

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 (CO₂) 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 (CO₂) 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_{set}

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

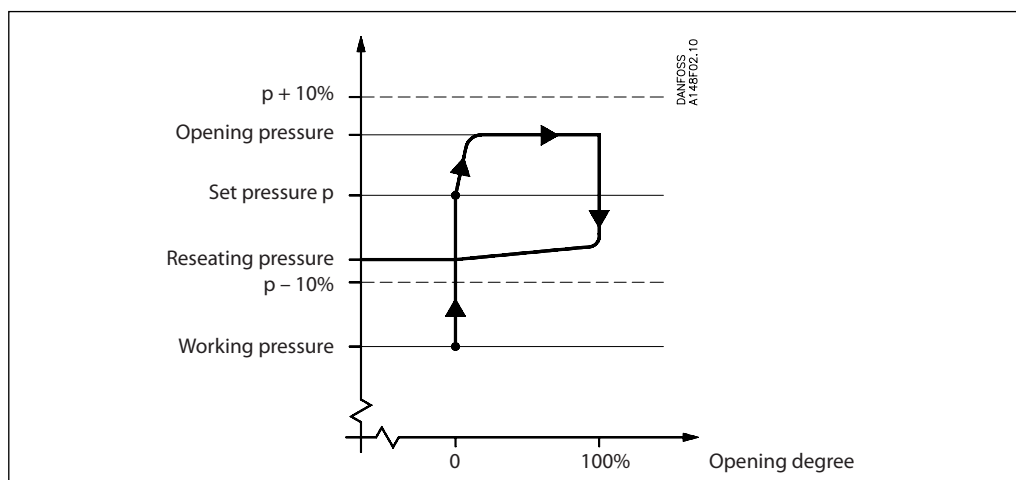


Pressure Equipment Directive (PED)

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

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

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

q_m Discharge capacity (kg/h).

C Discharge function depending of the actual refrigerant (κ) see table 2 (-).

A_o Flow area of the safety relief valve (mm²).

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 . (m³/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).

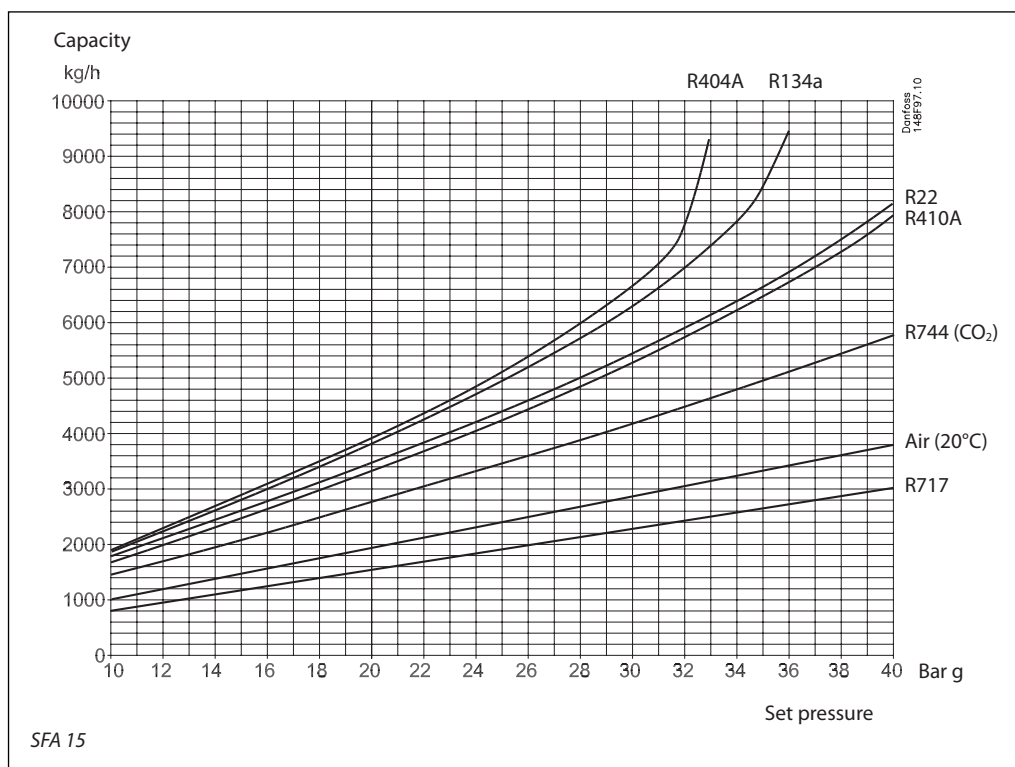
For further details see the above-mentioned ISO or EN standards.

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 ₂)	1.30	2.63
Air	1.40	2.70

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

Capacity

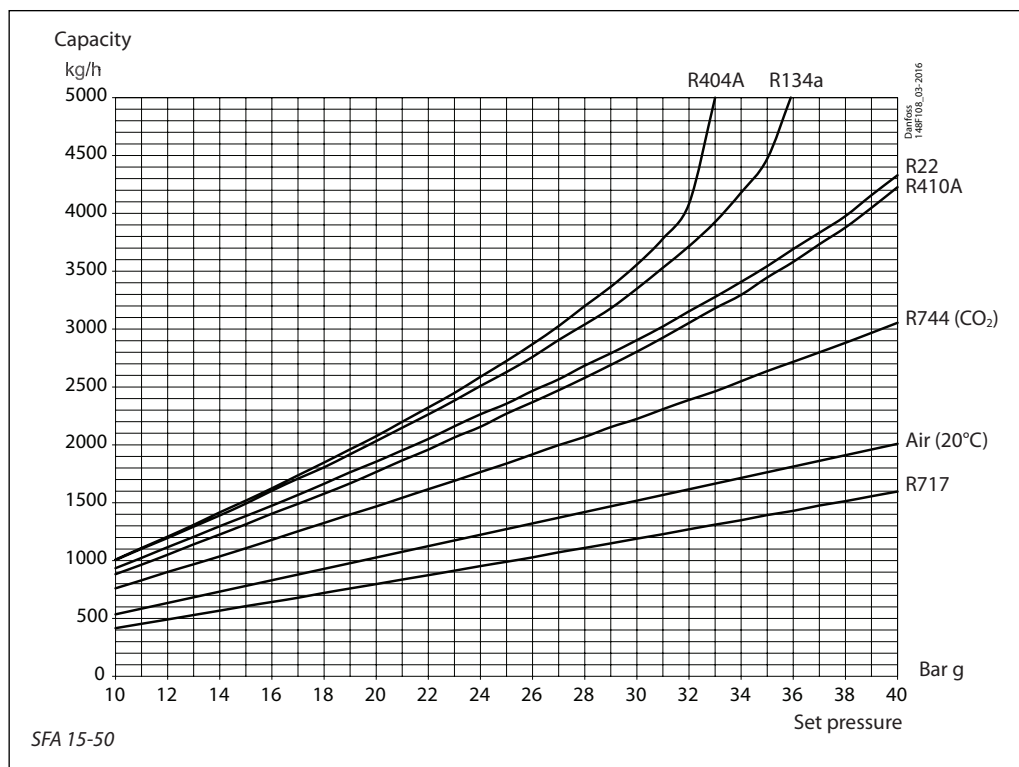


Capacity

Set pressure	qm	R22	R134a	R404A	R410A	R717	R744 (CO ₂)	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

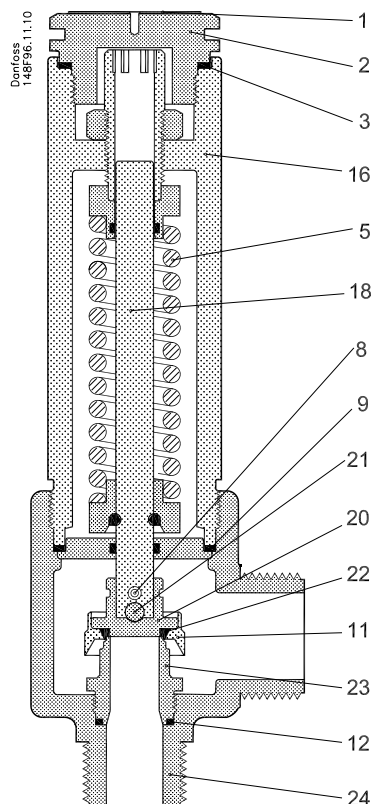
Capacity



Capacity

Set pressure	qm	R22	R134a	R404A	R410A	R717	R744 (CO ₂)	Air (20°C)
<i>SFA 15-50</i>								
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

Material specification

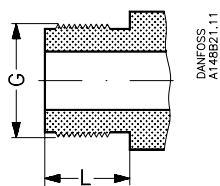


No.	Part	Material	DIN	ISO	ASTM
1	Marking label	Stainless steel			
2	Threaded plug	Steel			
3	Packing washer	Aluminium (Non-asbestos gasket)			
5	Spring	Steel	Class C, DIN17223		
8	Split	Steel	94 ELFORZ		
9	Packing washer	Aluminium (Non-asbestos gasket)			
11	Retainer	Stainless steel	X8CrNiS 18 9		AISI 303, A276
12	Packing washer	Aluminium (Non-asbestos gasket)			
16	Valve top	Steel	G20Mn5QT Alt. S235JRG2 Alt. S355J2G3	Fe360BFN Fe510D1	LCC, A352 A284C 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	Cloroprene (Neoprene)			
23	Valve seat	Stainless steel	X8CrNiS 18 9		AISI 303, A276
24	Valve housing	Steel	G20Mn5QT Alt. P285QH		LCC, A352 LF2, A350

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

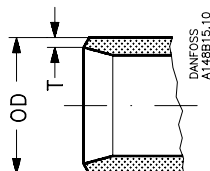
Connections

T



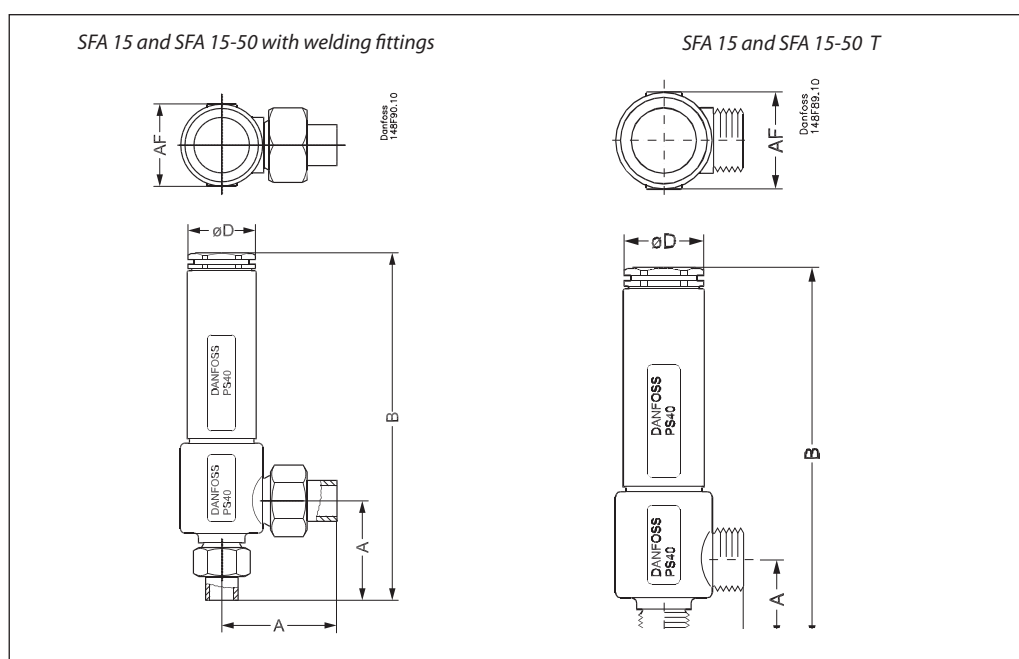
Size [mm]	Size [in]	Inlet	Outlet				L [mm]	L [in]	
<i>T outside pipe thread, (ISO 228/1)</i>									
15	1/2	G 3/4	G 1				15	0.59	

DIN



Size [mm]	Size [in]	Inlet [mm]		Inlet [in]		Outlet [mm]		Outlet [in]	
		OD	T	OD	T	OD	T	OD	T
<i>Welding fittings, DIN (2448)</i>									
15	1/2	21.3	2.3	0.839	0.091	26.9	2.3	1.059	0.091

