

Data sheet

# Check valves

## Type NRVA



Type NRVA check valves can be used in liquid, suction, and hot gas lines in refrigeration and air conditioning systems using ammonia or 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.

### Features

- A damping piston makes NRVA suitable for pulsating lines
- Teflon (PTFE) piston seat provides excellent seating with minimum closing force
- No orientation limitations
- Rated for 580 psig / 40 bar
- Available in a wide range of connection types including socket-weld, butt weld, FPT (internal NPT thread) and solder flange

### Technical data

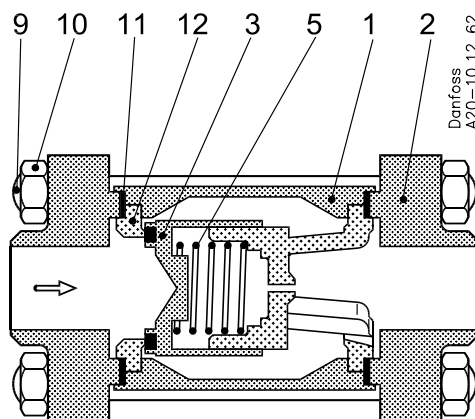
- *Refrigerants*  
Applicable to HCFC, HFC and R717 (Ammonia). For further information please see installation instruction for NRVA.  
Use with flammable hydrocarbons cannot be recommended; please contact Danfoss.
- *Temperature range*  
-50 – 140 °C / -58 – 284 °F.
- *Pressure range*  
The valve is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

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Technical data

Type	Nominal size in.	$\Delta p$ (see note 2)				$k_v$ value (see note 3) m <sup>3</sup> /h	$C_v$ value (see note 4) gal/min
		With standard spring		With special spring (see note 1)			
		bar	psig	bar	psig		
NRVA 15	½	0.12	1.7	0.3	4.4	5	6
NRVA 20	¾	0.12	1.7	0.3	4.4	6	7
NRVA 25	1	0.12	1.7	0.3	4.4	19	22
NRVA 32	1¼	0.12	1.7	0.3	4.4	20	23
NRVA 40	1½	0.07	1.0	0.4	5.8	44	51
NRVA 50	2	0.07	1.0	0.4	5.8	44	51
NRVA 65	2½	0.07	1.0	0.4	5.8	75	87

- 1) A special spring can be supplied to replace the standard valve spring.
- 2)  $\Delta p$  = minimum pressure differential at which the valve is completely open.
- 3) The  $k_v$  value is the flow of water in m<sup>3</sup>/h at a pressure drop across valve of 1 bar,  $\rho = 1000 \text{ kg/m}^3$ .
- 4) The  $C_v$  value is the flow of water in gal/min at a pressure drop across valve of 1 psig,  $\rho = 10 \text{ lbs/gal}$ .

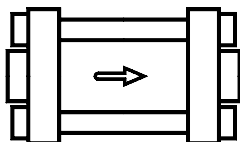


Material specification for NRVA check valves

No.	Part	Material	DIN	ISO	ASTM
1	Housing	Steel	G20Mn5QT *) EN10213-3		LCC, A352
			P285QH EN10222-4		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

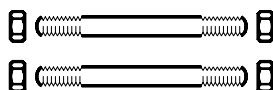


Nominal Size		Valve Type	Flange Type	Code number
Inches	mm			
1/2	15	NRVA 15	3/8" FPT	* See note
1/2	15	NRVA 15	3/8" SOC	* See note
1/2	15	NRVA 15	3/8" BW	* See note
1/2	15	NRVA 15	1/2" FPT	027X0181
1/2	15	NRVA 15	1/2" SOC	027X0182
1/2	15	NRVA 15	1/2" BW	027X0253
1/2	15	NRVA 15	5/8" ODS	* See note
3/4	20	NRVA 20	3/4" BW	027X0183
3/4	20	NRVA 20	3/4" SOC	027X0247
3/4	20	NRVA 20	7/8" ODS	* See note
1	25	NRVA 25	1" FPT	* See note
1	25	NRVA 25	1" SOC	027X0184
1	25	NRVA 25	1" BW	027X0246
1 1/4	32	NRVA 32	1 1/4" SOC	027X0185
1 1/4	32	NRVA 32	1 1/4" BW	027X0252
1 1/4	32	NRVA 32	1 3/8" ODS	* See note
1 1/2	40	NRVA 40	1 1/2" SOC	027X0188
1 1/2	40	NRVA 40	1 1/2" BW	027X0251
2	50	NRVA 50	2" SOC	027X0189
2	50	NRVA 50	2" BW	027X0190
2 1/2	65	NRVA 65	2 1/2" BW	027X0191

