ENGINEERING
TOMORROW

Catalogue

Check valves for Industrial Refrigeration

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Check & stop valve, SCA-X, 52 bar (754 psi)
Check valve, CHV-X, 52 bar (754 psi)

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Check & stop valve, SCA-X, 52 bar (754 psi)
Check valve, CHV-X, 52 bar (754 psi)

SCA-X are check valves with a built-in shut-off valve function. SCA-X valves are avilable in angleway versions.

CHV-X are check valves only. CHV-X are available in both angleway and straightway versions.

The valves are designed to open at very low differential pressures, allow favourable flow conditions and are easy to disassemble for inspection and service.

The SCA-X is equipped with vented cap and has internal backseating enabling the spindle seal to be replaced whilst the valve still under pressure.

Laser cut V-ports provide excellent opening characteristics (SCA-X/CHV-X 50-125).

The valve cone has a built-in flexibility to ensure a precise and tight closing towards the valve seat.

A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.

Features

- Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO_2), Propane, Butane, Iso-Butane and Ethane.
  R717 Heat Pump and Propylene applications with replaced O-ring.
- Modular Concept:
  – Each valve housing is available with several different connection types and sizes.
  – Possible to convert SCA-X or CHV-X to any other product in the FlexlineTM SVL family (Hand operated regulating valve, shut-off valve or strainer) just by replacing the complete top part.
- Fast and easy valve overhaul service. It is easy to replace the top part and no welding is needed.
- Designed to open at a very low differential pressure of 0.04 bar /0.58 psig.
- Designed with a built-in damping chamber preventing valve flutter in case of low refrigerant velocity and/or low density.
- Each valve is clearly marked with type, size and performance range.
  Additional ID ring to be installed when preparing for Ammonia Heat Pump or Propylene application.
- Easy to disassemble for inspection and service.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure.
- Optimal flow characteristics ensuring quick opening to the fully open position.
- Protection against pulsation by built-in damping facility.
- Housing and bonnet material is low temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities.
- Equipped with Stainless steel bolts.
- Max. working pressure:
  52 bar g / 754 psi g
- Temperature range:
  -60 – 150 °C / -76 – 302 °F
- Classification: DNV, CRN, BV, EAC etc.
  To get an updated list of certification on the products please contact your local Danfoss Sales Company.

Design

Connections
Available with the following connections:

- Butt-weld DIN (EN 10220)
  DN 15 - 125 (½ - 5 in.)
- Butt-weld ANSI (B 36.10 Schedule 80),
  DN 15 - 40 (½ - 1½ in.)
- Butt-weld ANSI (B 36.10 Schedule 40),
  DN 50 - 125 (2 - 5 in.)
- Butt-weld GOST, (8734-75 and 8732-78)
  DN 15 - 125 (½ - 5 in.)
- Socket-weld ANSI (B 16.11),
  DN 50 (2 in.)

Housing
The housing is made from special, cold resistant steel.

Valve cone
Valve cone with built in metallic stop - prevents damage to teflon ring in case of overtightening.

Damping chamber
The chamber is filled with refrigerants (gas or liquid), which provides a damping effect when the valve opens and closes.

Spindle (SCA-X)
Made of polished stainless steel, which is ideal for O-ring sealing.

Packing Gland (SCA-X)
The "full temperature range" packing gland is the standard for the entire SVL platform.

This ensures perfect tightness throughout the whole temperature range:
–60/+150°C (–76/+302°F).

Pressure Equipment Directive (PED)
The SCA-X/CHV-X valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

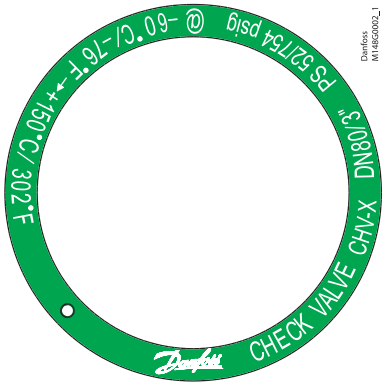
For further details / restrictions - see the product instruction.

Installation
The valve must be mounted vertically with the cone downwards.

The valve is designed to resist very high internal pressure. However, the piping system in general should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion.

For further information refer to installation instructions for SCA-X/CHV-X.

If cold refrigeration oil having low viscosity enters and settles in the damping chamber, problems with the check valve may arise. Consequently, it may be necessary to modify the valve for more viscous liquids by enlarging the hole to the damping chamber.



Example of marking ring, CHV-X

SCA-X/CHV-X valves			
Nominal bore	DN = < 25 mm (1 in.)	DN32-80 mm (1¼ - 3 in.)	DN100 - 125 mm (4 - 5 in.)
Classified for	Fluid group I		
Category	Article 3, paragraph 3	II	III

Application

Figure 3 shows the check & stop valve SCA-X in the discharge line of a screw compressor unit. The SCA-X valve in the discharge line prevents "back condensation" in the oil separator as well as pressure equalising through the compressor.

Compared to an ordinary shut-off and check valve arrangement the combined check & stop valve solution, as shown, is easier to install and has lower flow resistance.

Installation of the SCA-X/CHV-X in the economizer line is **not** recommended.

For horizontal installation of the function module; please contact Danfoss.

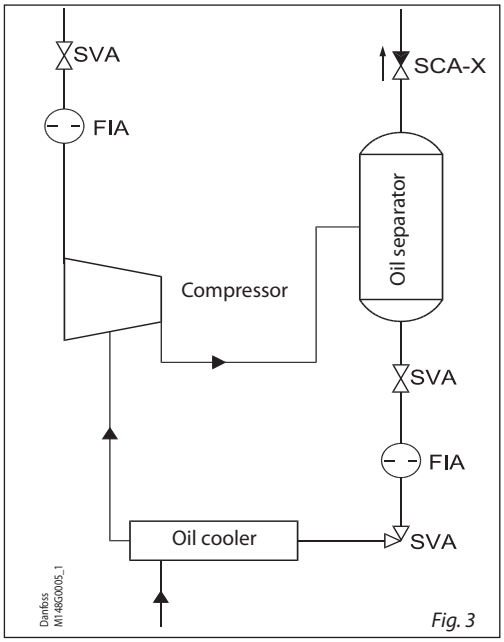


Fig. 3

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Technical data

- *Refrigerants*
  Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO_2), Propane, Butane, Iso-Butane and Ethane.
  R717 Heat Pump and Propylene applications with replaced O-ring.
- *Temperature range*
  -60 – 150 °C / -76 – 302 °F.
- *Max. working pressure*
  52 bar g / 754 psig.

Computation and selection

Introduction

When dimensioning SCA-X/CHV-X, it is important to select a valve that is best suited to all operating conditions. Therefore, it is necessary to consider both the nominal and part load working conditions.

The SCA-X/CHV-X valve can be calculated in two ways:
– Using the tables below.
– Using Coolselector®2

Example

SI-Units

Assumed working conditions:
Maximum flow $\dot{V}$ = 1000 m³/h
Density ρ = 3.0 kg/m³
Minimum part load = 33%

Used expressions:
Recommended velocity - C_{rec} [m/s]
Minimum recommended velocity - $C_{min, rec}$ [m/s]
Maximum velocity - C_{max} [m/s]
Part load velocity - C_{part} [m/s]

We know the density ρ ≈ 3.0 kg/m³, consequently C_{rec} as well as $C_{min, rec}$ can be found in the figure below (standard valve).

C_{rec} ≈14 m/s
$C_{min, rec}$ ≈ 3 m/s

US-Units

Assumed working conditions:
Maximum flow $\dot{V}$ = 1160 gpm
Density ρ = 0.187 lb/feet³
Minimum part load = 33%

Used expressions:
Recommended velocity - C_{rec} [ft/min]
Minimum recommended velocity - $C_{min, rec}$ [ft/min]
Maximum velocity - C_{max} [ft/min]
Part load velocity - C_{part} [ft/min]

We know the density ρ ≈ 0.187 lb/feet³, consequently C_{rec} as well as $C_{min, rec}$ can be found in the figure (standard valve).

C_{rec} ≈ 2756 ft/min
$C_{min, rec}$ ≈ 591 ft/min

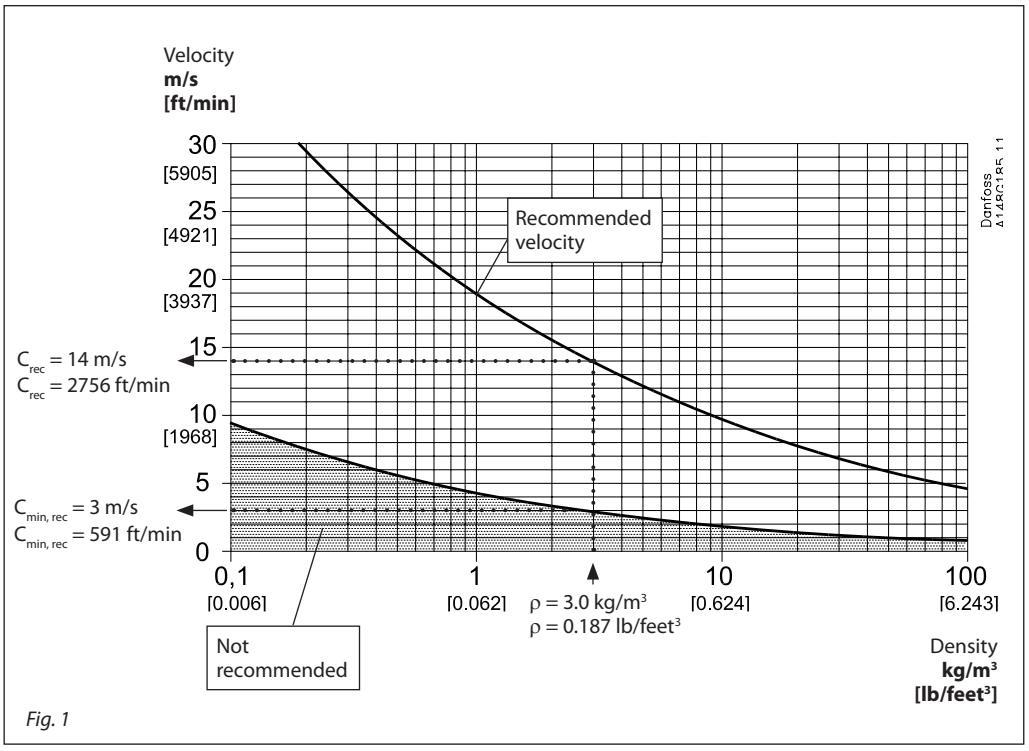

Fig. 1

Selection example continued on following page.

Computation and selection
(continued)

Knowing that $\dot{V}$ = 1000 m³/h (1160 gpm) fig. 2 gives the following choices:

For SCA-X / CHV-X in size DN 100 the maximum velocity $C_{max} \approx$ 31 m/s (6100 ft/min)
For SCA-X / CHV-X in size DN 125 the maximum velocity $C_{max} \approx$ 20 m/s (3900 ft/min)

In conclusion SCA-X in size DN 125 is selected because $C_{max} \approx$ 20 m/s (3900 ft/min) comes nearest to the recommended velocity $C_{rec} \approx$ 14 m/s (2756 ft/min) and at the same time part load conditions fulfil the requirements, as described:

We know that $C_{max} \approx$ 20 m/s (3900 ft/min) and that minimum part load is 33%. It follows that $C_{part} \approx$ 6.5 m/s (1290 ft/min). Thus, C_{part} (6.5 m/s) > $C_{min, rec}$ (3.0 m/s) and the selected SCA-X model DN125 is the perfect choice.

If the valve in question (for instance under part load conditions) provides a velocity less than $C_{min, rec}$ the valve might start hammering and become noisy. As a result the valve may wear prematurely.

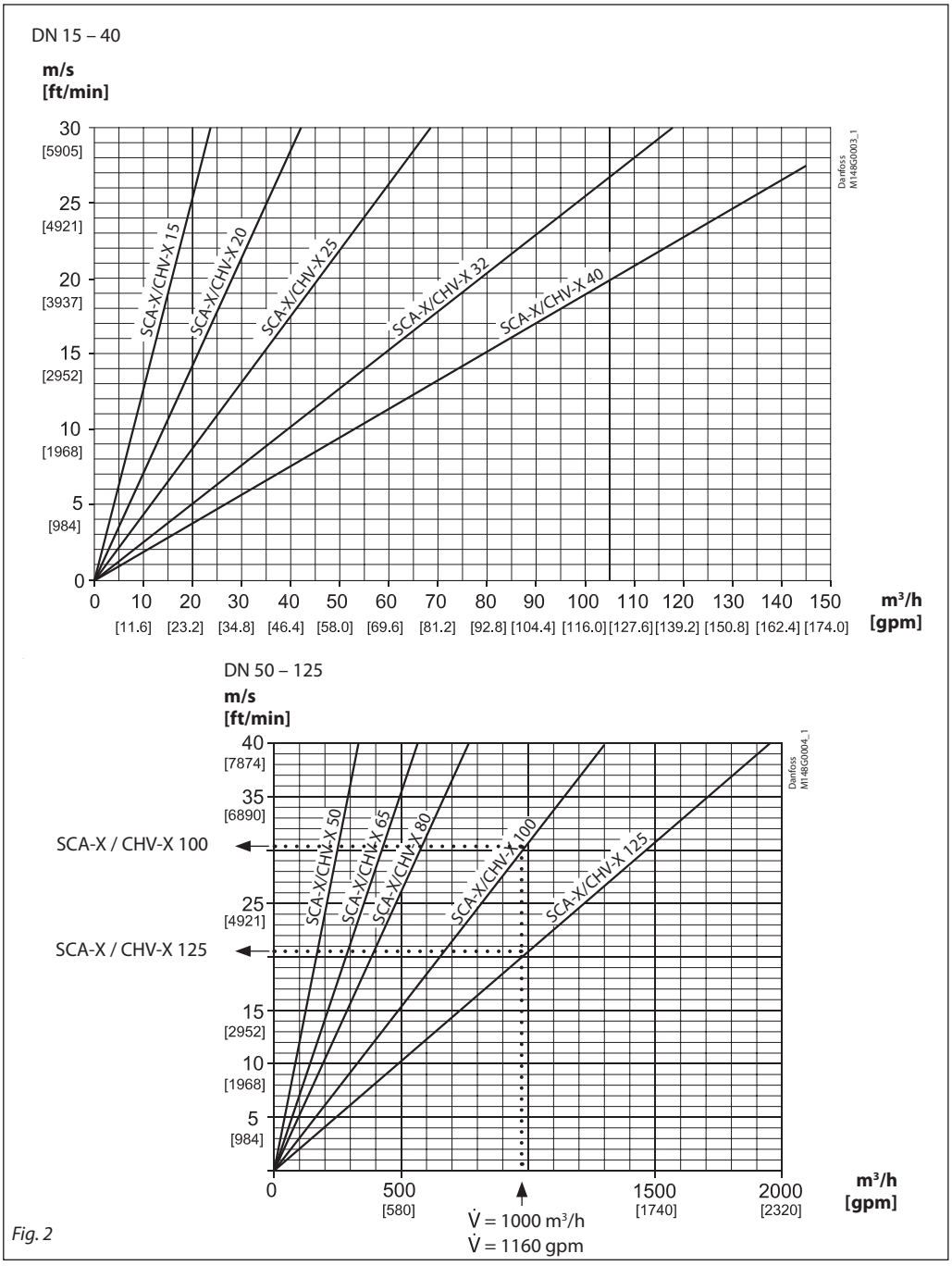

Fig. 2

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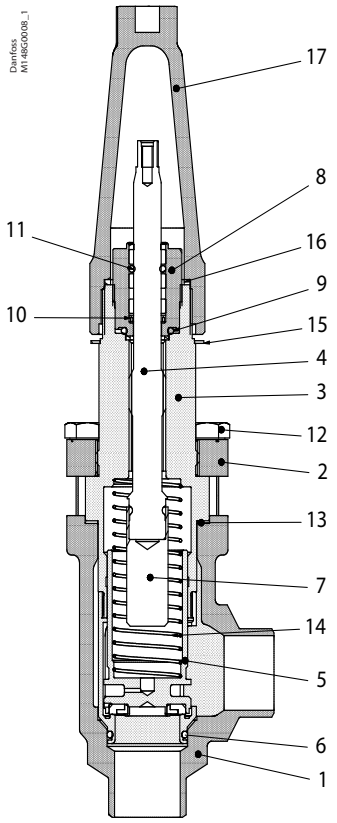
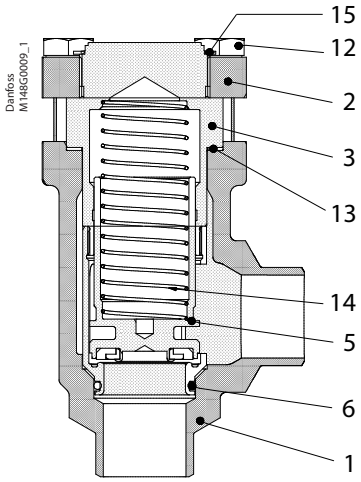
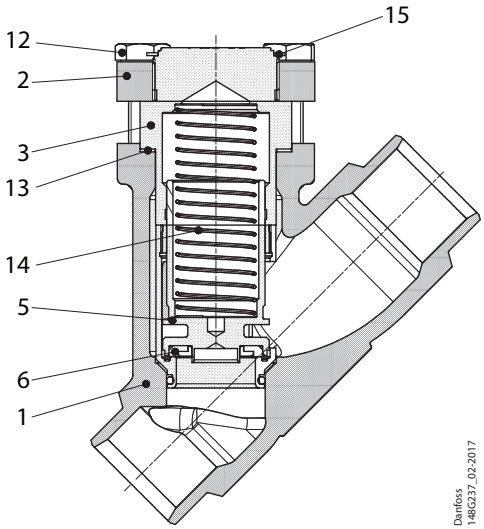
Material specification



SCA-X 15 - 40



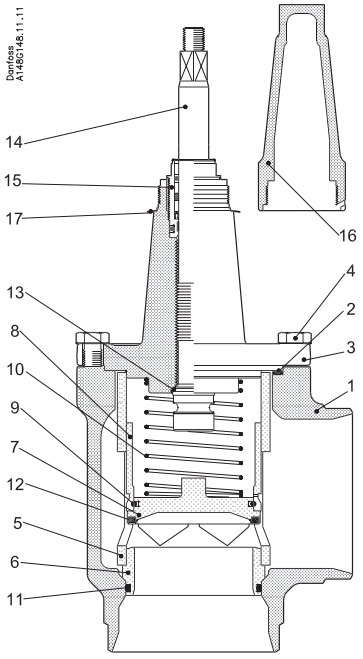
CHV-X 15 - 40



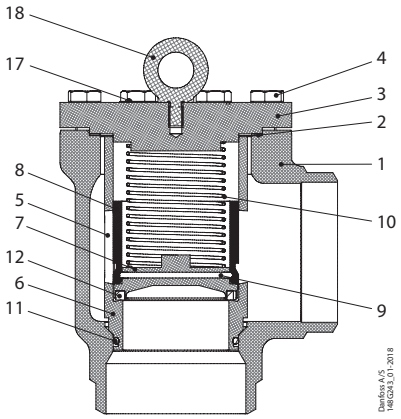
CHV-X 15 - 40

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing	Steel	P285QH EN10222-4		LF2A350
2	Bonnet, Flange	Steel	P275NL1 EN10028-3		
3	Bonnet, Insert	Steel			
4	Spindle	Stainless steel	X 10CrNiS18-9	Type 17, 17440	AISI 303, 683/13
5	Cone	Steel Teflon (PTFE)			
6	O-ring	Cloroprene (Neoprene)			
7	Spindle extension	Steel			
8	Packing gland O-rings	Steel Cloroprene (Neoprene)			
9	Packing washer	Aluminium			
10	Spring loaded seal	Teflon (PTFE)			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, non-asbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminium			

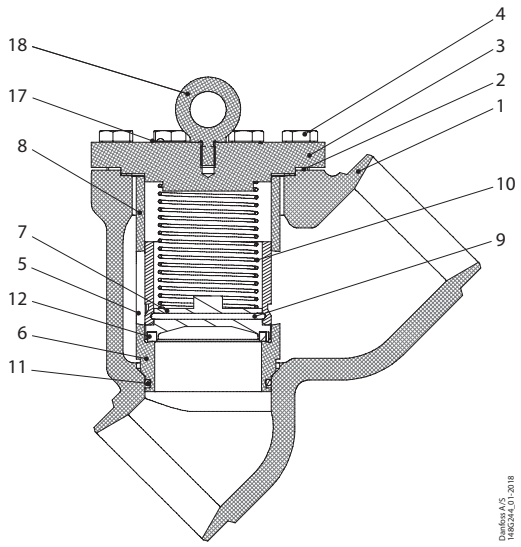
Material specification



SCA-X 50 - 125



CHV-X 50 - 125



CHV-X 50 - 125

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing DN 50-65	Steel	P285 QH EN 10222-4		LF2A350
	Housing DN 80-125	Steel	G20Mn5 QT SEW 685		LCC, A352
2	Gasket	Fiber, Non-asbestos			
3	SCA-X: Valve bonnet CHV-X: End cover	Steel	P285 QH EN 10222-4		LF2A350
4	Bolts	Stainless steel	A2-70	A2-70	A-276
5	Tube	Steel			
6	Seat	Steel			
7	Valve plate	Steel			
8	Guide sleeve	Steel			
9	Spring ring	Steel			
10	Spring	Steel			
11	O-ring	Cloroprene (Neoprene)			
12	Teflon ring	Teflon (PTFE)			
13	Soft back seal	Teflon (PTFE)			
14	Spindle DN 50-65	Stainless steel	X8CrNiS18-9 17440	Type 17 R 683/13	AISI 303
	Spindle DN 80-125	Stainless steel	X5CrNi1810 17440	Type 11 683/13	AISI 304 A-276
15	Packing gland	Steel	9Mn28, 1651	Type 2, R 683/9	1213, SAE J403
16	Spindle seal cap and gasket	Aluminium			
17	Marking label	Stainless steel			
18	Eye bolt DIN 580	Steel			

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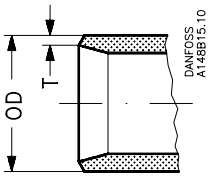
Connections

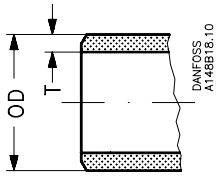
DIN



Butt-weld DIN (EN 10220)

Size mm	Size in.	OD mm	T mm	OD in.	T in.			k_v Angleway m^3/h	C_v Angleway USgal/min	K_v Straightway m^3/h	C_v Straightway USgal/min
15	½	21.3	2.3	0.839	0.091			8	9.3	4	4.6
20	¾	26.9	2.3	1.059	0.091			10	11.6	7	8.1
25	1	33.7	2.6	1.327	0.102			24	27.8	16	18.6
32	1¼	42.4	2.6	1.669	0.102			30	34.8	21	24.4
40	1½	48.3	2.6	1.902	0.102			30	34.8	21	24.4
50	2	60.3	2.9	2.37	0.11			45	53	28	34
65	2½	76.1	2.9	3.00	0.11			72	85	41	48
80	3	88.9	3.2	3.50	0.13			103	129	81	94
100	4	114.3	3.6	4.50	0.14			196	232	157	182
125	5	139.7	4.0	5.50	0.16			301	356	250	290