Dimensions and weights



Valve size		A	B	ØD	AF	Weight
<i>SFA 15 T, with threaded connections ISO 228/1 pipe threads</i>						
SFA 15 and SFA 15-50 T (1/2 in)	mm in	45 1.77	210 8.27	45 1.81	55 2.17	2.2 kg 4.9 lbs
<i>SFA with welding fittings, DIN 2448</i>						
SFA 15 and SFA 15-50 (1/2 in)	mm in	83 3.27	248 9.76	45 1.81	55 2.17	2.5 kg 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	148F3210
15	1/2	SFA 15 T 211	11	160	148F3211
15	1/2	SFA 15 T 212	12	174	148F3212
15	1/2	SFA 15 T 213	13	189	148F3213
15	1/2	SFA 15 T 214	14	203	148F3214
15	1/2	SFA 15 T 215	15	218	148F3215
15	1/2	SFA 15 T 216	16	232	148F3216
15	1/2	SFA 15 T 217	17	247	148F3217
15	1/2	SFA 15 T 218	18	261	148F3218
15	1/2	SFA 15 T 219	19	276	148F3219
15	1/2	SFA 15 T 220	20	290	148F3220
15	1/2	SFA 15 T 221	21	305	148F3221
15	1/2	SFA 15 T 222	22	319	148F3222
15	1/2	SFA 15 T 223	23	334	148F3223
15	1/2	SFA 15 T 224	24	348	148F3224
15	1/2	SFA 15 T 225	25	363	148F3225
15	1/2	SFA 15 T 226	26	377	148F3226
15	1/2	SFA 15 T 227	27	392	148F3227
15	1/2	SFA 15 T 228	28	406	148F3228
15	1/2	SFA 15 T 229	29	421	148F3229
15	1/2	SFA 15 T 230	30	435	148F3230
15	1/2	SFA 15 T 231	31	450	148F3231
15	1/2	SFA 15 T 232	32	464	148F3232
15	1/2	SFA 15 T 233	33	479	148F3233
15	1/2	SFA 15 T 234	34	493	148F3234
15	1/2	SFA 15 T 235	35	508	148F3235
15	1/2	SFA 15 T 236	36	522	148F3236
15	1/2	SFA 15 T 237	37	537	148F3237
15	1/2	SFA 15 T 238	38	551	148F3238
15	1/2	SFA 15 T 239	39	566	148F3239
15	1/2	SFA 15 T 240	40	580	148F3240

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

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

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

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

Ordering

Repair kit

Type	Code number
Repair kit SFA 15	148F3036
Repair kit SFA 15-50	148F3150

Nipples and gaskets

Type	Code number
Nipples + gaskets set for SFV 15 / SFA 15 and SFA 15-50	148F3019

Safety relief valves

Type SFV 20-25

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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 (CO₂) 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 (CO₂) 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

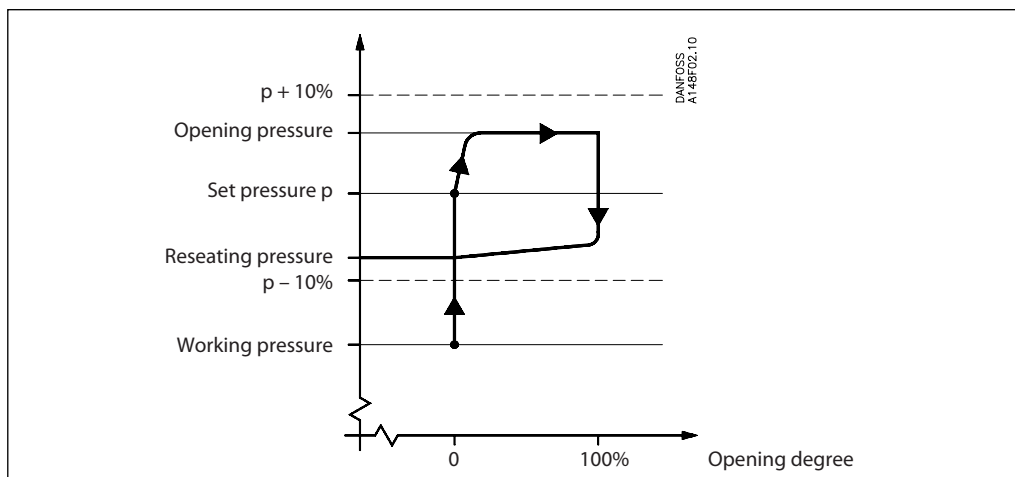


Pressure Equipment Directive (PED)

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 d_o	Flow area A_o	De-rated, certified coefficient of discharge K_{dr}
	Inlet	Outlet			
SFV 20	20 mm	25 mm	18 mm	254 mm ²	0.54
	¾ in	1 in	0.709 in	0.394 in ²	
SFV 25	25 mm	32 mm	23 mm	415 mm ²	0.48
	1 in	1¼	0.906 in	0.643 in ²	

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 (κ) see table 2 (-)

A_o Flow area of the safety relief valve (mm²).

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 . (m³/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)

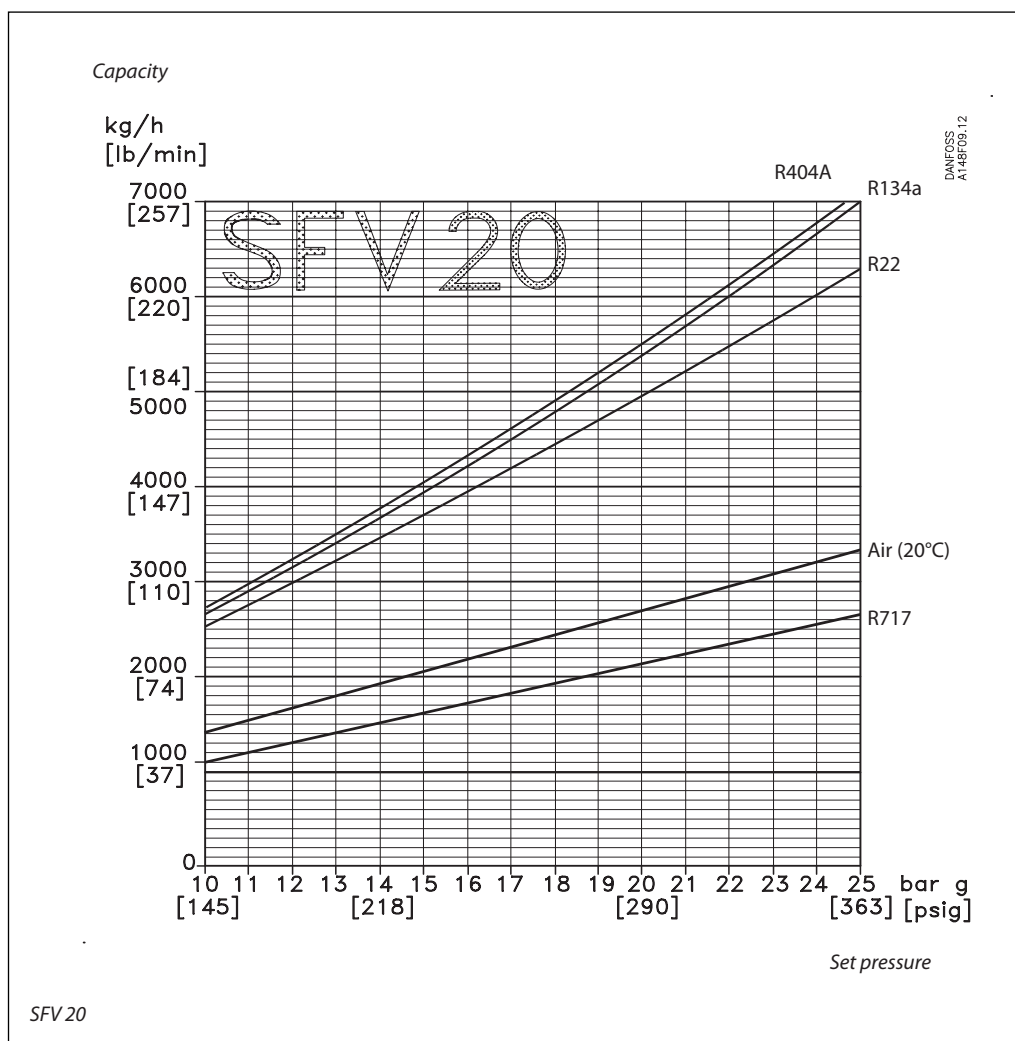
For further details see the above-mentioned ISO or EN standards.

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 ₂)	1.30	2.63
Air	1.40	2.70

Safety relief valves, type SFV 20-25

Capacity (cont.)

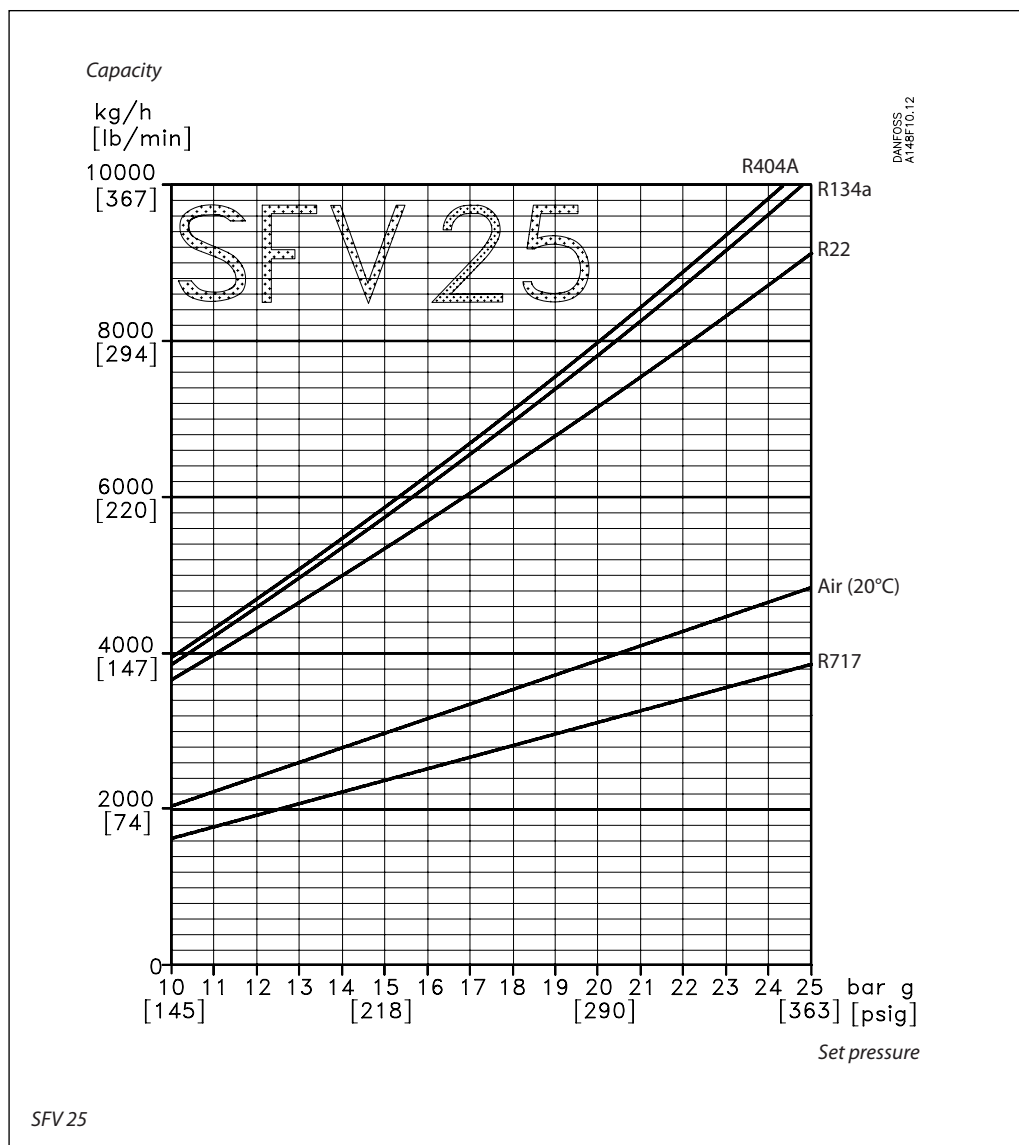


Capacity

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

Safety relief valves, type SFV 20-25

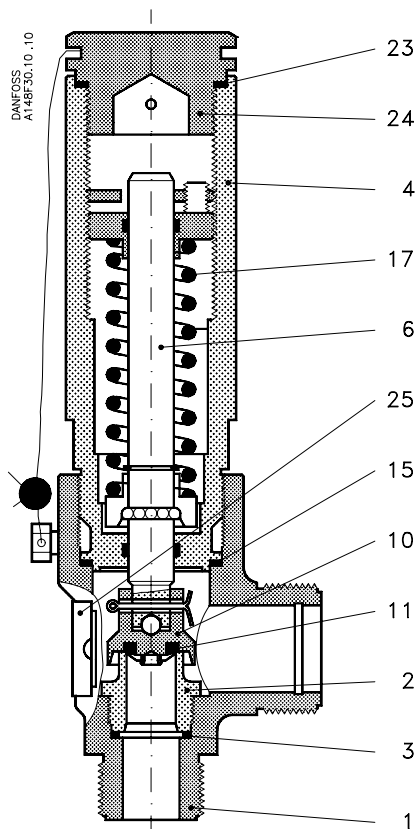
Capacity
(cont.)