**Note:**  
When ordering this valve size and connection type, please consult with Customer Service for individual component Code Numbers to complete the valve kit.

BW: butt weld      FPT: female NPT pipe thread  
SOC: socket weld      ODS: solder

Spare parts



Replacement NRVA valve with flange gaskets, without flanges or bolts

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

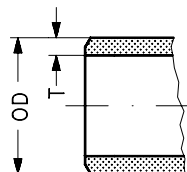
Type	Dimensions	Code no.
NRVA 15 / 20	M 12 x 115 mm Quantity: 2	006-1107
NRVA 25 / 32	M 12 x 148 mm Quantity: 4	006-1135
NRVA 40 / 50	M 12 x 167 mm Quantity: 4	006-1137
NRVA 65	M 16 x 200 mm Quantity: 8	006-1138

To be continued next page.

**Flange connections**

Danfoss flange sets are supplied without gaskets, bolts, and nuts.

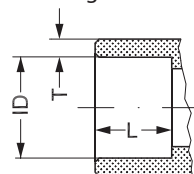
**Butt Weld**



*Butt welding ANSI B 36.10*

Size mm	Size in.	OD mm	T mm	OD in.	T in.	Flange type	For use with valve housing size	Code no.
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

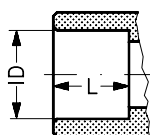
**Socket welding**



*Socket welding ANSI (B 16.11)*

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.
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

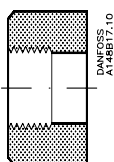
**Soldering**



*Soldering (ANSI B 16.22)*

Size mm	Size in.	ID mm	ID in.	L mm	L in.	Flange type	For use with valve housing size	Code no.
	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

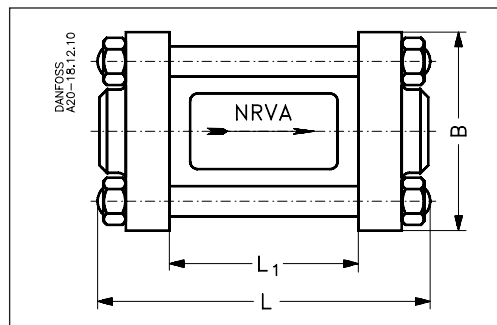
**Inside pipe thread**



*FPT inside pipe thread, NPT (ANSI/ASME B 1.20.1)*

Size mm	Size in.	Inside pipe thread	Flange type	For use with valve housing size	Code no.
10	3/8	(3/8 x 18 NPT)	1.3	NRVA 15/20	027G1005
15	1/2	(1/2 x 14 NPT)	1.3	NRVA 15/20	027G1006
20	3/4	(3/4 x 14 NPT)	4	NRVA 25/32	027G1007