ANSI



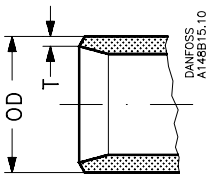
Butt-weld ANSI (B 36.10 Schedule 80)

Size mm	Size in.	OD mm	T mm	OD in.	T in.			k_v Angleway m^3/h	C_v Angleway USgal/min	K_v Straightway m^3/h	C_v Straightway USgal/min
15	½	21.3	3.7	0.839	0.146			8	9.3	4	4.6
20	¾	26.9	4.0	1.059	0.158			10	11.6	7	8.1
25	1	33.7	4.6	1.327	0.181			24	27.8	16	18.6
32	1¼	42.4	4.9	1.669	0.193			30	34.8	21	24.4
40	1½	48.3	5.1	1.902	0.201			30	34.8	21	24.4

Butt-weld ANSI (B 36.10 Schedule 40)

50	2	60.3	3.9	2.37	0.15			45	53	28	34
65	2½	73.0	5.2	2.87	0.20			72	85	41	48
80	3	88.9	5.5	3.50	0.22			103	129	81	94
100	4	114.3	6.0	4.50	0.24			196	232	157	182
125	5	141.3	6.6	5.56	0.26			301	356	250	290

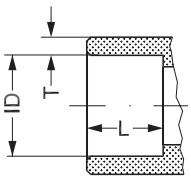
GOST



Butt-weld GOST (8734-75 and 8732-78)

Size mm	Size in.	OD mm	T mm	OD in.	T in.			k_v Angleway m^3/h	C_v Angleway USgal/min	K_v Straightway m^3/h	C_v Straightway USgal/min
15	½	18	2	0.709	0.079			8	9.3	4	4.6
20	¾	25	2.5	0.984	0.098			10	11.6	7	8.1
25	1	32	3	1.260	0.118			24	28.8	16	18.6
32	1¼	38	3	1.496	0.118			30	49.4	21	24.4
40	1½	45	3	1.772	0.118			30	52.4	21	24.4
50	2	57	3.5	2.244	0.138			45	53	28	34
65	2½	76.1	2.9	3	0.11			72	85	41	48
80	3	88.9	3.2	3.50	0.13			103	129	81	94
100	4	108	4	4.252	0.157			196	232	157	182
125	5	133	4	5.236	0.157			301	356	250	290

SOC



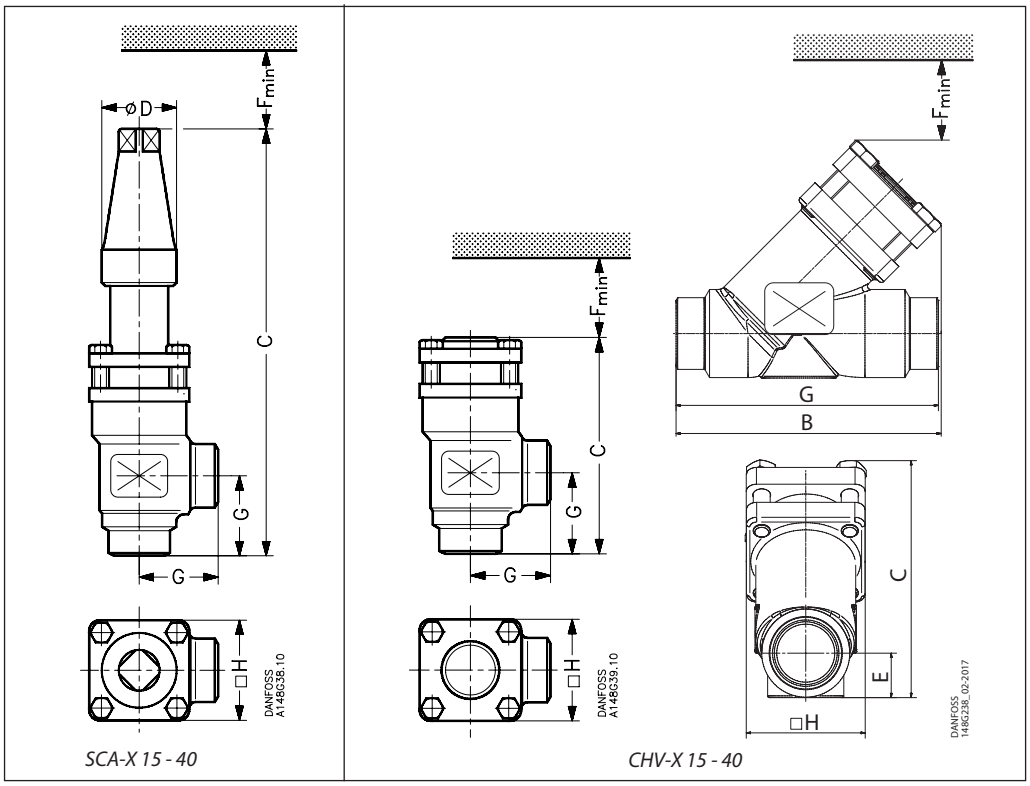
Size mm	Size in.	ID mm	T mm	ID in.	T in.	L mm	L in.				

Socket welding ANSI (B 16.11)

15	½	21.8	6	0.858	0.235	10	0.39				
20	¾	27.2	4.6	1.071	0.181	13	0.51				
25	1	33.9	7.2	1.335	0.284	13	0.51				
32	1¼	42.7	6.1	1.743	0.240	13	0.51				
40	1½	48.8	6.6	1.921	0.260	13	0.51				
50	2	61.2	6.2	2.41	0.24	16	0.63				

Dimensions and weights

SCA-X /CHV-X 15 - 40 (½- 1½ in.)



Valve size		C		G		∅D		F_{min}		□H	Weight
SCA-X 15 - 40											
SCA-X 15 (½ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 20 (¾ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 25 (1 in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 32 (1¼ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 40 (1½ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
CHV-X 15 - 40 Angleway											
CHV-X 15 (½ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 20 (¾ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 25 (1 in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 32 (1¼ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 40 (1½ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb

Valve size		C	B	E		G		F_{min}		□H	Weight
CHV-X 15 - 40 Straightway											
CHV-X 15 (½ in.)	mm in.	99 3.90	114 4.49	19 0.75		120 4.72		60 2.36		60 2.36	1.3kg 2.87lb
CHV-X 20 (¾ in.)	mm in.	99 3.90	114 4.49	19 0.75		120 4.72		60 2.36		60 2.36	1.3kg 2.87lb
CHV-X 25 (1 in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb
CHV-X 32 (1¼ in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb
CHV-X 40 (1½ in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb
CHV-X 32-40 Straightway, Socket weld											
CHV-X 32-40 (1¼ - 1½ in.)	mm in.	132 5.20	156 6.14	26 1.02		155 6.10		85 3.35		70 2.76	2.8kg 6.11lb

Specified weights are approximate values only.

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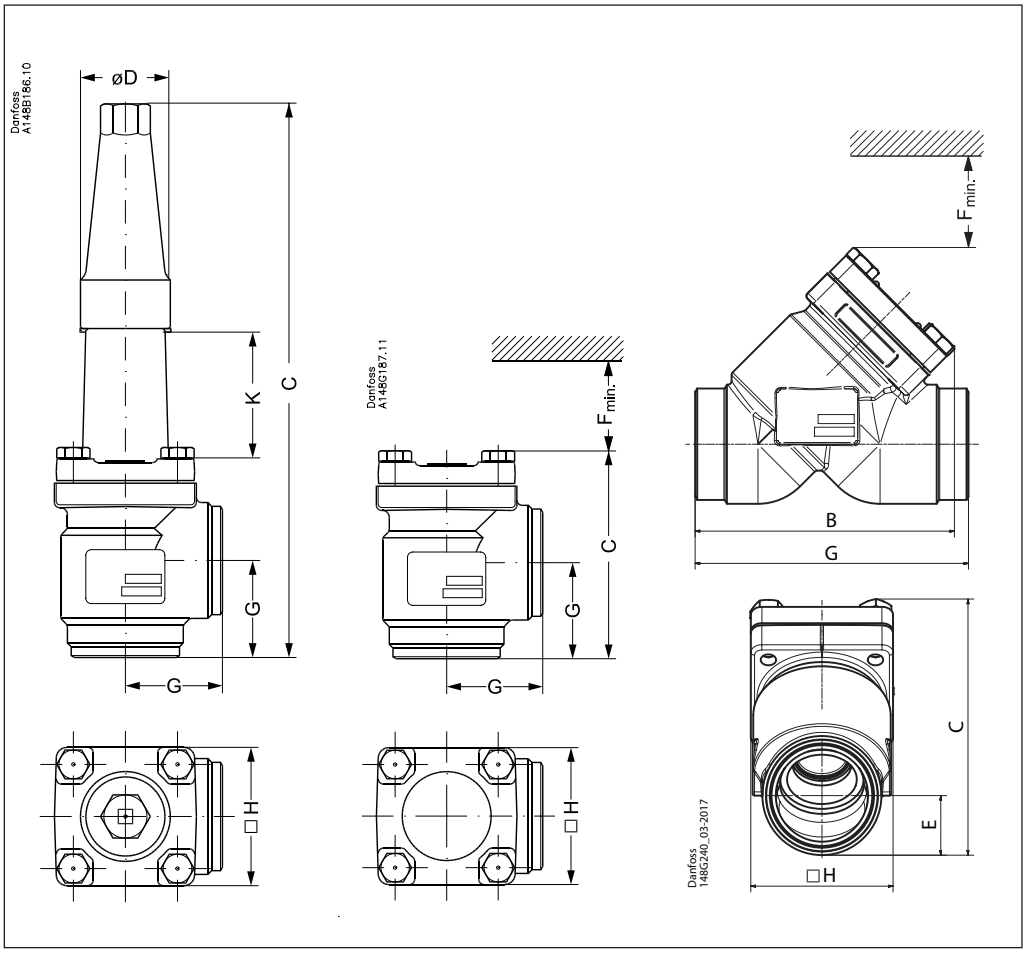
Dimensions and weights

SCA-X/CHV-X 50 - 65 (2 - 2½ in.)



Valve size	K			C			G	∅D	□H		Weight
SCA-X											
SCA-X 50 mm SCA-X (2) in.	70 2.76			315 12.40			60 2.36	50 1.97	77 3.03		3.8 kg 8.40 lb
SCA-X 65 mm SCA-X (2½) in.	70 2.76			335 13.19			70 2.76	50 1.97	90 3.54		5.5 kg 12.16 lb

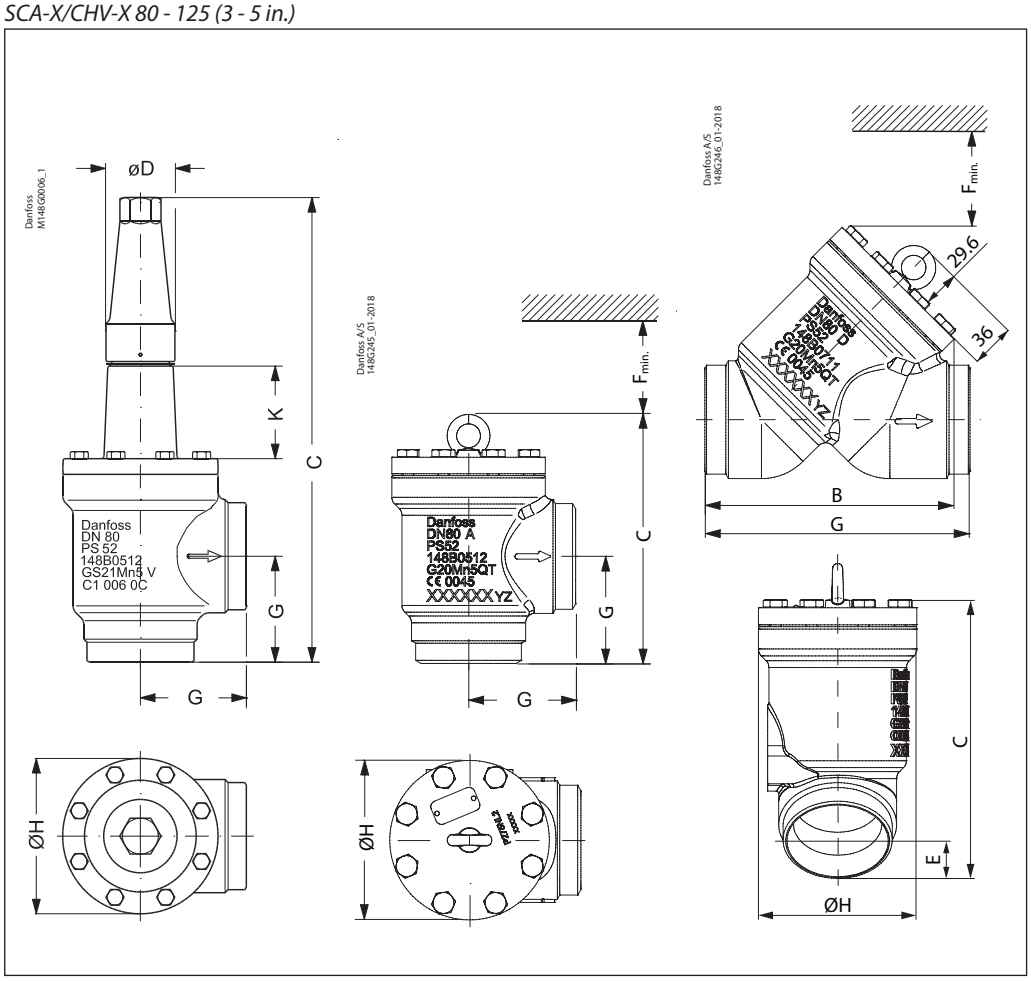
Valve size				C			G	$F_{min.}$	□H		Weight
CHV-X Angleway											
CHV-X 50 mm CHV-X (2) in.				132 5.20			60 2.36	92 3.62	77 3.03		3.2 kg 7.10 lb
CHV-X 65 mm CHV-X (2½) in.				152 5.98			70 2.76	107 4.21	90 3.54		4.5 kg 9.95 lb

Valve size				C	B	E	G	$F_{min.}$	□H		Weight
CHV-X Straightway											
CHV-X 50 mm CHV-X (2) in.				139 5.47	140 5.51	32 1.26	148 5.83	92 3.62	77 3.03		3 kg 6.72 lb
CHV-X 65 mm CHV-X (2½) in.				163 6,4	164 6,4	40 1,6	176 6,9	107 4.21	90 3.54		4.3 kg 9.44 lb
CHV-X Straightway, Socket weld											
CHV-X 50 mm CHV-X (2) in.				142 5.59	147 5.79	37 1.46	162 6.38	92 3.62	77 3.03		3.8 kg 8.33 lb

Specified weights are approximate values only.

Dimensions and weights

SCA-X/CHV-X 80 - 125 (3 - 5 in.)



Valve size	K			C			G	ØD		ØH	Weight
SCA-X											
SCA-X 80 mm SCA-X (3) in.	76 3.00			388 15.28			90 3.54	58 2.28		129 5.08	9.7 kg 21.4 lb
SCA-X 100 mm SCA-X (4) in.	90 3.54			437 17.20			106 4.17	58 2.28		156 6.14	15.3 kg 33.7 lb
SCA-X 125 mm SCA-X (5) in.	90 3.54			533 20.98			128 5.04	74 2.91		193 7.60	28.1 kg 61.9 lb

Valve size				C			G		$F_{min.}$	ØH	Weight
CHV-X Angleway											
CHV-X 80 mm CHV-X (3) in.				218.6 8.61			90 3.54		103.4 4.07	129 5.08	8.7 kg 19.23 lb
CHV-X 100 mm CHV-X (4) in.				252.6 9.94			106 4.17		133.4 5.25	156 6.14	14.3 kg 31.60 lb
CHV-X 125 mm CHV-X (5) in.				297.6 11.72			128 5.04		160.4 6.31	193 7.60	25.6 kg 56.58 lb

Valve size				C	B	E	G		$F_{min.}$	ØH	Weight
CHV-X Straightway											
CHV-X 80 mm CHV-X (3) in.				206 8.11	204 8.03	48 1.89	216 8.50		133 5.24	129 5.08	9.3 kg 20.4 lb
CHV-X 100 mm CHV-X (4) in.				256 10.08	248 9.76	62 2.44	264 10.39		163 6.43	156 6.14	14.6 kg 32.29 lb
CHV-X 125 mm CHV-X (5) in.				314 12.36	302 11.89	74 2.91	322 12.68		190 7.48	193 7.60	32.5 kg 71.65 lb

Specified weights are approximate values only.

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Ordering complete valves

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 wich may not form part of the standard product range.

For further information please contact your local Danfoss Sales Company.

Valve type	**SCA-X** **CHV-X**	Check & stop valve Check Valve				
			A	**D**	**G**	**SOC**
(valve size measured on the connection diameter)	**15**	DN 15	x	x	x	x
	20	DN 20	x	x	x	x
	25	DN 25	x	x	x	x
	32	DN 32	x	x	x	x
	40	DN 40	x	x	x	x
	50	DN 50	x	x	x	x
	65	DN 65	x	x		
	80	DN 80	x	x		
	100	DN 100	x	x	x	
	125	DN 125	x	x	x	
Connections	**A**	Welding branches: ANSI B 31.5 schedule 80 DN 15 - 40 (½ - 1½ in.) Welding branches: ANSI B 31.5 schedule 40 DN 50 - 125 (2 - 5 in.)				
	D	Welding branches: EN 10220				
	G	Butt-weld connection: GOST (8734-75 and 8732-78)				
	SOC	Socket weld: ANSI B 16.11				
Valve housing	**ANG**	Angle flow				
	STR	Straight flow				

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

Angleway

SCA-X Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	SCA-X 15 D ANG	**148B5208**
20	¾	SCA-X 20 D ANG	**148B5308**
25	1	SCA-X 25 D ANG	**148B5408**
32	1¼	SCA-X 32 D ANG	**148B5508**
40	1½	SCA-X 40 D ANG	**148B5608**
50	2	SCA-X 50 D ANG	**148B5702**
65	2½	SCA-X 65 D ANG	**148B5803**
80	3	SCA-X 80 D ANG	**148B5902**
100	4	SCA-X 100 D ANG	**148B6002**
125	5	SCA-X 125 D ANG	**148B6102**

SCA-X Butt-weld ANSI (B 36.10 Schedule 80)

Size		Type	Code No.
mm	in.		
15	½	SCA-X 15 A ANG	**148B5209**
20	¾	SCA-X 20 A ANG	**148B5309**
25	1	SCA-X 25 A ANG	**148B5409**
32	1¼	SCA-X 32 A ANG	**148B5509**
40	1½	SCA-X 40 A ANG	**148B5609**

SCA-X Butt-weld ANSI (B 36.10 Schedule 40)

Size		Type	Code No.
mm	in.		
50	2	SCA-X 50 A ANG	**148B5703**
65	2½	SCA-X 65 A ANG	**148B5802**
80	3	SCA-X 80 A ANG	**148B5903**
100	4	SCA-X 100 A ANG	**148B6004**
125	5	SCA-X 125 A ANG	**148B6103**

SCA-X Socket welding ANSI (B 16.11)

Size		Type	Code No.
mm	in.		
50	2	SCA-X 50 SOC ANG	**148B5704**

Angleway

CHV-X Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 D ANG	**148B5236**
20	¾	CHV-X 20 D ANG	**148B5336**
25	1	CHV-X 25 D ANG	**148B5436**
32	1¼	CHV-X 32 D ANG	**148B5536**
40	1½	CHV-X 40 D ANG	**148B5636**
50	2	CHV-X 50 D ANG	**148B5736**
65	2½	CHV-X 65 D ANG	**148B5838**
80	3	CHV-X 80 D ANG	**148B5936**
100	4	CHV-X 100 D ANG	**148B6036**
125	5	CHV-X 125 D ANG	**148B6136**

CHV-X Butt-weld ANSI (B 36.10 Schedule 80)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 A ANG	**148B5237**
20	¾	CHV-X 20 A ANG	**148B5337**
25	1	CHV-X 25 A ANG	**148B5437**
32	1¼	CHV-X 32 A ANG	**148B5537**
40	1½	CHV-X 40 A ANG	**148B5637**

CHV-X Butt-weld ANSI (B 36.10 Schedule 40)

Size		Type	Code No.
mm	in.		
50	2	CHV-X 50 A ANG	**148B5737**
65	2½	CHV-X 65 A ANG	**148B5837**
80	3	CHV-X 80 A ANG	**148B5937**
100	4	CHV-X 100 A ANG	**148B6037**
125	5	CHV-X 125 A ANG	**148B6137**

CHV-X Socket welding ANSI (B 16.11)

Size		Type	Code No.
mm	in.		
32	1¼	CHV 32 SOC ANG	**148B5539**
50	2	CHV 50 SOC ANG	**148B5740**

ANG = Angleway

Ordering complete valves
(continued)

Straightway

CHV-X Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 D STR	**148B6581**
20	¾	CHV-X 20 D STR	**148B6583**
25	1	CHV-X 25 D STR	**148B6585**
32	1¼	CHV-X 32 D STR	**148B6587**
40	1½	CHV-X 40 D STR	**148B6589**
50	2	CHV-X 50 D STR	**148B6591**
65	2½	CHV-X 65 D STR	**148B6593**
80	3	CHV-X 80 D STR	**148B6595**
100	4	CHV-X 100 D STR	**148B6597**
125	5	CHV-X 125 D STR	**148B6599**

CHV-X Butt-weld ANSI (B 36.10 Schedule 80)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 A STR	**148B6582**
20	¾	CHV-X 20 A STR	**148B6584**
25	1	CHV-X 25 A STR	**148B6586**
32	1¼	CHV-X 32 A STR	**148B6588**
40	1½	CHV-X 40 A STR	**148B6590**

CHV-X Butt-weld ANSI (B 36.10 Schedule 40)

Size		Type	Code No.
mm	in.		
50	2	CHV-X 50 A STR	**148B6592**
65	2½	CHV-X 65 A STR	**148B6594**
80	3	CHV-X 80 A STR	**148B6596**
100	4	CHV-X 100 A STR	**148B6598**
125	5	CHV-X 125 A STR	**148B6600**

CHV-X Socket welding ANSI (B 16.11)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 SOC STR	**148B6601**
20	¾	CHV-X 20 SOC STR	**148B6602**
25	1	CHV-X 25 SOC STR	**148B6603**
32	1¼	CHV-X 32 SOC STR	**148B6604**
40	1½	CHV-X 40 SOC STR	**148B6605**
50	2	CHV-X 50 SOC STR	**148B6606**

STR = Straightway

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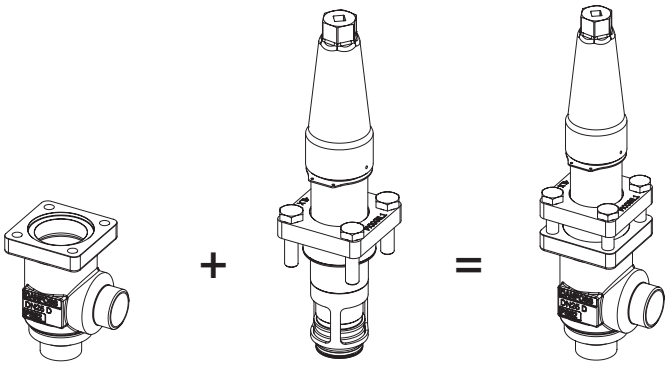
Ordering SVA-X from the parts programme

Example
(select from table 1 and 2)

