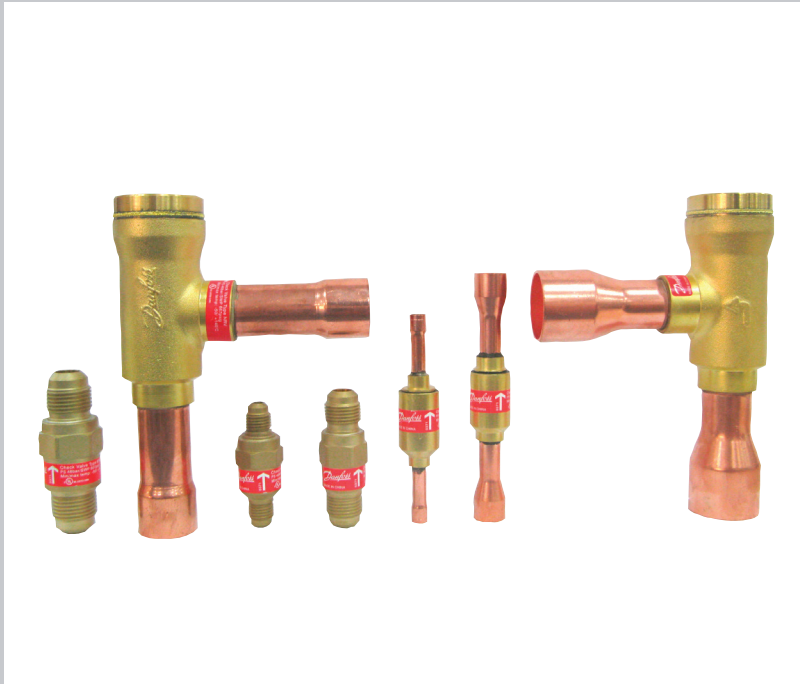


Data sheet

Check valve

Types NRV and NRVH



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

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

Features

- Can be used for HC, HCFC and HFC refrigerants,
- 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,
- NRVH is for use in refrigeration plant with compressors connected in parallel,
- Oversize connections provide flexibility in use.

Approvals

UL US listed

Technical data

Temperature range	-50 – 140 °C
Max. working pressure (PS/MWP)	46 bar (667 psig)

Dimensioning and selection

When selecting the right Danfoss check valve the 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

Straightway Flare Version

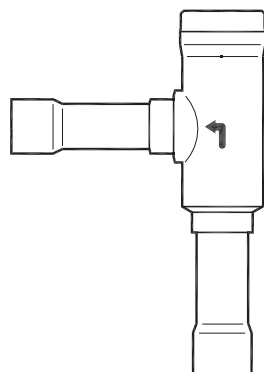


Type	Pressure drop across valve Δp ²⁾	k_v -value ³⁾	Connection [in.]		Connection [mm]	
	[bar]		Size	Code no.	Size	Code no.
NRV 6	0.07	0.56	1/4	020-1040	6	020-1040
NRV 10	0.07	1.20	3/8	020-1041	10	020-1041
NRV 12	0.05	2.05	1/2	020-1042	12	020-1042
NRV 16	0.05	3.60	5/8	020-1043	16	020-1043
NRV 19	0.05	5.50	3/4	020-1044	19	020-1044



Note: Only Solder versions, connection size from 6s to 19s, are allowed for flammable refrigerants.

Angleway Solder ODF Version



Type	Pressure drop across valve Δp ²⁾	k_v -value ³⁾	Connection [in.]		Connection [mm]	
	[bar]		Size	Code no.	Size	Code no.
NRV 22s	0.04	8.50	7/8	020-1020	22	020-1020
NRVH 22s	0.30	8.50	7/8	020-1032	22	020-1032
NRV 22s ¹⁾	0.04	8.50	1 1/8	020-1060	28	020-1055
NRVH 22s ¹⁾	0.30	8.50	1 1/8	020-1072	28	020-1067
NRV 28s	0.04	16.50	1 1/8	020-1021	28	020-1025
NRVH 28s	0.30	16.50	1 1/8	020-1029	28	020-1033
NRV 28s ¹⁾	0.04	16.50	1 3/8	020-1056	35	020-1056
NRVH 28s ¹⁾	0.30	16.50	1 3/8	020-1068	35	020-1068
NRV 35s	0.04	29.0	1 3/8	020-1026	35	020-1026
NRVH 35s	0.30	29.0	1 3/8	020-1034	35	020-1034
NRV 35s ¹⁾	0.04	29.0	1 5/8	020-1061	42	020-1027
NRVH 35s ¹⁾	0.30	29.0	1 5/8	020-1073	42	020-1035

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, ρ = 1000 kg/m³.



Note: Only Solder versions, connection size from 6s to 19s, are allowed for flammable refrigerants.

