ) see table 2 (-).

$A_0$  Flow area of the safety relief valve (mm<sup>2</sup>).

$K_{dr}$  De-rated coefficient of discharge ( $K_{dr} = K_d \times 0.9$ ), (the  $K_{dr}$  is certified by TÜV) see table 1 (-).

$K_b$  Correction factor for sub-critical flow (-).

$K_b = 1.0$  when the back pressure is lower than approx.  $0.5 \times$  relieving pressure ( $P_b < 0.5 \times p$ ).

For all SFV safety valves  $K_b = 1.0$

$v$  Specific volume of the vapour at the relieving pressure  $p$ . (m<sup>3</sup>/kg).

$p_{set}$  Set pressure, the predetermined pressure at which a pressure relief valve under operation starts to open ( $p_{set}$  is indicated on the metal plate on the safety relief valve). (bar gauge)

$p_{atm}$  Atmospheric pressure (1 bar).

$p$  Relieving pressure,  $p = p_{set} \times 1.1 + P_{atm}$  (bar absolute).

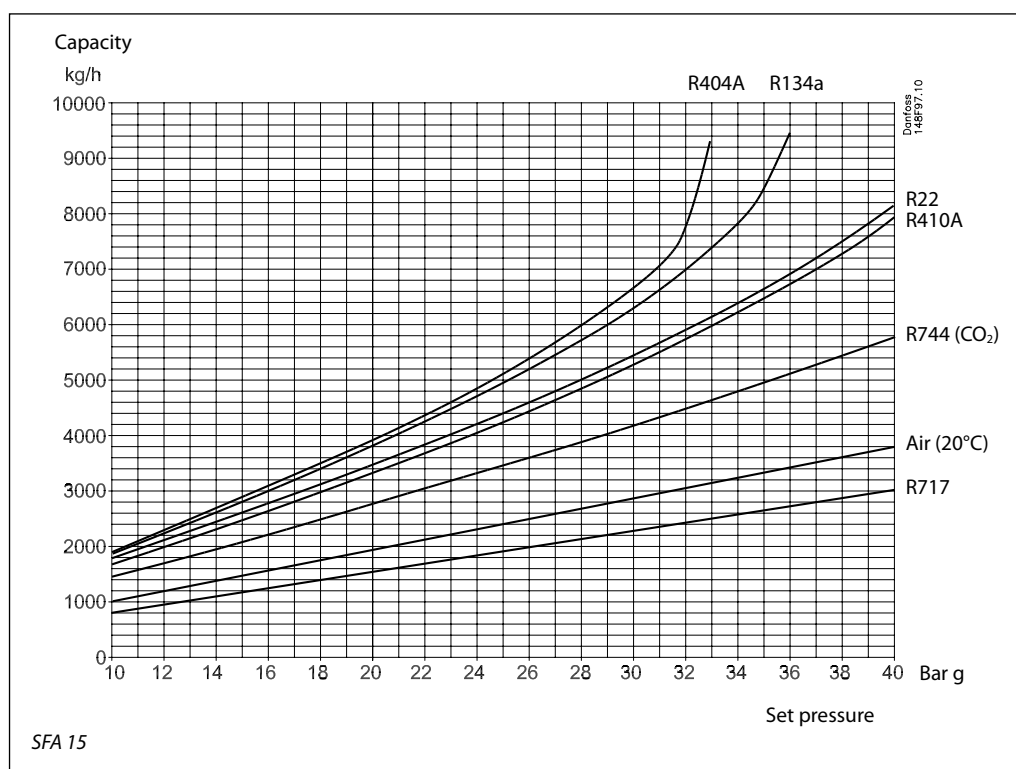
For further details see the above-mentioned ISO or EN standards.

Table 2. Properties of refrigerants

| Refrigerant             | Isentropic exponent [κ] | Discharge function [C] |
|-------------------------|-------------------------|------------------------|
| R22                     | 1.17                    | 2.54                   |
| R134a                   | 1.12                    | 2.50                   |
| R404A                   | 1.12                    | 2.49                   |
| R410A                   | 1.17                    | 2.54                   |
| R717 (Ammonia)          | 1.31                    | 2.64                   |
| R744 (CO <sub>2</sub> ) | 1.30                    | 2.63                   |
| Air                     | 1.40                    | 2.70                   |

# Safety relief valves, type SFA 15 and SFA 15-50

## Capacity



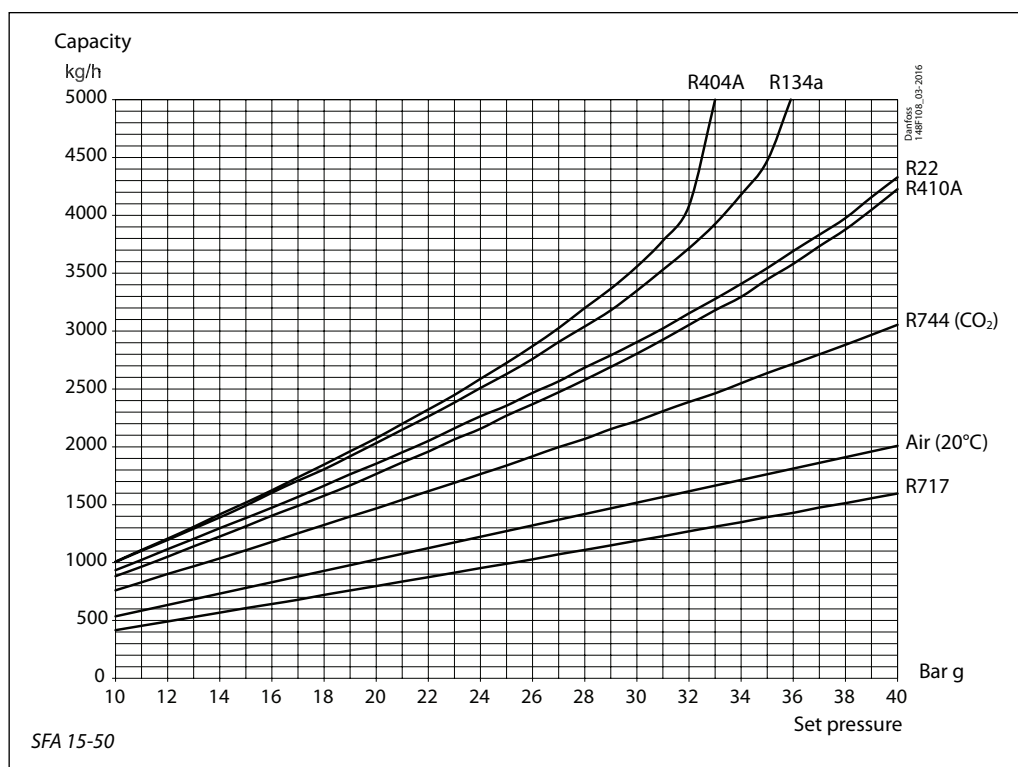
## Capacity

| Set pressure | qm     | R22  | R134a | R404A | R410A | R717 | R744 (CO <sub>2</sub> ) | Air (20°C) |
|--------------|--------|------|-------|-------|-------|------|-------------------------|------------|
| SFA 15       |        |      |       |       |       |      |                         |            |
| 10 bar g     | kg/h   | 1749 | 1881  | 1888  | 1652  | 779  | 1424                    | 1003       |
| 145 psi g    | lb/min | 64   | 69    | 69    | 61    | 29   | 52                      | 37         |
| 15 bar g     | kg/h   | 2592 | 2793  | 2842  | 2459  | 1135 | 2072                    | 1462       |
| 218 psi g    | lb/min | 95   | 103   | 104   | 90    | 42   | 76                      | 54         |
| 20 bar g     | kg/h   | 3471 | 3804  | 3883  | 3305  | 1492 | 2747                    | 1922       |
| 290 psi g    | lb/min | 128  | 140   | 143   | 121   | 55   | 101                     | 71         |
| 25 bar g     | kg/h   | 4409 | 4921  | 5101  | 4248  | 1853 | 3441                    | 2381       |
| 363 psi g    | lb/min | 162  | 181   | 187   | 156   | 68   | 126                     | 87         |
| 30 bar g     | kg/h   | 5437 | 6269  | 6659  | 5250  | 2227 | 4163                    | 2841       |
| 435 psi g    | lb/min | 200  | 230   | 245   | 193   | 82   | 153                     | 104        |
| 35 bar g     | kg/h   | 6633 | 8370  |       | 6450  | 2608 | 4936                    | 3301       |
| 508 psi g    | lb/min | 244  | 308   |       | 237   | 96   | 181                     | 121        |
| 40 bar g     | kg/h   | 8104 |       |       | 7911  | 2989 | 5718                    | 3760       |
| 580 psi g    | lb/min | 298  |       |       | 291   | 110  | 210                     | 138        |



## Safety relief valves, type SFA 15 and SFA 15-50

### Capacity

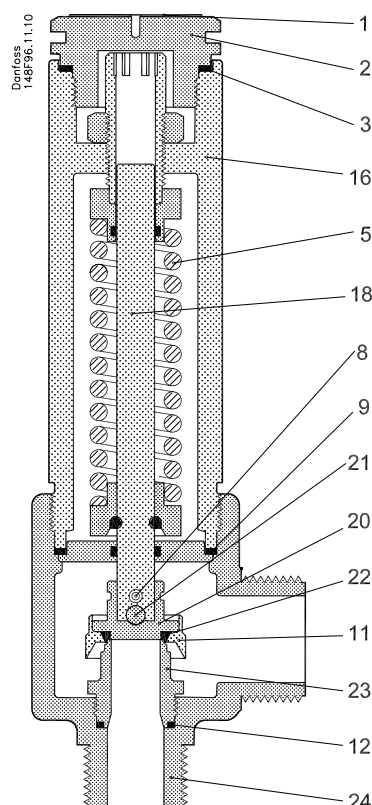


### Capacity

| Set pressure | qm     | R22  | R134a | R404A | R410A | R717 | R744 (CO <sub>2</sub> ) | Air (20°C) |
|--------------|--------|------|-------|-------|-------|------|-------------------------|------------|
| SFA 15-50    |        |      |       |       |       |      |                         |            |
| 10 bar g     | kg/h   | 935  | 1005  | 1009  | 883   | 416  | 761                     | 536        |
| 145 psi g    | lb/min | 34   | 37    | 37    | 32    | 15   | 28                      | 20         |
| 15 bar g     | kg/h   | 1385 | 1492  | 1519  | 1314  | 607  | 1107                    | 781        |
| 218 psi g    | lb/min | 51   | 55    | 56    | 48    | 22   | 41                      | 29         |
| 20 bar g     | kg/h   | 1854 | 2033  | 2075  | 1766  | 797  | 1468                    | 1027       |
| 290 psi g    | lb/min | 68   | 75    | 76    | 65    | 29   | 54                      | 38         |
| 25 bar g     | kg/h   | 2356 | 2629  | 2725  | 2270  | 990  | 1838                    | 1272       |
| 363 psi g    | lb/min | 87   | 97    | 100   | 83    | 36   | 68                      | 47         |
| 30 bar g     | kg/h   | 2905 | 3349  | 3557  | 2805  | 1190 | 2224                    | 1518       |
| 435 psi g    | lb/min | 107  | 123   | 131   | 103   | 44   | 82                      | 56         |
| 35 bar g     | kg/h   | 3544 | 4472  |       | 3446  | 1393 | 2637                    | 1763       |
| 508 psi g    | lb/min | 130  | 164   |       | 127   | 51   | 97                      | 65         |
| 40 bar g     | kg/h   | 4329 |       |       | 4226  | 1597 | 3055                    | 2009       |
| 580 psi g    | lb/min | 159  |       |       | 155   | 59   | 112                     | 74         |

## Safety relief valves, type SFA 15 and SFA 15-50

### Material specification

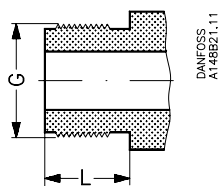


| No. | Part            | Material                           | DIN                                        | ISO                 | ASTM                          |
|-----|-----------------|------------------------------------|--------------------------------------------|---------------------|-------------------------------|
| 1   | Marking label   | Stainless steel                    |                                            |                     |                               |
| 2   | Threaded plug   | Steel                              |                                            |                     |                               |
| 3   | Packing washer  | Aluminium<br>(Non-asbestos gasket) |                                            |                     |                               |
| 5   | Spring          | Steel                              | Class C, DIN17223                          |                     |                               |
| 8   | Split           | Steel                              | 94 ELFORZ                                  |                     |                               |
| 9   | Packing washer  | Aluminium<br>(Non-asbestos gasket) |                                            |                     |                               |
| 11  | Retainer        | Stainless steel                    | X8CrNiS 18 9                               |                     | AISI 303, A276                |
| 12  | Packing washer  | Aluminium<br>(Non-asbestos gasket) |                                            |                     |                               |
| 16  | Valve top       | Steel                              | G20Mn5QT<br>Alt. S235JRG2<br>Alt. S355J2G3 | Fe360BFN<br>Fe510D1 | LCC, A352<br>A284C<br>A572-50 |
| 18  | Valve spindle   | Stainless steel                    | X5CrNi 18 10                               |                     | AISI 304, A276                |
| 20  | Valve cone      | Stainless steel                    | X8CrNiS 18 9                               |                     | AISI 303, A276                |
| 21  | Steel ball      | Steel                              |                                            |                     |                               |
| 22  | Valve cone seal | Chloroprene (Neoprene)             |                                            |                     |                               |
| 23  | Valve seat      | Stainless steel                    | X8CrNiS 18 9                               |                     | AISI 303, A276                |
| 24  | Valve housing   | Steel                              | G20Mn5QT<br>Alt. P285QH                    |                     | LCC, A352<br>LF2, A350        |

## Safety relief valves, type SFA 15 and SFA 15-50

### Connections

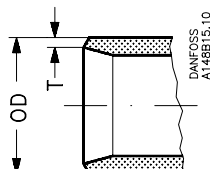
T



| Size [mm] | Size [in] | Inlet | Outlet |  |  |  | L [mm] | L [in] |  |
|-----------|-----------|-------|--------|--|--|--|--------|--------|--|
| 15        | 1/2       | G 3/4 | G 1    |  |  |  | 15     | 0.59   |  |

T outside pipe thread, (ISO 228/1)

DIN

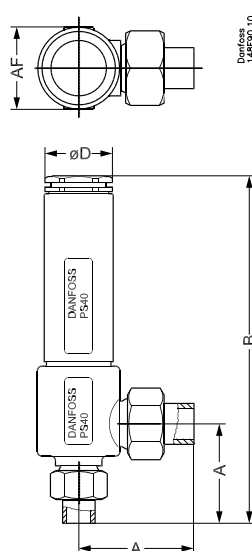


| Size [mm] | Size [in] | Inlet [mm] |     | Inlet [in] |       | Outlet [mm] |     | Outlet [in] |       |
|-----------|-----------|------------|-----|------------|-------|-------------|-----|-------------|-------|
|           |           | OD         | T   | OD         | T     | OD          | T   | OD          | T     |
| 15        | 1/2       | 21.3       | 2.3 | 0.839      | 0.091 | 26.9        | 2.3 | 1.059       | 0.091 |

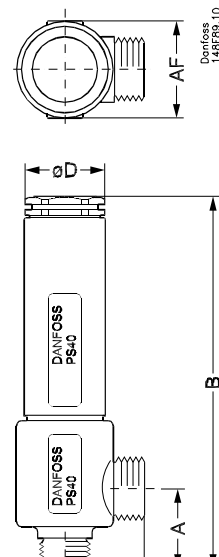
Welding fittings, DIN (2448)

### Dimensions and weights

SFA 15 and SFA 15-50 with welding fittings



SFA 15 and SFA 15-50 T



| Valve size                                                 |    |  | A    | B    |  | ØD   |  | AF   |  | Weight  |
|------------------------------------------------------------|----|--|------|------|--|------|--|------|--|---------|
| SFA 15 T, with threaded connections ISO 228/1 pipe threads |    |  |      |      |  |      |  |      |  |         |
| SFA 15 and SFA 15-50 T (1/2 in)                            | mm |  | 45   | 210  |  | 45   |  | 55   |  | 2.2 kg  |
|                                                            | in |  | 1.77 | 8.27 |  | 1.81 |  | 2.17 |  | 4.9 lbs |
| SFA with welding fittings, DIN 2448                        |    |  |      |      |  |      |  |      |  |         |
| SFA 15 and SFA 15-50 (1/2 in)                              | mm |  | 83   | 248  |  | 45   |  | 55   |  | 2.5 kg  |
|                                                            | in |  | 3.27 | 9.76 |  | 1.81 |  | 2.17 |  | 5.5 lbs |

Specified weights are approximate values only.

## Safety relief valves, type SFA 15 and SFA 15-50

### Ordering

#### Certified SFA valves with standard set pressure

| Size |      | Type         | Set pressure |         | Code number     |
|------|------|--------------|--------------|---------|-----------------|
| [mm] | [in] |              | [bar g]      | [psi g] |                 |
| 15   | 1/2  | SFA 15 T 210 | 10           | 145     | <b>148F3210</b> |
| 15   | 1/2  | SFA 15 T 211 | 11           | 160     | <b>148F3211</b> |
| 15   | 1/2  | SFA 15 T 212 | 12           | 174     | <b>148F3212</b> |
| 15   | 1/2  | SFA 15 T 213 | 13           | 189     | <b>148F3213</b> |
| 15   | 1/2  | SFA 15 T 214 | 14           | 203     | <b>148F3214</b> |
| 15   | 1/2  | SFA 15 T 215 | 15           | 218     | <b>148F3215</b> |
| 15   | 1/2  | SFA 15 T 216 | 16           | 232     | <b>148F3216</b> |
| 15   | 1/2  | SFA 15 T 217 | 17           | 247     | <b>148F3217</b> |
| 15   | 1/2  | SFA 15 T 218 | 18           | 261     | <b>148F3218</b> |
| 15   | 1/2  | SFA 15 T 219 | 19           | 276     | <b>148F3219</b> |
| 15   | 1/2  | SFA 15 T 220 | 20           | 290     | <b>148F3220</b> |
| 15   | 1/2  | SFA 15 T 221 | 21           | 305     | <b>148F3221</b> |
| 15   | 1/2  | SFA 15 T 222 | 22           | 319     | <b>148F3222</b> |
| 15   | 1/2  | SFA 15 T 223 | 23           | 334     | <b>148F3223</b> |
| 15   | 1/2  | SFA 15 T 224 | 24           | 348     | <b>148F3224</b> |
| 15   | 1/2  | SFA 15 T 225 | 25           | 363     | <b>148F3225</b> |
| 15   | 1/2  | SFA 15 T 226 | 26           | 377     | <b>148F3226</b> |
| 15   | 1/2  | SFA 15 T 227 | 27           | 392     | <b>148F3227</b> |
| 15   | 1/2  | SFA 15 T 228 | 28           | 406     | <b>148F3228</b> |
| 15   | 1/2  | SFA 15 T 229 | 29           | 421     | <b>148F3229</b> |
| 15   | 1/2  | SFA 15 T 230 | 30           | 435     | <b>148F3230</b> |
| 15   | 1/2  | SFA 15 T 231 | 31           | 450     | <b>148F3231</b> |
| 15   | 1/2  | SFA 15 T 232 | 32           | 464     | <b>148F3232</b> |
| 15   | 1/2  | SFA 15 T 233 | 33           | 479     | <b>148F3233</b> |
| 15   | 1/2  | SFA 15 T 234 | 34           | 493     | <b>148F3234</b> |
| 15   | 1/2  | SFA 15 T 235 | 35           | 508     | <b>148F3235</b> |
| 15   | 1/2  | SFA 15 T 236 | 36           | 522     | <b>148F3236</b> |
| 15   | 1/2  | SFA 15 T 237 | 37           | 537     | <b>148F3237</b> |
| 15   | 1/2  | SFA 15 T 238 | 38           | 551     | <b>148F3238</b> |
| 15   | 1/2  | SFA 15 T 239 | 39           | 566     | <b>148F3239</b> |
| 15   | 1/2  | SFA 15 T 240 | 40           | 580     | <b>148F3240</b> |

#### Certified SFA valves with standard set pressure and TÜV pressure setting certificate with each valve

| Size |      | Type         | Set pressure |         | Code number     |
|------|------|--------------|--------------|---------|-----------------|
| [mm] | [in] |              | [bar g]      | [psi g] |                 |
| 15   | 1/2  | SFA 15 T 310 | 10           | 145     | <b>148F3310</b> |
| 15   | 1/2  | SFA 15 T 311 | 11           | 160     | <b>148F3311</b> |
| 15   | 1/2  | SFA 15 T 312 | 12           | 174     | <b>148F3312</b> |
| 15   | 1/2  | SFA 15 T 313 | 13           | 189     | <b>148F3313</b> |
| 15   | 1/2  | SFA 15 T 314 | 14           | 203     | <b>148F3314</b> |
| 15   | 1/2  | SFA 15 T 315 | 15           | 218     | <b>148F3315</b> |
| 15   | 1/2  | SFA 15 T 316 | 16           | 232     | <b>148F3316</b> |
| 15   | 1/2  | SFA 15 T 317 | 17           | 247     | <b>148F3317</b> |
| 15   | 1/2  | SFA 15 T 318 | 18           | 261     | <b>148F3318</b> |
| 15   | 1/2  | SFA 15 T 319 | 19           | 276     | <b>148F3319</b> |
| 15   | 1/2  | SFA 15 T 320 | 20           | 290     | <b>148F3320</b> |
| 15   | 1/2  | SFA 15 T 321 | 21           | 305     | <b>148F3321</b> |
| 15   | 1/2  | SFA 15 T 322 | 22           | 319     | <b>148F3322</b> |
| 15   | 1/2  | SFA 15 T 323 | 23           | 334     | <b>148F3323</b> |
| 15   | 1/2  | SFA 15 T 324 | 24           | 348     | <b>148F3324</b> |
| 15   | 1/2  | SFA 15 T 325 | 25           | 363     | <b>148F3325</b> |
| 15   | 1/2  | SFA 15 T 326 | 26           | 377     | <b>148F3326</b> |
| 15   | 1/2  | SFA 15 T 327 | 27           | 392     | <b>148F3327</b> |
| 15   | 1/2  | SFA 15 T 328 | 28           | 406     | <b>148F3328</b> |
| 15   | 1/2  | SFA 15 T 329 | 29           | 421     | <b>148F3329</b> |
| 15   | 1/2  | SFA 15 T 330 | 30           | 435     | <b>148F3330</b> |
| 15   | 1/2  | SFA 15 T 331 | 31           | 450     | <b>148F3331</b> |
| 15   | 1/2  | SFA 15 T 332 | 32           | 464     | <b>148F3332</b> |
| 15   | 1/2  | SFA 15 T 333 | 33           | 479     | <b>148F3333</b> |
| 15   | 1/2  | SFA 15 T 334 | 34           | 493     | <b>148F3334</b> |
| 15   | 1/2  | SFA 15 T 335 | 35           | 508     | <b>148F3335</b> |
| 15   | 1/2  | SFA 15 T 336 | 36           | 522     | <b>148F3336</b> |
| 15   | 1/2  | SFA 15 T 337 | 37           | 537     | <b>148F3337</b> |
| 15   | 1/2  | SFA 15 T 338 | 38           | 551     | <b>148F3338</b> |
| 15   | 1/2  | SFA 15 T 339 | 39           | 566     | <b>148F3339</b> |
| 15   | 1/2  | SFA 15 T 340 | 40           | 580     | <b>148F3340</b> |

#### Certified SFA valves with standard set pressure

| Size |      | Type            | Set pressure |         | Code number     |
|------|------|-----------------|--------------|---------|-----------------|
| [mm] | [in] |                 | [bar g]      | [psi g] |                 |
| 15   | 1/2  | SFA 15-50 T 210 | 10           | 145     | <b>148F4000</b> |
| 15   | 1/2  | SFA 15-50 T 211 | 11           | 160     | <b>148F4001</b> |
| 15   | 1/2  | SFA 15-50 T 212 | 12           | 174     | <b>148F4002</b> |
| 15   | 1/2  | SFA 15-50 T 213 | 13           | 189     | <b>148F4003</b> |
| 15   | 1/2  | SFA 15-50 T 214 | 14           | 203     | <b>148F4004</b> |
| 15   | 1/2  | SFA 15-50 T 215 | 15           | 218     | <b>148F4005</b> |
| 15   | 1/2  | SFA 15-50 T 216 | 16           | 232     | <b>148F4006</b> |
| 15   | 1/2  | SFA 15-50 T 217 | 17           | 247     | <b>148F4007</b> |
| 15   | 1/2  | SFA 15-50 T 218 | 18           | 261     | <b>148F4008</b> |
| 15   | 1/2  | SFA 15-50 T 219 | 19           | 276     | <b>148F4009</b> |
| 15   | 1/2  | SFA 15-50 T 220 | 20           | 290     | <b>148F4010</b> |
| 15   | 1/2  | SFA 15-50 T 221 | 21           | 305     | <b>148F4011</b> |
| 15   | 1/2  | SFA 15-50 T 222 | 22           | 319     | <b>148F4012</b> |
| 15   | 1/2  | SFA 15-50 T 223 | 23           | 334     | <b>148F4013</b> |
| 15   | 1/2  | SFA 15-50 T 224 | 24           | 348     | <b>148F4014</b> |
| 15   | 1/2  | SFA 15-50 T 225 | 25           | 363     | <b>148F4015</b> |
| 15   | 1/2  | SFA 15-50 T 226 | 26           | 377     | <b>148F4016</b> |
| 15   | 1/2  | SFA 15-50 T 227 | 27           | 392     | <b>148F4017</b> |
| 15   | 1/2  | SFA 15-50 T 228 | 28           | 406     | <b>148F4018</b> |
| 15   | 1/2  | SFA 15-50 T 229 | 29           | 421     | <b>148F4019</b> |
| 15   | 1/2  | SFA 15-50 T 230 | 30           | 435     | <b>148F4020</b> |
| 15   | 1/2  | SFA 15-50 T 231 | 31           | 450     | <b>148F4021</b> |
| 15   | 1/2  | SFA 15-50 T 232 | 32           | 464     | <b>148F4022</b> |
| 15   | 1/2  | SFA 15-50 T 233 | 33           | 479     | <b>148F4023</b> |
| 15   | 1/2  | SFA 15-50 T 234 | 34           | 493     | <b>148F4024</b> |
| 15   | 1/2  | SFA 15-50 T 235 | 35           | 508     | <b>148F4025</b> |
| 15   | 1/2  | SFA 15-50 T 236 | 36           | 522     | <b>148F4026</b> |
| 15   | 1/2  | SFA 15-50 T 237 | 37           | 537     | <b>148F4027</b> |
| 15   | 1/2  | SFA 15-50 T 238 | 38           | 551     | <b>148F4028</b> |
| 15   | 1/2  | SFA 15-50 T 239 | 39           | 566     | <b>148F4029</b> |
| 15   | 1/2  | SFA 15-50 T 240 | 40           | 580     | <b>148F4030</b> |

