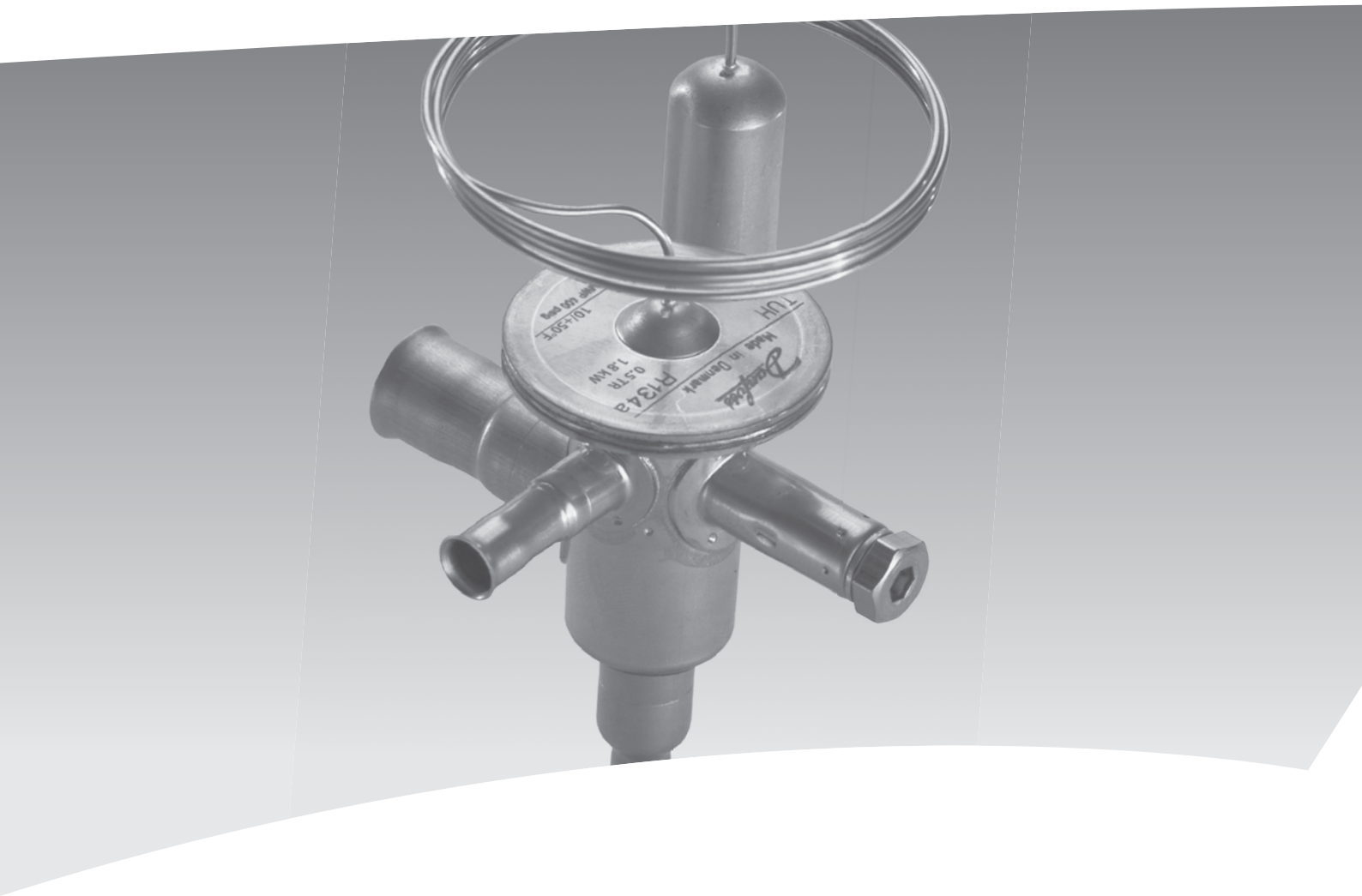


Capacity regulator (hot gas bypass), type TUH/TCHE

REFRIGERATION AND
AIR CONDITIONING

Technical leaflet

Contents

Technical leaflet **Capacity regulator (hot gas bypass), type TUH/TCHE**

Introduction

TUH/TCHE capacity regulators adapt the compressor capacity to the actual evaporator load for applications operating at an evaporating temperature of around 0°C. TUH/TCHE valves are typically used in applications such as:
- Air- driers
- Water chillers

Placed in a bypass between the high- and low pressure sides of the air-drier system TUH/TCHE maintain the compressor's suction pressure by injecting hot gas/cool gas from the high pressure side.

