

Data Sheet

Hot gas bypass regulator
Types **TUH**, **TCHE** and **TGHE**

Capacity regulator



TUH, TCHE and TGHE capacity regulators adapt compressor capacity to actual evaporator load in applications operating at an evaporating temperature of around 0°C.

TUH, TCHE and 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 and 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 and TGHE have external pressure equalisation and open directly when compressor suction pressure drops.

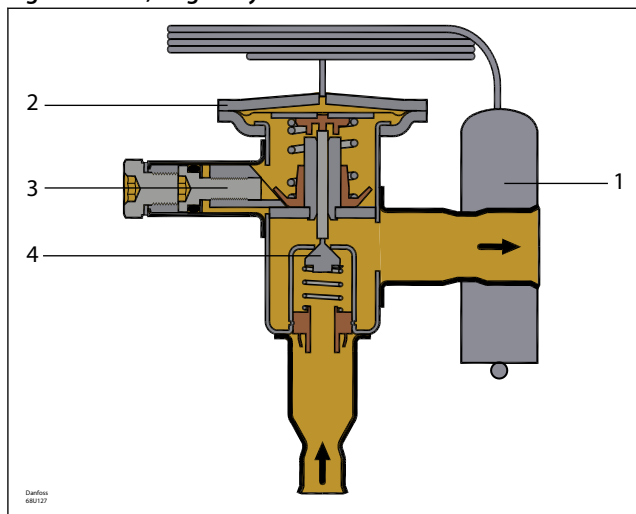
For all types, the bulb only serves as a reservoir for the charge. However, it is recommended that the bulb be mounted in a location where temperature variation during operation is limited.

Features

- Bimetal connections for TUH and TCHE.
 - Straightforward and fast soldering (no wet cloth or refrigeration pliers required)
- 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

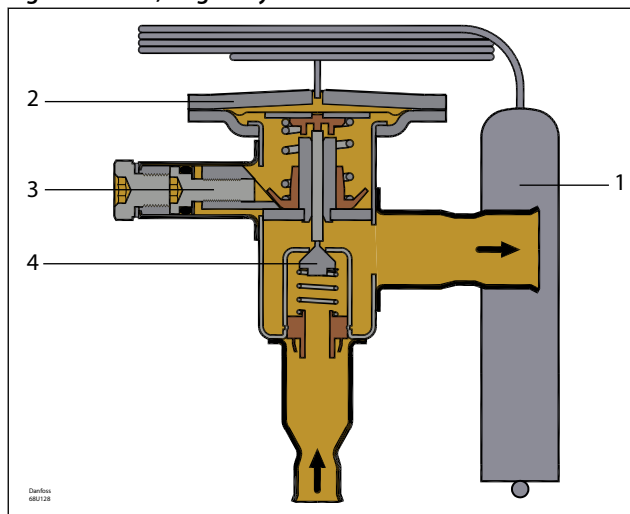
Functions

Figure 1: TUH, Angleway



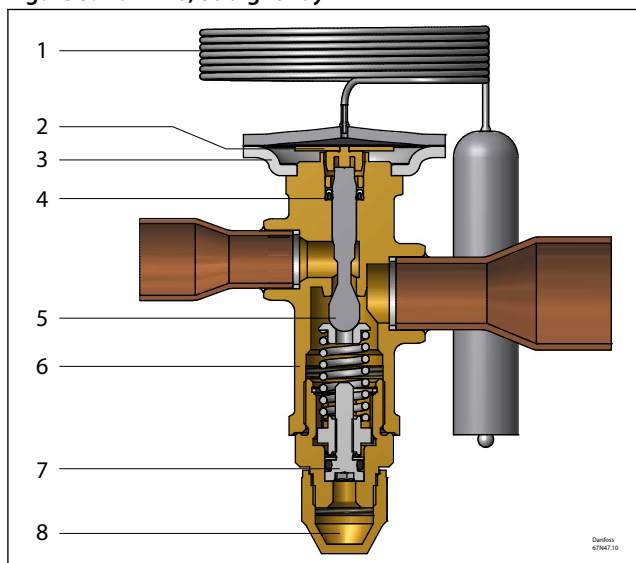
- | | |
|---|--------------------------|
| 1 | Bulb with capillary tube |
| 2 | Diaphragm element |

Figure 2: TCHE, Angleway



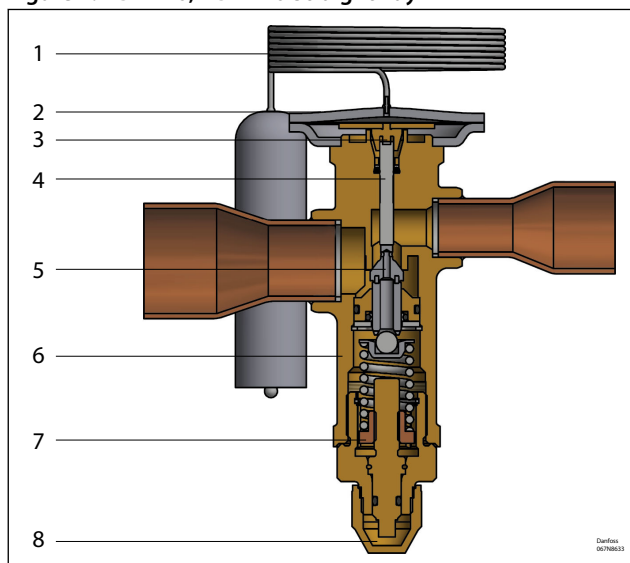
- | | |
|---|--|
| 3 | Setting spindle for adjustment of opening point/
minimum suction pressure |
| 4 | Fixed orifice |

Figure 3: TGHE 10, Straightway



- | | |
|---|--------------------------|
| 1 | Bulb with capillary tube |
| 2 | Thrust pad |
| 3 | Diaphragm element |
| 4 | Push pin seal |

Figure 4: TGHE 20, TGHE 40 Straightway



- | | |
|---|----------------------|
| 5 | Two-way balance port |
| 6 | Valve body |
| 7 | Setting spindle |
| 8 | Protective cap |

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.