Ordering

(continued)

Straightway Solder ODF Version



Type	Pressure drop across valve Δp ²⁾	k_v -value ³⁾	Connection [in.]		Connection [mm]	
	[bar]	[m ³ /h]	Size	Code no.	Size	Code no.
NRV 6s	0.07	0.56	1/4	020-1010	6	020-1014
NRV 6s ¹⁾	0.07	0.56	3/8	020-1057	10	020-1050
NRVH 6s ¹⁾	0.30	0.56	3/8	020-1069	10	020-1062
NRV 10s	0.07	1.20	3/8	020-1011	10	020-1015
NRVH 10s	0.30	1.20	3/8	020-1046	10	020-1036
NRV 10s ¹⁾	0.07	1.20	1/2	020-1058	12	020-1051
NRVH 10s ¹⁾	0.30	1.20	1/2	020-1070	12	020-1063
NRV 12s	0.05	2.05	1/2	020-1012	12	020-1016
NRVH 12s	0.30	2.05	1/2	020-1039	12	020-1037
NRV 12s ¹⁾	0.05	2.05	5/8	020-1052	16	020-1052
NRVH 12s ¹⁾	0.30	2.05	5/8	020-1064	16	020-1064
NRV 16s	0.05	3.60	5/8	020-1018	16	020-1018
NRVH 16s	0.30	3.60	5/8	020-1038	16	020-1038
NRV 16s ¹⁾	0.05	3.60	—	—	18	020-1053
NRVH 16s ¹⁾	0.30	3.60	—	—	18	020-1065
NRV 16s ¹⁾	0.05	3.60	3/4	020-1059	19	020-1059
NRVH 16s ¹⁾	0.30	3.60	3/4	020-1071	19	020-1071
NRV 19s	0.05	5.50	—	—	18	020-1017
NRVH 19s	0.30	5.50	—	—	18	020-1008
NRV 19s	0.05	5.50	3/4	020-1019	19	020-1019
NRVH 19s	0.30	5.50	3/4	020-1023	19	020-1023
NRV 19s ¹⁾	0.05	5.50	7/8	020-1054	22	020-1054
NRVH 19s ¹⁾	0.30	5.50	7/8	020-1066	22	020-1066

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, $\rho = 1000 \text{ kg/m}^3$.

Note: Only Solder versions, connection size from 6s to 19s, are allowed for flammable refrigerants.

Capacity (continued)

Liquid capacity in [kW]

Type	Liquid capacity in [kW] at pressure drop across valve Δp [bar]			
	NRV			NRV/NRVH
	0.05	0.07 ¹⁾	0.14	0.3 ²⁾
R22				
NRV/H 6	—	7.7	10.9	15.9
NRV/H 10	—	16.4	23.3	34.0
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	63.7	75.4	106.6	156.1
NRV/H 22	98.8	117.0	165.0	242.0
NRV/H 28	196.9	233.0	329.5	482.4
NRV/H 35	334.0	399.0	564.0	826.0
R134a				
NRV/H 6	—	7.1	10.0	14.7
NRV/H 10	—	15.3	21.7	31.7
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	59.3	70.2	99.3	145.3
NRV/H 22	91.1	108.0	152.0	223.0
NRV/H 28	183.4	217.0	306.9	449.3
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	—	11.2	15.8	23.2
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	43.4	51.4	72.6	106.3
NRV/H 22	69.0	81.6	115.0	169.0
NRV/H 28	134.2	158.8	224.5	328.6
NRV/H 35	236.0	278.0	394.0	577.0

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 _e [°C]		
		−30	−10 ¹⁾	+5
R22				
NRV 6	0.07	0.58	0.87	1.15
NRV 10	0.07	1.20	1.84	2.43
NRV 12	0.05	1.78	2.71	3.55
NRV 16	0.05	3.13	4.75	6.23
NRV 19	0.05	4.68	7.17	9.45
NRV 22	0.05	7.40	11.20	14.70
NRV 28	0.05	14.46	22.15	29.21
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	0.81	1.37	1.90
NRV 12	0.05	1.19	2.01	2.77
NRV 16	0.05	2.09	3.53	4.86
NRV 19	0.05	3.18	5.33	7.40
NRV 22	0.05	4.93	8.30	11.50
NRV 28	0.05	9.84	16.46	22.86
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	1.00	1.61	2.19
NRV 12	0.05	1.50	2.42	3.28
NRV 16	0.05	2.63	4.25	5.76
NRV 19	0.05	3.91	6.24	8.48
NRV 22	0.05	6.21	10.00	13.60
NRV 28	0.05	12.08	19.29	26.21
NRV 35	0.05	21.20	34.20	46.40

¹⁾ Rated capacities

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.

