



Capacity regulator (hot gas bypass)

TUH/TCHE/TGHE

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Introduction

TUH/TCHE/TGHE capacity regulators adapt compressor capacity to actual evaporator load in applications operating at an evaporating temperature of around 0°C. TUH/TCHE/TGHE valves are typically used in applications such as:

- Air driers
- Water chillers

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

TUH has internal pressure equalisation and opens when pressure drops at the valve outlet. TCHE/TGHE have external pressure equalisation and open directly when compressor suction pressure drops.

For all types, the bulb only serves as a reservoir for the charge. However, it is recommended that the bulb be mounted in a location where temperature variation during operation is limited (see application drawings).

Features

- *Bimetal connections for TUH and TCHE*
 - straightforward and fast soldering (no wet cloth or refrigeration pliers required)
- *Refrigerants*
 - R410A, R134a, R404A/R507, R407C, R22 and other refrigerants on request.
- *Replacement capacities up to 28.9 kW (8.3 TR) for R410A*
- Stable regulation
- Tight across the seat
- *Compact design*
 - small dimensions and low weight
- Hermetically tight design
- *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 diaphragm element*
 - optimum function
 - long diaphragm life
 - high pressure resistance
- *Adjustable setting*
 - accurate setting
 - fine tuning possible
- Low p-band
- Low hysteresis
- TUH & TCHE have an advanced filter/strainer design

Standard range

(Variants available on request)

Standard models:

One standard range per refrigerant

Refrigerants

R134a, R404A/R507, R407C, R22, R410A

Capillary tube length

TUH	0.8 m / 2.6 ft.
TCHE	0.9 m / 2.9 ft.
TGHE10	1.5 m / 5.0 ft.
TGHE20	1.5 m / 5.0 ft.
TGHE40	3.0 m / 10 ft.

Orifice sizes

TUH	Orifice 9
TCHE	Orifice 3
	Orifice 4
TGHE10	Orifice 10
TGHE20	Orifice 20
TGHE40	Orifice 40

Connections

TUH & TCHE

Inlet: 10 mm / 3/8 in.

Outlet: 12 mm / 1/2 in.

TGHE10 & TGHE20

Inlet: 16 mm / 5/8 in.

Outlet: 16 mm / 5/8 in.

TGHE40

Inlet: 22 mm / 7/8 in.

Outlet: 22 mm / 7/8 in.

Identification - TUH & TCHE

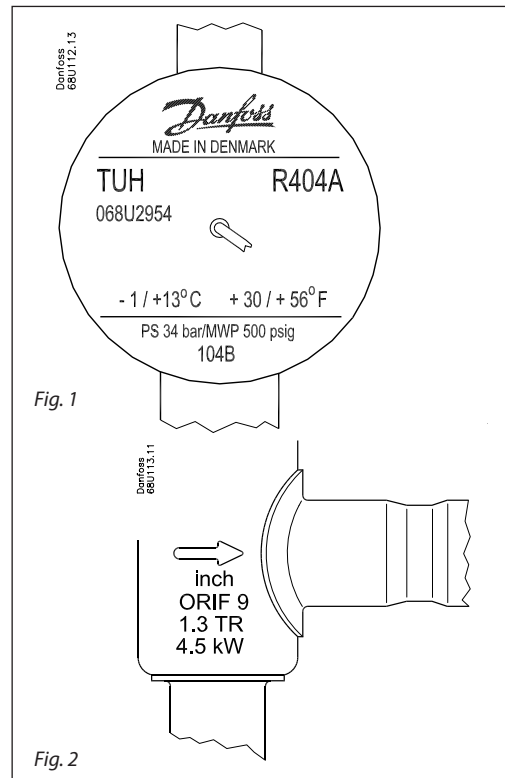
Main valve data is given on the element (fig. 1) and on the valve body (fig. 2).

Main valve data example, fig. 1

- TUH = Type
- 068U2954** = Code number
- R404A = Refrigerant
- 1 → +13°C = Adjusting range in °C
- +30 → +56°F = Adjusting range in °F
- PS 34 bar/
MWP 500 psig = Max. working pressure
- 104B = Date marking
(week **10**, year **2004**,
weekday **B** = Tuesday)

Main valve data example, fig. 2

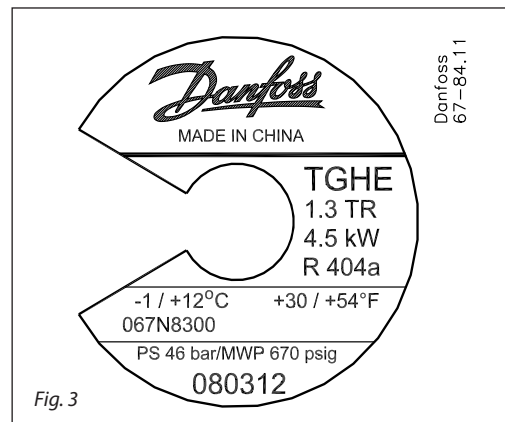
- ⇒ = Normal flow direction
- inch = Connection in inches
(MM = millimetres)
- ORIF 9 = Orifice number 9
- 1.3 TR = Replacement capacity in Tons
of Refrigeration
- 4.5 kW = Replacement capacity in kW



Identification - TGHE

Main valve data example, fig. 3

- TGHE 10 = Type
- 1.3 TR = Rated replacement capacity
 Q_{nom} in Tons of Refrigeration
- 4.5 kW = Rated replacement capacity
 Q_{nom} in kW
- R404A = Refrigerant
- 1 → +12°C = Adjusting range in °C
- +30 → +54°F = Adjusting range in °F
- 067N8300** = Code number
- PS 46 bar/
MWP 670 psig = Max. working pressure
- Date marking = 08 Year, 03 Month, 12 Day



Technical data

- *Max. valve body temperature:* 120°C / 248°F
Transient peak: 150°C / 302°F
- *Max. permissible working pressure*
R134a, R22, R407C, R404A:
PS = 34 bar / MWP = 500 psig
R410A
PS = 42.5 bar / MWP = 615 psig
- *Max. test pressure*
R134a, R22, R407C, R404A:
 $p' = 37.5$ bar / 540 psig
R410A:
 $p' = 47$ bar / 680 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 is increased by turning the spindle anti-clockwise and decreased by turning the spindle clockwise.
- Specifically designed for hot gas applications.
- All valves react only on to suction pressure variations.

Technical data (continued)

Adjustment range for start opening

Valve type	Refrigerant	Adjustment range for start opening	
		[°C]	[°F]
TUH	R134a	-1 → +12°C	+30 → +54°F
	R22 / R407C	-1 → +14°C	+30 → +58°F
	R404A	-1 → +13°C	+30 → +56°F
	R410A	-1 → +10°C	+30 → +50°F
TCHE	R134a	-1 → +12°C	+30 → +54°F
	R22 / R407C	-1 → +8°C	+30 → +46°F
	R404A	-1 → +7°C	+30 → +45°F
	R410A	-1 → +9°C	+30 → +48°F

Valve type	Refrigerant	Adjustment range for start opening	
		[°C]	[°F]
TGHE10	R134a	-1 → +14°C	+30 → +58°F
	R22 / R407C	-1 → +14°C	+30 → +58°F
	R404A	-1 → +12°C	+30 → +54°F
	R410A	-1 → +10°C	+30 → +50°F
TGHE20	R134a	-1 → +15°C	+30 → +59°F
	R22 / R407C	-1 → +15°C	+30 → +59°F
	R404A	-1 → +12°C	+30 → +54°F
	R410A	-1 → +10°C	+30 → +50°F
TGHE40	R134a	-1 → +12°C	+30 → +54°F
	R22 / R407C	-1 → +12°C	+30 → +54°F
	R404A	-1 → +10°C	+30 → +50°F
	R410A	-1 → +8°C	+30 → +46°F