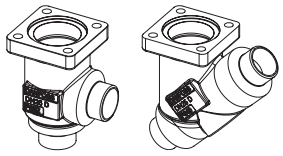


Valve housing, size 25 (1 in), DIN butt weld, angleway, **148B5452**
Table 1

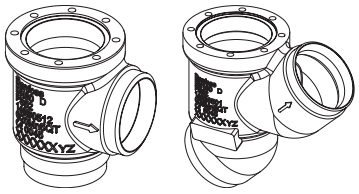
Top part, SCA-X size 25 (1 in) **148B5482**
Table 2

Table 1
SVL valve housings w/different connections

DN 15 – 65 mm (½ – 2½ in)



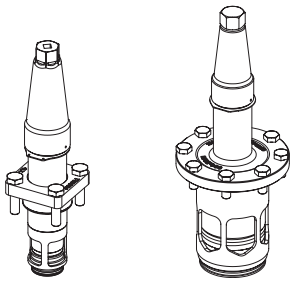
DN 80 – 125 mm (3 – 5 in)



Sizes [DN]		Valve Housing SVL										
		DIN-Butt weld		ANSI-Butt weld		GOST-Butt-weld		SOC		FPT		T
[mm]	[in]	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG
15	½	**148B5252**	**148B5253**	**148B5254**	**148B5255**	**148B5391**	**148B5392**	**148B5256**	**148B5257**	**148B5258**	**148B5259**	
20	¾	**148B5352**	**148B5353**	**148B5354**	**148B5355**	**148B5393**	**148B5394**	**148B5356**	**148B5357**	**148B5358**	**148B5359**	
25	1	**148B5452**	**148B5453**	**148B5454**	**148B5455**	**148B5498**	**148B5499**	**148B5456**	**148B5457**	**148B5458**	**148B5459**	
32	1 ¼	**148B5576**	**148B5577**	**148B5578**	**148B5579**	**148B5593**	**148B5594**	**148B5580**	**148B5581**	**148B5582**	**148B5583**	
40	1 ½	**148B5652**	**148B5653**	**148B5654**	**148B5655**	**148B5681**	**148B5682**	**148B5656**	**148B5657**			
50	2	**148B5741**	**148B5742**	**148B5743**	**148B5744**	**148B5759**	**148B5760**	**148B5745**	**148B5746**			
65	2 ½	**148B5816**	**148B5817**	**148B5818**	**148B5819**	**148B5816**	**148B5817**					
80	3	**148B5912**	**148B5913**	**148B5914**	**148B5915**	**148B5912**	**148B5913**					
100	4	**148B6014**	**148B6015**	**148B6016**	**148B6017**	**148B6033**	**148B6034**					
125	5	**148B6112**	**148B6113**	**148B6114**	**148B6115**	**148B6133**	**148B6134**					

Table 2
SCA-X complete top part including gaskets and bolts

SCA-X 15-50	SCA-X 80-125



Sizes [DN]		Complete top part
[mm]	[in]	SCA-X
15	½	**148B5282**
20	¾	
25	1	**148B5482**
32	1 ¼	
40	1 ½	
50	2	**148B5735**
65	2 ½	**148B5825**
80	3	**148B5918**
100	4	**148B6019**
125	5	**148B6118**

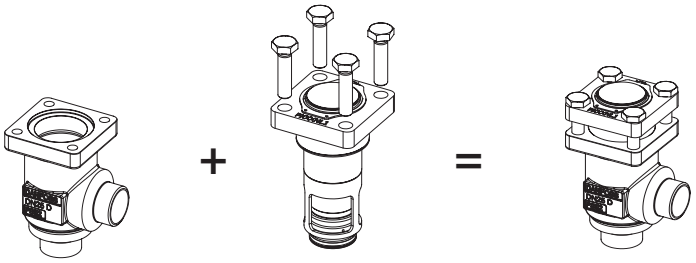
Replacement kit (O-ring replacement) for R717 Ammonia Heat Pump and Propylene applications (including ID tag)*

Size (DN)		O-ring kit for	
mm	in.	R717 Heat pump	R1270 Propylene
15	½	**148B6070**	**148B6077**
20	¾		
25	1	**148B6071**	**148B6078**
32	1¼		
40	1½		
50	2	**148B6072**	**148B6079**
65	2½	**148B6073**	**148B6080**
80	3	**148B6074**	**148B6081**
100	4	**148B6075**	**148B6082**
125	5	**148B6076**	**148B6083**

* Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between +100°C to 150°C (212°F to 302°F)

Ordering CHV-X from the parts programme

Example
(select from table 1 and 2)

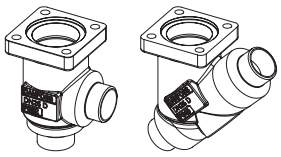


Valve housing, size 25 (1 in.), DIN butt weld, angleway, **148B5452** Table 1

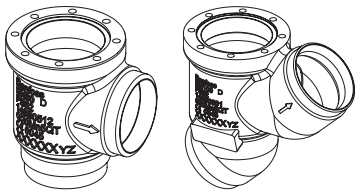
Top part, CHV-X size 25 (1 in.) **148B5483** *Table 2*

Table 1
SVL valve housings w/different connections

DN 15-65 mm (½ - 2½ in.)



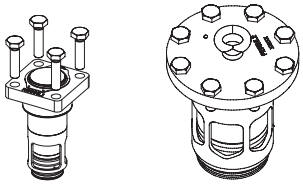
DN 80-125 mm (3 - 5 in.)



Sizes [DN]		Valve Housing SVL										
		DIN-Butt weld		ANSI-Butt weld		GOST-Butt-weld		SOC		FPT		T
mm	in.	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG
15	½	148B5252	148B5253	148B5254	148B5255	148B5391	148B5392	148B5256	148B5257	148B5258	148B5259	
20	¾	148B5352	148B5353	148B5354	148B5355	148B5393	148B5394	148B5356	148B5357	148B5358	148B5359	
25	1	148B5452	148B5453	148B5454	148B5455	148B5498	148B5499	148B5456	148B5457	148B5458	148B5459	
32	1¼	148B5576	148B5577	148B5578	148B5579	148B5593	148B5594	148B5580	148B5581	148B5582	148B5583	
40	1½	148B5652	148B5653	148B5654	148B5655	148B5681	148B5682	148B5656	148B5657			
50	2	148B5741	148B5742	148B5743	148B5744	148B5759	148B5760	148B5745	148B5746			
65	2½	148B5816	148B5817	148B5818	148B5819	148B5816	148B5817					
80	3	148B5912	148B5913	148B5914	148B5915	148B5912	148B5913					
100	4	148B6014	148B6015	148B6016	148B6017	148B6033	148B6034					
125	5	148B6112	148B6113	148B6114	148B6115	148B6133	148B6134					

Table 2
CHV-X complete top part including gaskets and bolts

CHV-X 15-50 | CHV-X 80-125



Sizes [DN]		Complete top part
mm	in.	CHV-X
15	½	148B5283
20	¾	
25	1	148B5483
32	1¼	
40	1½	
50	2	148B5747
65	2½	148B5827
80	3	148B5919
100	4	148B6022
125	5	148B6119

Replacement kit (O-ring replacement) for R717 Ammonia Heat Pump and Propylene applications (including ID tag)*

Size (DN)		O-ring kit for	
mm	in.	R717 Heat pump	R1270 Propylene
15	½	148B6070	148B6077
20	¾		
25	1	148B6071	148B6078
32	1¼		
40	1½		
50	2	148B6072	148B6079
65	2½	148B6073	148B6080
80	3	148B6074	148B6081
100	4	148B6075	148B6082
125	5	148B6076	148B6083

* Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between +100°C to 150°C (212°F to 302°F)

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ENGINEERING
TOMORROW

Check & stop valve, SCA-X, 65 bar (943 psi)
Check valve, CHV-X, 65 bar (943 psi)

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ENGINEERING TOMORROW

Check & stop valve, SCA-X, 65 bar (943 psi)
Check valve, CHV-X, 65 bar (943 psi)

SCA-X are check valves with a built-in stop valve function. CHV-X are check valves only. SCA-X/ CHV-X are available in angleway and straightway versions.

The valves are designed to open at very low differential pressures, allow favourable flow conditions and are easy to disassemble for inspection and service.

The SCA-X is equipped with vented cap and has internal backseating enabling the spindle seal to be replaced whilst the valve still under pressure.

Laser cut V-ports provide excellent opening characteristics (SCA-X/CHV-X 50-125).

The valve cone has a built-in flexibility to ensure a precise and tight closing towards the valve seat.

A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.

Features

- Modular Concept:
  - Each valve housing is available with DIN and ANSI butt weld connection and in several different sizes.
  - Possible to convert SCA-X or CHV-X to any other product in the Flexline™ SVL family (regulating valve, shut-off valve or strainer) just by replacing the complete top part.
- Fast and easy valve overhaul service. It is easy to replace the top part and no welding is needed.
- Designed to open at a very low differential pressure of 0.04 bar (0.58 psig).
- Designed with a built-in damping chamber preventing valve flutter in case of low refrigerant velocity and/or low density.
- Each valve is clearly marked with type, size and performance range.
  At replacement of the O-ring for special application, an additional ID ring is fixed to the valve.
- Easy to disassemble for inspection and service.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure.
- Optimal flow characteristics ensuring quick opening to the fully open position.
- Protection against pulsation by built-in damping facility.
- Housing and bonnet material is low temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities.
- Equipped with 42 CrMo5 bolts to withstand high pressure.
- Classification: DNV, CRN, BV, EAC etc.
  To get an updated list of certification on the products please contact your local Danfoss Sales Company.
- Service kits with replacement O-rings for R717 Heat Pump and R1270 Propylene include separate ID-ring for ID of application.

Technical data

- *Refrigerants*
  Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO_2) and flammable refrigerants.
  For further information please see the installation guide for SCA-X/CHV-X.
- *Temperature range*
  –60/+150°C (–76/+302°F).
- *Max. working pressure*
  65 bar (943 psig)
  With O-ring replaced (Service kit):
  Heat pump configuration: R717 - 65 bar (943 psi) @ +100°C to +150°C (+212°F to +302°F) continuous.
  Propylene configuration: R1270 - 65 bar (943 psi) @ -60°C to 150°C (-76°F to 302°F)

Design

Housing
The housing is made from special, cold resistant steel.

Valve cone
Valve cone with built in metallic stop - prevents damage to teflon ring in case of overtightening.

Teflon ring made of reinforced teflon

Damping chamber
The chamber is filled with refrigerants (gas or liquid), which provides a damping effect when the valve opens and closes.

Spindle (SCA-X)
Made of polished stainless steel, which is ideal for O-ring sealing.

Packing Gland (SCA-X)
The "full temperature range" packing gland is the standard for the entire SVL platform.

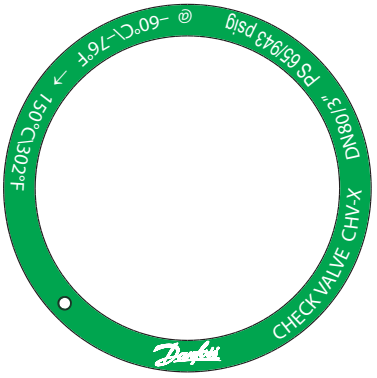
This ensures perfect tightness throughout the whole temperature range:
–60/+150°C (–76/+302°F).

Installation
The valve must be mounted vertically with the cone downwards.

The valve is designed to resist very high internal pressure. However, the piping system in general should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion.

For further information refer to installation guide for SCA-X/CHV-X.

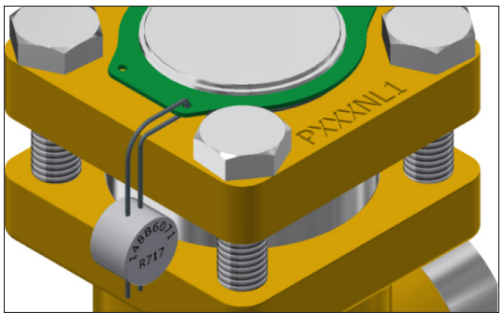
If cold refrigeration oil having low viscosity enters and settles in the damping chamber, problems with the check valve may arise. Consequently, it may be necessary to modify the valve for more viscous liquids by enlarging the hole to the damping chamber.



Example of marking ring, CHV-X

ID ring for special application
After converting a SCA or CHV valve for Heat Pump/Propylene applications (replacing O-ring) the color marked ID tag included in the service kit must be fixed to the valve as shown in figure to the right.

The ID tag indicates the special application and identifies the installed O-ring.



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Pressure Equipment Directive (PED)

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

For further details / restrictions - see Installation guide.

	SVL		
Nominal bore	DN≤ 25 mm (1 in.)	DN32-80 mm (1¼ - 3 in.)	DN100 - 200 mm (4-8 in.)
Classified for	Fluid group I		
Category	Article 3, paragraph 3	II	III

Computation and selection

Introduction

When dimensioning SCA-X/CHV-X, it is important to select a valve that is best suited to all operating conditions. Therefore, it is necessary to consider both the nominal and part load working conditions.

The SCA-X/CHV-X valve can be calculated in two ways:
– Using the tables below.
– Using Coolselector™

Example

SI-Units

Assumed working conditions:
Maximum flow $\dot{V}$ = 1000 m³/h
Density ρ = 3.0 kg/m³
Minimum part load = 33%

Used expressions:
Recommended velocity - C_{rec} [m/s]
Minimum recommended velocity - $C_{min, rec}$ [m/s]
Maximum velocity - C_{max} [m/s]
Part load velocity - C_{part} [m/s]

We know the density ρ ≈ 3.0 kg/m³, consequently C_{rec} as well as $C_{min, rec}$ can be found in the figure below (standard valve).

C_{rec} ≈14 m/s
$C_{min, rec}$ ≈ 3 m/s

US-Units

Assumed working conditions:
Maximum flow $\dot{V}$ = 1160 gpm
Density ρ = 0.187 lb/feet³
Minimum part load = 33%

Used expressions:
Recommended velocity - C_{rec} [ft/min]
Minimum recommended velocity - $C_{min, rec}$ [ft/min]
Maximum velocity - C_{max} [ft/min]
Part load velocity - C_{part} [ft/min]

We know the density ρ ≈ 0.187 lb/feet³, consequently C_{rec} as well as $C_{min, rec}$ can be found in the figure (standard valve).

C_{rec} ≈ 2756 ft/min
$C_{min, rec}$ ≈ 591 ft/min

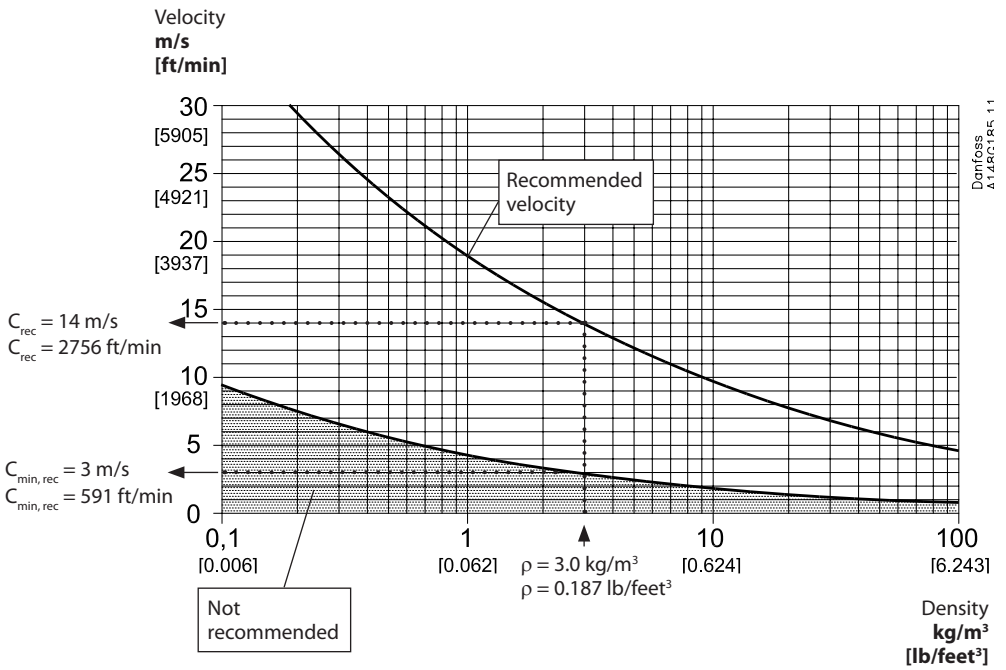

Fig. 1

Selection example continued on following page.

Computation and selection
(continued)

Knowing that $\dot{V}$ = 1000 m³/h (1160 gpm) fig. 2 gives the following choices:

For SCA-X/CHV-X in size DN 100 the maximum velocity C_{max} ≈ 31 m/s (6100 ft/min)
For SCA-X/CHV-X in size DN 125 the maximum velocity C_{max} ≈ 20 m/s (3900 ft/min)

In conclusion SCA-X in size DN 125 is selected because C_{max} ≈ 20 m/s (3900 ft/min) comes nearest to the recommended velocity C_{rec} ≈ 14 m/s (2756 ft/min) and at the same time part load conditions fulfil the requirements, as described:

We know that C_{max} ≈ 20 m/s (3900 ft/min) and that minimum part load is 33%. It follows that C_{part} ≈ 6.5 m/s (1290 ft/min). Thus, C_{part} (6.5 m/s) > $C_{min, rec}$ (3.0 m/s) and the selected SCA-X model DN125 is the perfect choice.

If the valve in question (for instance under part load conditions) provides a velocity less than $C_{min, rec}$ the valve might start hammering and become noisy. As a result the valve may wear prematurely.

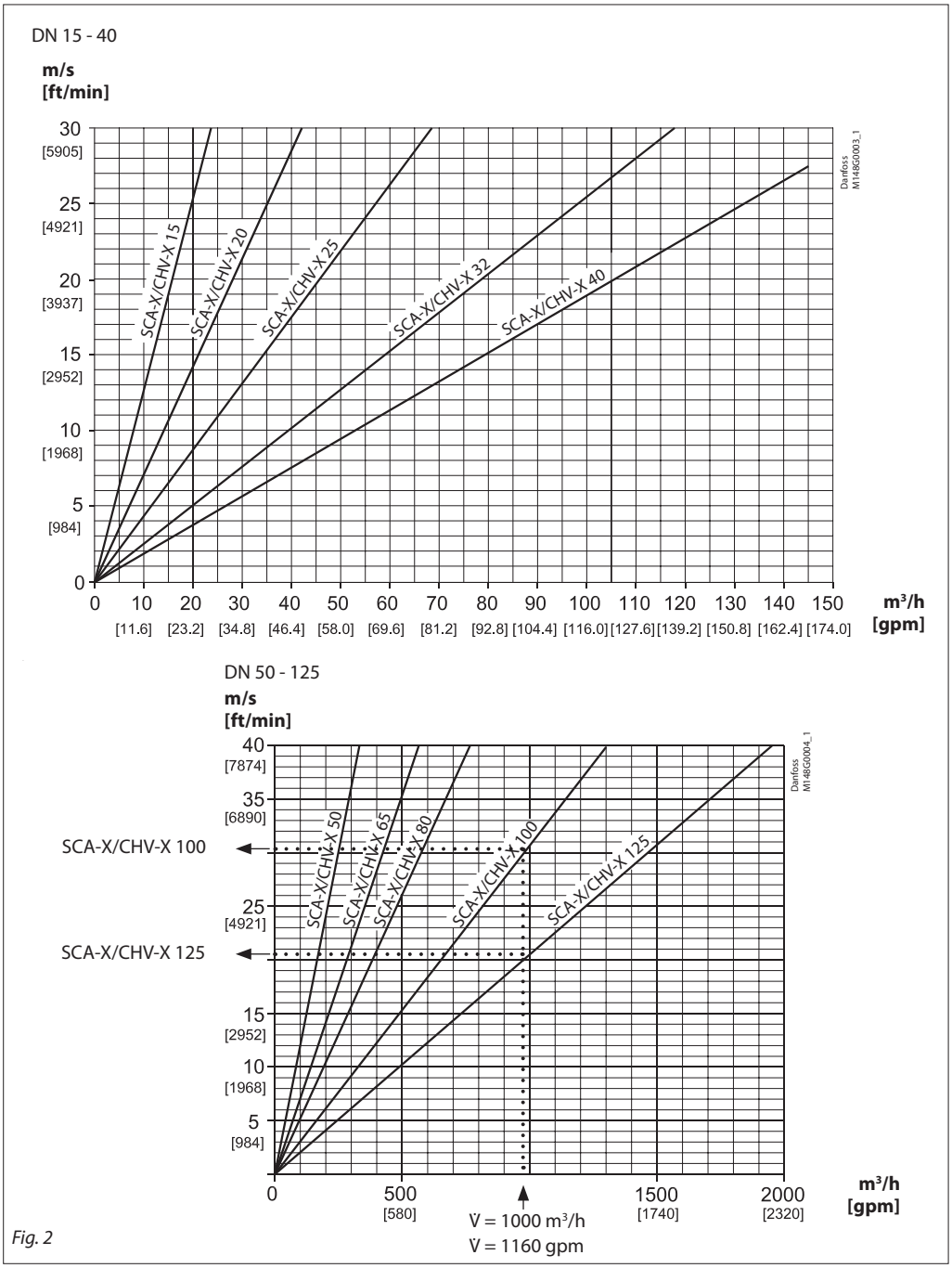

Fig. 2

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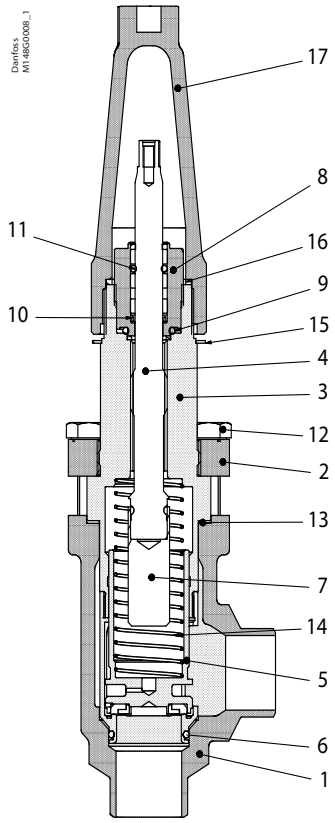
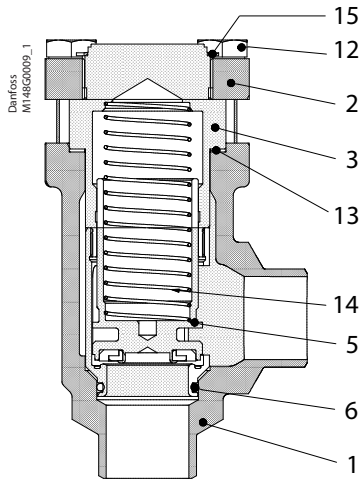
Material specification



SCA-X 15 - 40

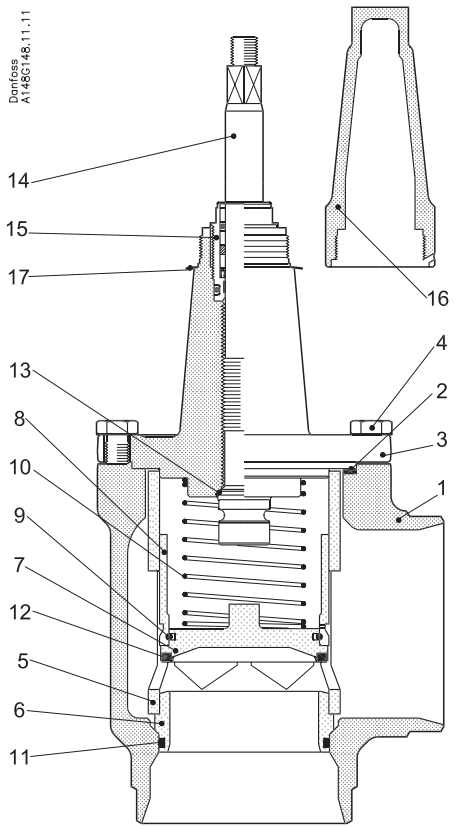


CHV-X 15 - 40

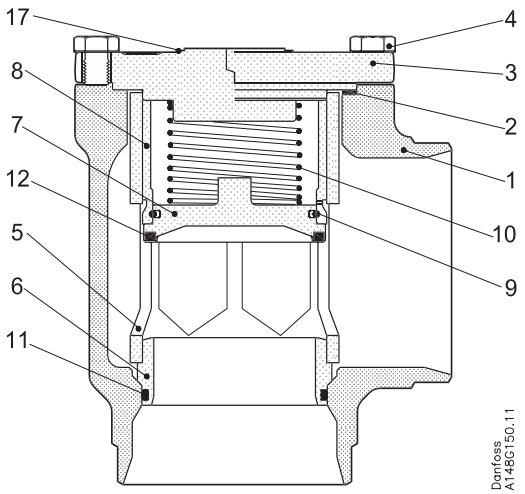
No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing	Steel	G20Mn5QT, 10213-3 --- P285QH+QT, 10222-4		LCC, A352 --- LF2, A350
2	Bonnet, Flange	Steel	P275NL1 EN10028-3		LF2, A350
3	Bonnet, Insert	Steel	11SMn30 10087	Type 2 R 683/9	AISI 1213
4	Spindle	Stainless steel	X8CrNiS18-9, EN 10088-3	Type 17 683/13	AISI 303
5	Cone	Steel Teflon (PTFE)			
6	O-ring	Cloroprene (Neoprene)*			
7	Spindle extension	Steel			
8	Packing gland O-rings	Stainless steel Cloroprene (Neoprene)	X8CrNiS18-9 10088	Type 17 683/13	AISI 303
9	Packing washer	Aluminium			
10	Spring loaded seal	Teflon (PTFE)			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	High temperature steel	42CrMo5 10269		A193
13	Gasket	Fiber, non-asbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminium			

*To be replaced in R717 Heat Pump and R1270 Propylene applications.