**Dimensions and weights**

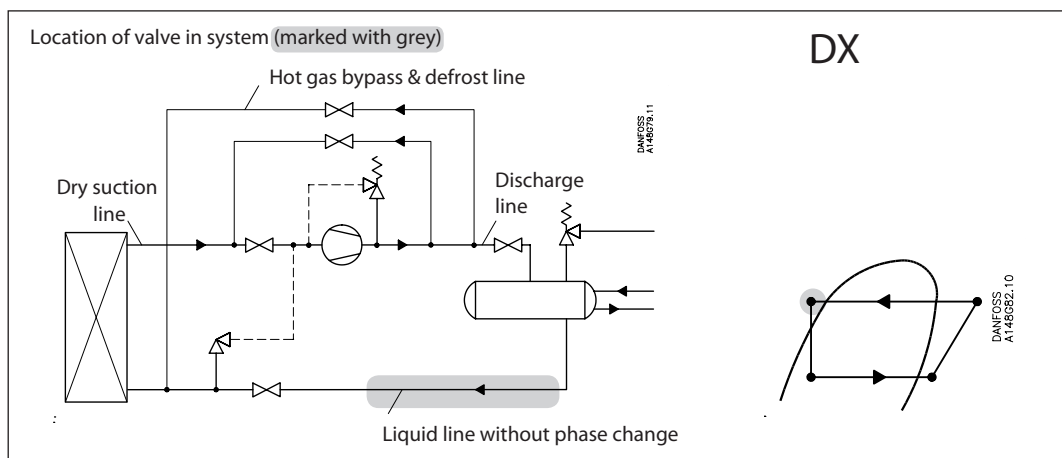
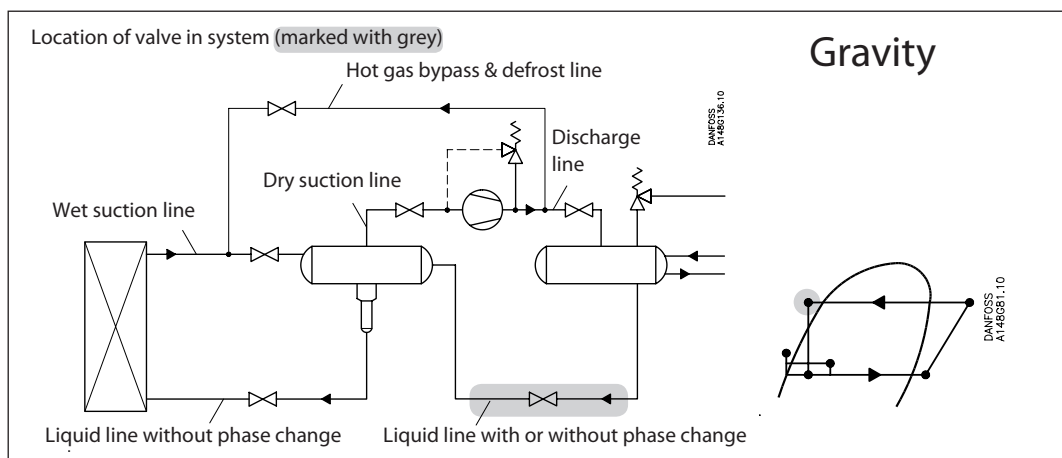
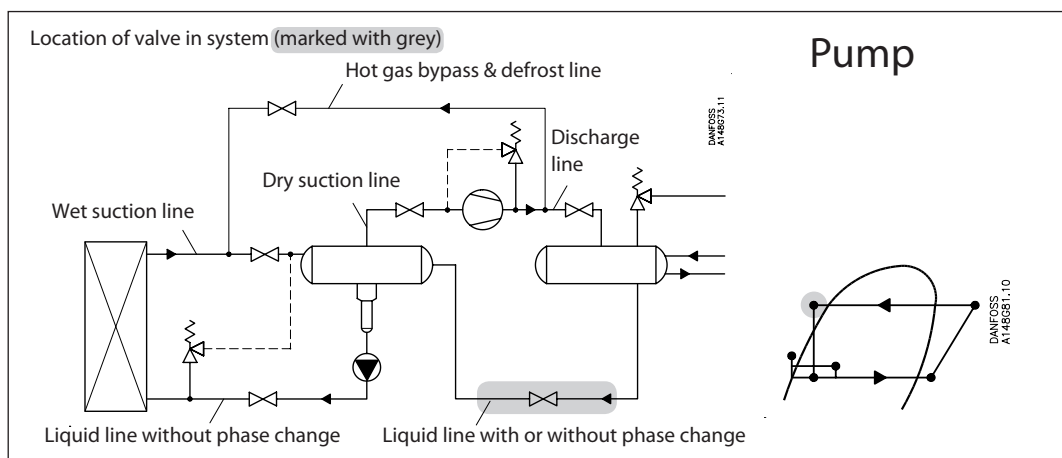