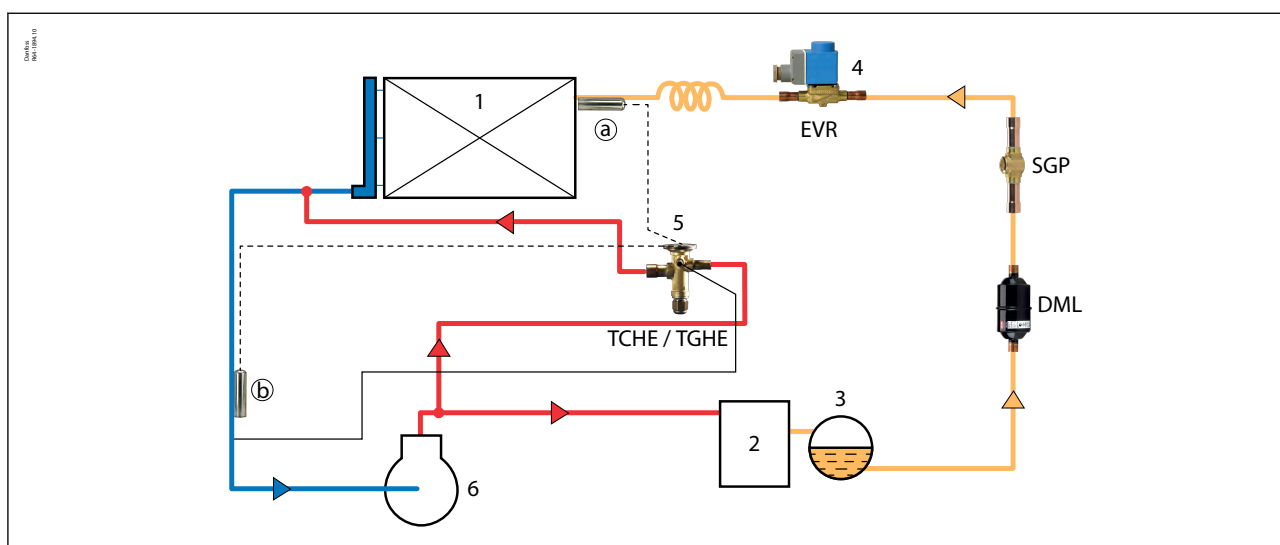
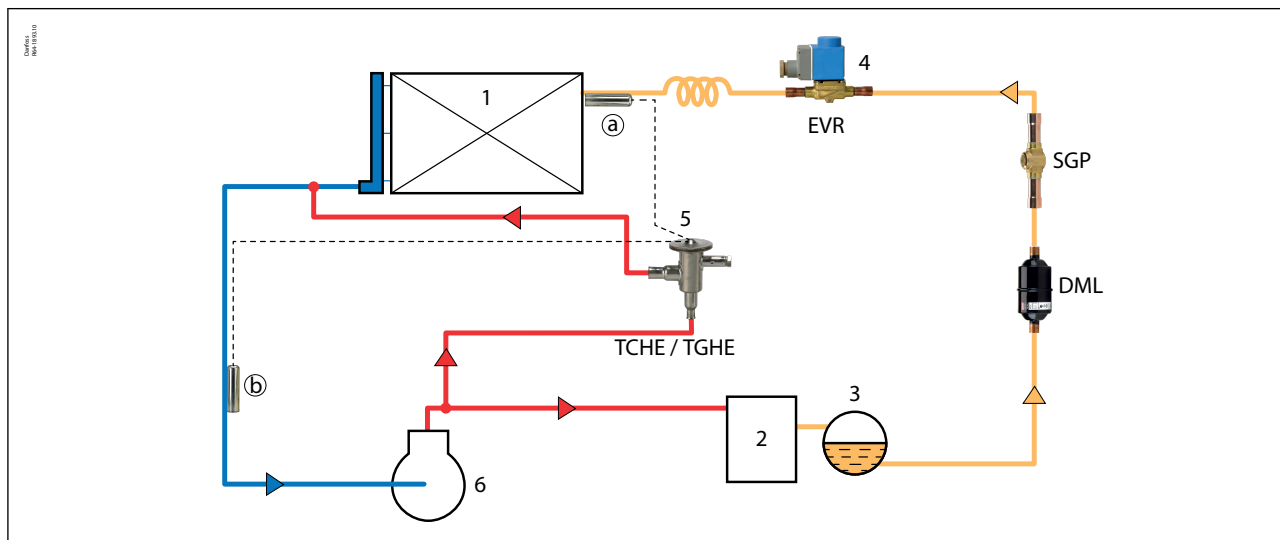
Specifically designed for hot gas applications.

All valves react only on to suction pressure variation.

Applications

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 drawings below).