#### Certified SFA valves with standard set pressure and TÜV pressure setting certificate with each valve

| Size |      | Type            | Set pressure |         | Code number     |
|------|------|-----------------|--------------|---------|-----------------|
| [mm] | [in] |                 | [bar g]      | [psi g] |                 |
| 15   | 1/2  | SFA 15-50 T 310 | 10           | 145     | <b>148F4100</b> |
| 15   | 1/2  | SFA 15-50 T 311 | 11           | 160     | <b>148F4101</b> |
| 15   | 1/2  | SFA 15-50 T 312 | 12           | 174     | <b>148F4102</b> |
| 15   | 1/2  | SFA 15-50 T 313 | 13           | 189     | <b>148F4103</b> |
| 15   | 1/2  | SFA 15-50 T 314 | 14           | 203     | <b>148F4104</b> |
| 15   | 1/2  | SFA 15-50 T 315 | 15           | 218     | <b>148F4105</b> |
| 15   | 1/2  | SFA 15-50 T 316 | 16           | 232     | <b>148F4106</b> |
| 15   | 1/2  | SFA 15-50 T 317 | 17           | 247     | <b>148F4107</b> |
| 15   | 1/2  | SFA 15-50 T 318 | 18           | 261     | <b>148F4108</b> |
| 15   | 1/2  | SFA 15-50 T 319 | 19           | 276     | <b>148F4109</b> |
| 15   | 1/2  | SFA 15-50 T 320 | 20           | 290     | <b>148F4110</b> |
| 15   | 1/2  | SFA 15-50 T 321 | 21           | 305     | <b>148F4111</b> |
| 15   | 1/2  | SFA 15-50 T 322 | 22           | 319     | <b>148F4112</b> |
| 15   | 1/2  | SFA 15-50 T 323 | 23           | 334     | <b>148F4113</b> |
| 15   | 1/2  | SFA 15-50 T 324 | 24           | 348     | <b>148F4114</b> |
| 15   | 1/2  | SFA 15-50 T 325 | 25           | 363     | <b>148F4115</b> |
| 15   | 1/2  | SFA 15-50 T 326 | 26           | 377     | <b>148F4116</b> |
| 15   | 1/2  | SFA 15-50 T 327 | 27           | 392     | <b>148F4117</b> |
| 15   | 1/2  | SFA 15-50 T 328 | 28           | 406     | <b>148F4118</b> |
| 15   | 1/2  | SFA 15-50 T 329 | 29           | 421     | <b>148F4119</b> |
| 15   | 1/2  | SFA 15-50 T 330 | 30           | 435     | <b>148F4120</b> |
| 15   | 1/2  | SFA 15-50 T 331 | 31           | 450     | <b>148F4121</b> |
| 15   | 1/2  | SFA 15-50 T 332 | 32           | 464     | <b>148F4122</b> |
| 5    | 1/2  | SFA 15-50 T 333 | 33           | 479     | <b>148F4123</b> |
| 15   | 1/2  | SFA 15-50 T 334 | 34           | 493     | <b>148F4124</b> |
| 15   | 1/2  | SFA 15-50 T 335 | 35           | 508     | <b>148F4125</b> |
| 15   | 1/2  | SFA 15-50 T 336 | 36           | 522     | <b>148F4126</b> |
| 15   | 1/2  | SFA 15-50 T 337 | 37           | 537     | <b>148F4127</b> |
| 15   | 1/2  | SFA 15-50 T 338 | 38           | 551     | <b>148F4128</b> |
| 15   | 1/2  | SFA 15-50 T 339 | 39           | 566     | <b>148F4129</b> |
| 15   | 1/2  | SFA 15-50 T 340 | 40           | 580     | <b>148F4130</b> |

## Safety relief valves, type SFA 15 and SFA 15-50

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### Ordering

#### *Repair kit*

| Type                 | Code number     |
|----------------------|-----------------|
| Repair kit SFA 15    | <b>148F3036</b> |
| Repair kit SFA 15-50 | <b>148F3150</b> |

#### *Nipples and gaskets*

| Type                                                       | Code number     |
|------------------------------------------------------------|-----------------|
| Nipples + gaskets set for<br>SFV 15 / SFA 15 and SFA 15-50 | <b>148F3019</b> |



# Safety relief valves

## Type SFV 20-25

### Contents

|                              | Page |
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| Design .....                 | 18   |
| Capacity .....               | 19   |
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| Connections .....            | 23   |
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# Safety relief valves

## Type SFV 20-25



SFV 20 – 25 are standard, **back pressure dependent** safety relief valves in angle-way execution, specially designed for protection of vessels and other components against excessive pressure.

The valve is designed to meet the strict quality demands and safety requirements for refrigeration installations, specified by the international classification societies.

The valve is recommended as an external and internal safety relief valve in refrigeration plants. The spring housing is closed tightly to avoid refrigerant leakage.

The inlet flow diameters of the valves are:

- 18 mm ( $\frac{3}{4}$  in) for SFV 20, and
- 23 mm (1 in) for SFV 25

The valves can be delivered with set pressures between 10 and 25 bar g (145 and 363 psi g).

Standard pressure setting valves having "TÜV Pressure Setting Certificate" with each valve, are also available.

### Features

- Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) within a temperature range of -30 °C / 100 °C (-22 °F / 212 °F).
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

### Technical data

- **Refrigerants**  
Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>) within a temperature range of -30 – 100 °C / -22 – 212 °F.  
Flammable hydrocarbons are not recommended.  
For further information please contact your local Danfoss Sales Company.
- **Pressure**  
Pressure setting range: 10 – 25 bar g / 145 – 363 psi g. For further information please contact your local Danfoss Sales Company.  
  
The valves are designed for:  
Strength test:  
43 bar g / 624 psi g  
Leakage safety:  
Same as set pressure

**Important:** The SFV safety relief valve is dependent on the back pressure (if the back pressure is higher than the atmospheric pressure, the opening pressure will be higher than stated set pressure).

Special circumstances such as vibrations (which should be avoided) and oscillating pressure may require an increased difference between the operational pressure and the closing pressure.

- **Pressure setting**  
The operating pressure of the plant should be at least 15% below the set pressure. This allows a perfect re-seating of the safety relief valve after having been activated.
- **Temperature range**  
-30 – 100 °C / -22 – 212 °F

## Safety relief valves, type SFV 20-25

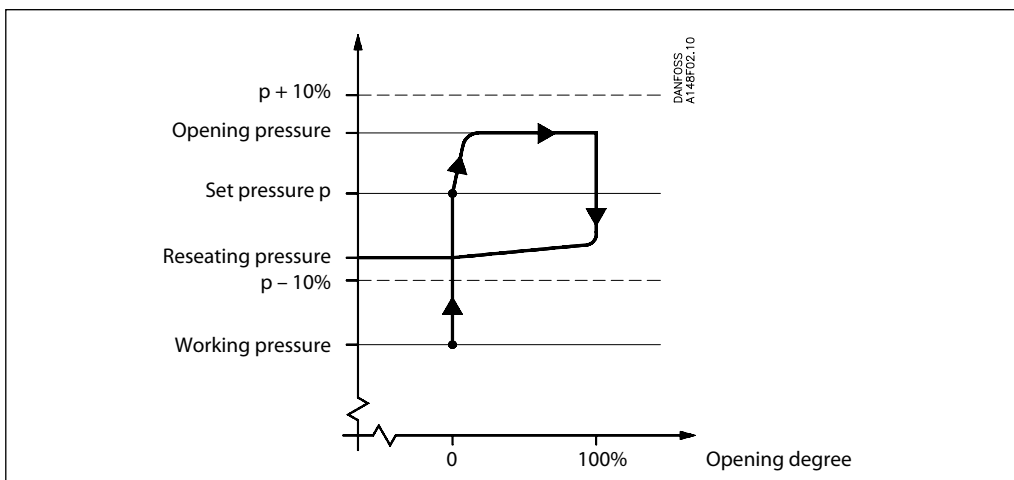


### Pressure Equipment Directive (PED)

The SFV-valves are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation Instruction

| SFV valves     |                  |                  |
|----------------|------------------|------------------|
| Nominal bore   | 18 mm (0.709 in) | 23 mm (0.906 in) |
| Classified for | Fluid group I    |                  |
| Category       | IV               |                  |

## Design



SFV is designed as a **standard safety relief valve** (DIN 3320), which are recommended for refrigeration plants. On a rise in pressure above the set pressure, the safety relief valve will initially start opening slightly, to minimise the outlet of

refrigerant. If the pressure continues to increase, the valve will open fully. The safety relief valve will be fully open before the pressure is 10% higher than set pressure, and fully closed before the pressure is 10% below set pressure.

### Connections

Available with the following connections:

- Outside pipe thread T (ISO 228/1)
- Welding fittings (DIN 2448)

### Housing

Made of special steel approved for low temperature operation. Spindle and seat are made of stainless steel, to ensure precise operation even during extraordinary conditions. The gasket of the valve cone is made of a special chloroprene (neoprene) compound.

### Installation

To ensure exact operation of the safety relief valve it should be installed with the spring housing upwards. If the valve is mounted as an internal safety relief valve without any demand for exact opening pressure, the valve may be fitted with the spring housing in other positions. When the valve is mounted, it is important to avoid the influence of static, dynamic and thermal stress.

A very precise technique has been applied for the production of the seal. However, this seal can still be damaged, if dirt is blown from the pipe system into the valve.

It is recommended that safety relief valves exhaust into the open air with a U-pipe filled with oil on the discharge branch, to prevent dirt from penetrating into the valve. It is also recommended that the valves be installed in pairs in conjunction with the double stop valve type DSV. For further information please see the DSV data sheet.

### Re-calibration / servicing

In certain countries the authorities demand that the valves are checked at least once a year (see local rules).

### Control / Identification

After adjustment of the set pressure at Danfoss, the valves are sealed. For that reason Danfoss can only guarantee correct operation, as long as the seal remains unbroken.

All valves are provided with a metal plate with the following information:

- Flow diameter
- Set pressure
- Date of production
- Production number
- Type approved code.

### Transport / Handling

The valves are fitted with special protection covers and packed into purpose made transportation cartons.

It is important the cover remains fitted around the valve until it is installed.

*To ensure the exact and precise operation of the valve it must be handled with care.*

## Safety relief valves, type SFV 20-25

### Capacity

The design and construction of the safety relief valve has been tested and approved by TÜV. This test comprises control of the function of the valve as well as measuring of the capacity, which is the basis of the curves and tables on the following pages. The values in the table are based on saturated gas.

If e.g. back pressure or superheated gas have to be taken into consideration, the formulas or the Danfoss computation program (DIRcalc™) can be used.

Table 1.

| Valve  | Nominal size |        | Flow diameter<br>$d_o$ | Flow area<br>$A_o$    | De-rated, certified<br>coefficient of discharge<br>$K_{dr}$ |
|--------|--------------|--------|------------------------|-----------------------|-------------------------------------------------------------|
|        | Inlet        | Outlet |                        |                       |                                                             |
| SFV 20 | 20 mm        | 25 mm  | 18 mm                  | 254 mm <sup>2</sup>   | 0.54                                                        |
|        | ¾ in         | 1 in   | 0.709 in               | 0.394 in <sup>2</sup> |                                                             |
| SFV 25 | 25 mm        | 32 mm  | 23 mm                  | 415 mm <sup>2</sup>   | 0.48                                                        |
|        | 1 in         | 1¼     | 0.906 in               | 0.643 in <sup>2</sup> |                                                             |

The discharge capacity of the safety relief valves are based on (ISO 4126-1 / prEN 1313 6 (1998)).

$$q_m = 0.2883 \times C \times A_o \times K_{dr} \times K_b \sqrt{v}$$

$q_m$  Discharge capacity (kg/h)

$C$  Discharge function depending of the actual refrigerant ( $\kappa$ ) see table 2 (-)

$A_o$  Flow area of the safety relief valve (mm<sup>2</sup>).

$K_{dr}$  De-rated coefficient of discharge ( $K_{dr} = K_d \times 0.9$ ), (the  $K_{dr}$  is certified by TÜV) see table 1 (-)

$K_b$  Correction factor for sub-critical flow. (-)

$K_b = 1.0$  when the back pressure is lower than approx.  $0.5 \times$  relieving pressure ( $P_b < 0.5 \times p$ )

For all SFV safety valves  $K_b = 1.0$

$v$  Specific volume of the vapour at the relieving pressure  $p$ . (m<sup>3</sup>/kg)

$p_{set}$  Set pressure, the predetermined pressure at which a pressure relief valve under operation starts to open ( $p_{set}$  is indicated on the metal plate on the safety relief valve).  
(bar gauge)

$p_{atm}$  Atmospheric pressure. (1 bar)

$p$  Relieving pressure,  $p = p_{set} \times 1.1 + P_{atm}$  (bar absolute)

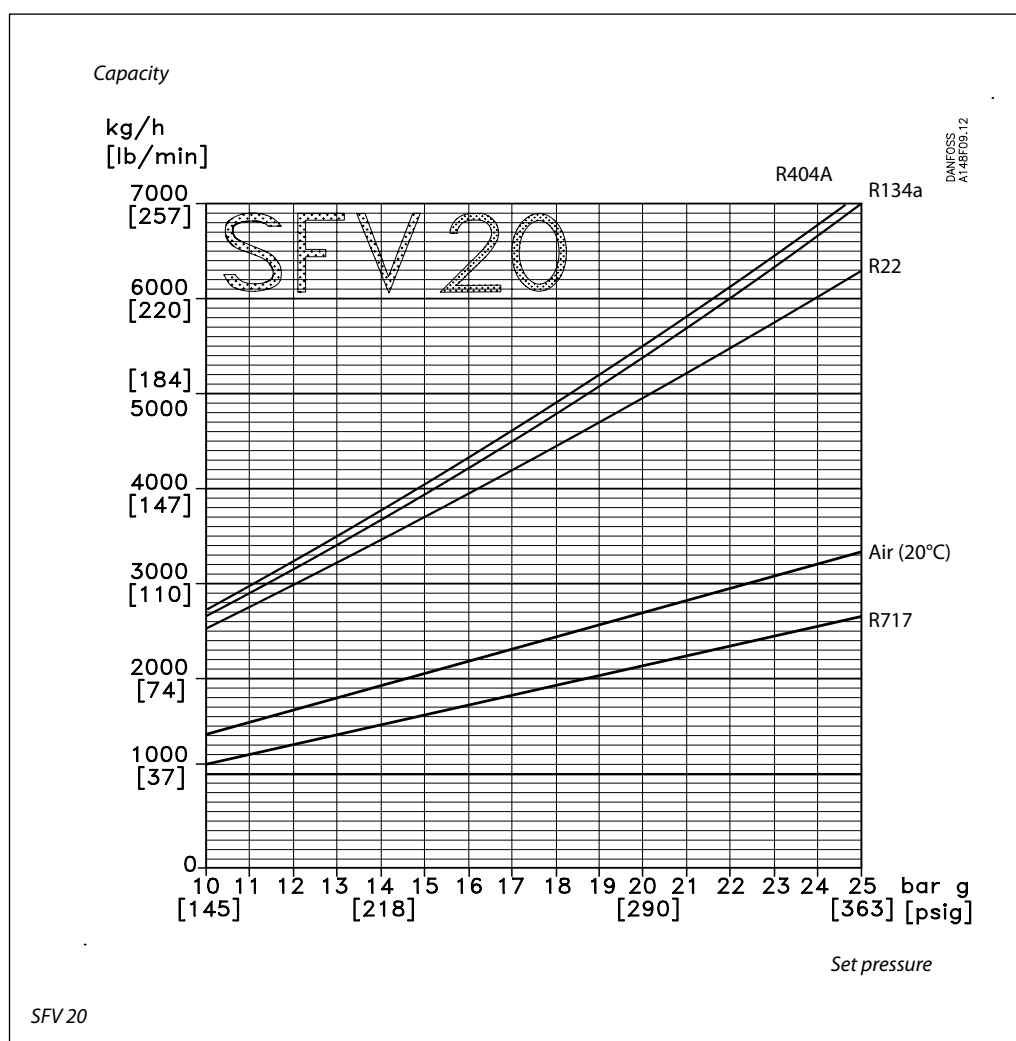
For further details see the above-mentioned ISO or EN standards.

Table 2. Properties of Refrigerants

| Refrigerant             | Isentropic<br>exponent<br>[ $\kappa$ ] | Discharge<br>function<br>[C] |
|-------------------------|----------------------------------------|------------------------------|
| R22                     | 1.17                                   | 2.54                         |
| R134a                   | 1.12                                   | 2.50                         |
| R404A                   | 1.12                                   | 2.49                         |
| R410A                   | 1.17                                   | 2.54                         |
| R717 (Ammonia)          | 1.31                                   | 2.64                         |
| R744 (CO <sub>2</sub> ) | 1.30                                   | 2.63                         |
| Air                     | 1.40                                   | 2.70                         |

**Safety relief valves, type SFV 20-25**

**Capacity**  
(cont.)

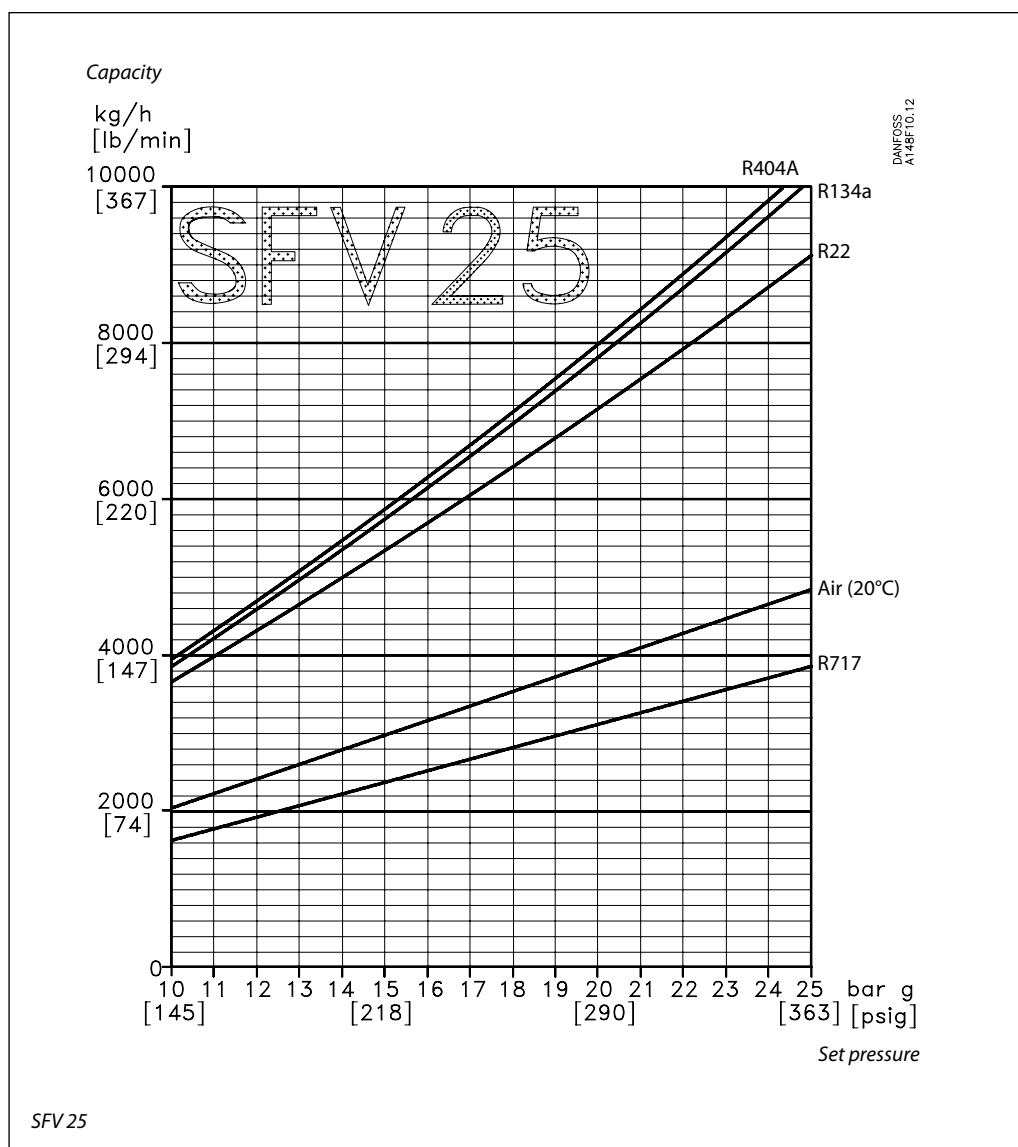


**Capacity**

| Set pressure          |                | R22         | R134a       | R404A       | R717       | Air (20°C)  |
|-----------------------|----------------|-------------|-------------|-------------|------------|-------------|
| SFV 20                |                |             |             |             |            |             |
| 13 bar g<br>189 psi g | kg/h<br>lb/min | 3220<br>118 | 3430<br>126 | 3500<br>129 | 1415<br>52 | 1790<br>66  |
| 18 bar g<br>261 psi g | kg/h<br>lb/min | 4440<br>163 | 4800<br>176 | 4900<br>180 | 1925<br>71 | 2435<br>89  |
| 21 bar g<br>305 psi g | kg/h<br>lb/min | 5215<br>192 | 5680<br>209 | 5770<br>212 | 2235<br>82 | 2820<br>104 |
| 25 bar g<br>363 psi g | kg/h<br>lb/min | 6285<br>231 | 6980<br>257 | 7125<br>262 | 2660<br>98 | 3335<br>122 |

# Safety relief valves, type SFV 20-25

## Capacity (cont.)

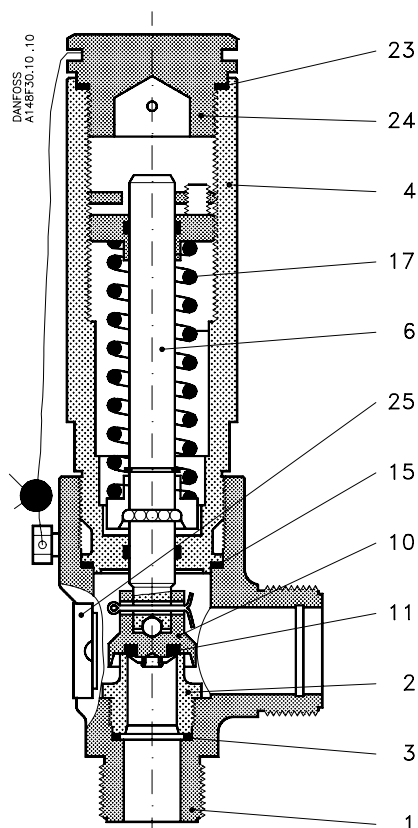


## Capacity

| Set pressure |        | R22  | R134a | R404A | R717 | Air (20°C) |
|--------------|--------|------|-------|-------|------|------------|
| SFV 25       |        |      |       |       |      |            |
| 13 bar g     | kg/h   | 4670 | 4980  | 5075  | 2050 | 2600       |
| 189 psi g    | lb/min | 172  | 183   | 186   | 75   | 96         |
| 18 bar g     | kg/h   | 6445 | 6965  | 7115  | 2790 | 3530       |
| 261 psi g    | lb/min | 237  | 256   | 261   | 103  | 130        |
| 21 bar g     | kg/h   | 7565 | 8240  | 8370  | 3240 | 4090       |
| 305 psi g    | lb/min | 278  | 303   | 308   | 119  | 150        |
| 25 bar g     | kg/h   | 9120 | 10135 | 10340 | 3860 | 4835       |
| 363 psi g    | lb/min | 335  | 372   | 380   | 142  | 178        |