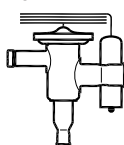
Ordering

Supplied with bulb strap

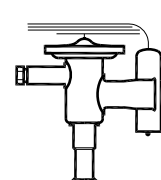
Standard range

R134a, R22, R404A/R507, R407C, R410A

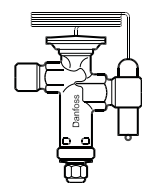
TUH



TCHE



TGHE

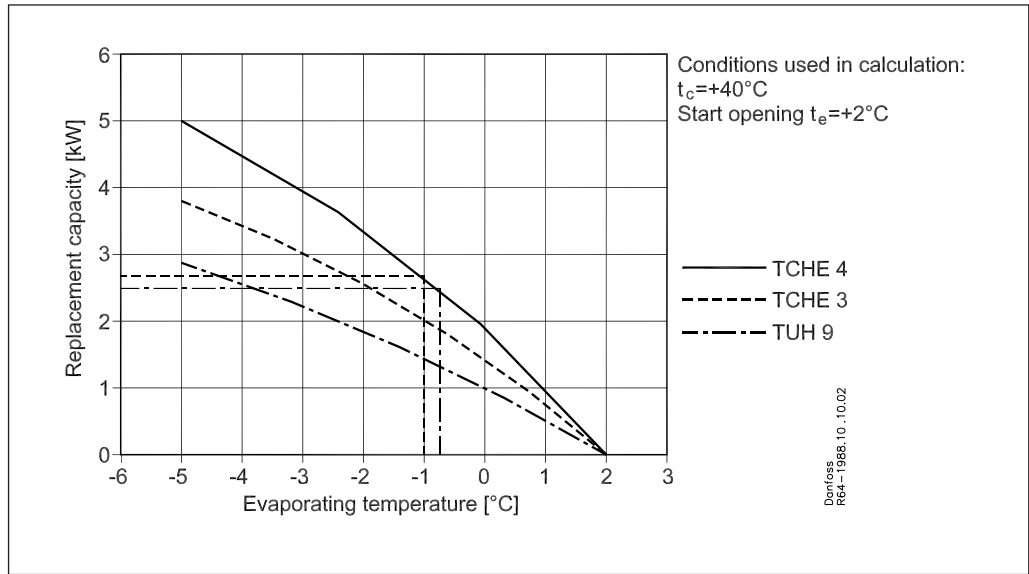


Refrigerant	Type	Orifice no.	Nominal replacement capacity ¹⁾		Pressure equalisation	Connection Inlet x Outlet			
			kW	TR		in. ²⁾	Code no.	mm ³⁾	Code no.
R134a	TUH	9	1.8	0.5	int.	3/8 x 1/2	068U2953	10 x 12	068U2950
	TCHE	3	2.6	0.8	ext.	3/8 x 1/2	068U4540	10 x 12	068U4530
	TCHE	4	3.4	1	ext.	3/8 x 1/2	068U4537	10 x 12	068U4534
	TGHE10	10	3.2	0.9	ext.	5/8 x 5/8	067N8312	16 x 16	---
	TGHE20	20	5.6	1.6	ext.	5/8 x 5/8	067N8301	16 x 16	---
	TGHE40	40	10.7	3.1	ext.	7/8 x 7/8	067N8306	22 x 22	---
R404A/R507	TUH	9	4.5	1.3	int.	3/8 x 1/2	068U2954	10 x 12	068U2951
	TCHE	3	5.9	1.7	ext.	3/8 x 1/2	068U4541	10 x 12	068U4531
	TCHE	4	7.6	2.2	ext.	3/8 x 1/2	068U4538	10 x 12	068U4535
	TGHE10	10	4.4	1.3	ext.	5/8 x 5/8	067N8300	16 x 16	---
	TGHE20	20	7.5	2.1	ext.	5/8 x 5/8	067N8302	16 x 16	---
R407C	TUH	9	2.8	0.8	int.	3/8 x 1/2	068U2955	10 x 12	068U2952
	TCHE	3	4.1	1.2	ext.	3/8 x 1/2	068U4542	10 x 12	068U4532
	TCHE	4	5.3	1.5	ext.	3/8 x 1/2	068U4539	10 x 12	068U4536
	TGHE10	10	3.8	1.1	ext.	5/8 x 5/8	067N8313	16 x 16	---
R22	TUH	9	3.0	0.9	int.	3/8 x 1/2	068U2959	10 x 12	068U2957
	TCHE	3	4.1	1.2	ext.	3/8 x 1/2	068U4546	10 x 12	068U4544
	TCHE	4	5.3	1.5	ext.	3/8 x 1/2	068U4547	10 x 12	068U4545
	TGHE10	10	5.0	1.4	ext.	5/8 x 5/8	067N8314	16 x 16	---
	TGHE20	20	8.8	2.5	ext.	5/8 x 5/8	067N8304	16 x 16	---
R410A	TUH	9	7.3	2.1	int.	3/8 x 1/2	068U2960	10 x 12	068U2958
	TCHE	3	10.0	2.9	ext.	3/8 x 1/2	068U4548	10 x 12	068U4528
	TCHE	4	12.9	3.7	ext.	3/8 x 1/2	068U4549	10 x 12	068U4529
	TGHE10	10	8.4	2.4	ext.	5/8 x 5/8	067N8315	16 x 16	---
	TGHE20	20	14.5	4.1	ext.	5/8 x 5/8	067N8305	16 x 16	---
R410A	TGHE40	40	28.9	8.3	ext.	7/8 x 7/8	067N8311	22 x 22	---

- ¹⁾ The nominal replacement capacity is the regulator capacity at evaporating temperature $t_e = -2^\circ\text{C} / 28^\circ\text{F}$, condensing temperature $t_c = +40^\circ\text{C} / 104^\circ\text{F}$, reduction of suction temperature / suction pressure $\Delta t_s = 4 \text{ K} / 7^\circ\text{F}$.
- ²⁾ Valves with inch connections have 1/4 in. pressure-equalisation.
- ³⁾ Valves with mm connections have 6 mm pressure-equalisation.

Sizing

R134a



Correction for condensing temperature
 The corrected replacement capacity can be obtained by dividing the replacement capacity with the correction factor given below.

Correction factor for condensing temperature

R134a	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

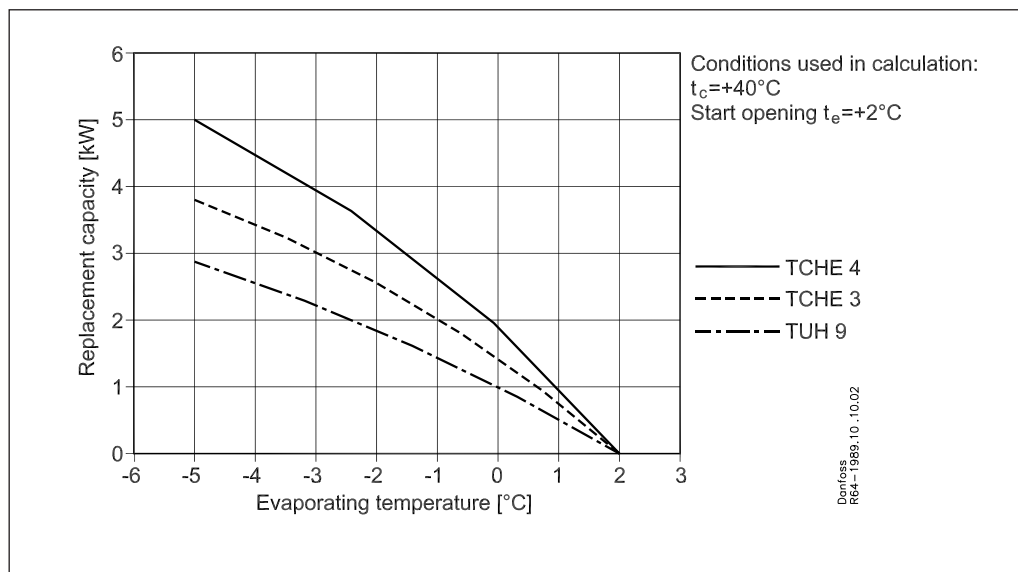
Example

Refrigerant	R134	The corrected replacement capacity thus becomes 3 kW divided by 1.2 = 2.5 kW.
Compressor capacity	6 kW at +2/+50°C	
Min. load 50%	3 kW	
Replacement capacity	6 - 3 = 3 kW	The TCHE 4 gives 2.7 kW at -1.0/+40°C (.....) and gives 2.5 kW at -0.8/+40°C (- -)
Min. evaporating temperature	te = -1.0°C	
Condensing temperature	tc = +50°C	
Correction factor (table)	1.2	Thus the TCHE 4 would be a suitable choice.

