ENGINEERING TOMORROW

Data Sheet

Float valve
Type **SV 4**, **SV 5** and **SV 6**

Liquid level regulators in refrigeration, freezing and air conditioning systems

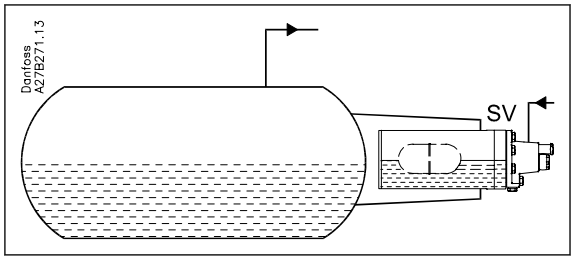
SV 4, SV 5 and SV 6 are for use on the low pressure side as modulating liquid level regulators in refrigeration, freezing and air conditioning systems with ammonia and other common types of refrigerants.

Features:

- Reliable function
- Stable regulation, even during momentary load change
- Liquid injection into the float housing or directly into the evaporator through external pipe connection
- Orifice assembly and filter can be replaced without evacuating the float housing
- Can be supplied without float housing for direct installation in the system (special order only)
- Can be used as pilot float for PMLF if mounted with special orifice (diameter Ø2.5 mm)
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company.

Applications

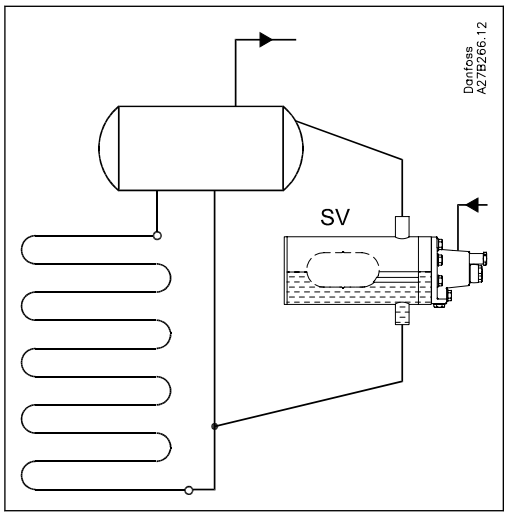
The liquid expands into the float housing



Direct liquid injection into the float housing. 4 pcs. M6 screws (pos. 28) are removed, and pos. 26 remains blanked off, see Figure 2. This leaves four holes through which liquid expands directly.

NOTE:
If the capacity is too high, only remove two or three screws. Pos. 28, see Figure 2.

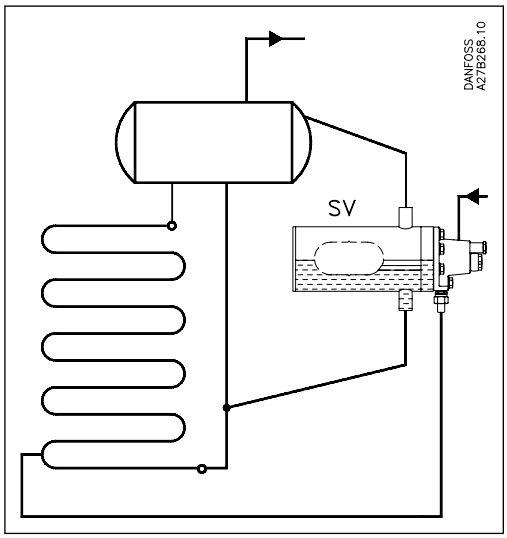
The liquid expands into the float housing



4 pcs. M6 screws (pos. 28) are removed, and pos. 26 remains blanked off, see Figure 2. This leaves four holes through which liquid expands directly.

NOTE:
If the capacity is too high, only remove two or three screws. Pos. 28, see Figure 2.

