

Check valves, type NRV and NRVH

Introduction



NRV and NRVH can be used in liquid, suction and hot gas lines in refrigeration and air conditioning plant with fluorinated refrigerants.

NRV and NRVH can also be supplied with oversize connections providing flexibility in the use of check valves.

Features

- The valve ensures only correct flow direction
- Both straightway and angleway versions
- Prevents back-condensation from warm to cold evaporator
- Built-in damping piston that makes the valves suitable for installation in lines where pulsation can occur, e.g. in the discharge line from the compressor.
- NRVH is supplied with spring to $\Delta p = 0.3$ bar. Used in refrigeration plant with compressors connected in parallel.
- Oversize connections provide flexibility in use.

Technical data

Max. working pressure
PS/MWP = 46 bar (667 psig)

Max. test pressure
 $p' = 60$ bar (870 psig)

Temperature of the medium
 $-50 \rightarrow 140^\circ\text{C}$

Dimensioning and selection

When selecting the right Danfoss check valve the following capacity tables on page 4 and 5 should be utilised together with plant requirements concerning piping and connection sizes. The optimum solution should include the highest capacity at lowest pressure drop across the valve before it closes.

Further, when dimensioning and selecting Danfoss check valves for mounting into the compressor discharge line, it is important to be aware of the following:

The differential pressure across the valve must always be higher than the given minimum pressure drop at which the valve is completely open. This also applies to lowest capacities for compressor with capacity regulation.

In refrigeration plants with compressors connected in parallel, it is advantageous to use NRVH, since the spring is stronger than the one utilised in NRV. Also, resonance problems can be avoided at partial load in the refrigerant plant.

Ordering

	Type	Version		Connection in.		Connection mm		Pressure drop across valve Δp ²⁾ bar	k_v -value ³⁾ m ³ /h	Max. working pressure
				Size	Code no.	Size	Code no.			
	NRV6		Flare	1/4	020-1040	6	020-1040	0.07	0.56	46 bar (667 psig)
	NRV 10			3/8	020-1041	10	020-1041		1.43	
	NRV 12			1/2	020-1042	12	020-1042	0.05	2.05	
	NRV 16			5/8	020-1043	16	020-1043		3.6	
	NRV 19			3/4	020-1044	19	020-1044		5.5	
	NRV 6s	Straight-way	Flare	1/4	020-1010	6	020-1014	0.07	0.56	
	NRV 6s ¹⁾			3/8	020-1057	10	020-1050			
	NRVH 6s ¹⁾			3/8	020-1069	10	020-1062	0.3		
	NRV 10s			3/8	020-1011	10	020-1015	0.07	1.43	
	NRVH 10s			3/8	020-1046	10	020-1036	0.3		
	NRV 10s ¹⁾			1/2	020-1058	12	020-1051	0.07		
	NRVH 10s ¹⁾			1/2	020-1070	12	020-1063	0.3	2.05	
	NRV 12s			1/2	020-1012	12	020-1016	0.05		
	NRVH 12s			1/2	020-1039	12	020-1037	0.3		
	NRV 12s ¹⁾			5/8	020-1052	16	020-1052	0.05	3.6	
	NRVH 12s ¹⁾		5/8	020-1064	16	020-1064	0.3			
	NRV 16s		5/8	020-1018	16	020-1018	0.05			
	NRVH 16s		5/8	020-1038	16	020-1038	0.3	5.5		
	NRV 16s ¹⁾				18	020-1053	0.05			
	NRVH 16s ¹⁾				18	020-1065	0.3			
	NRV 16s ¹⁾		3/4	020-1059	19	020-1059	0.05	19.0		
	NRVH 16s ¹⁾		3/4	020-1071	19	020-1071	0.3			
	NRV 19s				18	020-1017	0.05			
	NRVH 19s				18	020-1008	0.3	29.0		
	NRV 19s		3/4	020-1019	19	020-1019	0.05			
	NRVH 19s		3/4	020-1023	19	020-1023	0.3			
	NRV 19s ¹⁾		7/8	020-1054	22	020-1054	0.05	8.5		
	NRVH 19s ¹⁾		7/8	020-1066	22	020-1066	0.3			
NRV 22s	7/8	020-1020	22	020-1020	0.04	19.0				
NRVH 22s	7/8	020-1032	22	020-1032	0.3					
NRV 22s ¹⁾	1 1/8	020-1060	28	020-1055	0.04	29.0				
NRVH 22s ¹⁾	1 1/8	020-1072	28	020-1067	0.3					
NRV 28s	1 1/8	020-1021	28	020-1025	0.04	19.0				
NRVH 28s	1 1/8	020-1029	28	020-1033	0.3					
NRV 28s ¹⁾	1 3/8	020-1056	35	020-1056	0.04	8.5				
NRVH 28s ¹⁾	1 3/8	020-1068	35	020-1068	0.3					
NRV 35s	1 3/8	020-1026	35	020-1026	0.04	19.0				
NRVH 35s	1 3/8	020-1034	35	020-1034	0.3					
NRV 35s ¹⁾	1 5/8	020-1061	42	020-1027	0.04	29.0				
NRVH 35s ¹⁾	1 5/8	020-1073	42	020-1035	0.3					

