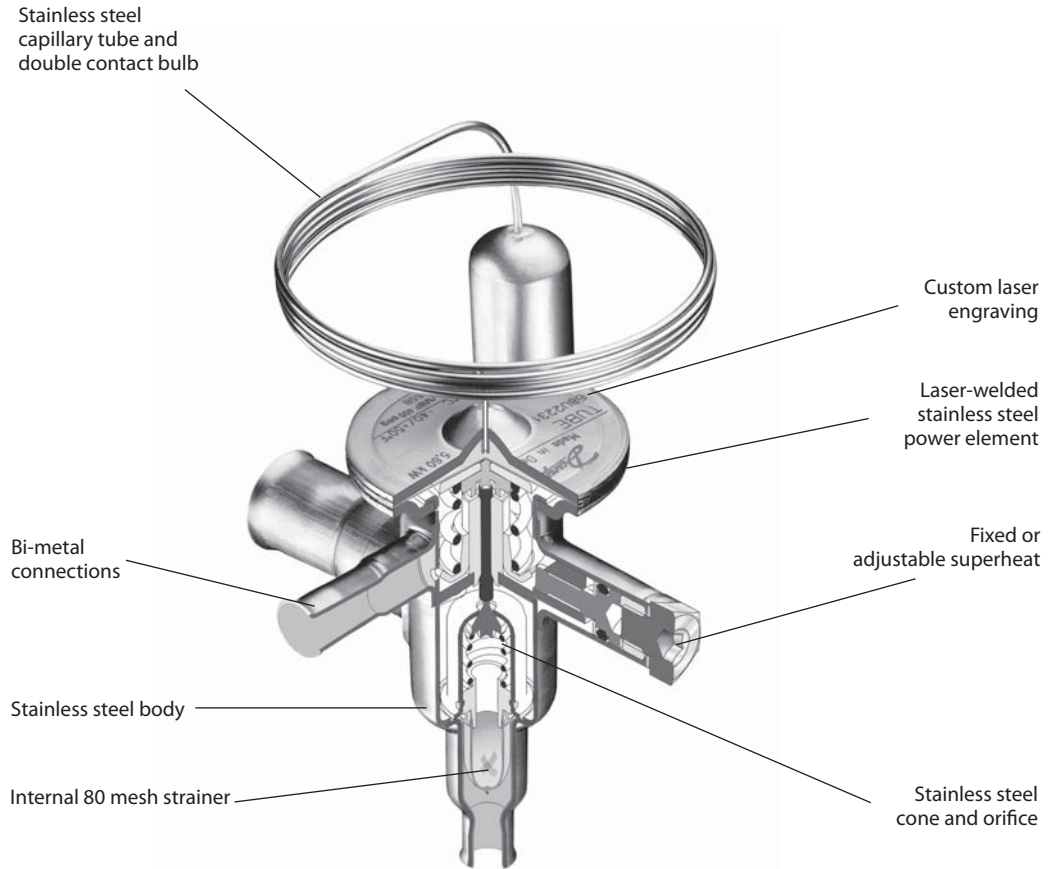


## Thermostatic expansion valves

TUB and TUC series



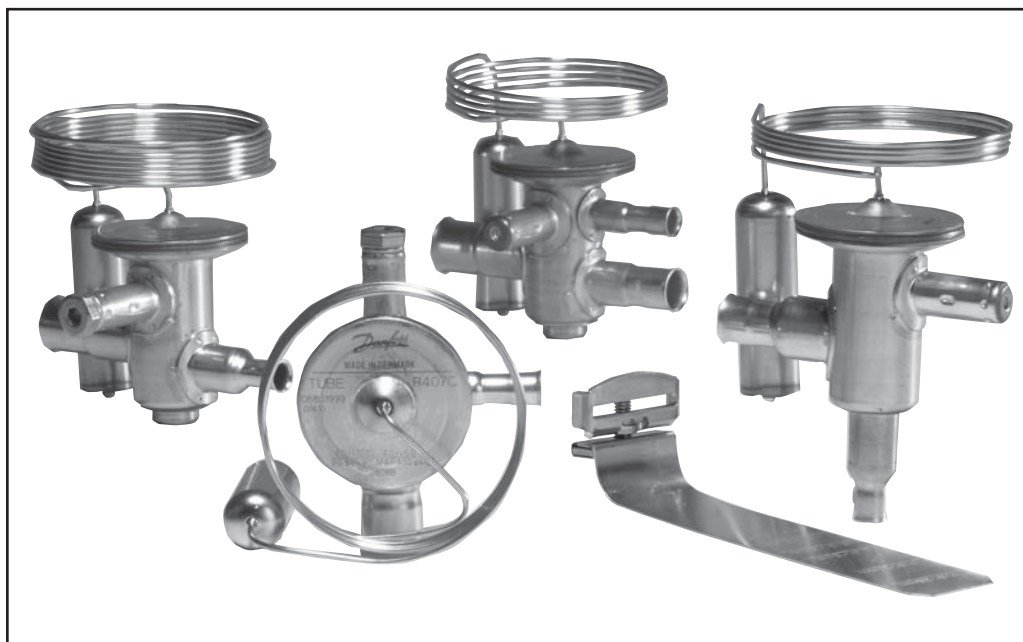
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### Metric conversions

1 psi = 0.07 bar  
 $\frac{5}{9} (t_1^{\circ}\text{F} - 32) = t_2^{\circ}\text{C}$   
 1 ton = 3.5 kW  
 1 in. = 25.4 mm  
 1 ft = 0.3 m  
 1 lb = 0.454 kg  
 1 oz = 28.35  
 US gal/min = 0.86 m<sup>3</sup>/h

## Introduction



The TU series of thermostatic expansion valves is specifically developed for soldering into hermetic refrigeration systems.

TU valves are offered in rated capacities up to 4.5 TR (R22) and can be used in a wide range of applications:

- Conventional refrigeration systems
- Heat pump systems
- Air conditioning systems
- Specialty refrigeration appliances
- Liquid chillers
- Ice Machines
- Transport refrigeration

The TU is made of stainless steel and therefore is well-suited to refrigeration systems for aggressive environments and for the food industry.

Danfoss also offers a wide range of options that makes possible countless valve combinations.

**Differentiating features**
*Stainless steel*

- High body strength
- High corrosion resistance
- Highly vibration-resistant, flexible capillary tube

*40% reserve capacity over nominal rating*

- Reduces pulldown time after defrost compared to conventional TXV's.

*Bi-metal connections*

- Fast and easy soldering without the need for a wet cloth.

*Precision Port design*

Four major features contributing to superior repeatable performance over an extended valve life:

- *Laser-welded power element* insures diaphragm's structural integrity and lengthens life.
- *Precision-machined push-rod and bushing* avoid the need for a packing gland.
- *Free-floating push-rod* is self-aligning and eliminates binding.
- *Precision-machined cone and orifice* accurately meter refrigerant under all operating conditions.

*Stainless steel capillary tube*

- Tolerates more bending for easier installation and longer life.
- Greater resistance to vibration during operation.

*Stainless steel bulb*

- Self-aligning for fast and easy installation; secures with a single strap or Quick Clip.
- More contact surface for better heat transfer.

*Built-in Strainer*

- **Angleway valve body:** Unique 80 mesh strainer design capable of retaining more than twice the amount of dirt compared to that of a conventional design without restricting flow.
- **Straightway valve body:** 100 mesh strainer

*Compact design*

- Small footprint and light weight for compact installation.

*Laser engraving*

- Durable positive valve identification; no labels to peel off over time.

*Patented superheat adjustment device:*

- Adjust with  $\frac{5}{32}$ " Allen wrench.

*Versions with optional self-cleaning bleed port available*
*Bi-flow operation*
*Optional Quick Clip bulb fastener*

- For fast and easy installation.

*Metric conversions*

1 psi = 0.07 bar

$\frac{5}{9}(t_1^{\circ}\text{F} - 32) = t_2^{\circ}\text{C}$

1 ton = 3.5 kW

1 in. = 25.4 mm

1 ft = 0.3 m

1 lb = 0.454 kg

1 oz = 28.35

US gal/min = 0.86 m<sup>3</sup>/h

**TU product family**

The TU family includes three valve types: TUA, TUB, and TUC. Standard configurations are as follows:

**TUA, TUAE<sup>1)</sup>**

- Internal (TUA) or external (TUAE) equalization
- Replaceable orifice and strainer
- Adjustable superheat
- Straightway body

**TUB, TUBE**

- Internal (TUB) or external (TUBE) equalization
- Fixed orifice and strainer
- Adjustable superheat
- Angleway body (straightway optional)

**TUC, TUCE**

- Internal (TUC) or external (TUCE) equalization
- Fixed orifice and strainer
- Fixed superheat
- Straightway or angleway body

1) For additional information, please see technical leaflet on TUA/TUAE.

**Thermostatic charge options**

Danfoss offers the following standard range thermostatic charge:  
*Range N:* -40 to +50°F

In addition to the standard range, TU is also available with the following range options:  
*Range N:* -40 to +50°F MOP~ +60°F  
*Range NM:* -40 to +25°F MOP~ +32°F  
*Range B<sup>1)</sup>* -75 to -15°F  
*Range B<sup>1)</sup>* -75 to -15°F MOP~ -4°F

1) TU valves for range B are not supplied for R134a.

**Valve options**

*Connection sizes*

Inlet × outlet:  
 1/4 in. × 3/8 in.  
 1/4 in. × 1/2 in.  
 3/8 in. × 3/8 in.  
 3/8 in. × 1/2 in.  
 1/2 in. × 5/8 in.

External equalization: 1/4 in.

15% bleed port (optional)

*Capillary tube length*

2.6 ft. (5 ft. optional)

*Static superheat settings*

3.5°F, 5.5°F, 7°F, 11°F  
 Standard = 9°F, charge N, (R507 = 11°F)

*Non-adjustable superheat (type TUC, TUCE)*

TUB, TUBE connections, inlet × outlet

Orifice no.	Angleway body			
	1/4 × 3/8	1/4 × 1/2	3/8 × 3/8	3/8 × 1/2
0 → 6				
7 → 9				

Standard       Optional

For information on all custom valve options including the TUC series, please contact Danfoss.

**Sizing**

For optimum performance, it is important to select a TU valve according to system conditions and application. Selecting an incorrect valve will result in operational difficulties or poor system performance.

The following procedure will help you select the correct valve for your needs.

Example:

Refrigerant = R22

Evaporator capacity:

$Q_e = 13,000 \text{ Btu (1.08 TR)}$

Evaporating temperature:

$t_e = +40^\circ\text{F}$  (equals  $p_e = 70 \text{ psig}$ )

Condensing temperature:

$t_c = +100^\circ\text{F}$  (equals  $p_c = 195 \text{ psig}$ )

Liquid refrigerant temperature:

$t_l = +80^\circ\text{F}$

**Step 1**

*Determine the pressure drop across the valve*

The pressure drop,  $\Delta p$ , is calculated by the formula:

$$\Delta p = p_c - p_e - pdw$$

where

$p_c$  = condensing pressure

$p_e$  = evaporating pressure, and

$pdw$  = the sum of other pressure drops in the liquid line, evaporator, and distributor.