Type		L	L <sup>1)</sup>	B	Weight
NRVA 15 – 20	mm	115	50	80	1.4 kg
	in.	4.53	1.97	3.15	3.09 lb
NRVA 25 – 32	mm	138	74	Ø 83	3.0 kg
	in.	5.43	2.91	Ø 3.27	6.61 lb
NRVA 40 – 50	mm	172	94.5	Ø 103	5.0 kg
	in.	6.77	3.72	Ø 4.05	11.02 lb
NRVA 65	mm	226	124	Ø 185	13.0 kg
	in.	8.90	4.88	Ø 7.28	28.66 lb

<sup>1)</sup> Without flanges

Nominal capacities

Liquid line with or without phase change



## Nominal capacities

## Liquid line with or without phase change

Calculation example (R-134a capacities):

Running conditions in a plant are as follows:

$$T_e = -20 \text{ }^\circ\text{F}$$

$$Q_o = 130 \text{ TR}$$

$$T_{liq} = 50 \text{ }^\circ\text{F}$$

$$\text{Max. } \Delta P = 5 \text{ psi}$$

The capacity table is based on nominal conditions  
( $\Delta P = 3 \text{ psi}$ ,  $T_{liq} = 90 \text{ }^\circ\text{F}$ )

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

Correction factor for  $\Delta P$  5 psi,  $f_{\Delta P} = 0.79$

Correction factor for liquid temperature  $f_{T_{liq}} = 0.81$ .

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

From the capacity table a NRVA 25 with  $Q_n = 100 \text{ TR}$   
is the correct selection for the application.

Nominal capacities

Liquid line with or without phase change

R-717

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (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

R-22

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (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



Nominal capacities

Liquid line with or without phase change

R-134a

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.15
130 °F	1.35

R-404A

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	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  $\Delta P$  ( $f_{\Delta P}$ )

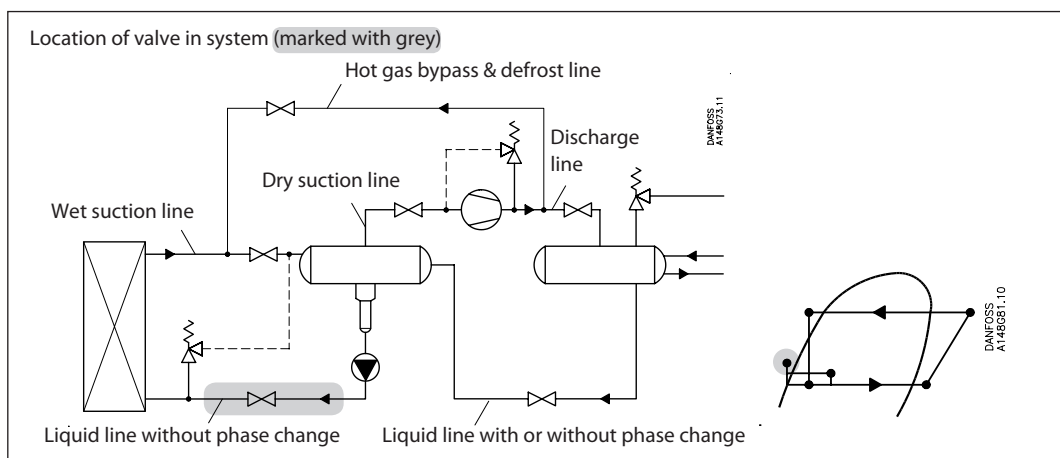
$\Delta P$ (psi)	Correction factor
3	1.00
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.29
130 °F	1.92

Nominal capacities

Pumped liquid line



Calculation example (R-134a capacities):

Running conditions in a plant are as follows:

$T_e = -20\text{ }^\circ\text{F}$   
 $Q_0 = 130\text{ TR}$   
 Circulation rate = 3  
 Max.  $\Delta P = 5\text{ psi}$

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

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

From the capacity table a NRVA 40 with  $Q_n = 101\text{ TR}$  is the correct selection for the application.