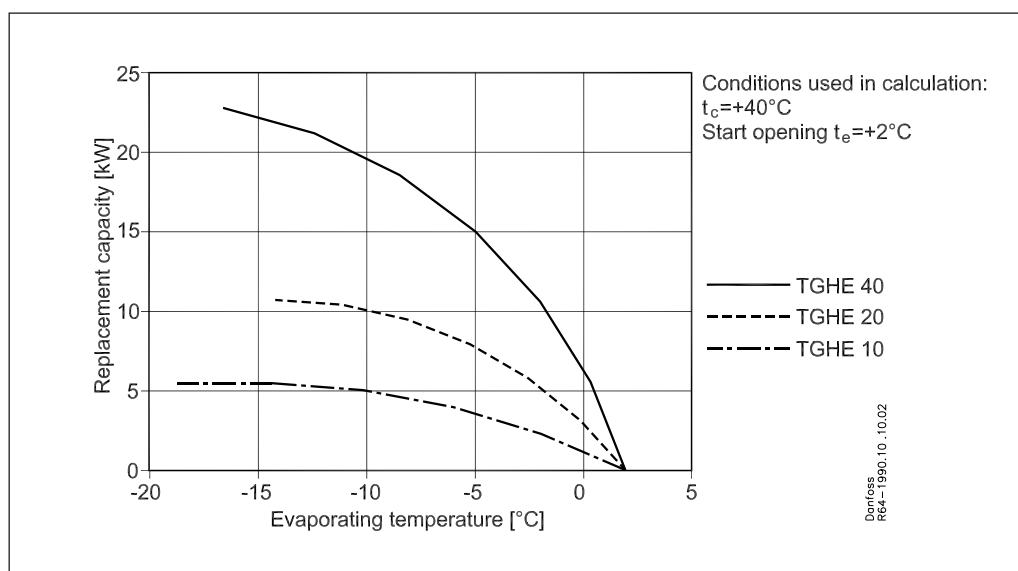
Replacement capacity

R134a

TUH & TCHE



TGHE



Correction factor for condensing temperature

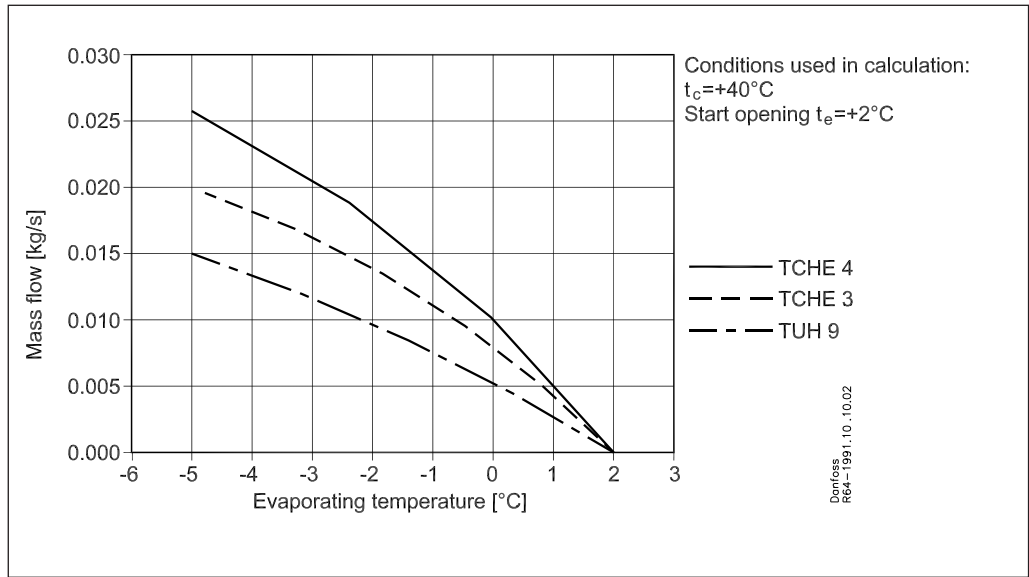
R134a	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

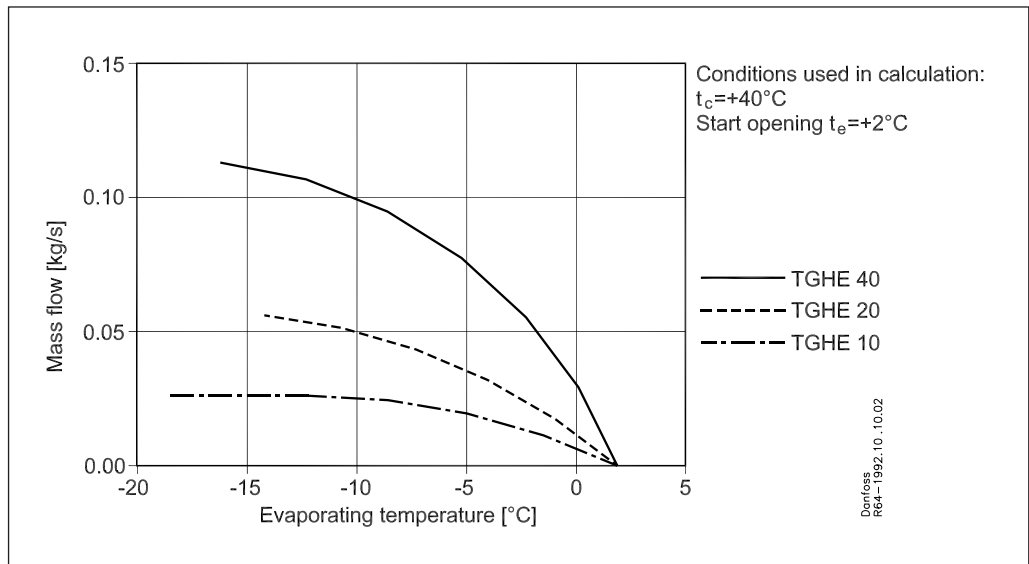
Mass flow

R134a

TUH & TCHE



TGHE



Correction factor for condensing temperature

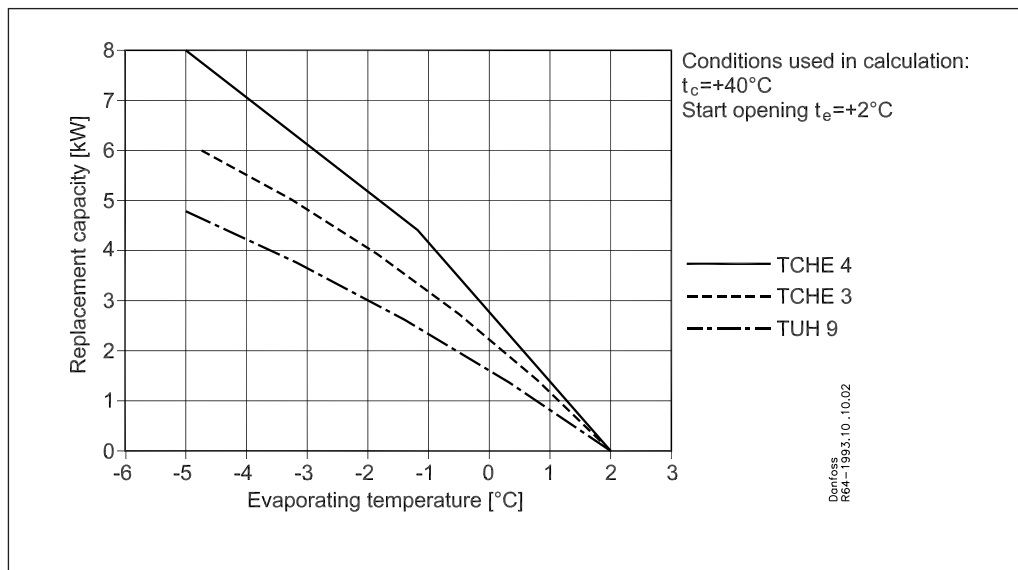
R134a	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