## Safety relief valves, type SFV 20-25

### Material specification



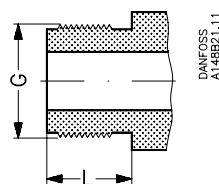
| No. | Part            | Material                          | DIN                                | ISO                            | ASTM                              |
|-----|-----------------|-----------------------------------|------------------------------------|--------------------------------|-----------------------------------|
| 1   | Housing         | Steel                             | G20Mn5 QT<br>*P285QH<br>*TTSt35N   | TW 6, 2604/3-75                | Grade 1, A333, A334<br>* A350 LF2 |
| 2   | Valve seat      | Stainless steel                   | X10CrNiS189, 17440                 | Type 17, 683/13                | AISI 303                          |
| 3   | Packing washer  | Aluminium<br>*Non-asbestos gasket |                                    |                                |                                   |
| 4   | Valve top       | Steel                             | St. 37.2, 1652                     | Fe 360 B, 660                  | Grade C, A 283                    |
| 6   | Valve spindle   | Stainless steel                   | X10CrNiS189, 17440                 | Type 17, 683/13                | AISI 303                          |
| 10  | Valve cone      | Steel                             |                                    |                                |                                   |
| 11  | Valve cone seal | Cloroprene (Neoprene)             |                                    |                                |                                   |
| 15  | Packing washer  | Aluminium<br>*Non-asbestos gasket |                                    |                                |                                   |
| 17  | Spring          | Steel                             | Class C                            | A 679, 17223                   |                                   |
| 23  | Packing washer  | Aluminum<br>*Non-asbestos gasket  |                                    |                                |                                   |
| 24  | Plug            | Steel                             | 9S Mn28, 1651<br>*R St 37.2, 17100 | Type 2, R 683<br>Fe 360 B, 630 | Grade C, A 283                    |
| 25  | Marking label   | Aluminium                         |                                    |                                |                                   |

\* Alternative material

## Safety relief valves, type SFV 20-25

### Connections

**T**

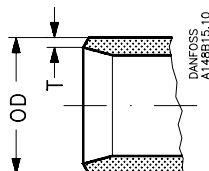


Danfoss  
A148B21.11

| Size<br>[mm] | Size<br>[in] | Inlet   | Outlet  |  | L<br>[mm] | L<br>[in] |  |  |
|--------------|--------------|---------|---------|--|-----------|-----------|--|--|
| 20           | 3/4          | G 1 1/4 | G 1 1/2 |  | 20        | 0.79      |  |  |
| 25           | 1            | G 1 1/4 | G 1 1/2 |  | 20        | 0.79      |  |  |

*T outside pipe thread, (ISO 228/1)*

**DIN**

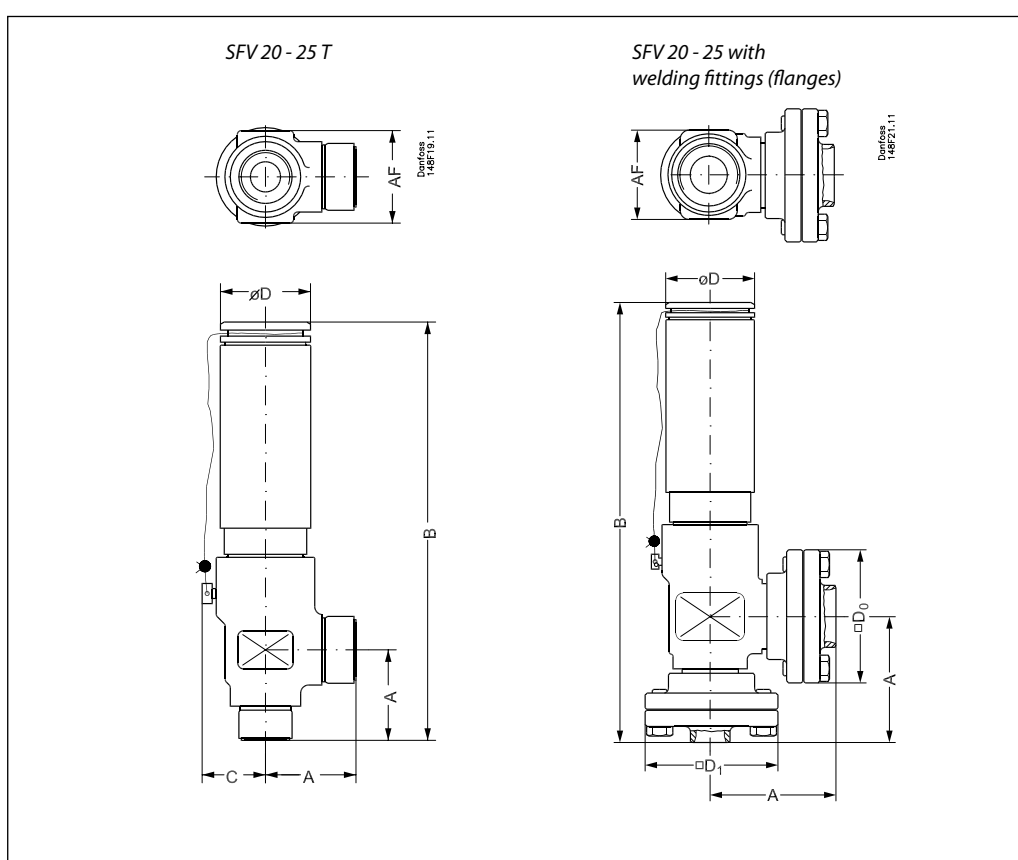


Danfoss  
A148B15.10

| Size<br>[mm] | Size<br>[in] | Inlet [mm]<br>OD | Inlet [mm]<br>T | Inlet [in]<br>OD | Inlet [in]<br>T | Outlet [mm]<br>OD | Outlet [mm]<br>T | Outlet [in]<br>OD | Outlet [in]<br>T |  |  |
|--------------|--------------|------------------|-----------------|------------------|-----------------|-------------------|------------------|-------------------|------------------|--|--|
| 20           | 3/4          | 26.9             | 2.3             | 1.059            | 0.091           | 33.7              | 2.6              | 1.337             | 0.102            |  |  |
| 25           | 1            | 33.7             | 2.6             | 1.327            | 0.102           | 42.4              | 2.6              | 1.669             | 0.102            |  |  |

*Welding fittings DIN (2448)*

### Dimensions and weights



| Valve size                                                             |          | A          | B            | C          | □ D <sub>0</sub> | øD         | □ D <sub>1</sub> | AF         | Weight |
|------------------------------------------------------------------------|----------|------------|--------------|------------|------------------|------------|------------------|------------|--------|
| <i>SFV 20 - 25 T, with threaded connections ISO 228/1 pipe threads</i> |          |            |              |            |                  |            |                  |            |        |
| SFV 20 (3/4 in)                                                        | mm<br>in | 55<br>2.17 | 270<br>10.63 | 40<br>1.57 |                  | 60<br>2.36 |                  | 60<br>2.36 | 4.2 kg |
| SFV 25 (1 in)                                                          | mm<br>in | 55<br>2.17 | 270<br>10.63 | 40<br>1.57 |                  | 60<br>2.36 |                  | 60<br>2.36 | 4.2 kg |
| <i>SFV with welding fittings, DIN 2448</i>                             |          |            |              |            |                  |            |                  |            |        |
| SFV 20 (3/4 in)                                                        | mm<br>in | 85<br>3.35 | 300<br>11.81 |            | 90<br>3.54       | 60<br>2.36 | 90<br>3.54       | 60<br>2.36 | 6.0 kg |
| SFV 25 (1 in)                                                          | mm<br>in | 85<br>3.35 | 300<br>11.81 |            | 90<br>3.54       | 60<br>2.36 | 90<br>3.54       | 60<br>2.36 | 6.0 kg |

Specified weights are approximate values only.

## Safety relief valves, type SFV 20-25

### Ordering

#### How to order

The table below is used to identify the valve required.

Please note that the type codes only serve to identify the valves, some of which may not form part of the standard product range. For further information please contact your local Danfoss Sales Company.

#### Example for type codes

**SFV 20 T 210**

#### Type codes

| Valve type                                                                 | SFV                    | Safety relief valve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
|----------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Nominal size in mm<br><br>(valve size measured on the connection diameter) | <b>20</b><br><b>25</b> | <div>Available connections</div> <div>T      DIN welding fitting</div> <div>DN 20      x      x</div> <div>DN 25      x      x</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
| Connections                                                                | <b>T</b>               | Outside threaded connections: ISO 228/1 Pipe thread<br>- The welding fittings for single mounted safety relief valve must be ordered separately                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| Pressure setting                                                           |                        | <div>Standard pressure setting: 2××</div> <div><div></div><div>SFV 20</div><div>SFV 25</div></div> <div><div><b>210</b><br/><b>211</b><br/><b>212</b><br/><b>213</b><br/><b>214</b><br/><b>215</b><br/><b>216</b><br/><b>217</b><br/><b>218</b><br/><b>219</b><br/><b>220</b><br/><b>221</b><br/><b>222</b><br/><b>223</b><br/><b>224</b><br/><b>225</b></div><div>10 bar g (145 psi g)<br/>11 bar g (160 psi g)<br/>12 bar g (174 psi g)<br/>13 bar g (188 psi g)<br/>14 bar g (203 psi g)<br/>15 bar g (218 psi g)<br/>16 bar g (232 psi g)<br/>17 bar g (247 psi g)<br/>18 bar g (261 psi g)<br/>19 bar g (276 psi g)<br/>20 bar g (290 psi g)<br/>21 bar g (305 psi g)<br/>22 bar g (319 psi g)<br/>23 bar g (334 psi g)<br/>24 bar g (348 psi g)<br/>25 bar g (363 psi g)</div><div>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x</div></div> <div><div></div><div>SFV 20</div><div>SFV 25</div></div> <div><div><b>310</b><br/><b>311</b><br/><b>312</b><br/><b>313</b><br/><b>314</b><br/><b>315</b><br/><b>316</b><br/><b>317</b><br/><b>318</b><br/><b>319</b><br/><b>320</b><br/><b>321</b><br/><b>322</b><br/><b>323</b><br/><b>324</b><br/><b>325</b></div><div>10 bar g (145 psi g)<br/>11 bar g (160 psi g)<br/>12 bar g (174 psi g)<br/>13 bar g (188 psi g)<br/>14 bar g (203 psi g)<br/>15 bar g (218 psi g)<br/>16 bar g (232 psi g)<br/>17 bar g (247 psi g)<br/>18 bar g (261 psi g)<br/>19 bar g (276 psi g)<br/>20 bar g (290 psi g)<br/>21 bar g (304 psi g)<br/>22 bar g (319 psi g)<br/>23 bar g (334 psi g)<br/>24 bar g (348 psi g)<br/>25 bar g (362 psi g)</div><div>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x<br/>x      x</div></div> |  |

#### Important!

Where products need to be certified according to specific certification societies, the relevant information should be included at the time of order.



## Safety relief valves, type SFV 20-25

### Ordering (cont.)

#### Certified SFV valves with standard set pressure

| Construction and test facilities are approved by TÜV |      |             |         |         |                 |
|------------------------------------------------------|------|-------------|---------|---------|-----------------|
| Size                                                 |      | Type        | [Bar g] | [psi g] | Part no.        |
| [mm]                                                 | [in] |             |         |         |                 |
| 20                                                   | 3/4  | SFV20 T 210 | 10      | 145     | <b>2416+254</b> |
| 20                                                   | 3/4  | SFV20 T 211 | 11      | 160     | <b>2416+255</b> |
| 20                                                   | 3/4  | SFV20 T 212 | 12      | 174     | <b>2416+256</b> |
| 20                                                   | 3/4  | SFV20 T 213 | 13      | 189     | <b>2416+150</b> |
| 20                                                   | 3/4  | SFV20 T 214 | 14      | 203     | <b>2416+257</b> |
| 20                                                   | 3/4  | SFV20 T 215 | 15      | 218     | <b>2416+258</b> |
| 20                                                   | 3/4  | SFV20 T 216 | 16      | 232     | <b>2416+259</b> |
| 20                                                   | 3/4  | SFV20 T 217 | 17      | 247     | <b>2416+260</b> |
| 20                                                   | 3/4  | SFV20 T 218 | 18      | 261     | <b>2416+151</b> |
| 20                                                   | 3/4  | SFV20 T 219 | 19      | 276     | <b>2416+261</b> |
| 20                                                   | 3/4  | SFV20 T 220 | 20      | 290     | <b>2416+262</b> |
| 20                                                   | 3/4  | SFV20 T 221 | 21      | 305     | <b>2416+152</b> |
| 20                                                   | 3/4  | SFV20 T 222 | 22      | 319     | <b>2416+241</b> |
| 20                                                   | 3/4  | SFV20 T 223 | 23      | 334     | <b>2416+263</b> |
| 20                                                   | 3/4  | SFV20 T 224 | 24      | 348     | <b>2416+264</b> |
| 20                                                   | 3/4  | SFV20 T 225 | 25      | 363     | <b>2416+183</b> |

#### Certified SFV valves with standard set pressure and TÜV pressure setting certificate with each valve

| Each valve is certified by a representative from TÜV |      |             |         |         |                 |
|------------------------------------------------------|------|-------------|---------|---------|-----------------|
| Size                                                 |      | Type        | [Bar g] | [psi g] | Part no.        |
| [mm]                                                 | [in] |             |         |         |                 |
| 20                                                   | 3/4  | SFV20 T 310 | 10      | 145     | <b>2416+285</b> |
| 20                                                   | 3/4  | SFV20 T 311 | 11      | 160     | <b>2416+286</b> |
| 20                                                   | 3/4  | SFV20 T 312 | 12      | 174     | <b>2416+287</b> |
| 20                                                   | 3/4  | SFV20 T 313 | 13      | 189     | <b>2416+160</b> |
| 20                                                   | 3/4  | SFV20 T 314 | 14      | 203     | <b>2416+288</b> |
| 20                                                   | 3/4  | SFV20 T 315 | 15      | 218     | <b>2416+289</b> |
| 20                                                   | 3/4  | SFV20 T 316 | 16      | 232     | <b>2416+290</b> |
| 20                                                   | 3/4  | SFV20 T 317 | 17      | 247     | <b>2416+291</b> |
| 20                                                   | 3/4  | SFV20 T 318 | 18      | 261     | <b>2416+161</b> |
| 20                                                   | 3/4  | SFV20 T 319 | 19      | 276     | <b>2416+292</b> |
| 20                                                   | 3/4  | SFV20 T 320 | 20      | 290     | <b>2416+293</b> |
| 20                                                   | 3/4  | SFV20 T 321 | 21      | 305     | <b>2416+162</b> |
| 20                                                   | 3/4  | SFV20 T 322 | 22      | 319     | <b>2416+294</b> |
| 20                                                   | 3/4  | SFV20 T 323 | 23      | 334     | <b>2416+295</b> |
| 20                                                   | 3/4  | SFV20 T 324 | 24      | 348     | <b>2416+296</b> |
| 20                                                   | 3/4  | SFV20 T 325 | 25      | 363     | <b>2416+186</b> |

#### Certified SFV valves with standard set pressure

| Construction and test facilities are approved by TÜV |      |             |         |         |                 |
|------------------------------------------------------|------|-------------|---------|---------|-----------------|
| Size                                                 |      | Type        | [Bar g] | [psi g] | Part no.        |
| [mm]                                                 | [in] |             |         |         |                 |
| 25                                                   | 1    | SFV25 T 210 | 10      | 145     | <b>2416+265</b> |
| 25                                                   | 1    | SFV25 T 211 | 11      | 160     | <b>2416+266</b> |
| 25                                                   | 1    | SFV25 T 212 | 12      | 174     | <b>2416+267</b> |
| 25                                                   | 1    | SFV25 T 213 | 13      | 189     | <b>2416+153</b> |
| 25                                                   | 1    | SFV25 T 214 | 14      | 203     | <b>2416+268</b> |
| 25                                                   | 1    | SFV25 T 215 | 15      | 218     | <b>2416+269</b> |
| 25                                                   | 1    | SFV25 T 216 | 16      | 232     | <b>2416+270</b> |
| 25                                                   | 1    | SFV25 T 217 | 17      | 247     | <b>2416+271</b> |
| 25                                                   | 1    | SFV25 T 218 | 18      | 261     | <b>2416+154</b> |
| 25                                                   | 1    | SFV25 T 219 | 19      | 276     | <b>2416+272</b> |
| 25                                                   | 1    | SFV25 T 220 | 20      | 290     | <b>2416+273</b> |
| 25                                                   | 1    | SFV25 T 221 | 21      | 305     | <b>2416+155</b> |
| 25                                                   | 1    | SFV25 T 222 | 22      | 319     | <b>2416+242</b> |
| 25                                                   | 1    | SFV25 T 223 | 23      | 334     | <b>2416+274</b> |
| 25                                                   | 1    | SFV25 T 224 | 24      | 348     | <b>2416+275</b> |
| 25                                                   | 1    | SFV25 T 225 | 25      | 363     | <b>2416+184</b> |

#### Certified SFV valves with standard set pressure and TÜV pressure setting certificate with each valve

| Each valve is certified by a representative from TÜV |      |             |         |         |                 |
|------------------------------------------------------|------|-------------|---------|---------|-----------------|
| Size                                                 |      | Type        | [Bar g] | [psi g] | Part no.        |
| [mm]                                                 | [in] |             |         |         |                 |
| 25                                                   | 1    | SFV25 T 310 | 10      | 145     | <b>2416+297</b> |
| 25                                                   | 1    | SFV25 T 311 | 11      | 160     | <b>2416+298</b> |
| 25                                                   | 1    | SFV25 T 312 | 12      | 174     | <b>2416+299</b> |
| 25                                                   | 1    | SFV25 T 313 | 13      | 189     | <b>2416+163</b> |
| 25                                                   | 1    | SFV25 T 314 | 14      | 203     | <b>2416+300</b> |
| 25                                                   | 1    | SFV25 T 315 | 15      | 218     | <b>2416+301</b> |
| 25                                                   | 1    | SFV25 T 316 | 16      | 232     | <b>2416+302</b> |
| 25                                                   | 1    | SFV25 T 317 | 17      | 247     | <b>2416+303</b> |
| 25                                                   | 1    | SFV25 T 318 | 18      | 261     | <b>2416+164</b> |
| 25                                                   | 1    | SFV25 T 319 | 19      | 276     | <b>2416+304</b> |
| 25                                                   | 1    | SFV25 T 320 | 20      | 290     | <b>2416+305</b> |
| 25                                                   | 1    | SFV25 T 321 | 21      | 305     | <b>2416+165</b> |
| 25                                                   | 1    | SFV25 T 322 | 22      | 319     | <b>2416+306</b> |
| 25                                                   | 1    | SFV25 T 323 | 23      | 334     | <b>2416+307</b> |
| 25                                                   | 1    | SFV25 T 324 | 24      | 348     | <b>2416+308</b> |
| 25                                                   | 1    | SFV25 T 325 | 25      | 363     | <b>2416+187</b> |

### Flanges and gaskets

| Type                             | Code No.        |
|----------------------------------|-----------------|
| Flanges + gaskets set for SFV 20 | <b>148F3020</b> |
| Flanges + gaskets set for SFV 25 | <b>148F3021</b> |

### Repair kit

| Type                                     | Code No.        |
|------------------------------------------|-----------------|
| Repair kit for SFV 20 (gaskets and cone) | <b>2453+082</b> |
| Repair kit for SFV 25 (gaskets and cone) | <b>2453+083</b> |



# Change-over valve

## Type DSV 1 and DSV 2

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| Dimensions and weights for double safety valve systems ..... | 33   |
| Dimensions and weights .....                                 | 35   |
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# Change-over valve

## Type DSV 1 and DSV 2



DSV 1 and DSV 2 are change-over valves, which are designed to meet all industrial refrigeration application requirements.

DSV valves are designed specifically for use with double safety valve systems.

The valves are designed to give favourable flow characteristics and are easy to dismantle for servicing. The valve cone is designed to ensure perfect closing, even with minimum torque the valve will close effectively. All valves are equipped with vented cap and nipple / flange connections, which permit easy inspection or replacement of safety valves.

### Features

- Applicable to HCFC, non flammable HFC, R717 (Ammonia) and R744 (CO<sub>2</sub>)
- Each valve type is clearly marked with type, size and performance range
- The valves and caps are prepared for sealing, to prevent operation by unauthorised persons, using a seal wire
- Can accept flow in both directions
- Housing and bonnet are made from low temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities
- Max. operating pressure:  
DSV 1 and DSV 2: 40 bar g / 580 psi g
- Temperature range:  
DSV 1 and DSV 2: -50 – 100 °C / -58 – 212 °F
- **DSV 1** when fitted with 2 x SFA 15/BSV 8 or **DSV 2** when fitted with a combination of either 2 x SFA 15, or 2 x SFV 20, or 2 x SFV 25, meet the requirements according to EN13136 "Safety Valves Calculations" regarding max. 3% pressure drop in upstream line.
- Classification: DNV, CRN, BV, EAC etc.  
To get an updated list of certification on the products please contact your local Danfoss Sales Company.

## Change-over valves, type DSV 1 and DSV 2

### Pressure Equipment Directive (PED)

DSV valves are approved and CE-marked in accordance with Pressure Equipment Directive - 97/23/EC.

For further details / restrictions - see Installation Instruction.



|                | DSV 1 valves           | DSV 2 valves       |
|----------------|------------------------|--------------------|
| Nominal bore   | DN ≤ 25 mm (1 in)      | DN32 mm (1 1/4 in) |
| Classified for | Fluid group I          |                    |
| Category       | Article 3, paragraph 3 | II                 |

## Design

### Connections

Available with the following connections: - Weld branch / nipples / flanges - DIN 2448  
Note: DSV valves are supplied c/w DSV inlet connection fittings, DSV outlet connection fittings, and SFA / BSV / SFV outlet connection fittings. Please refer to ordering section.

### Housing and bonnet

Made from special, cold resistant steel approved for low temperature operation.

### Valve cone

A Teflon tightening ring provides perfect sealing with a minimum closing torque.

### Spindle

Made of polished stainless steel, which is ideal for O-ring sealing.

### Packing gland

The "full temperature range" packing gland ensures perfect tightness in the whole temperature range: -50 – 100 °C / -58 – 212 °F. The packing gland is equipped with a scraper ring to prevent penetration of dirt and other foreign bodies.

## Technical data

- **Refrigerants**  
Applicable to HCFC, non flammable HFC, R717 (Ammonia) and R744 (CO<sub>2</sub>).  
Flammable hydrocarbons are not recommended.  
The valve is only recommended for use in closed circuits.
- **Temperature range**  
-50 – 100 °C / -58 – 212 °F.
- **Pressure**  
The valves are designed for:  
Max. operating pressure: 40 bar g / 580 psig
- **Capacity**

| Type  | K <sub>v</sub> - value | C <sub>v</sub> - value |
|-------|------------------------|------------------------|
|       | [m <sup>3</sup> /h]    | [Us gal/min]           |
| DSV 1 | 17.5                   | 20.3                   |
| DSV 2 | 30.0                   | 34.8                   |

- **Installation**  
DSV are used as changeover valves between two SFA / BSV / SFV safety valves. When the spindle is turned clockwise (fig. 1) the inlet port C is connected to B. When the spindle is turned anticlockwise (fig. 1) the inlet port C is connected to A. For further information refer to installation instruction for DSV.