Capacity

Set pressure		R22	R134a	R404A	R717	Air (20°C)
<i>SFV 25</i>						
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

Material specification



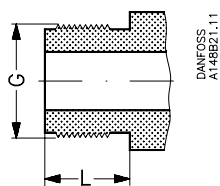
No.	Part	Material	DIN	ISO	ASTM
1	Housing	Steel	G20Mn5 QT *P285QH *TTSt35N	TW 6, 2604/3-75	Grade 1, A333, A334 * A350 LF2
2	Valve seat	Stainless steel	X10CrNiS189, 17440	Type 17, 683/13	AISI 303
3	Packing washer	Aluminium *Non-asbestos gasket			
4	Valve top	Steel	St. 37.2, 1652	Fe 360 B, 660	Grade C,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

* Alternative material

Safety relief valves, type SFV 20-25

Connections

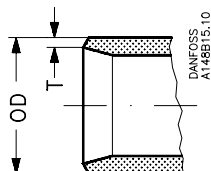
T



Size [mm]	Size [in]	Inlet	Outlet	L [mm]	L [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)

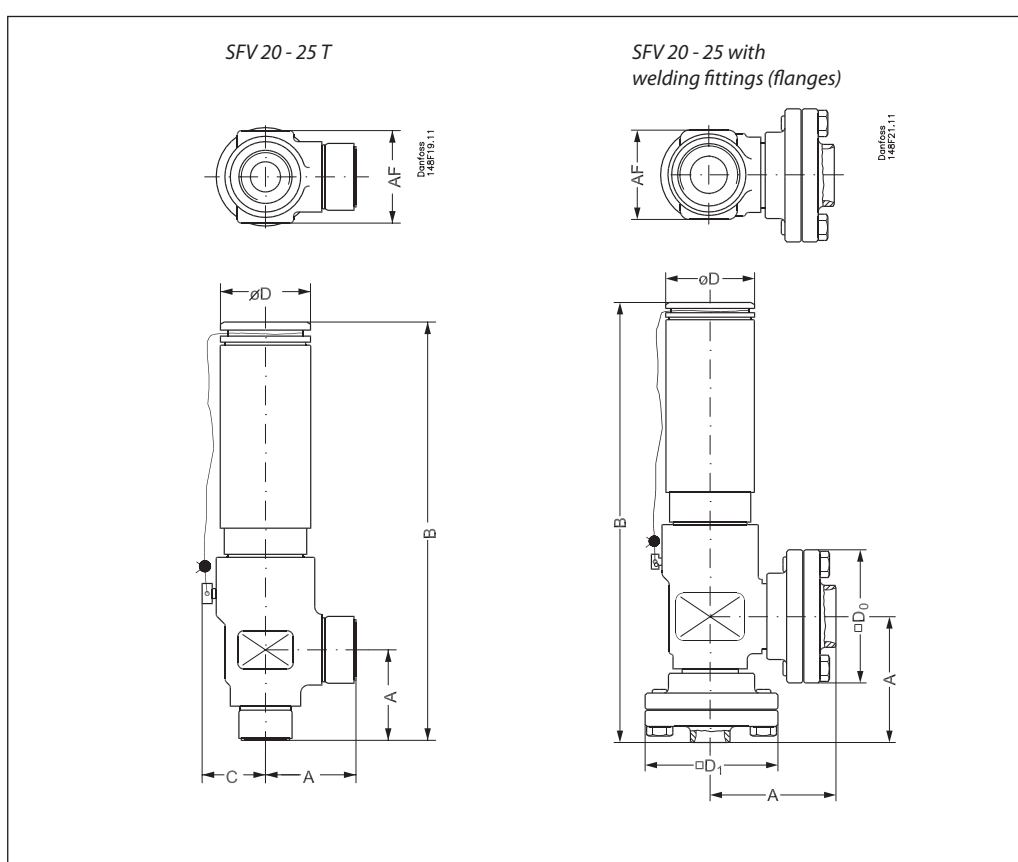
DIN



Size [mm]	Size [in]	Inlet [mm]		Inlet [in]		Outlet [mm]		Outlet [in]	
		OD	T	OD	T	OD	T	OD	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 ₀	øD	□ D ₁	AF	Weight
<i>SFV 20 - 25 T, with threaded connections ISO 228/1 pipe threads</i>									
SFV 20 (3/4 in)	mm in	55 2.17	270 10.63	40 1.57		60 2.36		60 2.36	4.2 kg
SFV 25 (1 in)	mm in	55 2.17	270 10.63	40 1.57		60 2.36		60 2.36	4.2 kg
<i>SFV with welding fittings, DIN 2448</i>									
SFV 20 (3/4 in)	mm in	85 3.35	300 11.81		90 3.54	60 2.36	90 3.54	60 2.36	6.0 kg
SFV 25 (1 in)	mm in	85 3.35	300 11.81		90 3.54	60 2.36	90 3.54	60 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 (valve size measured on the connection diameter)	20 25	<table border="1"> <thead> <tr> <th colspan="2">Available connections</th> </tr> <tr> <th>T</th> <th>DIN welding fitting</th> </tr> </thead> <tbody> <tr> <td>DN 20</td> <td>x x</td> </tr> <tr> <td>DN 25</td> <td>x x</td> </tr> </tbody> </table>		Available connections		T	DIN welding fitting	DN 20	x x	DN 25	x x																																																																																																																																
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Connections	T	Outside threaded connections: ISO 228/1 Pipe thread - The welding fittings for single mounted safety relief valve must be ordered separately																																																																																																																																									
Pressure setting		<table border="1"> <thead> <tr> <th colspan="2">Standard pressure setting: 2x×</th> <th>SFV 20</th> <th>SFV 25</th> </tr> </thead> <tbody> <tr><td>210</td><td>10 bar g (145 psi g)</td><td>x</td><td>x</td></tr> <tr><td>211</td><td>11 bar g (160 psi g)</td><td>x</td><td>x</td></tr> <tr><td>212</td><td>12 bar g (174 psi g)</td><td>x</td><td>x</td></tr> <tr><td>213</td><td>13 bar g (188 psi g)</td><td>x</td><td>x</td></tr> <tr><td>214</td><td>14 bar g (203 psi g)</td><td>x</td><td>x</td></tr> <tr><td>215</td><td>15 bar g (218 psi g)</td><td>x</td><td>x</td></tr> <tr><td>216</td><td>16 bar g (232 psi g)</td><td>x</td><td>x</td></tr> <tr><td>217</td><td>17 bar g (247 psi g)</td><td>x</td><td>x</td></tr> <tr><td>218</td><td>18 bar g (261 psi g)</td><td>x</td><td>x</td></tr> <tr><td>219</td><td>19 bar g (276 psi g)</td><td>x</td><td>x</td></tr> <tr><td>220</td><td>20 bar g (290 psi g)</td><td>x</td><td>x</td></tr> <tr><td>221</td><td>21 bar g (305 psi g)</td><td>x</td><td>x</td></tr> <tr><td>222</td><td>22 bar g (319 psi g)</td><td>x</td><td>x</td></tr> <tr><td>223</td><td>23 bar g (334 psi g)</td><td>x</td><td>x</td></tr> <tr><td>224</td><td>24 bar g (348 psi g)</td><td>x</td><td>x</td></tr> <tr><td>225</td><td>25 bar g (363 psi g)</td><td>x</td><td>x</td></tr> <tr> <th colspan="2">Standard pressure setting with TÜV certificate: 3x×</th> <th>SFV 20</th> <th>SFV 25</th> </tr> <tr><td>310</td><td>10 bar g (145 psi g)</td><td>x</td><td>x</td></tr> <tr><td>311</td><td>11 bar g (160 psi g)</td><td>x</td><td>x</td></tr> <tr><td>312</td><td>12 bar g (174 psi g)</td><td>x</td><td>x</td></tr> <tr><td>313</td><td>13 bar g (188 psi g)</td><td>x</td><td>x</td></tr> <tr><td>314</td><td>14 bar g (203 psi g)</td><td>x</td><td>x</td></tr> <tr><td>315</td><td>15 bar g (218 psi g)</td><td>x</td><td>x</td></tr> <tr><td>316</td><td>16 bar g (232 psi g)</td><td>x</td><td>x</td></tr> <tr><td>317</td><td>17 bar g (247 psi g)</td><td>x</td><td>x</td></tr> <tr><td>318</td><td>18 bar g (261 psi g)</td><td>x</td><td>x</td></tr> <tr><td>319</td><td>19 bar g (276 psi g)</td><td>x</td><td>x</td></tr> <tr><td>320</td><td>20 bar g (290 psi g)</td><td>x</td><td>x</td></tr> <tr><td>321</td><td>21 bar g (304 psi g)</td><td>x</td><td>x</td></tr> <tr><td>322</td><td>22 bar g (319 psi g)</td><td>x</td><td>x</td></tr> <tr><td>323</td><td>23 bar g (334 psi g)</td><td>x</td><td>x</td></tr> <tr><td>324</td><td>24 bar g (348 psi g)</td><td>x</td><td>x</td></tr> <tr><td>325</td><td>25 bar g (362 psi g)</td><td>x</td><td>x</td></tr> </tbody> </table>		Standard pressure setting: 2x×		SFV 20	SFV 25	210	10 bar g (145 psi g)	x	x	211	11 bar g (160 psi g)	x	x	212	12 bar g (174 psi g)	x	x	213	13 bar g (188 psi g)	x	x	214	14 bar g (203 psi g)	x	x	215	15 bar g (218 psi g)	x	x	216	16 bar g (232 psi g)	x	x	217	17 bar g (247 psi g)	x	x	218	18 bar g (261 psi g)	x	x	219	19 bar g (276 psi g)	x	x	220	20 bar g (290 psi g)	x	x	221	21 bar g (305 psi g)	x	x	222	22 bar g (319 psi g)	x	x	223	23 bar g (334 psi g)	x	x	224	24 bar g (348 psi g)	x	x	225	25 bar g (363 psi g)	x	x	Standard pressure setting with TÜV certificate: 3x×		SFV 20	SFV 25	310	10 bar g (145 psi g)	x	x	311	11 bar g (160 psi g)	x	x	312	12 bar g (174 psi g)	x	x	313	13 bar g (188 psi g)	x	x	314	14 bar g (203 psi g)	x	x	315	15 bar g (218 psi g)	x	x	316	16 bar g (232 psi g)	x	x	317	17 bar g (247 psi g)	x	x	318	18 bar g (261 psi g)	x	x	319	19 bar g (276 psi g)	x	x	320	20 bar g (290 psi g)	x	x	321	21 bar g (304 psi g)	x	x	322	22 bar g (319 psi g)	x	x	323	23 bar g (334 psi g)	x	x	324	24 bar g (348 psi g)	x	x	325	25 bar g (362 psi g)	x	x
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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

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

Certified SFV 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.
20	3/4	SFV20 T 310	10	145	2416+285
20	3/4	SFV20 T 311	11	160	2416+286
20	3/4	SFV20 T 312	12	174	2416+287
20	3/4	SFV20 T 313	13	189	2416+160
20	3/4	SFV20 T 314	14	203	2416+288
20	3/4	SFV20 T 315	15	218	2416+289
20	3/4	SFV20 T 316	16	232	2416+290
20	3/4	SFV20 T 317	17	247	2416+291
20	3/4	SFV20 T 318	18	261	2416+161
20	3/4	SFV20 T 319	19	276	2416+292
20	3/4	SFV20 T 320	20	290	2416+293
20	3/4	SFV20 T 321	21	305	2416+162
20	3/4	SFV20 T 322	22	319	2416+294
20	3/4	SFV20 T 323	23	334	2416+295
20	3/4	SFV20 T 324	24	348	2416+296
20	3/4	SFV20 T 325	25	363	2416+186

Certified SFV valves with standard set pressure

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

Certified SFV 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.
25	1	SFV25 T 310	10	145	2416+297
25	1	SFV25 T 311	11	160	2416+298
25	1	SFV25 T 312	12	174	2416+299
25	1	SFV25 T 313	13	189	2416+163
25	1	SFV25 T 314	14	203	2416+300
25	1	SFV25 T 315	15	218	2416+301
25	1	SFV25 T 316	16	232	2416+302
25	1	SFV25 T 317	17	247	2416+303
25	1	SFV25 T 318	18	261	2416+164
25	1	SFV25 T 319	19	276	2416+304
25	1	SFV25 T 320	20	290	2416+305
25	1	SFV25 T 321	21	305	2416+165
25	1	SFV25 T 322	22	319	2416+306
25	1	SFV25 T 323	23	334	2416+307
25	1	SFV25 T 324	24	348	2416+308
25	1	SFV25 T 325	25	363	2416+187

Flanges and gaskets

Type	Code No.
Flanges + gaskets set for SFV 20	148F3020
Flanges + gaskets set for SFV 25	148F3021

Repair kit

Type	Code No.
Repair kit for SFV 20 (gaskets and cone)	2453+082
Repair kit for SFV 25 (gaskets and cone)	2453+083

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 (CO₂)
- 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

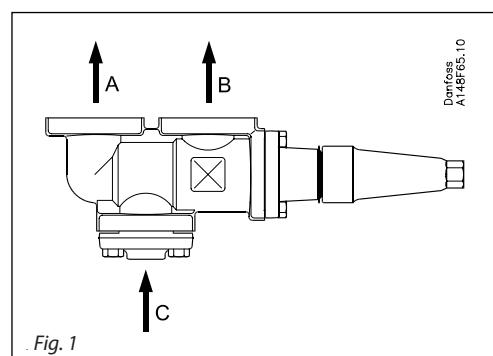
The "full temperature range" packing gland ensures perfect tightness in the whole temperature range: -50 – 100 °C / -58 – 212 °F. The packing gland is equipped with a scraper ring to prevent penetration of dirt and other foreign bodies.