The pressures  $p_c$  and  $p_e$  can be found by using the design condensing and evaporating temperatures at the saturated vapor point, then using a pressure temperature chart or a Danfoss refrigerant slide to convert the temperatures to pressures.

In this example, the pressure drop across the valve will be:

$$\Delta p = p_c - p_e = 195 - 70 = 125 \text{ psi.}$$

*Metric conversions*  
 1 psi = 0.07 bar  
 $5/9 (t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW  
 1 in. = 25.4 mm  
 1 ft = 0.3 m

**Sizing**

(continued)  
Step 2

Determine required valve capacity.  
Use the design evaporator capacity,  $Q_e$ , to select the required valve size at a given evaporating temperature. If necessary, correct the evaporator capacity for subcooling. Subcooled liquid refrigerant entering the evaporator increases evaporator capacity, so that a smaller valve may be required.

From the subcooling correction factor table, on page 10, we find the appropriate correction factor  $F_{sc}$  equals 0.94 for  $\Delta t_{sub} = 20^\circ F$ . Now, determine the required valve capacity by multiplying the evaporator capacity by the correction factor for subcooling.

Required valve capacity  
 $Q_e \times F_{sc} = 1.08 \times 0.94 = 1.02 \text{ TR}$

In this example, the subcooling is:  
 $\Delta t_{sub} = t_c - t_l = 100 - 80 = 20^\circ F$

Step 3

Use the calculated valve capacity to select the corresponding orifice size from the capacity table for R22 as indicated below.

Note that the expansion valve capacity must be equal to or slightly more than the corrected evaporator capacity.  
In this sizing example, orifice 5 will be suitable.

**Capacities (TR)**

Range N:  $-40 \rightarrow +50^\circ F$ .  $\Delta t_{sub} = 10^\circ F$ , OS =  $7^\circ F$

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225
<b>Evaporating temperature <math>+40^\circ F</math></b>									
	0	0.14	0.16	<b>0.18</b>	0.19	0.20	0.20	0.20	0.20
	1	0.21	0.24	<b>0.26</b>	0.27	0.28	0.29	0.29	0.30
	2	0.28	0.33	<b>0.36</b>	0.38	0.40	0.41	0.42	0.43
	3	0.39	0.45	<b>0.50</b>	0.53	0.56	0.57	0.58	0.59
	4	0.59	0.68	<b>0.75</b>	0.80	0.83	0.86	0.88	0.88
	5	0.78	0.91	<b>0.99</b>	1.05	1.11	1.15	1.17	1.19
	6	1.18	1.37	<b>1.50</b>	1.60	1.67	1.73	1.77	1.80
	7	1.57	1.82	<b>2.00</b>	2.13	2.23	2.30	2.35	2.40

The extended capacity tables can be found on pages 8 to 17.

Step 4

Select a thermostatic charge  
Danfoss offers a universal wide range thermostatic charge, *Range N*, suited for most applications in the normal temperature range.

The table on page 7 include standard range N valves only.  
Ranges NM and B are available for special low temperature applications.

Step 5

Determine if external equalization is required.  
**Note!** External equalization is always required if a distributor is used or if there is an appreciable difference in pressure across the evaporator.

Finally, determine connection sizes, then find the valve's code number from the table on page 7.

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ F - 32) = t_2^\circ C$   
 1 ton = 3.5 kW

**Technical data**

*Maximum bulb temperature*  
212°F

*Capillary tube length*  
2.6 or 5 ft.

*Maximum valve body temperature*  
250°F  
Short-lived peak 300°F

*Standard static superheat setting,*  
*Range N (R22, R134a, R404A, R407C, R410A) = 9°F*  
*Range N (R507) = 11°F*

*Maximum working pressure (excl. R410A)*  
MWP = 500 psig

*Standard refrigerants*  
R22, R134a, R404A, R407C, R410A and R507.

*Maximum test pressure (excl. R410A)*  
p' = 540 psig

TU valves are continually evaluated for use with newer refrigerants. For more information, please contact Danfoss.

*Maximum working pressure, R410A*  
MWP = 615 psig

*Maximum test pressure, R410A*  
p' = 680 psig

*MOP points*

Refrigerant	Range N -40 to +50°F	Range NM -40 to +25°F	Range B -75 to -15°F
	MOP point for evaporating temperature $t_e$ and evaporating pressure $p_e$		
	$t_e = 60^\circ\text{F}$	$t_e = 32^\circ\text{F}$	$t_e = -4^\circ\text{F}$
R22	$p_e = 100$ psig	$p_e = 60$ psig	$p_e = 20$ psig
R134a	$p_e = 55$ psig	$p_e = 30$ psig	
R404A / R507	$p_e = 120$ psig	$p_e = 75$ psig	$p_e = 30$ psig
R407C	$p_e = 95$ psig	$p_e = 50$ psig	$p_e = 15$ psig
R410A	$p_e = 165$ psig	$p_e = 100$ psig	$p_e = 45$ psig

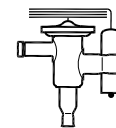
*MOP valves*

To avoid risk of charge migration when using MOP valves, the bulb temperature must always be lower than the thermostatic element temperature.

For code nos. on valves having NM and B range charges and other MOP valves not listed in this leaflet, please contact Danfoss.

*Metric conversions*  
1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
1 ton = 3.5 kW  
1 in. = 25.4 mm  
1 ft = 0.3 m

**TUB series  
Ordering**



Angleway valve body with 2.6 ft. cap. tube and bulb strap<sup>1)</sup>  
Range N: -40 to +50°F (without MOP)

Valve type	Connection Solder ODF inlet x outlet in.	Press. equal.	Orifice no. <sup>3)</sup>	R22		R134a		R404A/R507		R407C		R410A		
				Range N -40 to +50°F		Range N -40 to +50°F		Range N -40 to +50°F		Range N -40 to +50°F		Range N -40 to +50°F		
				Rated capacity TR <sub>2</sub> <sup>2)</sup>	Code no.	Rated capacity TR <sub>2</sub> <sup>2)</sup>	Code no.	Rated capacity TR <sub>2</sub> <sup>2)</sup>	Code no.	Rated capacity TR <sub>2</sub> <sup>2)</sup>	Code no.	Rated capacity TR <sub>2</sub> <sup>2)</sup>	Code no.	
TUB	1/4 x 1/2	Int.	0			0.13	068U2660							
			1	0.25	068U2057	0.19	068U2027	0.19	068U2094			0.40	068U1958	
			2	0.36	068U2058	0.28	068U2028	0.28	068U2095			0.60	068U1959	
			3	0.50	068U2059	0.39	068U2029	0.39	068U2096			0.80	068U1960	
			4	0.75	068U2060	0.59	068U2030	0.60	068U2097			1.30	068U1961	
			5	1.00	068U2061	0.78	068U2031	0.79	068U2098			1.70	068U1962	
	3/8 x 1/2		6	1.50	068U2062	1.20	068U2032	1.20	068U2099			2.50	068U1963	
			1	0.25	068U2157									
			2	0.36	068U2179									
			3	0.50	068U2180									
			4	0.75	068U2183									
			5	1.00	068U2181									
			6	1.50	068U2182									
			7	2.00	068U2063									
TUBE	1/4 x 1/2	Ext. 1/4 in. solder ODF	1					0.19	068U2103					
			2					0.28	068U2104					
			3			0.39	068U2020	0.39	068U2105					
			4	0.75	068U2070	0.59	068U2021	0.60	068U2106					
			5	1.00	068U2071	0.78	068U2022	0.79	068U2107	1.10	068U1935			
			6	1.50	068U2072	1.20	068U2023	1.20	068U2108	1.60	068U1936			
	3/8 x 1/2		1	0.25	068U2159									
			2	0.36	068U2160									
			3	0.50	068U2161									
			4	0.75	068U2162									
			5	1.00	068U2163									
			6	1.50	068U2164									
			7	2.00	068U2073	1.60	068U2024	1.60	068U2109	2.10	068U1937	3.40	068U1973	
			8	3.00	068U2074	2.30	068U2025	2.40	068U2110	3.20	068U1938	5.00	068U1974	
9	4.50	068U2075	3.50	068U2026	3.50	068U2111	4.80	068U1939	7.50	068U1975				

<sup>1)</sup> The TUB series is also available with 5 ft. cap. tube. Please contact Danfoss for further information.  
<sup>2)</sup> According to ARI 750  
 Rated capacities for range N are based on:  
 Liquid temperature ahead of expansion valve t<sub>l</sub> = 100°F  
 Evaporating temperature t<sub>e</sub> = 40°F  
 Pressure drop across valve Δp = 60 psi for R134a  
 Pressure drop across valve Δp = 100 psi for R22, R404A, R407C and R507  
 Pressure drop across valve Δp = 160 psi for R410A  
<sup>3)</sup> All TUB and TUBE valves with orifice 0 and 9 cannot be used for bi-flow operation.