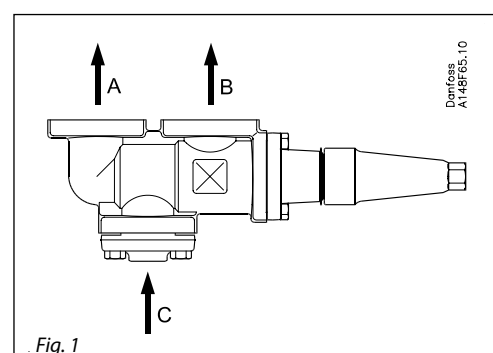
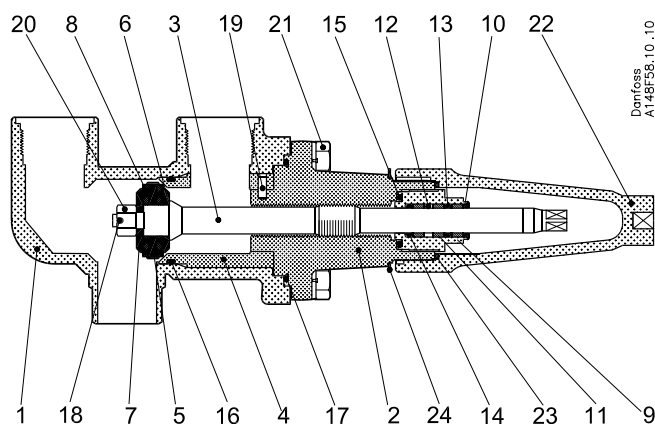


Fig. 1

## Change-over valves, type DSV 1 and DSV 2

### Material specification

DSV 1

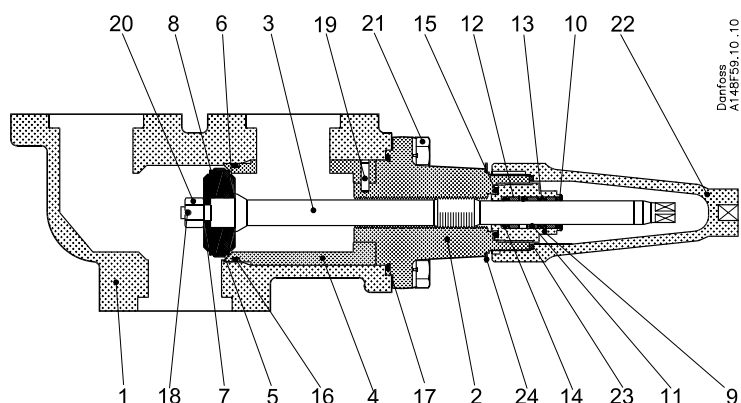


| No.   | Part                | Material              | DIN / EN            | ISO            | ASTM           |
|-------|---------------------|-----------------------|---------------------|----------------|----------------|
| 1     | Housing             | Steel                 | P285QH, EN10222-4   |                | LF2A350        |
| 2     | Bonnet              | Steel                 | P285QH, EN10222-4   |                | LF2A350        |
| 3     | Spindle             | Stainless steel       | X10CrNiS 18 9 17440 | Type 17 683/13 | AISI 303       |
| 4     | Seat                | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 5     | Cone, Middle        | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 6     | Cone, Back          | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 7     | Cone, Front         | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 8     | Cone seal           | Teflon(PTFE)          |                     |                |                |
| 9     | Packing gland       | Steel                 | 9SMn28, 1651        | Type 2, R683/9 | 1213,SAE J403  |
| 13-17 | O-ring              | Cloroprene (Neoprene) |                     |                |                |
| 20    | Slotted nut         | Steel                 |                     |                |                |
| 21    | Screw               | Steel                 | A2-70               | A2-70          | Type 308       |
| 22    | Seal cap            | Aluminium             |                     |                |                |
| 23    | Gasket for seal cap | Nylon                 |                     |                |                |
| 24    | Idenfication ring   | Stainless steel       |                     |                |                |

## Change-over valves, type DSV 1 and DSV 2

### Material specification

DSV 2

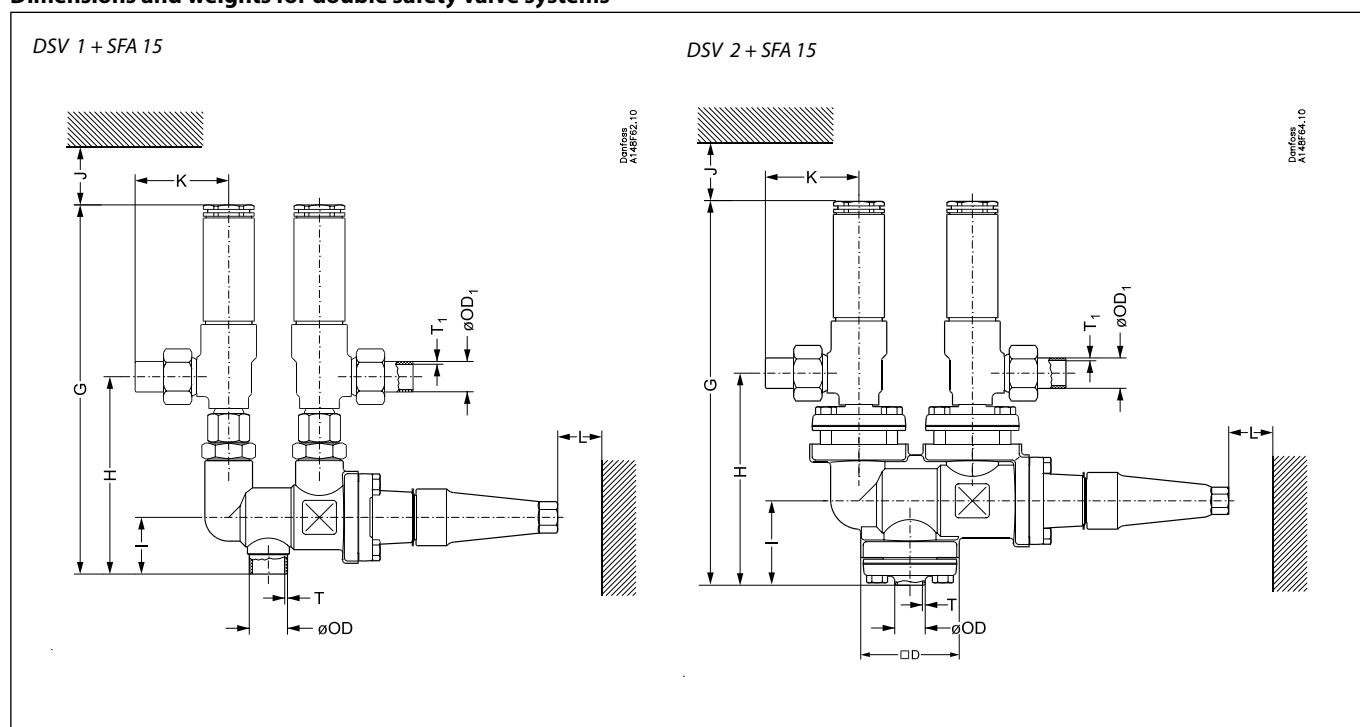


| No.     | Part                | Material              | DIN / EN            | ISO            | ASTM           |
|---------|---------------------|-----------------------|---------------------|----------------|----------------|
| 1       | Housing             | Steel                 | P285QH, EN10222-4   |                | LF2A350        |
| 2       | Bonnet              | Steel                 | P285QH, EN10222-4   |                | LF2A350        |
| 3       | Spindle             | Stainless steel       | X10CrNiS 18 9 17440 | Type 17 683/13 | AISI 303       |
| 4       | Seat                | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 5       | Cone, Middle        | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 6       | Cone, Back          | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 7       | Cone, Front         | Steel                 | 9 SMn28, 1651       | Type2, R683/9  | 1213, SAEJ 403 |
| 8       | Cone seal           | Teflon(PTFE)          |                     |                |                |
| 9       | Packing gland       | Steel                 | 9SMn28, 1651        | Type 2, R683/9 | 1213,SAE J403  |
| 13 – 17 | O-ring              | Cloroprene (Neoprene) |                     |                |                |
| 20      | Slotted nut         | Steel                 |                     |                |                |
| 21      | Screw               | Steel                 | A2-70               | A2-70          | Type 308       |
| 22      | Seal cap            | Aluminium             |                     |                |                |
| 23      | Gasket for seal cap | Nylon                 |                     |                |                |
| 24      | Idenfication ring   | Stainless steel       |                     |                |                |



## Change-over valves, type DSV 1 and DSV 2

### Dimensions and weights for double safety valve systems



| Valve size  | DN       | ØOD     | ØOD1         | T            | T1          |             | G            | H           | I          | J          | K            | L          | Weight              |
|-------------|----------|---------|--------------|--------------|-------------|-------------|--------------|-------------|------------|------------|--------------|------------|---------------------|
| SFA 15      |          |         |              |              |             |             |              |             |            |            |              |            |                     |
| DSV 1 (D25) | mm<br>in | 25<br>1 | 33.7<br>1.33 | 26.9<br>1.06 | 2.6<br>0.10 | 2.3<br>0.09 | 339<br>13.35 | 174<br>6.85 | 50<br>1.97 | 40<br>1.58 | 82.5<br>3.25 | 80<br>3.15 | 4.55 kg<br>10.03 lb |

| Valve size   |          | DN      | ØOD          | ØOD1         | T           | T1          | □D           |  | G            | H           | I            | J          | K            | L          | Weight            |
|--------------|----------|---------|--------------|--------------|-------------|-------------|--------------|--|--------------|-------------|--------------|------------|--------------|------------|-------------------|
|              |          | SFA 15  |              |              |             |             |              |  |              |             |              |            |              |            |                   |
| DSV 2 (FD20) | mm<br>in | 20<br>¾ | 26.9<br>1.06 | 26.9<br>1.06 | 2.3<br>0.09 | 2.3<br>0.09 | 82.5<br>3.25 |  | 351<br>13.82 | 186<br>7.32 | 73.5<br>2.89 | 10<br>0.39 | 82.5<br>3.25 | 80<br>3.15 | 9.3 kg<br>20.5 lb |

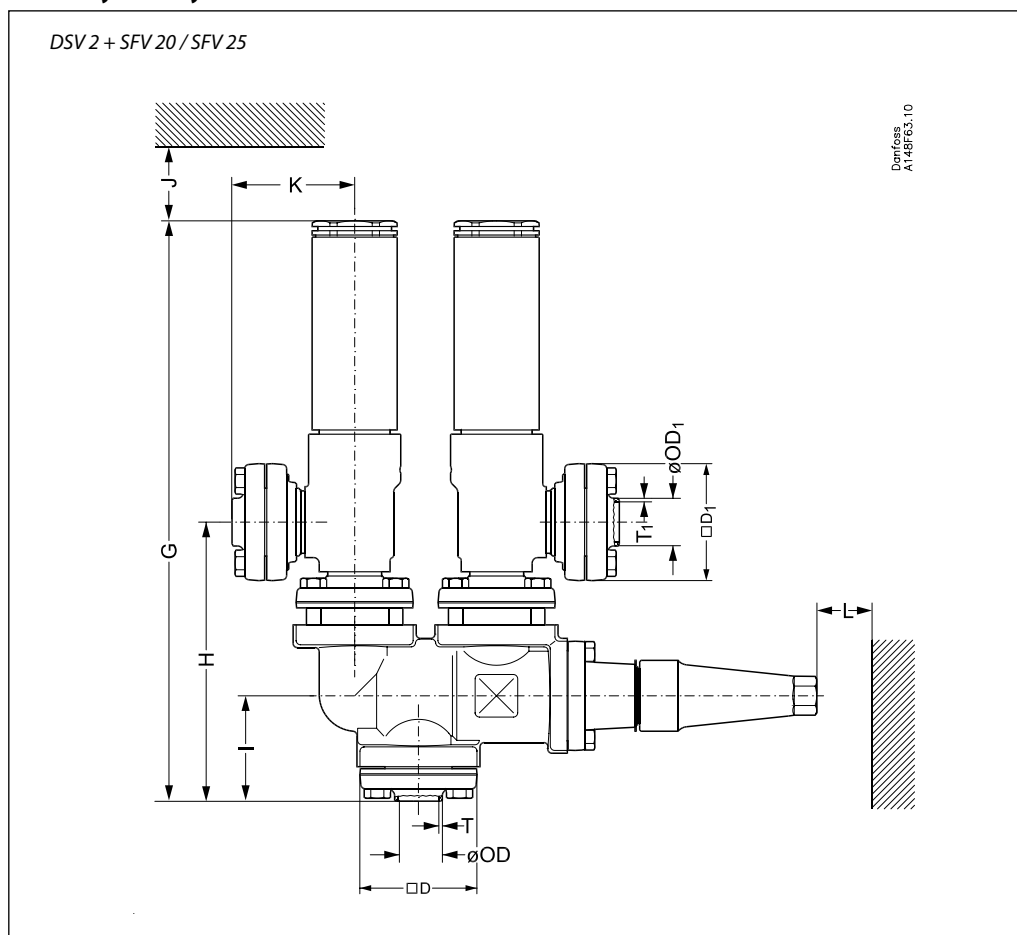
| Valve size |    | DN     | ØOD  | ØOD1 | T    | T1   | □D   |  | G     | H    | I    | J    | K    | L    | Weight  |
|------------|----|--------|------|------|------|------|------|--|-------|------|------|------|------|------|---------|
|            |    | SFA 15 |      |      |      |      |      |  |       |      |      |      |      |      |         |
| DSV 2      | mm | 25     | 33.7 | 26.9 | 2.6  | 2.3  | 82.5 |  | 351   | 186  | 73.5 | 10   | 82.5 | 80   | 9.3 kg  |
| (FD25)     | in | 1      | 1.33 | 1.06 | 0.10 | 0.09 | 3.25 |  | 13.82 | 7.32 | 2.89 | 0.39 | 3.25 | 3.15 | 20.5 lb |

| Valve size   |          | DN        |  | ØOD          | ØOD1         | T           | T1          | □D           |  | G            | H           | I            | J          | K            | L          | Weight            |
|--------------|----------|-----------|--|--------------|--------------|-------------|-------------|--------------|--|--------------|-------------|--------------|------------|--------------|------------|-------------------|
|              |          | SFA 15    |  |              |              |             |             |              |  |              |             |              |            |              |            |                   |
| DSV 2 (FD32) | mm<br>in | 32<br>1 ¼ |  | 42.4<br>1.67 | 26.9<br>1.06 | 2.6<br>0.10 | 2.3<br>0.09 | 82.5<br>3.25 |  | 351<br>13.82 | 186<br>7.32 | 73.5<br>2.89 | 10<br>0.39 | 82.5<br>3.25 | 80<br>3.15 | 9.3 kg<br>20.5 lb |

Specified weights (incl. all fittings and excl. SFA / SFV) are approximate values only.

## Change-over valves, type DSV 1 and DSV 2

### Dimensions and weights for double safety valve systems



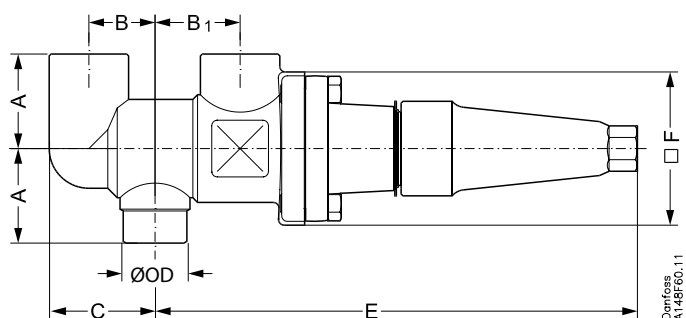
| Valve size |    | DN     | ØOD  | ØOD1 | T    | T1   | □D   | □D1  | G     | H    | I    | J    | K    | L    | Weight   |
|------------|----|--------|------|------|------|------|------|------|-------|------|------|------|------|------|----------|
|            |    | SFV 20 |      |      |      |      |      |      |       |      |      |      |      |      |          |
| DSV 2      | mm | 25     | 33.7 | 33.7 | 2.6  | 2.6  | 82.5 | 82.5 | 412   | 197  | 73.5 | 10   | 85   | 80   | 11.9 kg  |
| (FD25)     | in | 1      | 1.33 | 1.33 | 0.10 | 0.10 | 3.25 | 3.25 | 16.22 | 7.76 | 2.89 | 0.39 | 3.35 | 3.15 | 26.23 lb |
|            |    | SFV 20 |      |      |      |      |      |      |       |      |      |      |      |      |          |
| DSV 2      | mm | 32     | 42.4 | 33.7 | 2.6  | 2.6  | 82.5 | 82.5 | 412   | 197  | 73.5 | 10   | 85   | 80   | 11.9 kg  |
| (FD32)     | in | 1 1/4  | 1.67 | 1.33 | 0.10 | 0.10 | 3.25 | 3.25 | 16.22 | 7.76 | 2.89 | 0.39 | 3.35 | 3.15 | 26.23 lb |
|            |    | SFV 25 |      |      |      |      |      |      |       |      |      |      |      |      |          |
| DSV 2      | mm | 32     | 42.4 | 42.4 | 2.6  | 2.6  | 82.5 | 82.5 | 412   | 197  | 73.5 | 10   | 85   | 80   | 11.9 kg  |
| (FD32)     | in | 1 1/4  | 1.67 | 1.67 | 0.10 | 0.10 | 3.25 | 3.25 | 16.22 | 7.76 | 2.89 | 0.39 | 3.35 | 3.15 | 26.23 lb |

Specified weights (incl. all fittings and excl. SFA / SFV) are approximate values only.

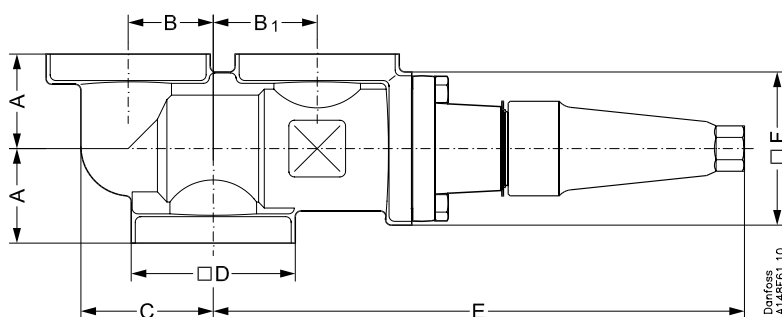
## Change-over valves, type DSV 1 and DSV 2

### Dimensions and weights

DSV 1



DSV 2



| Valve size |    | A  | B    | B <sub>1</sub> | C    | ØOD  | E     | □F   | Weight  |
|------------|----|----|------|----------------|------|------|-------|------|---------|
| DSV 1      | mm | 50 | 35   | 45             | 56   | 33.7 | 255   | 77   | 3.6 kg  |
|            | in | 2  | 1.38 | 1.77           | 2.20 | 1.33 | 10.04 | 3.03 | 7.94 lb |

| Valve size |    | A  | B    | B <sub>1</sub> | C    | □D   | E     | □F   | Weight   |
|------------|----|----|------|----------------|------|------|-------|------|----------|
| DSV 2      | mm | 50 | 45   | 55             | 70   | 82,5 | 281   | 77   | 6.1 kg   |
|            | in | 2  | 1.77 | 2.17           | 2.76 | 3.25 | 11.06 | 3.03 | 13.45 lb |

Specified weights are approximate values only.

## Change-over valves, type DSV 1 and DSV 2

### Ordering

#### How to order

The table below is used to identify the valve required.

Please note that the type codes only serve to identify the valves, some of which may not form part of the standard product range. For further information please contact your local Danfoss Sales Company.

#### Example

DSV 2 FD20 SFA15 = 148F3006

DSV2 = Valve type

FD20 = DSV inlet connection

SFA15 = Safety valve combination

#### Type codes

| Valve type           | DSV inlet connection | DSV outlet connection  | SFV outlet connection | Safety valve combination | Code No.        |
|----------------------|----------------------|------------------------|-----------------------|--------------------------|-----------------|
| DSV 1                | D25 (1 in)           | G 3/4" Union           | ND20 (3/4 in)         | SFA 15 / BSV 8           | <b>148F3005</b> |
| DSV 2                | FD20 (3/4 in)        | G 3/4" thread flange   | ND20 (3/4 in)         | SFA 15 / BSV 8           | <b>148F3006</b> |
| DSV 2                | FD25 (1 in)          | G 3/4" thread flange   | ND20 (3/4 in)         | SFA 15 / BSV 8           | <b>148F3007</b> |
| DSV 2                | FD32 (1 1/4 in)      | G 3/4" thread flange   | ND20 (3/4 in)         | SFA 15 / BSV 8           | <b>148F3008</b> |
| DSV 2                | FD25 (1 in)          | G 1 1/4" thread flange | FD25 (1 in)           | SFV20                    | <b>148F3009</b> |
| DSV 2                | FD32 (1 1/4 in)      | G 1 1/4" thread flange | FD25 (1 in)           | SFV20                    | <b>148F3010</b> |
| DSV 2                | FD32 (1 1/4 in)      | G 1 1/4" thread flange | FD32 (1 1/4 in)       | SFV25                    | <b>148F3011</b> |
| Connection fittings: | D                    | Weld branches DIN 2448 |                       |                          |                 |
|                      | ND                   | Weld nipples DIN 2448  |                       |                          |                 |
|                      | FD                   | Weld flanges DIN 2448  |                       |                          |                 |

Above code numbers include:

DSV valve, DSV inlet connection fitting, DSV outlet connection fitting, SFA / BSV / SFV outlet connection fittings and necessary seals.

Safety valves SFA / BSV / SFV must be ordered separately (see SFA / BSV / SFV technical documentation).

#### Fittings and gaskets

| Type                                                        | Code No.        |
|-------------------------------------------------------------|-----------------|
| Nipples + gaskets set for 25D / ND20 DSV1 / SFA 15 / BSV 8  | <b>148F3037</b> |
| Flanges + gaskets set for FD20 / ND20 DSV2 / SFA 15 / BSV 8 | <b>148F3038</b> |
| Flanges + gaskets set for FD25 / ND20 DSV2 / SFA 15 / BSV 8 | <b>148F3039</b> |
| Flanges + gaskets set for FD32 / ND20 DSV2 / SFA 15 / BSV 8 | <b>148F3040</b> |
| Flanges + gaskets set for FD25 / FD25 DSV2 / SFV 20         | <b>148F3041</b> |
| Flanges + gaskets set for FD32 / FD25 DSV2 / SFV 20         | <b>148F3042</b> |
| Flanges + gaskets set for FD32 / FD32 DSV2 / SFV 25         | <b>148F3043</b> |

# Safety relief valves

## Type BSV-8

### Contents

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| Technical data .....         | 39   |
| Design .....                 | 40   |
| Capacity .....               | 41   |
| Material specification ..... | 44   |
| Connections .....            | 45   |
| Dimension and weight .....   | 45   |
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# Safety relief valves

## Type BSV-8



BSV is a standard, back pressure **independent** safety relief valve, especially designed for protection of small components against excessive pressure and as a pilot valve for the pilot operated internal safety valve, type POV.

BSV is an angle-way safety relief valve which can operate with a very high back pressure. The valve is designed to meet the strict quality demands and safety requirements for refrigeration installations, specified by the international classification societies.

As the valve is not dependent on the back pressure, it is recommended for use as an internal safety relief valve. However, the valve can also be used as an external safety relief valve. The spring housing is tightly sealed to avoid refrigerant leakage.

The inlet flow diameter of the BSV 8 is 8.0 mm ( $\frac{5}{16}$  in).

The valves can be delivered with set pressures between 10 and 25 bar g (145 and 363 psi g).

Standard pressure setting valves having "TÜV Pressure Setting Certificate" with each valve are also available.

### Features

- Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>).
- Classification: DNV, CRN, BV, EAC etc.  
To get an updated list of certification on the products please contact your local Danfoss Sales Company.

### Technical data

- **Refrigerants**  
Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>).  
Flammable hydrocarbons are not recommended. For further information please contact your local Danfoss Sales Company
- **Pressure**  
Pressure setting range: 10 - 25 bar g / 145 - 363 psi g, For further information please contact your local Danfoss Sales Company  
The valves are designed for:  
Strength test: 43 bar g / 624 psi g  
Leakage safety: 25 bar g / 363 psi g  
Special circumstances such as vibrations (which should be avoided) and oscillating pressure may require an increased difference between the operational pressure and the closing pressure.
- **Pressure setting**

The operating pressure of the plant should be at least 15% below the set pressure. This allows a perfect re-seating of the safety relief valve after having been activated.

- **Temperature range for BSV used as an external safety relief valve:**  
-30 - 100 °C / -22 - 212 °F
- **Temperature range for BSV used as a pilot valve for POV:**  
-50 - 100 °C / -58 - 212 °F

#### Note:

For temperatures below -30 °C / -22 °F, the valve may not re-seat to a 100% gas tightness when activated.

## Safety relief valves, type BSV-8

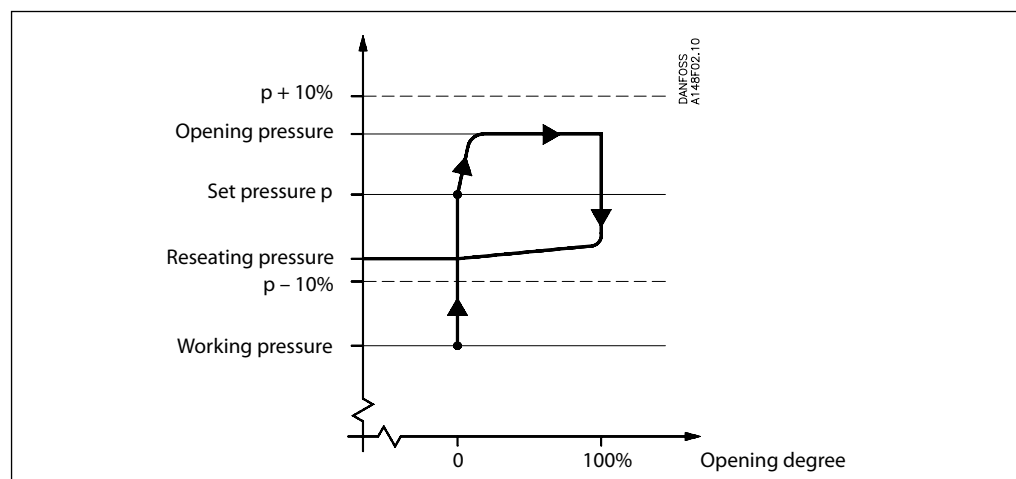


### Pressure Equipment Directive (PED)

The BSV-valves are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation Instruction

|                       | BSV 8           |
|-----------------------|-----------------|
| <b>Nominal bore</b>   | 8 mm (0.315 in) |
| <b>Classified for</b> | Fluid group I   |
| <b>Category</b>       | IV              |

## Design



BSV is designed as a standard safety relief valve (DIN 3320) which are recommended for refrigeration plants. On a rise in pressure above the set pressure, the safety relief valve will initially start opening slightly, to minimise the outlet of refrigerant. If the pressure continues to increase, the valve will open fully. The safety relief valve will be fully open before the pressure is 10%

higher than set pressure, and fully closed before the pressure is 10% below set pressure.