1) Oversize connections

 2) Δp = the minimum pressure at which the valve is completely open.

The NRVH with a stronger spring is used in the discharge line from compressors connected in parallel.

 3) The k_v value is the flow of water in m³/h at a pressure drop across valve of 1 bar, $\rho = 1000 \text{ kg/m}^3$.

Capacity
Liquid capacity in kW

Type	Liquid capacity in kW at pressure drop across valve Δp bar			
	NRV			NRV/H
	0.05	0.07 ¹⁾	0.14	0.3 ²⁾

Suction vapour capacity in kW

Type	Pres- sure drop across valve Δp bar	Suction vapour capacity kW at evaporating temperature t_0 °C		
		-30	-10 ¹⁾	+5

R22

NRV/H 6		7.7	10.9	15.9
NRV/H 10		19.7	27.8	40.7
NRV/H 12	23.8	28.2	39.9	58.4
NRV/H 16	41.8	49.5	70.0	103.0
NRV/H 19	58.1	68.7	97.3	142.7
NRV/H 22	98.8	117.0	165.0	242.0
NRV/H 28	221.0	261.0	370.0	541.0
NRV/H 35	334.0	399.0	564.0	826.0

R22

NRV 6	0.07	0.58	0.87	1.15
NRV 10	0.07	1.47	2.23	2.93
NRV 12	0.05	1.78	2.71	3.55
NRV 16	0.05	3.13	4.75	6.23
NRV 19	0.05	4.35	6.60	8.65
NRV 22	0.05	7.40	11.20	14.70
NRV 28	0.05	16.50	25.10	32.80
NRV 35	0.05	25.20	38.30	50.20

R134a

NRV/H 6		7.1	10.0	14.7
NRV/H 10		18.1	25.6	37.5
NRV/H 12	22.0	26.0	36.8	53.8
NRV/H 16	38.6	45.7	64.6	94.5
NRV/H 19	53.6	63.4	89.6	131.0
NRV/H 22	91.1	108.0	152.0	223.0
NRV/H 28	204.0	241.0	341.0	499.0
NRV/H 35	311.0	368.0	520.0	761.0

R134a

NRV 6	0.07	0.38	0.65	0.90
NRV 10	0.07	0.96	1.66	2.29
NRV 12	0.05	1.19	2.01	2.77
NRV 16	0.05	2.09	3.53	4.86
NRV 19	0.05	2.90	4.90	6.80
NRV 22	0.05	4.93	8.30	11.50
NRV 28	0.05	11.00	18.60	25.70
NRV 35	0.05	16.80	28.40	39.20