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

Capacity (continued)

Liquid capacity in [kW]

Type	Liquid capacity in [kW] at pressure drop across valve Δp [bar]			
	NRV			NRV/NRVH
	0.05	0.07 ¹⁾	0.14	0.3 ²⁾
R407C				
NRV/H 6	—	7.2	10.3	14.9
NRV/H 10	—	15.8	22.3	32.7
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	61.1	72.3	102.3	149.7
NRV/H 22	92.9	110.0	155.0	228.0
NRV/H 28	188.9	223.5	316.1	426.7
NRV/H 35	314.0	375.0	530.0	776.0
R410A				
NRV/H 6	—	7.942	11.23	16.44
NRV/H 10	—	16.2	22.9	33.5
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	62.6	74.1	104.8	153.3
NRV/H 22	101.9	120.5	170.5	249.6
NRV/H 28	193.5	229.0	323.8	474.0
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 _e [°C]		
		-30	-10 ¹⁾	+5
R407C				
NRV 6	0.07	0.50	0.80	1.06
NRV 10	0.07	1.06	1.72	2.34
NRV 12	0.05	1.55	2.49	3.27
NRV 16	0.05	2.72	4.37	5.73
NRV 19	0.05	4.13	6.67	9.08
NRV 22	0.05	6.44	10.30	13.50
NRV 28	0.05	12.77	20.62	28.08
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	1.52	2.31	3.04
NRV 12	0.05	2.225	3.37	4.422
NRV 16	0.05	3.908	5.919	7.765
NRV 19	0.05	5.90	8.97	11.80
NRV 22	0.05	9.227	13.97	18.33
NRV 28	0.05	18.22	27.72	36.46
NRV 35	0.05	31.48	47.68	62.55

¹⁾ Rated capacities

The suction vapour capacities are based on liquid temperature $t_e = 25^\circ\text{C}$ 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.

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
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]			
	NRV			NRV/NRVH
	0.05	0.07 ²⁾	0.14	0.3 ³⁾
R22				
NRV/H 6	—	1.36	1.93	2.84
NRV/H 10	—	2.97	4.20	6.15
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	11.51	13.62	19.26	28.18
NRV/H 22	17.30	20.60	29.20	43.10
NRV/H 28	35.60	42.1	59.50	87.10
NRV/H 35	59.20	70.20	99.80	147.00
R134a				
NRV/H 6	—	1.07	1.52	2.26
NRV/H 10	—	2.38	3.36	4.90
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	9.20	10.89	15.38	22.47
NRV/H 22	13.70	16.20	23.10	34.30
NRV/H 28	28.4	33.6	47.5	69.5
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	—	2.63	3.72	5.44
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	10.18	12.05	17.04	24.94
NRV/H 22	15.30	18.10	25.50	37.70
NRV/H 28	31.50	37.20	52.70	77.10
NRV/H 35	52.20	61.80	87.00	129.00

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

Hot gas capacity in [kg/s]

Type	Hot gas capacity [kg/s] at pressure drop across valve Δp [bar]			
	NRV			NRV/NRVH
	0.05	0.07 ²⁾	0.14	0.3 ³⁾
R22				
NRV/H 6	—	0.0081	0.01160	0.0170
NRV/H 10	—	0.0169	0.0239	0.0350
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	0.0654	0.0774	0.1095	0.1602
NRV/H 22	0.1047	0.1233	0.17620	0.2581
NRV/H 28	0.2023	0.2393	0.3384	0.4952
NRV/H 35	0.3555	0.4190	0.60112	0.8800
R134a				
NRV/H 6	—	0.0070	0.0100	0.0150
NRV/H 10	—	0.0145	0.0205	0.0299
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	0.0562	0.0665	0.0939	0.1372
NRV/H 22	0.0850	0.1030	0.1470	0.2210
NRV/H 28	0.1737	0.2055	0.2903	0.4241
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	—	0.0202	0.0285	0.0417
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	0.0781	0.0924	0.1306	0.1912
NRV/H 22	0.1280	0.1518	0.2158	0.3156
NRV/H 28	0.2413	0.2855	0.4038	0.5909
NRV/H 35	0.4361	0.5150	0.7368	1.0792

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

Capacity (continued)

Hot gas capacity in [kW]

Type	Hot gas capacity [kW] ¹⁾ at pressure drop across valve Δp [bar]			
	NRV			NRV/NRVH
	0.05	0.07 ²⁾	0.14	0.3 ³⁾
R407C				
NRV/H 6	—	1.46	2.07	3.04
NRV/H 10	—	3.18	4.49	6.58
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	12.31	14.56	20.59	30.14
NRV/H 22	18.50	22.00	31.20	46.10
NRV/H 28	38.00	45.00	63.60	93.10
NRV/H 35	63.30	75.10	107.00	157.00
R410A				
NRV/H 6	—	1.73	2.44	3.552
NRV/H 10	—	3.70	5.23	7.67
NRV/H 12	5.355	6.332	8.933	13
NRV/H 16	9.404	11.12	15.69	22.83
NRV/H 19	14.34	16.96	23.99	35.13
NRV/H 22	22.2	26.25	37.04	53.91
NRV/H 28	44.3	52.4	74.2	0.2397
NRV/H 35	75.75	89.57	126.4	183.9

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

- $t_c = 25\text{ °C}$,
- subcooling = 4 K,
- evaporating temp. = -10 °C and
- hot gas temp. $t_h = 60\text{ °C}$ ahead of valve.