The capacity table is based on nominal conditions (pressure drop  $\Delta p = 3\text{ psi}$ , circulation rate = 4).

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

Nominal capacities

Pumped liquid line

R-717

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration], circulation rate = 4,  $\Delta P = 3$  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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate ( $f_{rc}$ )

Circulation rate	Correction factor
2	0.5
3	0.75
<b>4</b>	<b>1</b>
6	1.5
8	2
10	2.5

R-22

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration], circulation rate = 4,  $\Delta P = 3$  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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate ( $f_{rc}$ )

Circulation rate	Correction factor
2	0.5
3	0.75
<b>4</b>	<b>1</b>
6	1.5
8	2
10	2.5

Nominal capacities

Pumped liquid line

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration], circulation rate = 4,  $\Delta P = 3$  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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>4</b>	<b>1</b>
6	1.5
8	2
10	2.5

R-404A

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration], circulation rate = 4,  $\Delta P = 3$  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	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  $\Delta P$  ( $f_{\Delta P}$ )

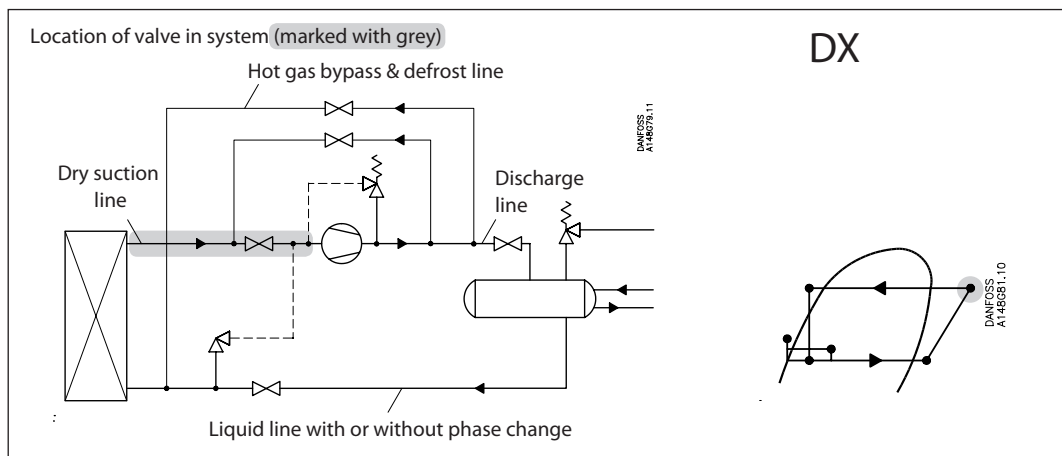
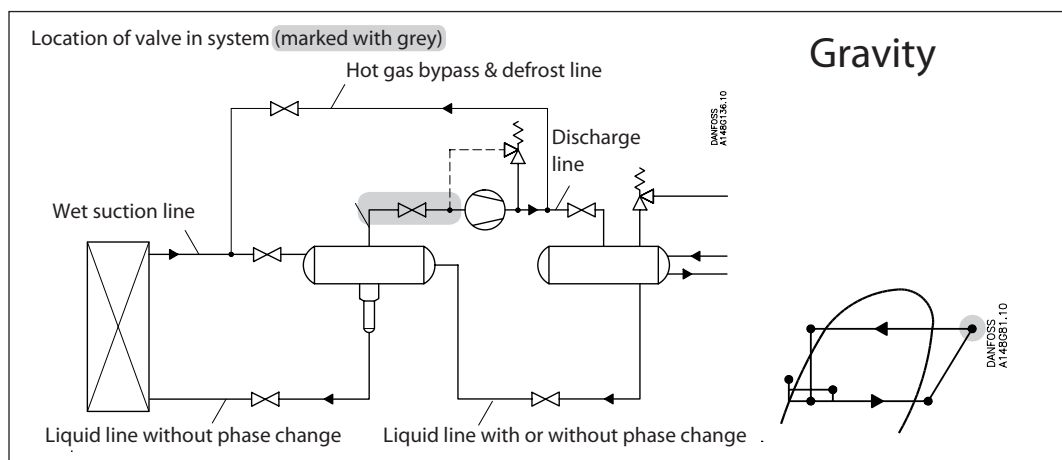
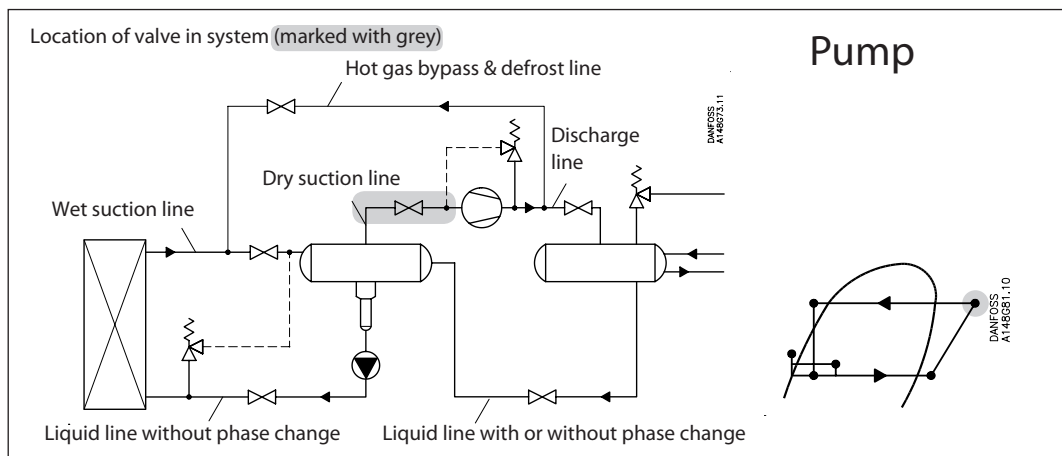
$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
4	0.87
5	0.79
6	0.72
7	0.66
8	0.62

