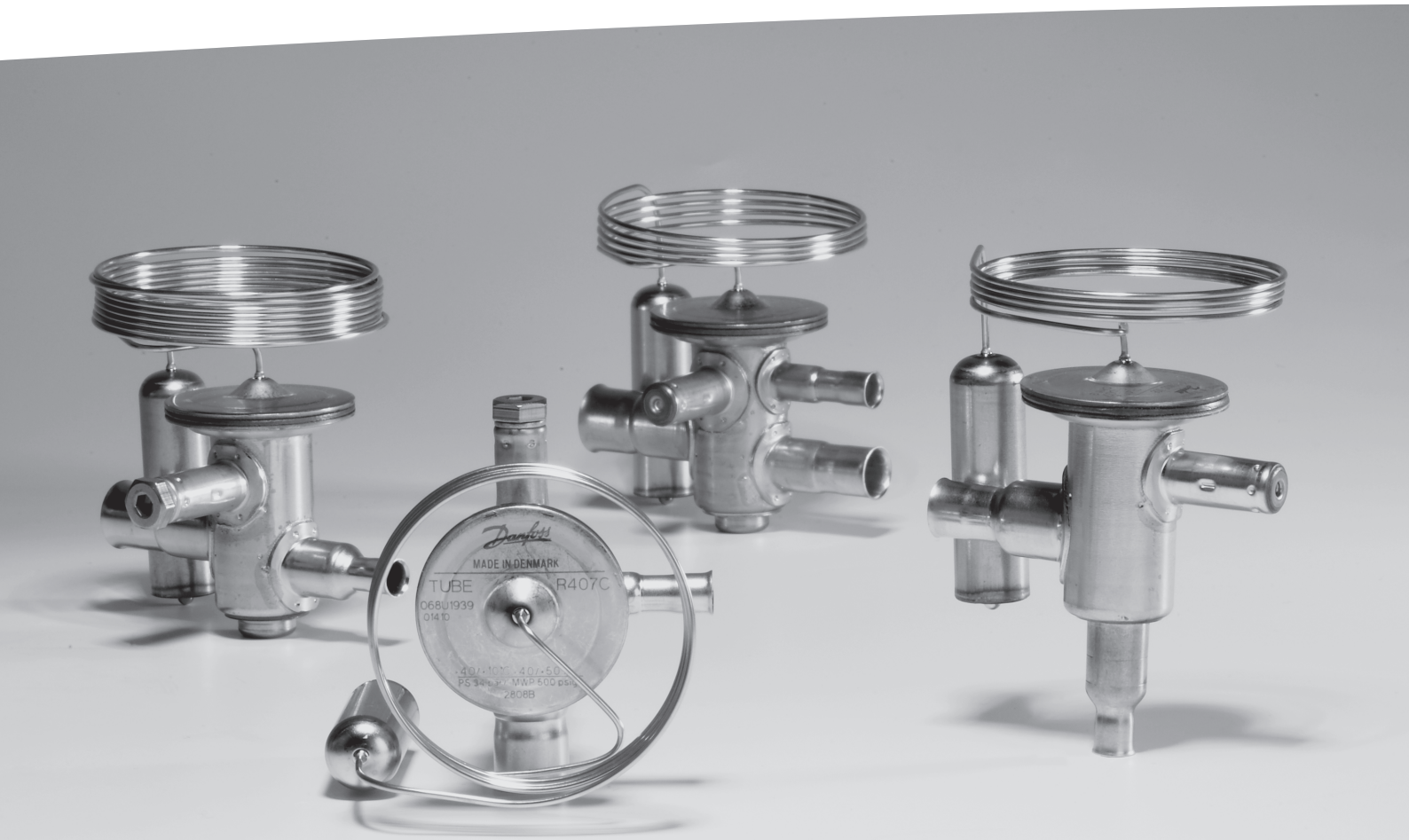
MAKING MODERN LIVING POSSIBLE

Technical brochure

Thermostatic expansion valves
TUB/TUBE and TUC/TUCE



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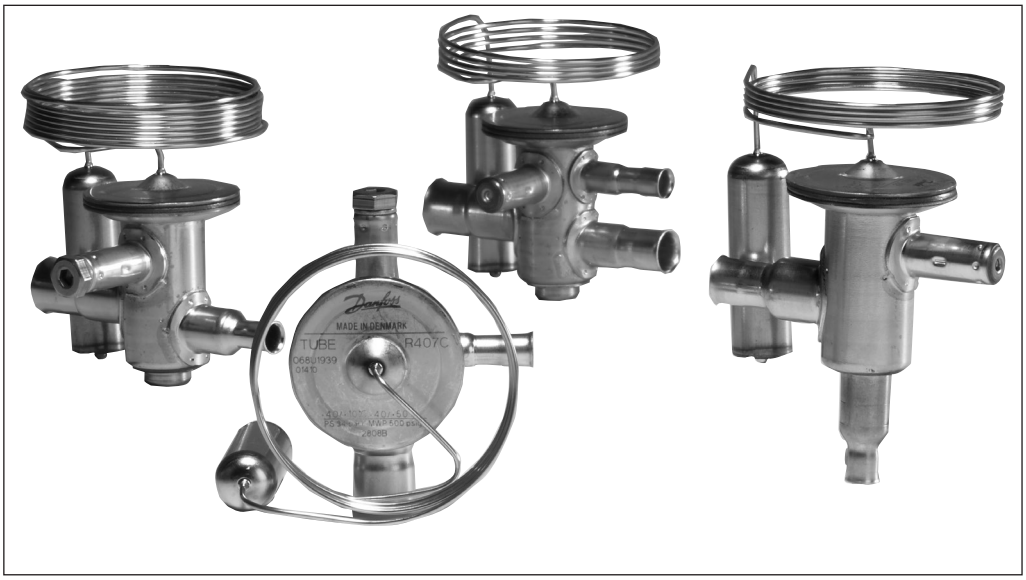
Introduction



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)

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Standard range

Versions available in the standard range:

Range N : −40 to +10°C without MOP

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

Capillary tube length: 0.8 m

Connections:

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:

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

Valves to special temperature ranges can be supplied.

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

For further information, please contact Danfoss.

Capillary tube length: 1.5 m

Bleed: 15%

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

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

Technical data

Max. bulb temperature	100°C
Max. valve body temperature	120°C,