The TUH has internal pressure equalisation and is opening on a decrease in pressure at the outlet of the valve. The TCHE has external pressure equalisation and is opening directly on a decrease in the suction pressure at the compressor.

For both valves, the bulb only serve as a reservoir for the charge, however, it is recommended to mount it in a position where the temperature variation during running conditions is limited (see ⓐ and ⓑ in the application drawing).

Features

- Bimetal connections
  - straightforward and fast soldering (no wet cloth or refrigeration pliers required).
- Refrigerants
  R134a, R404A/R507, R407C, and other refrigerants by request.
- Replacement capacities up to 7.6 kW (2.2 TR) for R404A
- Stable regulation
- Tight across the seat
- Stainless steel, hermetically tight solder version
  - high connection strength
  - high corrosion resistance
  - capillary tube joints of high strength and vibration resistance
- Compact design
  - small dimensions and low weight
- Laser-welded, stainless steel diaphragm element
  - optimum function
  - long diaphragm life
  - high pressure resistance
- Adjustable setting
  - accurate setting
  - fine tuning possible
- Low p-band
- Advanced filter/strainer design
- Low hysteresis

Standard range

(Variant versions available upon request)

Versions available in the standard ranges only:

One standard range per refrigerant

Refrigerants: R134a, R404A/R507, R407C

Capillary tube length: TUH: 0.8 m / 2.6 ft.
TCHE: 0.9 m / 2.9 ft.

Orifice sizes: TUH: Orifice 9
TCHE: Orifice 3
Orifice 4

Connections:
Inlet 10 mm / 3/8 in.
Outlet 12 mm / 1/2 in.

Technical data

Max. valve body temperature 120°C / 248°F
short-lived peak 150°C / 302°F

Permissible working pressure
PS = 34 bar / MWP = 500 psig

Max. test pressure p' = 37.5 bar / 540 psig

P-band max. 0.5 bar / 7.3 psig

Setting
The valve is set to start opening at an evaporating temperature of +2°C/+36°F . The setting can be changed by turning the setting spindle. The temperature at which the valve starts opening will increase by turning the spindle clockwise whereas it will decrease by turning the spindle anticlockwise.

Adjustment range for start opening:
R134a −12 → +10°C / +10 → +50°F
R404A/R507 −5 → +5°C / +23 → +41°F
R407C −7 → +7°C / +19 → +45°F

Specifically designed for hot gas applications. Both the TUH and TCHE valves react only on suction pressure variations.

Identification

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

Main valve data example, fig. 1

TUH	= Type
068U2954	= Code number
R404A	= Refrigerant
−5 → +5°C	= Adjusting range in °C
+23 → +41°F	= Adjusting range in °F
PS 34 bar/ MWP 500 psig	= Max. working pressure
104B	= Date marking (week **10**, year 200**4**, weekday **B** = Tuesday)

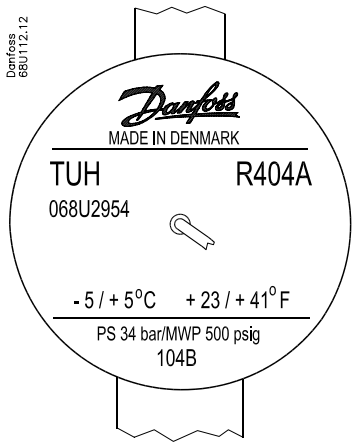


Fig. 1

Main valve data example, fig. 2

⇒	= Normal flow direction
inch	= Connection in inches (MM = millimetres)
ORIF 9	= Orifice number 9
1.3 TR	= Replacement capacity in Tons of Refrigeration
4.5 kW	= Replacement capacity in kW

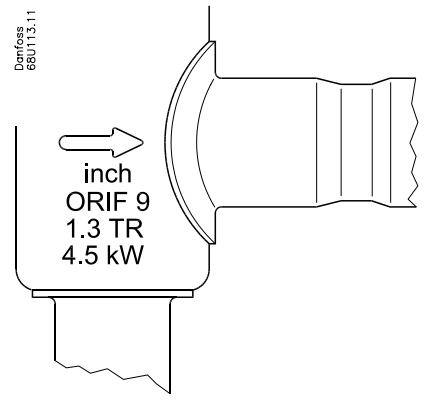
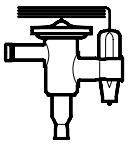