Correction factor for circulation rate ( $f_{rec}$ )

Circulation rate	Correction factor
2	0.5
3	0.75
<b>4</b>	<b>1</b>
6	1.5
8	2
10	2.5

Nominal capacities

Dry suction line



## Nominal capacities

## Dry suction line

Calculation example (R-134a capacities):

Running conditions in a plant are as follows:

$$\begin{aligned}T_e &= 0\text{ }^\circ\text{F} \\Q_0 &= 23\text{ TR} \\T_{liq} &= 50\text{ }^\circ\text{F} \\T_s &= 10\text{ }^\circ\text{F} \\ \text{Max. } \Delta P &= 5\text{ psi}\end{aligned}$$

The capacity table is based on nominal conditions (pressure drop  $\Delta P = 3$  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  $\Delta P$  5 psi  $f_{\Delta P} = 0.79$

Correction factor for liquid temperature

$$f_{T_{liq}} = 0.81$$

Correction factor for superheat ( $T_s$ ) = 1,0

$$\begin{aligned}Q_n &= Q_0 \times f_{\Delta P} \times f_{T_{liq}} \times f_{T_s} = \\23 \times 0.79 \times 0.81 \times 1.0 &= 14.7\text{ TR}\end{aligned}$$

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.

Nominal capacities

Dry suction line

R 717

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.04
130 °F	1.09

R 22

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	1.4	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.09
130 °F	1.20

Nominal capacities

Dry suction line

R-134a

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.15
130 °F	1.35

R-404A

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],  
 $T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$

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	1.0	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  $\Delta P$  ( $f_{\Delta P}$ )