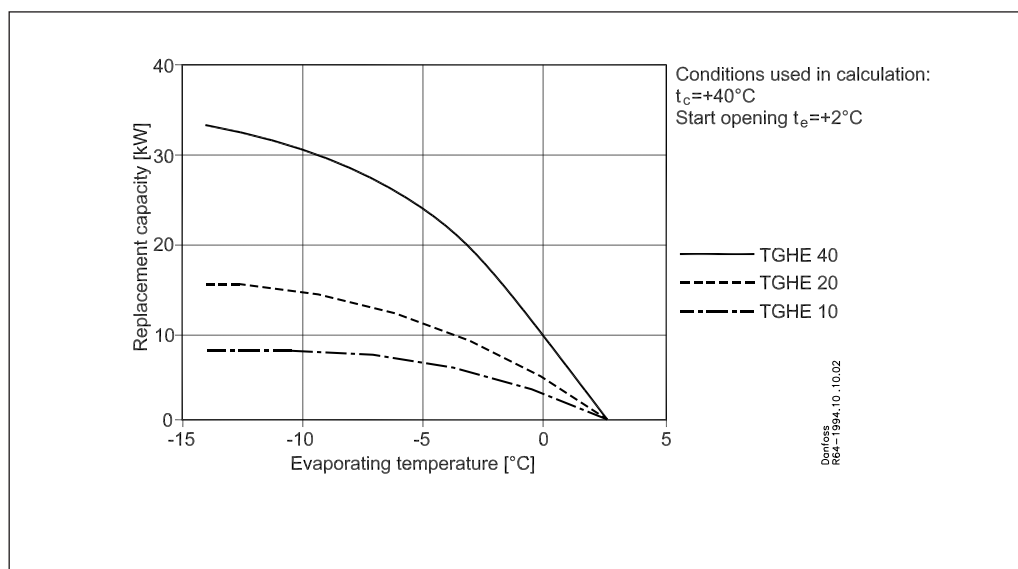
Replacement capacity

R22

TUH & TCHE



TGHE



Correction factor for condensing temperature

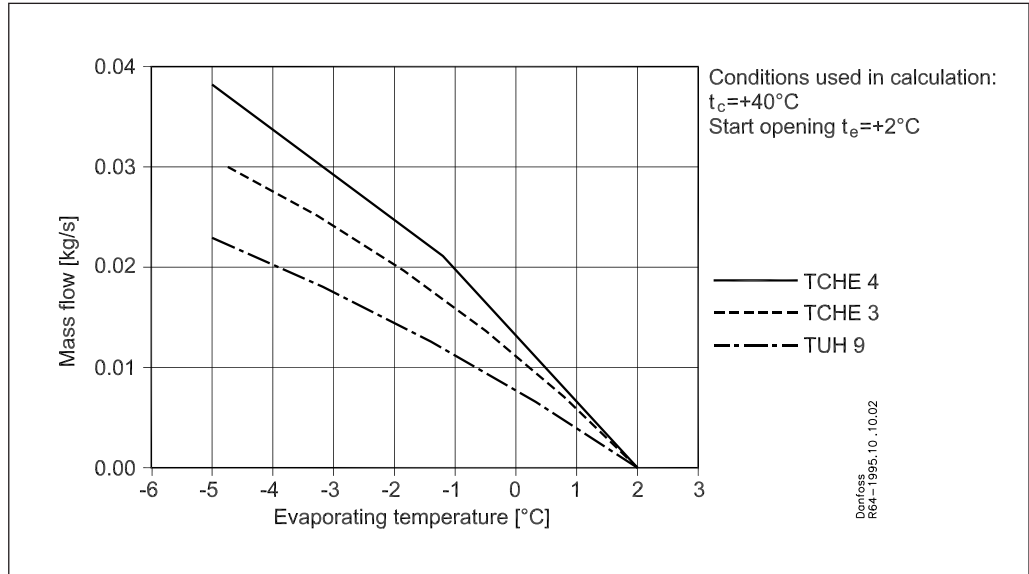
R22	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

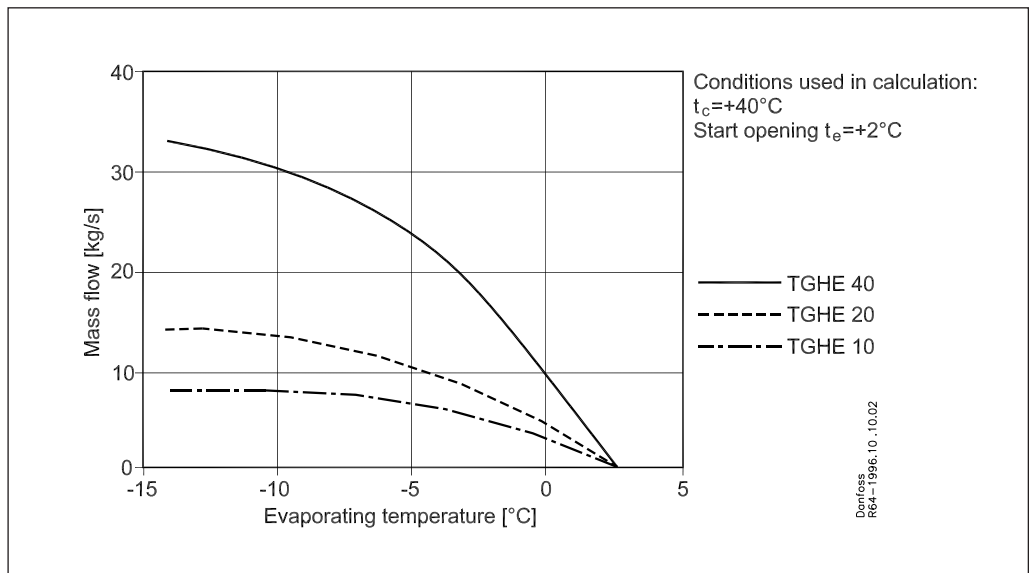
Mass flow

R22

TUH & TCHE



TGHE



Correction factor for condensing temperature

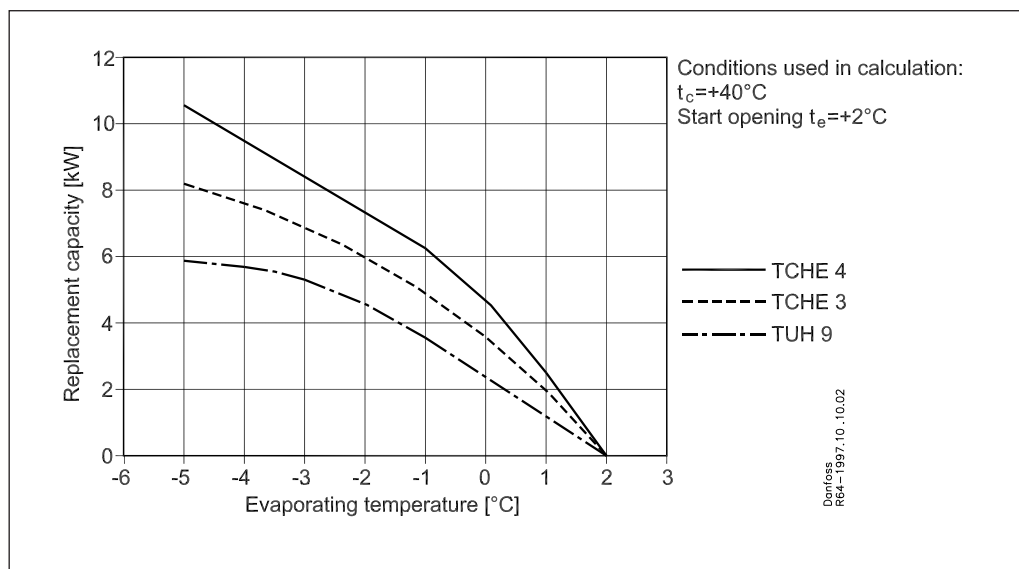
R22	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

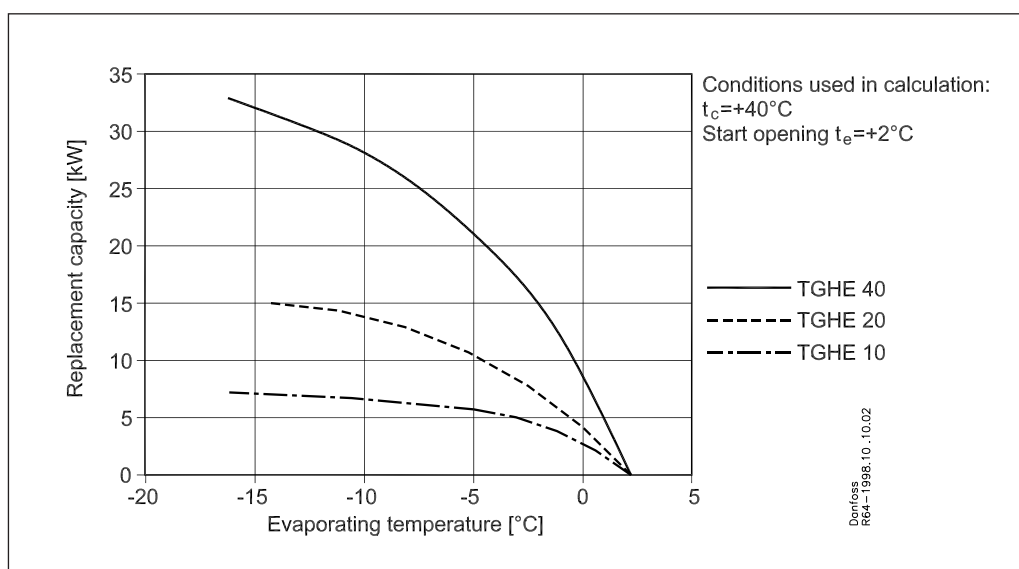
Replacement capacity

R404A/R507

TUH & TCHE



TGHE



Correction factor for condensing temperature

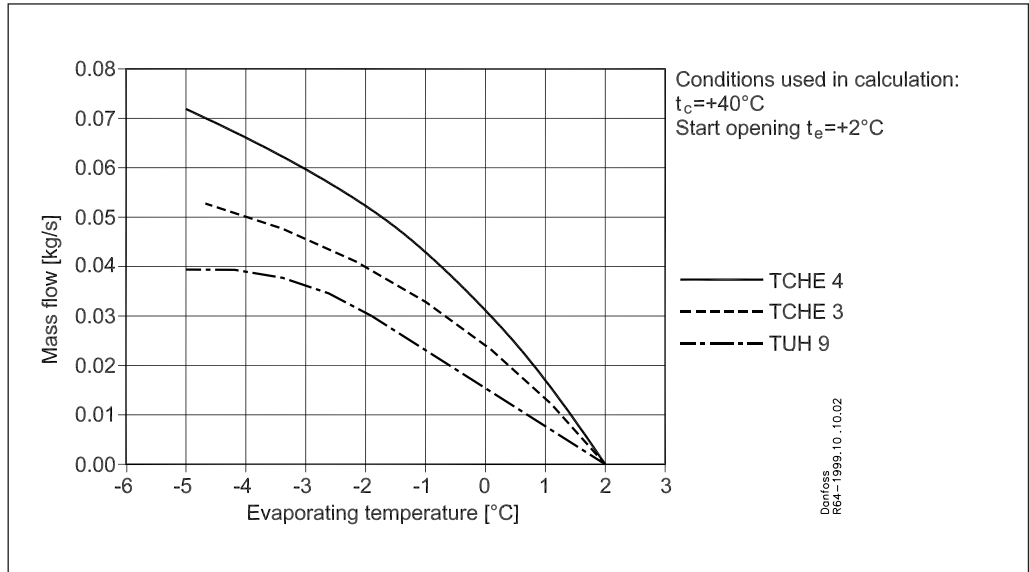
R404A/R507	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

