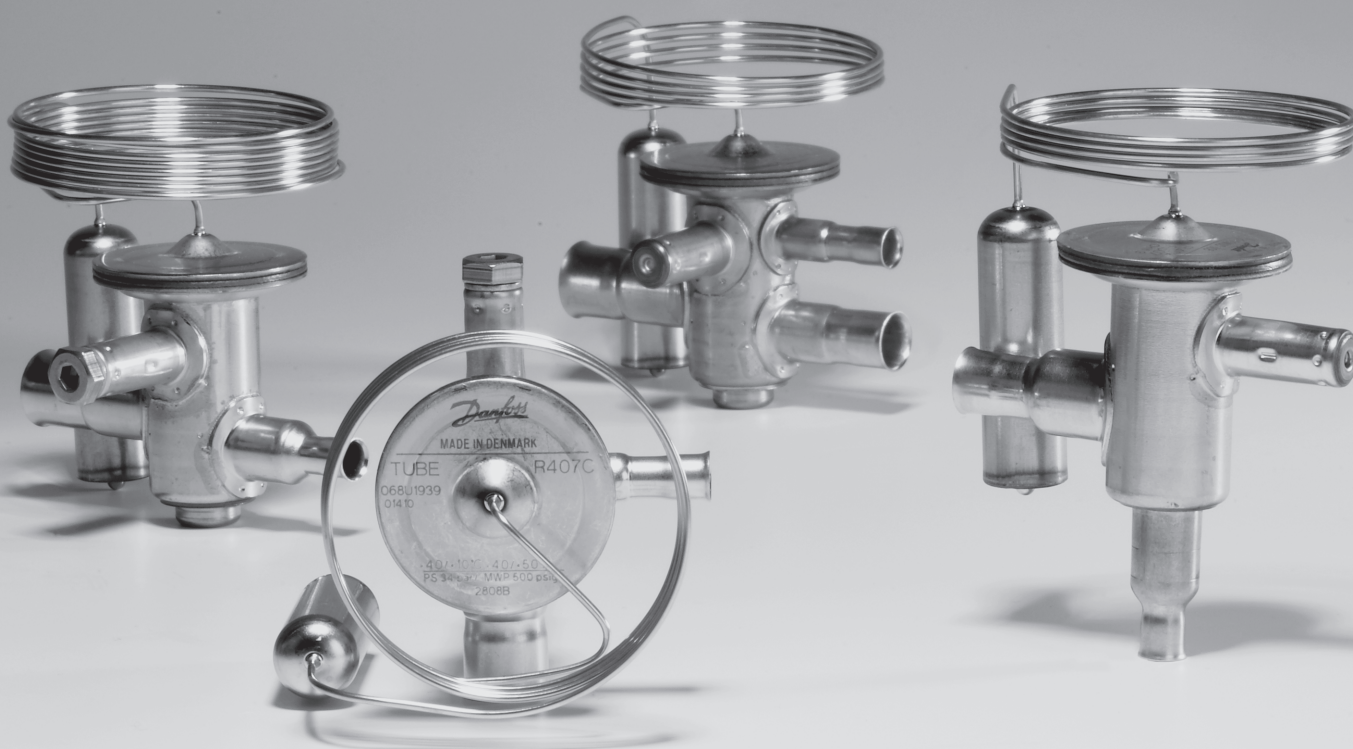




Technical brochure

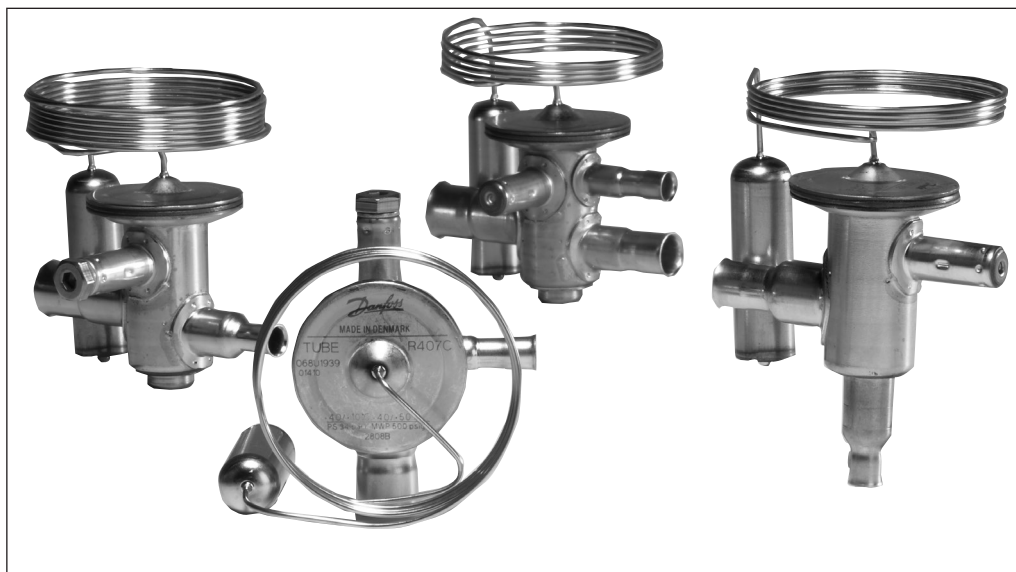
# Thermostatic expansion valves TUB/TUBE and TUC/TUCE



Contents

	Page
Introduction.....	3
Features.....	3
Standard range.....	4
Variant range.....	4
Technical data.....	4
MOP valves.....	4
Identification.....	5
Ordering	
Angleway - R22, R134a, R404A/R507.....	6
Angleway - R407C, R410A.....	7
Capacity	
R22.....	8
R134a.....	10
R404A/R507.....	11
R407C.....	13
R407C.....	14
R410A.....	15
Design/Function.....	16
Dimensions and weight.....	17

## Introduction



The TU series of thermostatic expansion valves has been developed for soldering into hermetic refrigeration systems.

TU valves are made of stainless steel and are therefore very suitable for use in the food industry.

TU valves can be used in many forms of refrigeration systems, in particular:

- Traditional refrigeration systems
- Heat pump systems
- Air conditioning units
- Refrigeration appliances
- Liquid coolers
- Ice cube machines
- Mobile refrigeration systems

All variants are available in both single packs and industrial packs as required by the customer.

TUB/TUBE have adjustable superheat and are available in angleway versions as standard.

TUC/TUCE have fixed superheat, but are otherwise identical to TUB.

TUB/TUBE and TUC/TUCE can be delivered in straightway versions.

All straightway versions and TUC/TUCE valves are produced to order and therefore this catalogue contains no description of a standard range or code numbers.

TU valves are also available in a number of variants that give countless combination possibilities.

Contact Danfoss for further information.

## Features

- Bimetal connections
  - straightforward and fast soldering (no wet cloth or refrigeration pliers required).
- Refrigerants
  - R22, R134a, R404A, R507, R407C, R410A and future refrigerants
- Capacities from 0.6 to 16 kW (0.17 to 4.5 TR) for R22
  - large capacity range in small steps
- Stable regulation
- Biflow function (orifice 1 to 8)
- Compact design
  - small dimensions and low weight
- Stainless steel, hermetically tight solder version
  - high connection strength
  - high corrosion resistance
  - capillary tube joints of high strength and vibration resistance
- Laser-welded, stainless steel thermostatic diaphragm element
  - optimum function
  - long diaphragm life
  - high pressure resistance
- Stainless steel bulb
  - straightforward and fast installation
  - good heat transfer from bulb to pipe
- Adjustable superheat type (TUB/TUBE)
  - accurate setting
  - adjustable in operation
- Fixed superheat type (TUC/TUCE)
- Filter with high dirt retention capacity
- Available with self-cleaning bleed
- Available with MOP (Max. Operating Pressure)

**Standard range**

Versions available in the standard range:

*Capillary tube length:*

0.8 m

*Range N:* -40 to +10°C without MOP

*Connections:*
*Static superheat (SS):*  
 R22, R134a, R404A, R407C, R410A = 5 K  
 R507 = 6.4 K

Inlet	Orifice 0 → 6	¼ in./6 mm
	Orifice 7 → 9	⅜ in./10 mm
Outlet		½ in./12 mm

**Variant range**

In addition to the standard range, TUB/TUBE and TUC/TUCE valves are also available in these variants and variant combinations:

*Capillary tube length:*

1.5 m

*Bleed:*

15%

*Straightway versions*

Range N	-40 → +10°C	MOP	+15°C
Range NM	-40 → -5°C	MOP	0°C
Range B	-60 → -25°C		
Range B	-60 → -25°C	MOP	-20°C

*Connections:*

Inlet	Orifice 0 → 6	⅜ in./10 mm
	Orifice 7 → 9	¼ in./6 mm
	Straightway only	½ in./12 mm
Outlet		⅜ in./10 mm
	Straightway only	⅝ in./16 mm

Valves to special temperature ranges can be supplied.