Fig. 2

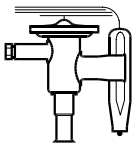
Ordering

Supplied with bulb strap

TU



TC



Standard range

R134a, R404A/R507, R407C

Refrigerant	Type	Orifice no.	Nominal replacement capacity[1]		Pressure equalisation	Connection Inlet × Outlet			
			kW	TR		in.[2]	**Code no.**	mm[3]	**Code no.**
R134a	TUH	9	1.8	0.5	int.	$^3/_8 \times {}^1/_2$	**068U2953**	10 × 12	**068U2950**
	TCHE	3	2.6	0.75	ext.	$^3/_8 \times {}^1/_2$	**068U4540**	10 × 12	**068U4530**
	TCHE	4	3.4	1	ext.	$^3/_8 \times {}^1/_2$	**068U4537**	10 × 12	**068U4534**
R404A/R507	TUH	9	4.5	1.3	int.	$^3/_8 \times {}^1/_2$	**068U2954**	10 × 12	**068U2951**
	TCHE	3	5.9	1.7	ext.	$^3/_8 \times {}^1/_2$	**068U4541**	10 × 12	**068U4531**
	TCHE	4	7.6	2.2	ext.	$^3/_8 \times {}^1/_2$	**068U4538**	10 × 12	**068U4535**
R407C	TUH	9	2.8	0.8	int.	$^3/_8 \times {}^1/_2$	**068U2955**	10 × 12	**068U2952**
	TCHE	3	4.1	1.2	ext.	$^3/_8 \times {}^1/_2$	**068U4542**	10 × 12	**068U4532**
	TCHE	4	5.3	1.5	ext.	$^3/_8 \times {}^1/_2$	**068U4539**	10 × 12	**068U4536**

[1] The nominal replacement capacity is the regulator capacity at evaporating temperature t_e = –2°C / 28°F, condensing temperature t_c = +40°C / 104°F, reduction of suction temperature / suction pressure Δt_s = 4 K / 7°F.

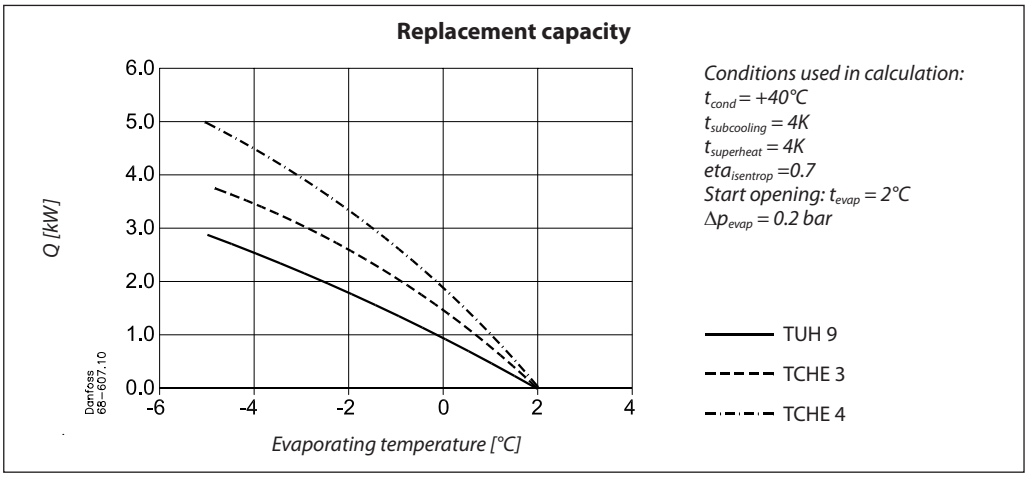
[2] Valves with inch connections have $^1/_4$ in. pressure equalisation.

[3] Valves with mm connections have 6 mm pressure equalisation.