Technical data

- Refrigerants**
 Applicable to HCFC, non flammable HFC, R717 (Ammonia) and R744 (CO₂).
 Flammable hydrocarbons are not recommended.
 The valve is only recommended for use in closed circuits.
- For further information please contact Danfoss.
- 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 _v - value	C _v - value
	[m ³ /h]	[Usgal/min]
DSV 1	17.5	20.3
DSV 2	30.0	34.8

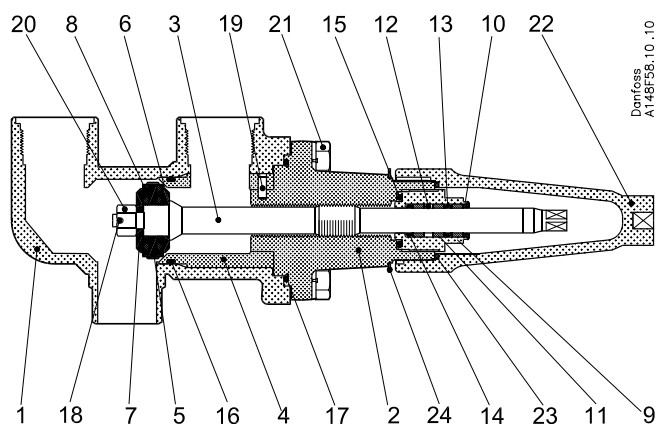
- Installation**
 DSV are used as changeover valves between two SFA / BSV / SFV safety valves. When the spindle is turned clockwise (fig. 1) the inlet port C is connected to B. When the spindle is turned anticlockwise (fig. 1) the inlet port C is connected to A. For further information refer to installation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



Change-over valves, type DSV 1 and DSV 2

Material specification

DSV 1

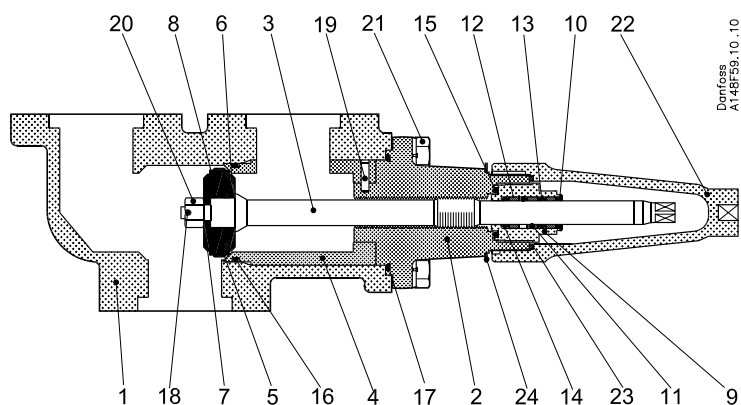


No.	Part	Material	DIN / EN	ISO	ASTM
1	Housing	Steel	P285QH, EN10222-4		LF2A350
2	Bonnet	Steel	P285QH, EN10222-4		LF2A350
3	Spindle	Stainless steel	X10CrNiS 18 9 17440	Type 17 683/13	AISI 303
4	Seat	Steel	9 SMn28, 1651	Type2, R683/9	1213, SAEJ 403
5	Cone, Middle	Steel	9 SMn28, 1651	Type2, R683/9	1213, 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

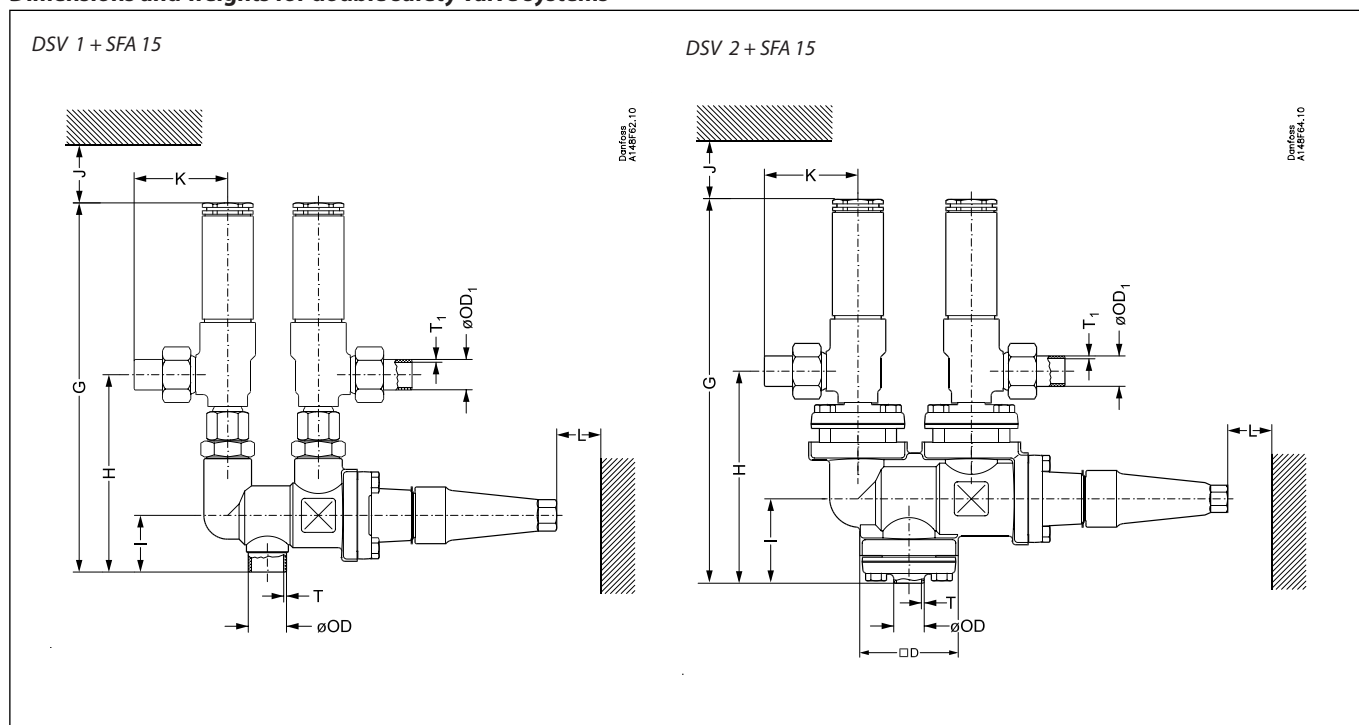
DSV 2



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	Identification 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							G	H	I	J	K	L	Weight
DSV 1 (D25)	mm	25	33.7	26.9	2.6	2.3			339	174	50	40	82.5	80	4.55 kg
	in	1	1.33	1.06	0.10	0.09			13.35	6.85	1.97	1.58	3.25	3.15	10.03 lb

Valve size	DN	ØOD	ØOD1	T	T1	ØD		G	H	I	J	K	L	Weight
------------	----	-----	------	---	----	----	--	---	---	---	---	---	---	--------

		SFA 15							G	H	I	J	K	L	Weight
DSV 2 (FD20)	mm	20	26.9	26.9	2.3	2.3	82.5		351	186	73.5	10	82.5	80	9.3 kg
	in	¾	1.06	1.06	0.09	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	ØD		G	H	I	J	K	L	Weight
------------	----	-----	------	---	----	----	--	---	---	---	---	---	---	--------

		SFA 15							G	H	I	J	K	L	Weight
DSV 2 (FD25)	mm	25	33.7	26.9	2.6	2.3	82.5		351	186	73.5	10	82.5	80	9.3 kg
	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

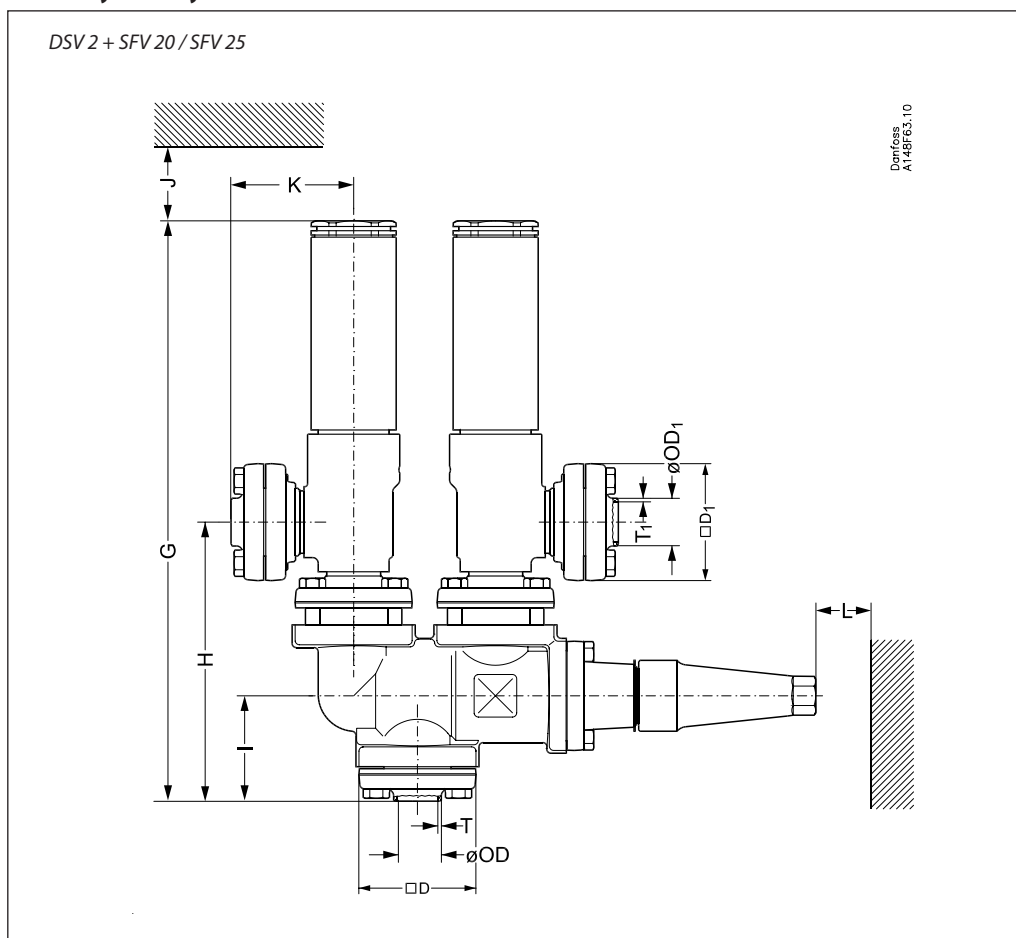
Valve size	DN	ØOD	ØOD1	T	T1	ØD		G	H	I	J	K	L	Weight
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		SFA 15							G	H	I	J	K	L	Weight
DSV 2 (FD32)	mm	32	42.4	26.9	2.6	2.3	82.5		351	186	73.5	10	82.5	80	9.3 kg
	in	1 ¼	1.67	1.06	0.10	0.09	3.25		13.82	7.32	2.89	0.39	3.25	3.15	20.5 lb