Metric conversions  
 1 psi = 0.07 bar  
 5/9 (t<sub>1</sub> °F - 32) = t<sub>2</sub> °C  
 1 ton = 3.5 kW  
 1 in. = 25.4 mm



Capacities (TR)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R22**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Evaporating temperature +50°F

TU	0	0.15	0.17	0.18	0.19	0.20	0.20	0.21	0.21
	1	0.22	0.25	0.27	0.29	0.30	0.30	0.31	0.31
	2	0.31	0.36	0.40	0.43	0.44	0.46	0.47	0.48
	3	0.43	0.50	0.55	0.59	0.61	0.63	0.65	0.66
	4	0.65	0.76	0.83	0.89	0.93	0.96	0.98	1.00
	5	0.87	1.01	1.11	1.18	1.23	1.27	1.30	1.32
	6	1.30	1.51	1.67	1.78	1.86	1.93	1.96	2.00
	7	1.73	2.01	2.22	2.36	2.48	2.56	2.61	2.66
	8	2.58	3.00	3.31	3.53	3.69	3.81	3.90	3.97
	9	3.87	4.52	4.97	5.29	5.53	5.71	5.84	5.93

Evaporating temperature 0°F

TU	0	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.16
	1	0.14	0.16	0.18	0.19	0.20	0.20	0.21	0.21
	2	0.17	0.20	0.22	0.23	0.24	0.26	0.25	0.26
	3	0.24	0.28	0.30	0.32	0.34	0.35	0.35	0.36
	4	0.36	0.41	0.45	0.48	0.50	0.51	0.52	0.53
	5	0.48	0.55	0.60	0.64	0.66	0.68	0.70	0.70
	6	0.72	0.83	0.90	0.95	0.99	1.02	1.04	1.05
	7	0.96	1.10	1.20	1.28	1.33	1.37	1.39	1.41
	8	1.45	1.67	1.81	1.92	2.00	2.06	2.10	2.12
	9	2.14	2.46	2.68	2.83	2.95	3.03	3.09	3.12

Evaporating temperature +40°F

TU	0	0.14	0.16	<b>0.18</b>	0.19	0.20	0.20	0.20	0.20
	1	0.21	0.24	<b>0.26</b>	0.27	0.28	0.29	0.29	0.30
	2	0.28	0.33	<b>0.36</b>	0.38	0.40	0.41	0.42	0.43
	3	0.39	0.45	<b>0.50</b>	0.53	0.56	0.57	0.58	0.59
	4	0.59	0.68	<b>0.75</b>	0.80	0.83	0.86	0.88	0.88
	5	0.78	0.91	<b>0.99</b>	1.06	1.11	1.15	1.17	1.19
	6	1.18	1.37	<b>1.50</b>	1.60	1.67	1.73	1.77	1.80
	7	1.57	1.82	<b>2.00</b>	2.13	2.23	2.30	2.35	2.40
	8	2.34	2.72	<b>2.99</b>	3.19	3.33	3.44	3.51	3.57
	9	3.52	4.06	<b>4.46</b>	4.76	4.97	5.13	5.25	5.37

Evaporating temperature -20°F

TU	0	0.10	0.11	0.12	0.12	0.13	0.13	0.13	0.13
	1	0.11	0.13	0.14	0.14	0.15	0.15	0.16	0.16
	2	0.13	0.15	0.16	0.17	0.18	0.18	0.18	0.19
	3	0.18	0.21	0.23	0.24	0.25	0.25	0.26	0.26
	4	0.27	0.31	0.33	0.35	0.36	0.37	0.38	0.38
	5	0.36	0.41	0.44	0.47	0.49	0.50	0.51	0.51
	6	0.53	0.61	0.66	0.70	0.72	0.74	0.76	0.76
	7	0.71	0.81	0.88	0.93	0.97	1.00	1.01	1.02
	8	1.08	1.23	1.34	1.41	1.46	1.50	1.53	1.55
	9	1.58	1.80	1.96	2.07	2.14	2.20	2.25	2.26

Evaporating temperature +20°F

TU	0	0.13	0.15	0.16	0.17	0.17	0.18	0.18	0.18
	1	0.18	0.20	0.22	0.23	0.24	0.25	0.25	0.26
	2	0.23	0.26	0.28	0.30	0.32	0.33	0.33	0.34
	3	0.31	0.36	0.40	0.42	0.44	0.45	0.46	0.47
	4	0.47	0.54	0.59	0.63	0.66	0.67	0.69	0.70
	5	0.62	0.72	0.79	0.84	0.87	0.90	0.92	0.93
	6	0.93	1.08	1.18	1.26	1.31	1.35	1.38	1.40
	7	1.25	1.44	1.58	1.68	1.75	1.80	1.84	1.87
	8	1.88	2.17	2.37	2.52	2.63	2.71	2.77	2.80
	9	2.97	3.22	3.51	3.74	3.90	4.02	4.10	4.16

Evaporating temperature -40°F

TU	0	0.07	0.08	0.09	0.10	0.10	0.10	0.10	0.10
	1	0.08	0.09	0.10	0.10	0.11	0.11	0.11	0.11
	2	0.09	0.11	0.11	0.12	0.12	0.13	0.13	0.13
	3	0.13	0.15	0.16	0.17	0.17	0.18	0.18	0.18
	4	0.19	0.22	0.23	0.25	0.26	0.26	0.27	0.27
	5	0.26	0.29	0.31	0.33	0.34	0.35	0.36	0.36
	6	0.38	0.43	0.47	0.49	0.51	0.52	0.53	0.53
	7	0.51	0.58	0.63	0.66	0.68	0.70	0.71	0.72
	8	0.77	0.88	0.95	1.00	1.04	1.06	1.07	1.08
	9	1.12	1.28	1.38	1.45	1.50	1.54	1.56	1.58

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R22	1.08	1.00	0.94	0.89	0.85	0.81	0.78	0.74	0.71	0.68

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

**Capacities (TR)**

(continued)

Range B: -75 to -10°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R22**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature - 15°F**

TU	0	0.12	0.14	0.15	0.16	0.16	<b>0.16</b>	0.17	0.17
	1	0.16	0.18	0.20	0.21	0.22	<b>0.22</b>	0.23	0.23
	2	0.20	0.23	0.25	0.27	0.27	<b>0.28</b>	0.29	0.29
	3	0.28	0.32	0.35	0.37	0.38	<b>0.39</b>	0.40	0.40
	4	0.42	0.48	0.52	0.54	0.57	<b>0.58</b>	0.59	0.60
	5	0.56	0.64	0.69	0.73	0.76	<b>0.77</b>	0.79	0.80
	6	0.83	0.95	1.03	1.09	1.13	<b>1.16</b>	1.19	1.20
	7	1.11	1.27	1.38	1.46	1.52	<b>1.56</b>	1.58	1.60
	8	1.68	1.91	2.08	2.19	2.28	<b>2.34</b>	2.38	2.40
	9	2.48	2.83	3.07	3.24	3.40	<b>3.45</b>	3.51	3.55

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature -60°F**

TU	0	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.09
	1	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.10
	2	0.08	0.09	0.10	0.10	0.11	0.11	0.11	0.11
	3	0.11	0.13	0.14	0.14	0.15	0.15	0.15	0.16
	4	0.16	0.19	0.20	0.21	0.22	0.22	0.22	0.23
	5	0.22	0.25	0.27	0.28	0.29	0.30	0.30	0.30
	6	0.33	0.37	0.40	0.42	0.43	0.44	0.45	0.45
	7	0.44	0.50	0.53	0.56	0.58	0.59	0.60	0.61
	8	0.66	0.75	0.81	0.85	0.88	0.90	0.91	0.92
	9	0.97	1.09	1.17	1.23	1.27	1.30	1.32	1.33

**Evaporating temperature -30°F**

TU	0	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.14
	1	0.13	0.14	0.16	0.16	0.17	0.17	0.18	0.18
	2	0.15	0.17	0.19	0.20	0.20	0.21	0.21	0.21
	3	0.21	0.24	0.26	0.28	0.29	0.29	0.30	0.30
	4	0.31	0.36	0.38	0.40	0.42	0.43	0.44	0.44
	5	0.42	0.48	0.51	0.54	0.56	0.58	0.59	0.59
	6	0.62	0.71	0.77	0.81	0.84	0.86	0.87	0.88
	7	0.83	0.95	1.03	1.08	1.12	1.15	1.17	1.18
	8	1.26	1.43	1.55	1.63	1.69	1.74	1.76	1.78
	9	1.85	2.10	2.27	2.40	2.48	2.54	2.58	2.61

**Evaporating temperature -75°F**

TU	0	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06
	1	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.07
	2	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08
	3	0.08	0.09	0.10	0.10	0.10	0.11	0.11	0.11
	4	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.16
	5	0.16	0.18	0.19	0.20	0.20	0.21	0.21	0.21
	6	0.23	0.26	0.28	0.29	0.30	0.31	0.31	0.32
	7	0.31	0.35	0.38	0.39	0.41	0.42	0.42	0.42
	8	0.47	0.53	0.57	0.60	0.62	0.63	0.64	0.64
	9	0.68	0.77	0.83	0.86	0.89	0.91	0.92	0.93

**Evaporating temperature -45°F**

TU	0	0.09	0.10	0.11	0.11	0.11	0.12	0.12	0.12
	1	0.09	0.11	0.12	0.12	0.13	0.13	0.13	0.13
	2	0.11	0.13	0.14	0.14	0.15	0.15	0.15	0.16
	3	0.16	0.18	0.19	0.20	0.21	0.21	0.22	0.22
	4	0.23	0.26	0.28	0.29	0.30	0.31	0.32	0.32
	5	0.31	0.35	0.37	0.39	0.41	0.42	0.42	0.43
	6	0.46	0.52	0.56	0.59	0.61	0.62	0.63	0.64
	7	0.61	0.69	0.75	0.79	0.81	0.83	0.85	0.85
	8	0.92	1.05	1.13	1.19	1.23	1.26	1.28	1.29
	9	1.35	1.53	1.65	1.73	1.79	1.84	1.86	1.88

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R22	1.08	1.00	0.94	0.89	0.85	0.81	0.78	0.74	0.71	0.68

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

**Capacities (TR)**

(continued)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R134a**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		40	60	80	100	120	140	160	180

**Evaporating temperature +50°F**

TU	0	0.12	0.14	0.14	0.15	0.15	0.16		
	1	0.18	0.21	0.22	0.23	0.23	0.24		
	2	0.26	0.30	0.33	0.34	0.36	0.36		
	3	0.36	0.42	0.45	0.47	0.49	0.50		
	4	0.55	0.63	0.68	0.72	0.74	0.76		
	5	0.73	0.84	0.91	0.96	0.99	1.01		
	6	1.10	1.26	1.38	1.45	1.50	1.53		
	7	1.46	1.68	1.83	1.93	1.99	2.04		
	8	2.18	2.50	2.72	2.86	2.97	3.03		
	9	3.28	3.75	4.10	4.28	4.41	4.52		

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		40	60	80	100	120	140	160	180

**Evaporating temperature 0°F**

TU	0	0.09	0.10	0.10	0.11	0.11	0.11		
	1	0.10	0.12	0.13	0.13	0.14	0.14		
	2	0.13	0.14	0.15	0.16	0.16	0.17		
	3	0.18	0.20	0.21	0.22	0.23	0.23		
	4	0.26	0.29	0.31	0.33	0.34	0.34		
	5	0.35	0.39	0.42	0.44	0.45	0.46		
	6	0.52	0.59	0.63	0.66	0.67	0.68		
	7	0.70	0.78	0.84	0.88	0.90	0.91		
	8	1.05	1.18	1.27	1.32	1.36	1.37		
	9	1.54	1.74	1.86	1.94	1.99	2.02		

**Evaporating temperature +40°F**

TU	0	0.12	<b>0.13</b>	0.14	0.14	0.15	0.15		
	1	0.17	<b>0.19</b>	0.21	0.21	0.22	0.22		
	2	0.23	<b>0.27</b>	0.29	0.30	0.31	0.32		
	3	0.32	<b>0.37</b>	0.40	0.42	0.43	0.44		
	4	0.49	<b>0.56</b>	0.60	0.63	0.65	0.66		
	5	0.73	<b>0.74</b>	0.80	0.84	0.87	0.89		
	6	0.98	<b>1.12</b>	1.21	1.27	1.31	1.34		
	7	1.30	<b>1.49</b>	1.61	1.68	1.75	1.78		
	8	1.94	<b>2.23</b>	2.40	2.53	2.61	2.66		
	9	2.90	<b>3.32</b>	3.59	3.76	3.88	3.96		