R404A/R507

NRV/H 6		5.4	7.6	11.3
NRV/H 10		13.7	19.4	28.4
NRV/H 12	16.7	19.7	27.8	40.8
NRV/H 16	29.2	34.6	48.9	71.6
NRV/H 19	40.6	48.0	67.9	99.1
NRV/H 22	69.0	81.6	115.0	169.0
NRV/H 28	154.0	182.0	258.0	378.0
NRV/H 35	236.0	278.0	394.0	577.0

R404A/R507

NRV 6	0.07	0.49	0.77	1.06
NRV 10	0.07	1.24	1.97	2.70
NRV 12	0.05	1.50	2.42	3.28
NRV 16	0.05	2.63	4.25	5.76
NRV 19	0.05	3.65	5.90	8.00
NRV 22	0.05	6.21	10.00	13.60
NRV 28	0.05	13.90	22.40	30.40
NRV 35	0.05	21.20	34.20	46.40

R407C

NRV/H 6		7.2	10.3	14.9
NRV/H 10		18.5	26.1	38.3
NRV/H 12	22.4	26.6	37.5	54.9
NRV/H 16	39.3	46.5	65.8	96.8
NRV/H 19	54.6	64.6	91.5	134.0
NRV/H 22	92.9	110.0	155.0	228.0
NRV/H 28	208.0	245.0	348.0	509.0
NRV/H 35	314.0	375.0	530.0	776.0

R407C

NRV 6	0.07	0.50	0.80	1.06
NRV 10	0.07	1.28	2.05	2.70
NRV 12	0.05	1.55	2.49	3.27
NRV 16	0.05	2.72	4.37	5.73
NRV 19	0.05	3.78	6.07	7.96
NRV 22	0.05	6.44	10.30	13.50
NRV 28	0.05	14.40	23.10	30.20
NRV 35	0.05	21.90	35.20	46.20

The suction vapour capacities are based on liquid temperature $t_l = 25^\circ\text{C}$ ahead of the evaporator.

The table values refer to the evaporator capacity.

The capacities are based on dry, saturated vapour ahead of the valve.

Under operating conditions with superheated vapour ahead of the valve, the capacities are reduced by 4% for every 10 K superheat.

- ¹⁾ Rated capacities
²⁾ Capacity for NRVH

- ¹⁾ Rated capacities

Correction factors

When selecting the evaporator capacity is to be multiplied by a correction factor depending on the liquid temperature t_l ahead of the valve/the evaporator. The corrected capacity can then be found from the table.

Correction factors for liquid temperature t_l

t_l °C	-10	0	10	15	20	25	30	35	40	45	50
R22	0.76	0.82	0.88	0.92	0.96	1.00	1.05	1.10	1.16	1.22	1.30
R134a	0.73	0.79	0.86	0.90	0.95	1.00	1.06	1.12	1.19	1.27	1.37
R404A/R507	0.65	0.72	0.81	0.86	0.93	1.00	1.09	1.20	1.33	1.51	1.74
R407C	0.71	0.78	0.85	0.89	0.94	1.00	1.06	1.14	1.23	1.33	1.46

Capacity
Hot gas capacity in kW

Type	Hot gas capacity kW ¹⁾ at pressure drop across valve Δp bar			
	0.05	0.07 ²⁾	0.14	0.3 ³⁾

Hot gas capacity in kg/s

Type	Hot gas capacity kg/s at pressure drop across valve Δp bar			
	0.05	0.07 ²⁾	0.14	0.3 ³⁾

R22

NRV/H 6		1.36	1.93	2.84
NRV/H 10		3.46	4.92	7.25
NRV/H 12	4.18	4.96	7.05	10.40
NRV/H 16	7.34	8.71	12.40	18.30
NRV/H 19	10.20	12.10	17.20	25.40
NRV/H 22	17.30	20.60	29.20	43.10
NRV/H 28	38.80	46.00	65.40	96.30
NRV/H 35	59.20	70.20	99.80	147.00