1 Evaporator

2 Condenser

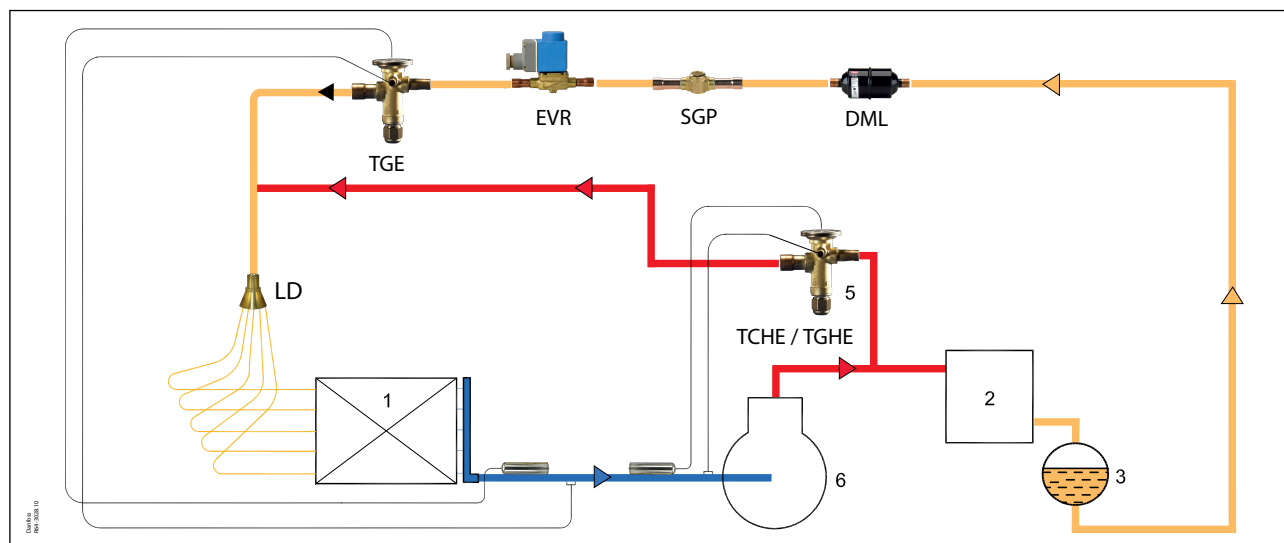
3 Receiver

4 Solenoid valve

5 Discharge bypass valve with adjustable setting

6 Compressor

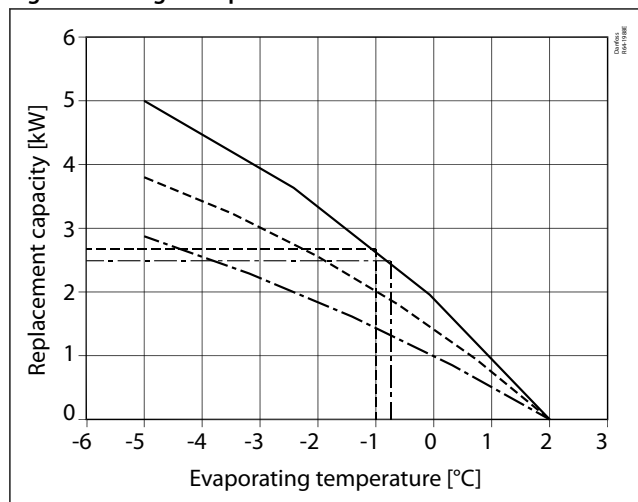
Hot gas bypass regulator, types TUH, TCHE and TGHE



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

Sizing

Figure 5: Sizing example for R134a



—	TCHE 4
- - -	TCHE 3
- . - .	TUH 9

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

Correction for condensing temperature

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

Table 1: Correction factor for condensing temperature

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

Example

Refrigerant: R134

Compressor capacity: 6 kW at +2 / +50 °C

Min. load 50%: 3 kW

Replacement capacity: $6 - 3 = 3$ kW

Hot gas bypass regulator, types TUH, TCHE and TGHE

Min. evaporating temperature t_e : -1.0 °C

Condensing temperature t_c : +50 °C

Correction factor (table): 1.2

The corrected replacement capacity thus becomes 3 kW divided by 1.2 = 2.5 kW. The TCHE 4 gives 2.7 kW at -1.0/+40°C (...) and gives 2.5 kW at -0.8/+40°C (- -). Thus the TCHE 4 would be a suitable choice.

Media

Table 2: Refrigerants features

Features	Description		
Standard models	One standard range per refrigerant		
Refrigerants	R134a, R404A/R507, R407C, R22, R410A		
Max. valve body temperature	120 °C / 248 °F		
	Transient peak	150 °C / 302 °F	
Max. permissible working pressure (PS)	R134a, R22, R407C, R404A	34 bar / MWP = 500 psig	
	R410A	TCHE	45.5 bar / 660 psig
		TGHE	49 bar / 710 psig
Max. test pressure	R134a, R22, R407C, R404A	37.5 bar / 540 psig	
	R410A	TCHE	50 bar / 725 psig
		TGHE	54 bar / 755 psig
P-band max.	0.5 bar / 7.3 psig		

Table 3: Adjustment range for start opening

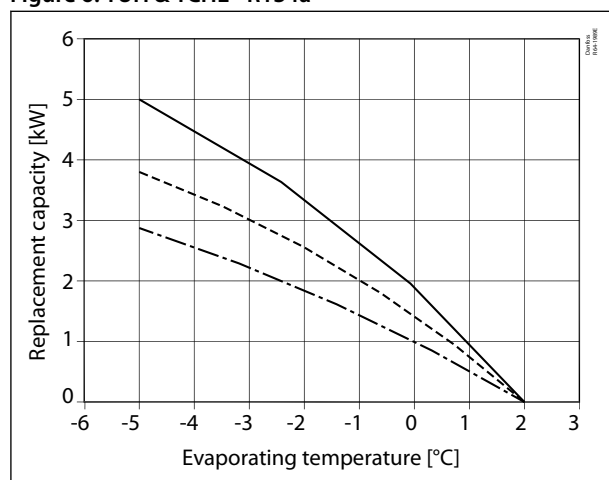
Valve type	Orifice sizes	Refrigerant	Adjustment range for start opening	
			[°C]	[°F]
TUH	9	R134a	-1 - 10	+30 - +50
			-6 - +5	+21 - +41
		R22/R407C	-4 - +8	+25 - +46
		R404A/R507	-1 - +12	+30 - +54
			-42 - -32	-44 - -26
TCHE	3 and 4	R410A	-1 - +10	+30 - +50
		R134a	-1 - 12	+30 - +54
			-5 - +5	+23 - +41
		R22/R407C	0 - +8	+32 - +46
		R407C	-1 - +8	+30 - +46
		R404A/R507	0 - +6	+32 - +43
TGHE 10	10		-1 - +9	+30 - +48
		R410A	-5 - +5	+23 - +41
		R134a	-1 - 12	+30 - +54
		R22/R407C	-1 - +10	+30 - +50
		R407C	-1 - +10	+30 - +50
TGHE 20	20	R404A/R507	-1 - +8	+30 - +46
		R410A	-1 - 12	+30 - +54
		R134a	-1 - +13	+30 - +55
		R22/R407C	-1 - +7	+30 - +45
		R407C	-1 - +7	+30 - +45
TGHE 40	40	R404A/R507	-1 - +7	+30 - +45
		R410A	-1 - +7	+30 - +45
		R134a	-1 - +16	+30 - +61
		R407C	-1 - +10	+30 - +50
		R404A/R507	-1 - +8	+30 - +46
		R410A	-1 - +8	+30 - +46

Product specification

Replacement capacity and Mass flow

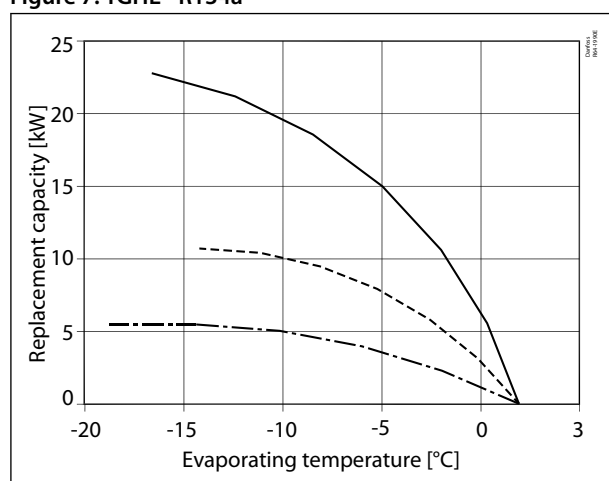
Replacement capacity - R134a

Figure 6: TUH & TCHE - R134a



—	TCHE 4
- - -	TCHE 3
- · - · -	TUH 9

Figure 7: TGHE - R134a



—	TGHE 40
- - -	TGHE 20
- · - · -	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

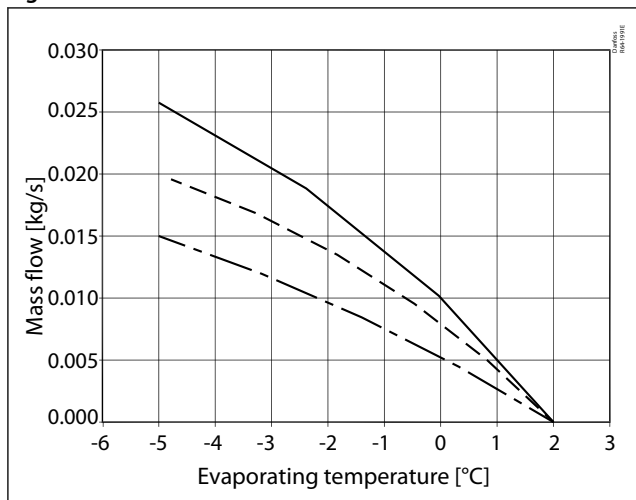
Table 4: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R134a	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.

