MAKING MODERN LIVING POSSIBLE

Refrigerant Valve
Check valves,
type NRV and NRVH

REFRIGERATION AND
AIR CONDITIONING

Technical leaflet

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

Temperature range	-50 →140°C
Max. working pressure (PS/MVP)	46 bar (667 psig)
Max. test pressure	p´ = 60 bar (870 psig)
Approvals	c UL us LISTED

Dimensioning and selection

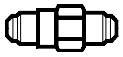
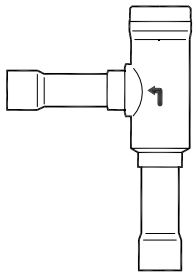
When selecting the right Danfoss check valve the following capacity tables on page 4 and 5 should be utilised together with plant requirements concerning piping and connection sizes. The optimum solution should include the highest capacity at lowest pressure drop across the valve before it closes.

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 Δ p [2] bar	k_v-value [3] m^3/h	Max. working pressure
				Size	**Code no.**	Size	**Code no.**			
	NRV6	Straight-way	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		Solder ODF	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		
	NRV 12s			1/2	**020-1012**	12	**020-1016**	0.05	2.05	
	NRVH 12s			1/2	**020-1039**	12	**020-1037**	0.3		
	NRV 12s [1]			5/8	**020-1052**	16	**020-1052**	0.05		
	NRVH 12s [1]			5/8	**020-1064**	16	**020-1064**	0.3		
	NRV 16s			5/8	**020-1018**	16	**020-1018**	0.05	3.6	
	NRVH 16s			5/8	**020-1038**	16	**020-1038**	0.3		
	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		
	NRVH 16s [1]			3/4	**020-1071**	19	**020-1071**	0.3		
	NRV 19s					18	**020-1017**	0.05	5.5	
	NRVH 19s					18	**020-1008**	0.3		
	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		
	NRVH 19s [1]			7/8	**020-1066**	22	**020-1066**	0.3		
	NRV 22s	Angle-way		7/8	**020-1020**	22	**020-1020**	0.04	8.5	
	NRVH 22s			7/8	**020-1032**	22	**020-1032**	0.3		
	NRV 22s [1]			1 1/8	**020-1060**	28	**020-1055**	0.04		
	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		
	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	29.0	
	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		
	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 m^3/h at a pressure drop across valve of 1 bar, $\rho = 1000\ kg/m^3$.

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]
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
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
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
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
R410A				
NRV/H 6		7.942	11.23	16.44
NRV/H 10		20.28	28.68	41.99
NRV/H 12	24.57	29.07	41.12	60.19
NRV/H 16	43.15	51.06	72.2	105.7
NRV/H 19	65.92	78	110.3	161.5
NRV/H 22	101.9	120.5	170.5	249.6
NRV/H 28	227.7	269.5	381.1	557.8
NRV/H 35	347.6	411.3	581.6	851.4

[1] Rated capacities
[2] Capacity for NRVH

Suction vapour capacity in kW

Type	Pressure drop across valve Δp bar	Suction vapour capacity kW at evaporating temperature t_o °C		
		−30	−10 [1]	+5
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 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 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 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
R410A				
NRV 6	0.07	0.7161	1.087	1.427
NRV 10	0.07	1.829	2.776	3.645
NRV 12	0.05	2.225	3.37	4.422
NRV 16	0.05	3.908	5.919	7.765
NRV 19	0.05	5.97	9.043	11.86
NRV 22	0.05	9.227	13.97	18.33
NRV 28	0.05	20.62	31.24	40.98
NRV 35	0.05	31.48	47.68	62.55

[1] Rated capacities

The suction vapour capacities are based on liquid temperature t_l = 25°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.