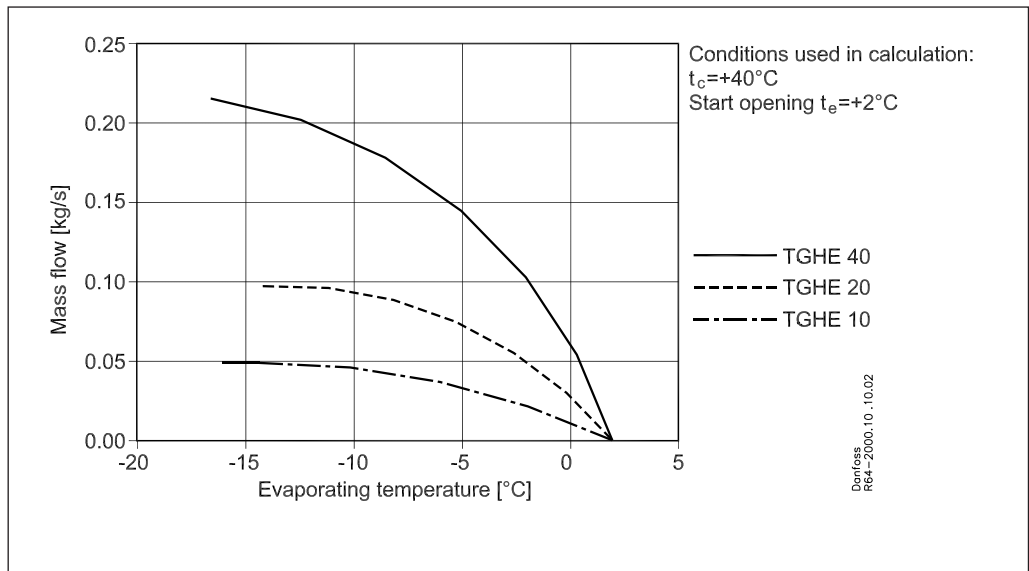
Mass flow

R404A/R507

TUH & TCHE



TGHE



Correction factor for condensing temperature

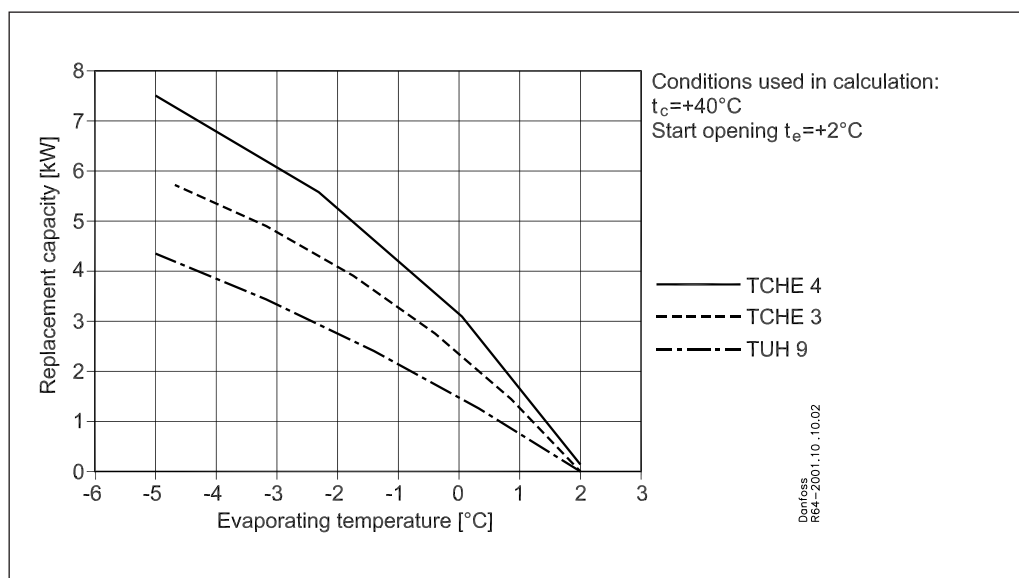
R404A/R507	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

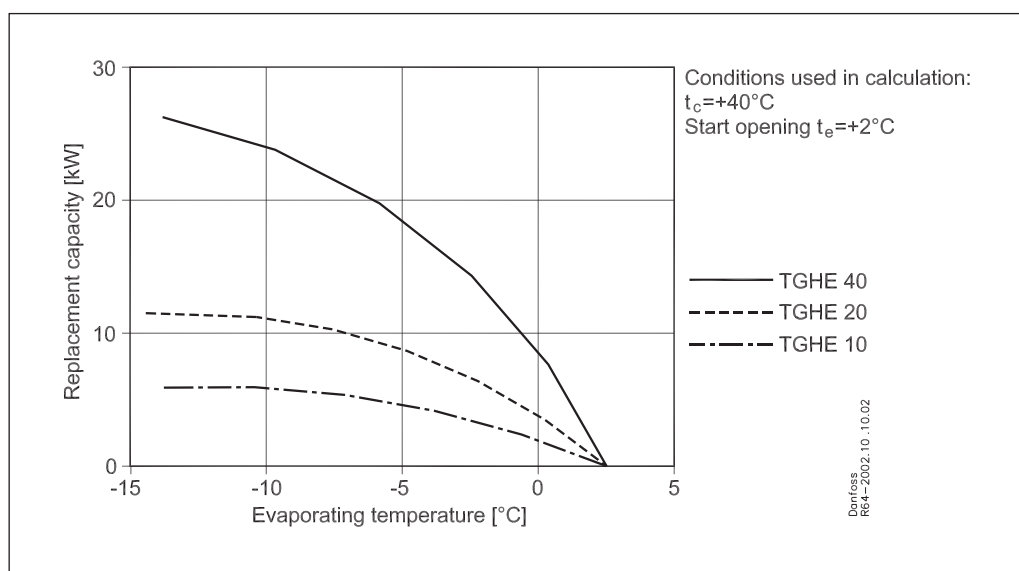
Replacement capacity

R407C

TUH & TCHE



TGHE



Correction factor for condensing temperature

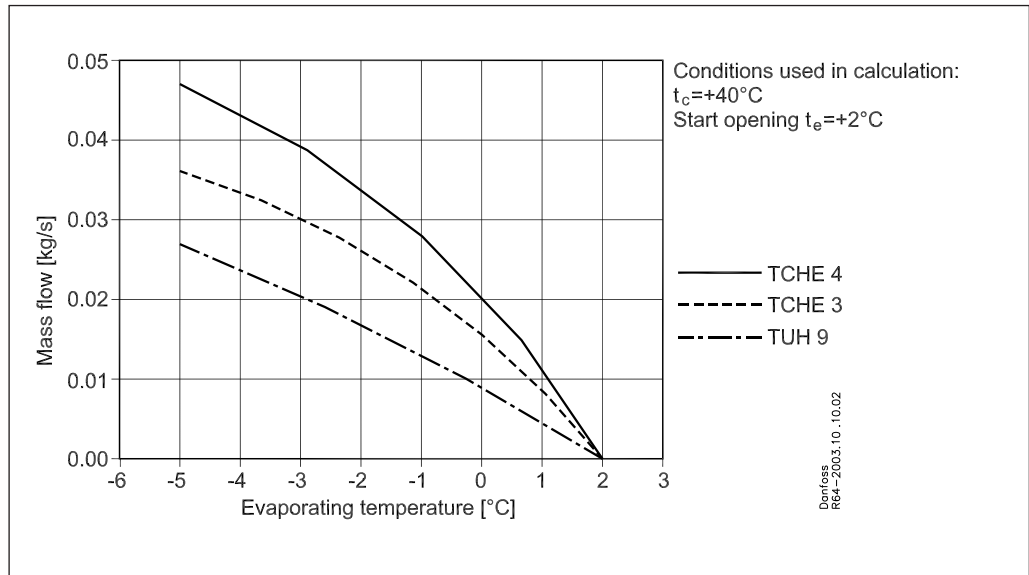
R407C	Condensing temperature		
	+30°C	+40°C	+50°C
	0.7	1.0	1.4