R22

NRV/H 6		0.0081	0.01160	0.0170
NRV/H 10		0.0199	0.02870	0.0420
NRV/H 12	0.0241	0.0284	0.04090	0.0599
NRV/H 16	0.0443	0.0521	0.07480	0.1099
NRV/H 19	0.0616	0.0725	0.10400	0.1530
NRV/H 22	0.1047	0.1233	0.17620	0.2581
NRV/H 28	0.2332	0.2747	0.39390	0.5763
NRV/H 35	0.3555	0.4190	0.60112	0.8800

R134a

NRV/H 6		1.07	1.52	2.26
NRV/H 10		2.73	3.89	5.76
NRV/H 12	3.30	3.92	5.58	8.26
NRV/H 16	5.80	6.88	9.79	14.50
NRV/H 19	8.07	9.35	13.60	20.20
NRV/H 22	13.70	16.20	23.10	34.30
NRV/H 28	30.60	36.30	51.70	76.60
NRV/H 35	46.70	55.40	78.90	117.00

R134a

NRV/H 6		0.0070	0.0100	0.0150
NRV/H 10		0.0170	0.0240	0.0360
NRV/H 12	0.0200	0.0240	0.0340	0.0510
NRV/H 16	0.0370	0.0440	0.0620	0.0940
NRV/H 19	0.0514	0.0611	0.0861	0.1305
NRV/H 22	0.0850	0.1030	0.1470	0.2210
NRV/H 28	0.1950	0.2280	0.3230	0.4940
NRV/H 35	0.2980	0.3480	0.4930	0.7540

R404A/R507

NRV/H 6		1.19	1.68	2.48
NRV/H 10		3.05	4.29	6.33
NRV/H 12	3.69	4.37	6.15	9.08
NRV/H 16	6.48	7.67	10.80	16.00
NRV/H 19	9.00	10.60	15.00	22.20
NRV/H 22	15.30	18.10	25.50	37.70
NRV/H 28	34.20	40.50	57.00	84.20
NRV/H 35	52.20	61.80	87.00	129.00

R404A/R507

NRV/H 6		0.0100	0.0143	0.0210
NRV/H 10		0.0246	0.0350	0.0512
NRV/H 12	0.0296	0.0350	0.0500	0.0732
NRV/H 16	0.0542	0.0640	0.0914	0.1340
NRV/H 19	0.0754	0.0890	0.1273	0.1864
NRV/H 22	0.1280	0.1518	0.2158	0.3156
NRV/H 28	0.2858	0.3379	0.4823	0.7056
NRV/H 35	0.4361	0.5150	0.7368	1.0792

R407C

NRV/H 6		1.46	2.07	3.04
NRV/H 10		3.70	5.26	7.76
NRV/H 12	4.47	5.31	7.54	11.10
NRV/H 16	7.85	9.32	13.30	19.60
NRV/H 19	10.90	12.90	18.40	27.20
NRV/H 22	18.50	22.00	31.20	46.10
NRV/H 28	41.50	49.20	70.00	103.00
NRV/H 35	63.30	75.10	107.00	157.00

R407C

NRV/H 6		0.0087	0.0124	0.0182
NRV/H 10		0.0213	0.0307	0.0449
NRV/H 12	0.0258	0.0304	0.0438	0.0641
NRV/H 16	0.0474	0.0557	0.0800	0.1176
NRV/H 19	0.0659	0.0776	0.1113	0.1637
NRV/H 22	0.1120	0.1319	0.1885	0.2762
NRV/H 28	0.2500	0.2939	0.4215	0.6166
NRV/H 35	0.3804	0.4483	0.6540	0.9416

¹⁾ The hot gas capacities are based on condensing temp.