*Capacity, orifice variants:*

In addition to the standard range, valves with orifice 0 are available for R134a, R404A and R507.

For further information, please contact Danfoss.

*Static superheat (SS):*  
 2 K, 3 K, 4 K, or 6 K (applies to TUB/TUBE and TUC/TUCE – see fig. 5)

**Technical data**

<i>Max. bulb temperature</i>	100°C
<i>Max. valve body temperature</i>	120°C,
<i>short-lived peak</i>	150°C

*Biflow operation*

 With flow in the opposite direction, the rated capacity is reduced by up to 15%.  
 TUBE with orifice 0 and 9, all TUB and valves with MOP charges cannot be used for biflow operation.

<i>Perm. working press. (excl. R410A)</i>	PS = 34 bar
<i>Max. working pressure, R410A</i>	PS = 45.5 bar
<i>Max. test pressure (excl. R410A)</i>	p' = 37.5 bar
<i>Max. test pressure, R410A</i>	p' = 50 bar

**MOP valves**

To avoid charge migration when MOP valves are used, the bulb temperature must be lower than the thermostatic element temperature.

**MOP-points**

Refrigerant	Range N -40 → +10°C	Range NM -40 → -5°C	Range B -60 → -25°C
	MOP point for evaporating temperature $t_e$ and evaporating pressure $p_e$ <sup>1)</sup>		
	$t_e = +15°C/+60°F$	$t_e = 0°C/+32°F$	$t_e = -20°C/-4°F$
R22	$p_e = 100 \text{ psig}/6.9 \text{ bar}$	$p_e = 60 \text{ psig}/4.0 \text{ bar}$	$p_e = 20 \text{ psig}/1.5 \text{ bar}$
R134a	$p_e = 55 \text{ psig}/3.9 \text{ bar}$	$p_e = 30 \text{ psig}/1.9 \text{ bar}$	
R404A / R507	$p_e = 120 \text{ psig}/8.4 \text{ bar}$	$p_e = 75 \text{ psig}/5.0 \text{ bar}$	$p_e = 30 \text{ psig}/2.0 \text{ bar}$
R407C	$p_e = 95 \text{ psig}/6.6 \text{ bar}$	$p_e = 50 \text{ psig}/3.6 \text{ bar}$	$p_e = 15 \text{ psig}/1.1 \text{ bar}$
R410A	$p_e = 165 \text{ psig}/11.5 \text{ bar}$	$p_e = 100 \text{ psig}/7.0 \text{ bar}$	$p_e = 45 \text{ psig}/3.0 \text{ bar}$

<sup>1)</sup>  $p_e$  in bar gauge

**Identification**

Main valve data is given on the 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. SS 5°C / 9°F)

*Main valve data example, fig. 1*

- TUBE = Type (E = external pressure equalisation)
- 068U2167** = Code number
- R22/R407C = Refrigerant
- MOP 100 / +15°C = MOP-point in psig / °C
- 40 / +10°C = Evaporating temperature range in °C
- 40 / +50°F = Evaporating temperature range in °F
- PS 34 bar/  
MWP 500 psig = Max. working pressure
- 1802B = Date marking  
(week **18**, year **2002**, weekday **B** = Tuesday)

*Main valve data example, fig. 2*

- ⇒ = Normal flow direction
- IN = Connection in inches  
(MM = millimetres)
- ORIF7 = Orifice number 7
- 2.00 TR = Rated capacity  $Q_{nom.}$  in Tons of Refrigeration
- 7.0 kW = Rated capacity  $Q_{nom.}$  in kW

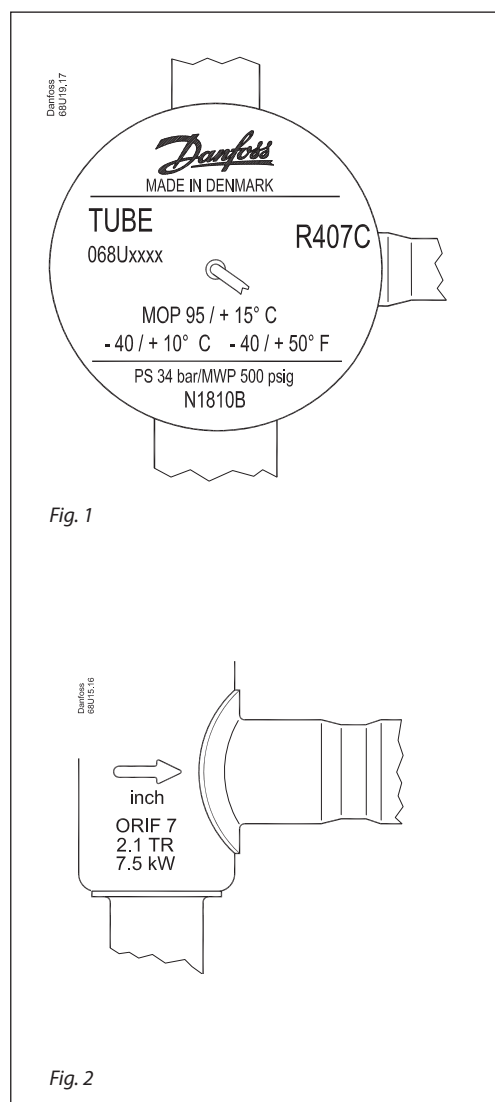
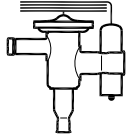