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

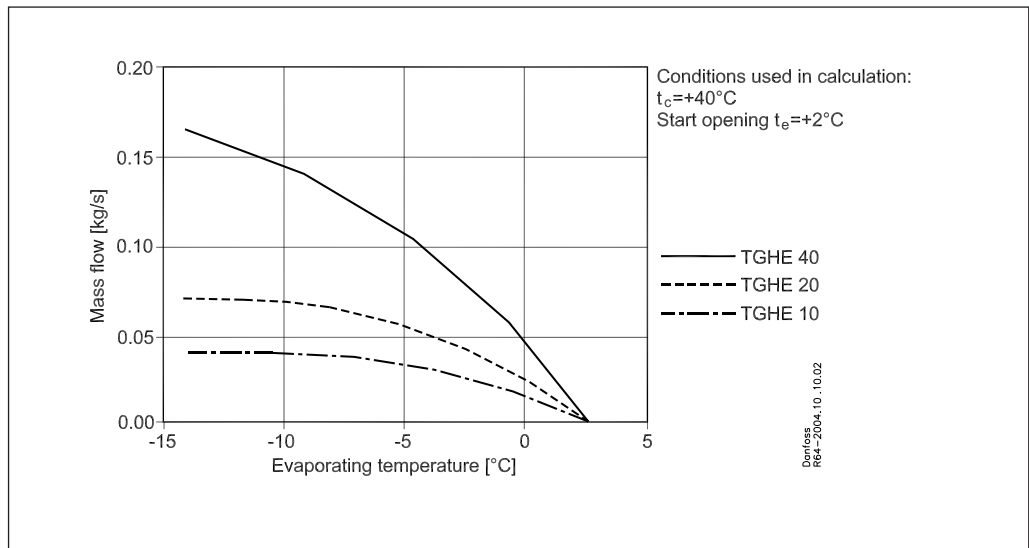
Mass flow

R407C

TUH & TCHE



TGHE



Correction factor for condensing temperature

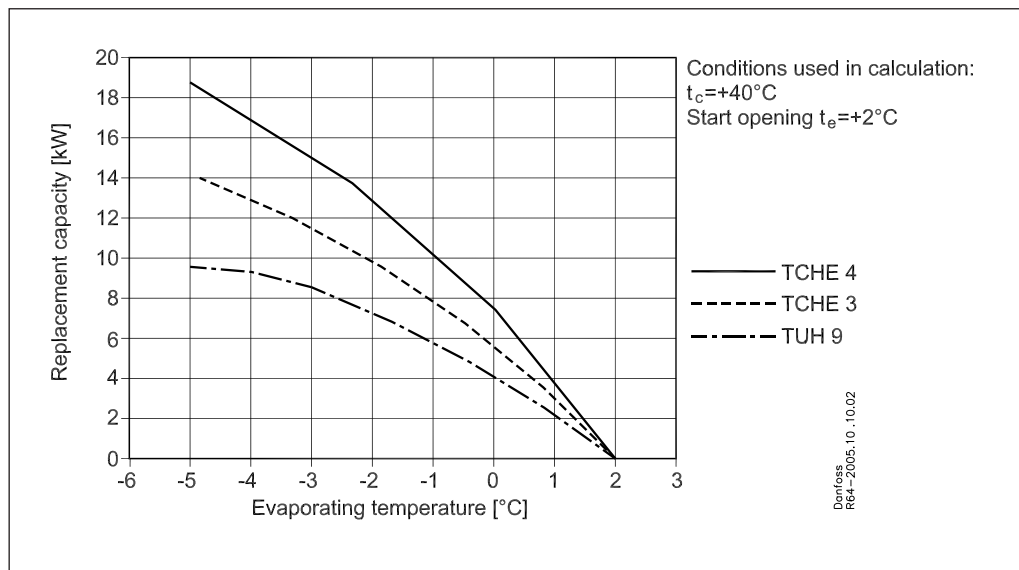
R407C	Condensing temperature		
	+30°C	+40°C	+50°C
	0.7	1.0	1.4

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

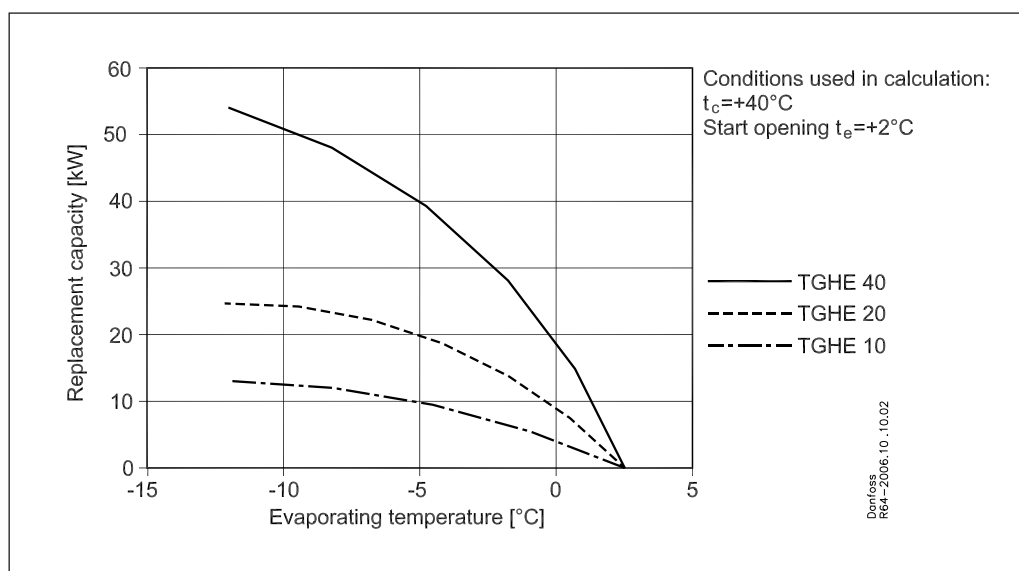
Replacement capacity

R410A

TUH & TCHE



TGHE



Correction factor for condensing temperature

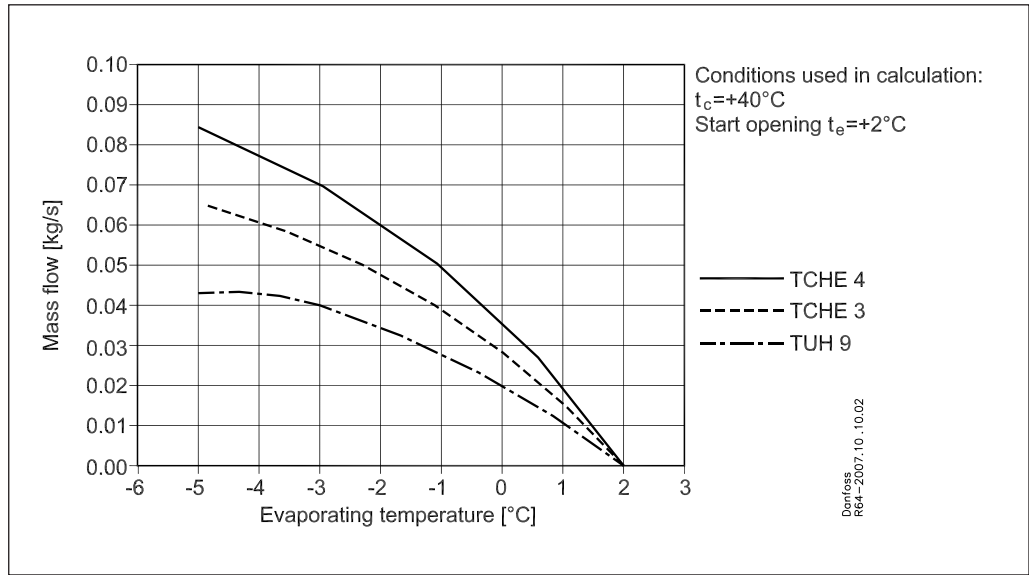
R410A	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