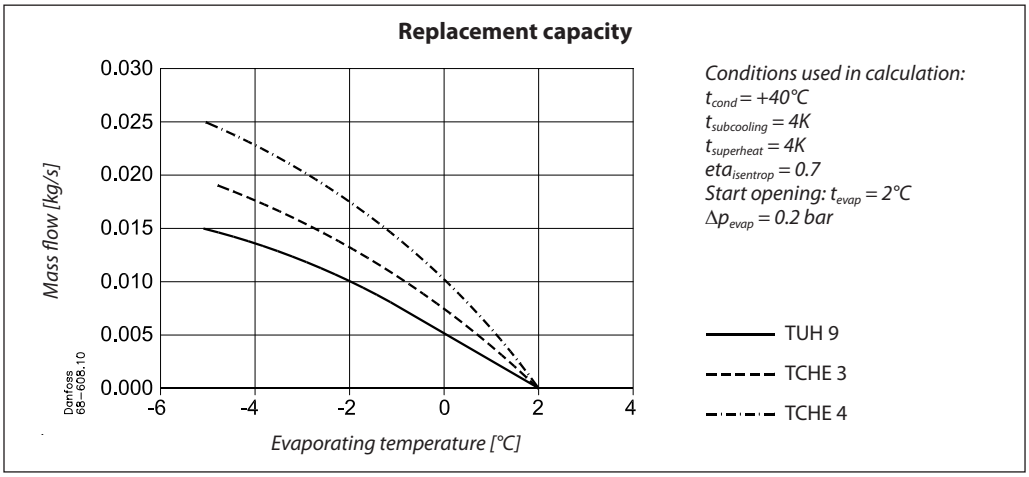
Capacity

R134a

Q [kW]



Mass flow [kg/s]



Correction factor for condensing temperature

	Condensing temperature		
R134a	+30°C	+40°C	+50°C
	0.7	1.0	1.4

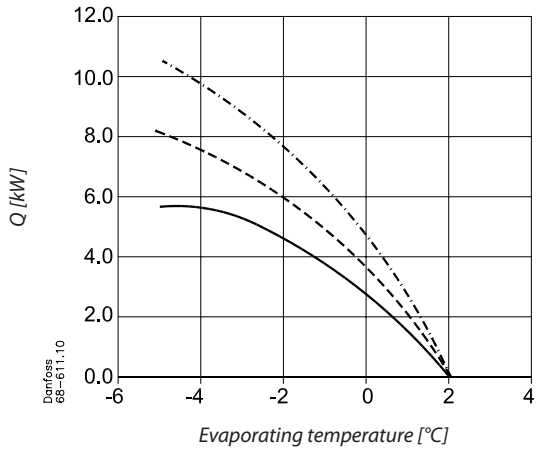
Above replacement capacity has to be multiplied with the correction factor.

R404A/R507

Capacity
(continued)

Q [kW]

Replacement capacity

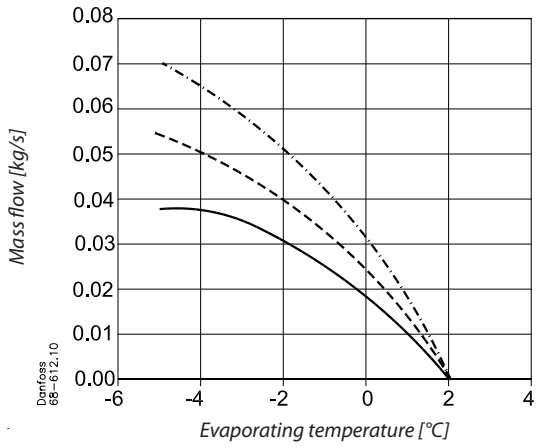


Conditions used in calculation:
t_{cond} = +40°C
$t_{subcooling}$ = 4K
$t_{superheat}$ = 4K
$eta_{isentrop}$ = 0.7
Start opening: t_{evap} = 2°C
Δp_{evap} = 0.2 bar

TUH 9
TCHE 3
TCHE 4

Mass flow [kg/s]

Replacement capacity



Conditions used in calculation:
t_{cond} = +40°C
$t_{subcooling}$ = 4K
$t_{superheat}$ = 4K
$eta_{isentrop}$ = 0.7
Start opening: t_{evap} = 2°C
Δp_{evap} = 0.2 bar