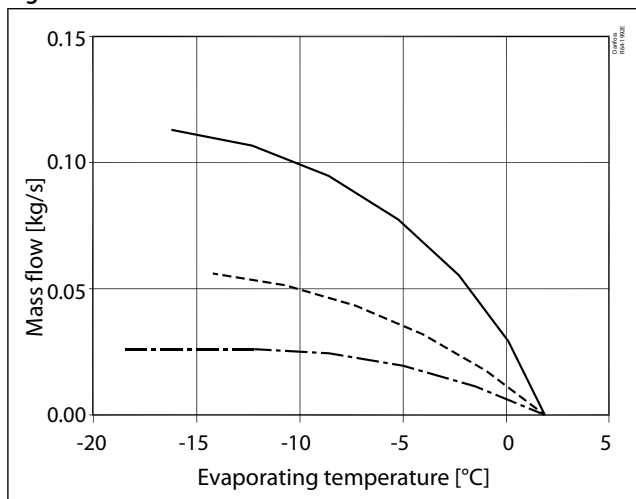
Mass flow - R134a

Figure 8: TUH & TCHE - R134a



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 9: TGHE - R134a



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

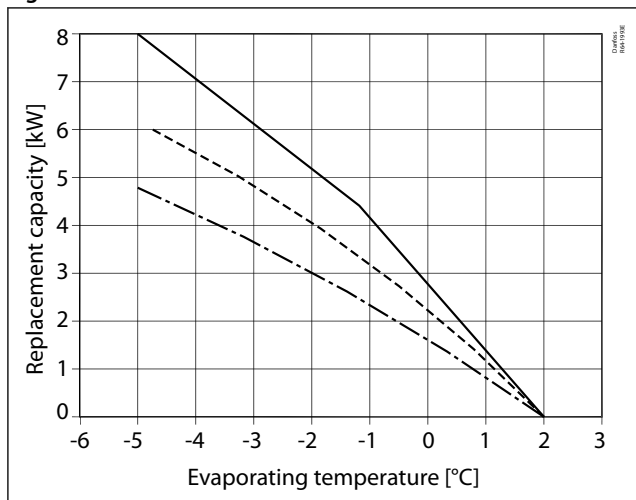
Table 5: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R134a	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.

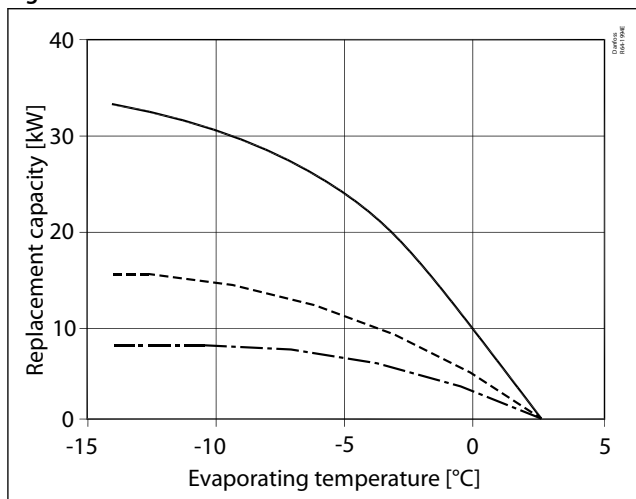
Replacement capacity - R22

Figure 10: TUH & TCHE - R22



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 11: TGHE - R22



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

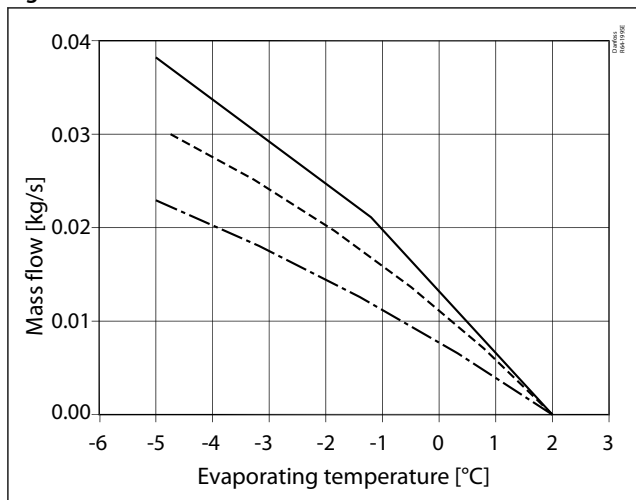
Table 6: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R22	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.

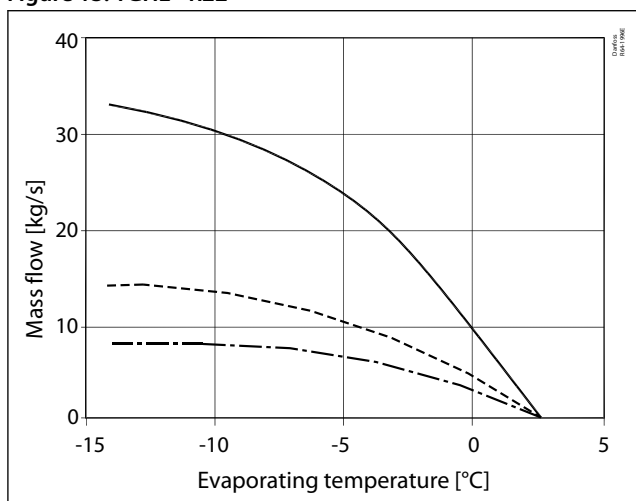
Mass flow - R22

Figure 12: TUH & TCHE - R22



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 13: TGHE - R22



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

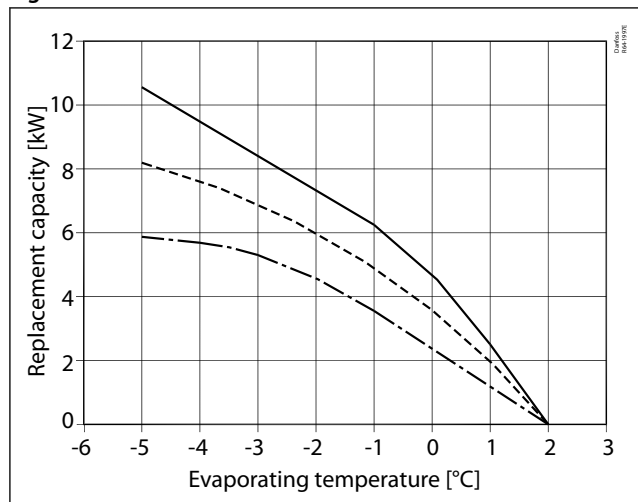
Table 7: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R22	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.