²⁾ Rated capacities

³⁾ Capacity for NRVH

Hot gas capacity in [kg/s]

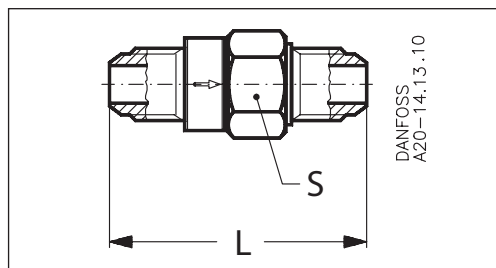
Type	Hot gas capacity [kg/s] at pressure drop across valve Δp [bar]			
	NRV			NRV/NRVH
	0.05	0.07 ²⁾	0.14	0.3 ³⁾
R407C				
NRV/H 6	—	0.0087	0.0124	0.0182
NRV/H 10	—	0.0183	0.0258	0.0378
NRV/H 12	0.0258	0.0304	0.0438	0.0641
NRV/H 16	0.0474	0.0557	0.0800	0.1176
NRV/H 19	0.0708	0.0838	0.1184	0.1734
NRV/H 22	0.1120	0.1319	0.1885	0.2762
NRV/H 28	0.2188	0.2589	0.3661	0.5358
NRV/H 35	0.3804	0.4483	0.6540	0.9416
R410A				
NRV/H 6	—	0.009298	0.01312	0.01909
NRV/H 10	—	0.0200	0.0283	0.0415
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	0.0776	0.0918	0.1298	0.1901
NRV/H 22	0.1194	0.1411	0.1991	0.2898
NRV/H 28	0.2668	0.2836	0.4012	0.5875
NRV/H 35	0.4072	0.4815	0.6793	0.9888

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

Note : For capacity calculation of other refrigerants, like R32, R600, R600a, R290, R1270, please contact Danfoss.

Dimensions [mm] and weights [kg]

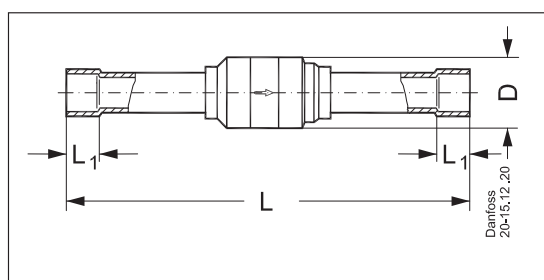
NRV 6 – 19



Flare straightway connection

Type	Size	L	Spanner flats S	Net weight
	[in.]			
NRV 6	1/4	56	19	0.1
NRV 10	3/8	60	19	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

NRV 6s – 19s / NRVH 6s – 19s



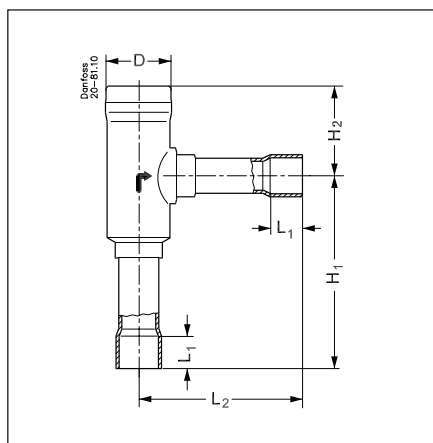
Solder straightway connection

Type	Size		L	L ₁	øD	Net weight
	[in.]	[mm]				
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

¹⁾ Oversize connections

Dimensions [mm] and weights [kg] (continued)

NRV 22s – 35s / NRVH 22s – 35s



Solder angleway connection

Type	Size		H ₁	H ₂	L ₁	L ₂	øD	Net weight
	[in.]	[mm]						
NRV/H 22s	7/8	22	94	48	17	88	37	0.5
NRV/H 22s ¹⁾	1 1/8	28	94	48	22	88	37	0.55
NRV/H 28s	1 1/8	28	141	67	22	123	49	1.24
NRV/H 28s ¹⁾	1 3/8	35	141	67	25	123	49	1.29
NRV/H 35s	1 3/8	35	141	67	25	123	49	1.25
NRV/H 35s ¹⁾	1 5/8	42	141	67	29	123	49	1.29

¹⁾ Oversize connections