short-lived peak	150°C
Perm. working press. (excl. R410A)	PS = 34 bar
Max. working pressure, R410A	PS = 45.5 bar
Max. test pressure (excl. R410A)	p' = 37.5 bar
Max. test pressure, R410A	p' = 50 bar

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.

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[1]		
	t_e = +15°C/+60°F	t_e = 0°C/+32°F	t_e = −20°C/−4°F
R22	p_e = 100 psig/6.9 bar	p_e = 60 psig/4.0 bar	p_e = 20 psig/1.5 bar
R134a	p_e = 55 psig/3.9 bar	p_e = 30 psig/1.9 bar	
R404A / R507	p_e = 120 psig/8.4 bar	p_e = 75 psig/5.0 bar	p_e = 30 psig/2.0 bar
R407C	p_e = 95 psig/6.6 bar	p_e = 50 psig/3.6 bar	p_e = 15 psig/1.1 bar
R410A	p_e = 165 psig/11.5 bar	p_e = 100 psig/7.0 bar	p_e = 45 psig/3.0 bar

[1] p_e in bar gauge

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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 20**02**, 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

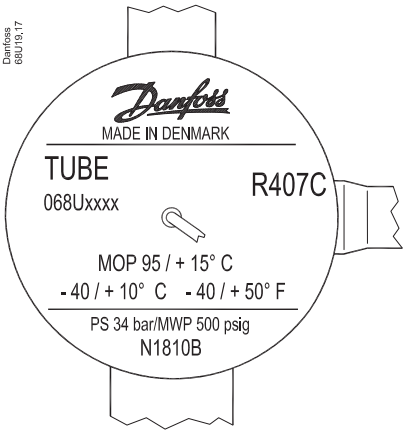


Fig. 1

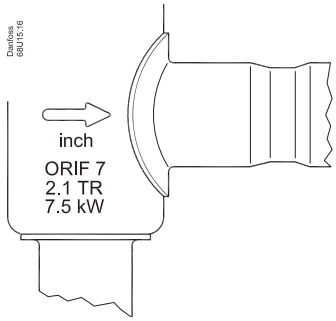
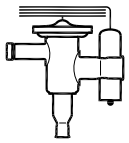