Fig. 1

Fig. 2

**Ordering**  
**Angleway**  
 Supplied with bulb strap  
 Standard valve range



## R22, R407C, R410A, R134a

Range N = -40 → +10°C

Refrigerant	Type	Rated capacity Q <sub>nom.</sub> <sup>1)</sup>		Orifice no. <sup>2)</sup>	Pressure equalisation	Connection Inlet × Outlet			
		kW	TR			in.	Code no.	mm	Code no.
R22/ R407C <sup>3)</sup>	TUB	0.9	0.25	1	int.	1/4 × 1/2	068U2057		
	TUB	1.3	0.36	2	int.	1/4 × 1/2	068U2058		
	TUB	1.8	0.50	3	int.	1/4 × 1/2	068U2059		
	TUB	2.6	0.75	4	int.	1/4 × 1/2	068U2060		
	TUB	3.5	1.00	5	int.	1/4 × 1/2	068U2061		
	TUB	5.3	1.50	6	int.	1/4 × 1/2	068U2062		
	TUB	7.0	2.00	7	int.	3/8 × 1/2	068U2063		
	TUB	11.0	3.00	8	int.	3/8 × 1/2	068U2064		
	TUBE	3.5	1.00	5	ext.	1/4 × 1/2	068U2071		
	TUBE	5.3	1.50	6	ext.	1/4 × 1/2	068U2072		
	TUBE	7.0	2.00	7	ext.	3/8 × 1/2	068U2073		
	TUBE	11.0	3.00	8	ext.	3/8 × 1/2	068U2074		
	TUBE	16.0	4.50	9	ext.	3/8 × 1/2	068U2075		
R407C	TUB	0.92	0.26	1	int.			6 × 12	068U1901
	TUB	1.4	0.38	2	int.			6 × 12	068U1902
	TUB	1.9	0.53	3	int.			6 × 12	068U1903
	TUB	2.8	0.80	4	int.			6 × 12	068U1904
	TUB	3.8	1.10	5	int.			6 × 12	068U1905
	TUB	5.7	1.60	6	int.			6 × 12	068U1906
	TUB	7.5	2.10	7	int.			10 × 12	068U1907
	TUB	11.0	3.20	8	int.			10 × 12	068U1908
	TUB	17.0	4.80	9	int.			10 × 12	068U1909
	TUBE	0.92	0.26	1	ext.			6 × 12	068U1911
	TUBE	1.4	0.38	2	ext.			6 × 12	068U1912
	TUBE	1.9	0.53	3	ext.			6 × 12	068U1913
	TUBE	2.8	0.80	4	ext.			6 × 12	068U1914
	TUBE	3.8	1.10	5	ext.	1/4 × 1/2	068U1935	6 × 12	068U1915
	TUBE	5.7	1.60	6	ext.	1/4 × 1/2	068U1936	6 × 12	068U1916
	TUBE	7.5	2.10	7	ext.	3/8 × 1/2	068U1937	10 × 12	068U1917
	TUBE	11.0	3.20	8	ext.	3/8 × 1/2	068U1938	10 × 12	068U1918
TUBE	17.0	4.80	9	ext.	3/8 × 1/2	068U1939	10 × 12	068U1919	
R410A	TUB	1.3	0.4	1	int.	1/4 × 1/2	068U1958		
	TUB	2.1	0.6	2	int.	1/4 × 1/2	068U1959		
	TUB	2.9	0.8	3	int.	1/4 × 1/2	068U1960		
	TUB	4.5	1.3	4	int.	1/4 × 1/2	068U1961		
	TUB	5.9	1.7	5	int.	1/4 × 1/2	068U1962		
	TUB	9.0	2.5	6	int.	1/4 × 1/2	068U1963		
	TUBE	12.0	3.4	7	ext.	3/8 × 1/2	068U1973		
	TUBE	18.0	5.0	8	ext.	3/8 × 1/2	068U1974		
	TUBE	26.0	7.5	9	ext.	3/8 × 1/2	068U1975		
R134a	TUB	0.47	0.13	0	int.	1/4 × 1/2	068U2660		
	TUB	0.7	0.19	1	int.	1/4 × 1/2	068U2027	6 × 12	068U2000
	TUB	1.0	0.28	2	int.	1/4 × 1/2	068U2028	6 × 12	068U2001
	TUB	1.4	0.39	3	int.	1/4 × 1/2	068U2029	6 × 12	068U2002
	TUB	2.1	0.59	4	int.	1/4 × 1/2	068U2030	6 × 12	068U2003
	TUB	2.7	0.78	5	int.	1/4 × 1/2	068U2031	6 × 12	068U2004
	TUB	4.1	1.20	6	int.	1/4 × 1/2	068U2032	6 × 12	068U2005
	TUBE	0.7	0.19	1	ext.			6 × 12	068U2009
	TUBE	1.0	0.28	2	ext.			6 × 12	068U2010
	TUBE	1.4	0.39	3	ext.	1/4 × 1/2	068U2020	6 × 12	068U2011
	TUBE	2.1	0.59	4	ext.	1/4 × 1/2	068U2021	6 × 12	068U2012
	TUBE	2.7	0.78	5	ext.	1/4 × 1/2	068U2022	6 × 12	068U2013
	TUBE	4.1	1.20	6	ext.	1/4 × 1/2	068U2023	6 × 12	068U2014
	TUBE	5.5	1.60	7	ext.	3/8 × 1/2	068U2024	10 × 12	068U2015
	TUBE	8.2	2.30	8	ext.	3/8 × 1/2	068U2025	10 × 12	068U2016
TUBE	12.0	3.50	9	ext.	3/8 × 1/2	068U2026	10 × 12	068U2017	

<sup>1)</sup> Rated capacity Q<sub>nom.</sub> is based on:  
 Evaporating temperature  
 t<sub>e</sub> = +5°C  
 Condensing temperature  
 t<sub>c</sub> = +32°C  
 Refrigerant liquid temperature  
 t<sub>l</sub> = +28°C  
 Opening superheat  
 OS = 4 K

<sup>2)</sup> TUBE with orifice 0 and 9 and all TUB (internal pressure equalisation) cannot be used for biflow operation.

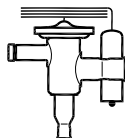
<sup>3)</sup> For R407C plants, please select valves from the dedicated R407C program

Valves with inch connections have 1/4 in. pressure equalisation.  
 Valves with mm connections have 6 mm pressure equalisation.

**Ordering**
**Angleway**

Supplied with bulb strap

Standard valve range



- <sup>1)</sup> Rated capacity  $Q_{nom.}$  is based on:  
 Evaporating temperature  
 $t_e = +5^\circ\text{C}$   
 Condensing temperature  
 $t_c = +32^\circ\text{C}$   
 Refrigerant liquid temperature  
 $t_l = +28^\circ\text{C}$   
 Opening superheat  
 $OS = 4\text{ K}$

- <sup>2)</sup> TUBE with orifice 0 and 9 and all TUB (internal pressure equalisation) cannot be used for biflow operation.

 Range  $N = -40 \rightarrow +10^\circ\text{C}$ 
**R404A/R507**

Refrigerant	Type	Rated capacity $Q_{nom.}$ <sup>1)</sup>		Orifice no. <sup>2)</sup>	Pressure equalisation	Connection Inlet × Outlet			
		kW	TR			in.	Code no.	mm	Code no.
R404A R507	TUB	0.7	0.19	1	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2094</b>	6 × 12	<b>068U2076</b>
	TUB	1.0	0.28	2	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2095</b>	6 × 12	<b>068U2077</b>
	TUB	1.4	0.39	3	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2096</b>	6 × 12	<b>068U2078</b>
	TUB	2.1	0.60	4	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2097</b>	6 × 12	<b>068U2079</b>
	TUB	2.8	0.79	5	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2098</b>	6 × 12	<b>068U2080</b>
	TUB	4.2	1.20	6	int.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2099</b>		
	TUBE	0.7	0.19	1	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2103</b>	6 × 12	<b>068U2085</b>
	TUBE	1.0	0.28	2	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2104</b>	6 × 12	<b>068U2086</b>
	TUBE	1.4	0.39	3	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2105</b>	6 × 12	<b>068U2087</b>
	TUBE	2.1	0.60	4	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2106</b>	6 × 12	<b>068U2088</b>
	TUBE	2.8	0.79	5	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2107</b>	6 × 12	<b>068U2089</b>
	TUBE	4.2	1.20	6	ext.	$\frac{1}{4} \times \frac{1}{2}$	<b>068U2108</b>	6 × 12	<b>068U2090</b>
	TUBE	5.6	1.60	7	ext.	$\frac{3}{8} \times \frac{1}{2}$	<b>068U2109</b>	10 × 12	<b>068U2091</b>
	TUBE	8.4	2.40	8	ext.	$\frac{3}{8} \times \frac{1}{2}$	<b>068U2110</b>	10 × 12	<b>068U2092</b>
TUBE	12.0	3.50	9	ext.	$\frac{3}{8} \times \frac{1}{2}$	<b>068U2111</b>	10 × 12	<b>068U2093</b>	

Valves with inch connections have  $\frac{1}{4}$  in. pressure equalisation.  
 Valves with mm connections have 6 mm pressure equalisation.

Capacity

Capacity in kW for range  $N = -40 \rightarrow +10^\circ\text{C}$  and opening superheat  $OS = 4\text{ K}$