The valve is recommended as an internal safety relief valve because its function is independent of the back pressure. The valve can also be used as an external safety relief valve.

### Connections

Available with the following connections:

- Outside pipe thread T (ISO 228/1)

### Housing

Made of special steel approved for low temperature application. Spindle and seat are made of stainless steel, to ensure precise operation even during extraordinary conditions. The gasket of the valve cone is made of a special neoprene compound.

### Installation

To ensure exact operation of the safety relief valve it should be installed with the spring housing upwards. If the valve is mounted as an internal safety relief valve without any demand for exact opening pressure, the valve may be fitted with the spring housing in other positions. When the valve is mounted, it is important to avoid the influence of static, dynamic and thermal stress.

A very precise technique has been applied for the production of the seal. However, this seal can still be damaged, if dirt is blown from the pipe system into the valve.

### Re-calibration / servicing

In certain countries the authorities demand that the valves are checked at least once a year (see local rules).

### Control / Identification

After adjustment of the set pressure at Danfoss, the valves are sealed. For that reason Danfoss can only guarantee correct operation, as long as the seal remains unbroken.

All valves are provided with a metal plate with the following information:

- Flow diameter
- Set pressure
- Date of production
- Production number
- Type approved code.

### Transport / Handling

The valves are fitted with special protection covers and packed in purpose made transportation cartons. It is important that the cover remains fitted around the valve until it is installed.

*To ensure the exact and precise operation of the valve it must be handled with care.*



## Safety relief valves, type BSV-8

### Capacity

The design and construction of the safety relief valve has been tested and approved by TÜV. This test comprises control of the function of the valve as well as measuring of the capacity, which is the basis of the curves and tables on the following pages. The values in the table are based on saturated gas.

If e.g. back pressure or superheated gas have to be taken into consideration, the formulas or the Danfoss computation program (DIRcalc™) can be used.

Table 1.

| Valve | Nominal size    |                 | Flow diameter<br>$d_0$ | Flow area<br>$A_0$                          | De-rated, certified<br>coefficient of discharge<br>$K_{dr}$ |
|-------|-----------------|-----------------|------------------------|---------------------------------------------|-------------------------------------------------------------|
|       | Inlet           | Outlet          |                        |                                             |                                                             |
| BSV 8 | 15 mm<br>1/2 in | 20 mm<br>3/4 in | 8 mm<br>0.315 in       | 50 mm <sup>2</sup><br>0.078 in <sup>2</sup> | 0.46                                                        |

The discharge capacity of the safety relief valves are based on (ISO 4126-1/EN 1268-1 / prEN 1313 6 (1998)).

$$q_m = 0.2883 \times C \times A_0 \times K_{dr} \times K_b \times \sqrt{\frac{p}{v}}$$

$q_m$  Discharge capacity (kg/h)

$C$  Discharge function depending of the actual refrigerant ( $\kappa$ ) see table 2.

$A_0$  Flow area of the safety relief valve (mm<sup>2</sup>).

$K_{dr}$  De-rated coefficient of discharge ( $K_{dr} = K_d \times 0.9$ ), (the  $K_{dr}$  is certified by TÜV) see table 1.

$K_b$  Correction factor for sub-critical flow. (-)

$K_b = 1.0$  when the back pressure is lower than approx.  $0.5 \times$  relieving pressure ( $P_b < 0.5 \times p$ ).

$v$  Specific volume of the vapour. (m<sup>3</sup>/kg)

$p_{set}$  Set pressure, the predetermined pressure at which a pressure relief valve under operation starts to open ( $p_{set}$  is indicated on the metal plate on the safety relief valve). (bar g)

$p_{atm}$  Atmospheric pressure. (1 bar)

$p$  Relieving pressure,  $p = p_{set} \times 1.1 + P_{atm}$  (bar a)

For further details see the above mentioned ISO or EN standards.

### Important!

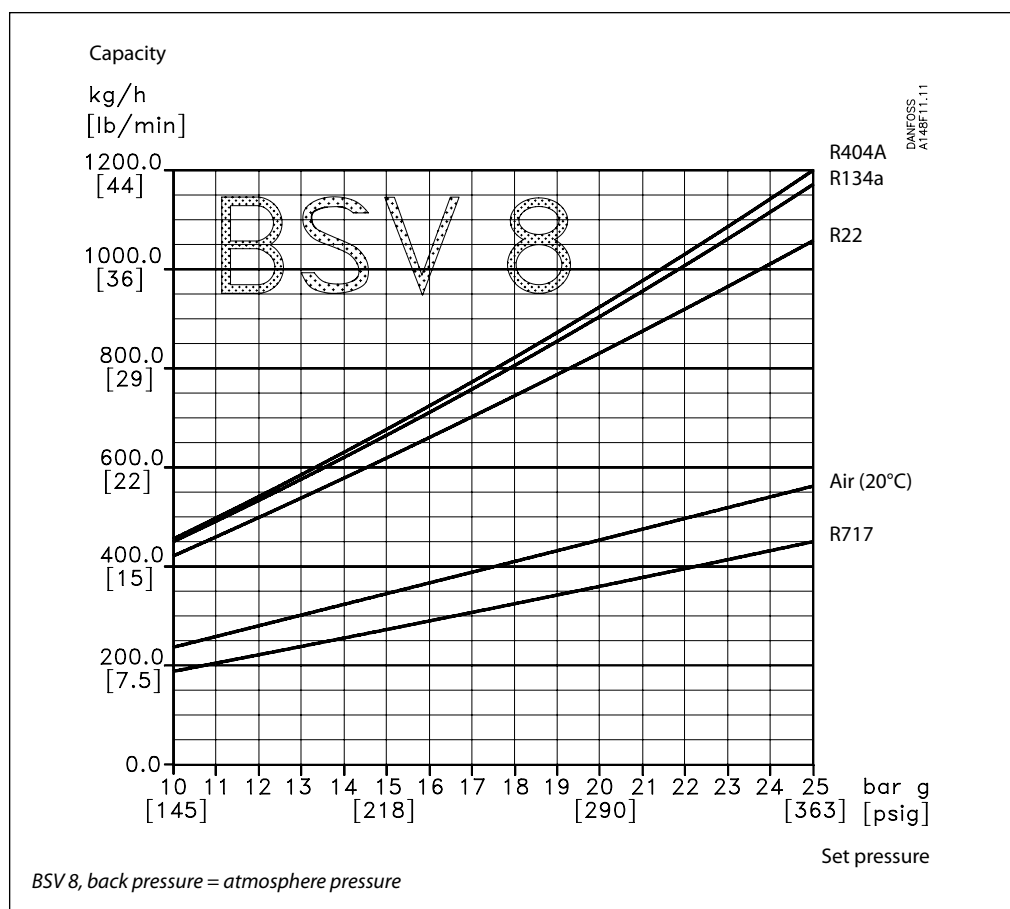
For back pressure higher than  $0.5 \times p$ , the Danfoss computer program (DIRcalc™) or the above mentioned standard must be used when calculating the capacity.

Table 2. Properties of Refrigerants

| Refrigerant             | Isentropic<br>exponent<br>[ $\kappa$ ] | Discharge<br>function<br>[C] |
|-------------------------|----------------------------------------|------------------------------|
| R22                     | 1.17                                   | 2.54                         |
| R134a                   | 1.12                                   | 2.50                         |
| R404A                   | 1.12                                   | 2.49                         |
| R410A                   | 1.17                                   | 2.54                         |
| R717 (Ammonia)          | 1.31                                   | 2.64                         |
| R744 (CO <sub>2</sub> ) | 1.30                                   | 2.63                         |
| Air                     | 1.40                                   | 2.70                         |

## Safety relief valves, type BSV-8

### Capacity



### Capacity

| Set pressure | R22 | R134a | R404A | R717 | Air (20 °C) |
|--------------|-----|-------|-------|------|-------------|
|--------------|-----|-------|-------|------|-------------|

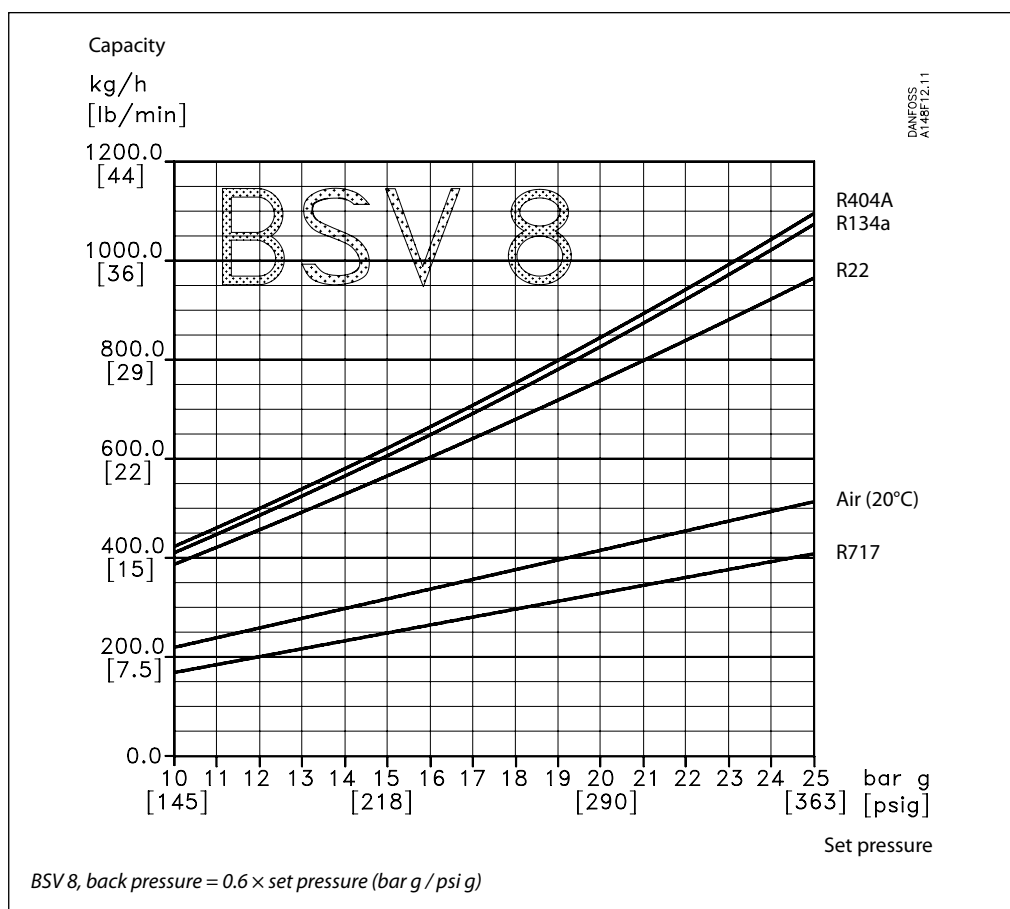
BSV 8, back pressure = atmosphere pressure

|                       |                |              |              |              |             |             |
|-----------------------|----------------|--------------|--------------|--------------|-------------|-------------|
| 13 bar g<br>189 psi g | kg/h<br>lb/min | 540<br>19.9  | 575<br>21.2  | 590<br>21.6  | 240<br>8.7  | 300<br>11.1 |
| 18 bar g<br>261 psi g | kg/h<br>lb/min | 745<br>27.5  | 810<br>29.7  | 825<br>30.3  | 325<br>11.9 | 410<br>15.0 |
| 21 bar g<br>305 psi g | kg/h<br>lb/min | 875<br>32.2  | 955<br>35.1  | 970<br>35.7  | 375<br>13.8 | 475<br>17.4 |
| 25 bar g<br>363 psi g | kg/h<br>lb/min | 1060<br>38.9 | 1175<br>43.2 | 1200<br>44.0 | 445<br>16.4 | 560<br>20.6 |

The capacity calculation is based on ISO 4126 - 1 / EN 1268 - 1 / prEN 13136 (1998)

## Safety relief valves, type BSV-8

### Capacity



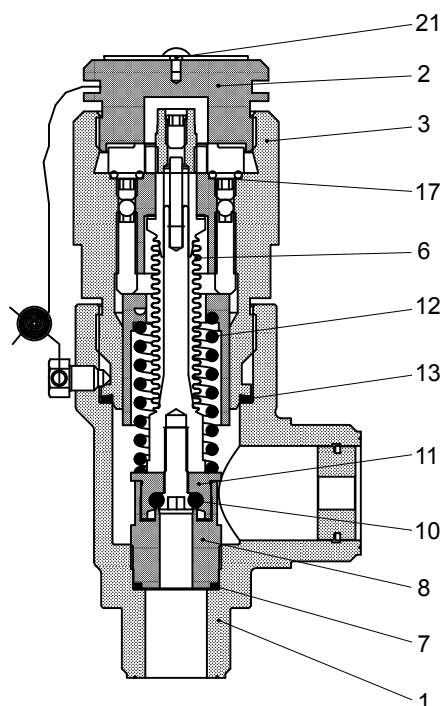
### Capacity

| Set pressure          |                | R22         | R134a        | R404A        | R717        | Air (20 °C) |
|-----------------------|----------------|-------------|--------------|--------------|-------------|-------------|
| 13 bar g<br>189 psi g | kg/h<br>lb/min | 495<br>18.2 | 525<br>19.4  | 535<br>19.7  | 215<br>8.0  | 275<br>10.1 |
| 18 bar g<br>261 psi g | kg/h<br>lb/min | 680<br>25.1 | 740<br>27.1  | 755<br>27.7  | 295<br>10.9 | 375<br>13.7 |
| 21 bar g<br>305 psi g | kg/h<br>lb/min | 800<br>29.4 | 875<br>32.1  | 885<br>32.6  | 345<br>12.6 | 435<br>15.9 |
| 25 bar g<br>363 psi g | kg/h<br>lb/min | 965<br>35.5 | 1075<br>39.4 | 1095<br>40.2 | 410<br>15.0 | 510<br>18.8 |

The capacity calculation is based on ISO 4126 - 1 / EN 1268 - 1 / prEN 13136 (1998)

## Safety relief valves, type BSV-8

### Material specification



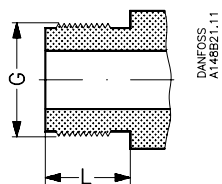
| No. | Part          | Material              | DIN                     | ISO                    | ASTM                                          |
|-----|---------------|-----------------------|-------------------------|------------------------|-----------------------------------------------|
| 1   | Housing       | Steel                 | TT St 35 N/V, 17173     | TW 6, 2604/3-75        | Grade 1, A333, A334<br>A350 LF2 <sup>1)</sup> |
| 2   | Threaded plug | Steel                 | 9S Mn28, 1651 - 88      | 11S Mn28<br>630/9 - 88 | 1213<br>SAE J 403                             |
| 3   | Valve top     | Steel                 | St. 37.2, 1652 - 2 - 90 | Fe 360 B, 660 - 80     | Grade C, A 283                                |
| 6   | Bellow        | Stainless steel       |                         |                        |                                               |
| 7   | Gasket        | Aluminium             |                         |                        |                                               |
| 8   | Valve seat    | Stainless steel       |                         |                        |                                               |
| 10  | O-ring        | Cloroprene (Neoprene) |                         |                        |                                               |
| 11  | Valve cone    | Steel                 |                         |                        |                                               |
| 12  | Spring        | Steel                 | Class C, 17223-1-84     |                        | A 679SAE J 403                                |
| 13  | O-ring        | Cloroprene (Neoprene) |                         |                        |                                               |
| 17  | Gasket        | Aluminium             |                         |                        |                                               |
| 21  | Marking label | Aluminium             |                         |                        |                                               |

<sup>1)</sup> Alternative material

## Safety relief valves, type BSV-8

### Connections

T



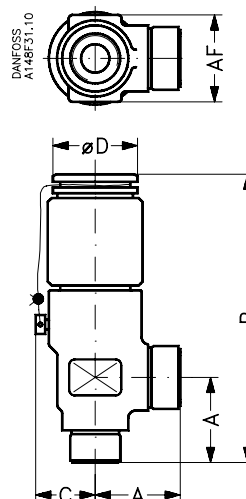
| Size<br>[mm] | Size<br>[in] | Inlet | Outlet |  | L<br>[mm] | L<br>[in] |  |  |
|--------------|--------------|-------|--------|--|-----------|-----------|--|--|
|--------------|--------------|-------|--------|--|-----------|-----------|--|--|

*T outside pipe thread, (ISO 228/1)*

|   |                |                 |     |  |    |      |  |  |
|---|----------------|-----------------|-----|--|----|------|--|--|
| 8 | $\frac{5}{16}$ | G $\frac{3}{4}$ | G 1 |  | 17 | 0.67 |  |  |
|---|----------------|-----------------|-----|--|----|------|--|--|

### Dimension and weight

BSV 8



| Valve size |  |  | A | B | C |  | ØD |  | AF |  | Weight |
|------------|--|--|---|---|---|--|----|--|----|--|--------|
|------------|--|--|---|---|---|--|----|--|----|--|--------|

*BSV 8, with threaded connections ISO 228/1 pipe threads*

| BSV 8 ( $\frac{5}{16}$ in) | mm |  | 45   | 150  | 32   |  | 50   |  | 46   |  | 1.5 kg |
|----------------------------|----|--|------|------|------|--|------|--|------|--|--------|
|                            | in |  | 1.77 | 5.91 | 1.26 |  | 1.97 |  | 1.81 |  | 3.3 lb |

Specified weights are approximate values only.

## Safety relief valves, type BSV-8

### Ordering

#### How to order

The table below is used to identify the valve required.

Please note that the type codes only serve to identify the valves, some of which may not form part of the standard product range. For further information please contact your local Danfoss Sales Company.

#### Example for type codes

|            |          |          |            |
|------------|----------|----------|------------|
| <b>BSV</b> | <b>8</b> | <b>T</b> | <b>211</b> |
|------------|----------|----------|------------|

#### Type codes

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Valve type         | <b>BSV</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Back pressure independent safety valve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Nominal size in mm | <b>8</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | DN 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Connections        | <b>T</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Outside threaded connections: ISO 228/1 Pipe thread<br>- Fittings for connections must be ordered separately<br>- Fittings for pilot operation<br>- The welding fittings for single mounted safety relief valve must be ordered separately                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Pressure setting   | <b>210</b><br><b>211</b><br><b>212</b><br><b>213</b><br><b>214</b><br><b>215</b><br><b>216</b><br><b>217</b><br><b>218</b><br><b>219</b><br><b>220</b><br><b>221</b><br><b>222</b><br><b>223</b><br><b>224</b><br><b>225</b><br><br><b>310</b><br><b>311</b><br><b>312</b><br><b>313</b><br><b>314</b><br><b>315</b><br><b>316</b><br><b>317</b><br><b>318</b><br><b>319</b><br><b>320</b><br><b>321</b><br><b>322</b><br><b>323</b><br><b>324</b><br><b>325</b> | <i>Standard pressure setting: 2xx</i><br>10 bar g (145 psi g)<br>11 bar g (160 psi g)<br>12 bar g (174 psi g)<br>13 bar g (189 psi g)<br>14 bar g (203 psi g)<br>15 bar g (218 psi g)<br>16 bar g (232 psi g)<br>17 bar g (247 psi g)<br>18 bar g (261 psi g)<br>19 bar g (276 psi g)<br>20 bar g (290 psi g)<br>21 bar g (305 psi g)<br>22 bar g (319 psi g)<br>23 bar g (334 psi g)<br>24 bar g (348 psi g)<br>25 bar g (363 psi g)<br><br><i>Standard pressure setting with TÜV certificate: 3xx</i><br>10 bar g (145 psi g)<br>11 bar g (160 psi g)<br>12 bar g (174 psi g)<br>13 bar g (188 psi g)<br>14 bar g (203 psi g)<br>15 bar g (218 psi g)<br>16 bar g (232 psi g)<br>17 bar g (247 psi g)<br>18 bar g (261 psi g)<br>19 bar g (276 psi g)<br>20 bar g (290 psi g)<br>21 bar g (304 psi g)<br>22 bar g (319 psi g)<br>23 bar g (334 psi g)<br>24 bar g (348 psi g)<br>25 bar g (362 psi g) |



#### Important!

Where products need to be certified according to specific certification societies, the relevant information should be included at the time of order.

## Safety relief valves, type BSV-8

### Certified BSV valves with standard set pressure

| Size |                | Construction and test facilities are approved by TÜV |         |         |          |
|------|----------------|------------------------------------------------------|---------|---------|----------|
| [mm] | [in]           | Type                                                 | [bar g] | [psi g] | Part No. |
| 8    | $\frac{5}{16}$ | BSV8 T 210                                           | 10      | 145     | 2416+200 |
| 8    | $\frac{5}{16}$ | BSV8 T 211                                           | 11      | 160     | 2416+309 |
| 8    | $\frac{5}{16}$ | BSV8 T 212                                           | 12      | 174     | 2416+310 |
| 8    | $\frac{5}{16}$ | BSV8 T 213                                           | 13      | 189     | 2416+201 |
| 8    | $\frac{5}{16}$ | BSV8 T 214                                           | 14      | 203     | 2416+311 |
| 8    | $\frac{5}{16}$ | BSV8 T 215                                           | 15      | 218     | 2416+312 |
| 8    | $\frac{5}{16}$ | BSV8 T 216                                           | 16      | 232     | 2416+221 |
| 8    | $\frac{5}{16}$ | BSV8 T 217                                           | 17      | 247     | 2416+313 |
| 8    | $\frac{5}{16}$ | BSV8 T 218                                           | 18      | 261     | 2416+202 |
| 8    | $\frac{5}{16}$ | BSV8 T 219                                           | 19      | 276     | 2416+225 |
| 8    | $\frac{5}{16}$ | BSV8 T 220                                           | 20      | 290     | 2416+203 |
| 8    | $\frac{5}{16}$ | BSV8 T 221                                           | 21      | 305     | 2416+204 |
| 8    | $\frac{5}{16}$ | BSV8 T 222                                           | 22      | 319     | 2416+224 |
| 8    | $\frac{5}{16}$ | BSV8 T 223                                           | 23      | 334     | 2416+314 |
| 8    | $\frac{5}{16}$ | BSV8 T 224                                           | 24      | 348     | 2416+315 |
| 8    | $\frac{5}{16}$ | BSV8 T 225                                           | 25      | 363     | 2416+205 |

### Certified BSV valves with standard set pressure and TÜV pressure setting certificate with each valve

| Size |                | Each valve is certified by a representative from TÜV |         |         |          |
|------|----------------|------------------------------------------------------|---------|---------|----------|
| [mm] | [in]           | Type                                                 | [bar g] | [psi g] | Part No. |
| 8    | $\frac{5}{16}$ | BSV8 T 310                                           | 10      | 145     | 2416+316 |
| 8    | $\frac{5}{16}$ | BSV8 T 311                                           | 11      | 160     | 2416+317 |
| 8    | $\frac{5}{16}$ | BSV8 T 312                                           | 12      | 174     | 2416+318 |
| 8    | $\frac{5}{16}$ | BSV8 T 313                                           | 13      | 189     | 2416+206 |
| 8    | $\frac{5}{16}$ | BSV8 T 314                                           | 14      | 203     | 2416+319 |
| 8    | $\frac{5}{16}$ | BSV8 T 315                                           | 15      | 218     | 2416+320 |
| 8    | $\frac{5}{16}$ | BSV8 T 316                                           | 16      | 232     | 2416+222 |
| 8    | $\frac{5}{16}$ | BSV8 T 317                                           | 17      | 247     | 2416+321 |
| 8    | $\frac{5}{16}$ | BSV8 T 318                                           | 18      | 261     | 2416+207 |
| 8    | $\frac{5}{16}$ | BSV8 T 319                                           | 19      | 276     | 2416+322 |
| 8    | $\frac{5}{16}$ | BSV8 T 320                                           | 20      | 290     | 2416+208 |
| 8    | $\frac{5}{16}$ | BSV8 T 321                                           | 21      | 305     | 2416+209 |
| 8    | $\frac{5}{16}$ | BSV8 T 322                                           | 22      | 319     | 2416+210 |
| 8    | $\frac{5}{16}$ | BSV8 T 323                                           | 23      | 334     | 2416+323 |
| 8    | $\frac{5}{16}$ | BSV8 T 324                                           | 24      | 348     | 2416+324 |
| 8    | $\frac{5}{16}$ | BSV8 T 325                                           | 25      | 363     | 2416+211 |

### Nipples and gaskets

Attention: Fittings for connections must be ordered separately

| Type                                                         | Code number |
|--------------------------------------------------------------|-------------|
| For stand-alone SFV 15/ SFA 15/ BSV-8: Nipples + gaskets set | 148F3019    |
| For system POV + BSV: Nipples + gaskets set                  | 148H3453    |





# Pressure relief valve

## Type POV

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# Pressure relief valve

## Type POV



The POV pressure relief valve is used in conjunction with the BSV safety relief valve and is specifically designed for protecting compressors against excessive pressure.