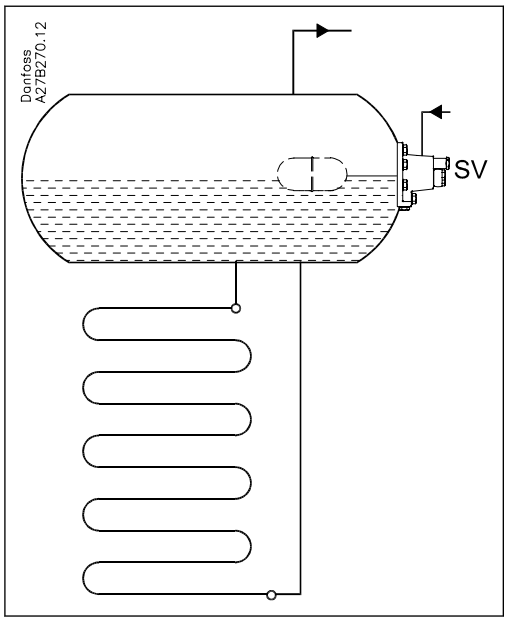
The liquid expands into the evaporator



Used in large evaporators with long pipe lines.
Pos. 26 is removed and weld connection is mounted.
Pos. 28 remains screwed. See Figure 2.

NOTE:
Pos. 26 and 28, see Figure 2.

The liquid expands directly into the surge drum



4 pcs. M6 screws (pos. 28) are removed, and pos. 26 remains blanked off, see Figure 2. This leaves four holes through which liquid expands directly.

NOTE:
If the capacity is too high, only remove two or three screws. Pos. 28, see Figure 2.

Media

Refrigerants

Applicable to HCFC, HFC and R717 (Ammonia). Use with flammable hydrocarbons cannot be recommended; please contact Danfoss.

New refrigerants

Danfoss products are continually evaluated for use with new refrigerants depending on market requirements.

When a refrigerant is approved for use by Danfoss, it is added to the relevant portfolio, and the R number of the refrigerant (e.g. R513A) will be added to the technical data of the code number. Therefore, products for specific refrigerants are best checked at store.danfoss.com/en/, or by contacting your local Danfoss representative.

Product specification

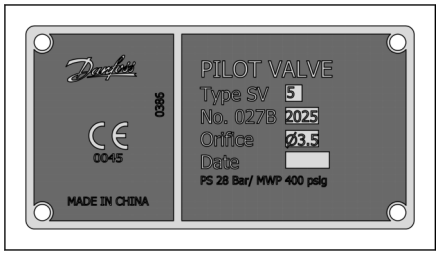
Pressure and temperature data

Table 1: Pressure and temperature data

Description	Values
P band	Approx. 35 mm
Max. working pressure	MWP = 28 bar
Max. Δp	SV 4 = 23 bar SV 5 = 21 bar SV 6 = 19 bar
Media temperature	-50 °C to 120 °C
Max. test pressure	MTP = 32 bar
kv value and diameter for orifice	SV 4: k_v = 0.23 m^3/h D = 3.0 mm SV 5: k_v = 0.31 m^3/h D = 3.5 mm SV 6: k_v = 0.43 m^3/h D = 4.0 mm

Identification

Figure 1: Identification



Materials

- Gaskets are non asbestos
- Valve housing made of low-temperature cast steel G20Mn5QT
- Float housing: ST 35.8 DIN 17175 W. no. 1.0305

Dimensioning example for SV

Table 2:

Description	Values
Refrigerant	R717 (NH_3)
Evaporating capacity	Q_e = 145 kW
Evaporating temperature	t_e = -10 °C (~ p_e = 2.9 bar abs.)
Condensing temperature	t_c = +30 °C (~ p_c = 11.7 bar abs.)
Liquid temperature ahead of SV	t_l = +20 °C
Subcooling	Δtsub = t_c – t_l = 30 °C – 20 °C = 10 K
Pressure drop in SV	Δp = p_c – p_e = 11.7 – 2.9 = 8.8 bar
Correction factor k for 10 K subcooling	= 0.98
Corrected capacity	145 × 0.98 = 142 kW

NOTE:
At t_e = -10 °C and Δp = 8 bar SV 5 yields 147 kW and can therefore be used.