**R22**

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature +10°C</b>										<b>Evaporating temperature 0°C</b>							
TU	0	0.42	0.53	0.60	0.65	0.68	0.70	0.71	0.72	0.40	0.50	0.56	0.60	0.63	0.65	0.67	0.67
	1	0.61	0.79	0.89	1.0	1.0	1.0	1.1	1.1	0.55	0.71	0.80	0.86	0.91	0.93	0.95	0.96
	2	0.9	1.2	1.3	1.5	1.6	1.6	1.7	1.7	0.73	1.0	1.1	1.2	1.3	1.3	1.4	1.4
	3	1.2	1.6	1.8	2.0	2.1	2.2	2.3	2.3	1.0	1.3	1.5	1.7	1.8	1.8	1.9	1.9
	4	1.8	2.4	2.8	3.1	3.2	3.4	3.5	3.5	1.5	2.0	2.3	2.5	2.7	2.8	2.8	2.8
	5	2.4	3.2	3.7	4.1	4.3	4.5	4.6	4.7	2.0	2.7	3.1	3.4	3.5	3.7	3.8	3.8
	6	3.7	4.9	5.6	6.1	6.5	6.7	6.9	7.1	3.1	4.0	4.6	5.0	5.3	5.5	5.7	5.8
	7	4.9	6.5	7.5	8.2	8.6	9.0	9.2	9.4	4.1	5.4	6.2	6.7	7.1	7.4	7.6	7.7
	8	7.3	9.6	11.2	12.2	12.9	13.4	13.7	13.9	6.1	8.0	9.2	10.1	10.6	11.0	11.3	11.5
9	10.9	14.5	16.7	18.2	19.3	20.0	20.5	20.9	9.1	12.1	13.8	15.0	15.9	16.4	16.8	17.1	
<b>Evaporating temperature -10°C</b>										<b>Evaporating temperature -20°C</b>							
TU	0	0.36	0.46	0.51	0.55	0.57	0.59	0.60	0.61	0.40	0.45	0.48	0.50	0.52	0.53	0.53	
	1	0.47	0.62	0.70	0.75	0.79	0.81	0.82	0.83	0.51	0.57	0.62	0.65	0.67	0.68	0.69	
	2	0.60	0.78	0.89	1.0	1.0	1.1	1.1	1.1	0.61	0.70	0.76	0.79	0.82	0.84	0.85	
	3	0.8	1.1	1.3	1.4	1.4	1.5	1.5	1.5	0.9	1.0	1.1	1.1	1.2	1.2	1.2	
	4	1.2	1.6	1.9	2.0	2.1	2.2	2.2	2.3	1.3	1.5	1.6	1.6	1.7	1.7	1.8	
	5	1.7	2.2	2.5	2.7	2.8	2.9	3.0	3.0	1.7	1.9	2.1	2.2	2.3	2.3	2.3	
	6	2.5	3.2	3.7	4.0	4.3	4.4	4.5	4.6	2.5	2.9	3.1	3.3	3.4	3.5	3.5	
	7	3.3	4.3	5.0	5.4	5.7	5.9	6.0	6.1	3.4	3.9	4.2	4.4	4.5	4.6	4.7	
	8	5.0	6.5	7.5	8.1	8.5	8.8	9.0	9.1	5.1	5.8	6.3	6.6	6.8	7.0	7.1	
9	7.4	9.7	11.1	12.0	12.6	13.1	13.3	13.5	7.6	8.6	9.3	9.7	10.1	10.3	10.4		
<b>Evaporating temperature -30°C</b>										<b>Evaporating temperature -40°C</b>							
TU	0		0.34	0.40	0.42	0.44	0.45				0.31	0.33	0.34	0.35	0.36	0.36	
	1		0.39	0.45	0.48	0.51	0.52	0.53	0.54			0.33	0.36	0.38	0.39	0.39	0.40
	2		0.47	0.53	0.57	0.60	0.62	0.63	0.63			0.39	0.42	0.44	0.45	0.46	0.46
	3		0.66	0.74	0.80	0.84	0.87	0.88	0.89			0.55	0.59	0.61	0.63	0.64	0.65
	4		1.0	1.1	1.2	1.2	1.3	1.3	1.3			0.80	0.86	0.90	0.92	0.94	0.95
	5		1.3	1.5	1.6	1.7	1.7	1.7	1.8			1.1	1.2	1.2	1.2	1.3	1.3
	6		1.9	2.2	2.4	2.5	2.5	2.6	2.6			1.6	1.7	1.8	1.8	1.9	1.9
	7		2.6	2.9	3.2	3.3	3.4	3.5	3.5			2.1	2.3	2.4	2.5	2.5	2.5
	8		3.9	4.4	4.8	5.0	5.1	5.2	5.3			3.2	3.5	3.6	3.7	3.8	3.8
9		5.7	6.5	7.0	7.3	7.5	7.7	7.7			4.7	5.1	5.3	5.5	5.5	5.6	

**Correction for subcooling  $\Delta t_{sub}$**   
 The evaporator capacity used must be corrected if subcooling deviates from 4 K.  
 The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

**Note:**  
 Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.06	1.11	1.15	1.2	1.25	1.3	1.35	1.39	1.44

Selection example

Refrigerant = R22  
 Evaporating temperature  $t_e = -10^\circ\text{C}$   
 Pressure drop in valve  $\Delta p = 10$  bar  
 Subcooling  $\Delta t_{sub} = 15$  K  
 Evaporator capacity = 3 kW  
 Correction value (table) = 1.11  
 The corrected evaporator capacity thus becomes 3 divided by 1.11 = 2.7 kW

Since the expansion valve capacity must be equal to or slightly more than the corrected evaporator capacity of 2.7 kW, a TUB/TUBE with orifice 5 and a table capacity of 2.8 kW would be a suitable choice.



**Capacity (continued)**

Capacity in kW for range B = -60 → -25°C and opening superheat OS = 4 K

**R22**

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature -25°C</b>										<b>Evaporating temperature -30°C</b>							
TU	0	0.36	0.45	0.50	0.54	0.56	0.58	0.59	0.59	0.33	0.42	0.46	0.49	0.52	0.53	0.54	0.54
	1	0.48	0.62	0.69	0.74	0.77	0.79	0.81	0.81	0.42	0.54	0.61	0.66	0.68	0.70	0.71	0.72
	2	0.61	0.79	0.89	0.96	1.01	1.04	1.06	1.07	0.52	0.67	0.75	0.81	0.85	0.88	0.89	0.90
	3	0.85	1.10	1.25	1.34	1.41	1.45	1.48	1.50	0.73	0.93	1.1	1.1	1.2	1.2	1.3	1.3
	4	1.3	1.6	1.9	2.0	2.1	2.1	2.2	2.2	1.1	1.4	1.6	1.7	1.8	1.8	1.8	1.9
	5	1.7	2.2	2.5	2.7	2.8	2.9	2.9	3.0	1.4	1.9	2.1	2.2	2.4	2.4	2.5	2.5
	6	2.5	3.3	3.7	4.0	4.2	4.3	4.4	4.5	2.1	2.8	3.1	3.4	3.5	3.6	3.7	3.7
	7	3.4	4.4	5.0	5.4	5.6	5.8	5.9	6.0	2.9	3.7	4.2	4.5	4.7	4.9	4.9	5.0
	8	5.1	6.6	7.5	8.0	8.4	8.7	8.9	8.9	4.3	5.6	6.3	6.8	7.1	7.3	7.4	7.5
	9	7.6	9.7	11.0	11.9	12.4	12.8	13.1	13.2	6.4	8.2	9.3	10.0	10.4	10.7	10.9	11.0
<b>Evaporating temperature -40°C</b>										<b>Evaporating temperature -50°C</b>							
TU	0	0.27	0.34	0.37	0.40	0.42	0.43	0.43	0.44	0.20	0.25	0.28	0.30	0.31	0.32	0.33	0.33
	1	0.31	0.39	0.44	0.47	0.50	0.51	0.52	0.52	0.21	0.27	0.30	0.32	0.34	0.35	0.35	0.35
	2	0.36	0.46	0.52	0.56	0.59	0.60	0.61	0.62	0.25	0.31	0.35	0.38	0.39	0.40	0.41	0.41
	3	0.51	0.65	0.73	0.79	0.82	0.85	0.86	0.87	0.35	0.44	0.50	0.53	0.55	0.57	0.58	0.58
	4	0.75	0.96	1.1	1.2	1.2	1.2	1.3	1.3	0.51	0.65	0.72	0.77	0.81	0.83	0.84	0.85
	5	1.0	1.3	1.4	1.6	1.6	1.7	1.7	1.7	0.68	0.87	0.97	1.0	1.1	1.1	1.1	1.1
	6	1.5	1.9	2.2	2.3	2.4	2.5	2.5	2.6	1.0	1.3	1.4	1.5	1.6	1.7	1.7	1.7
	7	2.0	2.6	2.9	3.1	3.2	3.3	3.4	3.4	1.4	1.7	1.9	2.1	2.2	2.2	2.3	2.3
	8	3.0	3.9	4.4	4.7	4.9	5.0	5.1	5.2	2.1	2.6	2.9	3.1	3.3	3.4	3.4	3.4
	9	4.5	5.7	6.4	6.8	7.1	7.3	7.5	7.5	3.0	3.8	4.3	4.6	4.8	4.9	5.0	5.0
<b>Evaporating temperature -60°C</b>																	
TU	0	0.14	0.17	0.19	0.21	0.21	0.22	0.22	0.22								
	1	0.14	0.18	0.20	0.22	0.22	0.23	0.23	0.23								
	2	0.16	0.21	0.23	0.25	0.26	0.26	0.27	0.27								
	3	0.23	0.29	0.33	0.35	0.36	0.37	0.38	0.38								
	4	0.34	0.43	0.48	0.51	0.53	0.54	0.55	0.55								
	5	0.45	0.57	0.64	0.68	0.71	0.73	0.74	0.74								
	6	0.67	0.85	0.95	1.01	1.05	1.08	1.09	1.10								
	7	0.91	1.1	1.3	1.4	1.4	1.5	1.5	1.5								
	8	1.4	1.7	1.9	2.1	2.1	2.2	2.2	2.2								
	9	2.0	2.5	2.8	3.0	3.1	3.2	3.2	3.2								