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

SFV 20

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

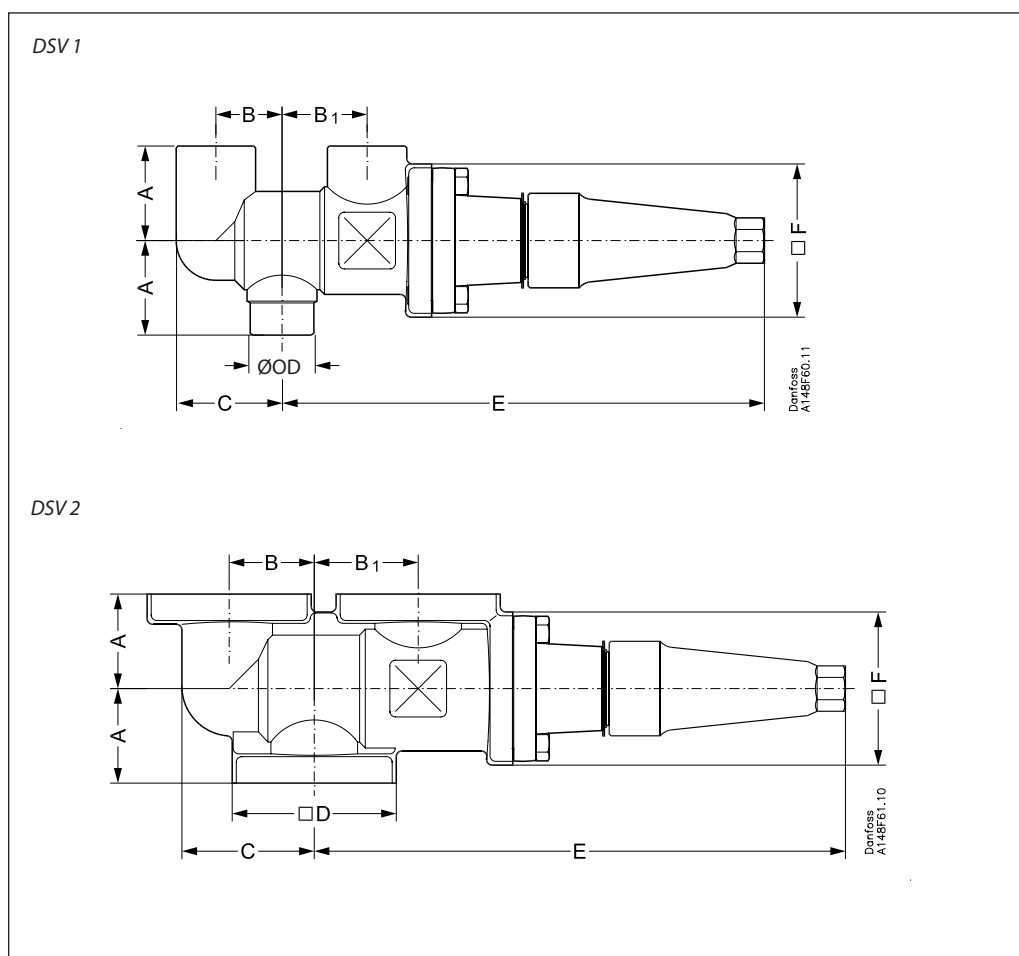
SFV 25

DSV 2 (FD32)	mm in	32 1 1/4	42.4 1.67	42.4 1.67	2.6 0.10	2.6 0.10	82.5 3.25	82.5 3.25	412 16.22	197 7.76	73.5 2.89	10 0.39	85 3.35	80 3.15	11.9 kg 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



Valve size	A	B	B ₁	C	ØOD	E	□F	Weight
DSV 1	mm	50	35	45	56	33.7	77	3.6 kg
	in	2	1.38	1.77	2.20	1.33	3.03	7.94 lb

Valve size	A	B	B ₁	C	□D	E	□F	Weight
DSV 2	mm	50	45	55	70	82,5	77	6.1 kg
	in	2	1.77	2.17	2.76	3.25	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	148F3005
DSV 2	FD20 (3/4 in)	G 3/4" thread flange	ND20 (3/4 in)	SFA 15 / BSV 8	148F3006
DSV 2	FD25 (1 in)	G 3/4" thread flange	ND20 (3/4 in)	SFA 15 / BSV 8	148F3007
DSV 2	FD32 (1 1/4 in)	G 3/4" thread flange	ND20 (3/4 in)	SFA 15 / BSV 8	148F3008
DSV 2	FD25 (1 in)	G 1 1/4" thread flange	FD25 (1 in)	SFV20	148F3009
DSV 2	FD32 (1 1/4 in)	G 1 1/4" thread flange	FD25 (1 in)	SFV20	148F3010
DSV 2	FD32 (1 1/4 in)	G 1 1/4" thread flange	FD32 (1 1/4 in)	SFV25	148F3011
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	148F3037
Flanges + gaskets set for FD20 / ND20 DSV2 / SFA 15 / BSV 8	148F3038
Flanges + gaskets set for FD25 / ND20 DSV2 / SFA 15 / BSV 8	148F3039
Flanges + gaskets set for FD32 / ND20 DSV2 / SFA 15 / BSV 8	148F3040
Flanges + gaskets set for FD25 / FD25 DSV2 / SFV 20	148F3041
Flanges + gaskets set for FD32 / FD25 DSV2 / SFV 20	148F3042
Flanges + gaskets set for FD32 / FD32 DSV2 / SFV 25	148F3043

Safety relief valves

Type BSV-8

Contents

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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 (CO₂).
- 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 (CO₂).
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

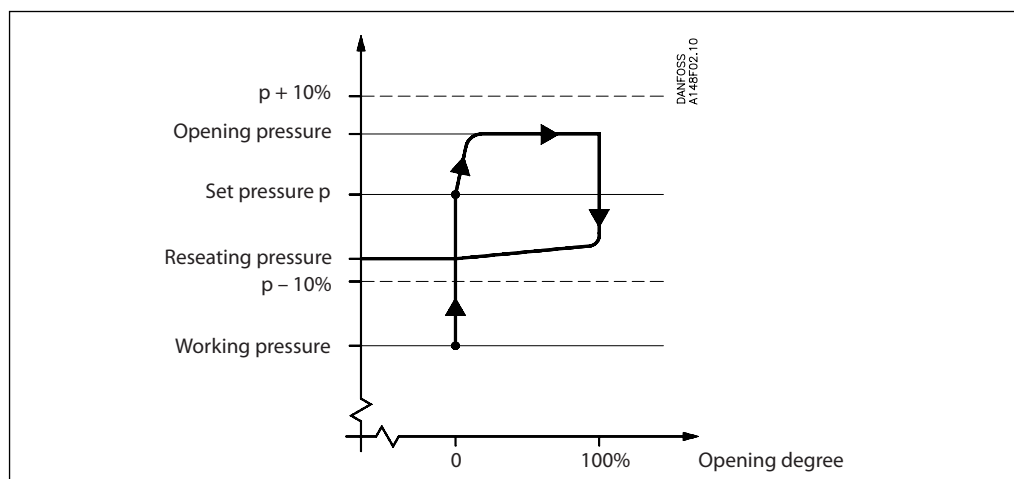


Pressure Equipment Directive (PED)

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
Nominal bore	8 mm (0.315 in)
Classified for	Fluid group I
Category	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 d_0	Flow area A_0	De-rated, certified coefficient of discharge K_{dr}
	Inlet	Outlet			
BSV 8	15 mm ½ in	20 mm ¾ in	8 mm 0.315 in	50 mm ² 0.078 in ²	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 (κ) see table 2.

A_0 Flow area of the safety relief valve (mm²).

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. (m³/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!

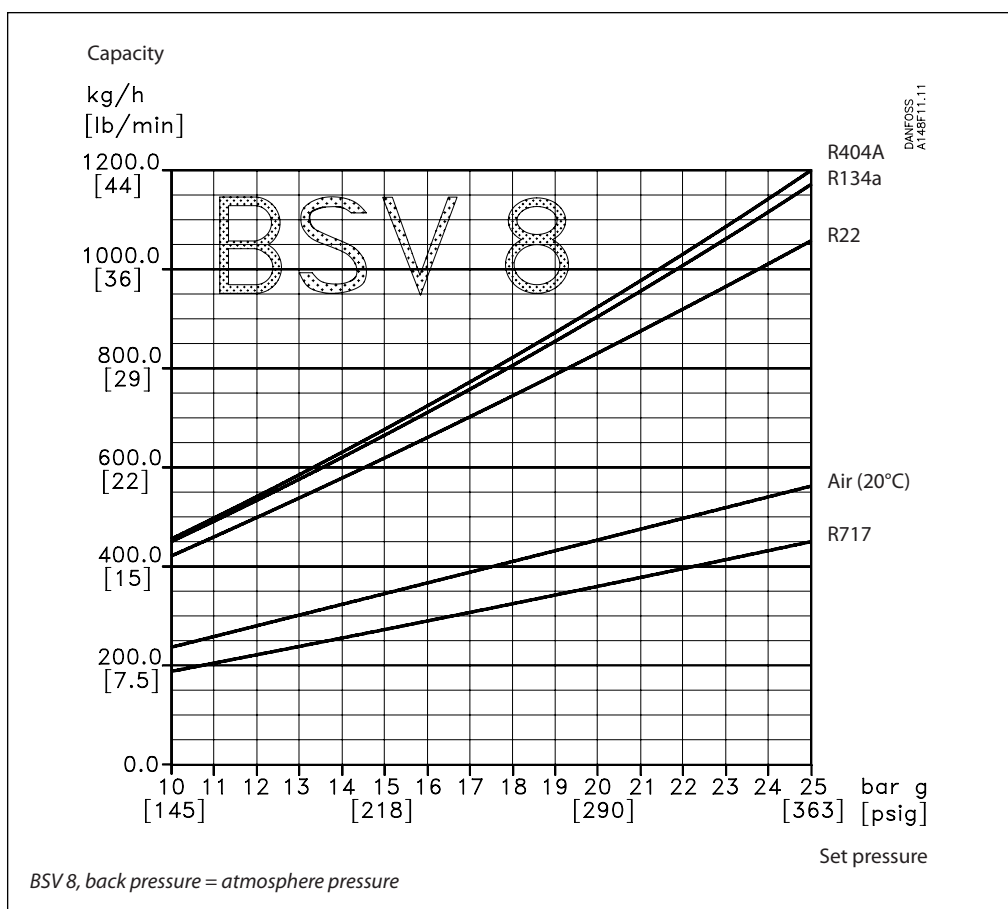
For back pressure higher than $0.5 \times p$, the Danfoss computer program (DIRcalc™) or the above mentioned standard must be used when calculating the capacity.

Table 2. Properties of Refrigerants

Refrigerant	Isentropic 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 ₂)	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)
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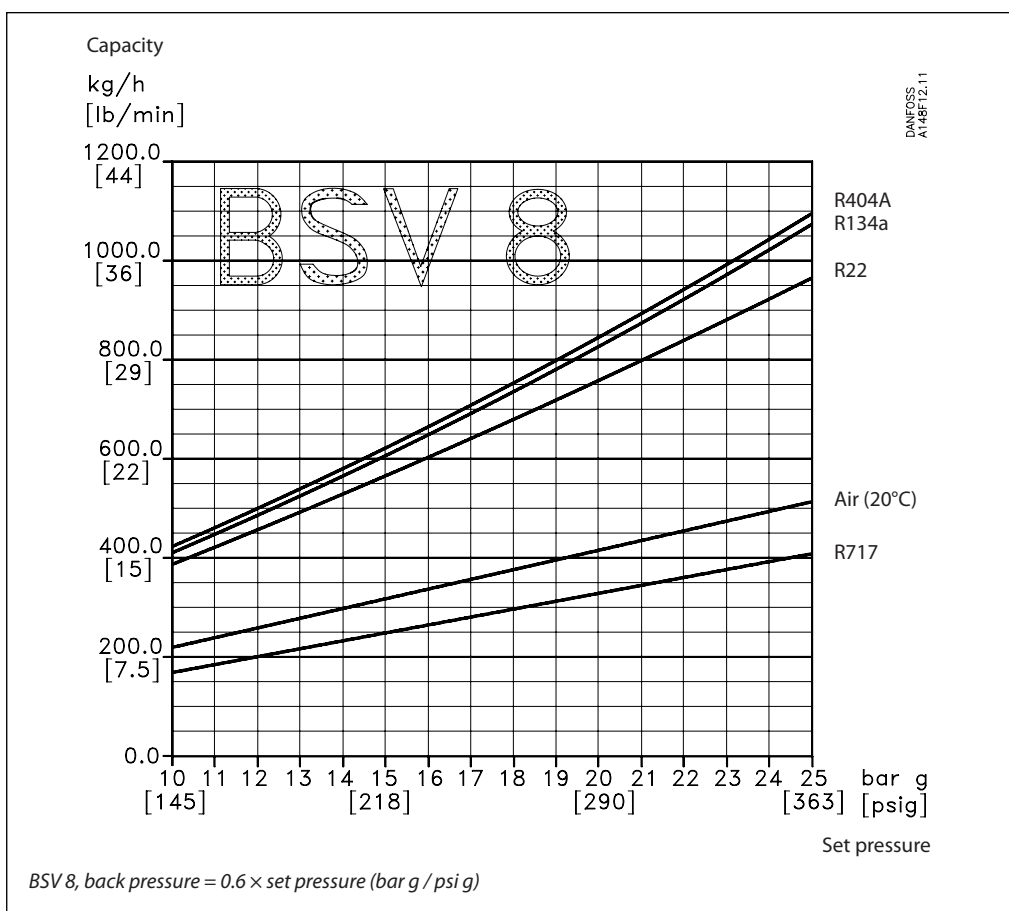
BSV 8, back pressure = atmosphere pressure