Capacity

The values in the capacity tables are based on a subcooling of 4 K just ahead of the SV valve. If the subcooling is more or less than 4 K, refer to the following correction factors.

Table 3: R717 (NH3)

Type	Evaporating temperature t_e [°C]	Capacity in kW at pressure drop across valve Δp bar							
		0.8	1.2	1.6	2	4	8	12	16
	10	37	45	52	58	79	105	122	134
	0	39	47	54	59	81	107	124	136
	-10	40	48	55	61	82	108	125	137
SV 4	-20	41	49	56	62	83	109	125	137
	-30	42	50	57	63	84	109	125	136
	-40	42	51	58	63	84	108	124	135
	-50	43	51	58	63	83	107	122	133
	10	51	62	71	78	107	143	166	183
	0	53	64	73	81	110	145	168	185
	-10	54	66	75	83	112	147	170	186
SV 5	20	56	67	76	84	113	148	170	186
	-30	57	68	78	85	114	148	170	185
	-40	58	69	78	86	114	147	168	184
	-50	58	69	78	86	113	146	167	182
	10	68	83	95	105	144	191	222	245
	0	71	86	98	108	147	195	226	248
	-10	73	88	101	111	150	197	227	250
SV 6	-20	75	90	103	113	152	198	228	250
	-30	76	92	104	115	153	198	227	248
	-40	77	93	105	115	153	197	226	246
	-50	78	93	105	115	152	196	223	243

Table 4: R22

Type	Evaporating temperature t_e [°C]	Capacity in kW at pressure drop across valve Δp bar							
		0.8	1.2	1.6	2	4	8	12	16
	10	8.5	10.3	11.7	12.9	17.2	21.8	24.1	25.1
	0	8.9	10.7	12.2	13.5	17.8	22.4	24.6	25.7
	-10	9.3	11.2	12.7	14	18.3	22.8	25	25.9
SV 4	-20	9.7	11.6	13.1	14.4	18.7	23.1	25.1	25.9
	-30	9.9	11.8	13.4	14.6	18.9	23.1	25	25.7
	-40	10.1	12.1	13.6	14.8	18.9	22.9	24.7	25.3
	-50	10.3	12.1	13.6	14.8	18.8	22.6	24.2	24.8
	10	11.6	14	15.9	17.6	23.4	29.6	32.7	34.2
	0	12.1	14.6	16.7	18.4	24.3	30.5	33.5	34.9
	-10	12.7	15.2	17.3	19	24.9	31.1	34	35.3
SV 5	-20	13.1	15.7	17.8	19.6	25.4	31.4	34.1	35.3
	-30	13.5	16.1	18.2	19.9	25.7	31.4	34	35
	-40	13.8	16.4	18.4	20.1	25.7	31.2	33.6	34.5
	-50	14	16.5	18.5	20.2	25.6	30.7	33	33.7
	10	15.5	18.7	21.3	23.6	31.4	39.7	43.9	45.8
	0	16.3	19.6	22.3	24.6	32.6	40.9	45	46.8
	-10	17	20.4	23.2	25.5	33.5	41.7	45.6	47.3
SV 6	-20	17.6	21.1	23.9	26.2	34.1	42.1	45.8	47.3
	-30	18.1	21.6	24.4	26.7	34.5	42.1	45.6	47
	-40	18.5	22	24.7	27	34.5	41.8	45	46.2
	-50	18.7	22.2	24.8	27	34.3	41.2	44.2	45.2

Correction factors

When dimensioning, multiply the evaporating capacity by the correction factor k, dependent on the subcooling Δtsub just ahead of the valve. The corrected capacity can then be found in the capacity table.