**Correction for subcooling  $\Delta t_{sub}$**   
 The evaporator capacity used must be corrected if subcooling deviates from 4 K.  
 The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

**Note:**  
 Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.06	1.11	1.15	1.2	1.25	1.3	1.35	1.39	1.44

Capacity (continued)

Capacity in kW for range  $N = -40 \rightarrow +10^\circ\text{C}$  and opening superheat  $OS = 4\text{ K}$

**R134a**

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature +10°C</b>																	
TU	0	0.38	0.46	0.50	0.53	0.54	0.54			0.35	0.42	0.46	0.48	0.49	0.49		
	1	0.57	0.69	0.76	0.79	0.81	0.81			0.50	0.61	0.66	0.69	0.70	0.71		
	2	0.82	1.1	1.2	1.2	1.3	1.3			0.66	0.84	0.93	0.98	1.0	1.0		
	3	1.1	1.4	1.6	1.7	1.8	1.8			0.92	1.2	1.3	1.4	1.4	1.4		
	4	1.7	2.2	2.5	2.6	2.7	2.7			1.4	1.8	1.9	2.0	2.1	2.1		
	5	2.3	2.9	3.3	3.5	3.6	3.6			1.8	2.3	2.6	2.7	2.8	2.8		
	6	3.4	4.4	4.9	5.2	5.4	5.5			2.8	3.5	3.9	4.1	4.2	4.3		
	7	4.6	5.9	6.6	7.0	7.2	7.2			3.7	4.7	5.2	5.5	5.6	5.7		
	8	6.8	8.7	9.8	10.3	10.6	10.8			5.5	7.0	7.8	8.2	8.4	8.5		
9	10.2	13.1	14.6	15.5	15.9	16.0			8.3	10.4	11.5	12.2	12.4	12.5			
<b>Evaporating temperature 0°C</b>																	
<b>Evaporating temperature -10°C</b>																	
TU	0	0.31	0.37	0.40	0.42	0.43	0.43			0.31	0.34	0.35	0.35	0.35			
	1	0.41	0.51	0.55	0.58	0.58	0.58			0.39	0.43	0.44	0.45	0.45			
	2	0.51	0.64	0.70	0.74	0.75	0.76			0.47	0.51	0.53	0.54	0.54			
	3	0.71	0.89	0.98	1.0	1.1	1.1			0.65	0.72	0.75	0.76	0.76			
	4	1.1	1.3	1.5	1.5	1.6	1.6			0.96	1.05	1.10	1.12	1.1			
	5	1.4	1.8	2.0	2.1	2.1	2.1			1.3	1.4	1.5	1.5	1.5			
	6	2.1	2.7	2.9	3.1	3.1	3.2			1.9	2.1	2.2	2.2	2.2			
	7	2.8	3.5	3.9	4.1	4.2	4.2			2.6	2.8	3.0	3.0	3.0			
	8	4.3	5.3	5.9	6.2	6.3	6.3			3.9	4.3	4.4	4.5	4.5			
9	6.3	7.9	8.7	9.1	9.3	9.3			5.7	6.2	6.5	6.6	6.6				
<b>Evaporating temperature -20°C</b>																	
<b>Evaporating temperature -30°C</b>																	
TU	0		0.25	0.27	0.28	0.28	0.28			0.18	0.19	0.20	0.20	0.20			
	1		0.28	0.30	0.32	0.32	0.32			0.19	0.21	0.21	0.21	0.21			
	2		0.32	0.35	0.37	0.37	0.37			0.22	0.24	0.25	0.25	0.25			
	3		0.46	0.50	0.52	0.53	0.52			0.31	0.34	0.35	0.35	0.35			
	4		0.67	0.73	0.76	0.77	0.76			0.45	0.49	0.50	0.51	0.51			
	5		0.90	0.98	1.02	1.03	1.0			0.61	0.66	0.68	0.68	0.68			
	6		1.3	1.5	1.5	1.5	1.5			0.90	0.97	1.0	1.0	1.0			
	7		1.8	2.0	2.0	2.1	2.1			1.2	1.3	1.4	1.4	1.4			
	8		2.7	3.0	3.1	3.1	3.1			1.8	2.0	2.1	2.1	2.1			
9		4.0	4.3	4.5	4.5	4.5			2.7	2.9	3.0	3.0	3.0				
<b>Evaporating temperature -40°C</b>																	

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

The evaporator capacity used must be corrected if subcooling deviates from 4 K.

The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

*Note:*

*Insufficient subcooling can produce flash gas.*

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.08	1.13	1.19	1.25	1.31	1.37	1.42	1.48	1.54

Capacity (continued)

Capacity in kW for range  $N = -40 \rightarrow +10^\circ\text{C}$  and opening superheat  $OS = 4\text{ K}$

R404A/R507

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature +10°C</b>																	
TU	0	0.32	0.40	0.44	0.46	0.46	0.46	0.45	0.44	0.31	0.39	0.42	0.44	0.44	0.44	0.43	0.42
	1	0.47	0.60	0.68	0.69	0.70	0.70	0.68	0.66	0.44	0.56	0.61	0.64	0.64	0.64	0.63	0.61
	2	0.70	0.91	1.0	1.1	1.1	1.1	1.1	1.1	0.60	0.77	0.87	0.92	0.94	0.94	0.93	0.90
	3	0.96	1.2	1.4	1.5	1.5	1.5	1.5	1.5	0.83	1.1	1.2	1.3	1.3	1.5	1.3	1.3
	4	1.5	1.9	2.1	2.3	2.3	2.3	2.3	2.2	1.3	1.6	1.8	1.9	2.0	2.0	1.9	1.9
	5	2.0	2.5	2.8	3.0	3.1	3.1	3.1	3.0	1.7	2.2	2.4	2.6	2.6	2.6	2.6	2.5
	6	2.9	3.8	4.3	4.5	4.7	4.7	4.6	4.5	2.5	3.2	3.6	3.8	3.9	3.9	3.9	3.8
	7	3.9	5.1	5.7	6.0	6.2	6.2	6.1	6.0	3.4	4.3	4.8	5.1	5.2	5.3	5.2	5.0
	8	5.8	7.5	8.4	9.0	9.2	9.2	9.1	8.9	5.0	6.5	7.2	7.6	7.8	7.8	7.7	7.5
9	8.8	11.3	12.7	13.5	13.8	13.9	13.7	13.39	7.5	9.6	10.8	11.4	11.7	11.7	11.5	11.2	
<b>Evaporating temperature 0°C</b>																	
TU	0	0.29	0.36	0.39	0.40	0.41	0.41	0.40	0.39	0.32	0.35	0.36	0.36	0.36	0.35	0.34	
	1	0.39	0.50	0.54	0.57	0.57	0.57	0.56	0.54	0.41	0.46	0.48	0.48	0.48	0.47	0.45	
	2	0.50	0.64	0.71	0.75	0.76	0.76	0.75	0.73	0.51	0.56	0.59	0.60	0.60	0.59	0.57	
	3	0.70	0.89	0.99	1.0	1.1	1.1	1.1	1.0	0.71	0.79	0.83	0.84	0.84	0.82	0.80	
	4	1.0	1.3	1.5	1.6	1.6	1.6	1.6	1.5	1.1	1.2	1.2	1.2	1.2	1.2	1.2	
	5	1.4	1.8	2.0	2.1	2.1	2.1	2.1	2.0	1.4	1.6	1.6	1.7	1.7	1.6	1.6	
	6	2.1	2.7	3.0	3.1	3.2	3.2	3.1	3.1	2.1	2.3	2.4	2.5	2.5	2.4	2.4	
	7	2.8	3.6	4.0	4.2	4.3	4.3	4.2	4.1	2.8	3.1	3.3	3.3	3.3	3.3	3.2	
	8	4.2	5.3	5.9	6.3	6.4	6.4	6.3	6.1	4.3	4.7	4.9	5.0	5.0	4.9	4.8	
9	6.2	7.9	8.8	9.3	9.5	9.5	9.3	9.0	6.3	6.9	7.3	7.4	7.4	7.2	7.0		
<b>Evaporating temperature -10°C</b>																	
TU	0			0.3	0.31	0.31	0.31	0.3	0.29			0.24	0.25	0.25	0.25	0.24	0.23
	1			0.36	0.38	0.38	0.38	0.37	0.36			0.27	0.28	0.28	0.28	0.27	0.26
	2			0.43	0.45	0.45	0.45	0.44	0.43			0.32	0.33	0.33	0.33	0.32	0.31
	3			0.60	0.63	0.64	0.63	0.62	0.60			0.45	0.46	0.47	0.46	0.45	0.43
	4			0.89	0.93	0.94	0.93	0.91	0.88			0.65	0.68	0.68	0.67	0.66	0.63
	5			1.2	1.2	1.3	1.2	1.2	1.2			0.88	0.91	0.91	0.90	0.88	0.85
	6			1.8	1.9	1.9	1.9	1.8	1.8			1.3	1.4	1.4	1.3	1.3	1.3
	7			2.4	2.5	2.5	2.5	2.4	2.4			1.8	1.8	1.8	1.8	1.8	1.7
	8			3.6	3.7	3.8	3.8	3.7	3.6			2.6	2.7	2.8	2.7	2.7	2.6
9			5.3	5.5	5.5	5.5	5.4	5.2			3.9	4.0	4.0	4.0	3.9	3.7	
<b>Evaporating temperature -20°C</b>																	
TU	0																
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
9																	
<b>Evaporating temperature -30°C</b>																	
TU	0																
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
9																	
<b>Evaporating temperature -40°C</b>																	
TU	0																
	1																
	2																
	3																
	4																
	5																
	6																
	7																
	8																
9																	