**Evaporating temperature - 20°F**

TU	0	0.07	0.08	0.08	0.08	0.08	0.09		
	1	0.07	0.08	0.09	0.09	0.09	0.09		
	2	0.09	0.10	0.10	0.11	0.11	0.11		
	3	0.12	0.14	0.14	0.15	0.15	0.15		
	4	0.18	0.20	0.21	0.22	0.22	0.23		
	5	0.24	0.26	0.28	0.29	0.30	0.30		
	6	0.35	0.39	0.42	0.44	0.45	0.45		
	7	0.47	0.53	0.56	0.59	0.60	0.60		
	8	0.71	0.80	0.85	0.88	0.90	0.91		
	9	1.04	1.17	1.24	1.28	1.32	1.33		

**Evaporating temperature +20°F**

TU	0	0.10	0.12	0.12	0.13	0.13	0.13		
	1	0.14	0.16	0.17	0.18	0.18	0.18		
	2	0.18	0.20	0.22	0.23	0.23	0.24		
	3	0.25	0.28	0.30	0.31	0.32	0.33		
	4	0.37	0.42	0.45	0.47	0.48	0.49		
	5	0.49	0.55	0.60	0.62	0.64	0.65		
	6	0.73	0.83	0.89	0.94	0.96	0.98		
	7	0.98	1.11	1.19	1.25	1.29	1.31		
	8	1.47	1.67	1.80	1.88	1.93	1.97		
	9	2.18	2.47	2.65	2.78	2.68	2.94		

**Evaporating temperature - 40°F**

TU	0	0.05	0.05	0.05	0.06	0.06	0.06		
	1	0.05	0.05	0.06	0.06	0.06	0.06		
	2	0.06	0.06	0.07	0.07	0.07	0.07		
	3	0.08	0.09	0.09	0.10	0.10	0.10		
	4	0.11	0.13	0.14	0.14	0.14	0.14		
	5	0.15	0.17	0.18	0.19	0.19	0.19		
	6	0.23	0.25	0.27	0.28	0.28	0.29		
	7	0.31	0.34	0.36	0.37	0.38	0.38		
	8	0.46	0.52	0.55	0.57	0.58	0.58		
	9	0.67	0.75	0.79	0.82	0.84	0.84		

**Correction factor for subcooling  $\Delta t_{sub}$**

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R134a	1.10	1.00	0.93	0.88	0.82	0.78	0.74	0.70	0.67	0.64

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

Capacities (TR)

(continued)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R404A**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		75	100	125	150	175	200	225	250

**Evaporating temperature +50°F**

TU	0	0.12	0.13	0.14	0.14	0.14	0.13	0.13	0.13
	1	0.19	0.20	0.21	0.21	0.21	0.20	0.20	0.19
	2	0.28	0.30	0.31	0.32	0.32	0.32	0.31	0.30
	3	0.38	0.41	0.43	0.44	0.44	0.44	0.43	0.42
	4	0.59	0.63	0.65	0.67	0.67	0.67	0.65	0.64
	5	0.78	0.83	0.87	0.89	0.89	0.88	0.88	0.85
	6	1.17	1.26	1.31	1.34	1.35	1.34	1.32	1.28
	7	1.56	1.68	1.74	1.78	1.78	1.78	1.75	1.70
	8	2.32	2.49	2.60	2.65	3.66	2.64	2.60	2.53
	9	3.49	3.74	3.90	4.00	3.99	3.95	3.89	3.79

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		75	100	125	150	175	200	225	250

**Evaporating temperature 0°F**

TU	0	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.10
	1	0.13	0.14	0.14	0.15	0.15	0.15	0.14	0.14
	2	0.16	0.17	0.18	0.18	0.18	0.18	0.18	0.17
	3	0.23	0.24	0.25	0.25	0.25	0.25	0.25	0.24
	4	0.34	0.36	0.37	0.37	0.37	0.37	0.36	0.35
	5	0.45	0.48	0.49	0.50	0.50	0.49	0.48	0.47
	6	0.67	0.72	0.74	0.75	0.75	0.74	0.73	0.71
	7	0.90	0.96	0.99	1.00	1.00	0.99	0.97	0.94
	8	1.36	1.44	1.49	1.51	1.51	1.48	1.46	1.42
	9	2.00	2.13	2.20	2.23	2.22	2.20	2.15	2.09

**Evaporating temperature +40°F**

TU	0	0.12	<b>0.13</b>	0.13	0.13	0.13	0.13	0.13	0.13
	1	0.18	<b>0.19</b>	0.20	0.20	0.20	0.20	0.19	0.19
	2	0.26	<b>0.28</b>	0.29	0.29	0.29	0.29	0.29	0.28
	3	0.35	<b>0.38</b>	0.40	0.40	0.40	0.40	0.39	0.39
	4	0.54	<b>0.58</b>	0.60	0.61	0.61	0.61	0.60	0.58
	5	0.71	<b>0.76</b>	0.79	0.81	0.81	0.81	0.79	0.77
	6	1.07	<b>1.15</b>	1.20	1.22	1.23	1.22	1.20	1.17
	7	1.43	<b>1.53</b>	1.59	1.63	1.63	1.61	1.60	1.56
	8	2.13	<b>2.29</b>	2.38	2.43	2.44	2.42	2.37	2.31
	9	3.20	<b>3.41</b>	3.56	3.62	3.64	3.61	3.55	3.46

**Evaporating temperature -20°F**

TU	0	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	1	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.10
	2	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.12
	3	0.17	0.18	0.19	0.19	0.19	0.18	0.18	0.17
	4	0.25	0.27	0.27	0.28	0.27	0.27	0.26	0.26
	5	0.34	0.36	0.36	0.37	0.37	0.36	0.35	0.34
	6	0.50	0.53	0.54	0.55	0.55	0.54	0.53	0.51
	7	0.67	0.71	0.73	0.74	0.73	0.72	0.71	0.68
	8	1.01	1.07	1.10	1.11	1.10	1.09	1.06	1.03
	9	1.49	1.57	1.61	1.63	1.62	1.59	1.56	1.51

**Evaporating temperature +20°F**

TU	0	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12
	1	0.16	0.17	0.18	0.18	0.18	0.17	0.17	0.17
	2	0.21	0.22	0.23	0.24	0.23	0.23	0.23	0.22
	3	0.29	0.31	0.32	0.33	0.33	0.32	0.32	0.31
	4	0.44	0.46	0.48	0.49	0.49	0.49	0.48	0.46
	5	0.58	0.62	0.64	0.65	0.65	0.65	0.64	0.62
	6	0.87	0.93	0.96	0.98	0.98	0.97	0.96	0.93
	7	1.16	1.24	1.29	1.31	1.31	1.30	1.28	1.24
	8	1.74	1.86	1.93	1.97	1.96	1.94	1.91	1.86
	9	2.59	2.77	2.87	2.91	2.91	2.89	2.83	2.76

**Evaporating temperature -40°F**

TU	0	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	1	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.07
	2	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
	3	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.12
	4	0.18	0.19	0.19	0.19	0.19	0.19	0.18	0.18
	5	0.24	0.25	0.26	0.26	0.26	0.25	0.26	0.24
	6	0.36	0.37	0.38	0.39	0.38	0.38	0.36	0.35
	7	0.48	0.50	0.51	0.52	0.51	0.50	0.49	0.47
	8	0.72	0.76	0.78	0.78	0.77	0.76	0.74	0.71
	9	1.06	1.11	1.14	1.14	1.13	1.11	1.08	1.04

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R404A	1.18	1.00	0.89	0.81	0.74	0.68	0.63	0.60	0.56	0.53

Metric conversions

1 psi = 0.07 bar

$\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$

1 ton = 3.5 kW

**Capacities (TR)**

(continued)

Range B: -75 to -15°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R404A**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature -15°F**

TU	0	0.10	0.11	0.11	0.12	0.12	<b>0.12</b>	0.11	0.11
	1	0.14	0.15	0.16	0.16	0.16	<b>0.16</b>	0.16	0.16
	2	0.17	0.19	0.20	0.21	0.21	<b>0.21</b>	0.21	0.20
	3	0.24	0.27	0.28	0.29	0.29	<b>0.29</b>	0.29	0.28
	4	0.36	0.40	0.42	0.43	0.44	<b>0.43</b>	0.43	0.42
	5	0.48	0.53	0.56	0.58	0.58	<b>0.58</b>	0.57	0.56
	6	0.71	0.80	0.84	0.87	0.88	<b>0.87</b>	0.86	0.84
	7	0.95	1.06	1.13	1.16	1.17	<b>1.17</b>	1.15	1.12
	8	1.43	1.60	1.69	1.73	1.75	<b>1.74</b>	1.72	1.68
	9	2.14	2.37	2.50	2.57	2.59	<b>2.58</b>	2.54	2.48

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature -60°F**

TU	0	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.06
	1	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	2	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	3	0.10	0.11	0.11	0.12	0.12	0.11	0.11	0.11
	4	0.15	0.16	0.17	0.17	0.17	0.17	0.16	0.16
	5	0.20	0.21	0.22	0.23	0.23	0.22	0.22	0.21
	6	0.29	0.32	0.33	0.34	0.34	0.33	0.33	0.32
	7	0.39	0.43	0.45	0.45	0.45	0.45	0.44	0.42
	8	0.59	0.65	0.68	0.69	0.69	0.68	0.66	0.64
	9	0.86	0.94	0.98	1.00	1.00	0.99	0.96	0.93

**Evaporating temperature -30°F**

TU	0	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	1	0.11	0.12	0.13	0.13	0.13	0.13	0.13	0.12
	2	0.13	0.15	0.15	0.16	0.16	0.16	0.16	0.15
	3	0.18	0.20	0.22	0.22	0.22	0.22	0.22	0.21
	4	0.27	0.30	0.32	0.32	0.33	0.33	0.32	0.31
	5	0.37	0.40	0.43	0.44	0.44	0.44	0.43	0.42
	6	0.54	0.60	0.64	0.65	0.66	0.65	0.64	0.62
	7	0.73	0.81	0.85	0.87	0.88	0.87	0.86	0.84
	8	1.10	1.22	1.28	1.31	1.32	1.31	1.29	1.26
	9	1.62	1.79	1.89	1.93	1.94	1.93	1.89	1.85

**Evaporating temperature -75°F**

TU	0	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.04
	1	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	2	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05
	3	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.07
	4	0.10	0.11	0.12	0.12	0.12	0.12	0.11	0.11
	5	0.14	0.15	0.16	0.16	0.16	0.16	0.15	0.15
	6	0.21	0.22	0.23	0.24	0.23	0.23	0.22	0.22
	7	0.28	0.30	0.31	0.32	0.32	0.31	0.30	0.29
	8	0.42	0.45	0.47	0.48	0.48	0.47	0.46	0.44
	9	0.61	0.66	0.69	0.69	0.69	0.68	0.66	0.64