TUH 9
TCHE 3
TCHE 4

Correction factor for condensing temperature

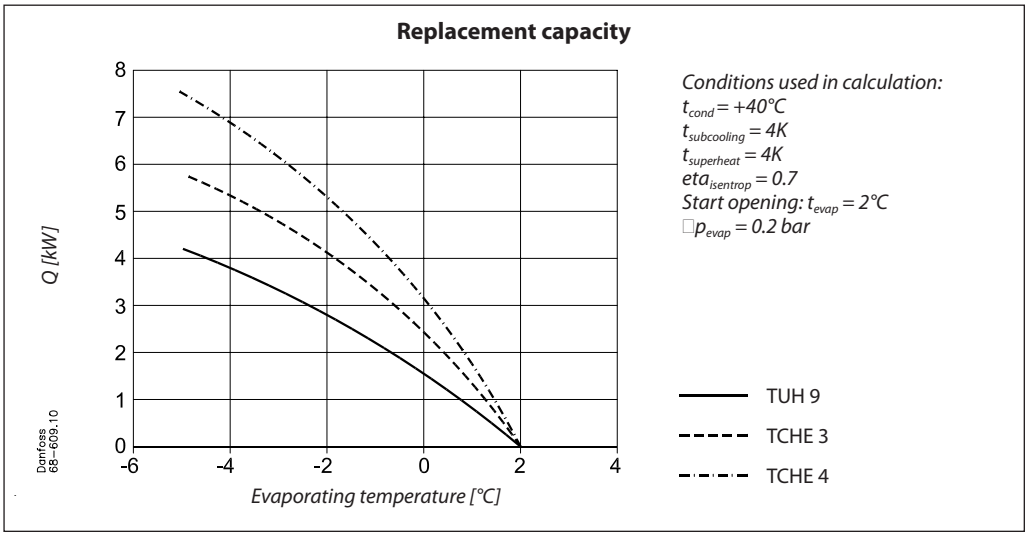
	Condensing temperature		
R404A/R507	+30°C	+40°C	+50°C
	0.8	1.0	1.2

Above replacement capacity has to be multiplied with the correction factor.

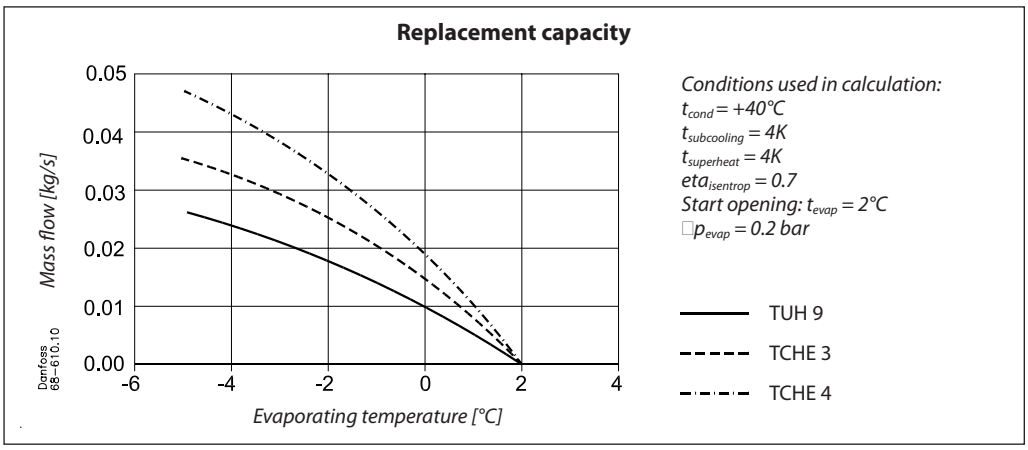
Capacity
(continued)

R407C

Q [kW]



Mass flow [kg/s]



Correction factor for condensing temperature

R407C	Condensing temperature		
	+30°C	+40°C	+50°C
	0.7	1.0	1.4

Above replacement capacity has to be multiplied with the correction factor.

Design/Function

1. Bulb with capillary tube
2. Diaphragm element
3. Setting spindle for adjustment of opening point/minimum suction pressure
4. Fixed orifice
5. Filter

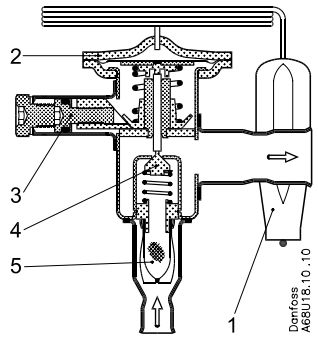


Fig. 3. TUH, Angleway

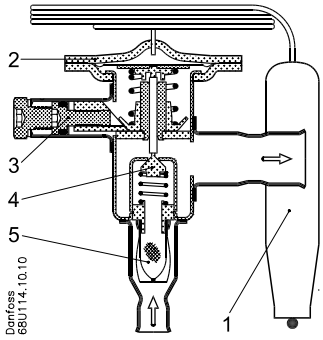
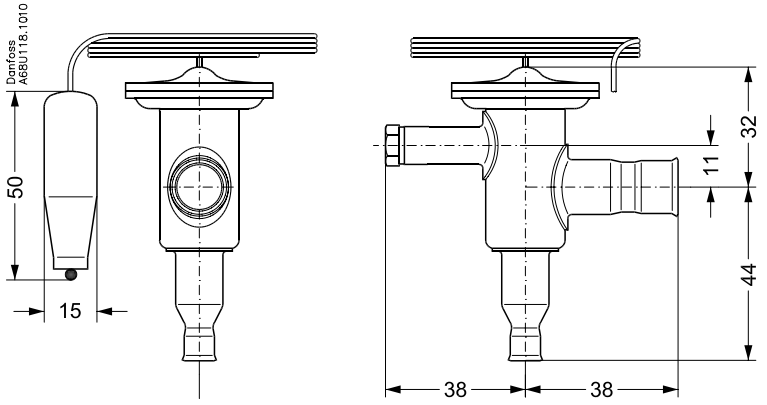