Correction for subcooling  $\Delta t_{sub}$

The evaporator capacity used must be corrected if subcooling deviates from 4 K.

The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

Note:

Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.1	1.2	1.29	1.37	1.46	1.54	1.63	1.7	1.78

Capacity (continued)

Capacity in kW for range B = -60 → -25°C and opening superheat OS = 4 K

R404A/R507

Valve type	Orifice no.	Pressure drop across valve Δp bar								Pressure drop across valve Δp bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature -25°C</b>										<b>Evaporating temperature -30°C</b>							
TU	0	0.30	0.36	0.39	0.40	0.40	0.40	0.39	0.38	0.28	0.33	0.36	0.37	0.37	0.37	0.36	0.35
	1	0.41	0.51	0.55	0.56	0.57	0.56	0.55	0.53	0.36	0.45	0.49	0.51	0.51	0.50	0.48	0.47
	2	0.53	0.66	0.73	0.76	0.77	0.77	0.75	0.73	0.45	0.57	0.62	0.65	0.65	0.65	0.64	0.61
	3	0.74	0.92	1.01	1.06	1.07	1.07	1.04	1.01	0.64	0.79	0.87	0.91	0.91	0.91	0.89	0.86
	4	1.1	1.4	1.5	1.6	1.6	1.6	1.6	1.5	1.0	1.2	1.3	1.3	1.4	1.3	1.3	1.3
	5	1.5	1.8	2.0	2.1	2.1	2.1	2.1	2.0	1.3	1.6	1.7	1.8	1.8	1.8	1.8	1.7
	6	2.2	2.8	3.0	3.2	3.2	3.2	3.1	3.0	1.9	2.4	2.6	2.7	2.7	2.7	2.6	2.6
	7	2.9	3.7	4.1	4.2	4.3	4.3	4.2	4.0	2.5	3.2	3.5	3.6	3.6	3.6	3.5	3.4
	8	4.4	5.5	6.1	6.3	6.4	6.4	6.3	6.1	3.8	4.7	5.2	5.4	5.5	5.4	5.3	5.1
9	6.5	8.2	9.0	9.4	9.5	9.4	9.2	8.9	5.6	7.0	7.7	8.0	8.1	8.0	7.8	7.5	
<b>Evaporating temperature -40°C</b>										<b>Evaporating temperature -50°C</b>							
TU	0		0.28	0.30	0.30	0.31	0.30	0.29	0.28		0.22	0.23	0.24	0.24	0.23	0.22	0.21
	1		0.34	0.37	0.38	0.38	0.38	0.37	0.35		0.24	0.25	0.26	0.26	0.26	0.25	0.24
	2		0.40	0.44	0.45	0.46	0.45	0.44	0.42		0.27	0.30	0.31	0.31	0.30	0.29	0.28
	3		0.57	0.62	0.64	0.64	0.63	0.62	0.59		0.39	0.42	0.43	0.43	0.42	0.41	0.39
	4		0.83	0.91	0.94	0.94	0.93	0.91	0.87		0.57	0.61	0.63	0.63	0.62	0.60	0.57
	5		1.1	1.2	1.3	1.3	1.3	1.2	1.2		0.76	0.82	0.84	0.84	0.83	0.81	0.77
	6		1.7	1.8	1.9	1.9	1.9	1.8	1.8		1.1	1.2	1.3	1.3	1.2	1.2	1.2
	7		2.2	2.4	2.5	2.5	2.5	2.4	2.4		1.5	1.6	1.7	1.7	1.7	1.6	1.5
	8		3.4	3.7	3.8	3.8	3.8	3.7	3.5		2.3	2.5	2.6	2.6	2.5	2.4	2.3
9		4.9	5.4	5.6	5.6	5.5	5.4	5.2		3.3	3.6	3.7	3.7	3.7	3.5	3.4	
<b>Evaporating temperature -60°C</b>																	
TU	0			0.16	0.16	0.16	0.16	0.15	0.15								
	1			0.17	0.17	0.17	0.17	0.16	0.15								
	2			0.19	0.20	0.20	0.19	0.19	0.18								
	3			0.27	0.28	0.28	0.27	0.26	0.25								
	4			0.40	0.41	0.41	0.40	0.38	0.36								
	5			0.53	0.55	0.55	0.53	0.51	0.49								
	6			0.79	0.81	0.81	0.79	0.76	0.73								
	7			1.1	1.1	1.1	1.1	1.0	1.0								
	8			1.6	1.7	1.7	1.6	1.6	1.5								
9			2.3	2.4	2.4	2.3	2.3	2.1									

**Correction for subcooling  $\Delta t_{sub}$**   
 The evaporator capacity used must be corrected if subcooling deviates from 4 K. The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

**Note:**  
 Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.1	1.2	1.29	1.37	1.46	1.54	1.63	1.7	1.78

Capacity (continued)

Capacity in kW for range  $N = -40 \rightarrow +10^\circ\text{C}$  and opening superheat  $OS = 4\text{ K}$