Fig. 2

Ordering
Angleway
Supplied with bulb strap
Standard valve range



R22, R407C, R410A, R134a

Range N = –40 → +10°C

Refrigerant	Type	Rated capacity $Q_{nom.}$ [1] kW	Rated capacity $Q_{nom.}$ [1] TR	Orifice no.[2]	Pressure equalisation	Connection Inlet × Outlet in.	Code no.	Connection Inlet × Outlet mm	Code no.
R22/ R407C [3]	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**

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

[1] Rated capacity $Q_{nom.}$ is based on:
Evaporating temperature
t_e = +5°C
Condensing temperature
t_c = +32°C
Refrigerant liquid temperature
t_l = +28°C
Opening superheat
OS = 4 K

[2] TUBE with orifice 0 and 9 and all TUB (internal pressure equalisation) cannot be used for biflow operation.

[3] For R407C plants, please select valves from the dedicated R407C program

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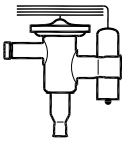
Ordering
Angleway
Supplied with bulb strap
Standard valve range



R404A/R507

Range N = –40 → +10°C

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

Valves with inch connections have ¼ in. pressure equalisation.
Valves with mm connections have 6 mm pressure equalisation.

[1] Rated capacity $Q_{nom.}$ is based on:
Evaporating temperature
t_e = +5°C
Condensing temperature
t_c = +32°C
Refrigerant liquid temperature
t_l = +28°C
Opening superheat
OS = 4 K

[2] TUBE with orifice 0 and 9 and all TUB (internal pressure equalisation) cannot be used for biflow operation.

Capacity

Capacity in kW for range N = –40 → +10°C and opening superheat OS = 4 K

R22

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
		Evaporating temperature +10°C								**Evaporating temperature 0°C**							
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
		Evaporating temperature –10°C								**Evaporating temperature –20°C**							
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
		Evaporating temperature –30°C								**Evaporating temperature –40°C**							
TU	0		0.34	0.38	0.40	0.42	0.44	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 Δt_{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 Δt_{sub}

Δt_{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°C
Pressure drop in valve Δp = 10 bar
Subcooling Δt_{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.

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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 Δp bar								Pressure drop across valve Δp bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
		Evaporating temperature –25°C								**Evaporating temperature –30°C**							
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
		Evaporating temperature –40°C								**Evaporating temperature –50°C**							
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
		Evaporating temperature –60°C															
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 Δt_{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 Δt_{sub}

Δt_{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 → +10°C and opening superheat OS = 4 K

R134a

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
		Evaporating temperature +10°C								**Evaporating temperature 0°C**							
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		
		Evaporating temperature –10°C								**Evaporating temperature –20°C**							
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		
		Evaporating temperature –30°C								**Evaporating temperature –40°C**							
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		

Correction for subcooling Δt_{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 Δt_{sub}

Δt_{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

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Capacity *(continued)*

Capacity in kW for range N = –40 → +10°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
		Evaporating temperature +10°C								**Evaporating temperature 0°C**							
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
		Evaporating temperature –10°C								**Evaporating temperature –20°C**							
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
		Evaporating temperature –30°C								**Evaporating temperature –40°C**							
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

Correction for subcooling Δt_{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 Δt_{sub}

Δt_{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

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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
		Evaporating temperature –25°C								**Evaporating temperature –30°C**							
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
		Evaporating temperature –40°C								**Evaporating temperature –50°C**							
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
				Evaporating temperature –60°C													
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 Δt_{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 Δt_{sub}

Δt_{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

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Capacity *(continued)*

Capacity in kW for range N = –40 → +10°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
		Evaporating temperature +10°C								**Evaporating temperature 0°C**							
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
		Evaporating temperature –10°C								**Evaporating temperature –20°C**							
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
		Evaporating temperature –30°C								**Evaporating temperature –40°C**							
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