$\Delta P$ (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

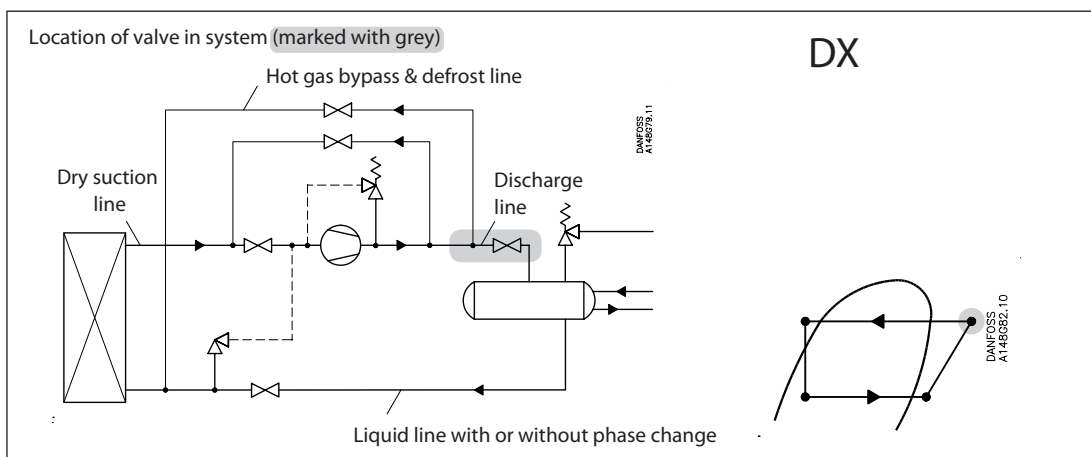
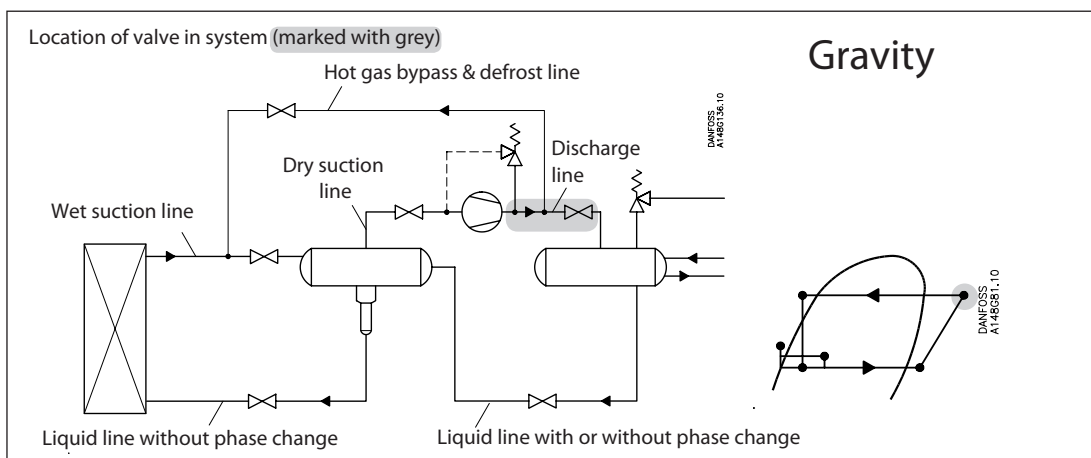
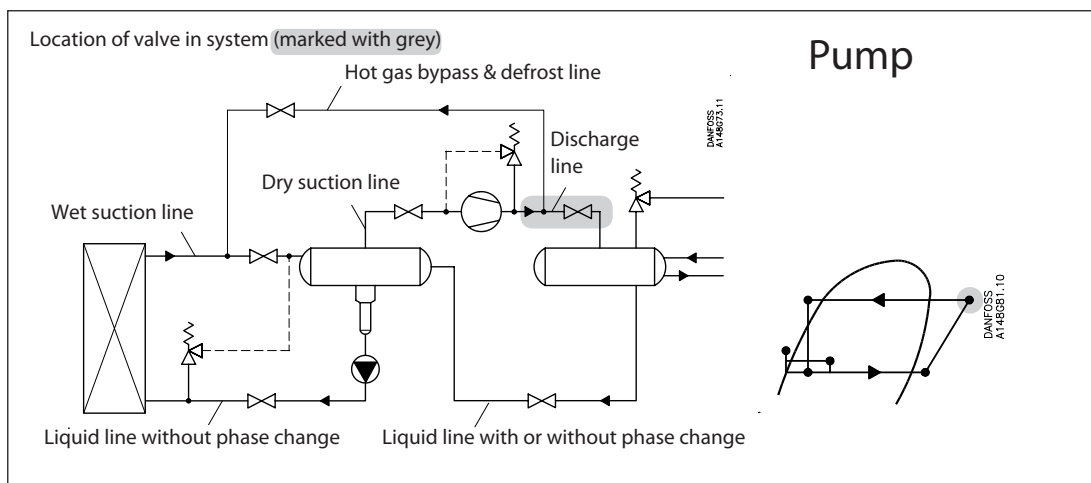
Correction factor for liquid temperature ( $T_{liq}$ )