Table 5: R717 (NH3)

Δt K	2	4	10	15	20	25	30	35	40	45	50
k	1.01	1	0.98	0.96	0.94	0.92	0.91	0.89	0.87	0.86	0.85

Table 6: R22

Δt K	2	4	10	15	20	25	30	35	40	45	50
k	1.01	1	0.96	0.93	0.9	0.87	0.85	0.83	0.8	0.78	0.77

Construction and function

Figure 2: Construction and function

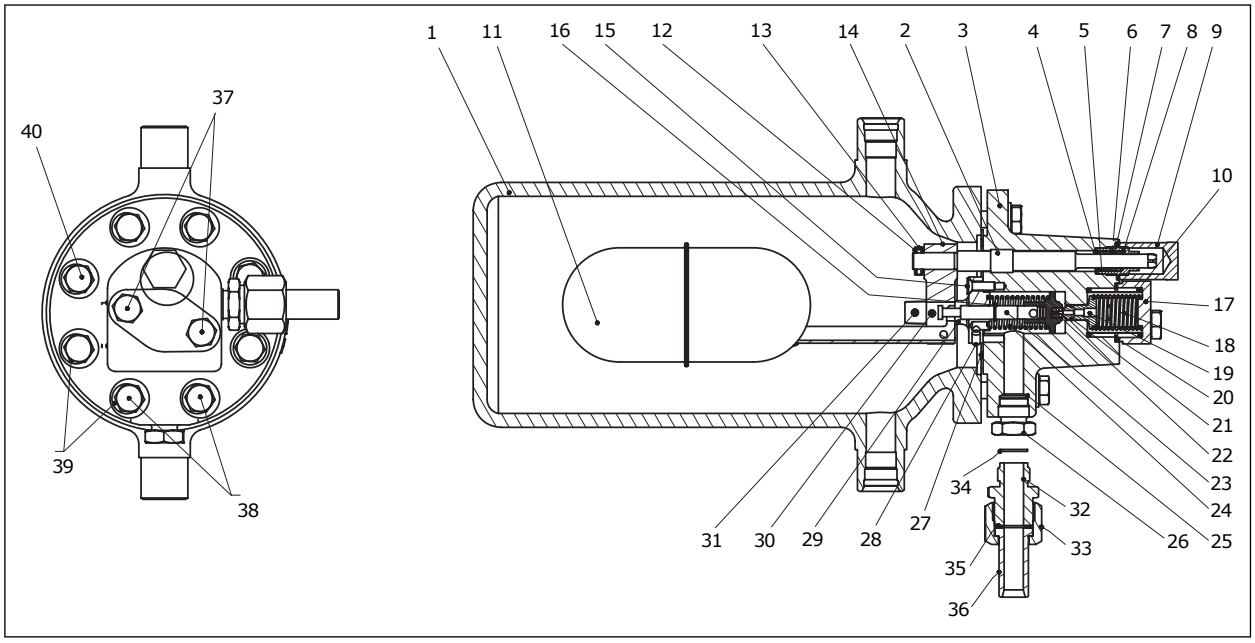


Table 7: Construction and function

No.	Part	Material	DIN/EN
1	Valve housing	Steel	G20Mn5+QT DIN EN 10213
2	Spindle	Stainless steel	
3	Valve top	Low temperature cast iron	EN-GJS-400-18LT EN1563
4	Seal ring	Nylon (PA6)	
5	O ring	Chloroperne (Neoprene)	
6	Distance ring	Nylon (PA6)	
7	Cap gasket	Nylon (PA6)	
8	Packing gland	Steel	
9	Cap for spindle	Steel	
10	Strainer	Steel/Stainless steel	
11	Float	Stainless steel	
12	Adjust ring	Steel	
13	Pin	Steel	
14	Fork for spindle	Steel	
15	Screw	Steel	
16	Lock ring	Steel	
17	Cover for filter	Steel	
18	Spring	Steel	
19	Nozzle	Teflon (PTFE)	
20	Gasket	Non-asbestos	
21	O ring	Chloroperne (Neoprene)	
22	Valve cone (guide)	Teflon (PTFE)	
23	Valve cone with pin	Steel/Nylon(PA6)	
24	Spring	Steel	
25	Gasket	Aluminum	
26	Plug	Steel	
27	Gasket	Non-asbestos	
28	Screw	Steel	
29	Cover with guide	Steel	