Material specification



SCA-X 50 - 125



CHV-X 50 - 125

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing DN 50-65	Steel	G20Mn5QT, 10213-3 --- P285QH+QT, 10222-4		LCC, A352 --- LF2, A350
	Housing DN 80-125	Steel	G20Mn5 QT SEW 685		LCC, A352
2	Gasket	Fiber, Non-asbestos			
3	SCA-X: Valve bonnet CHV-X: End cover	Steel	P285 QH EN 10222-4 --- P275NL1 or 2 EN10028-3		LF2, A350 --- A, A662
4	Bolts	High temperature steel	42CrMo5 10269		A193
5	Tube	Steel			
6	Seat	Steel			
7	Valve plate	Steel			
8	Guide sleeve	Steel			
9	Spring ring	Steel			
10	Spring	Steel			
11	O-ring	Cloroprene (Neoprene)*			
12	Teflon ring	Teflon (PTFE)			
13	Soft back seal	Teflon (PTFE)			
14	Spindle DN 50-65	Stainless steel	X8CrNiS18-9 17440	Type 17 R 683/13	AISI 303
	Spindle DN 80-125	Stainless steel	X5CrNi1810 17440	Type 11 683/13	AISI 304 A-276
15	Packing gland	Stainless steel	X8CrNiS18-9, EN 10088-3,	Type 17 R 683/13	AISI 303
16	Spindle seal cap and gasket	Aluminium			
17	Marking label	Stainless steel			

*To be replaced in R717 Heat Pump and R1270 Propylene applications.

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Application

Figure 3 shows the check & stop valve SCA-X in the discharge line of a screw compressor unit. The SCA-X valve in the discharge line prevents "back condensation" in the oil separator as well as pressure equalising through the compressor.

Compared to an ordinary stop and check valve arrangement the combined stop/check valve solution, as shown, is easier to install and has lower flow resistance.

Installation of the SCA-X/CHV-X in the economizer line is **not** recommended.

For horizontal installation of the function module; please contact Danfoss.

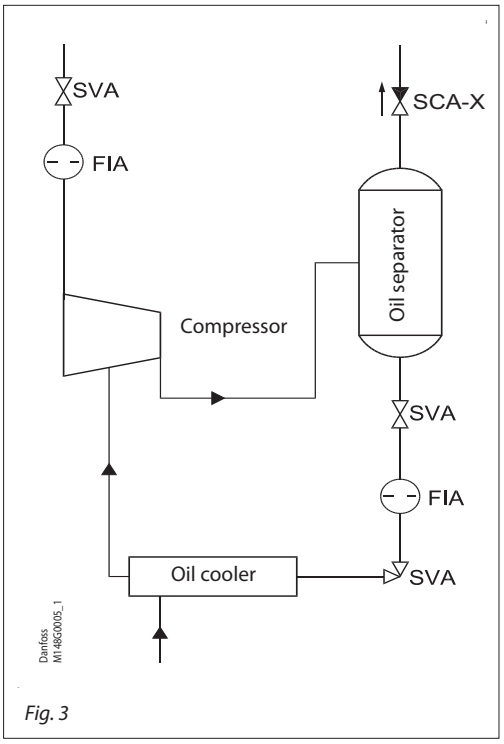
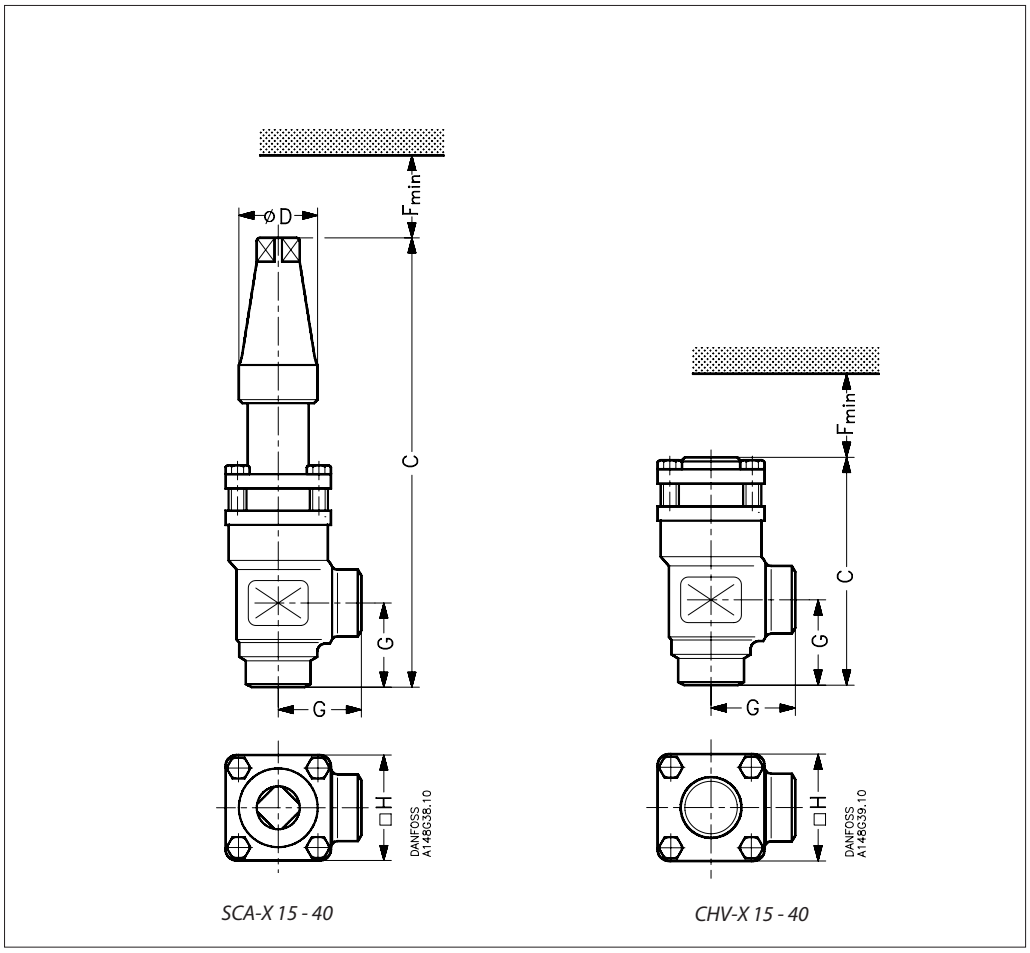


Fig. 3

Dimensions and weights

SCA-X/CHV-X 15 - 40 (½- 1½ in.)



SCA-X 15 - 40 *CHV-X 15 - 40*

Valve size		C		G		∅D		F_{min}		□H	Weight
SCA-X 15 - 40											
SCA-X 15 (½ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 20 (¾ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 25 (1 in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 32 (1¼ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 40 (1½ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb

Valve size		C		G				F_{min}		□H	Weight
CHV-X 15 - 40											
CHV-X 15 (½ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 20 (¾ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 25 (1 in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 32 (1¼ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 40 (1½ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb

Specified weights are approximate values only.

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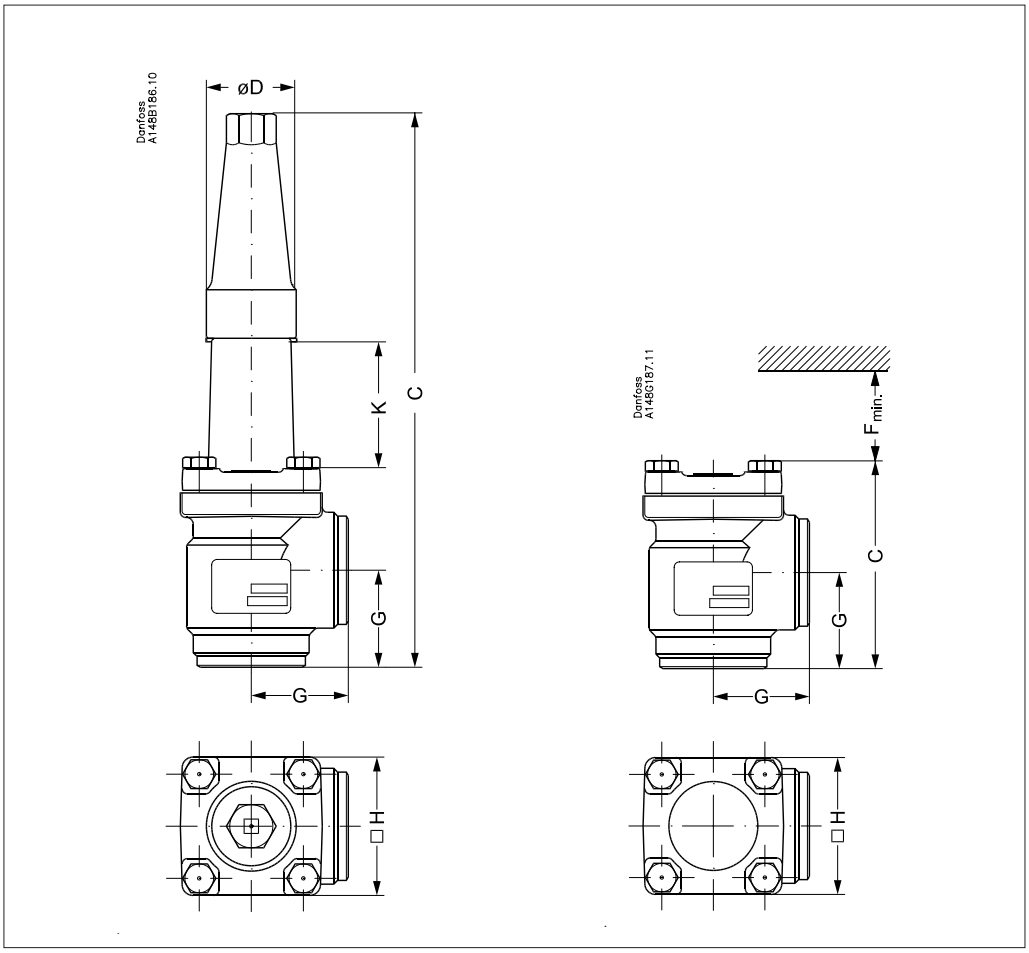
Dimensions and weights

SCA-X/CHV-X 50 - 65 (2 - 2½ in.)



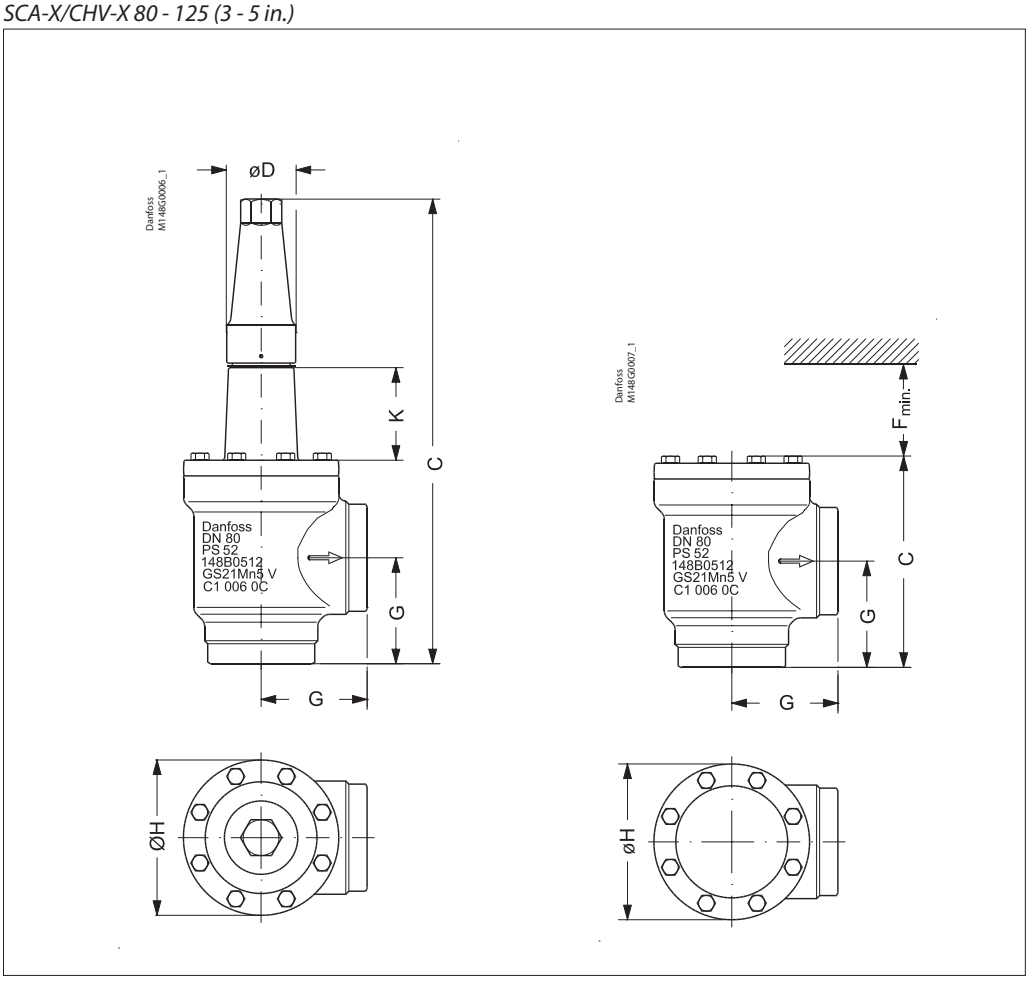
Valve size	K			C		G		∅D	□H		Weight
SCA-X											
SCA-X 50 mm SCA-X (2) in.	70 2.76			315 12.40		60 2.36		50 1.97	77 3.03		3.8 kg 8.40 lb
SCA-X 65 mm SCA-X (2½) in.	70 2.76		12.20	335 13.19		70 2.76	3.94	50 1.97	90 3.54		5.5 kg 12.16 lb

Valve size				C		G		$F_{min.}$	□H		Weight
CHV-X											
CHV-X 50 mm CHV-X (2) in.				132 5.20		60 2.36		92 3.62	77 3.03		3.2 kg 7.10 lb
CHV-X 65 mm CHV-X (2½) in.				152 5.98		70 2.76		107 4.21	90 3.54		4.5 kg 9.95 lb

Specified weights are approximate values only.

Dimensions and weights

SCA-X/CHV-X 80 - 125 (3 - 5 in.)



Valve size	K			C		G		ØD		ØH	Weight
SCA-X											
SCA-X 80 mm SCA-X (3) in.	76 3.00			388 15.28		90 3.54		58 2.28		129 5.08	9.7 kg 21.4 lb
SCA-X 100 mm SCA-X (4) in.	90 3.54			437 17.20		106 4.17		58 2.28		156 6.14	15.3 kg 33.7 lb
SCA-X 125 mm SCA-X (5) in.	90 3.54			533 20.98		128 5.04		74 2.91		193 7.60	28.1 kg 61.9 lb

Valve size				C		G			$F_{min.}$	ØH	Weight
CHV-X											
CHV-X 80 mm CHV-X (3) in.				189 7.44		90 3.54			133 5.24	129 5.08	8.7 kg 19.23 lb
CHV-X 100 mm CHV-X (4) in.				223 8.78		106 4.17			163 6.43	156 6.14	14.3 kg 31.60 lb
CHV-X 125 mm CHV-X (5) in.				268 10.55		128 5.04			190 7.48	193 7.60	25.6 kg 56.58 lb

Specified weights are approximate values only.

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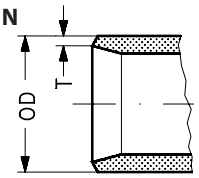
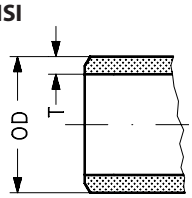
Connections

DIN



Size mm	Size in.	OD mm	T mm	OD in.	T in.			k_v-angle m^3/h	k_v-straight m^3/h	C_v-angle USgal/min	C_v-straight USgal/min
Butt-weld DIN (EN 10220)											
15	½	21.3	2.3	0.839	0.091			7.0	4.9	8.1	5.7
20	¾	26.9	2.3	1.059	0.091			14.6	10.2	16.9	11.8
25	1	33.7	2.6	1.327	0.103			24.8	17.4	28.8	20.2
32	1¼	42.4	2.6	1.669	0.102			42.6	29.8	49.4	34.6
40	1½	48.3	2.6	1.902	0.103			45.2	31.6	52.4	36.7
50	2	60.3	2.9	2.37	0.11			80	65	93	76
65	2½	76.1	2.9	3	0.11			120	97	140	113
80	3	88.9	3.2	3.50	0.13			182	152	211	176
100	4	114.3	3.6	4.50	0.14			313	278	363	323
125	5	139.7	4.0	5.50	0.16			514	470	596	545

ANSI



Size mm	Size in.	OD mm	T mm	OD in.	T in.			k_v-angle m^3/h	k_v-straight m^3/h	C_v-angle USgal/min	C_v-straight USgal/min
Butt-weld ANSI (B 36.10 Schedule 80)											
15	½	21.3	3.7	0.839	0.146			7.0	4.9	8.1	5.7
20	¾	26.9	4.0	1.059	0.158			14.6	10.2	16.9	11.8
25	1	33.7	4.6	1.327	0.181			24.8	17.4	28.8	20.2
32	1¼	42.4	4.9	1.669	0.193			42.6	29.8	49.4	34.6
40	1½	48.3	5.1	1.902	0.201			45.2	31.6	52.4	36.7
Butt-weld ANSI (B 36.10 Schedule 40)											
50	2	60.3	3.9	2.37	0.15			80	65	93	76
65	2½	73.0	5.2	2.87	0.20			120	97	140	113
80	3	88.9	5.5	3.50	0.22			182	152	211	176
100	4	114.3	6.0	4.50	0.24			313	278	363	323
125	5	141.3	6.6	5.56	0.26			514	470	596	545

Ordering

Size [DN]	Parts Program					
	Housing				Top complete	
	ANG		STR		SCA-X	CHV-X
	DIN	ANSI	DIN	ANSI		
6						
10						
15	148B6622	148B6612	148B6642	148B6632	148B5769	148B5776
20	148B6623	148B6613	148B6643	148B6633	148B5769	148B5776
25	148B6624	148B6614	148B6644	148B6634	148B5770	148B5777
32	148B6625	148B6615	148B6645	148B6635	148B5770	148B5777
40	148B6626	148B6616	148B6646	148B6636	148B5770	148B5777
50	148B6627	148B6617	148B6647	148B6637	148B5771	148B5778
65	148B6628	148B6618	148B6648	148B6638	148B5772	148B5779
80	148B6629	148B6619	148B6649	148B6639	148B5773	148B5780
100	148B6630	148B6620	148B6650	148B6640	148B5774	148B5781
125	148B6631	148B6621	148B6651	148B6641	148B5775	148B5782
150						
200						

Size [DN]	Service kit*	
	O-ring kit for	
	R717 Heat Pump	R1270 Propylene
6		
10		
15	148B6070	148B6077
20	148B6070	148B6077
25	148B6071	148B6078
32	148B6071	148B6078
40	148B6071	148B6078
50	148B6072	148B6079
65	148B6073	148B6080
80	148B6074	148B6081
100	148B6075	148B6082
125	148B6076	148B6083
150		
200		

ENGINEERING
TOMORROW

Check & stop valves, type SCA-X SS
Check valves, type CHV-X SS

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Design 36
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Dimensions and weights 39
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ENGINEERING TOMORROW

Check & stop valves, type SCA-X SS
Check valves, type CHV-X SS

In certain specific areas such as outdoor applications and corrosive atmospheres, such as coastal installations, there is a need for high surface protection to prevent failure due to corrosion.

Today's food safety standards often call for daily treatment with detergents to protect against bacteria growth, again producing a need for high surface protection.

SCA-X SS are check valves with a built-in stop valve function. CHV-X SS are check valves only.

The valves are designed to open at very low differential pressures, allow favourable flow conditions and are easy to disassemble for inspection and service.

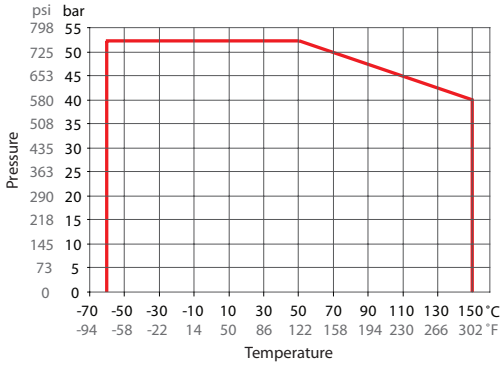
The valve cone has a built-in flexibility to ensure a precise and tight closing towards the valve seat.

A well balanced dampening effect between the piston and the cylinder gives an optimal protection during low loads and against pulsations.