**R407C**

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature <math>+10^\circ\text{C}</math></b>																	
TU	0	0.43	0.54	0.60	0.64	0.67	0.68	0.68	0.68	0.41	0.51	0.56	0.60	0.62	0.63	0.63	0.63
	1	0.63	0.81	0.90	0.96	0.99	1.01	1.02	1.01	0.56	0.73	0.81	0.86	0.89	0.90	0.91	0.90
	2	0.90	1.2	1.4	1.5	1.5	1.6	1.6	1.6	0.8	1.0	1.1	1.2	1.2	1.3	1.3	1.3
	3	1.2	1.6	1.9	2.0	2.1	2.2	2.2	2.2	1.0	1.4	1.5	1.7	1.7	1.8	1.8	1.8
	4	1.9	2.5	2.8	3.1	3.2	3.3	3.3	3.3	1.6	2.1	2.3	2.5	2.6	2.7	2.7	2.7
	5	2.5	3.3	3.8	4.1	4.2	4.4	4.4	4.4	2.1	2.7	3.1	3.3	3.5	3.5	3.6	3.6
	6	3.8	5.0	5.7	6.1	6.4	6.6	6.7	6.7	3.1	4.1	4.6	5.0	5.2	5.3	5.4	5.4
	7	5.0	6.6	7.6	8.2	8.6	8.8	8.9	8.9	4.2	5.4	6.2	6.7	6.9	7.1	7.2	7.2
	8	7.5	9.9	11.2	12.2	12.7	13.0	13.2	13.2	6.3	8.2	9.3	9.9	10.4	10.6	10.7	10.7
9	11.3	14.8	16.9	18.2	19.0	19.5	19.7	19.7	9.3	12.2	13.8	14.8	15.4	15.8	15.9	15.9	
<b>Evaporating temperature <math>0^\circ\text{C}</math></b>																	
<b>Evaporating temperature <math>-10^\circ\text{C}</math></b>																	
TU	0	0.37	0.46	0.51	0.54	0.55	0.56	0.57	0.56	0.33	0.40	0.44	0.47	0.48	0.49	0.49	0.49
	1	0.48	0.62	0.70	0.74	0.76	0.77	0.77	0.77	0.39	0.50	0.56	0.60	0.62	0.63	0.63	0.63
	2	0.60	0.78	0.88	0.94	0.98	1.00	1.01	1.01	0.47	0.60	0.68	0.72	0.75	0.76	0.77	0.76
	3	0.84	1.1	1.2	1.3	1.4	1.4	1.4	1.4	0.66	0.84	0.95	1.0	1.1	1.1	1.1	1.1
	4	1.3	1.6	1.8	2.0	2.0	2.1	2.1	2.1	0.98	1.3	1.4	1.5	1.6	1.6	1.6	1.6
	5	1.7	2.2	2.4	2.6	2.7	2.8	2.8	2.8	1.3	1.7	1.9	2.0	2.1	2.1	2.1	2.1
	6	2.5	3.2	3.7	3.9	4.1	4.2	4.2	4.2	1.9	2.5	2.8	3.0	3.1	3.2	3.2	3.2
	7	3.4	4.3	4.9	5.2	5.5	5.6	5.6	5.6	2.6	3.3	3.7	4.0	4.1	4.2	4.2	4.2
	8	5.0	6.5	7.4	7.9	8.2	8.4	8.4	8.4	3.9	5.0	5.7	6.0	6.2	6.4	6.4	6.4
9	7.5	9.6	10.9	11.6	12.1	12.3	12.4	12.4	5.8	7.4	8.3	8.9	9.2	9.3	9.4	9.3	
<b>Evaporating temperature <math>-20^\circ\text{C}</math></b>																	
<b>Evaporating temperature <math>-30^\circ\text{C}</math></b>																	
TU	0		0.26	0.29	0.31	0.32	0.32	0.32	0.31			0.29	0.31	0.32	0.32	0.32	0.31
	1		0.38	0.43	0.45	0.47	0.48	0.48	0.47			0.31	0.33	0.34	0.34	0.35	0.34
	2		0.45	0.50	0.53	0.55	0.56	0.56	0.56			0.36	0.38	0.40	0.40	0.40	0.40
	3		0.63	0.71	0.75	0.78	0.79	0.79	0.79			0.51	0.54	0.56	0.56	0.56	0.56
	4		0.93	1.0	1.1	1.1	1.2	1.2	1.2			0.75	0.79	0.81	0.82	0.82	0.82
	5		1.3	1.4	1.5	1.5	1.6	1.6	1.5			1.0	1.1	1.1	1.1	1.1	1.1
	6		1.9	2.1	2.2	2.3	2.3	2.3	2.3			1.5	1.6	1.6	1.6	1.6	1.6
	7		2.5	2.8	3.0	3.1	3.1	3.1	3.1			2.0	2.1	2.2	2.2	2.2	2.2
	8		3.8	4.2	4.5	4.6	4.7	4.7	4.7			3.0	3.2	3.3	3.3	3.3	3.3
9		5.5	6.2	6.5	6.7	6.8	6.9	6.8			4.4	4.7	4.8	4.9	4.9	4.8	
<b>Evaporating temperature <math>-40^\circ\text{C}</math></b>																	

Correction for subcooling  $\Delta t_{sub}$

The evaporator capacity used must be corrected if subcooling deviates from 4 K.

The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

Note:

Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.08	1.14	1.21	1.27	1.33	1.39	1.45	1.51	1.57

Capacity (continued)

Capacity in kW for range B = -60 → -25°C and opening superheat OS = 4 K

**R407C**

Valve type	Orifice no.	Pressure drop across valve Δp bar								Pressure drop across valve Δp bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
<b>Evaporating temperature -25°C</b>										<b>Evaporating temperature -30°C</b>							
TU	0	0.34	0.42	0.46	0.49	0.50	0.51	0.51	0.50	0.31	0.38	0.42	0.44	0.45	0.46	0.46	0.46
	1	0.43	0.54	0.61	0.65	0.66	0.67	0.67	0.67	0.37	0.47	0.52	0.56	0.57	0.58	0.59	0.58
	2	0.52	0.67	0.75	0.79	0.82	0.83	0.84	0.83	0.45	0.56	0.63	0.67	0.69	0.70	0.70	0.70
	3	0.73	0.93	1.0	1.1	1.2	1.2	1.2	1.2	0.62	0.79	0.88	0.94	0.97	0.98	0.98	0.98
	4	1.1	1.4	1.5	1.6	1.7	1.7	1.7	1.7	0.92	1.2	1.3	1.4	1.4	1.4	1.5	1.4
	5	1.5	1.8	2.1	2.2	2.3	2.3	2.3	2.3	1.2	1.6	1.7	1.8	1.9	1.9	1.9	1.9
	6	2.2	2.8	3.1	3.3	3.4	3.5	3.5	3.5	1.8	2.3	2.6	2.8	2.9	2.9	2.9	2.9
	7	2.9	3.7	4.1	4.4	4.5	4.6	4.6	4.6	2.5	3.1	3.5	3.7	3.8	3.9	3.9	3.9
	8	4.4	5.6	6.2	6.6	6.8	7.0	7.0	6.9	3.7	4.7	5.3	5.6	5.8	5.8	5.9	5.8
9	6.5	8.2	9.2	9.7	10.1	10.2	10.3	10.2	5.5	6.9	7.7	8.2	8.4	8.6	8.6	8.5	
<b>Evaporating temperature -40°C</b>										<b>Evaporating temperature -50°C</b>							
TU	0	0.24	0.30	0.33	0.35	0.36	0.36	0.36	0.36	0.17	0.22	0.24	0.25	0.26	0.26	0.26	0.26
	1	0.27	0.34	0.37	0.39	0.41	0.41	0.41	0.41	0.18	0.23	0.25	0.27	0.27	0.28	0.28	0.27
	2	0.31	0.39	0.44	0.46	0.47	0.48	0.48	0.48	0.21	0.27	0.29	0.31	0.32	0.32	0.32	0.32
	3	0.44	0.55	0.61	0.65	0.67	0.68	0.68	0.67	0.30	0.37	0.41	0.44	0.45	0.45	0.45	0.45
	4	0.65	0.81	0.90	0.95	0.98	0.99	0.99	0.98	0.44	0.55	0.60	0.63	0.65	0.66	0.66	0.65
	5	0.86	1.1	1.2	1.3	1.3	1.3	1.3	1.3	0.59	0.73	0.81	0.85	0.88	0.88	0.88	0.87
	6	1.3	1.6	1.8	1.9	2.0	2.0	2.0	2.0	0.87	1.1	1.2	1.3	1.3	1.3	1.3	1.3
	7	1.7	2.2	2.4	2.5	2.6	2.7	2.7	2.6	1.2	1.5	1.6	1.7	1.7	1.8	1.8	1.7
	8	2.6	3.3	3.6	3.9	4.0	4.0	4.0	4.0	1.8	2.2	2.4	2.6	2.6	2.7	2.7	2.6
9	3.8	4.8	5.3	5.6	5.8	5.8	5.8	5.8	2.6	3.2	3.5	3.7	3.8	3.9	3.9	3.8	
<b>Evaporating temperature -60°C</b>																	
TU	0	0.12	0.15	0.16	0.18	0.17	0.17	0.17	0.17								
	1	0.12	0.15	0.17	0.18	0.18	0.18	0.18	0.18								
	2	0.14	0.17	0.19	0.20	0.21	0.21	0.21	0.21								
	3	0.20	0.25	0.27	0.29	0.29	0.29	0.29	0.29								
	4	0.29	0.36	0.39	0.41	0.42	0.43	0.42	0.42								
	5	0.39	0.48	0.53	0.56	0.57	0.57	0.57	0.56								
	6	0.58	0.71	0.79	0.83	0.85	0.85	0.85	0.83								
	7	0.78	0.96	1.1	1.1	1.1	1.1	1.1	1.1								
	8	1.2	1.5	1.6	1.7	1.7	1.7	1.7	1.7								
9	1.7	2.1	2.3	2.4	2.5	2.5	2.5	2.5									

Correction for subcooling  $\Delta t_{sub}$   
 The evaporator capacity used must be corrected if subcooling deviates from 4 K.  
 The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

Note:  
 Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.08	1.14	1.21	1.27	1.33	1.39	1.45	1.51	1.57

Capacity (continued)

Capacity in kW for range  $N = -40 \rightarrow +10^\circ\text{C}$  and opening superheat  $OS = 4\text{ K}$