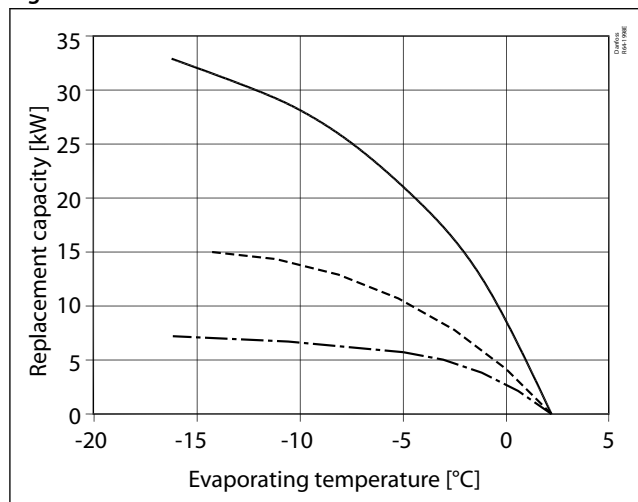
Replacement capacity - R404A/R507

Figure 14: TUH & TCHE - R404A/R507



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 15: TGHE - R404A/R507



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

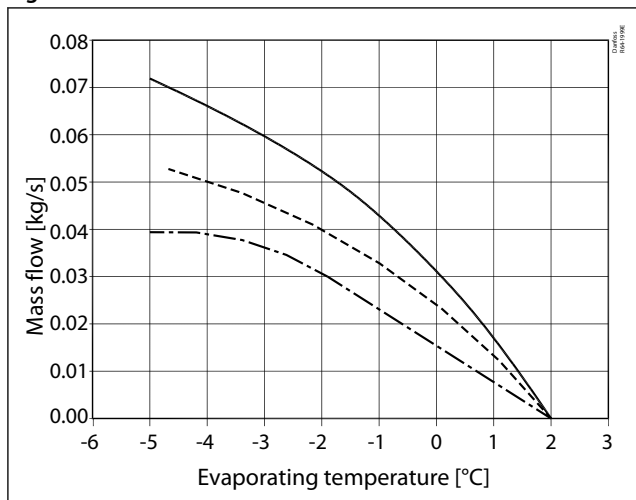
Table 8: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R404A/R507	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.

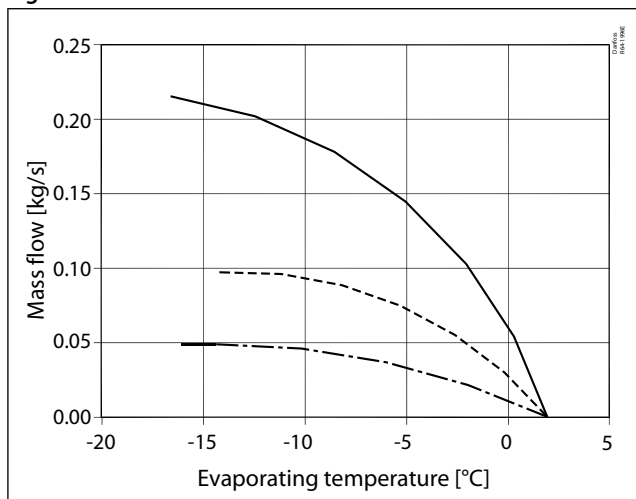
Mass flow - R404A/R507

Figure 16: TUH & TCHE - R404A/R507



— TCHE 4
 - - - TCHE 3
 - · - TUH 9

Figure 17: TGHE - R404A/R507



— TGHE 40
 - - - TGHE 20
 - · - TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

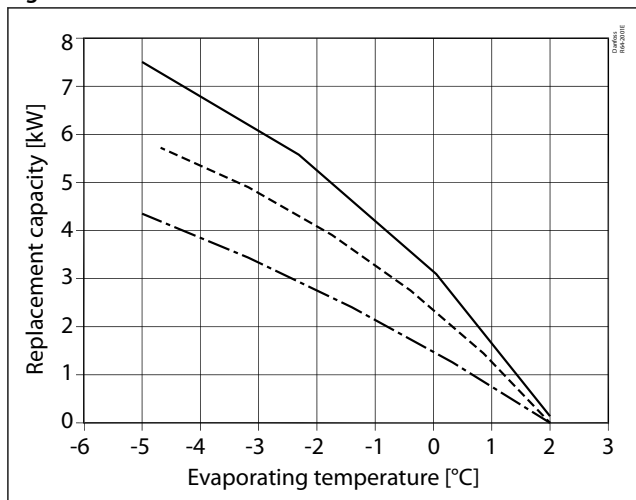
Table 9: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R404A/R507	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.

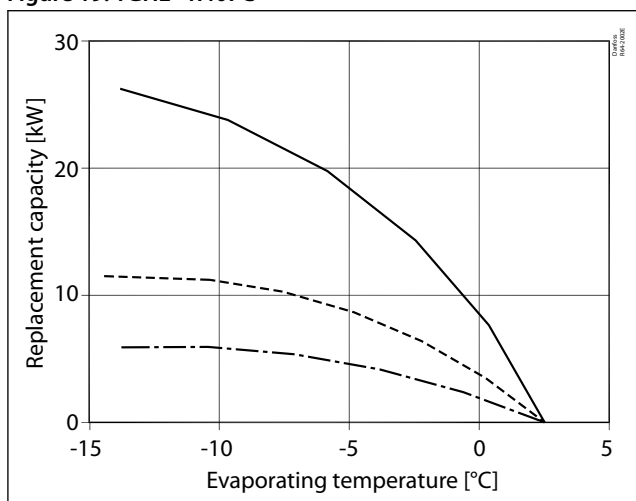
Replacement capacity - R407C

Figure 18: TUH & TCHE - R407C



—	TCHE 4
- - -	TCHE 3
- · - · -	TUH 9

Figure 19: TGHE - R407C



—	TGHE 40
- - -	TGHE 20
- · - · -	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