$t_c = +25^\circ\text{C}$,

subcooling = 4 K,

evaporating temp. = -10°C and

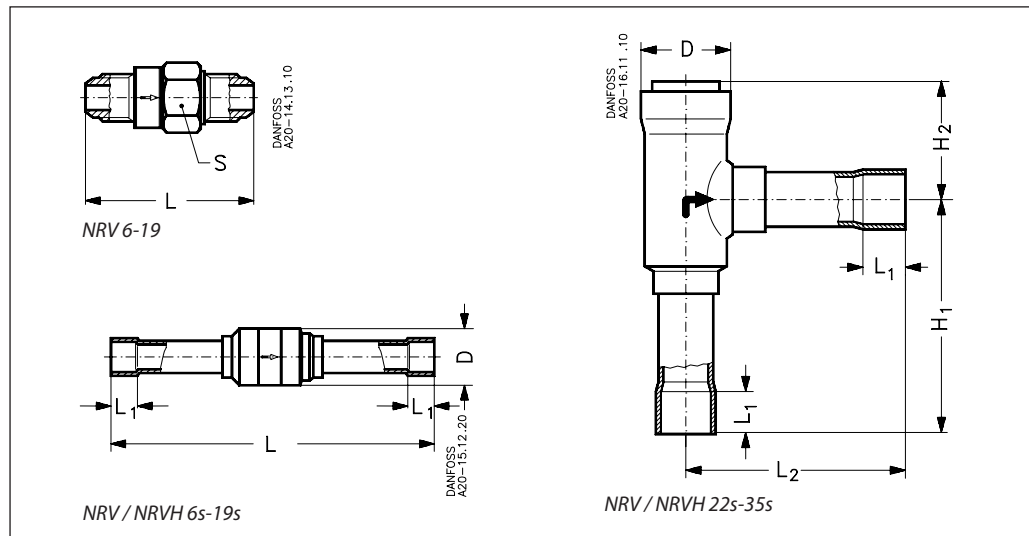
hot gas temp. $t_h = +60^\circ\text{C}$ ahead of valve.

²⁾ Rated capacities

³⁾ Capacity for NRVH

An increase of the hot gas temperature of 10 K will reduce the valve capacity approx. 2% and vice versa.

Dimensions and weights



Connection	Type	Size		H ₁ mm	H ₂ mm	L mm	L ₁ mm	L ₂ mm	∅D mm	Spanner flats S mm	Weight kg
		in.	mm								
Flare straight-way	NRV6	1/4				56				19	0.1
	NRV 10	3/8				60				20	0.2
	NRV 12	1/2				69				24	0.2
	NRV 16	5/8				80				28	0.3
	NRV 19	3/4				95				34	0.4
Solder straight-way	NRV/H 6s	1/4	6			92	7		18		0.1
	NRV/H 6s ¹⁾	3/8	10			92	9		18		0.2
	NRV/H 10s	3/8	10			109	9		18		0.2
	NRV/H 10s ¹⁾	1/2	12			109	10		18		0.2
	NRV/H 12s	1/2	12			131	10		22		0.2
	NRV/H 12s ¹⁾	5/8	16			131	12		22		0.2
	NRV/H 16s	5/8	16			138	12		28		0.3
	NRV/H 16s ¹⁾		18			138	14		28		0.3
	NRV/H 19s		18			165	14		34		0.4
	NRV/H 16s ¹⁾	3/4	19			138	14		28		0.3
	NRV/H 19s	3/4	19			165	14		34		0.4
NRV/H 19s ¹⁾	7/8	22			165	17		34		0.4	
Solder angleway	NRV/H 22s	7/8	22	94	47		17	88	36		0.5
	NRV/H 22s ¹⁾	1 1/8	28	94	47		22	88	36		0.5
	NRV/H 28s	1 1/8	28	141	65		22	123	48		1.1
	NRV/H 28s ¹⁾	1 3/8	35	141	65		25	123	48		1.1
	NRV/H 35s	1 3/8	35	141	65		25	123	48		1.1
NRV/H 35s ¹⁾	1 5/8	42	141	65		29	123	48		1.1	

¹⁾ Oversize connections