**Evaporating temperature -45°F**

TU	0	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	1	0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.09
	2	0.10	0.11	0.11	0.12	0.12	0.12	0.11	0.11
	3	0.14	0.15	0.16	0.16	0.16	0.16	0.16	0.15
	4	0.20	0.22	0.23	0.24	0.24	0.24	0.23	0.23
	5	0.27	0.30	0.31	0.32	0.32	0.32	0.31	0.30
	6	0.40	0.44	0.47	0.48	0.48	0.47	0.46	0.45
	7	0.54	0.60	0.63	0.64	0.64	0.63	0.62	0.60
	8	0.82	0.90	0.94	0.96	0.97	0.96	0.94	0.91
	9	1.20	1.32	1.38	1.41	1.41	1.40	1.37	1.33

**Correction factor for subcooling  $\Delta t_{sub}$**

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R404A	1.18	1.00	0.89	0.81	0.74	0.68	0.63	0.60	0.56	0.53

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9} (t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

Capacities (TR)

(continued)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

R407C

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Evaporating temperature +50°F

TU	0	0.15	0.17	0.18	0.19	0.20	0.20	0.20	0.20
	1	0.22	0.25	0.27	0.28	0.29	0.30	0.30	0.30
	2	0.32	0.36	0.40	0.42	0.43	0.44	0.45	0.45
	3	0.43	0.50	0.55	0.58	0.60	0.61	0.62	0.62
	4	0.66	0.76	0.83	0.88	0.91	0.92	0.94	0.94
	5	0.88	1.01	1.10	1.16	1.20	1.23	1.24	1.25
	6	1.32	1.52	1.66	1.76	1.82	1.85	1.88	1.89
	7	1.76	2.02	2.21	2.33	2.42	2.46	2.50	2.51
	8	2.62	3.02	3.31	3.48	3.60	3.69	3.72	3.74
	9	3.93	4.54	4.93	5.22	5.39	5.51	5.57	5.59

Evaporating temperature 0°F

TU	0	0.12	0.13	0.14	0.14	0.15	0.15	0.15	0.15
	1	0.14	0.16	0.17	0.18	0.19	0.19	0.19	0.19
	2	0.17	0.19	0.21	0.22	0.23	0.23	0.23	0.23
	3	0.24	0.27	0.29	0.31	0.32	0.32	0.32	0.32
	4	0.35	0.40	0.43	0.45	0.47	0.47	0.48	0.48
	5	0.47	0.54	0.58	0.61	0.62	0.63	0.64	0.64
	6	0.71	0.80	0.86	0.90	0.93	0.95	0.95	0.95
	7	0.94	1.07	1.16	1.21	1.25	1.27	1.28	1.28
	8	1.42	1.62	1.74	1.83	1.88	1.91	1.92	1.92
	9	2.09	2.38	2.57	2.69	2.76	2.81	2.83	2.83

Evaporating temperature +40°F

TU	0	0.15	0.16	<b>0.18</b>	0.18	0.19	0.19	0.19	0.19
	1	0.21	0.24	<b>0.26</b>	0.27	0.28	0.28	0.28	0.28
	2	0.28	0.33	<b>0.36</b>	0.38	0.39	0.40	0.40	0.40
	3	0.39	0.45	<b>0.49</b>	0.52	0.54	0.55	0.56	0.56
	4	0.60	0.68	<b>0.74</b>	0.78	0.81	0.83	0.83	0.84
	5	0.79	0.91	<b>0.99</b>	1.04	1.08	1.10	1.11	1.11
	6	1.19	1.36	<b>1.49</b>	1.57	1.62	1.66	1.67	1.68
	7	1.58	1.82	<b>1.98</b>	2.09	2.16	2.21	2.22	2.24
	8	2.37	2.73	<b>2.96</b>	3.12	3.23	3.30	3.34	3.36
	9	3.55	4.07	<b>4.42</b>	4.66	4.83	4.92	4.97	4.99

Evaporating temperature -20°F

TU	0	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12
	1	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.14
	2	0.13	0.14	0.15	0.16	0.16	0.16	0.17	0.16
	3	0.18	0.20	0.21	0.22	0.23	0.23	0.23	0.23
	4	0.26	0.29	0.31	0.33	0.33	0.34	0.34	0.34
	5	0.34	0.39	0.42	0.44	0.45	0.45	0.46	0.46
	6	0.51	0.58	0.62	0.65	0.67	0.67	0.68	0.68
	7	0.69	0.78	0.83	0.87	0.90	0.91	0.91	0.91
	8	1.04	1.17	1.26	1.31	1.35	1.37	1.37	1.37
	9	1.52	1.72	1.84	1.92	1.97	2.00	2.01	2.00

Evaporating temperature +20°F

TU	0	0.13	0.15	0.16	0.17	0.17	0.17	0.17	0.17
	1	0.18	0.20	0.22	0.23	0.24	0.24	0.24	0.24
	2	0.22	0.26	0.28	0.29	0.30	0.31	0.31	0.31
	3	0.31	0.36	0.39	0.41	0.42	0.43	0.43	0.43
	4	0.47	0.53	0.58	0.61	0.63	0.64	0.64	0.64
	5	0.62	0.71	0.77	0.81	0.84	0.85	0.86	0.86
	6	0.93	1.07	1.15	1.22	1.25	1.28	1.29	1.29
	7	1.24	1.42	1.54	1.62	1.68	1.71	1.72	1.73
	8	1.88	2.14	2.32	2.44	2.52	2.56	2.59	2.59
	9	2.78	3.18	3.44	3.61	3.73	3.80	3.83	3.83

Evaporating temperature -40°F

TU	0	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.09
	1	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.10
	2	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.11
	3	0.12	0.14	0.15	0.15	0.16	0.16	0.16	0.16
	4	0.18	0.20	0.22	0.22	0.23	0.23	0.23	0.23
	5	0.24	0.27	0.29	0.30	0.31	0.31	0.31	0.31
	6	0.36	0.40	0.43	0.45	0.46	0.46	0.46	0.46
	7	0.48	0.54	0.58	0.60	0.61	0.62	0.62	0.62
	8	0.73	0.82	0.87	0.91	0.93	0.94	0.94	0.94
	9	1.06	1.19	1.27	1.32	1.35	1.37	1.37	1.36

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R407C	1.14	1.00	0.92	0.86	0.81	0.77	0.73	0.69	0.67	0.64

Metric conversions

1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

Capacities (TR)

(continued)

Range B: -75 to -15°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

R407C

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Evaporating temperature -15°F

TU	0	0.12	0.13	0.14	0.14	<b>0.14</b>	0.15	0.15	0.15
	1	0.14	0.16	0.17	0.18	<b>0.18</b>	0.19	0.19	0.19
	2	0.17	0.19	0.21	0.22	<b>0.22</b>	0.23	0.23	0.23
	3	0.24	0.27	0.29	0.30	<b>0.31</b>	0.32	0.32	0.32
	4	0.35	0.40	0.43	0.45	<b>0.46</b>	0.47	0.47	0.47
	5	0.47	0.53	0.58	0.60	<b>0.61</b>	0.62	0.63	0.63
	6	0.71	0.80	0.86	0.90	<b>0.92</b>	0.93	0.94	0.94
	7	0.95	1.07	1.15	1.20	<b>1.23</b>	1.25	1.26	1.25
	8	1.43	1.61	1.73	1.81	<b>1.85</b>	1.88	1.89	1.89
	9	2.10	2.37	2.54	2.65	<b>2.72</b>	2.76	2.77	2.77

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

Evaporating temperature -60°F

TU	0	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	
	1	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.07
	2	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09
	3	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12
	4	0.14	0.16	0.17	0.17	0.18	0.18	0.18	0.18	0.18
	5	0.19	0.21	0.22	0.23	0.24	0.24	0.24	0.24	0.24
	6	0.28	0.31	0.33	0.34	0.35	0.35	0.35	0.35	0.35
	7	0.37	0.42	0.44	0.46	0.47	0.47	0.47	0.47	0.47
	8	0.56	0.63	0.67	0.70	0.71	0.72	0.72	0.72	0.71
	9	0.82	0.91	0.97	1.01	1.03	1.04	1.04	1.04	1.03

Evaporating temperature -30°F

TU	0	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.12	
	1	0.11	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14
	2	0.13	0.14	0.16	0.16	0.17	0.17	0.17	0.17	0.17
	3	0.18	0.20	0.22	0.23	0.23	0.24	0.24	0.24	0.24
	4	0.27	0.30	0.32	0.33	0.34	0.34	0.35	0.34	0.34
	5	0.35	0.40	0.43	0.45	0.46	0.46	0.46	0.46	0.46
	6	0.53	0.60	0.64	0.66	0.68	0.69	0.69	0.69	0.69
	7	0.71	0.80	0.85	0.89	0.91	0.92	0.93	0.92	0.92
	8	1.07	1.20	1.29	1.34	1.38	1.39	1.39	1.39	1.39
	9	1.57	1.76	1.89	1.96	2.01	2.04	2.04	2.04	2.04

Evaporating temperature -75°F

TU	0	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
	1	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	2	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	3	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.08	0.08
	4	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12
	5	0.13	0.15	0.16	0.16	0.16	0.17	0.17	0.16	0.16
	6	0.20	0.22	0.23	0.24	0.24	0.25	0.25	0.24	0.24
	7	0.26	0.29	0.31	0.32	0.33	0.33	0.33	0.33	0.33
	8	0.40	0.44	0.47	0.49	0.50	0.50	0.50	0.49	0.49
	9	0.58	0.64	0.68	0.71	0.72	0.72	0.72	0.72	0.71

Evaporating temperature -45°F

TU	0	0.08	0.08	0.09	0.09	0.10	0.10	0.10	0.10	
	1	0.08	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	2	0.09	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12
	3	0.13	0.15	0.16	0.17	0.17	0.17	0.17	0.17	0.17
	4	0.19	0.22	0.23	0.24	0.25	0.25	0.25	0.25	0.25
	5	0.26	0.29	0.31	0.32	0.33	0.33	0.33	0.33	0.33
	6	0.39	0.43	0.46	0.48	0.49	0.50	0.50	0.50	0.50
	7	0.52	0.58	0.62	0.65	0.66	0.67	0.67	0.66	0.66
	8	0.79	0.88	0.94	0.98	1.00	1.01	1.01	1.00	1.00
	9	1.14	1.28	1.37	1.42	1.45	1.47	1.47	1.46	1.46

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R407C	1.14	1.00	0.92	0.86	0.81	0.77	0.73	0.69	0.67	0.64