**R410A**

Valve type	Orifice no.	Pressure drop across valve $\Delta p$ bar								Pressure drop across valve $\Delta p$ bar							
		3	6	9	12	15	18	21	24	3	6	9	12	15	18	21	24
<b>Evaporating temperature <math>+10^\circ\text{C}</math></b>																	
TU	0	0.56	0.72	0.80	0.85	0.87	0.88	0.87	0.85	0.56	0.70	0.78	0.83	0.85	0.86	0.85	0.84
	1	0.89	1.13	1.26	1.30	1.37	1.38	1.36	1.33	0.84	1.06	1.18	1.24	1.29	1.30	1.29	1.27
	2	1.45	1.90	2.2	2.3	2.4	2.5	2.4	2.4	1.25	1.64	1.86	1.99	2.1	2.1	2.1	2.1
	3	1.98	2.6	3.0	3.2	3.3	3.3	3.3	3.3	1.72	2.3	2.6	2.7	2.9	2.9	2.9	2.9
	4	3.1	4.1	4.6	4.9	5.1	5.2	5.1	5.0	2.6	3.5	3.9	4.2	4.3	4.4	4.4	4.3
	5	4.1	5.3	6.1	6.5	6.7	6.8	6.8	6.7	3.5	4.6	5.2	5.6	5.8	5.9	5.8	5.8
	6	6.2	8.1	9.2	9.9	10.3	10.5	10.4	10.2	5.3	6.9	7.9	8.4	8.7	8.9	8.9	8.8
	7	8.2	10.7	12.7	13.1	13.6	13.8	13.8	13.5	7.0	9.2	10.4	11.1	11.6	11.8	11.8	11.6
	8	12.1	15.8	18.0	19.3	20.0	20.3	20.2	19.9	10.4	13.7	15.5	16.6	17.2	17.5	17.5	17.2
	9	18.3	24.0	27.2	29.1	30.2	30.6	30.5	29.9	15.7	20.5	23.3	24.9	25.8	26.2	26.2	25.7
<b>Evaporating temperature <math>0^\circ\text{C}</math></b>																	
<b>Evaporating temperature <math>-10^\circ\text{C}</math></b>																	
TU	0	0.53	0.67	0.74	0.78	0.80	0.81	0.81	0.79	0.60	0.67	0.70	0.72	0.73	0.73	0.72	
	1	0.76	0.96	1.07	1.13	1.16	1.17	1.17	1.15	0.83	0.92	0.97	1.00	1.01	1.00	0.99	
	2	1.04	1.35	1.52	1.63	1.69	1.72	1.72	1.70	1.06	1.20	1.28	1.32	1.34	1.34	1.33	
	3	1.44	1.86	2.1	2.3	2.3	2.4	2.4	2.4	1.48	1.67	1.78	1.84	1.87	1.87	1.85	
	4	2.2	2.8	3.2	3.4	3.5	3.6	3.6	3.5	2.2	2.5	2.7	2.7	2.8	2.8	2.8	
	5	2.9	3.7	4.2	4.5	4.7	4.8	4.8	4.8	3.0	3.3	3.5	3.7	3.7	3.7	3.7	
	6	4.3	5.6	6.4	6.8	7.1	7.2	7.2	7.1	4.4	5.0	5.3	5.5	5.6	5.6	5.5	
	7	5.8	7.5	8.5	9.1	9.4	9.6	9.6	9.5	5.9	6.6	7.1	7.4	7.5	7.5	7.4	
	8	8.6	11.2	12.7	13.6	14.1	14.3	14.3	14.1	8.9	10.0	10.7	11.0	11.2	11.2	11.1	
	9	12.9	16.8	19.0	20.3	21.0	21.3	21.3	21.0	13.2	14.8	15.8	16.4	16.6	16.6	16.4	
<b>Evaporating temperature <math>-20^\circ\text{C}</math></b>																	
<b>Evaporating temperature <math>-30^\circ\text{C}</math></b>																	
TU	0		0.52	0.58	0.61	0.63	0.63	0.63	0.62			0.48	0.50	0.52	0.52	0.52	0.51
	1		0.66	0.74	0.79	0.82	0.82	0.82	0.81			0.56	0.59	0.61	0.62	0.62	0.61
	2		0.81	0.90	0.96	1.00	1.01	1.01	1.00			0.66	0.70	0.72	0.73	0.73	0.72
	3		1.13	1.27	1.35	1.40	1.41	1.41	1.40			0.93	0.98	1.02	1.03	1.03	1.01
	4		1.67	1.87	2.0	2.1	2.1	2.1	2.1			1.36	1.45	1.49	1.51	1.50	1.48
	5		2.2	2.5	2.7	2.8	2.8	2.8	2.8			1.82	1.9	2.0	2.0	2.0	2.0
	6		3.3	3.7	4.0	4.1	4.2	4.2	4.1			2.7	2.9	3.0	3.0	3.0	3.0
	7		4.5	5.0	5.4	5.5	5.6	5.6	5.5			3.6	3.9	4.0	4.0	4.0	4.0
	8		6.7	7.6	8.0	8.3	8.4	8.4	8.3			5.5	5.8	6.0	6.1	6.1	6.0
	9		9.9	11.1	11.8	12.2	12.4	12.4	12.2			8.1	8.6	8.8	8.9	8.9	8.8
<b>Evaporating temperature <math>-40^\circ\text{C}</math></b>																	

Correction for subcooling  $\Delta t_{sub}$

The evaporator capacity used must be corrected if subcooling deviates from 4 K.

The corrected capacity can be obtained by dividing the evaporator capacity by the correction factor given below.

Note:

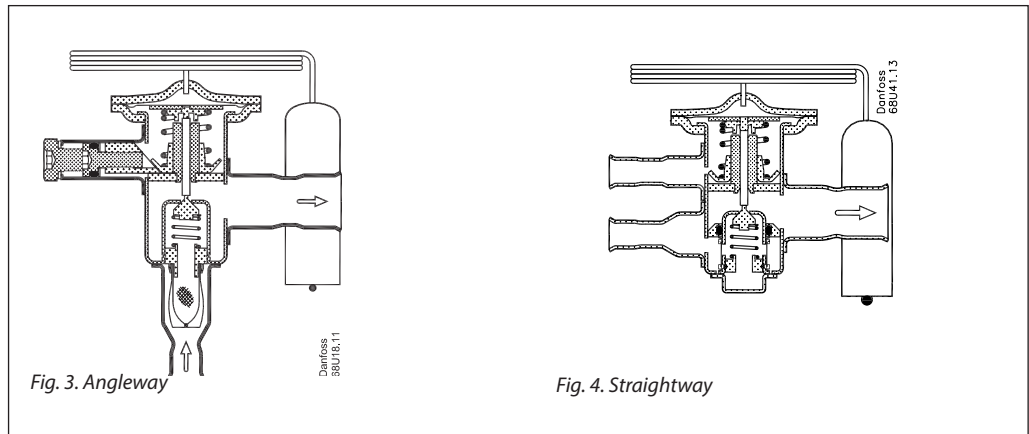
Insufficient subcooling can produce flash gas.

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

$\Delta t_{sub}$	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.08	1.15	1.21	1.27	1.33	1.39	1.45	1.50	1.56

Design/Function

1. Bulb with capillary tube
2. Thermostatic element with diaphragm
3. Setting spindle for adjustment of static superheat SS
4. Fixed orifice
5. Filter



Superheat, TUB

See fig. 5

SS = static superheat

OS = opening superheat

SH = SS + OS = total superheat

$Q_{nom.}$  = rated capacity

$Q_{max.}$  = maximum capacity

Static superheat SS can be adjusted with setting spindle 3, see fig. 3 (TUB). Static superheat cannot be adjusted on TUC.

The standard superheat setting SS is 5 K for valves without MOP and 4 K for valves with MOP.

The opening superheat OS is 4 K from when opening begins to when the valve gives its rated capacity  $Q_{nom.}$ .

Example

Static superheat	SS = 5 K
Opening superheat	OS = 4 K
Total superheat	SH = 5 + 4 = 9 K

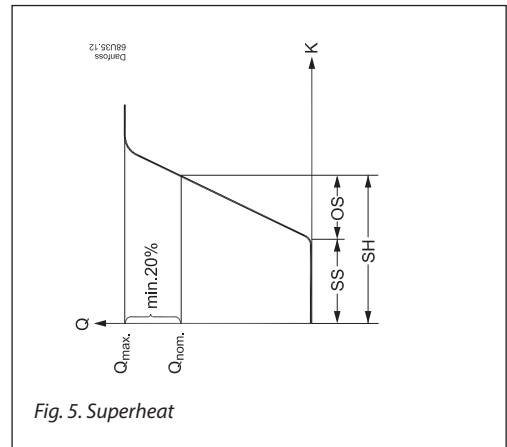


Fig. 5. Superheat



Dimensions and weight