13 bar g 189 psi g	kg/h lb/min	540 19.9	575 21.2	590 21.6	240 8.7	300 11.1
18 bar g 261 psi g	kg/h lb/min	745 27.5	810 29.7	825 30.3	325 11.9	410 15.0
21 bar g 305 psi g	kg/h lb/min	875 32.2	955 35.1	970 35.7	375 13.8	475 17.4
25 bar g 363 psi g	kg/h lb/min	1060 38.9	1175 43.2	1200 44.0	445 16.4	560 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)
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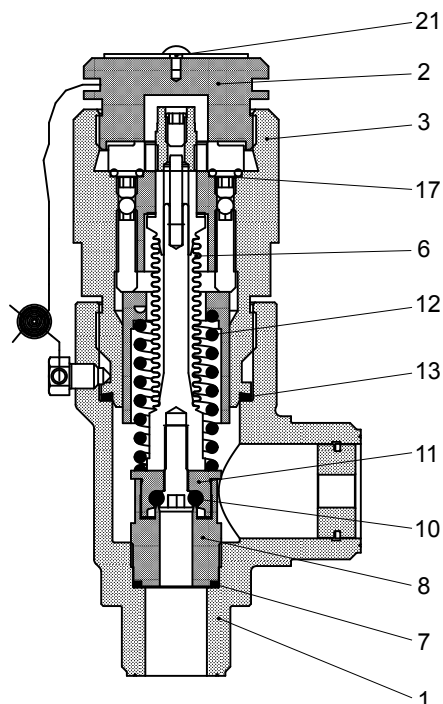
BSV 8, back pressure = 0.6 × set pressure (bar g/psi g)

13 bar g 189 psi g	kg/h lb/min	495 18.2	525 19.4	535 19.7	215 8.0	275 10.1
18 bar g 261 psi g	kg/h lb/min	680 25.1	740 27.1	755 27.7	295 10.9	375 13.7
21 bar g 305 psi g	kg/h lb/min	800 29.4	875 32.1	885 32.6	345 12.6	435 15.9
25 bar g 363 psi g	kg/h lb/min	965 35.5	1075 39.4	1095 40.2	410 15.0	510 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



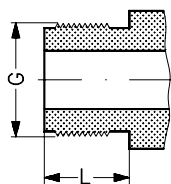
No.	Part	Material	DIN	ISO	ASTM
1	Housing	Steel	TT St 35 N/V, 17173	TW 6, 2604/3-75	Grade 1, A333, A334 A350 LF2 ¹⁾
2	Threaded plug	Steel	9S Mn28, 1651 - 88	11S Mn28 630/9 - 88	1213 SAE J 403
3	Valve top	Steel	St. 37.2, 1652 - 2 - 90	Fe 360 B, 660 - 80	Grade C, A 283
6	Bellow	Stainless steel			
7	Gasket	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			

¹⁾ Alternative material

Safety relief valves, type BSV-8

Connections

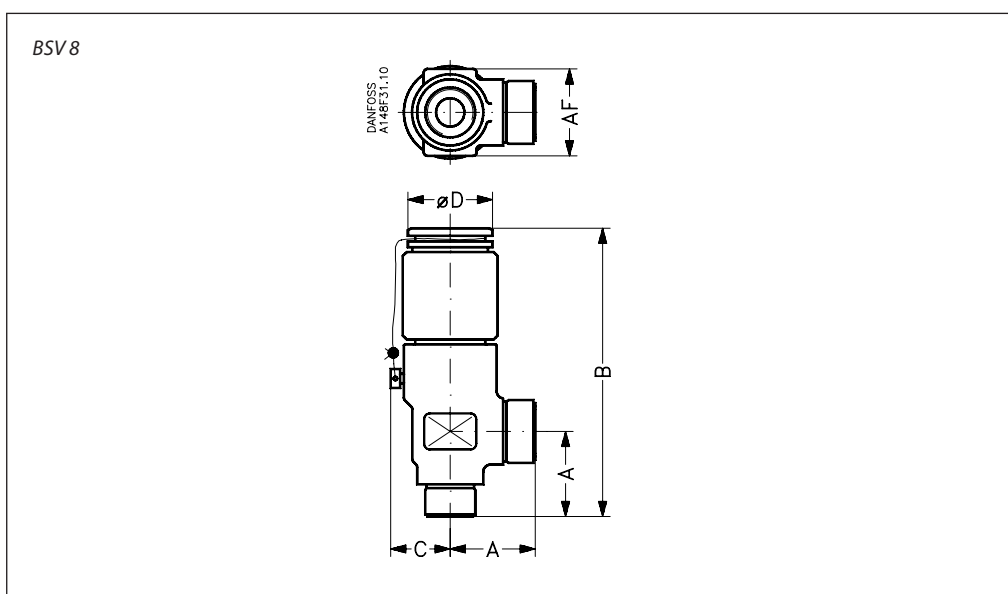
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Size [mm]	Size [in]	Inlet	Outlet		L [mm]	L [in]		
<i>T outside pipe thread, (ISO 228/1)</i>								
8	5/16	G 3/4	G 1		17	0.67		

Dimension and weight



Valve size		A	B	C	∅D	AF	Weight
<i>BSV 8, with threaded connections ISO 228/1 pipe threads</i>							
BSV 8 (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

BSV 8 T 211

Type codes

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



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	5/16	BSV8 T 210	10	145	2416+200
8	5/16	BSV8 T 211	11	160	2416+309
8	5/16	BSV8 T 212	12	174	2416+310
8	5/16	BSV8 T 213	13	189	2416+201
8	5/16	BSV8 T 214	14	203	2416+311
8	5/16	BSV8 T 215	15	218	2416+312
8	5/16	BSV8 T 216	16	232	2416+221
8	5/16	BSV8 T 217	17	247	2416+313
8	5/16	BSV8 T 218	18	261	2416+202
8	5/16	BSV8 T 219	19	276	2416+225
8	5/16	BSV8 T 220	20	290	2416+203
8	5/16	BSV8 T 221	21	305	2416+204
8	5/16	BSV8 T 222	22	319	2416+224
8	5/16	BSV8 T 223	23	334	2416+314
8	5/16	BSV8 T 224	24	348	2416+315
8	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	5/16	BSV8 T 310	10	145	2416+316
8	5/16	BSV8 T 311	11	160	2416+317
8	5/16	BSV8 T 312	12	174	2416+318
8	5/16	BSV8 T 313	13	189	2416+206
8	5/16	BSV8 T 314	14	203	2416+319
8	5/16	BSV8 T 315	15	218	2416+320
8	5/16	BSV8 T 316	16	232	2416+222
8	5/16	BSV8 T 317	17	247	2416+321
8	5/16	BSV8 T 318	18	261	2416+207
8	5/16	BSV8 T 319	19	276	2416+322
8	5/16	BSV8 T 320	20	290	2416+208
8	5/16	BSV8 T 321	21	305	2416+209
8	5/16	BSV8 T 322	22	319	2416+210
8	5/16	BSV8 T 323	23	334	2416+323
8	5/16	BSV8 T 324	24	348	2416+324
8	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

Contents

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Installation of compressor pressure relief valve POV + BSV	54
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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 (CO₂).
- 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 (CO₂)
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.

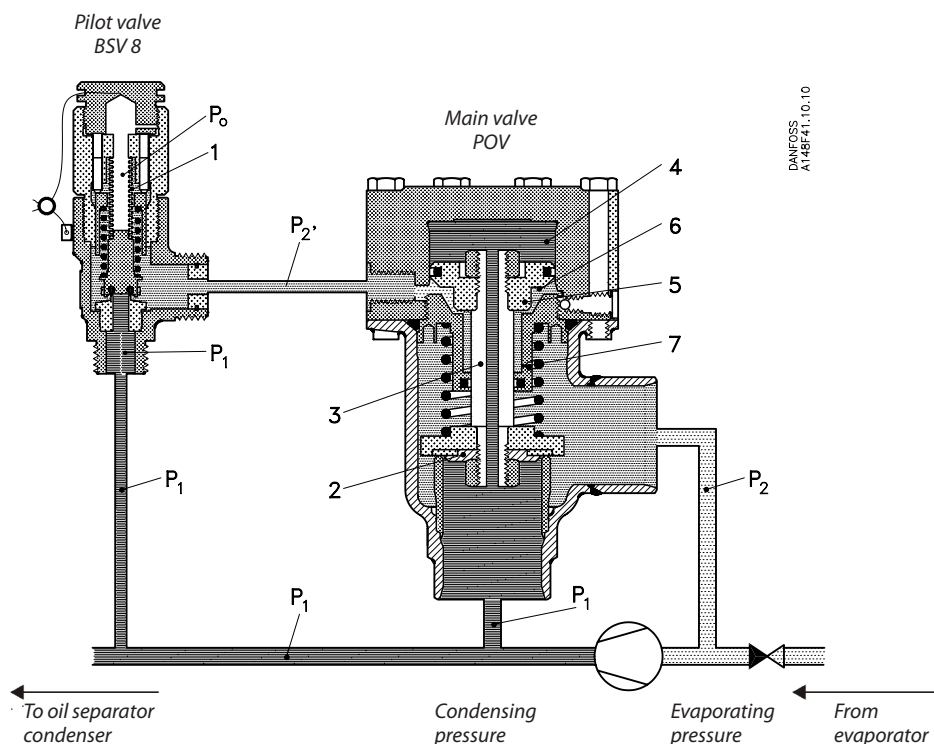
Main valve POV

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

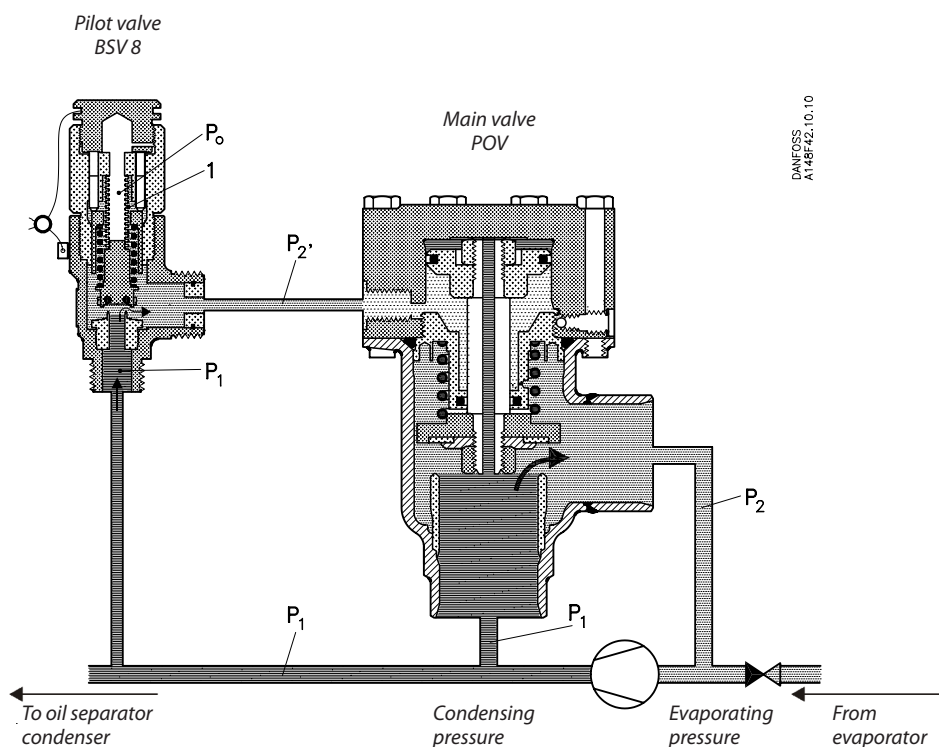
When the pressure P_1 reaches the set pressure of the pilot valve, it starts opening. The pressure of the pilot line P_2' and of the lower chamber (6) of the main valve increases. The pressure of the lower chamber is limited by flow through the nozzle (7). When the flow through the pilot valve exceeds 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 ≤ 30 seconds.

fig. 1, Inactive system (closed valve)



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fig. 2, Active system (open valve)



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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 ΔP_{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.