No.	Part	Material	DIN/EN
30	Pin	Steel	
31	Pin	Steel	
32	Nipple	Steel	
33	Union nut	Steel	
34	Gasket	Aluminum	
35	Gasket	Aluminum	
36	Welidng nipple	Steel	
37	Screw	Stainless steel	A2-70
38	Screw	Stainless steel	A2-70
39	Washer	Steel	
40	Screw	Stainless steel	A2-70

SV 4-6 float valves are for low pressure operation only. They are used for flooded evaporators, where only slight variations in the liquid level can be accepted. When the liquid level decreases, the float moves downwards. This opens the orifice (pos. 7) and the amount of liquid injected is increased.

The liquid inlet line should be dimensioned in such a way that acceptable liquid velocities and pressure drops are obtained. This is particularly important when the liquid is only slightly subcooled, since valve capacity is reduced considerably if flashgas occurs in the liquid ahead of the orifice.

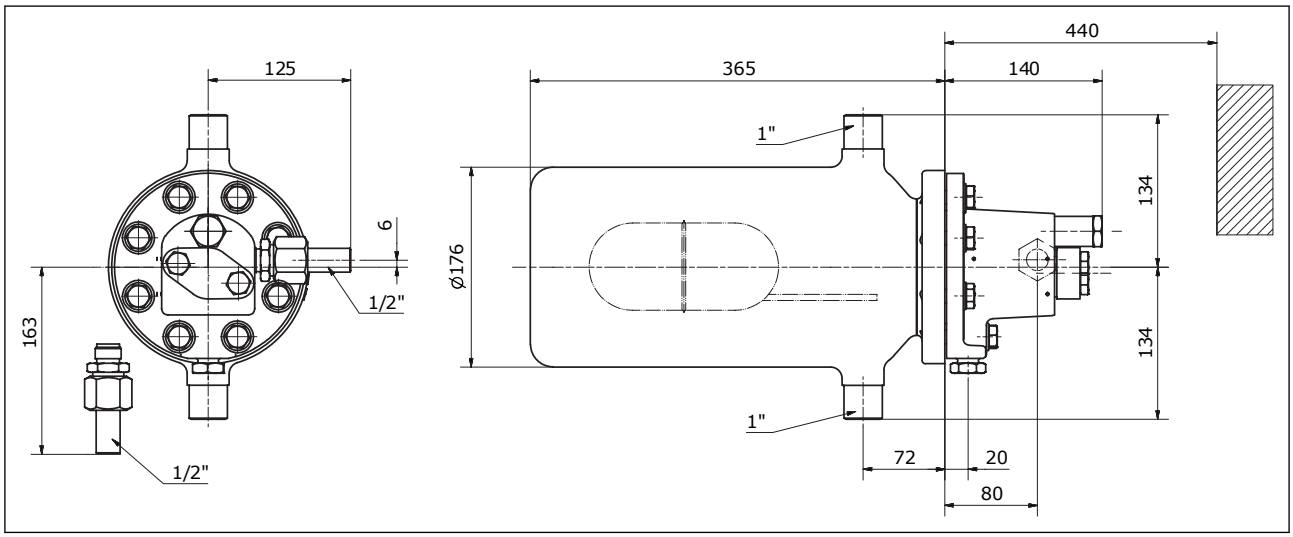
The flashgas quantity which occurs on expansion is removed through the balance pipe. On refrigeration plant using fluorinated refrigerants, slight subcooling and a large pressure drop can result in a flashgas quantity of approx. 50% of the injected liquid quantity.