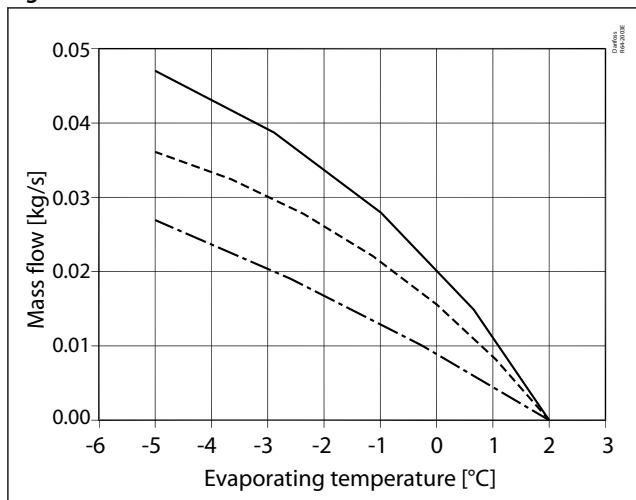
Table 10: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R407C	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.

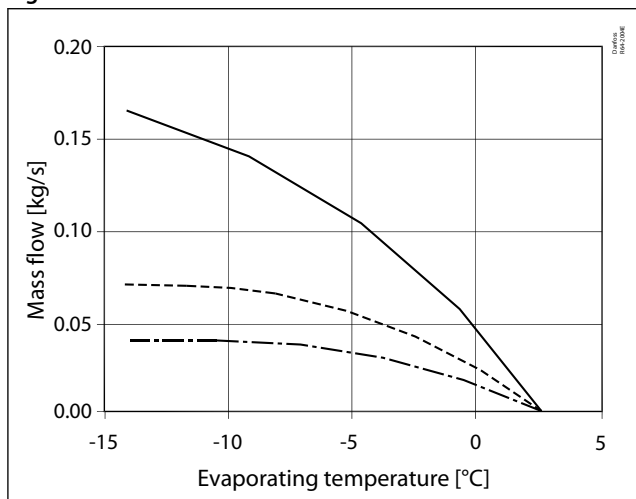
Mass flow - R407C

Figure 20: TUH & TCHE - R407C



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 21: TGHE - R407C



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

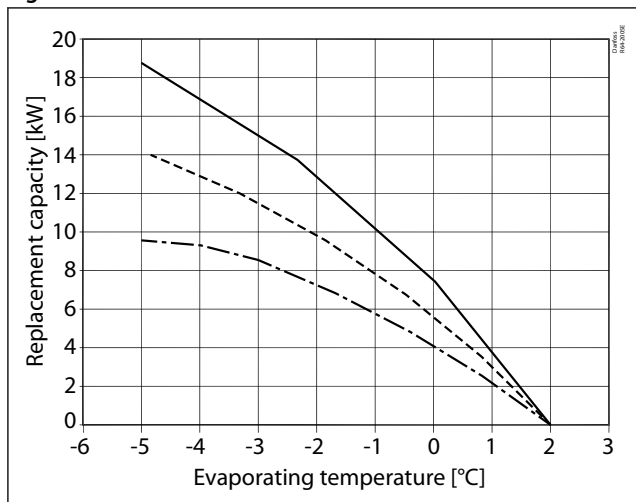
Table 11: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R407C	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.

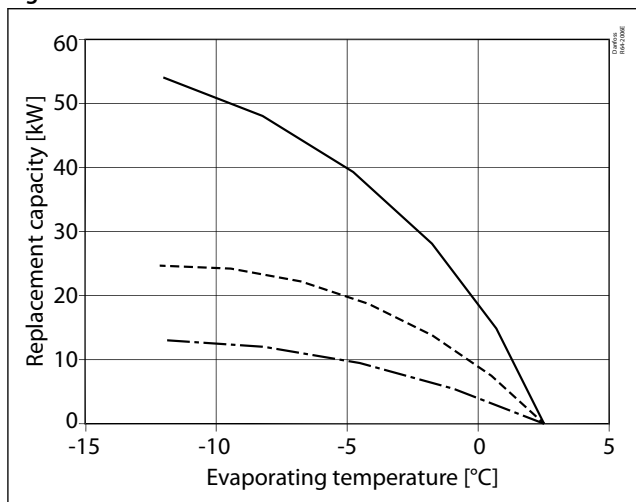
Replacement capacity - R410A

Figure 22: TUH & TCHE - R410A



—	TCHE 4
- - -	TCHE 3
- · - · -	TUH 9

Figure 23: TGHE - R410A



—	TGHE 40
- - -	TGHE 20
- · - · -	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

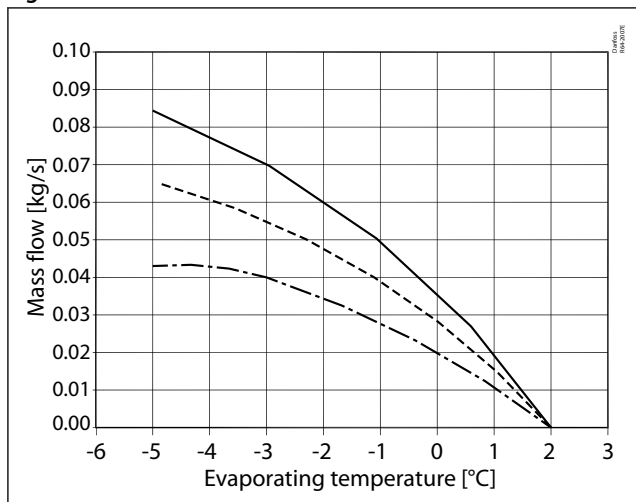
Table 12: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R410A	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.