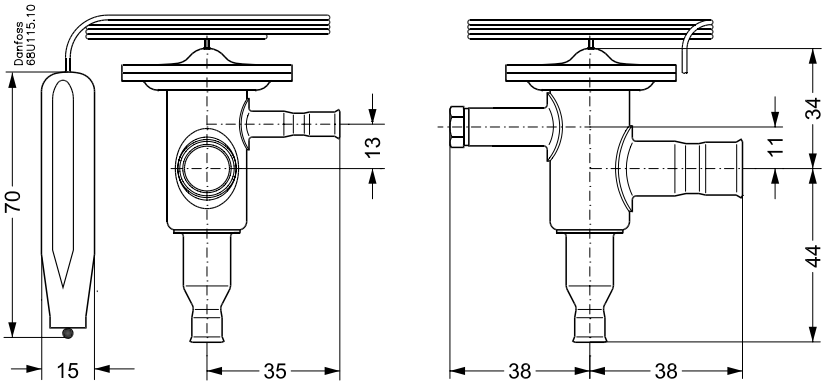
Fig. 4. TCHE, Angleway

Dimensions and weight



Connection dimensions, see ordering table.
Fig. 6. TUH, Angleway

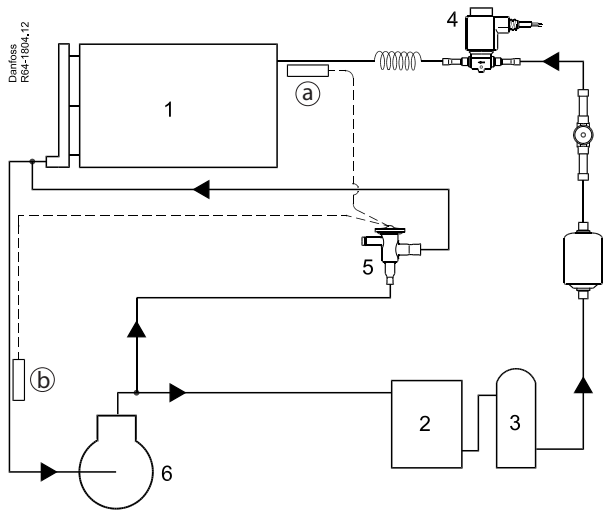
Weight 0.13 kg



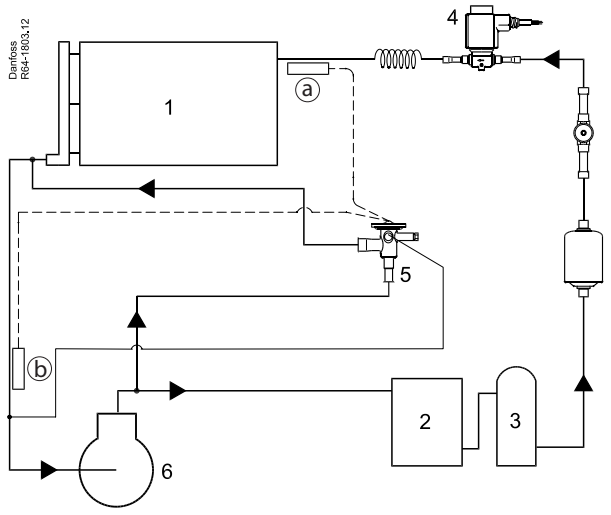
Connection dimensions, see ordering table.
Fig. 6. TCHE, Angleway

Weight 0.15 kg

Application



Internally pressure equalized



Externally pressure equalized

1. Evaporator
2. Condenser
3. Receiver
4. Solenoid valve
5. Discharge bypass valve with adjustable remote bulb
6. Compressor

Note:
The bulb serves only as a reservoir for the charge, however, it is recommended to mount it in a position where the temperature variation during running conditions is limited (see ⓐ and ⓑ in the application drawings above).