Therefore the pressure drop in this balance pipe must be kept at a minimum, otherwise there is a risk that:
- the liquid level in the evaporator will vary to an unacceptable degree as a function of evaporator load
- the absolute difference between the liquid level of the evaporator and the SV valve

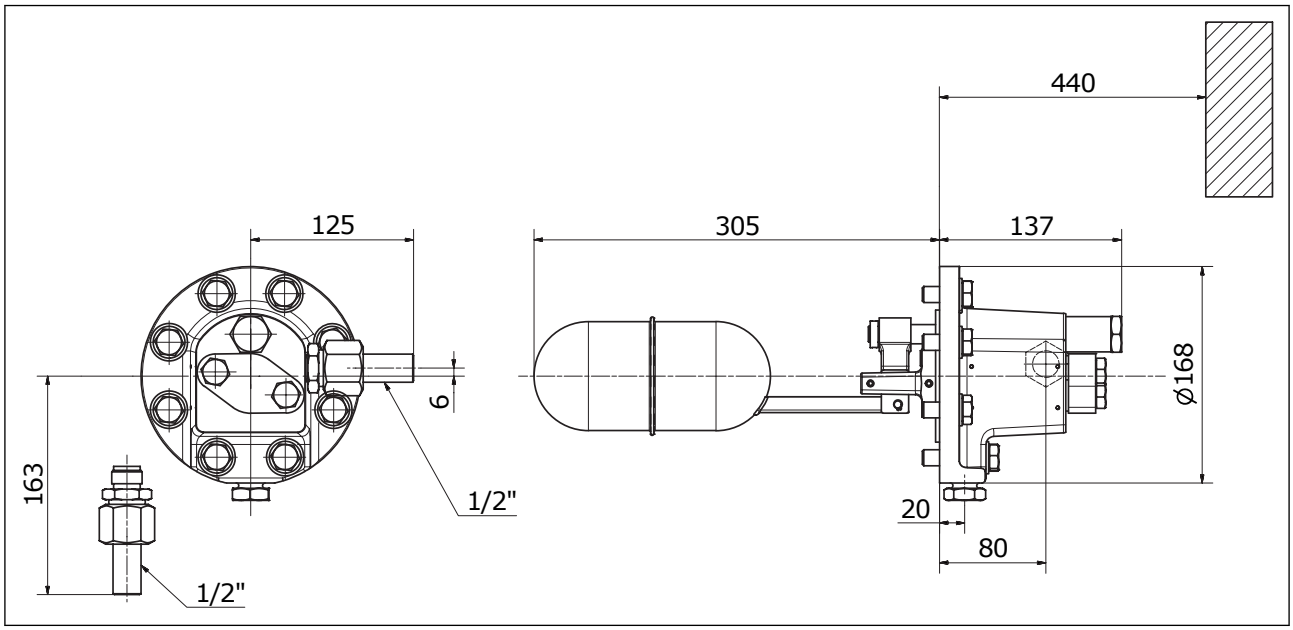
If too large amounts of flash gas are created it is recommended to use the external injection connection or let the liquid expand directly into the surge drum. See application drawings 3 and 4.

See instruction for SV 4-6 for:
- Cleaning of strainer
- Change of orifice
- Change of valve plate

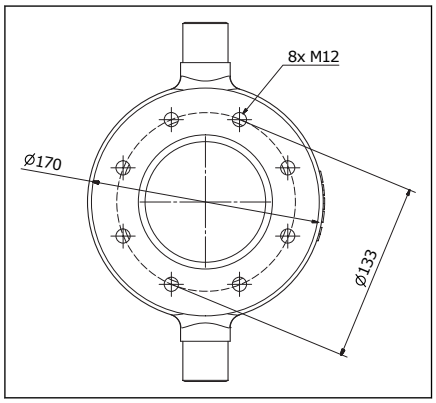
Dimensions and weight



NOTE:
Weight: 19.6 kg



NOTE:
Weight: 9.7 kg



NOTE:
Weight: 3.1 kg

Ordering

Regulator

The code nos. stated apply to float valves types SV 4, 5 and 6 with two 1" weld connections for balance tubes and two ½" weld joints for liquid and evaporator connections respectively.