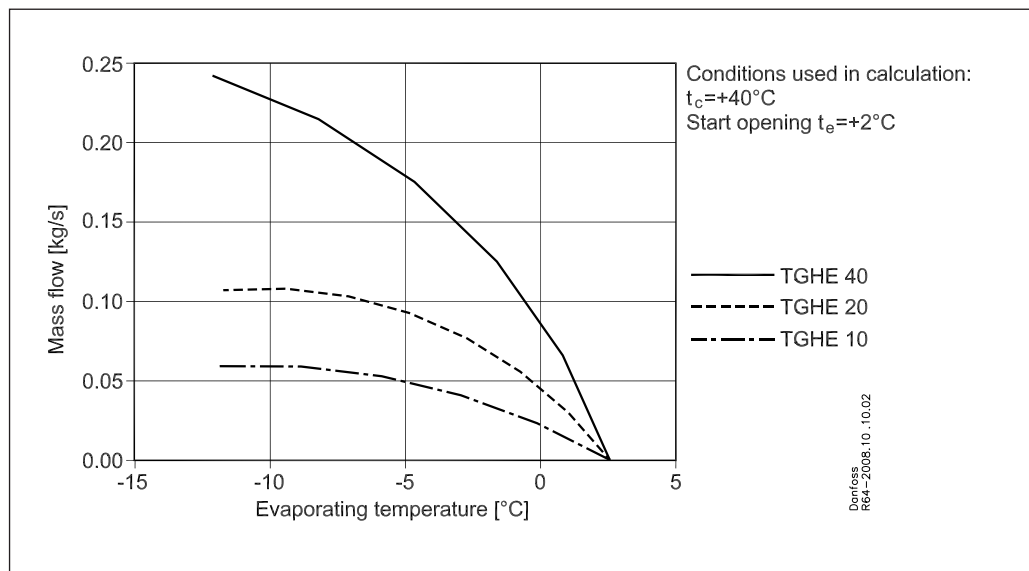
Mass flow

R410A

TUH & TCHE



TGHE



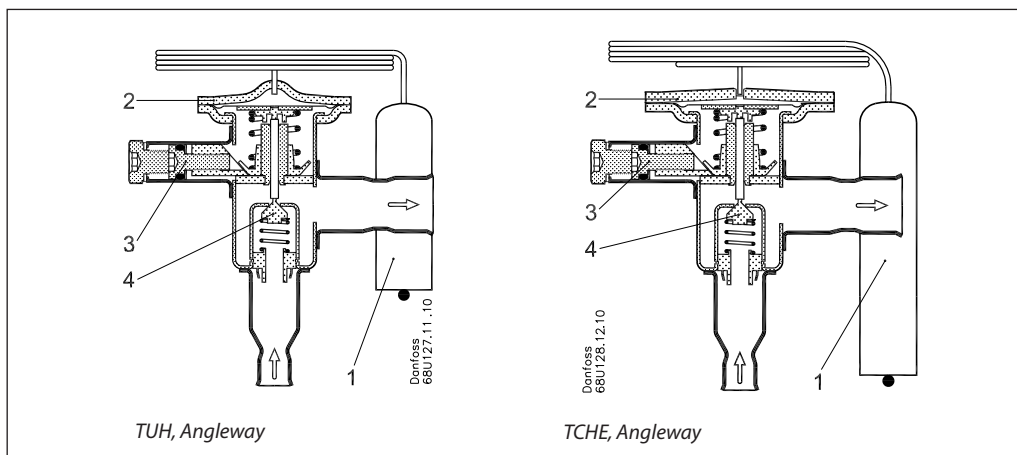
Correction factor for condensing temperature

R410A	Condensing temperature		
	+30°C	+40°C	+50°C
	0.8	1.0	1.2

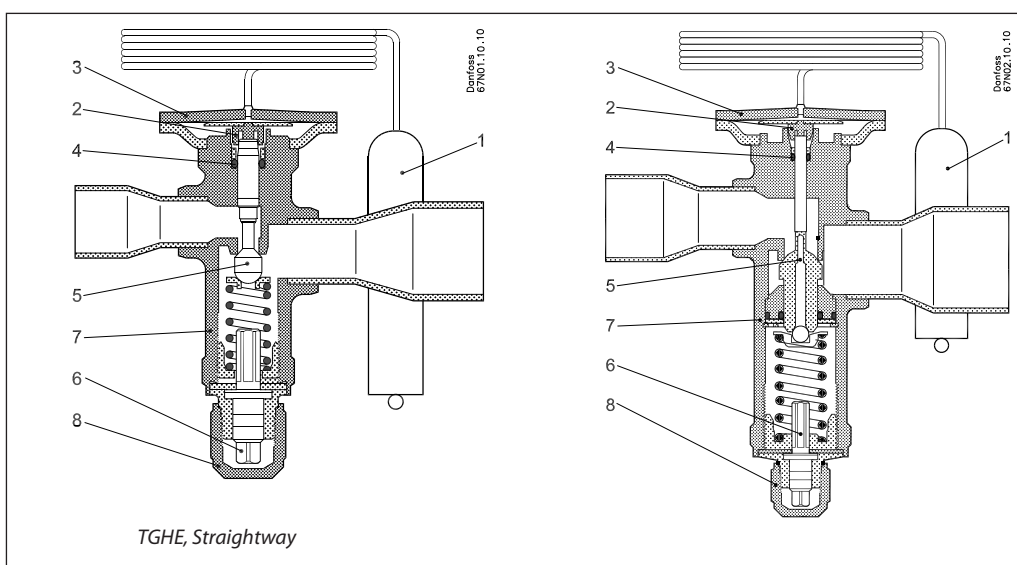
The correction factor can either be multiplied with the valve capacity or the replacement capacity can be divided with the correction factor.

Design/Function

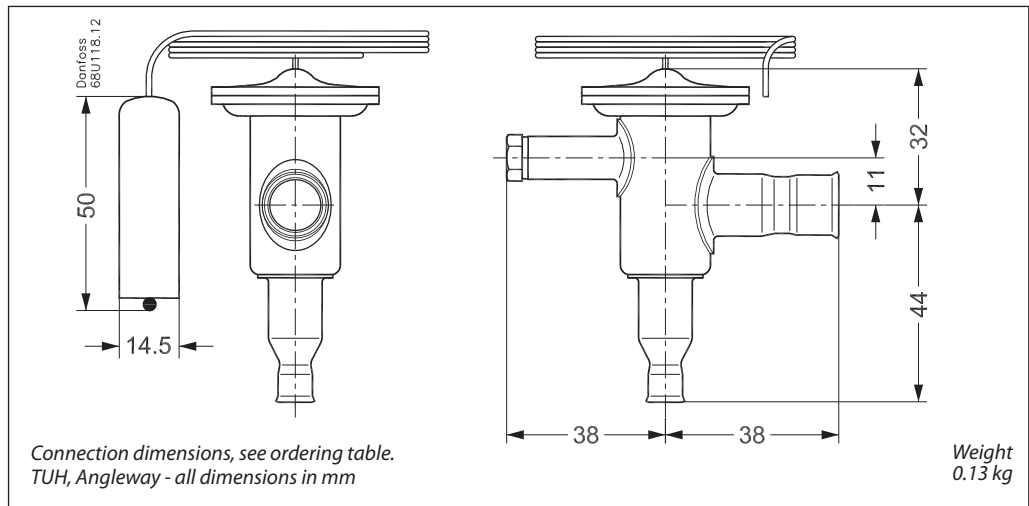
- 1. Bulb with capillary tube
- 2. Diaphragm element
- 3. Setting spindle for adjustment of opening point/minimum suction pressure
- 4. Fixed orifice



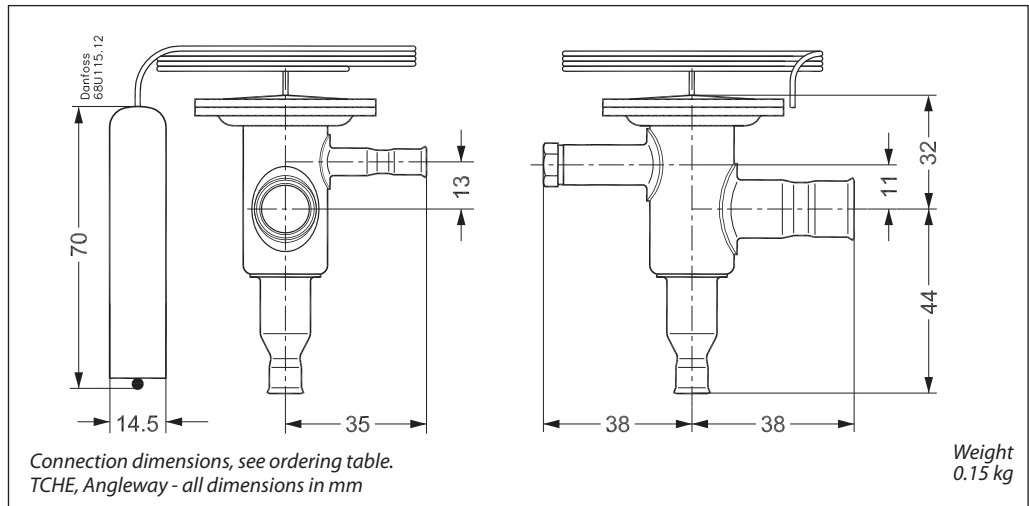
- 1. Bulb with capillary tube
- 2. Thrust pad
- 3. Element
- 4. Push pin seal
- 5. Two-way balance port
- 6. Static superheat adjustment spindle
- 7. Valve body
- 8. Protective cap