### Features

- Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>).
- The Pilot Operated Internal pressure relief Valve System POV + BSV is available in sizes from DN 40 to DN 80.
- POV + BSV is an internal pressure relief system thus eliminating the risk of refrigerant leakage to the atmosphere.
- The system renders full protection of the compressor even on increasing back pressure.
- The POV pressure relief valve (main valve) has a very large capacity even with high back pressure when compared to direct operating back pressure independent pressure relief valves.
- Small dimensions mean easy handling and installation.
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

## Pressure relief valve, type POV

### Design

#### Connections

Available with the following connections:

- Welding DIN (2448)
- Welding ANSI (B 36.10):  
DN 40, Schedule 80,  
DN 65 - 80, Schedule 40

#### Control/Identification

All pilot valves (BSV 8 Safety Relief Valves) are adjusted, tested and sealed before leaving Danfoss A/S. For that reason Danfoss can only guarantee correct operation, as long as the seal remains unbroken.

#### Transport/Handling

POV and BSV are supplied separately from Danfoss. BSV safety valves are fitted with special protection covers and packed in purpose made cartons. POV valves are provided with protection covers. It is important that the protective covers remain fitted until the valve is installed.

To ensure the exact and precise operation of the valve it must be handled with care.

#### Installation

To ensure exact operation of the valve it should be installed with the spring housing upwards (refer to "Installation of compressor pressure relief valve POV + BSV" on the following pages).

When the valve is mounted, it is important to avoid the influence of static, dynamic and thermal stress.

#### Re-calibration/servicing

In certain countries the authorities demand that the valves are readjusted at least once a year (see local rules).

#### Capacity

The design and construction of the pressure relief valve has been tested and approved by TÜV. This test comprises control of the function of the valve as well as measuring of the capacity, which is the basis of the curves and tables on the following pages.

#### Pressure Equipment Directive (PED)

POV valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

For further details / restrictions - see Installation Instruction.



| POV valves     |                    |                           |
|----------------|--------------------|---------------------------|
| Nominal bore   | DN40 mm (1 1/2 in) | DN65-80 mm (2 1/2 - 3 in) |
| Classified for | Fluid group I      |                           |
| Category       | I                  | II                        |

### Technical data

- **Refrigerants**  
Applicable for the refrigerants HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>)  
Flammable hydrocarbons are not recommended. For further information please contact your local Danfoss Sales Company.
- **Pressure**  
The valve is designed for:  
*Pressure setting range:*  
15 - 25 bar g / 218 - 363 psi g  
*Strength test:*  
50 bar g / 725 psig  
*Leakage test:*  
25 bar g / 363 psig  
*PB / MWP:*  
40 bar (580 psig)
- **Temperature range**  
-50 - 150 °C / -58 - 302 °F

# Pressure relief valve, type POV

## Function

### Pilot valve BSV 8

The pilot valve is actuated by the high pressure  $P_1$  and the back pressure  $P_2$ . The reference pressure in the stainless steel bellows (1)  $P_0$  is the atmospheric pressure. The effective area of the bellows is equivalent to the area of the valve seating, so the back pressure  $P_2$  does not affect the opening pressure of the valve.

### Main valve POV

The main valve is of the normally closed (N.C.) type. The high pressure  $P_1$  acts on the valve inlet side of the valve cone (2).  $P_1$  pressure also passes through the piston rod (3) to the upper chamber (4) of the valve, acting on the top of the piston (5). The area of the piston is larger than the area of the valve seat and this together with the spring pressure keeps the valve closed.

### System BSV 8 + POV

When the pressure  $P_1$  reaches the set pressure of the pilot valve, it starts opening. The pressure of the pilot line  $P_2$  and of the lower chamber (6) of the main valve increases. The pressure of the lower chamber is limited by flow through the nozzle (7). When the flow through the pilot valve exceeds the capacity of the nozzle, the pressure of the chamber (6) increases, providing the opening of the main valve. When the pressure  $P_1$  is reduced, the pilot valve closes, and the pressure  $P_2$  is equalized through the nozzle (7). The spring then closes the main valve. The closing time is  $\leq 30$  seconds.

fig. 1, Inactive system (closed valve)

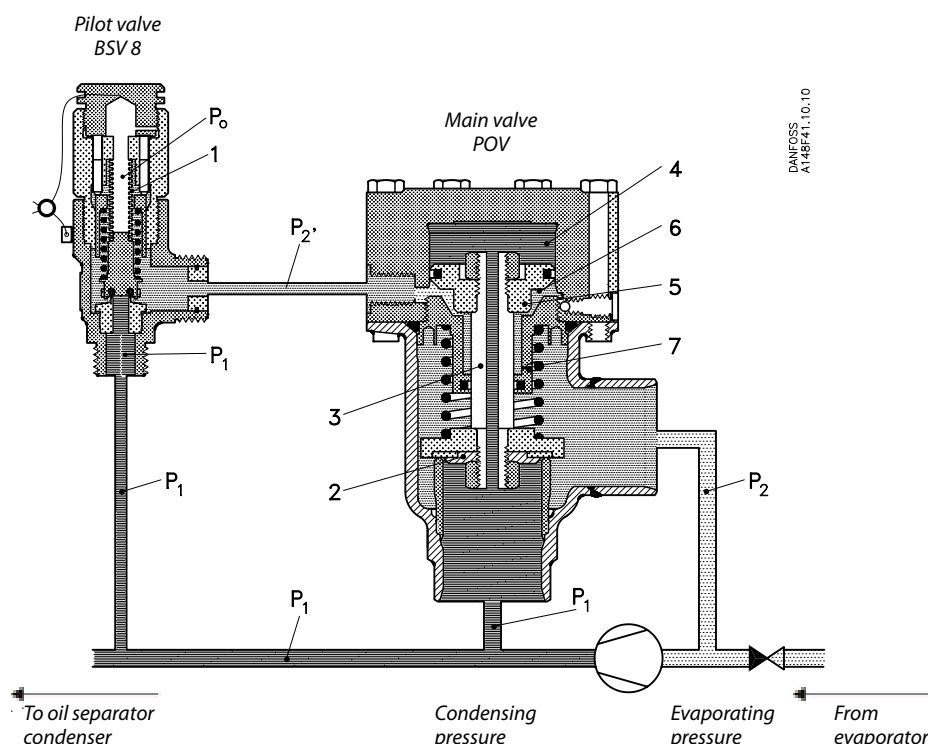
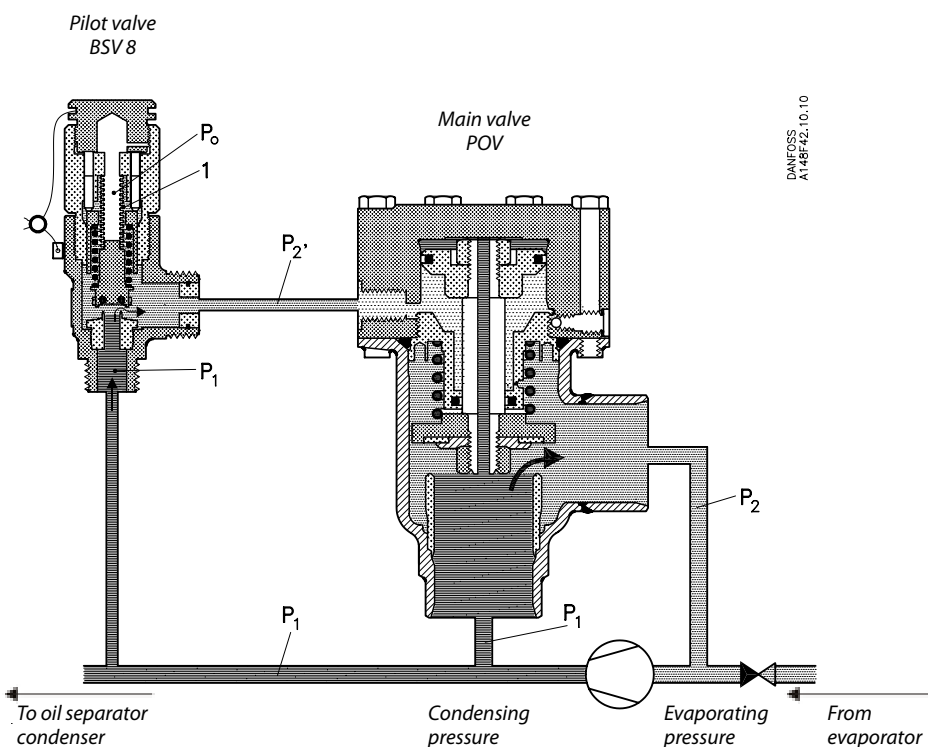


fig. 2, Active system (open valve)



# Pressure relief valve, type POV

## Installation of compressor pressure relief valve POV + BSV

### Set pressure

The BSV 8 set pressure is factory set in the range 15 – 25 bar g (145 – 363 psi g), where 15 bar g is the minimum value for this application (fig 4).

Standard set pressures: 18.0, 21.0, or 25.0 bar g (261, 305 or 363 psi g).

The operational pressure of the plant should be at least 15% below the set pressure of the pilot valve, and the opening pressure of the pilot valve ( $p_{set} + 10\%$ ) must be below the reseating pressure of the safety valve protecting the plant. This implies a perfect operation of the plant.

### Back pressure

$P_{2-0}$  is the effective back pressure of the POV main valve  $P_{2-0} = P_{2-1} + \Delta P_{outlet}$  where  $\Delta P_{outlet}$  is the pressure loss in the outlet line of POV (2).

$P_{2-1}$  is normally equal to the evaporating pressure.  $P_{2-0}$  must not exceed the limits in fig 4.

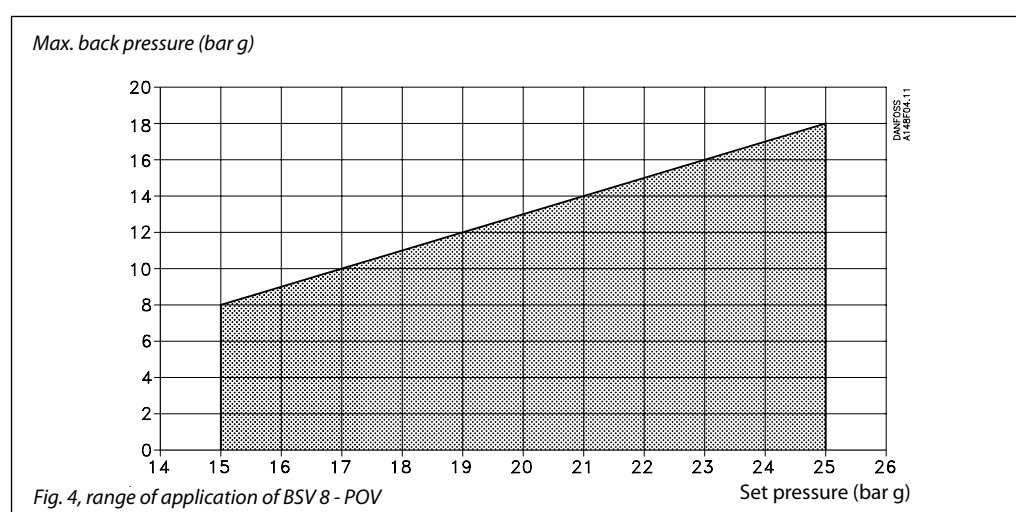
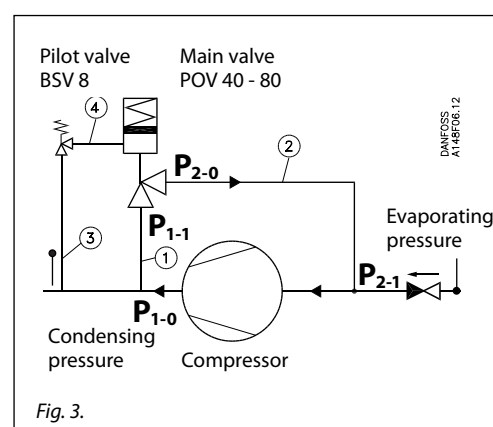
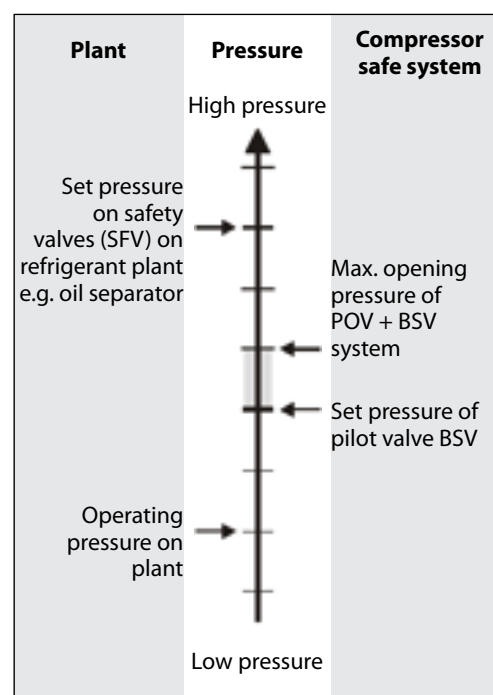
### Pressure loss in inlet line

The pressure loss in the inlet line of the POV (1) will not affect the function of the POV + BSV system, but a high pressure drop will reduce the capacity.

If the pressure drop in the inlet line  $\Delta P_{inlet}$  exceed 3% of the opening pressure, the capacity reduction must be taken into consideration by calculation.

### Pressure drop in the pilot inlet line

In order to ensure a proper function of the POV + BSV system, the pilot valve must be activated by the plant pressure. It is important that the inlet line of the pilot valve is mounted in a way which ensures that the pilot pressure is identical with the plant pressure. If the pilot pressure is mounted in the inlet line of the POV valve, it must be verified that the pressure drop in the pilot inlet line (3)  $\Delta P_{inlet}$  does not exceed 3% of the opening pressure.



## Pressure relief valve, type POV

### Installation of compressor pressure relief valve POV + BSV (continued)

**Important:** When locating the inlet line to the pilot valve, it is important that the connection is mounted in the gas phase and not in an oil phase, if any.

#### Pressure drop in the pilot outlet line

The pressure loss in the BSV outlet line (4)  $\Delta P_{P-outlet}$  is not critical.

Minimum internal diameter of the pilot outlet line 8 mm (0.314 in.)

Maximum length of pilot outlet line 1 m (3.25 ft)

**Note:** The Above mentioned guide lines are securing a safe function of the POV + BSV system, but there might be restrictions from national authorities.



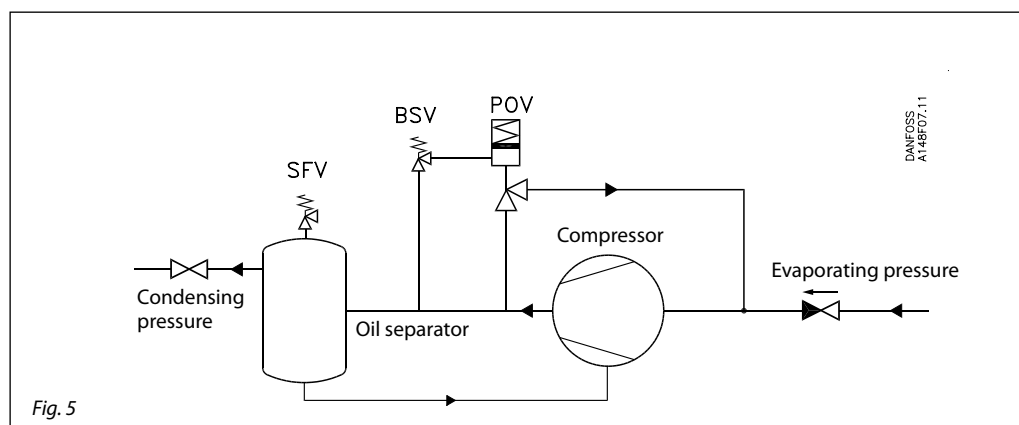
#### Note!

**Valve type POV is categorized as a pressure relief accessory (not as a safety accessory). Hence a safety valve (e.g. SFV) has to be installed to protect the system against excessive pressure.**

Fig. 5 shows a typical application of the POV + BSV system. In the example a non return valve has been mounted in the suction line, as well as a shut-off valve in the pressure line. It is good practise and a demand from the authorities of most countries to mount a safety valve on the oil separator.

If the shut-off valve in the pressure line is closed, and all regulation equipment fails, the pressure after the compressor will rise, and the BSV + POV system is activated. Provided that the required motor effect is present, there will be a

rise in temperature caused by the compression work, followed by a rise in pressure. Therefore, the safety relief valve of the oil separator must, besides being dimensioned for "normal" heat input, also be dimensioned for heat input, corresponding to the effect of the motor.



## Pressure relief valve, type POV

### Capacity

The values in the table are based on saturated gas and with 50K superheat.

If other operating conditions have to be taken into consideration, the formulas or the Danfoss computation program (Coolselector®2) can be used.

Table 1

| Version  | Nominal size |        | Flow diameter<br>$d_0$ | Flow area<br>$A_0$   | De-rated, certified<br>coefficient of discharge<br>$K_{dr}$ |
|----------|--------------|--------|------------------------|----------------------|-------------------------------------------------------------|
|          | Inlet        | Outlet |                        |                      |                                                             |
| POV 600  | 40 mm        | 40 mm  | 32.6 mm                | 835 mm <sup>2</sup>  | 0.735                                                       |
|          | 1½ in.       | 1½ in. | 1.28 in.               | 1.28 in <sup>2</sup> |                                                             |
| POV 1050 | 65 mm        | 65 mm  | 39.8 mm                | 1244 mm <sup>2</sup> | 0.859                                                       |
|          | 2½ in.       | 2½ in. | 1.56 in.               | 1.93 in <sup>2</sup> |                                                             |
| POV 2150 | 80 mm        | 80 mm  | 59 mm                  | 2734 mm <sup>2</sup> | 0.799                                                       |
|          | 3 in.        | 3 in.  | 2.32 in.               | 4.24 in <sup>2</sup> |                                                             |

The discharge capacity of the pressure relief valves are based on (ISO 4126-1/EN 1268-1 / prEN 1313 6 (1998)).

$$q_m = 0.2883 \times C \times A_0 \times K_{dr} \times K_b \times \sqrt{\frac{p}{v}}$$

$q_m$  Discharge capacity (kg/h)

$C$  Discharge function depending of the actual refrigerant ( $\kappa$ ) see table 2 (-)

$A_0$  Flow area of the pressure relief valve (mm<sup>2</sup>).

$K_{dr}$  De-rated coefficient of discharge ( $K_{dr} = K_d \times 0.9$ ), (the  $K_{dr}$  is certified by TÜV) see table 1. (-)

$K_b$  Correction factor for sub-critical flow. (-)

$K_b = 1.0$  when the back pressure is lower than approx.  $0.5 \times$  relieving pressure ( $P_b < 0.5 \times p$ ).

For all BSV safety valves  $K_b = 1.0$

$v$  Specific volume of the vapour. (m<sup>3</sup>/kg)

$p_{set}$  Set pressure, the predetermined pressure at which a pressure relief valve under operation starts to open ( $p_{set}$  is indicated on the metal plate on the safety relief valve). (bar gauge)

$p_{atm}$  Atmospheric pressure. (1 bar)

$p$  Relieving pressure,  $p = p_{set} \times 1.1 + P_{atm}$  (bar absolute)

For further details see the above mentioned ISO or EN standards.

### Important!

For back pressure higher than  $0.5 \times p$ , the Danfoss computer program (DIRcalc™) or the above mentioned standard must be used when calculating the capacity.

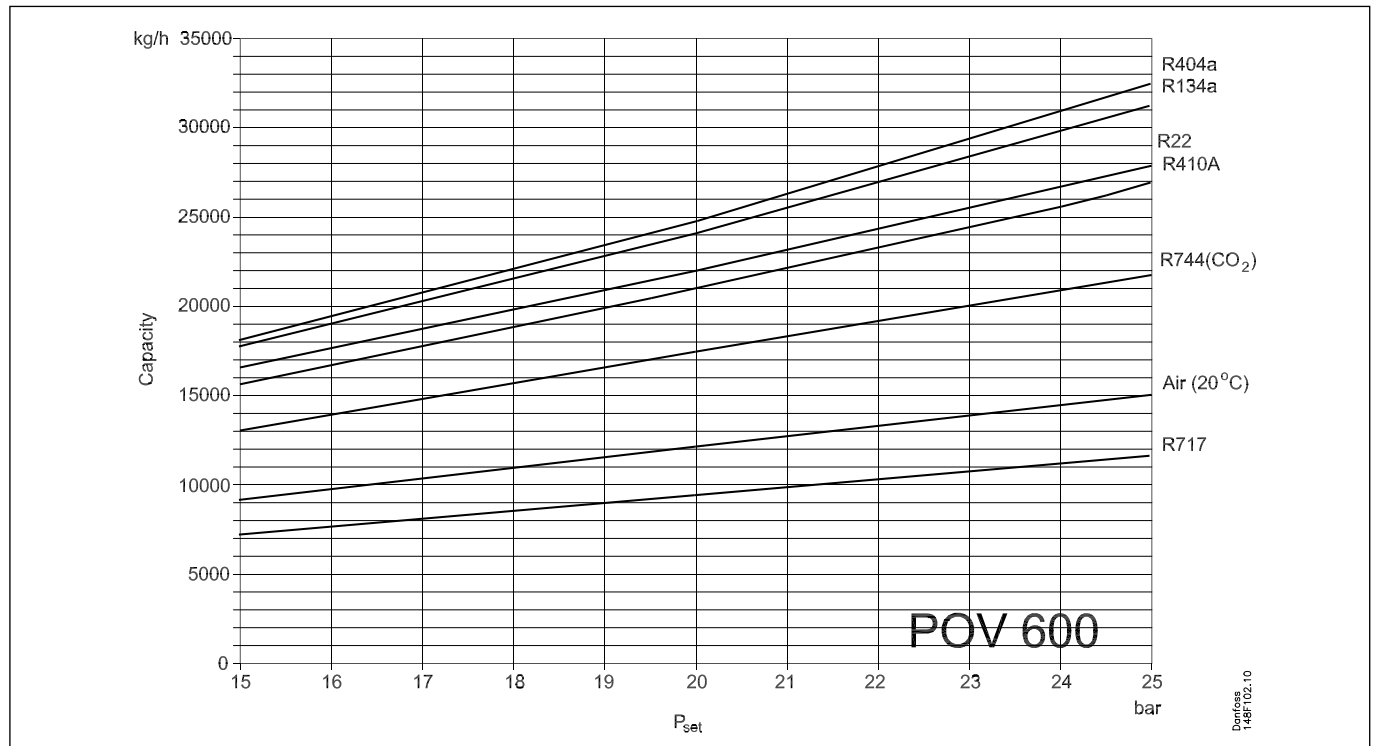
Table 2. Properties of Refrigerants

| Refrigerant<br>number    | Isentropic<br>exponent<br>$\kappa$ | Discharge<br>function<br>$C$ |
|--------------------------|------------------------------------|------------------------------|
| R 22                     | 1.17                               | 2.54                         |
| R 134a                   | 1.12                               | 2.50                         |
| R 404A                   | 1.12                               | 2.49                         |
| R 410A                   | 1.17                               | 2.54                         |
| R 717 (Ammonia)          | 1.31                               | 2.64                         |
| R 744 (CO <sub>2</sub> ) | 1.30                               | 2.63                         |
| Air                      | 1.40                               | 2.70                         |



**Pressure relief valve, type POV**

**Capacity - POV 600**



Calculation based on the formula  $q_m = 0.2883 \times C \times A_o \times K_{dr} \times K_b \times \sqrt{\frac{P}{v}}$