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
R410A	0.77	0.82	0.88	0.92	0.96	1.00	1.05	1.05	1.17	1.24	1.33

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]
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
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
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
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
R410A				
NRV/H 6		1.73	2.44	3.552
NRV/H 10		4.417	6.231	9.07
NRV/H 12	5.355	6.332	8.933	13
NRV/H 16	9.404	11.12	15.69	22.83
NRV/H 19	14.37	16.99	23.97	34.88
NRV/H 22	22.2	26.25	37.04	53.91
NRV/H 28	49.63	58.68	82.79	120.5
NRV/H 35	75.75	89.57	126.4	183.9

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		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		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		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		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
R410A				
NRV/H 6		0.009298	0.01312	0.01909
NRV/H 10		0.02374	0.0335	0.04876
NRV/H 12	0.02879	0.03404	0.04802	0.06989
NRV/H 16	0.05055	0.05977	0.08432	0.1227
NRV/H 19	0.07723	0.09132	0.1288	0.1875
NRV/H 22	0.1194	0.1411	0.1991	0.2898
NRV/H 28	0.2668	0.3155	0.445	0.6478
NRV/H 35	0.4072	0.4815	0.6793	0.9888

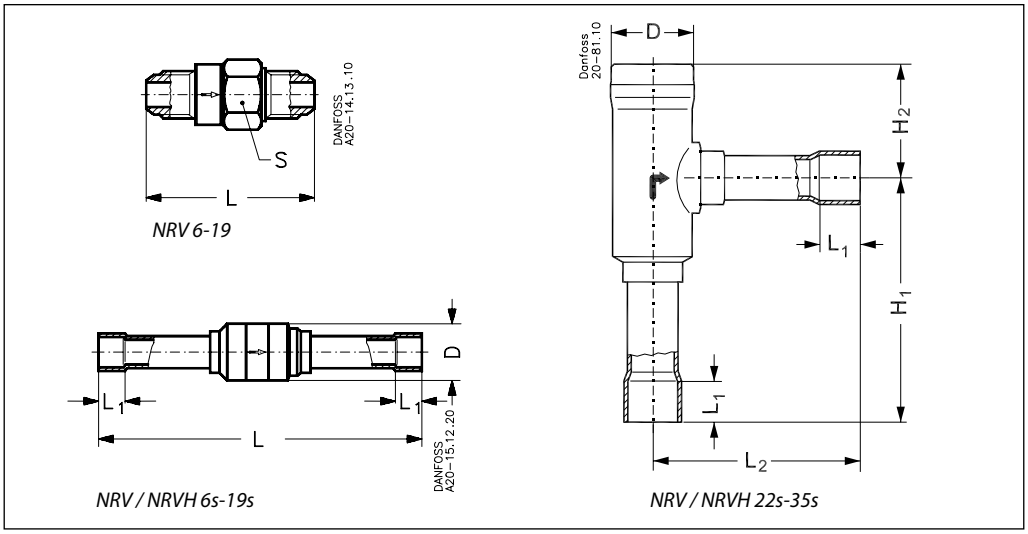
[1] The hot gas capacities are based on condensing temp. t_c = +25°C, subcooling = 4 K, evaporating temp. = –10°C and hot gas temp. t_h = +60° C ahead of valve.

[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	H_2	L	L_1	L_2	∅D	Spanner flats S	Weight
		in.	mm	mm	mm	mm	mm	mm	mm	mm	kg
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 10s1)	1/2	12			109	10		18		0.2
	NRV/H 12s	1/2	12			131	10		22		0.2
	NRV/H 12s1)	5/8	16			131	12		22		0.2
	NRV/H 16s	5/8	16			138	12		28		0.3
	NRV/H 16s1)		18			138	14		28		0.3
	NRV/H 19s		18			165	14		34		0.4
	NRV/H 16s1)	3/4	19			138	14		28		0.3
	NRV/H 19s	3/4	19			165	14		34		0.4
	NRV/H 19s1)	7/8	22			165	17		34		0.4
Solder angleway	NRV/H 22s	7/8	22	94	48		17	88	37		0.5
	NRV/H 22s1)	1 1/8	28	94	48		22	88	37		0.5
	NRV/H 28s	1 1/8	28	141	67		22	123	49		1.1
	NRV/H 28s1)	1 3/8	35	141	67		25	123	49		1.1
	NRV/H 35s	1 3/8	35	141	67		25	123	49		1.1
	NRV/H 35s1)	1 5/8	42	141	67		29	123	49		1.1

1) Oversize connections