Correction for subcooling Δt_{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 Δt_{sub}

Δt_{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
		Evaporating temperature –25°C								**Evaporating temperature –30°C**							
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
		Evaporating temperature –40°C								**Evaporating temperature –50°C**							
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
		Evaporating temperature –60°C															
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	0.20								
	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 Δt_{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 Δt_{sub}

Δt_{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

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Capacity *(continued)*

Capacity in kW for range N = −40 → +10°C and opening superheat OS = 4 K

R410A

Valve type	Orifice no.	Pressure drop across valve Δp bar								Pressure drop across valve Δp bar							
		3	6	9	12	15	18	21	24	3	6	9	12	15	18	21	24
		Evaporating temperature +10°C								**Evaporating temperature 0°C**							
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
		Evaporating temperature –10°C								**Evaporating temperature –20°C**							
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
		Evaporating temperature –30°C								**Evaporating temperature –40°C**							
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

Correction for subcooling Δt_{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 Δt_{sub}

Δt_{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

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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

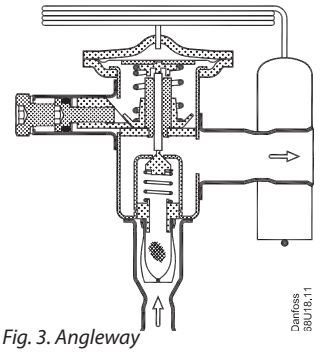

Fig. 3. Angleway

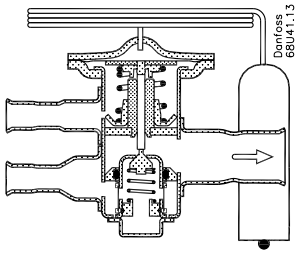

Fig. 4. Straightway

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

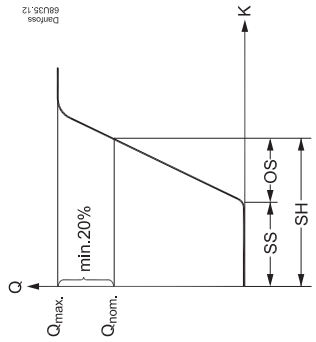

Fig. 5. Superheat

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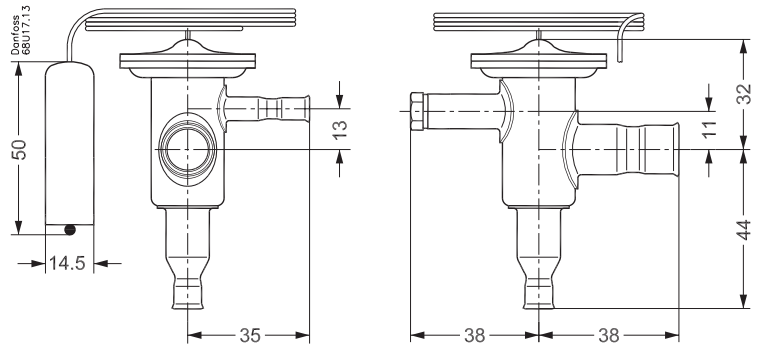
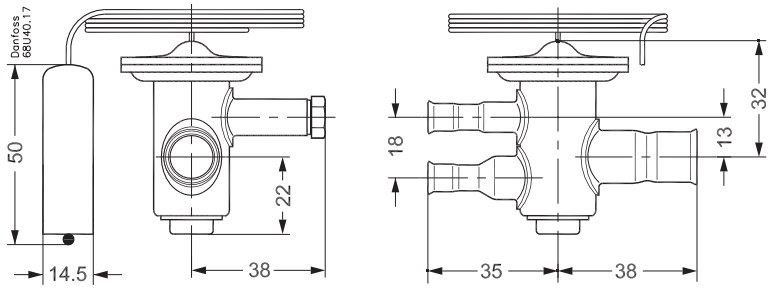
Dimensions and weight



Connection dimensions, see ordering tables.
Fig. 6. Angleway

Weight
0.13 kg



Connection dimensions, see ordering tables.
Fig. 6. Straightway

Weight
0.13 kg

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