$P_{set}$  Set pressure in bar g  
 $P$  Relieving pressure in bar a  
 $C$  Discharge function  
 $v$  Specific volume of the vapour at the relieving pressure  $P$  in m<sup>3</sup>/kg  
 $q_m$  Discharge capacity in kg/h  
 $K_b$  Correction factor for sub-critical flow  
 $d_o$  Flow diameter seat mm<sup>2</sup>  
 $A_o$  Flow area seat in mm<sup>2</sup>  
 $K_{dr}$  De-rated coefficient of discharge at defined lifting height

| $P_{set}$ |         | $P$     |         | R22     |        |          | R134a   |        |          | R404a   |        |          | R717    |        |          |
|-----------|---------|---------|---------|---------|--------|----------|---------|--------|----------|---------|--------|----------|---------|--------|----------|
| [bar g]   | [psi g] | [bar a] | [psi a] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] |
| 10        | 145     | 12.0    | 174     | 0.01974 | 11077  | 407      | 0.01655 | 11907  | 437      | 0.01629 | 11953  | 439      | 0.10753 | 4933   | 181      |
| 11        | 160     | 13.1    | 190     | 0.01797 | 12130  | 446      | 0.01502 | 13059  | 480      | 0.01470 | 13147  | 483      | 0.09867 | 5380   | 198      |
| 12        | 174     | 14.2    | 206     | 0.01638 | 13228  | 486      | 0.01383 | 14169  | 521      | 0.01346 | 14305  | 526      | 0.09130 | 5823   | 214      |
| 13        | 189     | 15.3    | 222     | 0.01514 | 14281  | 525      | 0.01273 | 15330  | 563      | 0.01233 | 15514  | 570      | 0.08461 | 6279   | 231      |
| 14        | 203     | 16.4    | 238     | 0.01400 | 15376  | 565      | 0.01172 | 16475  | 605      | 0.01128 | 16793  | 617      | 0.07900 | 6728   | 247      |
| 15        | 218     | 17.5    | 254     | 0.01311 | 16414  | 603      | 0.01094 | 17685  | 650      | 0.01048 | 17997  | 661      | 0.07383 | 7189   | 264      |
| 16        | 232     | 18.6    | 270     | 0.01229 | 17477  | 642      | 0.01007 | 19004  | 698      | 0.00973 | 19256  | 708      | 0.06998 | 7613   | 280      |
| 17        | 247     | 19.7    | 286     | 0.01152 | 18578  | 683      | 0.00940 | 20243  | 744      | 0.00902 | 20582  | 756      | 0.06636 | 8045   | 296      |
| 18        | 261     | 20.8    | 302     | 0.01080 | 19716  | 724      | 0.00888 | 21400  | 786      | 0.00842 | 21889  | 804      | 0.06213 | 8544   | 314      |
| 19        | 276     | 21.9    | 318     | 0.01012 | 20899  | 768      | 0.00828 | 22741  | 836      | 0.00786 | 23247  | 854      | 0.05898 | 8998   | 331      |
| 20        | 290     | 23.0    | 334     | 0.00961 | 21978  | 808      | 0.00775 | 24089  | 885      | 0.00738 | 24586  | 903      | 0.05620 | 9446   | 347      |
| 21        | 305     | 24.1    | 350     | 0.00908 | 23145  | 850      | 0.00727 | 25459  | 935      | 0.00688 | 26066  | 958      | 0.05350 | 9910   | 364      |
| 22        | 319     | 25.2    | 365     | 0.00861 | 24305  | 893      | 0.00685 | 26820  | 985      | 0.00645 | 27528  | 1011     | 0.05121 | 10358  | 381      |
| 23        | 334     | 26.3    | 381     | 0.00810 | 25599  | 941      | 0.00645 | 28235  | 1037     | 0.00606 | 29013  | 1066     | 0.04900 | 10818  | 397      |
| 24        | 348     | 27.4    | 397     | 0.00768 | 26834  | 986      | 0.00606 | 29733  | 1092     | 0.00565 | 30670  | 1127     | 0.04687 | 11290  | 415      |
| 25        | 363     | 28.5    | 413     | 0.00738 | 27918  | 1026     | 0.00574 | 31158  | 1145     | 0.00530 | 32295  | 1187     | 0.04514 | 11733  | 431      |
| 26        | 377     | 29.6    | 429     | 0.00699 | 29235  | 1074     | 0.00541 | 32707  | 1202     | 0.00496 | 34022  | 1250     | 0.04348 | 12183  | 448      |
| 27        | 392     | 30.7    | 445     | 0.00670 | 30410  | 1117     | 0.00506 | 34442  | 1266     | 0.00463 | 35862  | 1318     | 0.04150 | 12700  | 467      |
| 28        | 406     | 31.8    | 461     | 0.00634 | 31817  | 1169     | 0.00479 | 36028  | 1324     | 0.00429 | 37918  | 1393     | 0.04010 | 13149  | 483      |
| 29        | 421     | 32.9    | 477     | 0.00607 | 33075  | 1215     | 0.00453 | 37683  | 1385     | 0.00401 | 39892  | 1466     | 0.03870 | 13615  | 500      |
| 30        | 435     | 34.0    | 493     | 0.00579 | 34426  | 1265     | 0.00422 | 39690  | 1458     | 0.00371 | 42161  | 1549     | 0.03730 | 14098  | 518      |
| 31        | 450     | 35.1    | 509     | 0.00552 | 35824  | 1316     | 0.00392 | 41842  | 1537     | 0.00339 | 44814  | 1647     | 0.03612 | 14556  | 535      |
| 32        | 464     | 36.2    | 525     | 0.00523 | 37376  | 1373     | 0.00365 | 44036  | 1618     | 0.00300 | 48378  | 1778     | 0.03482 | 15056  | 553      |
| 33        | 479     | 37.3    | 541     | 0.00499 | 38841  | 1427     | 0.00337 | 46520  | 1709     | 0.00206 | 59262  | 2178     | 0.03370 | 15535  | 571      |
| 34        | 493     | 38.4    | 557     | 0.00475 | 40393  | 1484     | 0.00306 | 49534  | 1820     |         |        |          | 0.03276 | 15987  | 587      |
| 35        | 508     | 39.5    | 573     | 0.00452 | 41997  | 1543     | 0.00275 | 52994  | 1947     |         |        |          | 0.03158 | 16514  | 607      |
| 36        | 522     | 40.6    | 589     | 0.00428 | 43755  | 1608     | 0.00221 | 59933  | 2202     |         |        |          | 0.03083 | 16945  | 623      |
| 37        | 537     | 41.7    | 605     | 0.00408 | 45418  | 1669     |         |        |          |         |        |          | 0.02972 | 17491  | 643      |
| 38        | 551     | 42.8    | 621     | 0.00389 | 47124  | 1731     |         |        |          |         |        |          | 0.02901 | 17935  | 659      |
| 39        | 566     | 43.9    | 637     | 0.00365 | 49269  | 1810     |         |        |          |         |        |          | 0.02815 | 18440  | 678      |
| 40        | 580     | 45.0    | 653     | 0.00345 | 51308  | 1885     |         |        |          |         |        |          | 0.02740 | 18923  | 695      |

## Pressure relief valve, type POV

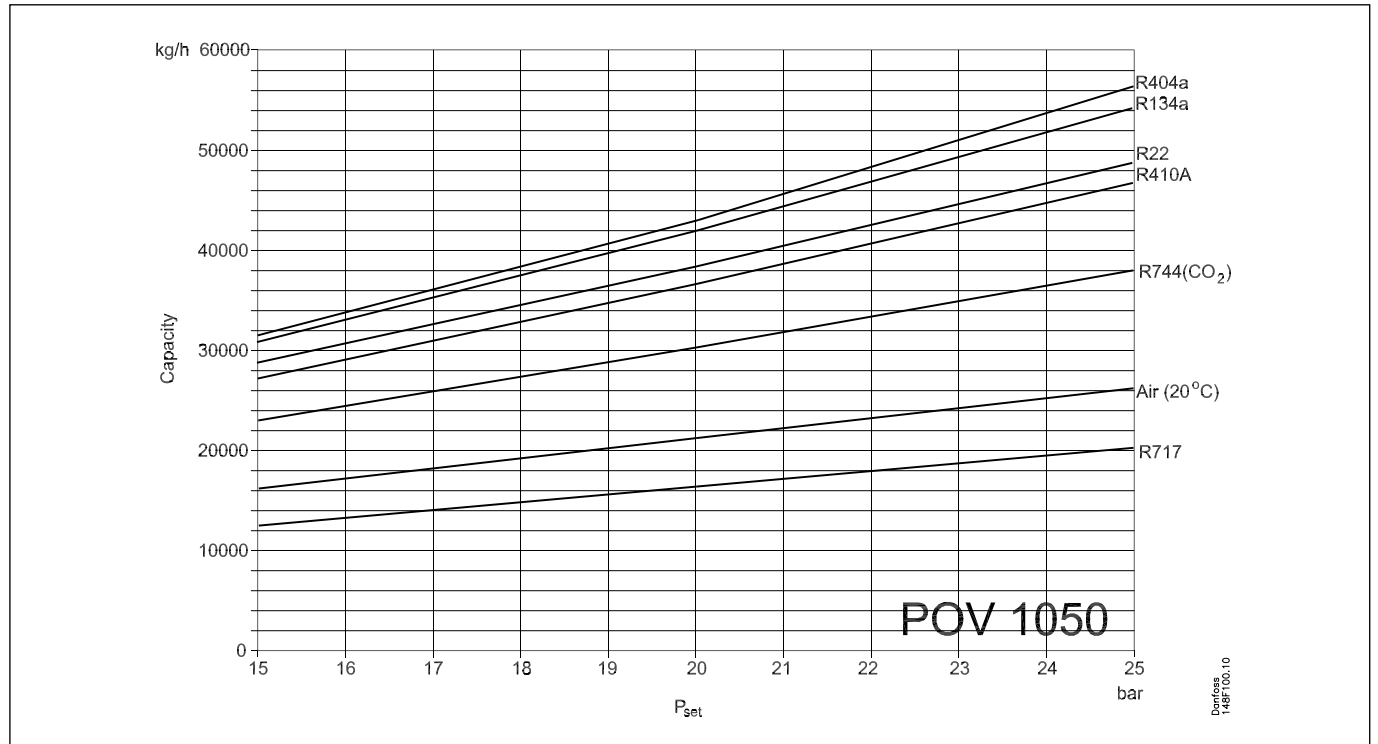
### Capacity - POV 600

(Continued)

| P <sub>set</sub> |         | P       |         | Air(20 °C) |                                   | R410a   |                                   | R744 (CO <sub>2</sub> ) |                                   |
|------------------|---------|---------|---------|------------|-----------------------------------|---------|-----------------------------------|-------------------------|-----------------------------------|
| [bar g]          | [psi g] | [bar a] | [psi a] | [v]        | q <sub>m</sub><br>[kg/h] [lb/min] | [v]     | q <sub>m</sub><br>[kg/h] [lb/min] | [v]                     | q <sub>m</sub><br>[kg/h] [lb/min] |
| 10               | 145     | 12.0    | 174     | 0.06790    | 6349 233                          | 0.02213 | 10461 384                         | 0.03196                 | 9014 331                          |
| 11               | 160     | 13.1    | 190     | 0.06220    | 6931 255                          | 0.02022 | 11435 420                         | 0.02930                 | 9836 361                          |
| 12               | 174     | 14.2    | 206     | 0.05738    | 7513 276                          | 0.01848 | 12453 458                         | 0.02690                 | 10688 393                         |
| 13               | 189     | 15.3    | 222     | 0.05325    | 8095 297                          | 0.01690 | 13517 497                         | 0.02514                 | 11476 422                         |
| 14               | 203     | 16.4    | 238     | 0.04968    | 8676 319                          | 0.01569 | 14525 534                         | 0.02352                 | 12283 451                         |
| 15               | 218     | 17.5    | 254     | 0.04656    | 9258 340                          | 0.01457 | 15570 572                         | 0.02201                 | 13117 482                         |
| 16               | 232     | 18.6    | 270     | 0.04381    | 9840 362                          | 0.01353 | 16657 612                         | 0.02061                 | 13974 513                         |
| 17               | 247     | 19.7    | 286     | 0.04136    | 10422 383                         | 0.01275 | 17659 649                         | 0.01932                 | 14854 546                         |
| 18               | 261     | 20.8    | 302     | 0.03917    | 11004 404                         | 0.01201 | 18696 687                         | 0.01825                 | 15704 577                         |
| 19               | 276     | 21.9    | 318     | 0.03721    | 11586 426                         | 0.01132 | 19760 726                         | 0.01726                 | 16570 609                         |
| 20               | 290     | 23.0    | 334     | 0.03543    | 12168 447                         | 0.01060 | 20927 769                         | 0.01645                 | 17394 639                         |
| 21               | 305     | 24.1    | 350     | 0.03381    | 12750 468                         | 0.00995 | 22110 812                         | 0.01560                 | 18283 672                         |
| 22               | 319     | 25.2    | 365     | 0.03233    | 13332 490                         | 0.00944 | 23212 853                         | 0.01485                 | 19162 704                         |
| 23               | 334     | 26.3    | 381     | 0.03098    | 13914 511                         | 0.00887 | 24463 899                         | 0.01420                 | 20019 736                         |
| 24               | 348     | 27.4    | 397     | 0.02974    | 14496 533                         | 0.00847 | 25552 939                         | 0.01355                 | 20918 769                         |
| 25               | 363     | 28.5    | 413     | 0.02859    | 15078 554                         | 0.00795 | 26899 988                         | 0.01299                 | 21789 801                         |
| 26               | 377     | 29.6    | 429     | 0.02753    | 15660 575                         | 0.00758 | 28074 1032                        | 0.01239                 | 22736 835                         |
| 27               | 392     | 30.7    | 445     | 0.02654    | 16242 597                         | 0.00722 | 29295 1076                        | 0.01185                 | 23677 870                         |
| 28               | 406     | 31.8    | 461     | 0.02562    | 16824 618                         | 0.00687 | 30565 1123                        | 0.01145                 | 24515 901                         |
| 29               | 421     | 32.9    | 477     | 0.02477    | 17406 640                         | 0.00653 | 31888 1172                        | 0.01093                 | 25521 938                         |
| 30               | 435     | 34.0    | 493     | 0.02396    | 17988 661                         | 0.00621 | 33242 1221                        | 0.01059                 | 26358 968                         |
| 31               | 450     | 35.1    | 509     | 0.02321    | 18570 682                         | 0.00589 | 34681 1274                        | 0.01015                 | 27355 1005                        |
| 32               | 464     | 36.2    | 525     | 0.02251    | 19152 704                         | 0.00558 | 36185 1330                        | 0.00978                 | 28301 1040                        |
| 33               | 479     | 37.3    | 541     | 0.02184    | 19734 725                         | 0.00530 | 37688 1385                        | 0.00948                 | 29179 1072                        |
| 34               | 493     | 38.4    | 557     | 0.02122    | 20316 746                         | 0.00508 | 39059 1435                        | 0.00910                 | 30217 1110                        |
| 35               | 508     | 39.5    | 573     | 0.02063    | 20898 768                         | 0.00478 | 40839 1501                        | 0.00875                 | 31254 1148                        |
| 36               | 522     | 40.6    | 589     | 0.02007    | 21479 789                         | 0.00455 | 42437 1559                        | 0.00847                 | 32206 1183                        |
| 37               | 537     | 41.7    | 605     | 0.01954    | 22062 811                         | 0.00430 | 44241 1626                        | 0.00820                 | 33172 1219                        |
| 38               | 551     | 42.8    | 621     | 0.01904    | 22643 832                         | 0.00409 | 45957 1689                        | 0.00794                 | 34153 1255                        |
| 39               | 566     | 43.9    | 637     | 0.01856    | 23225 853                         | 0.00385 | 47973 1763                        | 0.00768                 | 35169 1292                        |
| 40               | 580     | 45.0    | 653     | 0.01811    | 23808 875                         | 0.00362 | 50089 1840                        | 0.00743                 | 36201 1330                        |

**Pressure relief valve, type POV**

**Capacity - POV 1050**



Calculation based on the formula  $q_m = 0.2883 \times C \times A_o \times K_{dr} \times K_b \times \sqrt{\frac{P}{v}}$

P<sub>set</sub> Set pressure in bar g  
P Relieving pressure in bar a  
C Discharge function  
v Specific volume of the vapour at the relieving pressure P in m<sup>3</sup>/kg  
q<sub>m</sub> Discharge capacity in kg/h  
K<sub>b</sub> Correction factor for sub-critical flow  
d<sub>o</sub> Flow diameter seat mm<sup>2</sup>  
A<sub>o</sub> Flow area seat in mm<sup>2</sup>  
K<sub>dr</sub> De-rated coefficient of discharge at defined lifting height

| P <sub>set</sub> |         | P       |         | R22     |        |          | R134a   |        |          | R404a   |        |          | R717    |        |          |
|------------------|---------|---------|---------|---------|--------|----------|---------|--------|----------|---------|--------|----------|---------|--------|----------|
| [bar g]          | [psi g] | [bar a] | [psi a] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] |
| 10               | 145     | 12.0    | 174     | 0.01974 | 19295  | 709      | 0.01655 | 20741  | 762      | 0.01629 | 20822  | 765      | 0.10753 | 8593   | 316      |
| 11               | 160     | 13.1    | 190     | 0.01797 | 21129  | 776      | 0.01502 | 22748  | 836      | 0.01470 | 22902  | 841      | 0.09867 | 9372   | 344      |
| 12               | 174     | 14.2    | 206     | 0.01638 | 23042  | 847      | 0.01383 | 24681  | 907      | 0.01346 | 24918  | 916      | 0.09130 | 10144  | 373      |
| 13               | 189     | 15.3    | 222     | 0.01514 | 24878  | 914      | 0.01273 | 26703  | 981      | 0.01233 | 27024  | 993      | 0.08461 | 10938  | 402      |
| 14               | 203     | 16.4    | 238     | 0.01400 | 26785  | 984      | 0.01172 | 28698  | 1054     | 0.01128 | 29252  | 1075     | 0.07900 | 11719  | 431      |
| 15               | 218     | 17.5    | 254     | 0.01311 | 28592  | 1051     | 0.01094 | 30807  | 1132     | 0.01048 | 31350  | 1152     | 0.07383 | 12523  | 460      |
| 16               | 232     | 18.6    | 270     | 0.01229 | 30444  | 1119     | 0.01007 | 33104  | 1216     | 0.00973 | 33542  | 1232     | 0.06998 | 13261  | 487      |
| 17               | 247     | 19.7    | 286     | 0.01152 | 32362  | 1189     | 0.00940 | 35262  | 1296     | 0.00902 | 35853  | 1317     | 0.06636 | 14015  | 515      |
| 18               | 261     | 20.8    | 302     | 0.01080 | 34344  | 1262     | 0.00888 | 37279  | 1370     | 0.00842 | 38130  | 1401     | 0.06213 | 14883  | 547      |
| 19               | 276     | 21.9    | 318     | 0.01012 | 36405  | 1338     | 0.00828 | 39613  | 1456     | 0.00786 | 40495  | 1488     | 0.05898 | 15674  | 576      |
| 20               | 290     | 23.0    | 334     | 0.00961 | 38285  | 1407     | 0.00775 | 41961  | 1542     | 0.00738 | 42828  | 1574     | 0.05620 | 16455  | 605      |
| 21               | 305     | 24.1    | 350     | 0.00908 | 40317  | 1481     | 0.00727 | 44348  | 1630     | 0.00688 | 45405  | 1668     | 0.05350 | 17264  | 634      |
| 22               | 319     | 25.2    | 365     | 0.00861 | 42338  | 1556     | 0.00685 | 46718  | 1717     | 0.00645 | 47953  | 1762     | 0.05121 | 18043  | 663      |
| 23               | 334     | 26.3    | 381     | 0.00810 | 44593  | 1638     | 0.00645 | 49185  | 1807     | 0.00606 | 50540  | 1857     | 0.04900 | 18844  | 692      |
| 24               | 348     | 27.4    | 397     | 0.00768 | 46744  | 1718     | 0.00606 | 51793  | 1903     | 0.00565 | 53425  | 1963     | 0.04687 | 19666  | 723      |
| 25               | 363     | 28.5    | 413     | 0.00738 | 48632  | 1787     | 0.00574 | 54275  | 1994     | 0.00530 | 56257  | 2067     | 0.04514 | 20438  | 751      |
| 26               | 377     | 29.6    | 429     | 0.00699 | 50925  | 1871     | 0.00541 | 56975  | 2093     | 0.00496 | 59265  | 2178     | 0.04348 | 21223  | 780      |
| 27               | 392     | 30.7    | 445     | 0.00670 | 52974  | 1946     | 0.00506 | 59997  | 2205     | 0.00463 | 62470  | 2295     | 0.04150 | 22123  | 813      |
| 28               | 406     | 31.8    | 461     | 0.00634 | 55424  | 2036     | 0.00479 | 62760  | 2306     | 0.00429 | 66051  | 2427     | 0.04010 | 22905  | 842      |
| 29               | 421     | 32.9    | 477     | 0.00607 | 57614  | 2117     | 0.00453 | 65642  | 2412     | 0.00401 | 69489  | 2553     | 0.03870 | 23716  | 871      |
| 30               | 435     | 34.0    | 493     | 0.00579 | 59969  | 2203     | 0.00422 | 69138  | 2540     | 0.00371 | 73442  | 2699     | 0.03730 | 24557  | 902      |
| 31               | 450     | 35.1    | 509     | 0.00552 | 62404  | 2293     | 0.00392 | 72886  | 2678     | 0.00339 | 78063  | 2868     | 0.03612 | 25356  | 932      |
| 32               | 464     | 36.2    | 525     | 0.00523 | 65107  | 2392     | 0.00365 | 76708  | 2819     | 0.00300 | 84273  | 3096     | 0.03482 | 26226  | 964      |
| 33               | 479     | 37.3    | 541     | 0.00499 | 67660  | 2486     | 0.00337 | 81035  | 2978     | 0.00266 | 103232 | 3793     | 0.03370 | 27061  | 994      |
| 34               | 493     | 38.4    | 557     | 0.00475 | 70363  | 2585     | 0.00306 | 86286  | 3170     |         |        |          | 0.03276 | 27848  | 1023     |
| 35               | 508     | 39.5    | 573     | 0.00452 | 73157  | 2688     | 0.00275 | 92314  | 3392     |         |        |          | 0.03158 | 28767  | 1057     |
| 36               | 522     | 40.6    | 589     | 0.00428 | 76220  | 2801     | 0.00221 | 104400 | 3836     |         |        |          | 0.03083 | 29517  | 1085     |
| 37               | 537     | 41.7    | 605     | 0.00408 | 79116  | 2907     |         |        |          |         |        |          | 0.02972 | 30468  | 1120     |
| 38               | 551     | 42.8    | 621     | 0.00389 | 82087  | 3016     |         |        |          |         |        |          | 0.02901 | 31243  | 1148     |
| 39               | 566     | 43.9    | 637     | 0.00365 | 85825  | 3154     |         |        |          |         |        |          | 0.02815 | 32121  | 1180     |
| 40               | 580     | 45.0    | 653     | 0.00345 | 89377  | 3284     |         |        |          |         |        |          | 0.02740 | 32963  | 1211     |

## Pressure relief valve, type POV

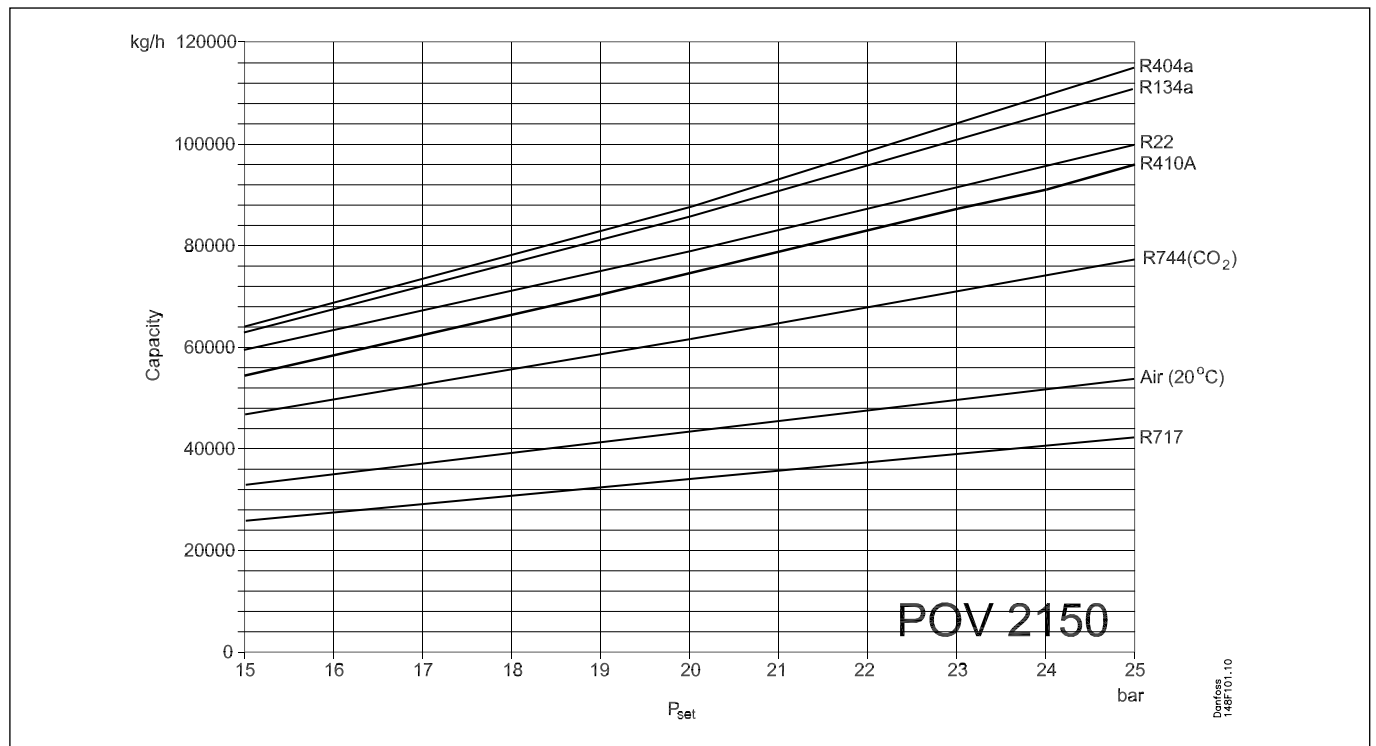
### Capacity - POV 1050

(Continued)