Features

- Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO_2), Propane, Butane, Iso-Butane and Ethane.
  R717 Heat Pump and Propylene applications with replaced O-ring.
- Designed to give favourable flow conditions.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure (SCA-SS)
- Housing is made of special cold resistant stainless steel approved for low temperature operations.
- Easy to disassemble for inspection and service.
- Butt-weld DIN and ANSI connections.
- Max. operating pressure:
  52 bar g (754 psig)
- Temperature range:
  –60/+150°C (–76 +302°F).
- Compact and light valves for 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 and temperature range



SCA-X SS/CHV-X SS DN15-DN40

Design

Connections
Available with the following connections:
- Butt-weld DIN (EN 10220)
  DN 15 - 40 (½ - 1½ in.)
- Butt-weld ANSI (B 36.19M)
  DN 20 - 40 (¾ - 1½ in.)

Housing
Made of stainless steel approved for low temperature operations.

Valve cone
Valve cone with built in metallic stop - prevents damage to teflon ring in case of overtightening.

Damping chamber
The chamber is filled with refrigerants (gas or liquid), which provides a damping effect when the valve opens and closes.

Spindle (SCA-X SS)
Made of polished stainless steel, which is ideal for O-ring sealing.

Packing Gland (SCA-X SS)
The "full temperature range" packing gland is the standard for the entire SVL platform.
This ensures perfect tightness throughout the whole temperature range:
–60/+150°C (–76/+302°F).

Pressure Equipment Directive (PED)
The SCA-X SS/CHV-X SS valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

For further details / restrictions - see the product instruction.

Installation
The valve must be mounted vertically with the cone downwards.

The valve is designed to resist very high internal pressure. However, the piping system in general should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion.

For further information refer to installation instructions for SCA-X SS/CHV-X SS.

If cold refrigeration oil having low viscosity enters and settles in the damping chamber, problems with the check valve may arise. Consequently, it may be necessary to modify the valve for more viscous liquids by enlarging the hole to the damping chamber.

Example of marking ring, CHV-X SS

SCA-X SS/CHV-X SS valves		
Nominal bore	DN = < 25 mm (1 in.)	DN32-40 mm (1¼ - 1½ in.)
Classified for	Fluid group I	
Category	Article 3, paragraph 3	II

Technical data

- *Refrigerants*
  Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO_2), Propane, Butane, Iso-Butane and Ethane.
  R717 Heat Pump and Propylene applications with replaced O-ring.
  For further information refer to the installation guide for SCA-X SS/CHV-X SS.
- *Temperature range*
  –60/+150°C (–76/+302°F).
- *Max. working pressure*
  52 bar g (754 psig).

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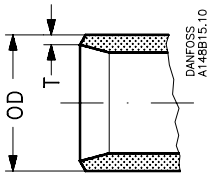
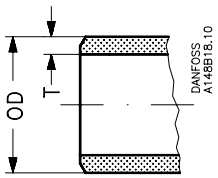
Connections

DIN



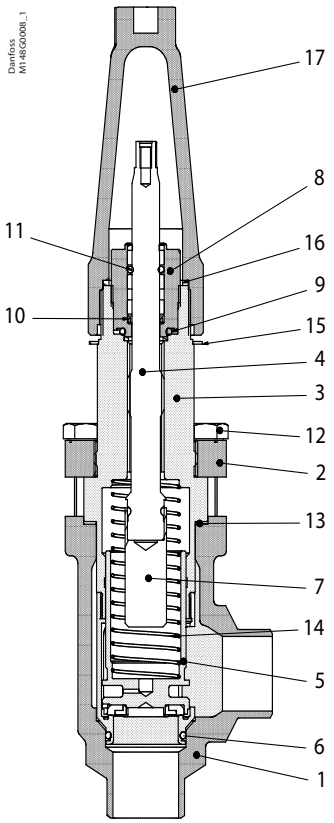
ANSI



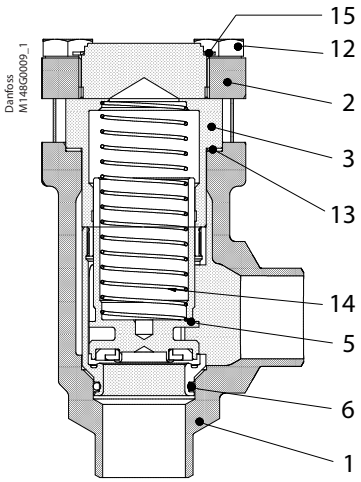
Size		OD	T
Butt-weld DIN (EN 10220)			
15	mm	21.3	2.3
½	in.	0.839	0.091
20	mm	26.9	2.3
¾	in	1.059	0.091
25	mm	33.7	2.6
1	in.	1.327	0.103
32	mm	42.4	2.6
1¼	in.	1.669	0.102
40	mm	48.3	2.6
1½	in.	1.902	0.103

Size		OD	T
Butt-weld ANSI (B 36.19M, SCHEDULE 40)			
20	mm	26.9	2.9
¾	in	1.06	0.11
25	mm	33.7	3.5
1	in.	1.33	0.14
32	mm	42.4	3.6
1¼	in.	1.67	0.14
40	mm	48.3	3.7
1½	in.	1.9	0.15

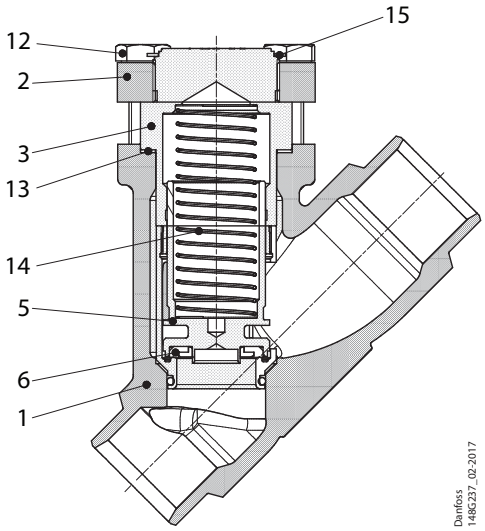
Material specification



SCA-X SS 15 - 40



CHV-X SS 15 - 40



CHV-X SS 15 - 40

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing	Stainless steel	GX5CrNi19-10 EN10213-4		AISI 304
2	Bonnet, Flange	Stainless steel	X5CrNi18-10 EN10088		AISI 304
3	Bonnet, Insert	Stainless steel	X8CrNiS18-9 DIN 17440		
4	Spindle	Stainless steel	X8CrNiS18-9 DIN 17440	Type 17, 17440	AISI 303
5	Cone	Steel Teflon (PTFE)			
6	O-ring	Cloroprene (Neoprene)			
7	Spindle extension	Steel			
8	Packing gland O-rings	Stainless steel Cloroprene (Neoprene)			
9	Packing washer	Aluminium			
10	Spring loaded seal	Teflon (PTFE)			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, non-asbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminium			

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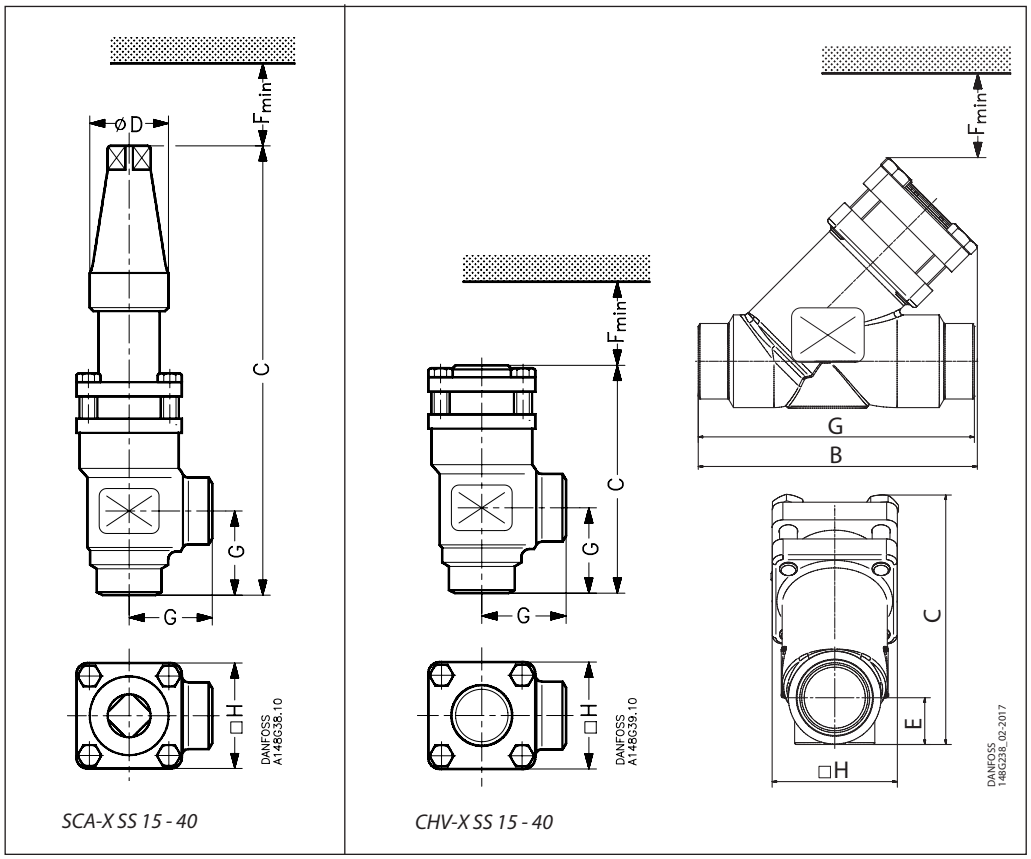
Dimensions and weights

SCA-X SS/CHV-X SS 15 - 40 (½- 1½ in.)



Valve size		C		G		∅D		F_{min}		□H	Weight
SCA-X SS 15 - 40											
SCA-X SS 15 (½ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X SS 20 (¾ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X SS 25 (1 in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X SS 32 (1¼ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X SS 40 (1½ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
CHV-X SS 15 - 40 Angleway											
CHV-X SS 15 (½ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X SS 20 (¾ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X SS 25 (1 in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X SS 32 (1¼ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X SS 40 (1½ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb

Valve size		C	B	E		G		F_{min}		□H	Weight
CHV-X SS 15 - 40 Straightway											
CHV-X SS 15 (½ in.)	mm in.	99 3.90	114 4.49	19 0.75		120 4.72		60 2.36		60 2.36	1.3kg 2.87lb
CHV-X SS 20 (¾ in.)	mm in.	99 3.90	114 4.49	19 0.75		120 4.72		60 2.36		60 2.36	1.3kg 2.87lb
CHV-X SS 25 (1 in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb
CHV-X SS 32 (1¼ in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb
CHV-X SS 40 (1½ in.)	mm in.	141 5.55	157 6.18	26 1.02		155 6.10		85 3.35		70 2.76	2.6kg 5.73lb

Specified weights are approximate values only.

Ordering complete valves

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 wich may not form part of the standard product range.

For further information please contact your local Danfoss Sales Company.

Valve type	**SCA-X SS** **CHV-X SS**	Stop Check Valve Check Valve		
			D	**A**
(valve size measured on the connection diameter)	**15**	DN 15	x	
	20	DN 20	x	x
	25	DN 25	x	x
	32	DN 32	x	x
	40	DN 40	x	x
Connections	**D** **A**	Butt-weld connection: DIN EN 10220 Butt-weld connection: ANSI B 36.19M		
Valve housing	**ANG**	Angle flow		
	STR	Straight flow		

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

SCA-X SS Angleway

Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	SCA-X SS 15 D ANG	**148B5293**
20	¾	SCA-X SS 20 D ANG	**148B5381**
25	1	SCA-X SS 25 D ANG	**148B5490**
32	1¼	SCA-X SS 32 D ANG	**148B5585**
40	1½	SCA-X SS 40 D ANG	**148B5664**

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code No.
mm	in.		
20	¾	SCA-X SS 20 A40 ANG	**148B6489**
25	1	SCA-X SS 25 A40 ANG	**148B6480**
32	1¼	SCA-X SS 32 A40 ANG	**148B6490**
40	1½	SCA-X SS 40 A40 ANG	**148B5687**

CHV-X SS Angleway

Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	CHV-X SS 15 D ANG	**148B5294**
20	¾	CHV-X SS 20 D ANG	**148B5382**
25	1	CHV-X SS 25 D ANG	**148B5491**
32	1¼	CHV-X SS 32 D ANG	**148B5586**
40	1½	CHV-X SS 40 D ANG	**148B5665**

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code No.
mm	in.		
20	¾	CHV-X SS 20 A40 ANG	**148B6491**
25	1	CHV-X SS 25 A40 ANG	**148B6481**
32	1¼	CHV-X SS 32 A40 ANG	**148B6492**
40	1½	CHV-X SS 40 A40 ANG	**148B5688**

CHV-X SS Straightway

Butt-weld DIN (EN 10220)

Size		Type	Code No.
mm	in.		
15	½	CHV-X SS 15 D STR	**148B5678**
20	¾	CHV-X SS 20 D STR	**148B5679**
25	1	CHV-X SS 25 D STR	**148B5680**
32	1¼	CHV-X SS 32 D STR	**148B6544**
40	1½	CHV-X SS 40 D STR	**148B6566**

Butt-weld ANSI (B 36.19M SCHEDULE 40)

Size		Type	Code No.
mm	in.		
20	¾	CHV-X SS 20 A40 STR	**148B6608**
25	1	CHV-X SS 25 A40 STR	**148B6609**
32	1¼	CHV-X SS 32 A40 STR	**148B6610**
40	1½	CHV-X SS 40 A40 STR	**148B6611**

ANG = Angleway
STR = Straightway

Replacement kit (O-ring replacement) for R717 Ammonia Heat Pump and Propylene applications (including ID tag)*

Size		O-ring kit for	
mm	in.	R717 Heat pump	R1270 Propylene
15	½	**148B6070**	**148B6077**
20	¾		
25	1	**148B6071**	**148B6078**
32	1¼		
40	1½		

* Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between +100°C to 150°C (212°F to 302°F)

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ENGINEERING
TOMORROW

Check valves
Type NRVA

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ENGINEERING
TOMORROW

Check valves
Type NRVA

Check valve type NRVA can be used in liquid, suction and hot gas lines in refrigeration and air conditioning plant with ammonia.

NRVA can also be used in refrigerating systems with fluorinated refrigerants.

When the NRVA is used in liquid lines where cold, thick oil or impurities may be present, it is recommended that the standard spring be replaced by a special spring. See ordering table.

Features

- Ensures correct direction of flow.
- Valve housing made of steel.
- Available for 40 bar g / 580 psig working pressure.
- Large range of flanges with connection dimensions in accordance with standards: DIN, ANSI, SOC, SA and FPT.
- Fitted with damping piston that makes the valves suitable for installation in lines where pulsation can occur, e.g. in the discharge line from the compressor.
- Classification: DNV, CRN, BV, EAC etc.
  To get an updated list of certification on the products please contact your local Danfoss Sales Company.

Design

Connections
There is a very wide range of connection possibilities with NRVA check valves:

- Welding, DIN (2448)
- Welding, ANSI (B 36.10)
- Welding socket, ANSI (B 16.11)
- Solder connection, DIN (2856)
- Solder connection, ANSI (B 16.22)
- FPT internal thread, NPT (ANSI/ASME B 1.20.1)

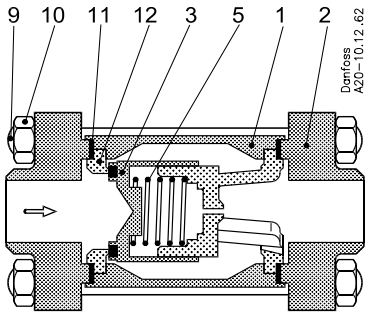
Gaskets:
Do not contain asbestos.

Valve cone:
The valve cone has a teflon tightening ring. Teflon tightening ring renders perfect sealing at a minimum closing force.

Technical data

- *Refrigerants*
  Applicable to HCFC, HFC and R717 (Ammonia).
  For further information please see installation instruction for NRVA.
  Use with flammable hydrocarbons cannot be recommended; please contact Danfoss.
- *Temperature range*
  -50 – 140 °C / -58 – 284 °F.
- *Pressure range*
  The valve is designed for:
  Max. working pressure: 40 bar g / 580 psig.

Material specification

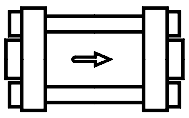


Material specification for NRVA check valves

No.	Part	Material	DIN	ISO	ASTM
1	Housing	Steel	G20Mn5QT *) EN10213-3 --- P285QH EN10222-4		LCC, A352 --- LF2,A350
2	Flanges	Steel	RSt. 37-2, 10025	Fe360 B, 630	Grade C, A 283
3	Valve cone	Stainless steel Teflon			
5	Spring	Steel			
9	Bolts	Stainless steel	A2-70		
10	Nut	Stainless steel			
11	Gasket	Non asbestos			
12	Valve seat	Steel			

*) NRVA 40 / NRVA 50 housing material is TTSt 35N until January 2006

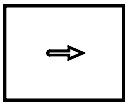
Ordering



Complete valves incl. DIN 2448 flange:

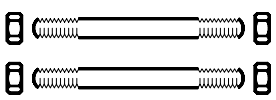
Type	Weld flange connection	Code no.		Δp [2]				k_v value [3]	C_v value [4]
		Valve	Spec. spring [1]	With standard spring		With spec. spring [1]			
	[in]			[bar[	[psig]	[bar]	[psig]	[m³/h]	[gal/min]
NRVA 15	1/2	**020-2000**	**020-2307**	0.12	1.7	0.3	4.4	5	6
NRVA 20	3/4	**020-2001**	**020-2307**	0.12	1.7	0.3	4.4	6	7
NRVA 25	1	**020-2002**	**020-2317**	0.12	1.7	0.3	4.4	19	22
NRVA 32	1 1/4	**020-2003**	**020-2317**	0.12	1.7	0.3	4.4	20	23
NRVA 40	1 1/2	**020-2004**	**020-2327**	0.07	1.0	0.4	5.8	44	51
NRVA 50	2	**020-2005**	**020-2327**	0.07	1.0	0.4	5.8	44	51
NRVA 65	2 1/2	**020-2006**	**020-2337**	0.07	1.0	0.4	5.8	75	87

[1] A special type spring can be supplied to replace the standard valve spring.
[2] Δp = the minimum pressure differential at which the valve is completely open.
[3] The k_v value is the flow of water in m³/h at a pressure drop across valve of 1 bar, ρ = 1000 kg/m³.
[4] The C_v value is the flow of water in gal/min at a pressure drop across valve of 1 psig, ρ = 10 lbs/gal.



Valve body without flanges:

Type	Code no.
NRVA 15	**020-2020**
NRVA 20	**020-2020**
NRVA 25	**020-2022**
NRVA 32	**020-2022**
NRVA 40	**020-2024**
NRVA 50	**020-2024**
NRVA 65	**020-2026**



Staybolts and gaskets

Type	Dimensions	Code no.
NRVA 15 / 20	M 12 × 115 mm	**006-1107**
NRVA 25 / 32	M 12 × 148 mm	**006-1135**
NRVA 40 / 50	M 12 × 167 mm	**006-1137**
NRVA 65	M 16 × 200 mm	**006-1138**

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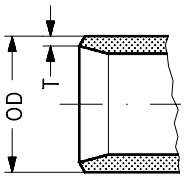
Flange connections

Danfoss flange sets excluding gaskets, bolts and nuts, are specially made for the Danfoss product range and must only be used for the purpose described.

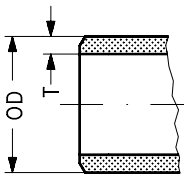
Select the valve based on capacity and then select the size of flanges most suitable for the application, which can be mounted on the valve.

DIN



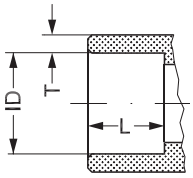
Size [mm]	Size [in]	OD [mm]	T [mm]	OD [in]	T [in]	Flange type	For use with valve housing size	Code no.
Butt welding DIN (2448)								
10	3/8	18	2	0.710	0.079	1.3	NRVA 15/20	**027N1112**
15	1/2	22	2.5	0.866	0.098	1.3	NRVA 15/20	**027N1115**
20	3/4	26.9	2.3	1.059	0.091	1.3	NRVA 15/20	**027N1120**
25	1	33.7	2.6	1.327	0.103	4	NRVA 25/32	**027N1026**
32	1 1/4	42.4	2.6	1.669	0.102	4	NRVA 25/32	**027N1033**
40	1 1/2	48.3	2.6	1.902	0.103	6	NRVA 40/50	**027N1042**
50	2	60.3	2.9	2.370	0.110	6	NRVA 40/50	**027N1051**
65	2 1/2	76.1	2.9	3.000	0.110	8	NRVA 65	**027N1055**

ANSI



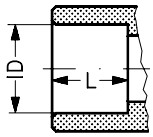
Size [mm]	Size [in]	OD [mm]	T [mm]	OD [in]	T [in]	Flange type	For use with valve housing size	Code no.
Butt welding ANSI B 36.10								
10	3/8	17.2	3.2	0.677	0.126	1.3	NRVA 15/20	**027N2020**
15	1/2	21.3	3.7	0.839	0.146	1.3	NRVA 15/20	**027N2021**
20	3/4	26.9	4.0	1.059	0.158	1.3	NRVA 15/20	**027N2022**
25	1	33.7	4.6	1.327	0.181	4	NRVA 25/32	**027N2023**
32	1 1/4	42.4	4.9	1.669	0.193	4	NRVA 25/32	**027N2024**
40	1 1/2	48.3	5.1	1.902	0.201	6	NRVA 40/50	**027N2025**
50	2	60.3	3.9	2.370	0.150	6	NRVA 40/50	**027N2026**
65	2 1/2	73.0	5.2	3.000	0.200	8	NRVA 65	**027N2027**

SOC



Size [mm]	Size [in]	ID [mm]	T [mm]	ID [in]	T [in]	L [mm]	L [in]	Flange type	For use with valve housing size	Code no.
Socket welding ANSI (B 16.11)										
10	3/8	17.8	4.1	0.701	0.161	10	0.394	1.3	NRVA 15/20	**027N2010**
15	1/2	22	4.8	0.866	0.189	10	0.394	1.3	NRVA 15/20	**027N2011**
20	3/4	27.4	5.0	1.079	0.197	13	0.512	4	NRVA 25/32	**027N2012**
25	1	34.1	5.8	1.343	0.228	13	0.512	4	NRVA 25/32	**027N2013**
32	1 1/4	42.9	6.0	1.689	0.236	13	0.512	4	NRVA 25/32	**027N2016**
40	1 1/2	49.0	6.5	1.929	0.254	13	0.512	6	NRVA 40/50	**027N2015**

SA

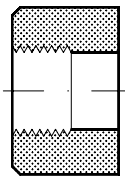


Size [mm]	Size [in]	ID [mm]		ID [in]		L [mm]	L [in]	Flange type	For use with valve housing size	Code no.
Soldering DIN (2856)										
16		16.07				15		1.3	NRVA 15/20	**027L1116**
22		22.08				22		1.3	NRVA 15/20	**027L1122**
35		35.07				25		4	NRVA 25/32	**027L2335**
54		54.09				33		4	NRVA 40/50	**027L2554**
Soldering (ANSI B 16.22)										
	5/8			0.628			0.807	1.3	NRVA 15/20	**027L1117**
	7/8			0.878			0.866	1.3	NRVA 15/20	**027L1123**
	1 3/8			1.375			0.984	4	NRVA 25/32	**027L2335**
	2 1/8			2.125			1.300	4	NRVA 40/50	**027L2554**

To be continued next page.