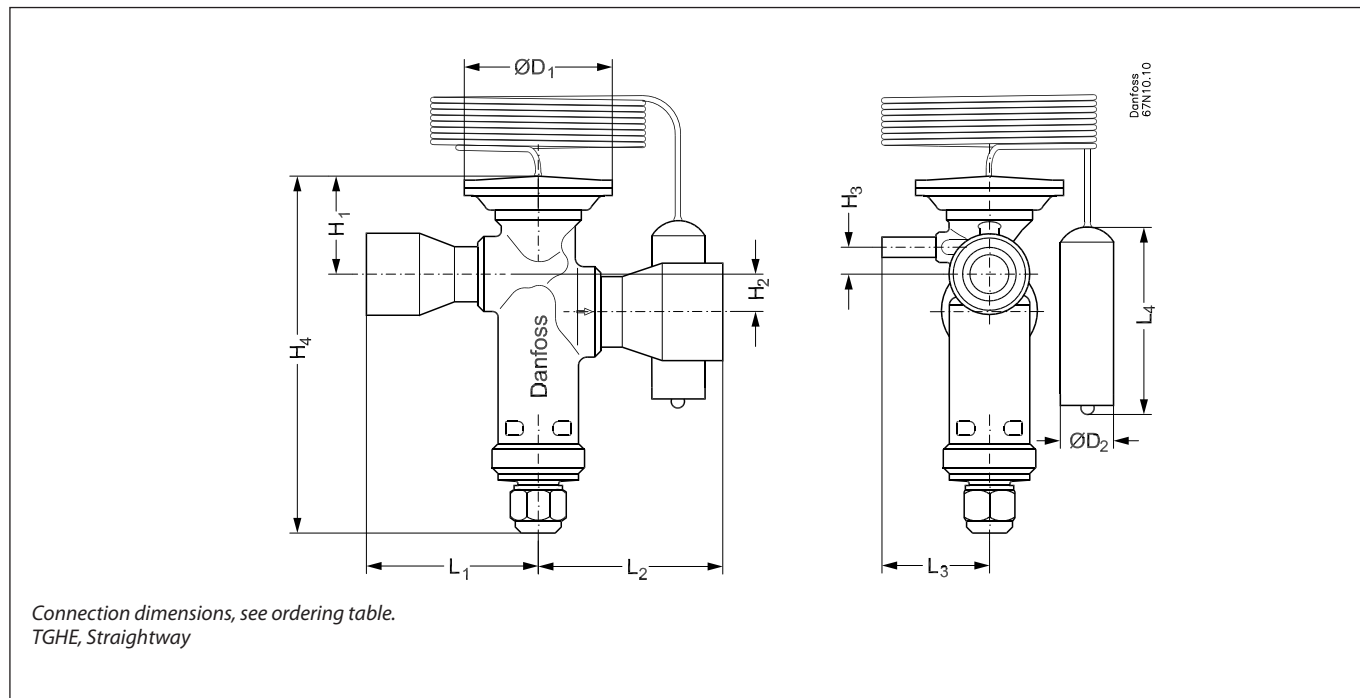
Dimensions and weight
TUH



TCHE



Dimensions and weight
TGHE



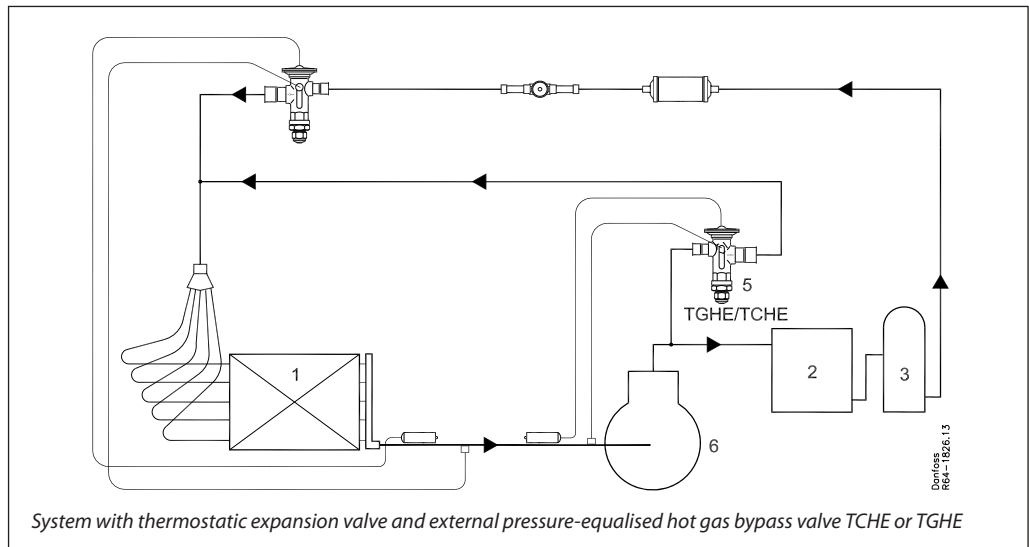
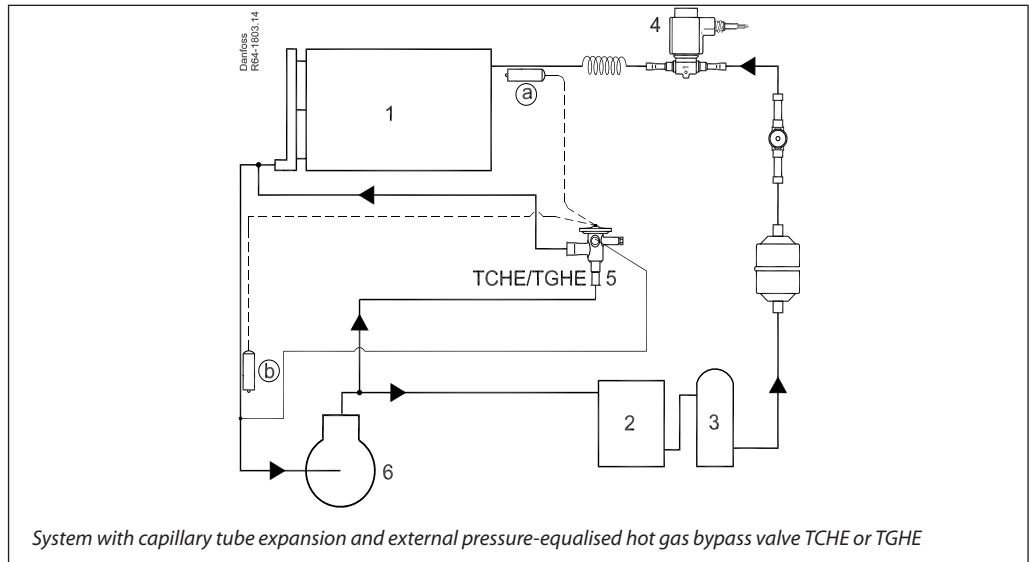
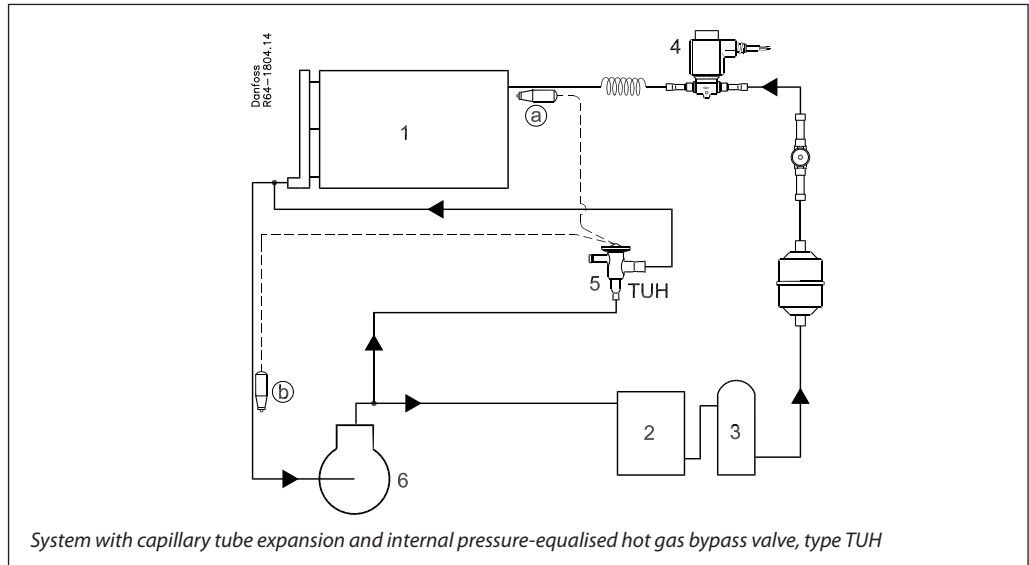
Type	Connection, ODF solder		Capillary tube length	H ₁	H ₂	H ₃	H ₄	L ₁	L ₂	L ₃	L ₄	øD ₁	øD ₂	Weight
	Inlet × outlet	Inlet × outlet												
	in.	mm												
TGEH 10	5/8 × 5/8	16 × 16	1.5	25.0	7.5	5.0	93.0	41.5	45.5	36.5	70.0	45.0	14.5	0.42
TGEH 20	5/8 × 5/8	16 × 16	1.5	28.5	9.0	8.0	117.0	48.0	62.0	40.0	70.0	53.0	14.5	0.65
TGHE 40	1 1/8 × 1 1/8	28 × 28	3.0	31.0	15.0	11.0	144.0	69.5	43.5	78.0	60.0	60.0	19.2	1.06

Application

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 (a) and (b) in the application drawings).

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



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