| P <sub>set</sub> |         | P       |         | Air(20 °C) |        |          | R410a   |        |          | R744 (CO <sub>2</sub> ) |        |          |
|------------------|---------|---------|---------|------------|--------|----------|---------|--------|----------|-------------------------|--------|----------|
| [bar g]          | [psi g] | [bar a] | [psi a] | [v]        | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]                     | [kg/h] | [lb/min] |
| 10               | 145     | 12.0    | 174     | 0.06790    | 11059  | 406      | 0.02213 | 18223  | 670      | 0.03196                 | 15701  | 577      |
| 11               | 160     | 13.1    | 190     | 0.06220    | 12073  | 444      | 0.02022 | 19919  | 732      | 0.02930                 | 17134  | 630      |
| 12               | 174     | 14.2    | 206     | 0.05738    | 13087  | 481      | 0.01848 | 21693  | 797      | 0.02690                 | 18617  | 684      |
| 13               | 189     | 15.3    | 222     | 0.05325    | 14100  | 518      | 0.01690 | 23547  | 865      | 0.02514                 | 19990  | 735      |
| 14               | 203     | 16.4    | 238     | 0.04968    | 15114  | 555      | 0.01569 | 25301  | 930      | 0.02352                 | 21397  | 786      |
| 15               | 218     | 17.5    | 254     | 0.04656    | 16128  | 593      | 0.01457 | 27122  | 997      | 0.02201                 | 22849  | 840      |
| 16               | 232     | 18.6    | 270     | 0.04381    | 17141  | 630      | 0.01353 | 29016  | 1066     | 0.02061                 | 24343  | 894      |
| 17               | 247     | 19.7    | 286     | 0.04136    | 18155  | 667      | 0.01275 | 30761  | 1130     | 0.01932                 | 25875  | 951      |
| 18               | 261     | 20.8    | 302     | 0.03917    | 19169  | 704      | 0.01201 | 32568  | 1197     | 0.01825                 | 27356  | 1005     |
| 19               | 276     | 21.9    | 318     | 0.03721    | 20183  | 742      | 0.01132 | 34421  | 1265     | 0.01726                 | 28864  | 1061     |
| 20               | 290     | 23.0    | 334     | 0.03543    | 21197  | 779      | 0.01060 | 36453  | 1339     | 0.01645                 | 30299  | 1113     |
| 21               | 305     | 24.1    | 350     | 0.03381    | 22210  | 816      | 0.00995 | 38515  | 1415     | 0.01560                 | 31849  | 1170     |
| 22               | 319     | 25.2    | 365     | 0.03233    | 23224  | 853      | 0.00944 | 40434  | 1486     | 0.01485                 | 33380  | 1227     |
| 23               | 334     | 26.3    | 381     | 0.03098    | 24238  | 891      | 0.00887 | 42613  | 1566     | 0.01420                 | 34873  | 1281     |
| 24               | 348     | 27.4    | 397     | 0.02974    | 25251  | 928      | 0.00847 | 44510  | 1635     | 0.01355                 | 36438  | 1339     |
| 25               | 363     | 28.5    | 413     | 0.02859    | 26265  | 965      | 0.00795 | 46856  | 1722     | 0.01299                 | 37955  | 1395     |
| 26               | 377     | 29.6    | 429     | 0.02753    | 27279  | 1002     | 0.00758 | 48903  | 1797     | 0.01239                 | 39606  | 1455     |
| 27               | 392     | 30.7    | 445     | 0.02654    | 28293  | 1040     | 0.00722 | 51030  | 1875     | 0.01185                 | 41244  | 1515     |
| 28               | 406     | 31.8    | 461     | 0.02562    | 29307  | 1077     | 0.00687 | 53243  | 1956     | 0.01145                 | 42703  | 1569     |
| 29               | 421     | 32.9    | 477     | 0.02477    | 30321  | 1114     | 0.00653 | 55548  | 2041     | 0.01093                 | 44457  | 1634     |
| 30               | 435     | 34.0    | 493     | 0.02396    | 31334  | 1151     | 0.00621 | 57906  | 2128     | 0.01059                 | 45914  | 1687     |
| 31               | 450     | 35.1    | 509     | 0.02321    | 32348  | 1189     | 0.00589 | 60412  | 2220     | 0.01015                 | 47651  | 1751     |
| 32               | 464     | 36.2    | 525     | 0.02251    | 33361  | 1226     | 0.00558 | 63033  | 2316     | 0.00978                 | 49299  | 1811     |
| 33               | 479     | 37.3    | 541     | 0.02184    | 34375  | 1263     | 0.00530 | 65651  | 2412     | 0.00948                 | 50828  | 1868     |
| 34               | 493     | 38.4    | 557     | 0.02122    | 35389  | 1300     | 0.00508 | 68040  | 2500     | 0.00910                 | 52637  | 1934     |
| 35               | 508     | 39.5    | 573     | 0.02063    | 36403  | 1338     | 0.00478 | 71140  | 2614     | 0.00875                 | 54443  | 2000     |
| 36               | 522     | 40.6    | 589     | 0.02007    | 37416  | 1375     | 0.00455 | 73924  | 2716     | 0.00847                 | 56101  | 2061     |
| 37               | 537     | 41.7    | 605     | 0.01954    | 38430  | 1412     | 0.00430 | 77066  | 2832     | 0.00820                 | 57784  | 2123     |
| 38               | 551     | 42.8    | 621     | 0.01904    | 39444  | 1449     | 0.00409 | 80055  | 2942     | 0.00794                 | 59492  | 2186     |
| 39               | 566     | 43.9    | 637     | 0.01856    | 40458  | 1487     | 0.00385 | 83566  | 3071     | 0.00768                 | 61263  | 2251     |
| 40               | 580     | 45.0    | 653     | 0.01811    | 41472  | 1524     | 0.00362 | 87253  | 3206     | 0.00743                 | 63061  | 2317     |

**Pressure relief valve, type POV**

**Capacity - POV 2150**



Calculation based on the formula  $q_m = 0.2883 \times C \times A_o \times K_{dr} \times K_b \times \sqrt{\frac{P}{v}}$

P<sub>set</sub> Set pressure in bar g  
P Relieving pressure in bar a  
C Discharge function  
v Specific volume of the vapour at the relieving pressure P in m<sup>3</sup>/kg  
q<sub>m</sub> Discharge capacity in kg/h  
K<sub>b</sub> Correction factor for sub-critical flow  
d<sub>o</sub> Flow diameter seat mm<sup>2</sup>  
A<sub>o</sub> Flow area seat in mm<sup>2</sup>  
K<sub>dr</sub> De-rated coefficient of discharge at defined lifting height

| P <sub>set</sub> |         | P       |         | R22     |        |          | R134a   |        |          | R404a   |        |          | R717    |        |          |
|------------------|---------|---------|---------|---------|--------|----------|---------|--------|----------|---------|--------|----------|---------|--------|----------|
| [bar g]          | [psi g] | [bar a] | [psi a] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] | [v]     | [kg/h] | [lb/min] |
| 10               | 145     | 12.0    | 174     | 0.01974 | 39440  | 1449     | 0.01655 | 42395  | 1558     | 0.01629 | 42561  | 1564     | 0.10753 | 17564  | 645      |
| 11               | 160     | 13.1    | 190     | 0.01797 | 43190  | 1587     | 0.01502 | 46497  | 1708     | 0.01470 | 46812  | 1720     | 0.09867 | 19157  | 704      |
| 12               | 174     | 14.2    | 206     | 0.01638 | 47098  | 1731     | 0.01383 | 50450  | 1854     | 0.01346 | 50934  | 1871     | 0.09130 | 20735  | 762      |
| 13               | 189     | 15.3    | 222     | 0.01514 | 50851  | 1868     | 0.01273 | 54583  | 2006     | 0.01233 | 55239  | 2030     | 0.08461 | 22358  | 821      |
| 14               | 203     | 16.4    | 238     | 0.01400 | 54749  | 2012     | 0.01172 | 58660  | 2155     | 0.01128 | 59793  | 2197     | 0.07900 | 23955  | 880      |
| 15               | 218     | 17.5    | 254     | 0.01311 | 58444  | 2147     | 0.01094 | 62970  | 2314     | 0.01048 | 64080  | 2355     | 0.07383 | 25597  | 941      |
| 16               | 232     | 18.6    | 270     | 0.01229 | 62230  | 2287     | 0.01007 | 67665  | 2486     | 0.00973 | 68562  | 2519     | 0.06998 | 27106  | 996      |
| 17               | 247     | 19.7    | 286     | 0.01152 | 66149  | 2431     | 0.00940 | 72077  | 2648     | 0.00902 | 73285  | 2693     | 0.06636 | 28646  | 1053     |
| 18               | 261     | 20.8    | 302     | 0.01080 | 70200  | 2579     | 0.00888 | 76199  | 2800     | 0.00842 | 77940  | 2864     | 0.06213 | 30421  | 1118     |
| 19               | 276     | 21.9    | 318     | 0.01012 | 74413  | 2734     | 0.00828 | 80972  | 2975     | 0.00786 | 82774  | 3041     | 0.05898 | 32038  | 1177     |
| 20               | 290     | 23.0    | 334     | 0.00961 | 78257  | 2875     | 0.00775 | 85771  | 3152     | 0.00738 | 87543  | 3217     | 0.05620 | 33635  | 1236     |
| 21               | 305     | 24.1    | 350     | 0.00908 | 82411  | 3028     | 0.00727 | 90650  | 3331     | 0.00688 | 92811  | 3410     | 0.05350 | 35287  | 1297     |
| 22               | 319     | 25.2    | 365     | 0.00861 | 86540  | 3180     | 0.00685 | 95495  | 3509     | 0.00645 | 98018  | 3602     | 0.05121 | 36882  | 1355     |
| 23               | 334     | 26.3    | 381     | 0.00810 | 91150  | 3349     | 0.00645 | 100536 | 3694     | 0.00606 | 103306 | 3796     | 0.04900 | 38518  | 1415     |
| 24               | 348     | 27.4    | 397     | 0.00768 | 95546  | 3511     | 0.00606 | 105868 | 3890     | 0.00565 | 109203 | 4013     | 0.04687 | 40199  | 1477     |
| 25               | 363     | 28.5    | 413     | 0.00738 | 99406  | 3653     | 0.00574 | 110941 | 4076     | 0.00530 | 114992 | 4225     | 0.04514 | 41776  | 1535     |
| 26               | 377     | 29.6    | 429     | 0.00699 | 104094 | 3825     | 0.00541 | 116459 | 4279     | 0.00496 | 121141 | 4451     | 0.04348 | 43380  | 1594     |
| 27               | 392     | 30.7    | 445     | 0.00670 | 108281 | 3979     | 0.00506 | 122636 | 4506     | 0.00463 | 127692 | 4692     | 0.04150 | 45220  | 1662     |
| 28               | 406     | 31.8    | 461     | 0.00634 | 113289 | 4163     | 0.00479 | 128284 | 4714     | 0.00429 | 135011 | 4961     | 0.04010 | 46820  | 1720     |
| 29               | 421     | 32.9    | 477     | 0.00607 | 117767 | 4327     | 0.00453 | 134176 | 4930     | 0.00401 | 142040 | 5219     | 0.03870 | 48477  | 1781     |
| 30               | 435     | 34.0    | 493     | 0.00579 | 122580 | 4504     | 0.00422 | 141322 | 5193     | 0.00371 | 150120 | 5516     | 0.03730 | 50197  | 1844     |
| 31               | 450     | 35.1    | 509     | 0.00552 | 127557 | 4687     | 0.00392 | 148983 | 5474     | 0.00339 | 159565 | 5863     | 0.03612 | 51829  | 1904     |
| 32               | 464     | 36.2    | 525     | 0.00523 | 133083 | 4890     | 0.00365 | 156795 | 5761     | 0.00300 | 172258 | 6329     | 0.03482 | 53608  | 1970     |
| 33               | 479     | 37.3    | 541     | 0.00499 | 138300 | 5082     | 0.00337 | 165640 | 6086     | 0.00206 | 211011 | 7753     | 0.03370 | 55313  | 2032     |
| 34               | 493     | 38.4    | 557     | 0.00475 | 143826 | 5285     | 0.00306 | 176372 | 6481     |         |        |          | 0.03276 | 56922  | 2092     |
| 35               | 508     | 39.5    | 573     | 0.00452 | 149537 | 5495     | 0.00275 | 188694 | 6933     |         |        |          | 0.03158 | 58801  | 2161     |
| 36               | 522     | 40.6    | 589     | 0.00428 | 155797 | 5725     | 0.00221 | 213399 | 7841     |         |        |          | 0.03083 | 60334  | 2217     |
| 37               | 537     | 41.7    | 605     | 0.00408 | 161717 | 5942     |         |        |          |         |        |          | 0.02972 | 62278  | 2288     |
| 38               | 551     | 42.8    | 621     | 0.00389 | 167790 | 6165     |         |        |          |         |        |          | 0.02901 | 63861  | 2346     |
| 39               | 566     | 43.9    | 637     | 0.00365 | 175430 | 6446     |         |        |          |         |        |          | 0.02815 | 65657  | 2412     |
| 40               | 580     | 45.0    | 653     | 0.00345 | 182690 | 6713     |         |        |          |         |        |          | 0.02740 | 67378  | 2476     |

## Pressure relief valve, type POV

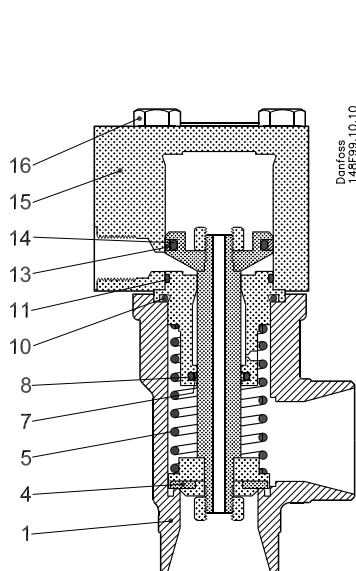
### Capacity - POV 2150

(Continued)

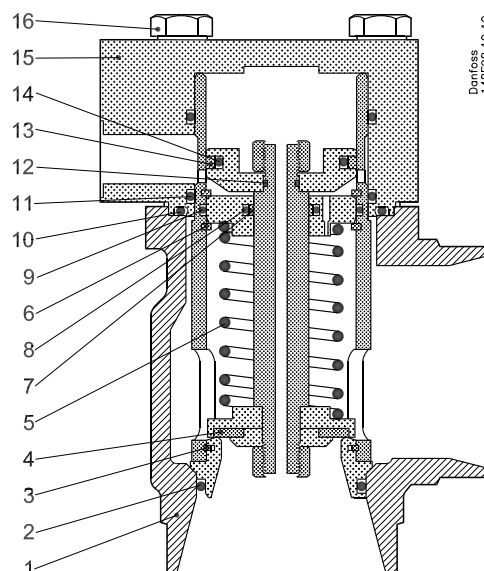
| P <sub>set</sub> |         | P       |         | Air(20 °C) |                                   | R410a   |                                   | R744 (CO <sub>2</sub> ) |                                   |
|------------------|---------|---------|---------|------------|-----------------------------------|---------|-----------------------------------|-------------------------|-----------------------------------|
| [bar g]          | [psi g] | [bar a] | [psi a] | [v]        | Q <sub>m</sub><br>[kg/h] [lb/min] | [v]     | Q <sub>m</sub><br>[kg/h] [lb/min] | [v]                     | Q <sub>m</sub><br>[kg/h] [lb/min] |
| 10               | 145     | 12.0    | 174     | 0.06790    | 22605                             | 0.02213 | 37249                             | 0.03196                 | 32094                             |
| 11               | 160     | 13.1    | 190     | 0.06220    | 24677                             | 0.02022 | 40716                             | 0.02930                 | 35022                             |
| 12               | 174     | 14.2    | 206     | 0.05738    | 26750                             | 0.01848 | 44342                             | 0.02690                 | 38055                             |
| 13               | 189     | 15.3    | 222     | 0.05325    | 28822                             | 0.01690 | 48131                             | 0.02514                 | 40861                             |
| 14               | 203     | 16.4    | 238     | 0.04968    | 30894                             | 0.01569 | 51717                             | 0.02352                 | 43737                             |
| 15               | 218     | 17.5    | 254     | 0.04656    | 32966                             | 0.01457 | 55438                             | 0.02201                 | 46704                             |
| 16               | 232     | 18.6    | 270     | 0.04381    | 35038                             | 0.01353 | 59310                             | 0.02061                 | 49757                             |
| 17               | 247     | 19.7    | 286     | 0.04136    | 37110                             | 0.01275 | 62878                             | 0.01932                 | 52890                             |
| 18               | 261     | 20.8    | 302     | 0.03917    | 39183                             | 0.01201 | 66570                             | 0.01825                 | 55917                             |
| 19               | 276     | 21.9    | 318     | 0.03721    | 41254                             | 0.01132 | 70359                             | 0.01726                 | 58999                             |
| 20               | 290     | 23.0    | 334     | 0.03543    | 43327                             | 0.01060 | 74513                             | 0.01645                 | 61933                             |
| 21               | 305     | 24.1    | 350     | 0.03381    | 45399                             | 0.00995 | 78726                             | 0.01560                 | 65101                             |
| 22               | 319     | 25.2    | 365     | 0.03233    | 47471                             | 0.00944 | 82648                             | 0.01485                 | 68230                             |
| 23               | 334     | 26.3    | 381     | 0.03098    | 49543                             | 0.00887 | 87103                             | 0.01420                 | 71281                             |
| 24               | 348     | 27.4    | 397     | 0.02974    | 51615                             | 0.00847 | 90981                             | 0.01355                 | 74481                             |
| 25               | 363     | 28.5    | 413     | 0.02859    | 53687                             | 0.00795 | 95776                             | 0.01299                 | 77582                             |
| 26               | 377     | 29.6    | 429     | 0.02753    | 55760                             | 0.00758 | 99961                             | 0.01239                 | 80956                             |
| 27               | 392     | 30.7    | 445     | 0.02654    | 57832                             | 0.00722 | 104308                            | 0.01185                 | 84305                             |
| 28               | 406     | 31.8    | 461     | 0.02562    | 59904                             | 0.00687 | 108831                            | 0.01145                 | 87287                             |
| 29               | 421     | 32.9    | 477     | 0.02477    | 61977                             | 0.00653 | 113543                            | 0.01093                 | 90872                             |
| 30               | 435     | 34.0    | 493     | 0.02396    | 64048                             | 0.00621 | 118362                            | 0.01059                 | 93850                             |
| 31               | 450     | 35.1    | 509     | 0.02321    | 66121                             | 0.00589 | 123485                            | 0.01015                 | 97401                             |
| 32               | 464     | 36.2    | 525     | 0.02251    | 68192                             | 0.00558 | 128842                            | 0.00978                 | 100769                            |
| 33               | 479     | 37.3    | 541     | 0.02184    | 70265                             | 0.00530 | 134195                            | 0.00948                 | 103894                            |
| 34               | 493     | 38.4    | 557     | 0.02122    | 72337                             | 0.00508 | 139076                            | 0.00910                 | 107593                            |
| 35               | 508     | 39.5    | 573     | 0.02063    | 74410                             | 0.00478 | 145413                            | 0.00875                 | 111285                            |
| 36               | 522     | 40.6    | 589     | 0.02007    | 76480                             | 0.00455 | 151104                            | 0.00847                 | 114673                            |
| 37               | 537     | 41.7    | 605     | 0.01954    | 78554                             | 0.00430 | 157526                            | 0.00820                 | 118114                            |
| 38               | 551     | 42.8    | 621     | 0.01904    | 80625                             | 0.00409 | 163636                            | 0.00794                 | 121605                            |
| 39               | 566     | 43.9    | 637     | 0.01856    | 82697                             | 0.00385 | 170813                            | 0.00768                 | 125225                            |
| 40               | 580     | 45.0    | 653     | 0.01811    | 84770                             | 0.00362 | 178349                            | 0.00743                 | 128900                            |

## Pressure relief valve, type POV

### Material specification



**POV 600**



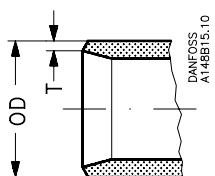
**POV 1050, POV 2150**

| No   | Part          | Material            | EN                    | ISO           | ASTM             |
|------|---------------|---------------------|-----------------------|---------------|------------------|
| 1    | Housing       | Steel               | P285QH<br>EN 10222-4  |               | LF2, A350        |
| 2    | O-ring        | Cloropren (Neopren) |                       |               |                  |
| 3    | Spring ring   | Steel               |                       |               |                  |
| 4    | Telfon washer | PTFE(Teflon)        |                       |               |                  |
| 5    | Spring        | Steel               |                       |               |                  |
| 6    | Seeger        | Steel               |                       |               |                  |
| 7    | Glide ring    | PTFE(Teflon)        |                       |               |                  |
| 8-12 | O-ring        | Cloropren (Neopren) |                       |               |                  |
| 13   | Glide ring    | PTFE(Teflon)        |                       |               |                  |
| 14   | O-ring        | Cloropren (Neopren) |                       |               |                  |
| 15   | Top cover     | Steel               | P275NL1<br>EN 10028-3 |               | Grade A, A662    |
| 16   | Bolt          | Stainless steel     | A2-70<br>1515-1       | A2-70<br>3506 | Grade B8<br>A320 |

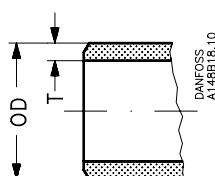
## Pressure relief valve, type POV

### Connections

DIN



ANSI



| Version | Size | Size | OD   | T    | OD   | T    |  |
|---------|------|------|------|------|------|------|--|
|         | [mm] | [in] | [mm] | [mm] | [in] | [in] |  |

#### Welding DIN (2448)

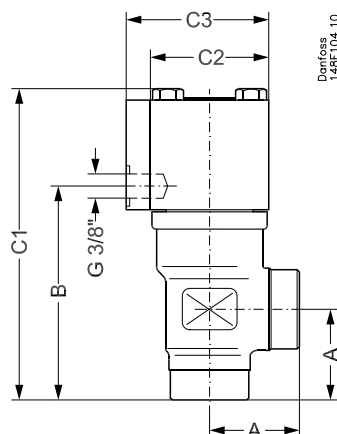
|          |    |       |      |     |       |       |  |
|----------|----|-------|------|-----|-------|-------|--|
| POV 600  | 40 | 1 1/2 | 48.3 | 2.6 | 1.902 | 0.103 |  |
| POV 1050 | 65 | 2 1/2 | 76.1 | 2.9 | 3     | 0.11  |  |
| POV 2150 | 80 | 3     | 88.9 | 3.2 | 3.5   | 0.13  |  |

#### Welding ANSI (B 36.10)

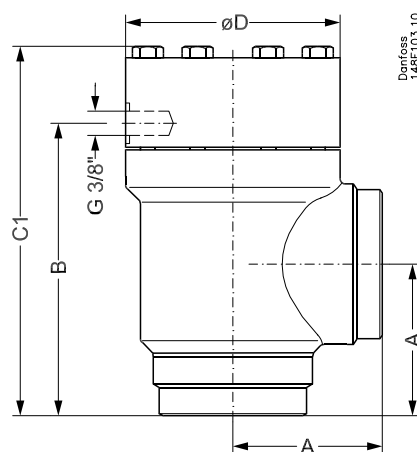
|          |    |       |      |     |       |       |             |
|----------|----|-------|------|-----|-------|-------|-------------|
| POV 600  | 40 | 1 1/2 | 48.3 | 5.1 | 1.902 | 0.201 | Schedule 80 |
| POV 1050 | 65 | 2 1/2 | 73   | 5.2 | 2.87  | 0.2   | Schedule 40 |
| POV 2150 | 80 | 3     | 88.9 | 5.5 | 3.5   | 0.22  | Schedule 40 |

### Dimensions and weights

#### POV 600, POV 1050



#### POV 2150



| Valve size           |    | A   | B   | C1  | C2  | C3  | ØD  | Weight |
|----------------------|----|-----|-----|-----|-----|-----|-----|--------|
| POV 600<br>1 1/2 in  | mm | 55  | 130 | 188 | 73  | 88  |     | 5 kg   |
|                      | in | 2.2 | 5.1 | 7.4 | 2.8 | 3.5 |     |        |
| POV 1050<br>2 1/2 in | mm | 70  | 137 | 184 | 90  | 105 |     | 6 kg   |
|                      | in | 2.8 | 5.4 | 7.2 | 3.5 | 4.1 |     |        |
| POV 2150<br>3 in     | mm | 90  | 174 | 219 |     |     | 130 | 11 kg  |
|                      | in | 3.5 | 6.9 | 8.6 |     |     | 5.1 |        |

Specified weights are approximate values only.



## Pressure relief valve, type POV

### Ordering

| Type                          | Code no.        |
|-------------------------------|-----------------|
| POV 600 BUTT WELD DIN DN 40   | <b>2417+232</b> |
| POV 600 BUTT WELD ANSI DN 40  | <b>2417+047</b> |
| POV 1050 BUTT WELD DIN DN 65  | <b>148F3026</b> |
| POV 1050 BUTT WELD ANSI DN 65 | <b>148F3027</b> |
| POV 2150 BUTT WELD DIN DN 80  | <b>148F3033</b> |
| POV 2150 BUTT WELD ANSI DN 80 | <b>148F3034</b> |

### Nipples and gaskets

**Attention: Fittings for connections must be ordered separately**

| Size |      | Type                 | Code no.        |
|------|------|----------------------|-----------------|
| [mm] | [in] | For system POV + BSV |                 |
| 15   | 1/2  | Set of fittings      | <b>148H3453</b> |

### Important!

Where products need to be certified according to specific certification societies or where higher pressures are required, the relevant information should be included at the time of order.