Flange connections
(Continued)

FPT



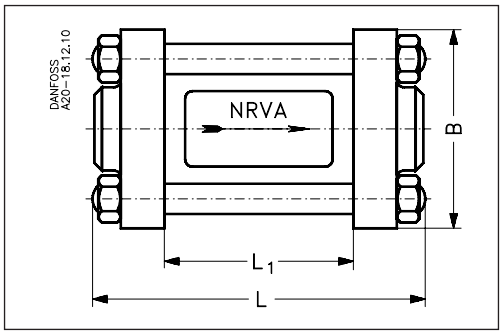
Size [mm]	Size [in]	Inside pipe thread	Flange type	For use with valve housing size	Code no.
FPT inside pipe thread, NPT (ANSI/ASME B 1.20.1)					
10	3/8	(3/8 × 18 NPT)	1.3	NRVA 15/20	**027G1005**
15	1/2	(1/2 × 14 NPT)	1.3	NRVA 15/20	**027G1006**
20	3/4	(3/4 × 14 NPT)	4	NRVA 25/32	**027G1007**

Example
NRVA 32 with 1 1/4" flanges for ANSI butt welding:

NRVA 32 + bolts + flanges (set) =
020-2022 + 006-1135 + 027N2024

NOTE:
The flanges sets are exclusive gaskets, bolts and nuts.

Dimensions and weights



Type		L	L_1 [1])	B	Weight
NRVA 15 – 20	[mm]	115	50	80	1.4 kg
	[in]	4.53	1.97	3.15	3.09 lb
NRVA 25 – 32	[mm]	138	74	∅ 83	3.0 kg
	[in]	5.43	2.91	∅ 3.27	6.61 lb
NRVA 40 – 50	[mm]	172	94.5	∅ 103	5.0 kg
	[in]	6.77	3.72	∅ 4.05	11.02 lb
NRVA 65	[mm]	226	124	∅ 185	13.0 kg
	[in]	8.90	4.88	∅ 7.28	28.66 lb

[1]) Without flanges

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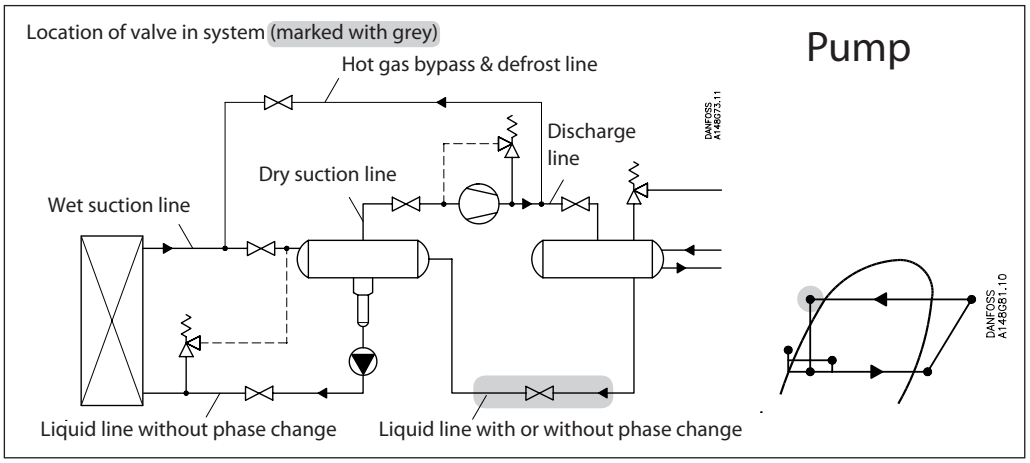
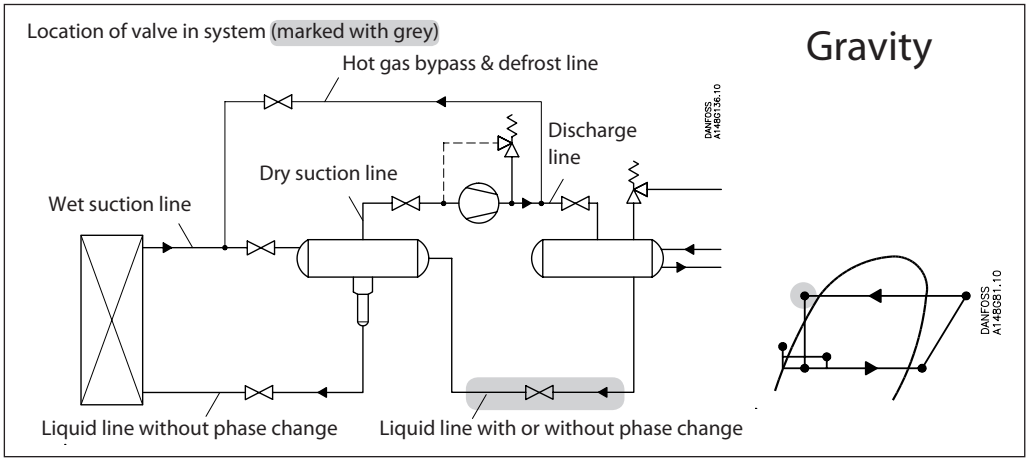
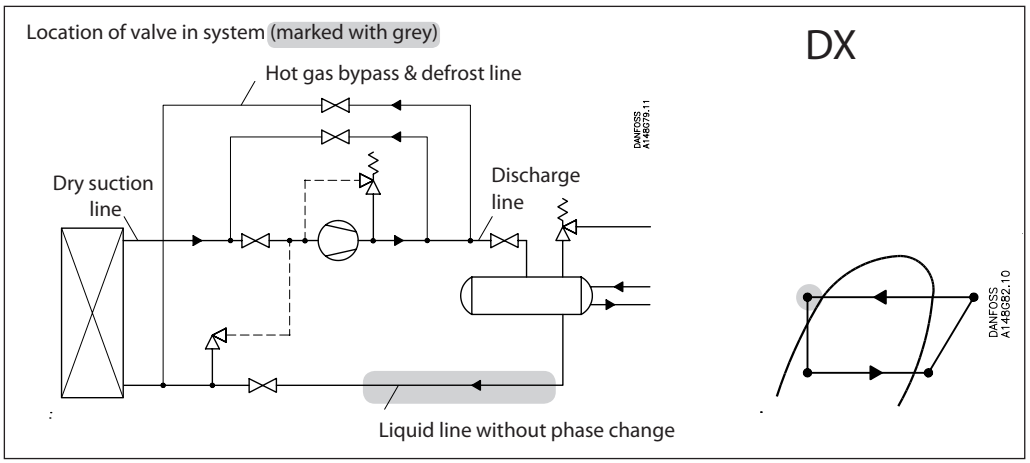
Nominal capacities

Liquid line with/without phase change







Nominal capacities

Liquid line with / without phase change

SI units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:
T_e = –20 °C
Q_0 = 300 kW
T_{liq} = 10 °C
Max. ΔP = 0.3 bar

The capacity table is based on nominal conditions (ΔP = 0.2 bar, T_{liq} = 30 °C).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 0.3 bar $f_{\Delta P}$ = 0.82.
Correction factor for liquid temperature $f_{T liq}$ = 0.82.

$Q_n = Q_o \times f_{\Delta P} \times f_{T liq} = 300 \times 0.82 \times 0.82 = 202$ kW.

From the capacity table a NRVA 25 with Qn = 370 kW is the correct selection for the application.

US units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:
T_e = -20 °F
Q_o = 130 TR
T_{liq} = 50 °F
Max. ΔP = 5 psi

The capacity table is based on nominal conditions (ΔP = 3 psi, T_{liq} = 90 °F)

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 5 psi, $f_{\Delta P}$ = 0.79
Correction factor for liquid temperature $f_{T liq}$ = 0.81.

$Q_n = Q_o \times f_{\Delta P} \times f_{T liq} = 130 \times 0.79 \times 0.81 = 83.2$ TR

From the capacity table a NRVA 25 with Qn = 100 TR is the correct selection for the application.

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Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 717

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	504	512	519	526	532	537	542	546
NRVA 20	6	605	614	623	631	638	645	651	655
NRVA 25	19	1916	1945	1973	1998	2022	2042	2060	2075
NRVA 32	20	2016	2048	2077	2104	2128	2150	2169	2185
NRVA 40	44	4436	4505	4569	4628	4682	4730	4771	4806
NRVA 50	44	4436	4505	4569	4628	4682	4730	4771	4806
NRVA 65	75	7562	7678	7787	7889	7981	8062	8133	8192

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.82
-10 °C	0.86
0 °C	0.88
10 °C	0.92
20 °C	0.96
30 °C	**1.00**
40 °C	1.04
50 °C	1.09

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 717

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	143.9	145.9	147.7	149.2	150.6	151.7	152.5	153.0
NRVA 20	7	173	175	177	179	181	182	183	184
NRVA 25	22	547	554	561	567	572	576	580	581
NRVA 32	23	576	583	591	597	602	607	610	612
NRVA 40	51	1266	1284	1300	1313	1325	1335	1342	1347
NRVA 50	51	1266	1284	1300	1313	1325	1335	1342	1347
NRVA 65	87	2158	2188	2215	2239	2259	2276	2288	2295

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.82
10 °F	0.85
30 °F	0.88
50 °F	0.92
70 °F	0.96
90 °F	**1.00**
110 °F	1.04
130 °F	1.09

Nominal capacities

Liquid line with / without phase change

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 22

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	99	102	105	108	111	114	116	118
NRVA 20	6	119	123	126	130	133	136	139	142
NRVA 25	19	376	389	400	411	422	431	440	448
NRVA 32	20	396	409	421	433	444	454	463	472
NRVA 40	44	872	900	927	952	977	999	1020	1038
NRVA 50	44	872	900	927	952	977	999	1020	1038
NRVA 65	75	1486	1534	1580	1623	1665	1703	1738	1769

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.71
-10 °C	0.75
0 °C	0.80
10 °C	0.86
20 °C	0.92
30 °C	**1.00**
40 °C	1.09
50 °C	1.22

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 22

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	28	29	30	31	32	32	33	34
NRVA 20	7	34	35	36	37	38	39	40	41
NRVA 25	22	106	110	114	117	120	123	126	129
NRVA 32	23	112	116	120	123	127	130	133	135
NRVA 40	51	246	255	263	271	279	286	292	298
NRVA 50	51	246	255	263	271	279	286	292	298
NRVA 65	87	419	434	449	462	475	487	498	507

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.73
10 °F	0.77
30 °F	0.82
50 °F	0.87
70 °F	0.93
90 °F	**1.00**
110 °F	1.09
130 °F	1.20

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Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 134a

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	89	93	97	101	105	109	113	36
NRVA 20	6	107	112	117	122	127	131	136	68
NRVA 25	19	338	354	370	385	401	415	429	90
NRVA 32	20	356	373	390	406	422	437	452	158
NRVA 40	44	783	820	857	893	928	962	994	260
NRVA 50	44	783	820	857	893	928	962	994	389
NRVA 65	75	1335	1398	1461	1522	1582	1639	1695	678

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.66
-10 °C	0.70
0 °C	0.76
10 °C	0.82
20 °C	0.90
30 °C	**1.00**
40 °C	1.13
50 °C	1.29

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 134a

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	25	26	28	29	30	32	33	10
NRVA 20	7	30	32	33	35	36	38	39	20
NRVA 25	22	95	100	105	110	115	120	124	26
NRVA 32	23	100	106	111	116	121	126	131	46
NRVA 40	51	220	232	244	255	266	278	288	75
NRVA 50	51	220	232	244	255	266	278	288	112
NRVA 65	87	376	396	416	435	454	473	490	196

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.64
10 °F	0.68
30 °F	0.74
50 °F	0.81
70 °F	0.89
90 °F	**1.00**
110 °F	1.15
130 °F	1.35

Nominal capacities

Liquid line with/without phase change

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 404A

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	57.2	61.3	65.3	69.2	73.0	76.6	79.9	82.8
NRVA 20	6	68.7	73.6	78.4	83.1	87.6	91.9	95.8	99.4
NRVA 25	19	217.5	232.9	248.2	263.1	277.4	290.9	303.5	314.7
NRVA 32	20	228.9	245.2	261.3	276.9	292.0	306.3	319.5	331.2
NRVA 40	44	503.6	539.4	574.8	609.2	642.4	673.8	702.8	728.7
NRVA 50	44	503.6	539.4	574.8	609.2	642.4	673.8	702.8	728.7
NRVA 65	75	858.5	919.4	979.7	1038.4	1094.9	1148.5	1198.0	1242.1

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.55
-10 °C	0.60
0 °C	0.66
10 °C	0.74
20 °C	0.85
30 °C	**1.00**
40 °C	1.23
50 °C	1.68

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 404A

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	15.7	17.0	18.2	19.5	20.7	21.8	22.8	23.7
NRVA 20	7	18.8	20.4	21.9	23.4	24.8	26.1	27.4	28.4
NRVA 25	22	59.6	64.5	69.3	74.0	78.5	82.7	86.8	89.9
NRVA 32	23	62.8	67.9	73.0	77.9	82.6	87.0	91.3	94.7
NRVA 40	51	138.1	149.4	160.6	171.4	181.7	191.4	200.9	208.2
NRVA 50	51	138.1	149.4	160.6	171.4	181.7	191.4	200.9	208.2
NRVA 65	87	235.4	254.7	273.7	292.2	309.8	326.3	342.5	355.0

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.52
10 °F	0.57
30 °F	0.63
50 °F	0.72
70 °F	0.83
90 °F	**1.00**
110 °F	1.29
130 °F	1.92

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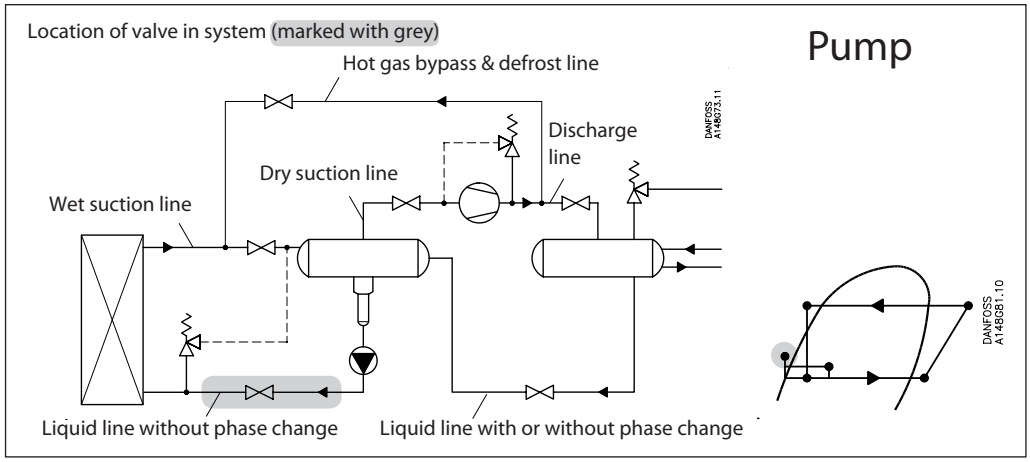
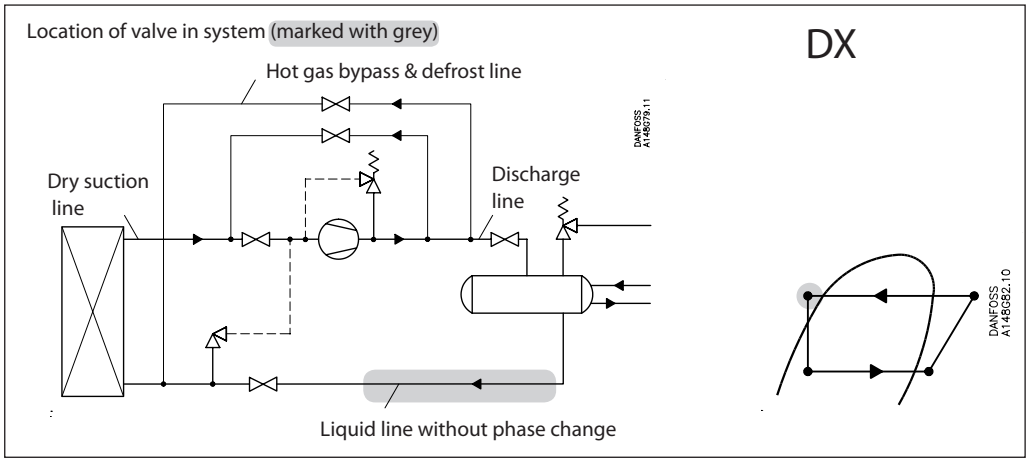
Nominal capacities

Liquid line without phase change





Nominal capacities

Liquid line without phase change

SI units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:

T_e = -20 °C
Q_0 = 300 kW
circulation rate = 3
Max. ΔP = 0.3 bar

The capacity table is based on nominal conditions (pressure drop ΔP = 0.2 bar, circulation rate = 4).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 0.3 bar $f_{\Delta P} = 0.82$
Correction factor for circulation rate $f_{rec} = 0.75$.

$Q_n = Q_0 \times f_{\Delta p} \times f_{rec} = 300 \times 0.82 \times 0.75 = 184.5$ kW

From the capacity table a NRVA 40 with Q_n = 336 kW is the correct selection for the application.

US units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:

T_e = -20 °F
Q_0 = 130 TR
Circulation rate = 3
Max. ΔP = 5 psi

The capacity table is based on nominal conditions (pressure drop Δp = 3 psi, circulation rate = 4).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 5 psi $f_{\Delta p} = 0.79$
Correction factor for circulation rate $f_{rec} = 0.75$.

$Q_n = Q_0 \times f_{\Delta P} \times f_{circ} = 130 \times 0.79 \times 0.75 = 77.0$ TR

From the capacity table a NRVA 40 with Q_n = 101 TR is the correct selection for the application.

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Nominal capacities

Liquid line without phase change

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 717

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	182.5	177.1	171.9	166.4	160.7	154.9	148.8	142.5
NRVA 20	6	219	213	206	200	193	186	179	171
NRVA 25	19	693	673	653	632	611	589	566	541
NRVA 32	20	730	708	687	665	643	620	595	570
NRVA 40	44	1606	1559	1512	1464	1414	1363	1310	1254
NRVA 50	44	1606	1559	1512	1464	1414	1363	1310	1254
NRVA 65	75	2737	2657	2578	2495	2411	2324	2232	2137

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 717

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	52.8	51.1	49.5	47.8	45.9	44.0	41.9	39.8
NRVA 20	7	63.3	61.4	59.4	57.4	55.1	52.8	50.3	47.8
NRVA 25	22	200.5	194.4	188.2	181.7	174.5	167.3	159.2	151.4
NRVA 32	23	211	205	198	191	184	176	168	159
NRVA 40	51	464	450	436	421	404	387	369	351
NRVA 50	51	464	450	436	421	404	387	369	351
NRVA 65	87	792	767	743	717	689	660	628	598

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

Nominal capacities

Liquid line without phase change

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 22

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	45	43	41	40	38	36	34	32
NRVA 20	6	53	52	50	48	46	43	41	39
NRVA 25	19	169	163	157	151	144	137	130	122
NRVA 32	20	178	172	166	159	152	145	137	128
NRVA 40	44	392	378	364	350	334	318	301	283
NRVA 50	44	392	378	364	350	334	318	301	283
NRVA 65	75	668	645	621	596	570	542	513	482

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 22

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	12.9	12.4	11.9	11.4	10.8	10.2	9.5	8.8
NRVA 20	7	15	15	14	14	13	12	11	11
NRVA 25	22	49	47	45	43	41	39	36	34
NRVA 32	23	52	50	48	46	43	41	38	35
NRVA 40	51	114	109	105	100	95	90	84	78
NRVA 50	51	114	109	105	100	95	90	84	78
NRVA 65	87	193	186	179	171	162	153	143	133

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

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Nominal capacities

Liquid line without phase change

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 134a

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	41.2	39.7	38.2	36.6	34.8	33.0	31.1	32
NRVA 20	6	49	48	46	44	42	40	37.4	39
NRVA 25	19	157	151	145	139	132	126	118	122
NRVA 32	20	165	159	153	146	139	132	125	128
NRVA 40	44	363	350	336	322	307	291	274	283
NRVA 50	44	363	350	336	322	307	291	274	283
NRVA 65	75	618	596	573	549	523	496	467	482

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 134a

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	11.9	11.4	10.9	10.4	9.9	9.2	8.6	8.8
NRVA 20	7	14.3	13.7	13.1	12.5	11.8	11.1	10.3	11
NRVA 25	22	45	43	42	40	37	35	33	34
NRVA 32	23	48	46	44	42	39	37	34	35
NRVA 40	51	105	101	96	92	87	81	76	78
NRVA 50	51	105	101	96	92	87	81	76	78
NRVA 65	87	179	172	164	156	148	138	129	133

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

Nominal capacities

Liquid line without phase change

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 404A

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	36	35	33	31	30	28	26	23
NRVA 20	6	43	42	39	38	35	33	31	28
NRVA 25	19	138	132	125	119	112	105	97	89
NRVA 32	20	145	139	131	125	118	111	102	93
NRVA 40	44	319	306	289	276	260	244	225	205
NRVA 50	44	319	306	289	276	260	244	225	205
NRVA 65	75	543	521	492	470	444	415	384	350

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 404A

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	10.5	10.0	9.5	9.0	8.4	7.8	7.0	6.2
NRVA 20	7	13	12	11	11	10	9	8	7
NRVA 25	22	40	38	36	34	32	30	27	24
NRVA 32	23	42	40	38	36	34	31	28	25
NRVA 40	51	92	88	83	79	74	68	62	55
NRVA 50	51	92	88	83	79	74	68	62	55
NRVA 65	87	158	151	142	134	126	117	105	93

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.5
3	0.75
4	**1**
6	1.5
8	2
10	2.5

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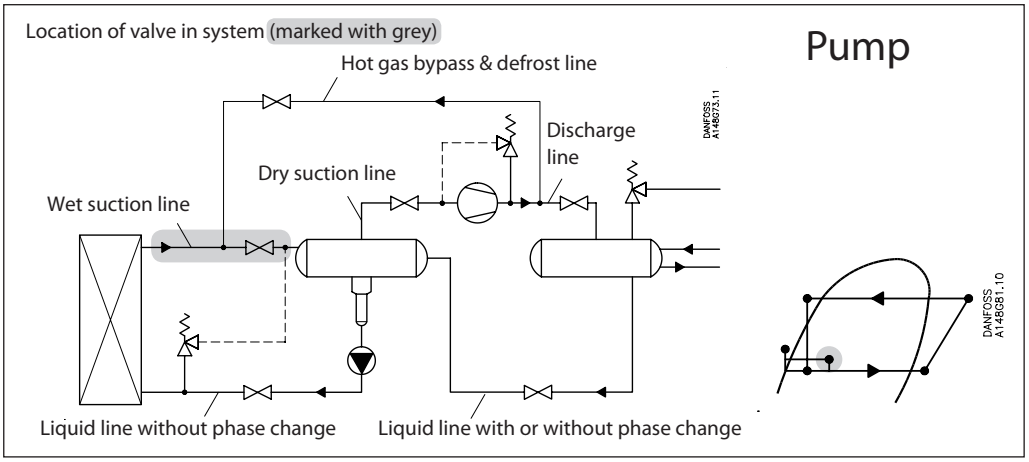
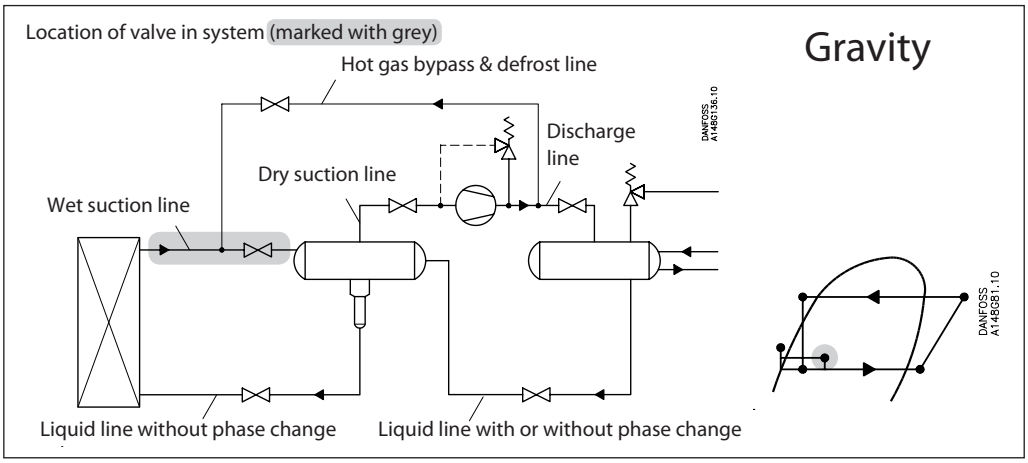
Nominal capacities

Wet suction line

Pump



Gravity



Nominal capacities

Wet suction line

SI units

Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

T_e = -20 °C
Q_0 = 100 kW
Circulation rate = 3
Max. ΔP = 0.3 bar

The capacity table is based on nominal conditions (pressure drop ΔP = 0.2 bar, circulation rate = 4).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 0.3 bar $f_{\Delta P}$ = 0.82
Correction factor for circulation rate f_{rec} = 0.9.