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9} (t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

**Capacities (TR)**

(continued)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R410A**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	100	150	200	250	300	350	400

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	100	150	200	250	300	350	400

**Evaporating temperature +50°F**

TU	0	0.17	0.22	0.24	0.26	0.26	0.26	0.25	0.24
	1	0.28	0.36	0.39	0.41	0.42	0.41	0.40	0.39
	2	0.47	0.61	0.69	0.73	0.75	0.75	0.74	0.72
	3	0.64	0.83	0.94	0.99	1.02	1.02	1.01	0.98
	4	1.00	1.29	1.46	1.55	1.58	1.59	1.56	1.48
	5	1.31	1.71	1.91	2.04	2.10	2.10	2.07	2.00
	6	2.00	2.60	2.94	3.13	3.21	3.22	3.20	3.07
	7	2.64	3.44	3.87	4.12	4.24	4.25	4.18	4.05
	8	3.88	5.05	5.69	6.05	6.22	6.24	6.14	5.92
	9	5.90	7.62	8.60	9.13	9.37	9.23	9.23	8.91

**Evaporating temperature 0°F**

TU	0	0.16	0.20	0.22	0.23	0.24	0.24	0.23	0.23
	1	0.23	0.29	0.32	0.33	0.34	0.34	0.34	0.33
	2	0.30	0.39	0.44	0.46	0.49	0.49	0.49	0.47
	3	0.42	0.54	0.61	0.64	0.68	0.68	0.68	0.66
	4	0.64	0.81	0.91	0.96	1.01	1.02	1.01	0.98
	5	0.85	1.09	1.21	1.28	1.35	1.36	1.34	1.31
	6	1.27	1.63	1.82	1.93	2.04	2.06	2.03	1.98
	7	1.69	2.17	2.43	2.57	2.72	2.74	2.71	2.64
	8	2.53	3.25	3.63	3.84	4.06	4.08	4.04	3.94
	9	3.79	4.85	5.41	5.73	6.05	6.08	6.02	5.85

**Evaporating temperature +40°F**

TU	0	0.18	0.22	0.24	0.26	0.26	0.26	0.26	0.25
	1	0.28	0.35	0.38	0.40	0.41	0.41	0.40	0.39
	2	0.44	0.58	0.65	0.69	0.73	0.73	0.72	0.70
	3	0.61	0.78	0.88	0.94	0.99	0.99	0.98	0.95
	4	0.94	1.22	1.37	1.45	1.52	1.53	1.51	1.46
	5	1.24	1.61	1.81	1.92	2.02	2.03	2.00	1.94
	6	1.88	2.45	2.75	2.93	3.09	3.10	3.06	2.97
	7	2.49	3.23	3.64	3.87	4.07	4.09	4.04	3.92
	8	3.68	4.77	5.37	5.71	6.01	6.03	5.95	5.76
	9	5.58	7.24	8.11	8.60	9.04	9.07	8.93	8.65

**Evaporating temperature -20°F**

TU	0	0.14	0.18	0.19	0.20	0.21	0.21	0.21	0.20
	1	0.19	0.24	0.26	0.28	0.29	0.29	0.28	0.27
	2	0.23	0.30	0.33	0.35	0.37	0.37	0.36	0.36
	3	0.32	0.41	0.46	0.49	0.51	0.51	0.51	0.50
	4	0.48	0.61	0.68	0.72	0.76	0.76	0.75	0.74
	5	0.65	0.82	0.91	0.96	1.02	1.02	1.01	0.98
	6	0.96	1.22	1.37	1.44	1.53	1.53	1.52	1.48
	7	1.29	1.64	1.83	1.93	2.04	2.05	2.03	1.98
	8	1.94	2.46	2.74	2.90	3.06	3.07	3.04	2.96
	9	2.87	3.65	4.06	4.28	4.52	4.54	4.49	4.37

**Evaporating temperature +20°F**

TU	0	0.17	0.21	0.24	0.25	0.25	0.25	0.25	0.24
	1	0.26	0.33	0.36	0.37	0.39	0.39	0.38	0.37
	2	0.38	0.49	0.55	0.58	0.61	0.62	0.61	0.59
	3	0.52	0.67	0.75	0.80	0.84	0.85	0.85	0.82
	4	0.79	1.02	1.15	1.22	1.28	1.29	1.27	1.24
	5	1.05	1.36	1.52	1.62	1.70	1.71	1.69	1.65
	6	1.59	2.05	2.30	2.45	2.59	2.60	2.58	2.51
	7	2.11	2.72	3.06	3.25	3.43	3.45	3.42	3.33
	8	3.14	4.04	4.55	4.83	5.10	5.12	5.07	4.93
	9	4.73	6.09	6.83	7.23	7.63	7.67	7.57	7.37

**Evaporating temperature -40°F**

TU	0	0.12	0.15	0.16	0.17	0.18	0.18	0.17	0.17
	1	0.14	0.18	0.20	0.21	0.22	0.22	0.22	0.21
	2	0.17	0.21	0.24	0.25	0.26	0.26	0.26	0.25
	3	0.24	0.30	0.33	0.35	0.37	0.37	0.37	0.36
	4	0.35	0.44	0.49	0.51	0.54	0.54	0.54	0.52
	5	0.47	0.59	0.65	0.69	0.73	0.73	0.72	0.70
	6	0.70	0.88	0.98	1.03	1.09	1.09	1.08	1.05
	7	0.93	1.18	1.31	1.38	1.45	1.46	1.44	1.40
	8	1.41	1.78	1.97	2.08	2.19	2.20	2.17	2.11
	9	2.07	2.61	2.90	3.05	3.21	3.22	3.18	3.10

Correction factor for subcooling  $\Delta t_{sub}$

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R410A	1.14	1.00	0.89	0.83	0.77	0.72	0.68	0.65	0.61	0.59

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1 - 32) = t_2$   
 1 ton = 3.5 kW



**Capacities (TR)**

(continued)

Range N: -40 to +50°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R507**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		75	100	125	150	175	200	225	250

**Evaporating temperature +50°F**

TU	0	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14
	1	0.18	0.20	0.20	0.21	0.21	0.21	0.21	0.21
	2	0.26	0.28	0.30	0.31	0.31	0.31	0.31	0.31
	3	0.36	0.39	0.41	0.42	0.43	0.43	0.43	0.42
	4	0.54	0.59	0.62	0.64	0.65	0.65	0.64	0.64
	5	0.72	0.78	0.82	0.85	0.86	0.87	0.86	0.85
	6	1.08	1.18	1.24	1.28	1.30	1.31	1.31	1.29
	7	1.44	1.57	1.65	1.70	1.73	1.74	1.73	1.71
	8	2.16	2.34	2.47	2.53	2.58	2.60	2.58	2.55
	9	3.23	3.51	3.70	3.81	3.87	3.89	3.90	3.81

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		75	100	125	150	175	200	225	250

**Evaporating temperature 0°F**

TU	0	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11
	1	0.13	0.14	0.14	0.15	0.15	0.15	0.15	0.15
	2	0.16	0.17	0.18	0.18	0.18	0.18	0.18	0.18
	3	0.22	0.24	0.25	0.25	0.26	0.26	0.25	0.25
	4	0.33	0.35	0.37	0.37	0.38	0.38	0.38	0.37
	5	0.44	0.47	0.49	0.50	0.50	0.51	0.50	0.49
	6	0.66	0.70	0.73	0.75	0.76	0.76	0.75	0.74
	7	0.88	0.94	0.98	1.00	1.01	1.01	1.01	0.99
	8	1.32	1.42	1.47	1.51	1.52	1.52	1.51	1.49
	9	1.95	2.09	2.18	2.22	2.25	2.25	2.23	2.20

**Evaporating temperature +40°F**

TU	0	0.12	<b>0.13</b>	0.13	0.14	0.14	0.14	0.14	0.13
	1	0.17	<b>0.19</b>	0.19	0.20	0.20	0.20	0.20	0.19
	2	0.24	<b>0.26</b>	0.27	0.28	0.29	0.29	0.29	0.28
	3	0.33	<b>0.36</b>	0.38	0.39	0.40	0.40	0.39	0.39
	4	0.50	<b>0.54</b>	0.57	0.59	0.60	0.60	0.59	0.59
	5	0.66	<b>0.72</b>	0.76	0.78	0.79	0.79	0.79	0.78
	6	1.00	<b>1.08</b>	1.14	1.17	1.19	1.20	1.19	1.18
	7	1.33	<b>1.44</b>	1.52	1.56	1.59	1.60	1.59	1.57
	8	1.99	<b>2.16</b>	2.27	2.34	2.37	2.38	2.38	2.34
	9	2.99	<b>3.23</b>	3.39	3.50	3.54	3.56	3.54	3.49

**Evaporating temperature -20°F**

TU	0	0.09	0.09	0.09	0.10	0.10	0.10	0.09	0.09
	1	0.10	0.11	0.11	0.12	0.12	0.12	0.11	0.11
	2	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.13
	3	0.17	0.18	0.19	0.19	0.19	0.19	0.19	0.19
	4	0.25	0.27	0.28	0.28	0.28	0.28	0.28	0.28
	5	0.34	0.36	0.37	0.38	0.38	0.38	0.38	0.37
	6	0.50	0.54	0.55	0.56	0.57	0.57	0.56	0.55
	7	0.67	0.72	0.74	0.76	0.76	0.76	0.75	0.74
	8	1.02	1.08	1.12	1.14	1.15	1.15	1.13	1.11
	9	1.50	1.59	1.65	1.67	1.68	1.68	1.66	1.63

**Evaporating temperature +20°F**

TU	0	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.12
	1	0.15	0.17	0.17	0.18	0.18	0.18	0.18	0.17
	2	0.20	0.21	0.22	0.23	0.23	0.23	0.23	0.23
	3	0.28	0.30	0.31	0.32	0.32	0.33	0.32	0.32
	4	0.41	0.45	0.47	0.48	0.48	0.48	0.48	0.48
	5	0.55	0.59	0.62	0.64	0.65	0.65	0.64	0.64
	6	0.82	0.89	0.93	0.96	0.97	0.97	0.97	0.96
	7	1.10	1.19	1.24	1.28	1.29	1.30	1.29	1.27
	8	1.65	1.78	1.86	1.92	1.94	1.95	1.94	1.91
	9	2.46	2.66	2.77	2.84	2.88	2.89	2.87	2.83

**Evaporating temperature -40°F**

TU	0	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.07
	1	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.08
	2	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.09
	3	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14
	4	0.19	0.20	0.20	0.21	0.21	0.20	0.20	0.20
	5	0.25	0.26	0.27	0.28	0.28	0.27	0.27	0.27
	6	0.37	0.39	0.40	0.41	0.41	0.41	0.40	0.39
	7	0.50	0.53	0.54	0.55	0.55	0.55	0.54	0.53
	8	0.75	0.80	0.82	0.83	0.83	0.83	0.82	0.80
	9	1.10	1.16	1.20	1.21	1.22	1.21	1.19	1.17