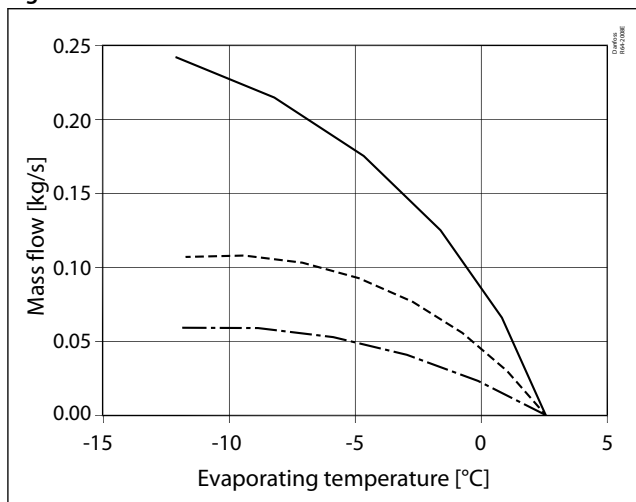
Mass flow - R410A

Figure 24: TUH & TCHE - R410A



—	TCHE 4
- - -	TCHE 3
- · - ·	TUH 9

Figure 25: TGHE - R410A



—	TGHE 40
- - -	TGHE 20
- · - ·	TGHE 10

Conditions used in calculation: $t_c = +40^\circ\text{C}$, Start opening $t_e = +2^\circ\text{C}$

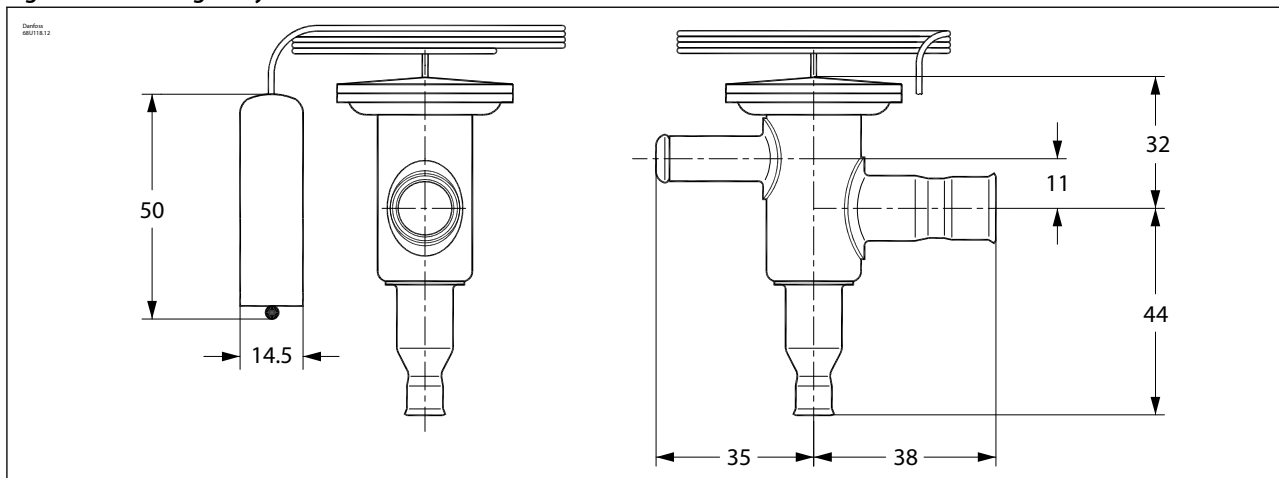
Table 13: Correction factor for condensing temperature

Refrigerant	Condensing temperature		
	+30°C	+40°C	+50°C
R410A	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.

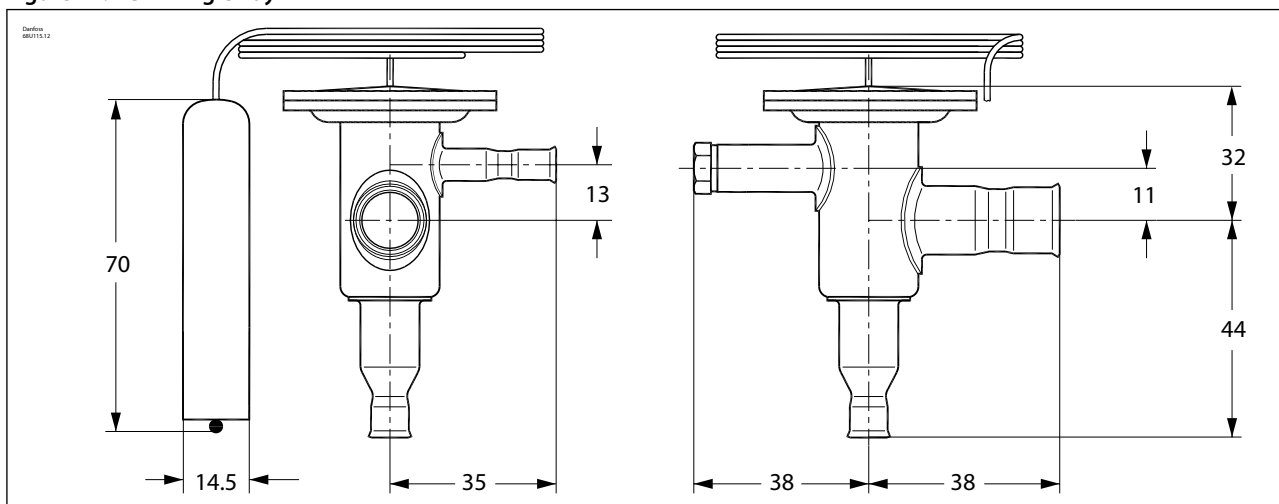
Dimensions and weight

Figure 26: TUH Angleway



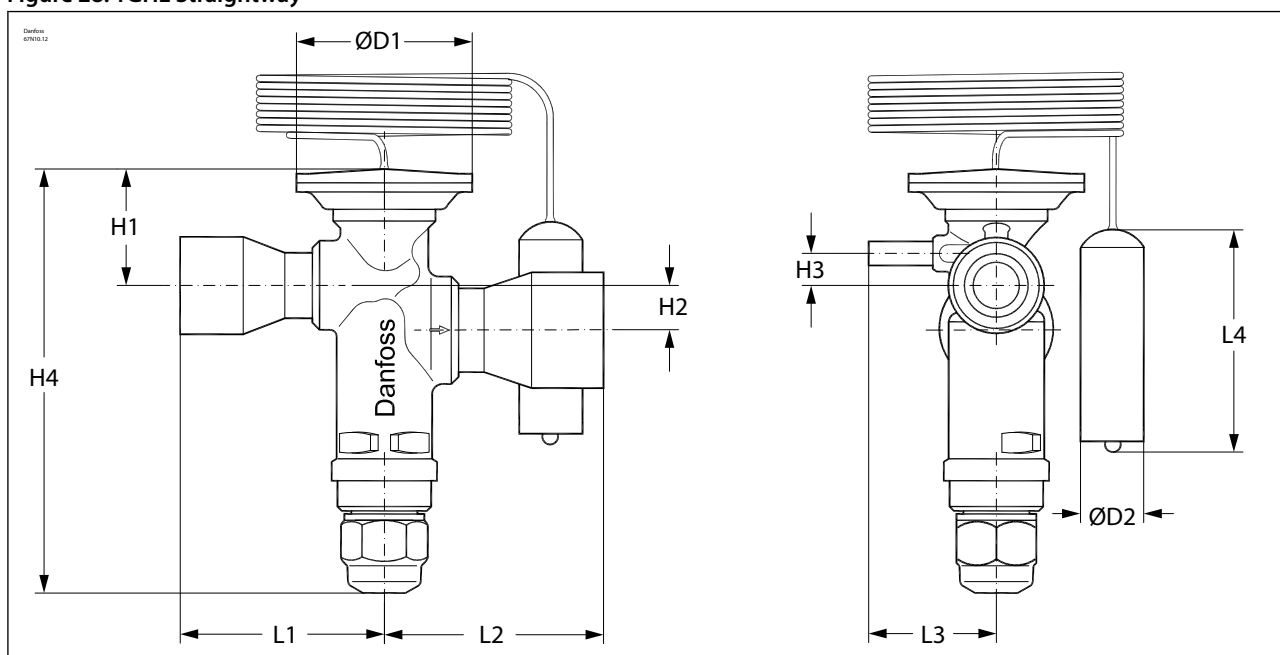
All dimensions in mm. TUH weight is 0.13 kg. For connection dimensions, see [Ordering](#).