$Q_n = Q_0 \times f_{\Delta P} \times f_{rec} = 100 \times 0.82 \times 0.9 = 73{,}8$ kW.

From the capacity table a NRVA 40 with Q_n = 157 kW is the correct selection for the application.

Choosing NRVA 32 would give a slightly higher pressure drop than 0.3. Accepting this requires a plant evaluation.

US units

Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

T_e = - 20 °F
Q_0 = 10 TR
Circulation rate = 3
Max. ΔP = 5 psi

The capacity table is based on nominal conditions (pressure drop ΔP = 3 psi, circulation rate = 4).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 5 psi $f_{\Delta p}$ = 0.79
Correction factor for circulation rate f_{rec} = 0.9.

$Q_n = Q_0 \times f_{\Delta P} \times f_{circ} = 10 \times 0.79 \times 0.9 = 7.1$ TR

From the capacity table a NRVA 25 with Q_n = 16.5 TR is the correct selection for the application.

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Nominal capacities

Wet suction line

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 717

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	9.1	11.8	14.7	17.9	21.3	24.9	28.7	32.6
NRVA 20	6	11.0	14.2	17.6	21.4	25.5	29.9	34.5	39.2
NRVA 25	19	34.7	45.0	55.9	67.9	80.9	94.7	109.1	124.0
NRVA 32	20	36.6	47.3	58.8	71.5	85.1	99.7	115	131
NRVA 40	44	80.4	104.1	129.4	157	187	219	253	287
NRVA 50	44	80.4	104	129	157	187	219	253	287
NRVA 65	75	137	178	221	268	319	374	431	490

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 717

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	2.5	3.4	4.3	5.4	6.5	7.7	8.9	10.1
NRVA 20	7	3.1	4.1	5.2	6.5	7.8	9.2	10.7	12.1
NRVA 25	22	9.7	13.0	16.5	20.5	24.7	29.2	33.8	38.5
NRVA 32	23	10.2	13.7	17.3	21.6	26.0	30.8	35.5	40.5
NRVA 40	51	22.4	30.1	38.1	47.5	57.2	67.7	78.2	89.1
NRVA 50	51	22.4	30.1	38.1	47.5	57.2	67.7	78.2	89.1
NRVA 65	87	38.2	51.3	65.0	80.9	97.6	115	133	152

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

Nominal capacities

Wet suction line

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 22

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	4.5	5.5	6.5	7.7	8.9	10.0	11.2	12.4
NRVA 20	6	5.3	6.6	7.9	9.2	10.6	12.1	13.5	14.9
NRVA 25	19	16.9	21	25	29	34	38	43	47
NRVA 32	20	17.8	22	26	31	35	40	45	50
NRVA 40	44	39	48	58	68	78	88	99	109
NRVA 50	44	39	48	58	68	78	88	99	109
NRVA 65	75	67	82	98	115	133	151	168	186

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 22

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.3	1.6	1.9	2.3	2.7	3.0	3.4	3.8
NRVA 20	7	1.5	1.9	2.3	2.7	3.2	3.6	4.1	4.6
NRVA 25	22	4.8	6.0	7.3	8.7	10.1	11.5	13.1	14.4
NRVA 32	23	5.0	6.3	7.7	9.2	10.6	12.2	13.8	15.2
NRVA 40	51	11.1	13.9	16.9	20	23	27	30	33
NRVA 50	51	11.1	13.9	16.9	20	23	27	30	33
NRVA 65	87	18.9	24	29	34	40	46	52	57

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

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Nominal capacities

Wet suction line

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 134a

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	3.3	4.6	5.7	6.7	7.7	8.8	9.8	12.4
NRVA 20	6	4.0	5.5	6.8	8.0	9.3	10.5	11.8	14.9
NRVA 25	19	12.6	17.3	22	25	29	33	37	47
NRVA 32	20	13.3	18.2	23	27	31	35	39	50
NRVA 40	44	29	40.1	50	59	68	77	87	109
NRVA 50	44	29	40.1	50	59	68	77	87	109
NRVA 65	75	50	68.4	85	100	116	132	148	186

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 134a

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.0	1.3	1.7	2.0	2.4	2.7	3.1	3.8
NRVA 20	7	1.2	1.6	2.0	2.4	2.8	3.3	3.7	4.6
NRVA 25	22	3.7	5.1	6.4	7.7	9.0	10.3	11.6	14.4
NRVA 32	23	3.8	5.4	6.8	8.1	9.4	10.9	12.2	15.2
NRVA 40	51	8.5	11.8	14.9	17.8	21	24	27	33
NRVA 50	51	8.5	11.8	14.9	17.8	21	24	27	33
NRVA 65	87	14.4	20	25	30	35	41	46	57

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

Nominal capacities

Wet suction line

SI units

Capacity table for nominal conditions, Q_N [kW], circulation rate = 4, ΔP = 0.2 bar

R 404A

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	4.6	5.5	6.5	7.6	8.7	9.8	10.8	11.7
NRVA 20	6	5.5	6.7	7.8	9.1	10.4	11.7	12.9	14.0
NRVA 25	19	17.4	21.1	24.7	28.9	33.0	37.1	40.9	44.4
NRVA 32	20	18.3	22.2	26.1	30.4	34.7	39.0	43.1	46.7
NRVA 40	44	40.3	48.8	57.3	66.9	76.4	85.8	94.8	102.8
NRVA 50	44	40.3	48.8	57.3	66.9	76.4	85.8	94.8	102.8
NRVA 65	75	68.7	83.2	97.7	114.0	130.3	146.3	161.6	175.3

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration], circulation rate = 4, ΔP = 3 psi

R 404A

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.3	1.6	1.9	2.3	2.6	2.9	3.3	3.5
NRVA 20	7	1.6	1.9	2.3	2.7	3.1	3.5	3.9	4.2
NRVA 25	22	4.9	6.1	7.3	8.6	9.9	11.2	12.4	13.4
NRVA 32	23	5.2	6.4	7.7	9.0	10.4	11.8	13.1	14.1
NRVA 40	51	11.4	14.1	16.9	19.9	22.9	25.9	28.8	31.1
NRVA 50	51	11.4	14.1	16.9	19.9	22.9	25.9	28.8	31.1
NRVA 65	87	19.4	24.1	28.8	33.9	39.1	44.1	49.1	52.9

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate (f_{rec})

Circulation rate	Correction factor
2	0.77
3	0.90
4	**1**
6	1.13
8	1.20
10	1.25

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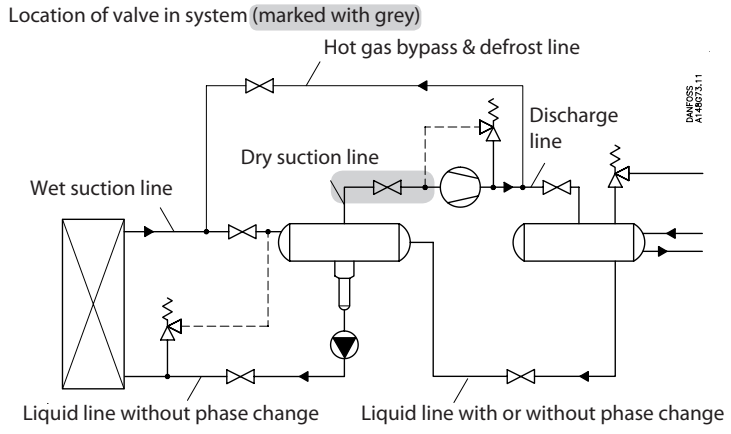
Nominal capacities

Dry suction line

Pump



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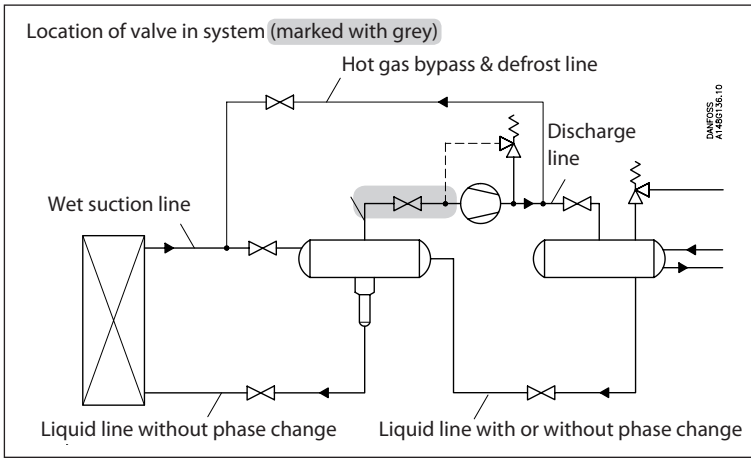
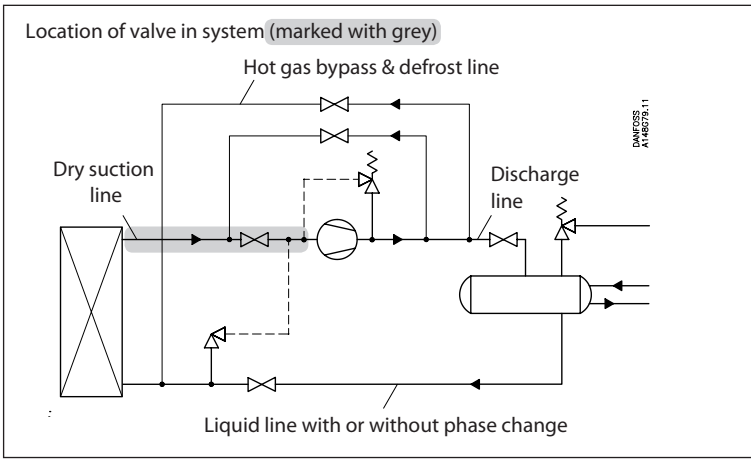


DX



Nominal capacities

Dry suction line

SI units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:

T_e = -20 °C
Q_0 = 90 kW
T_{liq} = 10 °C
T_s = 6 °C
Max. ΔP = 0.3 bar

The capacity table is based on nominal conditions (pressure drop ΔP = 0.2 bar, T_{liq} = 30 °C), T_s = 10 °C

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 0.3 bar $f_{\Delta P}$ = 0.82
Correction factor for liquid temperature f_{Tliq} = 0.82
Correction factor for superheat (T_S) = 1,0

$Q_n = Q_0 \times f_{\Delta P} \times f_{Tliq} \times f_{Ts}$
$= 90 \times 0.82 \times 0.82 \times 1.0 = 60.5$ kW

From the capacity table a NRVA 40 or NRVA 50 with Q_n = 65 kW is the correct selection depending on connections for the application.

US units

Calculation example (R 134a capacities):

Running conditions in a plant are as follows:

T_e = 0 °F
Q_0 = 23 TR
T_{liq} = 50 °F
T_s = 10 °F
Max. ΔP = 5 psi

The capacity table is based on nominal conditions (pressure drop ΔP = 3 psi, T_{liq} = 90 °F), T_s = 14 °F

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 5 psi $f_{\Delta p}$ = 0.79
Correction factor for liquid temperature f_{Tliq} = 0.81
Correction factor for superheat (T_S) = 1,0

$Q_n = Q_0 \times f_{\Delta P} \times f_{Tliq} \times f_{Ts}$ =
23 x 0.79 x 0.81 x 1.0 = 14.7 TR

From the capacity table a NRVA 40 or NRVA 50 with Q_n = 19.3 TR is the correct selection depending on connections for the application.

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Nominal capacities

Dry suction line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 717

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	12.9	17.0	21.8	27.5	33.7	41.0	49.0	57.9
NRVA 20	6	15.5	20.4	26.2	32.9	40.5	49.2	58.9	69.5
NRVA 25	19	49.0	64.7	82.8	104.3	128.2	155.7	186	220
NRVA 32	20	51.6	68.1	87.2	109.8	135	164	196	232
NRVA 40	44	113.5	149.7	192	242	297	361	432	510
NRVA 50	44	113	150	192	242	297	361	432	510
NRVA 65	75	193	255	327	412	506	615	736	869

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for superheat (T_S)

T_s	Correction factor
6 °C	1.00
8 °C	1.00
10 °C	1.00
12 °C	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.82
-10 °C	0.86
0 °C	0.88
10 °C	0.92
20 °C	0.96
30 °C	**1.00**
40 °C	1.04
50 °C	1.09

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 717

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	3.6	4.9	6.4	8.2	10.4	12.8	15.4	18.3
NRVA 20	7	4.3	5.9	7.7	9.8	12.4	15.4	18.5	22.0
NRVA 25	22	13.6	18.7	24.4	31.2	39.4	48.6	58.5	69.7
NRVA 32	23	14.3	19.7	25.7	32.8	41.4	51.2	61.5	73.3
NRVA 40	51	31.5	43.2	56.5	72.2	91.2	112.6	135.4	161
NRVA 50	51	31.5	43.2	56.5	72.2	91.2	113	135	161
NRVA 65	87	53.6	73.7	96.3	123	155	192	231	275

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for superheat (T_S)

T_s	Correction factor
10 °F	1.00
14 °F	1.00
18 °F	1.00
20 °F	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.82
10 °F	0.85
30 °F	0.88
50 °F	0.92
70 °F	0.96
90 °F	**1.00**
110 °F	1.04
130 °F	1.09

Nominal capacities

Dry suction line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 22

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	5.1	6.6	8.3	10.4	12.7	15.3	18.2	21.4
NRVA 20	6	6.1	7.9	10.0	12.5	15.2	18.3	22	26
NRVA 25	19	19.3	25	32	40	48	58	69	81
NRVA 32	20	20	26	33	42	51	61	73	85
NRVA 40	44	45	58	73	92	112	134	160	188
NRVA 50	44	45	58	73	92	112	134	160	188
NRVA 65	75	76	99	125	156	190	229	272	320

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for superheat (T_S)

T_s	Correction factor
6 °C	1.00
8 °C	1.00
10 °C	1.00
12 °C	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.71
-10 °C	0.75
0 °C	0.80
10 °C	0.86
20 °C	0.92
30 °C	**1.00**
40 °C	1.09
50 °C	1.22

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 22

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.4	1.9	2.4	3.1	3.8	4.7	5.7	6.8
NRVA 20	7	1.7	2.2	2.9	3.7	4.6	5.6	6.8	8.1
NRVA 25	22	5.3	7.1	9.2	11.7	14.5	17.7	22	26
NRVA 32	23	5.6	7.5	9.7	12.3	15.3	18.6	23	27
NRVA 40	51	12.3	16.4	21	27	34	41	50	60
NRVA 50	51	12.3	16.4	21	27	34	41	50	60
NRVA 65	87	21	28	36	46	57	70	86	102

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for superheat (T_S)

T_s	Correction factor
10 °F	1.00
14 °F	1.00
18 °F	1.00
20 °F	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.73
10 °F	0.77
30 °F	0.82
50 °F	0.87
70 °F	0.93
90 °F	**1.00**
110 °F	1.09
130 °F	1.20

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Nominal capacities

Dry suction line

R 134a

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	4.3	5.7	7.4	9.4	11.7	14.3	17.3	21.4
NRVA 20	6	5.2	6.9	8.9	11.2	14.0	17.2	21	26
NRVA 25	19	16.4	22	28	36	44	54	66	81
NRVA 32	20	17.3	23	30	37	47	57	69	85
NRVA 40	44	38	50	65	82	103	126	153	188
NRVA 50	44	38	50	65	82	103	126	153	188
NRVA 65	75	65	86	111	140	175	215	260	320

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for superheat (T_S)

T_s	Correction factor
6 °C	1.00
8 °C	1.00
10 °C	1.00
12 °C	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.66
-10 °C	0.70
0 °C	0.76
10 °C	0.82
20 °C	0.90
30 °C	**1.00**
40 °C	1.13
50 °C	1.29

R 134a

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.2	1.7	2.2	2.8	3.6	4.6	5.6	6.8
NRVA 20	7	1.5	2.0	2.6	3.4	4.3	5.5	6.7	8.1
NRVA 25	22	4.6	6.3	8.3	10.8	13.7	17.3	21	26
NRVA 32	23	4.9	6.6	8.8	11.4	14.4	18.3	22	27
NRVA 40	51	10.7	14.6	19.3	25	32	40	49	60
NRVA 50	51	10.7	14.6	19.3	25	32	40	49	60
NRVA 65	87	18.3	25	33	43	54	68	84	102

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for superheat (T_S)

T_s	Correction factor
10 °F	1.00
14 °F	1.00
18 °F	1.00
20 °F	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.64
10 °F	0.68
30 °F	0.74
50 °F	0.81
70 °F	0.89
90 °F	**1.00**
110 °F	1.15
130 °F	1.35

Nominal capacities

Dry suction line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
ΔP = 0.2 bar

R 404A

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	3.8	5.1	6.7	8.6	10.7	13.2	16.1	19.4
NRVA 20	6	4.6	6.1	8.0	10.3	12.8	15.8	19.3	23.3
NRVA 25	19	14.5	19.4	25.3	32.5	40.6	50.2	61.2	73.7
NRVA 32	20	15.3	20.4	26.7	34.3	42.8	52.8	64.4	77.6
NRVA 40	44	33.6	44.9	58.7	75.4	94	116	142	171
NRVA 50	44	33.6	44.9	59	75	94	116	142	171
NRVA 65	75	57.3	77	100	128	160	198	241	291

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.25	0.89
0.3	0.82
0.4	0.71
0.5	0.63
0.6	0.58

Correction factor for superheat (T_S)

T_s	Correction factor
6 °C	1.00
8 °C	1.00
10 °C	1.00
12 °C	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.55
-10 °C	0.60
0 °C	0.66
10 °C	0.74
20 °C	0.85
30 °C	**1.00**
40 °C	1.23
50 °C	1.68

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi

R 404A

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	1.0	1.4	1.9	2.5	3.2	4.0	5.1	6.2
NRVA 20	7	1.2	1.7	2.3	3.0	3.8	4.8	6.1	7.4
NRVA 25	22	3.9	5.4	7.3	9.5	12.2	15.3	19.3	23.5
NRVA 32	23	4.1	5.7	7.6	10.0	12.8	16.1	20.3	24.7
NRVA 40	51	9.1	12.5	16.8	22.0	28.2	35.4	44.6	54.4
NRVA 50	51	9.1	12.5	16.8	22.0	28.2	35.4	44.6	54.4
NRVA 65	87	15.5	21.4	28.7	37.5	48.0	60	76	93

* 2 °F below min. operating temperature.

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for superheat (T_S)

T_s	Correction factor
10 °F	1.00
14 °F	1.00
18 °F	1.00
20 °F	1.00

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.52
10 °F	0.57
30 °F	0.63
50 °F	0.72
70 °F	0.83
90 °F	**1.00**
110 °F	1.29
130 °F	1.92

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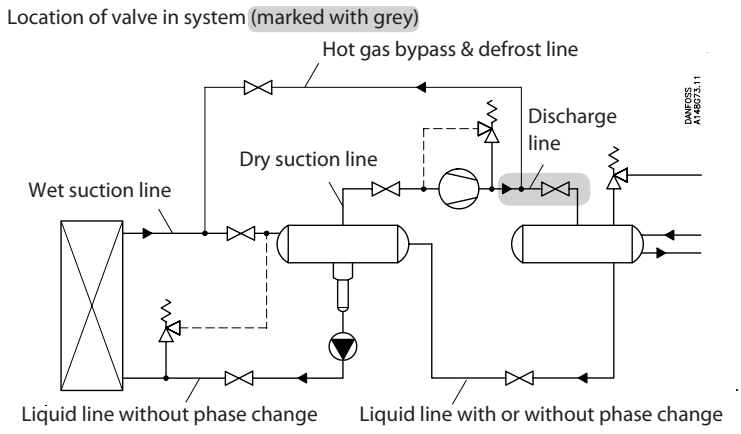
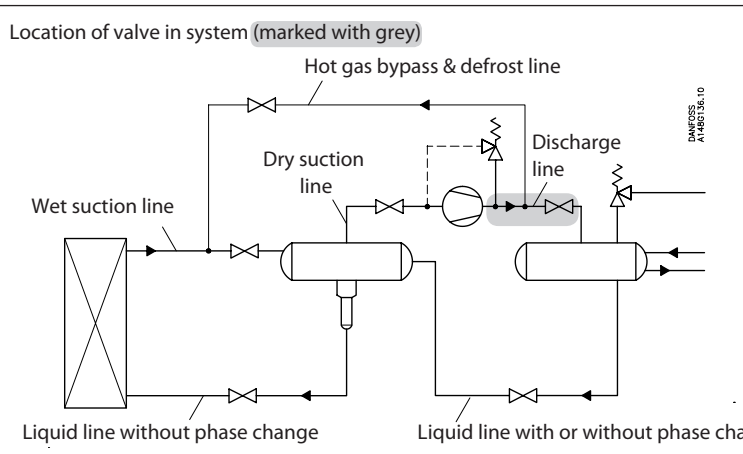
Nominal capacities

Discharge line

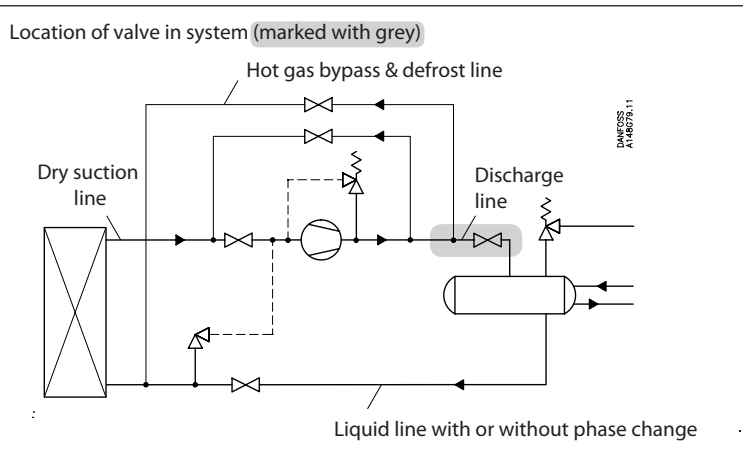
Pump



Gravity



DX



Nominal capacities

Discharge line

SI units

Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

T_e = -20 °C
Q_o = 90 kW
T_{liq} = 10 °C
Max. ΔP = 0.4 bar
T_{disch} = 60 °C

The capacity table is based on nominel conditions (ΔP = 0.2 bar, T_{liq} = 30 °C, P_{disch}= 12 bar, T_{disch} = 80 °C).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 0.4 bar $f_{\Delta P}$ = 0.72.
Correction factor for liquid temperature f_{Tliq} = 0.92.
Correction factor for T_{disch} 60 °C, f_{disch} = 0.97.
Correction factor for P_{disch} 12 bar, f_{pdisch} = 1.0.