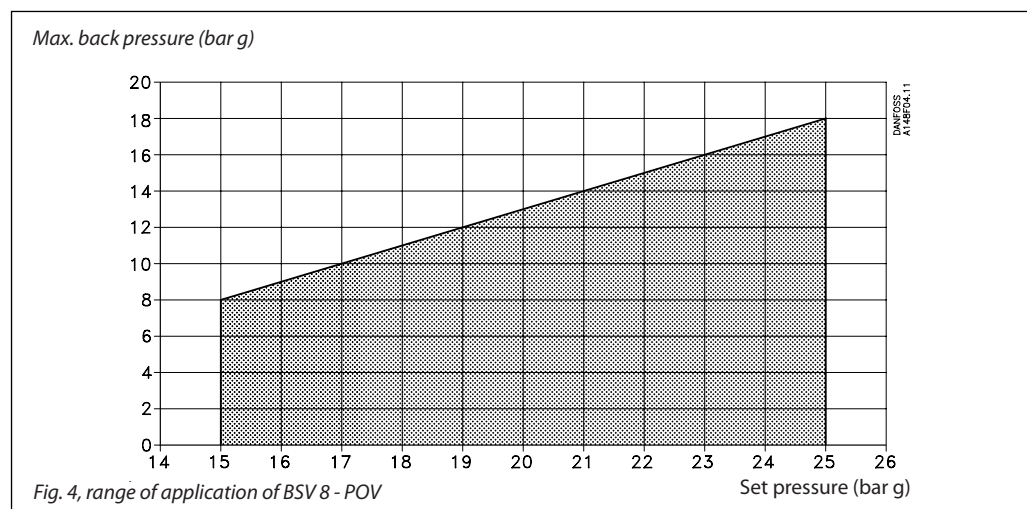
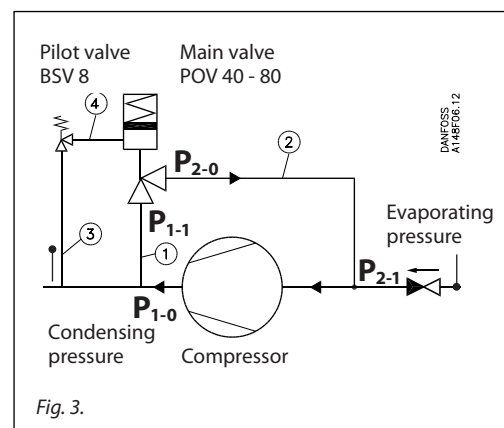
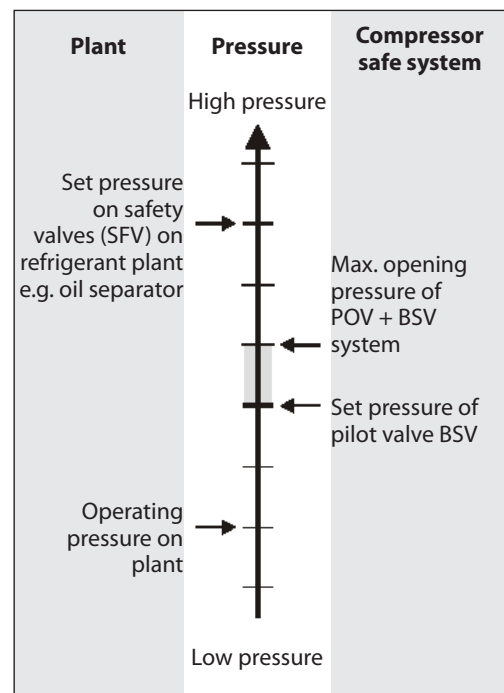
Pressure loss in inlet line

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 ΔP_{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) ΔP_{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.

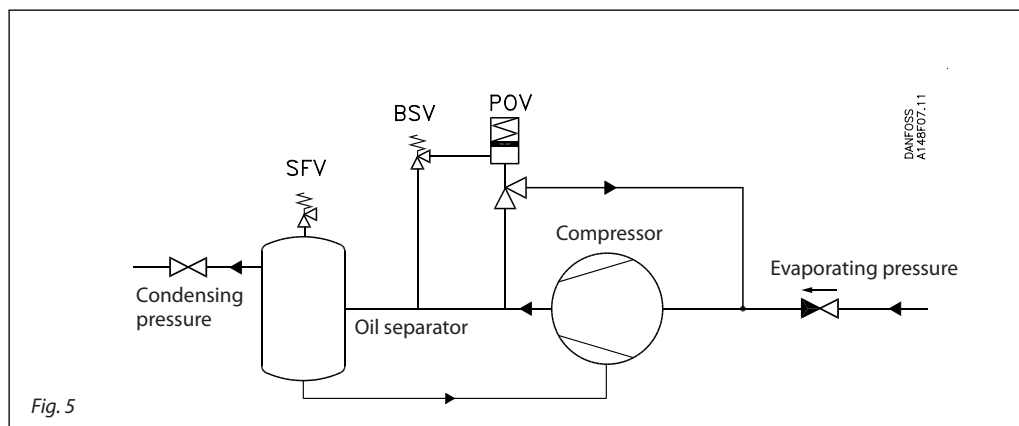


Note! Valve type POV is categorized as a pressure relief accessory (not as a safety accessory). Hence a safety valve (e.g. SFV) has to be installed to protect the system against excessive pressure.

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.

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.

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



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 d ₀	Flow area A ₀	De-rated, certified coefficient of discharge K _{dr}
	Inlet	Outlet			
POV 600	40 mm	40 mm	32.6 mm	835 mm ²	0.735
	1½ in.	1½ in.	1.28 in.	1.28 in ²	
POV 1050	65 mm	65 mm	39.8 mm	1244 mm ²	0.859
	2½ in.	2½ in.	1.56 in.	1.93 in ²	
POV 2150	80 mm	80 mm	59 mm	2734 mm ²	0.799
	3 in.	3 in.	2.32 in.	4.24 in ²	

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 (κ) see table 2 (-)

A₀ Flow area of the pressure relief valve (mm²).

K_{dr} De-rated coefficient of discharge (K_{dr} = K_d × 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 × relieving pressure (P_b < 0.5 × p).

For all BSV safety valves K_b = 1.0

v Specific volume of the vapour. (m³/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} × 1.1 + P_{atm} (bar absolute)

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

Important!

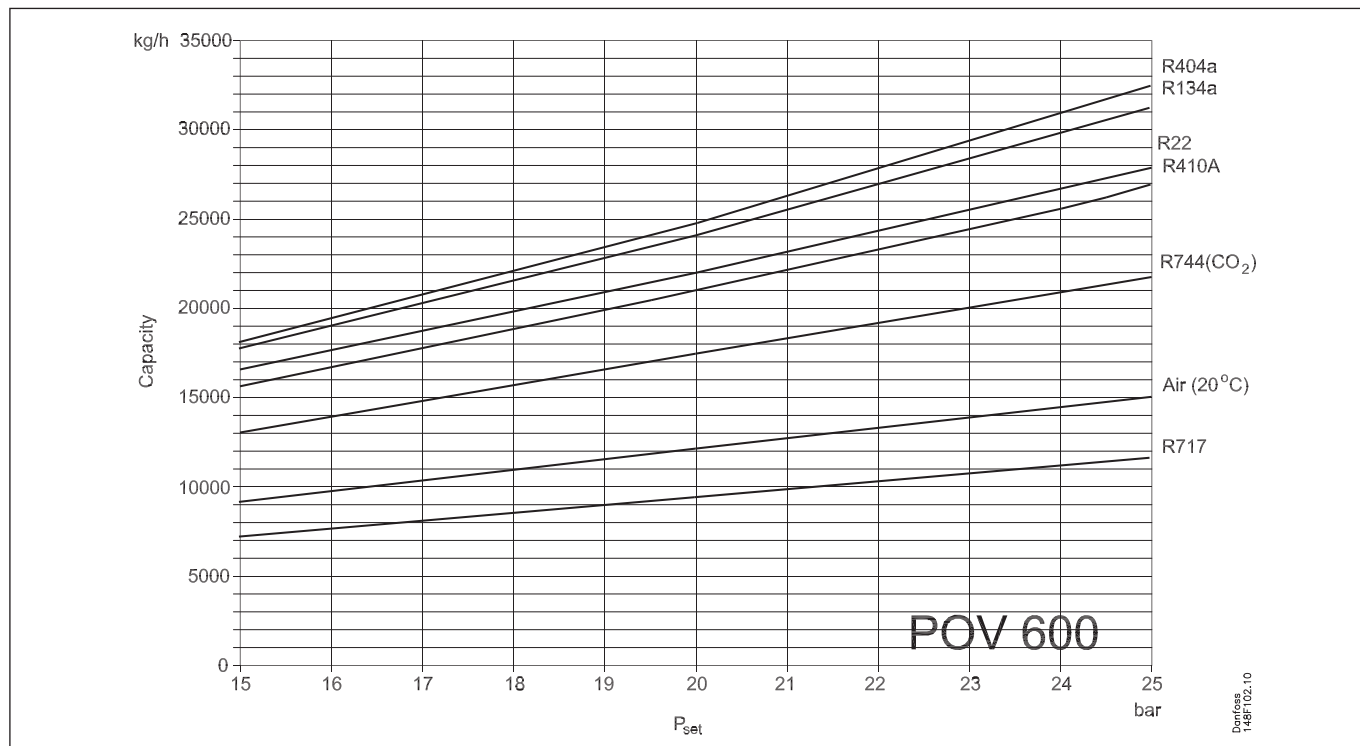
For back pressure higher than 0.5 × p, the Danfoss computer program (DIRcalc™) or the above mentioned standard must be used when calculating the capacity.

Table 2. Properties of Refrigerants

Refrigerant number	Isentropic exponent κ	Discharge function 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 ₂)	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^3/kg
 q_m Discharge capacity in kg/h
 K_b Correction factor for sub-critical flow
 d_o Flow diameter seat mm²
 A_o Flow area seat in mm²
 K_{dr} De-rated coefficient of discharge at defined lifting height

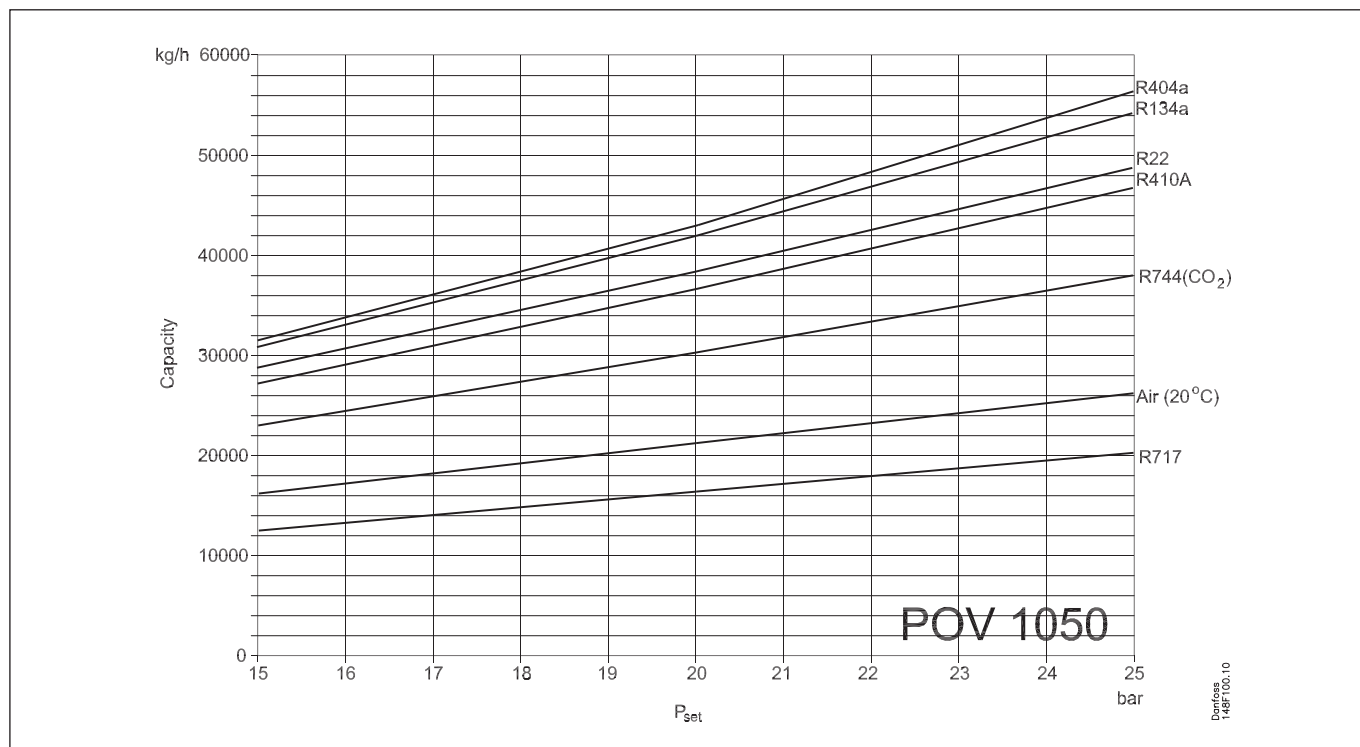
P_{set}		P		R22			R134a			R404a			R717		
[bar g]	[psi g]	[bar a]	[psi a]	[v]	[kg/h]	[lb/min]	[v]	[kg/h]	[lb/min]	[v]	[kg/h]	[lb/min]	[v]	[kg/h]	[lb/min]
10	145	12.0	174	0.01974	11077	407	0.01655	11907	437	0.01629	11953	439	0.10753	4933	181
11	160	13.1	190	0.01797	12130	446	0.01502	13059	480	0.01470	13147	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	0.00266	52962	1947	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 _{set}		P		Air(20 °C)			R410a			R744 (CO ₂)		
[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	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_{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^3/kg
 q_m Discharge capacity in kg/h
 K_b Correction factor for sub-critical flow
 d_o Flow diameter seat mm²
 A_o Flow area seat in mm²
 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	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