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



Nominal capacities

Discharge line



Nominal capacities

Discharge line

Calculation example (R-717 capacities):

Running conditions in a plant are as follows:

$$\begin{aligned} T_e &= 0 \text{ }^\circ\text{F} \\ Q_o &= 18 \text{ TR} \\ T_{liq} &= 50 \text{ }^\circ\text{F} \\ \text{Max. } \Delta P &= 7 \text{ psi} \\ T_{disch} &= 120 \text{ }^\circ\text{F} \end{aligned}$$

The capacity table is based on nominal conditions ( $\Delta P = 3 \text{ psi}$ ,  $T_{liq} = 90 \text{ }^\circ\text{F}$ ,  $P_{disch} = 185 \text{ psi}$ ,  $T_{disch} = 180 \text{ }^\circ\text{F}$ ).

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

Correction factor for  $\Delta P 7 \text{ psi}$   $f_{\Delta P} = 0.67$ .

Correction factor for liquid temperature

$f_{T_{liq}} = 0.92$ .

Correction factor for  $T_{disch} 120 \text{ }^\circ\text{F}$ ,  $f_{T_{disch}} = 0.95$ .

Correction factor for  $P_{disch} 185 \text{ psi}$ ,  $f_{P_{disch}} = 1.0$ .

$$\begin{aligned} Q_n &= Q_o \times f_{\Delta P} \times f_{T_{liq}} \times f_{T_{disch}} \times f_{P_{disch}} \\ &= 18 \times 0.67 \times 0.92 \times 0.95 \times 1.0 = 10.5 \text{ TR} \end{aligned}$$

From the capacity table a NRVA 15 with  $Q_n = 16.4 \text{ TR}$  is the correct selection for the application.

Nominal capacities

Discharge line

R-717

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],

$T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$ ,  
 $P_{disch.} = 185\text{ psi}$ ,  
 $T_{disch.} = 180\text{ }^\circ\text{F}$

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
<b>185</b>	<b>1.00</b>
240	0.87
300	0.78

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

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>180 °F</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.04
130 °F	1.09

R-22

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],

$T_{liq} = 90\text{ }^\circ\text{F}$ ,  
 $\Delta P = 3\text{ psi}$ ,  
 $P_{disch.} = 185\text{ psi}$ ,  
 $T_{disch.} = 180\text{ }^\circ\text{F}$

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
<b>185</b>	<b>1.00</b>
240	0.87
300	0.78

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

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>180 °F</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.09
130 °F	1.20

Nominal capacities

Discharge line

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],

$T_{liq} = 90\text{ °F}$ ,  
 $\Delta P = 3\text{ psi}$ ,  
 $P_{disch.} = 185\text{ psi}$ ,  
 $T_{disch.} = 180\text{ °F}$

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
<b>120</b>	<b>1.00</b>
185	0.83
240	0.71
300	0.64

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

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>180 °F</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.15
130 °F	1.35

R-404A

Capacity table for nominal conditions,  $Q_N$  [Tons of Refrigeration],

$T_{liq} = 90\text{ °F}$ ,  
 $\Delta P = 3\text{ psi}$ ,  
 $P_{disch.} = 185\text{ psi}$ ,  
 $T_{disch.} = 180\text{ °F}$

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
<b>185</b>	<b>1</b>
240	0.87
300	0.78

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

$\Delta P$ (psi)	Correction factor
<b>3</b>	<b>1.00</b>
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
<b>180 °F</b>	<b>1.00</b>
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
<b>90 °F</b>	<b>1.00</b>
110 °F	1.29
130 °F	1.92

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