Table 8: Ordering

Valve type	Orifice diameter	Code no.	Code no. without housing [1]	Rated capacity in kW [2]			
				R717	R22	R134a	R404A
SV 4	∅ 3.0 mm	**027B2024**	**027B2014**	102	21	16.4	15.4
SV 5	∅ 3.5 mm	**027B2025**	**027B2015**	138	28.6	22.3	21
SV 6	∅ 4.0 mm	**027B2026**	**027B2016**	186	38.3	29.9	28.1

[1] Flange for mounting without housing Code no. 027B2027
[2] The rated capacity refers to the valve capacity at evaporating temperature t_c = +5 °C, condensing temp. t_c = +32 °C and liquid temperature t_l = +28 °C

Spare parts and accessories

Smaller orifices for the SV 4 - 6 are available as spare parts and can be mounted in the SV 4 - 6 if smaller capacities are required.

- Seal kit: **027B2070**
- Other spare parts: See spare parts catalogue

Table 9: Special orifice code no. and rated capacities for SV 4 - 6

Orifice diameter	k_v	Capacities at -10°C evaporating temperature at pressure drop across valve ΔP bar						Code no. [1]
		R717			R22			
		4	7	10	4	7	10	
∅ 1.0 mm	0.026	9	12	13.5	1.6	2.2	2.4	**027B2080**
∅ 1.5 mm	0.06	21	27	29	3.8	4.9	5.2	**027B2081**
∅ 2.0 mm	0.1	35	46	50	6.3	8.3	9	**027B2082**
∅ 2.5 mm	0.16	56	70	81	10	13	15	**027B2083**
∅ 2.8 mm	0.2	70	87.5	101	12	16	18	**027B2084**

[1] The code no. includes orifice and all necessary gaskets

NOTE:
The SV 4 - 6 mounted with special orifice diameter ∅2.5 mm is recommended as pilot float valve for the servo-operated level regulators type PMFL for higher capacities.

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 10: Valid approvals

Type	File name	Document type	Document topic	Approval authority
SV 4	19.10327.266	Marine - Safety Certificate		RMRS
SV 5				
SV 6				

Table 11: Compliance

SV 4, SV 5 and SV 6	
Classified for	Fluid group I
Category	II

Table 12: Pressure Equipment Directive (PED)

CE	SV 4, SV 5 and SV 6 are approved in accordance with the European standard specified in the Pressure Equipment Directive and are CE marked. For further details / restrictions - see Installation guide.

ENGINEERING
TOMORROW

Online support

Danfoss offers a wide range of support along with our products, including digital product information, software, mobile apps, and expert guidance. See the possibilities below.

The Danfoss Product Store

The Danfoss Product Store is your one-stop shop for everything product related—no matter where you are in the world or what area of the cooling industry you work in. Get quick access to essential information like product specs, code numbers, technical documentation, certifications, accessories, and more.
Start browsing at store.danfoss.com.

Find technical documentation

Find the technical documentation you need to get your project up and running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more.

Start searching now at www.danfoss.com/en/service-and-support/documentation.

Get local information and support

Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert—all in your own language.

Find your local Danfoss website here: www.danfoss.com/en/choose-region.

Danfoss Learning

Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications, industry topics, and trends that will help you do your job better.

Create your Danfoss Learning account for free at www.danfoss.com/en/service-and-support/learning.

Spare Parts

Get access to the Danfoss spare parts and service kit catalog right from your smartphone. The app contains a wide range of components for air conditioning and refrigeration applications, such as valves, strainers, pressure switches, and sensors.

Download the Spare Parts app for free at www.danfoss.com/en/service-and-support/downloads.

Coolselector®2 - find the best components for you HVAC/R system

Coolselector®2 makes it easy for engineers, consultants, and designers to find and order the best components for refrigeration and air conditioning systems. Run calculations based on your operating conditions and then choose the best setup for your system design.

Download Coolselector®2 for free at coolselector.danfoss.com.

Danfoss A/S
Climate Solutions • danfoss.com • +45 7488 2222