**Correction factor for subcooling  $\Delta t_{sub}$**

When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R507	1.17	1.00	0.89	0.81	0.74	0.69	0.64	0.60	0.55	0.52

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^\circ\text{F} - 32) = t_2^\circ\text{C}$   
 1 ton = 3.5 kW

**Capacities (TR)**

(continued)

Range B: -75 to -15°F.  $\Delta t_{sub} = 10^\circ\text{F}$ , OS = 7°F

**R507**

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature -15°F**

TU	0	0.10	0.11	0.12	0.12	<b>0.12</b>	0.12	0.12	0.12
	1	0.14	0.16	0.17	0.17	<b>0.17</b>	0.17	0.17	0.17
	2	0.18	0.20	0.21	0.22	<b>0.23</b>	0.23	0.23	0.23
	3	0.25	0.28	0.30	0.31	<b>0.32</b>	0.32	0.32	0.31
	4	0.37	0.42	0.44	0.46	<b>0.47</b>	0.47	0.47	0.47
	5	0.50	0.56	0.59	0.61	<b>0.63</b>	0.63	0.63	0.62
	6	0.75	0.84	0.89	0.92	<b>0.94</b>	0.95	0.95	0.94
	7	1.00	1.12	1.19	1.23	<b>1.26</b>	1.27	1.26	1.25
	8	1.50	1.68	1.79	1.85	<b>1.88</b>	1.90	1.89	1.87
	9	2.23	2.49	2.65	2.74	<b>2.79</b>	2.81	2.80	2.77

Type	Orifice no.	Pressure drop across valve $\Delta p$ psi							
		50	75	100	125	150	175	200	225

**Evaporating temperature -60°F**

TU	0	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	1	0.06	0.07	0.07	0.08	0.08	0.08	0.08	0.07
	2	0.07	0.08	0.09	0.09	0.09	0.09	0.09	0.09
	3	0.11	0.12	0.12	0.12	0.13	0.12	0.12	0.12
	4	0.15	0.17	0.18	0.18	0.18	0.18	0.18	0.18
	5	0.21	0.23	0.24	0.24	0.24	0.24	0.24	0.24
	6	0.31	0.34	0.35	0.36	0.36	0.36	0.36	0.35
	7	0.41	0.45	0.47	0.48	0.49	0.49	0.48	0.47
	8	0.62	0.68	0.71	0.73	0.74	0.74	0.73	0.72
	9	0.91	0.99	1.04	1.06	1.07	1.07	1.06	1.04

**Evaporating temperature -30°F**

TU	0	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.10
	1	0.11	0.13	0.13	0.14	0.14	0.14	0.14	0.14
	2	0.14	0.15	0.16	0.17	0.17	0.17	0.17	0.17
	3	0.19	0.22	0.23	0.24	0.24	0.24	0.24	0.24
	4	0.29	0.32	0.34	0.35	0.35	0.35	0.35	0.35
	5	0.38	0.43	0.45	0.46	0.47	0.47	0.47	0.46
	6	0.57	0.64	0.67	0.69	0.71	0.71	0.71	0.70
	7	0.76	0.85	0.90	0.93	0.94	0.95	0.94	0.93
	8	1.15	1.28	1.35	1.40	1.42	1.43	1.42	1.40
	9	1.70	1.89	1.99	2.06	2.09	2.10	2.08	2.06

**Evaporating temperature -75°F**

TU	0	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	2	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06
	3	0.07	0.08	0.09	0.09	0.09	0.09	0.09	0.08
	4	0.11	0.12	0.12	0.13	0.13	0.13	0.12	0.12
	5	0.15	0.16	0.17	0.17	0.17	0.17	0.17	0.16
	6	0.22	0.24	0.25	0.25	0.25	0.25	0.25	0.24
	7	0.29	0.32	0.33	0.34	0.34	0.34	0.33	0.33
	8	0.44	0.48	0.50	0.51	0.51	0.51	0.50	0.49
	9	0.64	0.70	0.73	0.74	0.74	0.74	0.73	0.71

**Evaporating temperature -45°F**

TU	0	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09
	1	0.09	0.10	0.10	0.10	0.11	0.11	0.10	0.10
	2	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.12
	3	0.14	0.16	0.17	0.17	0.18	0.18	0.17	0.17
	4	0.21	0.23	0.25	0.25	0.26	0.26	0.25	0.25
	5	0.28	0.31	0.33	0.34	0.34	0.34	0.34	0.34
	6	0.42	0.47	0.49	0.51	0.51	0.51	0.51	0.50
	7	0.57	0.63	0.66	0.68	0.69	0.69	0.68	0.67
	8	0.86	0.95	1.00	1.03	1.04	1.04	1.03	1.01
	9	1.26	1.39	1.46	1.50	1.52	1.52	1.51	1.48

Correction factor for subcooling  $\Delta t_{sub}$

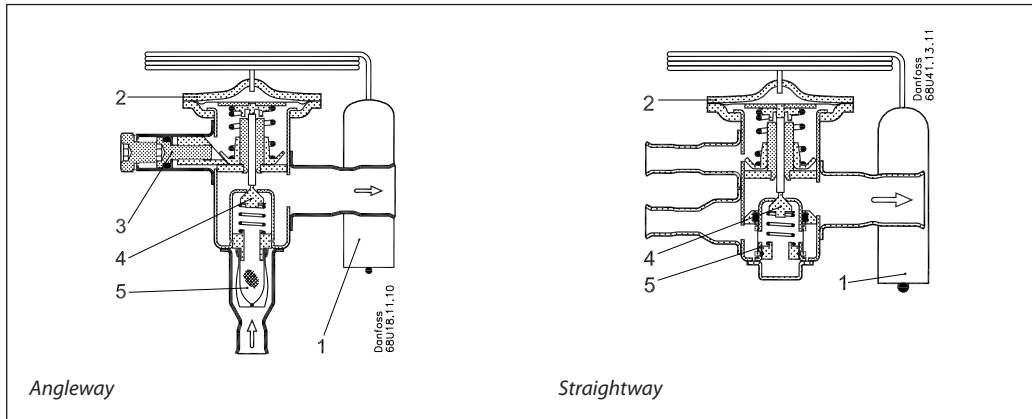
When subcooling  $\Delta t_{sub}$  ahead of the expansion valve is other than 10°F, adjust the evaporator capacity by multiplying by the appropriate correction factor found in the following table.

Refrigerant	0°F	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F
R507	1.17	1.00	0.89	0.81	0.74	0.69	0.64	0.60	0.55	0.52

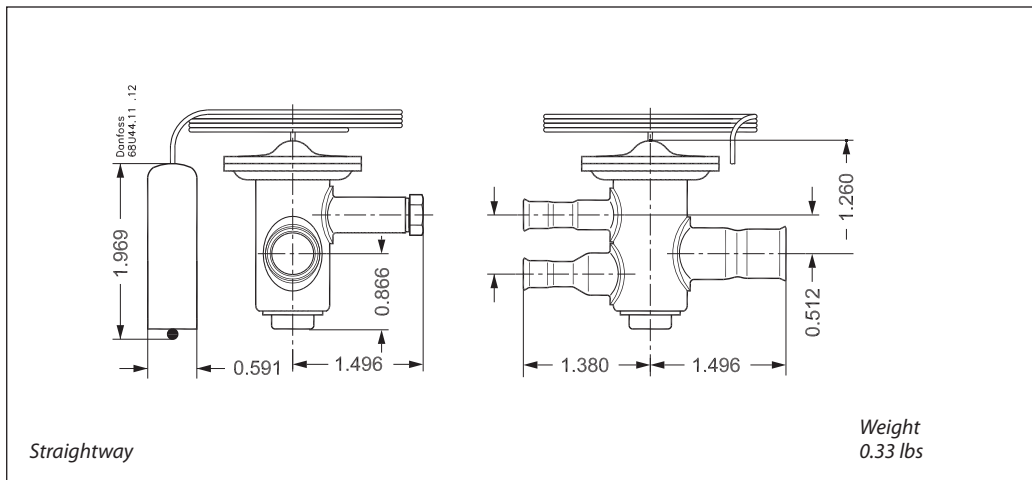
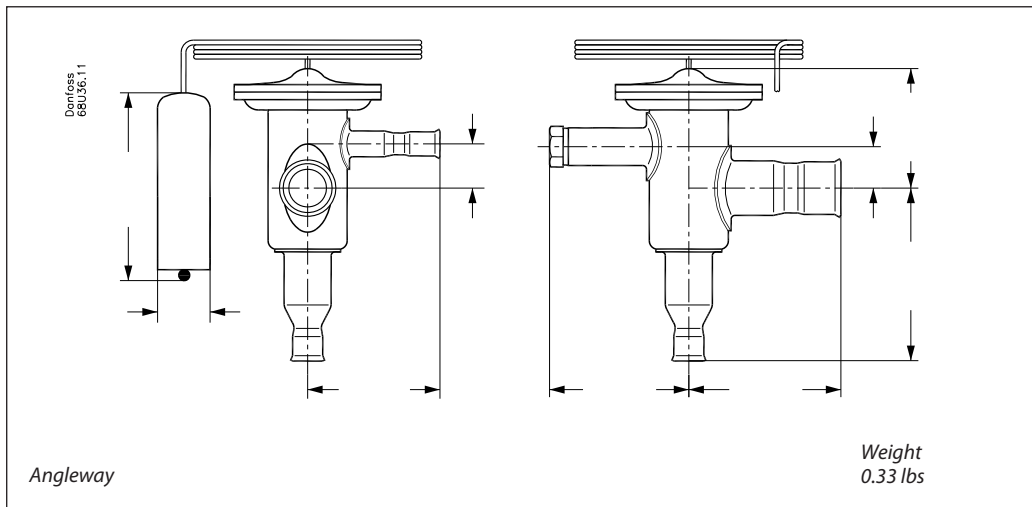
Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1 - 32) = t_2$   
 1 ton = 3.5 kW

**Design**

1. Bulb with capillary tube
2. Thermostatic element with diaphragm
3. Static superheat adjustment
4. Fixed orifice
5. Internal strainer



**Dimensions and weights**



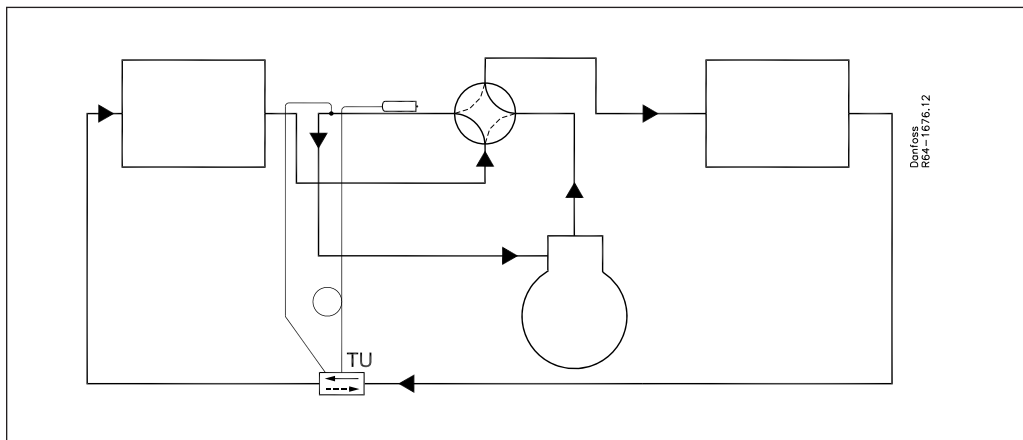
*Metric conversions*  
1 in. = 25.4 mm  
1 lb = 0.454 kg

**TU operation and function**

*Bi-flow*

Bi-flow function is sometimes used in systems with 4-way reversing valves where hot gas defrost or heating cycles are required. Only TU valves with external equalization can be used in bi-flow mode.