$Q_n = Q_o \times f_{\Delta P} \times f_{Tliq} \times f_{Tdisch} \times f_{Pdisch}$
$= 90 \times 0.72 \times 0.92 \times 0.97 \times 1.0 = 58$ kW.

From the capacity table a NRVA 20 with Q_n = 67.5 kW is the correct selection for the application.

US units

Calculation example (R 717 capacities):

Running conditions in a plant are as follows:

T_e = 0 °F
Q_o = 18 TR
T_{liq} = 50 °F
Max. ΔP = 7 psi
T_{disch} = 120 °F

The capacity table is based on nominel conditions (ΔP = 3 psi, T_{liq} = 90 °F, P_{disch}= 185 psi, T_{disch} = 180 °F).

The actual capacity must therefore be corrected to a nominal condition by multiplication with correction factors.

Correction factor for ΔP 7 psi $f_{\Delta P}$ = 0.67.
Correction factor for liquid temperature f_{Tliq} = 0.92.
Correction factor for T_{disch} 120 °F, f_{disch} = 0.95.
Correction factor for P_{disch} 185 psi, f_{pdisch} = 1.0.

$Q_n = Q_o \times f_{\Delta P} \times f_{Tliq} \times f_{circ} \times f_{Pdisch}$
$= 18 \times 0.67 \times 0.92 \times 0.95 \times 1.0 = 10.5$ TR

From the capacity table a NRVA 15 with Q_n= 16.4 TR is the correct selection for the application.

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Nominal capacities

Discharge line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
$P_{disch.}$ = 12 bar,
ΔP = 0.2 bar,
$T_{disch.}$ = 80 °C

R 717

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	53.9	54.8	55.5	56.3	56.9	57.5	58.0	58.4
NRVA 20	6	64.7	65.7	66.6	67.5	68.3	69.0	69.6	70.1
NRVA 25	19	205	208	211	214	216	218	220	222
NRVA 32	20	216	219	222	225	228	230	232	234
NRVA 40	44	475	482	489	495	501	506	510	514
NRVA 50	44	475	482	489	495	501	506	510	514
NRVA 65	75	809	821	833	844	854	862	870	876

Correction factor for discharge pressure (P_{disch})

P_{disch} (bar)	Correction factor
12	**1.00**
16	0.87
20	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.4	0.72
0.6	0.59
0.8	0.52
1	0.46
1.5	0.39
2	0.34
4	0.27

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
50 °C	0.96
60 °C	0.97
80 °C	**1.00**
90 °C	1.01
100 °C	1.03
110 °C	1.04
120 °C	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.82
-10 °C	0.86
0 °C	0.88
10 °C	0.92
20 °C	0.96
30 °C	**1.00**
40 °C	1.04
50 °C	1.09

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi,
$P_{disch.}$ = 185 psi,
$T_{disch.}$ = 180 °F

R 717

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	15.8	16.0	16.3	16.4	16.5	16.7	16.7	16.8
NRVA 20	7	19.0	19.2	19.5	19.7	19.8	20.1	20.1	20.2
NRVA 25	22	60.1	60.9	61.8	62.3	62.8	63.5	63.6	63.9
NRVA 32	23	63	64	65	66	66	67	67	67
NRVA 40	51	139	141	143	144	145	147	147	148
NRVA 50	51	139	141	143	144	145	147	147	148
NRVA 65	87	237	241	244	246	248	251	251	252

* 2 °F below min. operating temperature.

Correction factor for discharge pressure (P_{disch})

P_{disch} (psi)	Correction factor
185	**1.00**
240	0.87
300	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
5	0.79
7	0.67
10	0.56
15	0.47
20	0.41
30	0.35
60	0.28

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
120 °F	0.95
140 °F	0.97
180 °F	**1.00**
200 °F	1.02
210 °F	1.02
230 °F	1.04
250 °F	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.82
10 °F	0.85
30 °F	0.88
50 °F	0.92
70 °F	0.96
90 °F	**1.00**
110 °F	1.04
130 °F	1.09

Nominal capacities

Discharge line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
$P_{disch.}$ = 12 bar,
ΔP = 0.2 bar,
$T_{disch.}$ = 80 °C

R 22

Type	k_v [m³/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	17.3	17.9	18.4	18.9	19.4	19.8	20	21
NRVA 20	6	21	21	22	23	23	24	24	25
NRVA 25	19	66	68	70	72	74	75	77	78
NRVA 32	20	69	71	74	76	78	79	81	82
NRVA 40	44	152	157	162	166	171	175	178	181
NRVA 50	44	152	157	162	166	171	175	178	181
NRVA 65	75	260	268	276	284	291	297	304	309

Correction factor for discharge pressure (P_{disch})

P_{disch} (bar)	Correction factor
12	**1.00**
16	0.87
20	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.4	0.72
0.6	0.59
0.8	0.52
1	0.46
1.5	0.39
2	0.34
4	0.27

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
50 °C	0.96
60 °C	0.97
80 °C	**1.00**
90 °C	1.01
100 °C	1.03
110 °C	1.04
120 °C	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.71
-10 °C	0.75
0 °C	0.80
10 °C	0.86
20 °C	0.92
30 °C	**1.00**
40 °C	1.09
50 °C	1.22

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi,
$P_{disch.}$ = 185 psi,
$T_{disch.}$ = 180 °F

R 22

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	5.0	5.1	5.3	5.5	5.6	5.8	5.9	6.0
NRVA 20	7	5.9	6.2	6.4	6.6	6.7	6.9	7.1	7.2
NRVA 25	22	18.8	19.5	20	21	21	22	22	23
NRVA 32	23	19.8	21	21	22	22	23	24	24
NRVA 40	51	44	45	47	48	49	51	52	53
NRVA 50	51	44	45	47	48	49	51	52	53
NRVA 65	87	74	77	79	82	84	86	88	90

* 2 °F below min. operating temperature.

Correction factor for discharge pressure (P_{disch})

P_{disch} (psi)	Correction factor
185	**1.00**
240	0.87
300	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
5	0.79
7	0.67
10	0.56
15	0.47
20	0.41
30	0.35
60	0.28

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
120 °F	0.95
140 °F	0.97
180 °F	**1.00**
200 °F	1.02
210 °F	1.02
230 °F	1.04
250 °F	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.73
10 °F	0.77
30 °F	0.82
50 °F	0.87
70 °F	0.93
90 °F	**1.00**
110 °F	1.09
130 °F	1.20

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Nominal capacities

Discharge line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
$P_{disch.}$ = 12 bar,
ΔP = 0.2 bar,
$T_{disch.}$ = 80 °C

R 134a

Type	k_v [m³/h]	Evaporating temperature T_e						
		-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	13.5	14.2	14.8	15.4	16.0	16.6	17.2
NRVA 20	6	16.2	17.0	17.7	18.5	19.2	19.9	21
NRVA 25	19	51	54	56	59	61	63	65
NRVA 32	20	54	57	59	62	64	66	69
NRVA 40	44	119	125	130	136	141	146	151
NRVA 50	44	119	125	130	136	141	146	151
NRVA 65	75	203	212	222	231	240	249	257

Correction factor for discharge pressure (P_{disch})

P_{disch} (bar)	Correction factor
8	**1.00**
12	0.82
16	0.70
20	0.62

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.4	0.72
0.6	0.59
0.8	0.52
1	0.46
1.5	0.39
2	0.34
4	0.27

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
50 °C	0.96
60 °C	0.97
80 °C	**1.00**
90 °C	1.01
100 °C	1.03
110 °C	1.04
120 °C	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.66
-10 °C	0.70
0 °C	0.76
10 °C	0.82
20 °C	0.90
30 °C	**1.00**
40 °C	1.13
50 °C	1.29

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi,
$P_{disch.}$ = 185 psi,
$T_{disch.}$ = 180 °F

R 134a

Type	C_v [USgal/min]	Evaporating temperature T_e						
		-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	3.9	4.1	4.4	4.6	4.7	5.0	5.1
NRVA 20	7	4.7	5.0	5.2	5.5	5.7	5.9	6.2
NRVA 25	22	14.9	15.7	16.5	17.3	18.0	18.8	19.5
NRVA 32	23	15.7	16.6	17.4	18.2	19.0	19.8	21
NRVA 40	51	35	36	38	40	42	44	45
NRVA 50	51	35	36	38	40	42	44	45
NRVA 65	87	59	62	65	68	71	74	77

* 2 °F below min. operating temperature.

Correction factor for discharge pressure (P_{disch})

P_{disch} (psi)	Correction factor
120	**1.00**
185	0.83
240	0.71
300	0.64

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
5	0.79
7	0.67
10	0.56
15	0.47
20	0.41
30	0.35
60	0.28

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
120 °F	0.95
140 °F	0.97
180 °F	**1.00**
200 °F	1.02
210 °F	1.02
230 °F	1.04
250 °F	1.05

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.64
10 °F	0.68
30 °F	0.74
50 °F	0.81
70 °F	0.89
90 °F	**1.00**
110 °F	1.15
130 °F	1.35

Nominal capacities

Discharge line

SI units

Capacity table for nominal conditions, Q_N [kW],
T_{liq} = 30 °C,
$P_{disch.}$ = 12 bar,
ΔP = 0.2 bar,
$T_{disch.}$ = 80 °C

R 404A

Type	k_v [m^3/h]	Evaporating temperature T_e							
		-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C
NRVA 15	5	12.6	13.5	14.4	15.3	16.1	16.9	17.6	18.3
NRVA 20	6	15.2	16.2	17.3	18.4	19.4	20.3	21.2	22.0
NRVA 25	19	48.0	51.5	54.8	58.1	61.3	64.3	67.0	69.5
NRVA 32	20	50.6	54.2	57.7	61.2	64.5	67.7	70.6	73.2
NRVA 40	44	111.3	119.2	127.0	134.6	141.9	148.9	155.3	161.0
NRVA 50	44	111.3	119.2	127.0	134.6	141.9	148.9	155.3	161.0
NRVA 65	75	189.7	203.1	216.4	229.4	241.9	253.7	264.7	274.4

Correction factor for discharge pressure (P_{disch})

P_{disch} (bar)	Correction factor
12	**1**
16	0.87
20	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (bar)	Correction factor
0.2	**1.00**
0.4	0.72
0.6	0.59
0.8	0.52
1	0.46
1.5	0.39
2	0.34
4	0.27

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
50 °C	0.96
60 °C	0.97
80 °C	**1.00**
90 °C	1.01
100 °C	1.03
110 °C	1.04
120 °C	1.06

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-20 °C	0.55
-10 °C	0.60
0 °C	0.66
10 °C	0.74
20 °C	0.85
30 °C	**1.00**
40 °C	1.23
50 °C	1.68

US units

Capacity table for nominal conditions, Q_N [Tons of Refrigeration],
T_{liq} = 90 °F,
ΔP = 3 psi,
$P_{disch.}$ = 185 psi,
$T_{disch.}$ = 180 °F

R 404A

Type	C_v [USgal/min]	Evaporating temperature T_e							
		-60 °F*	-40 °F	-20 °F	0 °F	20 °F	40 °F	60 °F	80 °F
NRVA 15	6	3.5	3.8	4.0	4.3	4.6	4.8	5.1	5.3
NRVA 20	7	4.2	4.5	4.9	5.2	5.5	5.8	6.1	6.3
NRVA 25	22	13.2	14.3	15.4	16.4	17.4	18.3	19.3	20.0
NRVA 32	23	13.9	15.1	16.2	17.3	18.3	19.3	20.3	21.0
NRVA 40	51	30.7	33.2	35.6	38.0	40.3	42.5	44.6	46.2
NRVA 50	51	30.7	33.2	35.6	38.0	40.3	42.5	44.6	46.2
NRVA 65	87	52.2	56.5	60.7	64.8	68.7	72.4	76.0	78.8

* 2 °F below min. operating temperature.

Correction factor for discharge pressure (P_{disch})

P_{disch} (psi)	Correction factor
185	**1**
240	0.87
300	0.78

Correction factor for ΔP ($f_{\Delta P}$)

ΔP (psi)	Correction factor
3	**1.00**
5	0.79
7	0.67
10	0.56
15	0.47
20	0.41
30	0.35
60	0.28

Correction factor for discharge temperature (T_{disch})

Discharge temperature	Correction factor
120 °F	0.95
140 °F	0.97
180 °F	**1.00**
200 °F	1.02
210 °F	1.02
230 °F	1.04
250 °F	1.05

Correction factor for liquid temperature (T_{liq})

Liquid temperature	Correction factor
-10 °F	0.52
10 °F	0.57
30 °F	0.63
50 °F	0.72
70 °F	0.83
90 °F	**1.00**
110 °F	1.29
130 °F	1.92

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ENGINEERING
TOMORROW

Check valve
Type NRVS

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ENGINEERING
TOMORROW

Check valve
Type NRVS

Check valve type NRVS has no damping feature and therefore can only be used for liquid line applications. NRVS is designed to be mounted directly to PM or solenoid valves EVRA / EVRAT.

Features

- Ensures correct direction of flow
- Applicable to HCFC, HFC and R717 (Ammonia)
- 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

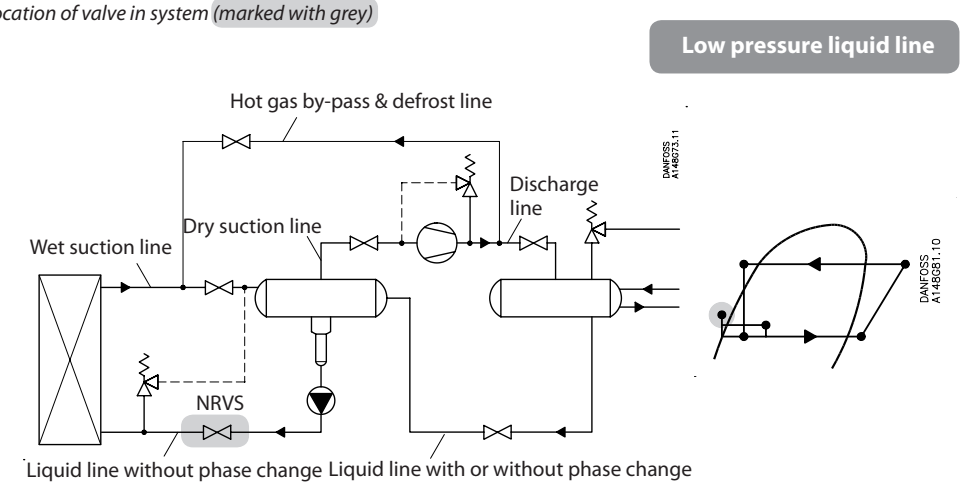
- Temperature of medium:
  -50 °C – 140 °C
- Maximum working pressure:
  PS = 28 bar / 406 psig

Materials

- Valve housing made of Stainless Steel
- Gaskets are non-asbestos

Capacities

Location of valve in system (marked with grey)



Valve combination	EVRA/EVRAT 10 + NRVS 15	EVRA/EVRAT 15 + NRVS 15	EVRA/EVRAT 20 + NRVS 25	EVRA + NRVS 25
k_v [m³/h]	1.4	2.2	4.1	7.0

Evaporating temperature T_e	Pressure Δp [bar]	Capacities (kW) Q_0 at circulation rate 1 R717			
-40 °C	0.15	172	270	504	960
	0.25	222	349	650	1110
	0.30	243	382	713	1216
	0.40	281	441	823	1405
	0.50	314	493	920	1570
-30 °C	0.15	167	262	489	835
	0.25	215	338	631	1078
	0.30	236	371	691	1180
	0.40	273	428	798	1363
	0.50	305	479	893	1524
-20 °C	0.15	161	254	473	808
	0.25	208	327	610	1042
	0.30	228	359	669	1142
	0.40	264	414	772	1319
	0.50	295	463	863	1475
-10 °C	0.15	156	245	456	780
	0.25	201	316	589	1005
	0.30	220	346	645	1102
	0.40	254	399	745	1271
	0.50	284	447	833	1422

Note: The capacities in the table must be divided by the actual circulation rate, or the evaporator capacities must be multiplied with the actual circulation rate.

Minimum opening differential pressure:

EVRA/EVRAT 10 – 20 + NRVS	0.07 bar
EVRA/EVRAT 25 + NRVS	0.11 bar

Example
An application has the following operating conditions:
Refrigerant: R717
Evaporating temperature: ..... -30 °C
Evaporator capacity (Q_0): ..... 290 kW
Circulation rate: 4
$\Delta p \leq 0.3$ bar

Solution
290 × 4 = 1160 kW
EVRAT 25 + NRVS 25: Q_0 = 1180 kW, at Δp = 0.3 bar is chosen.

Precise valve capacities can be calculated for various refrigerants by using the "DIRcalc™" (Danfoss Industrial Refrigeration calculation programme).

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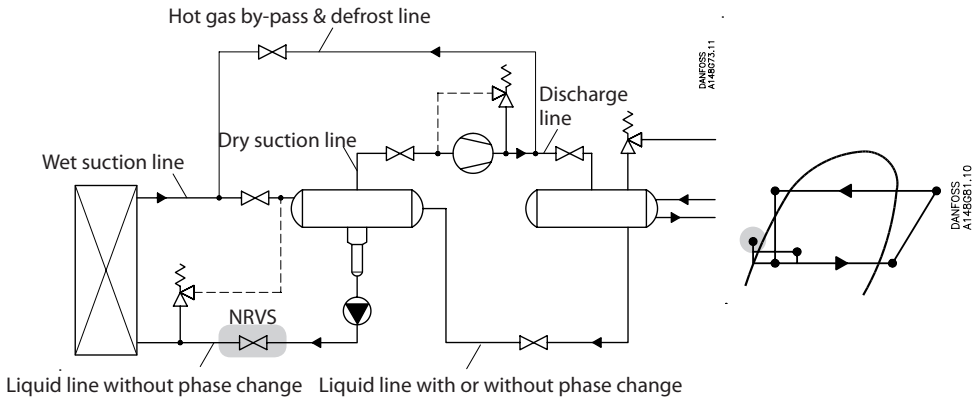
Capacities
(continued)

Location of valve in system (marked with grey)

Low pressure liquid line



Valve combination	PM 15	PM 20	PM 25
	NRVS 25	NRVS 25	NRVS 25
k_v [m³/h]	4.0	6.0	7.5

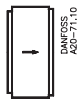
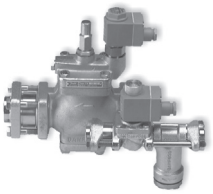
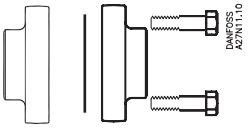
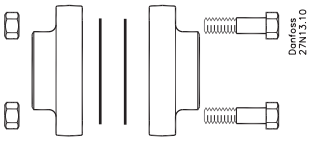
Evaporating temperature T_e	Pressure Δp (bar)	Capacities (kW) Q_0 at circulation rate 1 R717		
-50 °C	0.15	–	–	–
	0.25	653	979	1224
	0.30	715	1072	1340
	0.40	825	1238	1547
	0.50	923	1384	1730
-40 °C	0.15	–	–	–
	0.25	635	951	1188
	0.30	695	1043	1303
	0.40	803	1204	1506
	0.50	897	1346	1683
-30 °C	0.15	–	–	–
	0.25	615	922	1152
	0.30	675	1011	1265
	0.40	779	1169	1460
	0.50	871	1306	1632
-20 °C	0.15	–	–	–
	0.25	595	894	1114
	0.30	653	979	1224
	0.40	753	1130	1412
	0.50	852	1264	1580
-10 °C	0.15	–	–	–
	0.25	575	862	1075
	0.30	629	944	1180
	0.40	727	1090	1362
	0.50	812	1219	1523

Note: The capacities in the table must be divided by the actual circulation rate, or the evaporator capacities must be multiplied with the actual circulation rate.

Minimum opening differential pressure:
PM + NRVS will be fully open at Δp = 0.25 bar.

Precise valve capacities can be calculated for various refrigerants by using the "DIRcalc™" (Danfoss Industrial Refrigeration calculation programme).

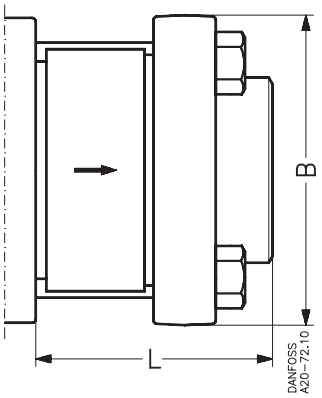
Ordering

Check valve			Flanges, gasket and bolts [1]			
						
Valve type	**Code. no.**	For valve type	**Code no.**	Weight [2] [kg]	Flange type	Connection size
NRVS 15	**020-2032**	EVRA / T 10, EVRA / T 15	**027N1255**	0.7		3/4 in
NRVS 25	**020-2033**	EVRA / T 20, EVRA / T 25, PM 15, PM 20, PM 25	**027N1254**	1.1		1 in
			Flanges,gaskets and bolts for NRVS stand alone[3]			
						
			Code no.	Weight[2] [kg]	Flange type	Connection size
			027N1256	0.256		3/4 in
			027N1257	0.443		1 in

1) Consists of one standard and one special flange, one gasket and 2 bolts.
2) Flange and bolts only.
3) Consist of flanges, gaskets, bolts and nuts only.
One standard flange and one special flange, two gasket, 2 bolts and 2 nuts.

Dimensions and weights

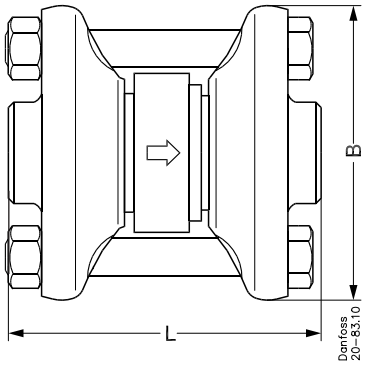
NRVS on valve



Type	L [mm]	B [mm]	Weight[1] kg
NRVS 15	47.5	78.0	0.1
NRVS 25	60.5	96.0	0.25

1) NRVS without flanges and bolts

NRVS stand alone



Type	L [mm]	B [mm]	Weight[1] kg
NRVS 15	78	80	0.1
NRVS 25	98	96	0.25

1) NRVS without flanges and bolts

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