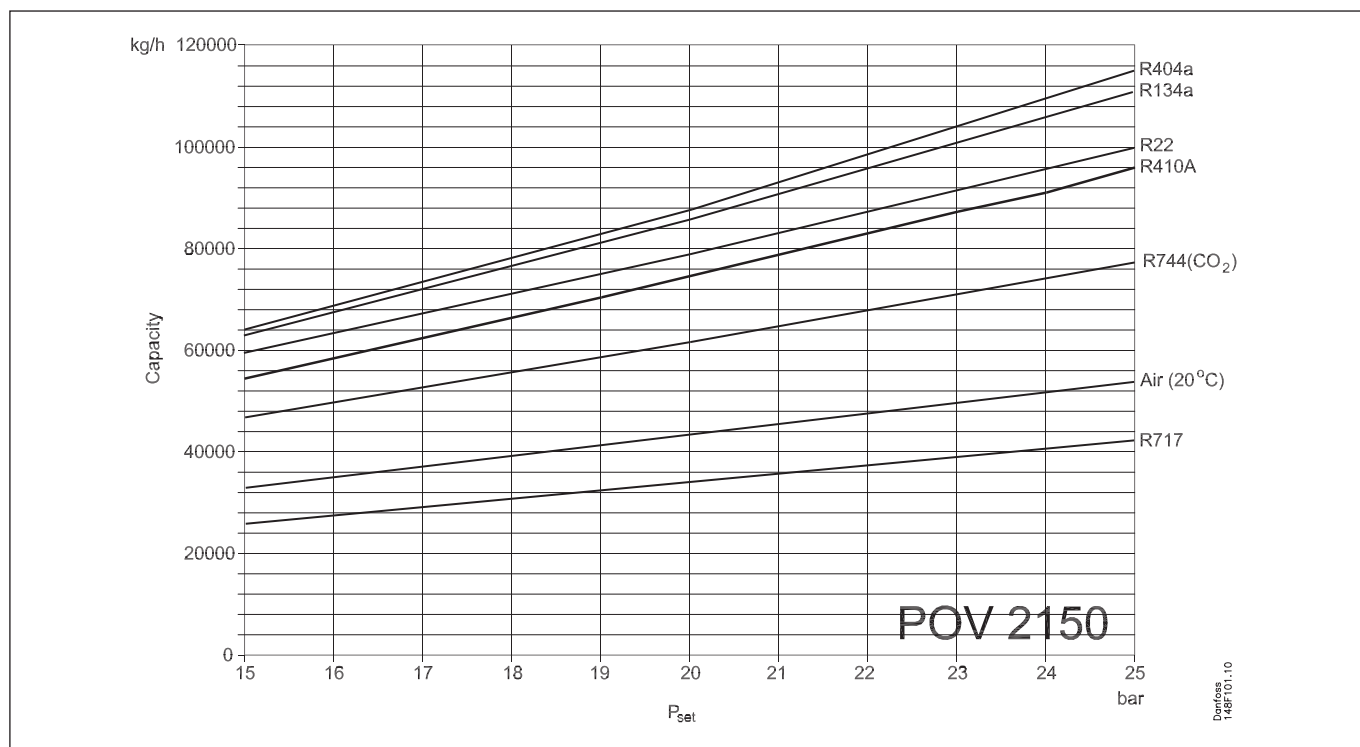
Capacity - POV 1050

(Continued)

P _{set}		P		Air(20 °C)			R410a			R744 (CO ₂)		
[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_{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^3/kg
 q_m Discharge capacity in kg/h
 K_b Correction factor for sub-critical flow
 d_o Flow diameter seat mm^2
 A_o Flow area seat in mm^2
 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	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	0.00266	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

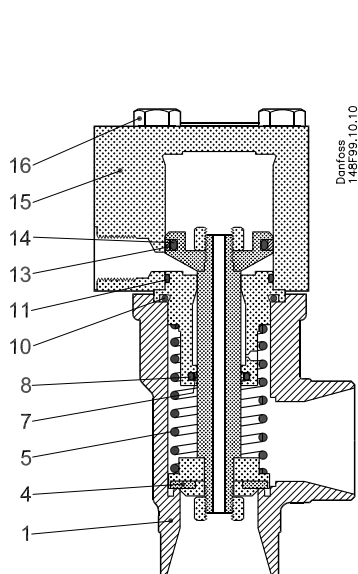
Capacity - POV 2150

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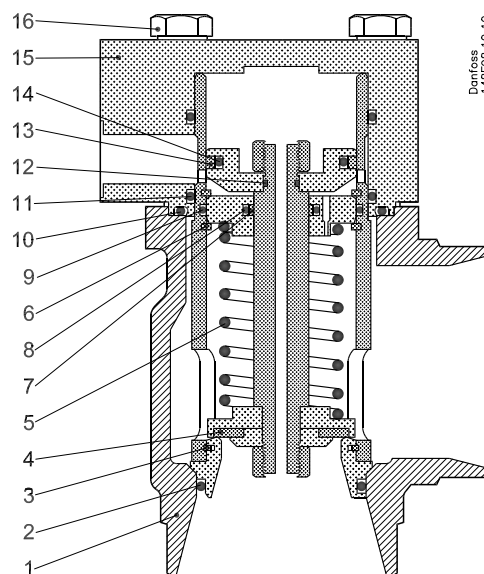
P _{set}		P		Air(20 °C)			R410a			R744 (CO ₂)		
[bar g]	[psi g]	[bar a]	[psi a]	[v]	[kg/h]	[lb/min]	[v]	[kg/h]	[lb/min]	[v]	[kg/h]	[lb/min]
10	145	12.0	174	0.06790	22605	831	0.02213	37249	1369	0.03196	32094	1179
11	160	13.1	190	0.06220	24677	907	0.02022	40716	1496	0.02930	35022	1287
12	174	14.2	206	0.05738	26750	983	0.01848	44342	1629	0.02690	38055	1398
13	189	15.3	222	0.05325	28822	1059	0.01690	48131	1768	0.02514	40861	1501
14	203	16.4	238	0.04968	30894	1135	0.01569	51717	1900	0.02352	43737	1607
15	218	17.5	254	0.04656	32966	1211	0.01457	55438	2037	0.02201	46704	1716
16	232	18.6	270	0.04381	35038	1287	0.01353	59310	2179	0.02061	49757	1828
17	247	19.7	286	0.04136	37110	1364	0.01275	62878	2310	0.01932	52890	1943
18	261	20.8	302	0.03917	39183	1440	0.01201	66570	2446	0.01825	55917	2055
19	276	21.9	318	0.03721	41254	1516	0.01132	70359	2585	0.01726	58999	2168
20	290	23.0	334	0.03543	43327	1592	0.01060	74513	2738	0.01645	61933	2276
21	305	24.1	350	0.03381	45399	1668	0.00995	78726	2893	0.01560	65101	2392
22	319	25.2	365	0.03233	47471	1744	0.00944	82648	3037	0.01485	68230	2507
23	334	26.3	381	0.03098	49543	1820	0.00887	87103	3201	0.01420	71281	2619
24	348	27.4	397	0.02974	51615	1897	0.00847	90981	3343	0.01355	74481	2737
25	363	28.5	413	0.02859	53687	1973	0.00795	95776	3519	0.01299	77582	2851
26	377	29.6	429	0.02753	55760	2049	0.00758	99961	3673	0.01239	80956	2975
27	392	30.7	445	0.02654	57832	2125	0.00722	104308	3833	0.01185	84305	3098
28	406	31.8	461	0.02562	59904	2201	0.00687	108831	3999	0.01145	87287	3207
29	421	32.9	477	0.02477	61977	2277	0.00653	113543	4172	0.01093	90872	3339
30	435	34.0	493	0.02396	64048	2353	0.00621	118362	4349	0.01059	93850	3448
31	450	35.1	509	0.02321	66121	2430	0.00589	123485	4537	0.01015	97401	3579
32	464	36.2	525	0.02251	68192	2506	0.00558	128842	4734	0.00978	100769	3703
33	479	37.3	541	0.02184	70265	2582	0.00530	134195	4931	0.00948	103894	3817
34	493	38.4	557	0.02122	72337	2658	0.00508	139076	5110	0.00910	107593	3953
35	508	39.5	573	0.02063	74410	2734	0.00478	145413	5343	0.00875	111285	4089
36	522	40.6	589	0.02007	76480	2810	0.00455	151104	5552	0.00847	114673	4214
37	537	41.7	605	0.01954	78554	2886	0.00430	157526	5788	0.00820	118114	4340
38	551	42.8	621	0.01904	80625	2962	0.00409	163636	6013	0.00794	121605	4468
39	566	43.9	637	0.01856	82697	3039	0.00385	170813	6276	0.00768	125225	4601
40	580	45.0	653	0.01811	84770	3115	0.00362	178349	6553	0.00743	128900	4736

Pressure relief valve, type POV

Material specification



POV 600



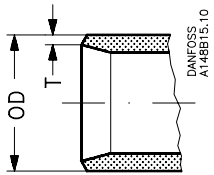
POV 1050, POV 2150

No	Part	Material	EN	ISO	ASTM
1	Housing	Steel	P285QH 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 EN 10028-3		Grade A, A662
16	Bolt	Stainless steel	A2-70 1515-1	A2-70 3506	Grade B8 A320

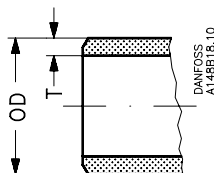
Pressure relief valve, type POV

Connections

DIN



ANSI



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

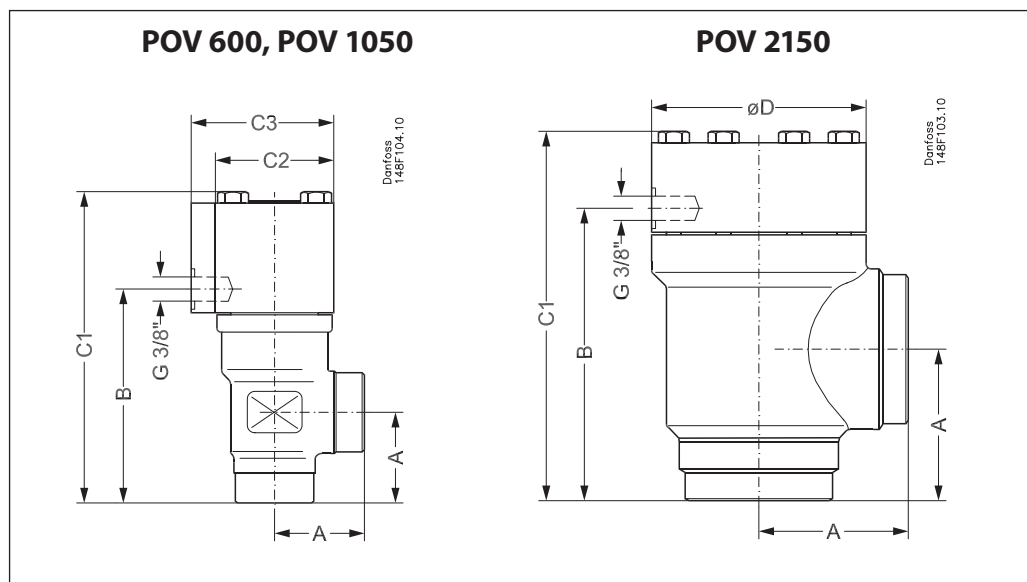
Welding DIN (2448)

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



Valve size		A	B	C1	C2	C3	ØD	Weight
POV 600 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 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 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	2417+232
POV 600 BUTT WELD ANSI DN 40	2417+047
POV 1050 BUTT WELD DIN DN 65	148F3026
POV 1050 BUTT WELD ANSI DN 65	148F3027
POV 2150 BUTT WELD DIN DN 80	148F3033
POV 2150 BUTT WELD ANSI DN 80	148F3034

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	148H3453

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.