Note that flow in the reverse direction can reduce the rated capacity by up to 15%. Valves for bi-flow operation should be installed so that the normal refrigerant flow through the valve direction is toward the main evaporator.



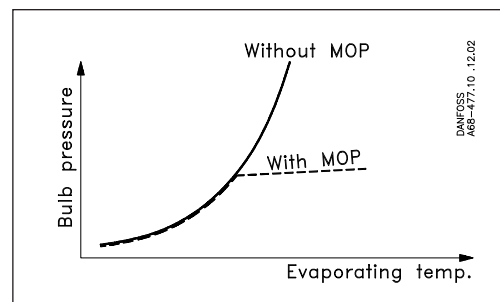
*Self-cleaning bleed*

Internal bleed is used to equalize evaporator and condensing pressures during the off cycle so that compressors with lower starting torque can start.

Bleed sizes are usually specified as a percentage of the nominal valve capacity. A standard bleed size is 15%; custom versions are available.

**MOP - Maximum Operating Pressure**

MOP function protects the compressor motor against overload during start-up. MOP is the evaporating pressure at which the expansion valve will throttle liquid injection into the evaporator and thus prevent the evaporating pressure from rising. MOP valves are primarily used in low temperature applications with a single evaporator and a single compressor. MOP occurs when the sensor reaches a predetermined maximum value. Above MOP any increase in sensor temperature results in only minimal additional opening of the expansion valve. An MOP charge is also known as a pressure limiting charge.



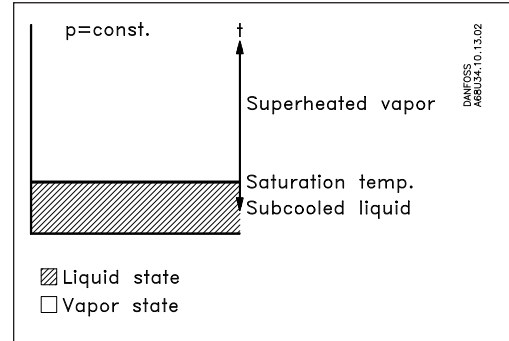
**Note!** The MOP point will change if the factory superheat setting of the expansion valve is changed.

*Metric conversions*  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^{\circ}\text{F} - 32) = t_2^{\circ}\text{C}$

**TU operation and function**  
(continued)

**Subcooling  $\Delta t_{sub}$**   
Subcooling is defined as the difference between the liquid refrigerant temperature and its saturation temperature. Depending on system design, subcooling may be necessary to prevent flash gas from forming in the liquid line. If flash gas forms in the liquid line, the capacity of the expansion valve will be greatly reduced.

**Superheat-subcooling relationship**

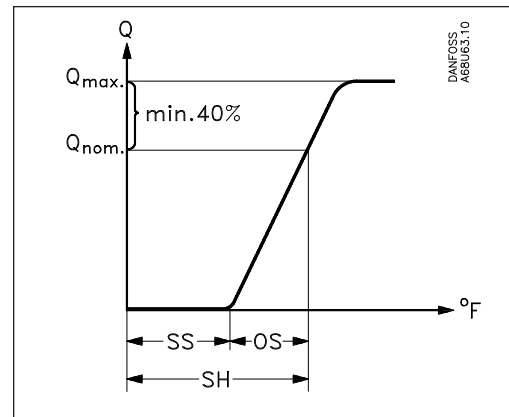


**Superheat**  
Superheat is the controlling parameter of the valve. Superheat, measured at the evaporator outlet, is defined as the difference between actual bulb temperature and the evaporating temperature at the saturation point. In other words, vapor is said to be superheated if its temperature is higher than the saturation temperature corresponding to its pressure. In order to prevent liquid refrigerant from entering the compressor, a certain minimum superheat must be maintained. Liquid entering the compressor causes serious damage. When discussing superheat, the following terms are used with respect to valve operation:

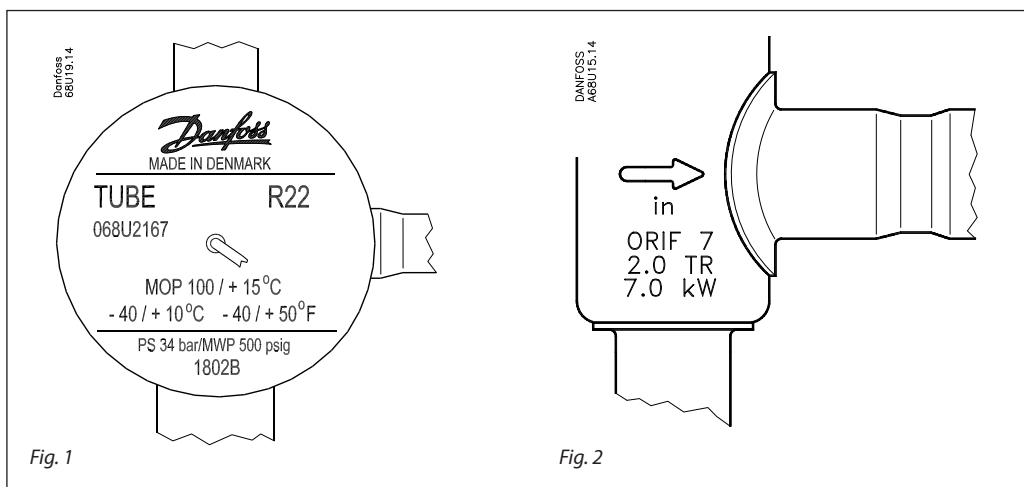
**Static Superheat**  
Static superheat, SS, is superheat above which the valve will begin to open.

**Opening Superheat**  
The opening superheat, OS, is the amount of superheat above static superheat, SS, required to produce a given valve capacity.

**Operating superheat**  
The operating superheat, SH, is the sum of the static superheat, SS, and the opening superheat, OS.



## Identification




Main valve data is indicated on the valve element (fig. 1) and on the valve body (fig. 2).

Valves with bleed are marked on the element: BP 15 (= 15% bleed of nominal capacity).

For valves with fixed superheat setting (type TUC, TUCE) the superheat is printed on the element (e.g. 5°C/9°F).

Example:

TUBE:	Type (E = external equalization)
<b>068U2167:</b>	Code number
R22:	Refrigerant
2.00 TR:	Rated capacity $Q_{nom}$ in TR
7.0 kW:	Rated capacity $Q_{nom}$ in kW
MOP 100 / +15°C:	MOP-point in psig / °C
-40 / +10°C	Evaporating temp. range in °C
<b>-40 / +50°F:</b>	Evaporating temp. range in °F
PS 34 bar / <b>MWP 500 psig:</b>	Max. working pressure in bar/psig
1802B:	Date marking: (week <b>18</b> , year <b>2002</b> , weekday <b>B</b> = Tuesday)
	Normal flow direction
in:	Connection in inches
ORIF7:	Orifice number 7

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1^{\circ}\text{F} - 32) = t_2^{\circ}\text{C}$   
 1 ton = 3.5 kW  
 1 in. = 25.4 mm



## TU stainless steel technology



### Sure quality

The TU is manufactured on fully automated, process-monitored production lines. Cellularized computer-monitored technology insures uniform high quality and that when delivered, every valve meets Danfoss quality standards and customer specifications. Cellularized production also makes possible simultaneous production of large and small quantities of standard and custom version valves.

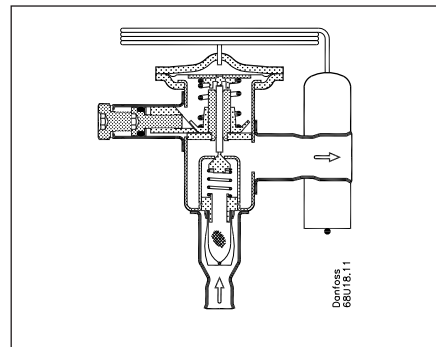
### Benefits of stainless steel

The fact that the TU is an all stainless steel expansion valve offers a number of benefits:

- Stainless steel is far more corrosion resistant than traditional valve materials.
- Stainless steel valves require no surface treatment.
- Stainless steel capillary tubes are three times stronger and twenty times more resistant to vibration than copper capillary tubes.
- Stainless steel has a greater strength-to-weight ratio, making TU valves lighter and more compact.
- Stainless steel diaphragms have greater strength and corrosion resistance for longer life.

### Danfoss precision port design

The TU thermostatic expansion valve introduces Precision Port design incorporating four features that insure superior repeatable performance over an extended valve life.



- Laser welding of the power element preserves the structural uniformity of the diaphragm, assuring consistent operation.
- A precision-machined pushrod and bushing make a practically frictionless seal with no need for a packing gland.
- The free-floating pushrod is self-aligning and eliminates binding.
- The precision-machined cone and orifice accurately meter refrigerant under all operating conditions.

## ... developed for your benefit

### New technology - fast and easy installation

The new TU stainless steel thermostatic expansion valve has significant installation advantages because it is a valve designed specifically for soldering. The TU can be installed in less than half the time required for traditional brass-bodied valves. The valve connections are made of copper and stainless steel bi-metal which makes installation easy, reliable, and fast.



### No need for a wet cloth...

Bi-metal has a very low thermal conductivity, actually only 10% that of copper, so heat applied during soldering remains largely in the copper layer of the connection tube, instead of being conducted to the valve body. External cooling is unnecessary. The result is less energy consumption and better solder quality. At the same time, the diaphragm's structural integrity is preserved.

*Danfoss has applied for patents for solder connections, body design, ball closing in the sensor, and the superheat adjustment. In addition, the valve is a copyright design in the USA, Japan, Germany, France, and Italy.*