Figure 27: TCHE Angleway



All dimensions in mm. TCHE weight is 0.15 kg. For connection dimensions, see [Ordering](#).

Figure 28: TGHE Straightway



For connection dimensions, see [Ordering](#).

Table 14: Dimensions and weight for TGHE

Type	Connection (ODF solder)		H1	H2	H3	H4	L1	L2	L3	L4	øD1	øD2	Weight
	Inlet × outlet	Inlet × outlet											
	[in.]	[mm]											
TGEH 10	5/8 × 5/8	16 × 16	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	28.5	9.0	8.0	117	48.0	62.0	40.0	70.0	53.0	14.5	0.65
TGHE 40	1 1/8 × 1 1/8	28 × 28	31.0	15.0	11.0	144	69.5	43.5	78.0	60.0	60.0	19.2	1.06

Table 15: Capillary tube length

Valve type	Capillary tube length	
	[m]	[ft]
TUH	0.8	2.6
TCHE	0.9	2.9
TGHE 10	1.5	5.0
TGHE 20	1.5	5.0
TGHE 40	3.0	10

Identification

Figure 29: TUH & TCHE label

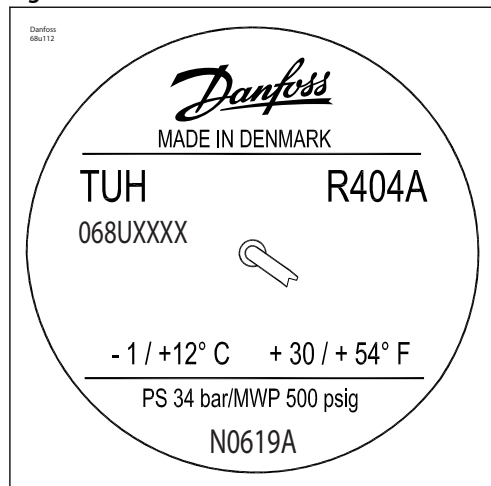


Table 16: TUH & TCHE label

Features	Description
TUH	Type
068UXXXX	Code number
R404A	Refrigerant
-1 – +12 °C	Adjusting range in °C
+30 – +54 °F	Adjusting range in °F
PS 34 bar/ MWP 500 psig	Max. working pressure
N0619A	Date marking (N = Nordborg, week 06, year 2019, weekday A = Monday)

Figure 30: TUH & TCHE valve body

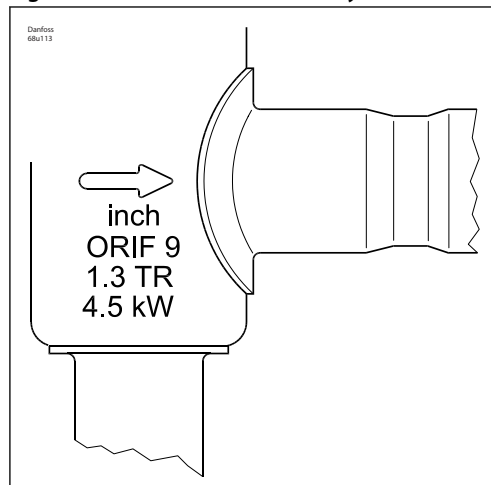


Table 17: Valve body data example

Features	Description
	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

Figure 31: TGHE label



Table 18: TUH & TCHE label

Features	Description
TGHE	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
067NXXXX	Code number
-1 – +12 °C	Adjusting range in °C
+30 – +54 °F	Adjusting range in °F
PS 46 bar/ MWP 670 psig	Max. working pressure
BE3216C	Date marking (BE = China, week 32, year 2016, weekday C = Wednesday)

Ordering

Table 19: Standard range (Supplied with bulb strap)

Type	Refrigerant	Orifice	Capacity ⁽¹⁾		Adjustment range for start opening		Connection					
							Inlet × Outlet					
			kW	TR	°C	°F	[in]	Code No.		[mm]	Code No.	
								IP	MP		IP	MP
TUH	R134a	9	1.8	0.5	-1 - 10	+30 - +50	3/8 × 1/2	068U2953	068U3748	10 × 12	068U2950	068U3746
		9			-1 - 10	+30 - +50	-	-	-	6 × 10	068U2961	068U3751
		9			-6 - 5	+21 - +41	-	-	-	10 × 12	068U2966	-
	R404A/R507	9	4.5	1.5	-1 - 12	+30 - +54	3/8 × 1/2	068U2954	-	10 × 12	068U2951	068U3747
		9			-42 - -32	-44 - -26	-	-	-	10 × 12	-	068U2962
	R22/R407C	9	3.0	0.9	-4 - -8	+25 - +46	3/8 × 1/2	068U2959	068U3749	-	-	-
	R410A	9	7.3	2.1	-1 - 10	+30 - +50	3/8 × 1/2	068U2960	068U3750	10 × 12	068U2958	-
TCHE	R134a	3	2.6	0.75	-1 - 12	+30 - +54	3/8 × 1/2	-	-	10 × 12	068U4530	068U4578
		4	3.4	1.0	-1 - 12	+30 - +54	3/8 × 1/2	068U4537	068U4583	10 × 12	068U4534	068U4580
		4			-5 - 5	+23 - +41	3/8 × 1/2	-	-	10 × 12	068U4560	-
	R404A/R507	3	5.9	1.7	0 - 6	+32 - +43	3/8 × 1/2	068U4541	-	10 × 12	068U4531	068U4579
		4	7.6	2.2	0 - 6	+32 - +43	-	-	-	10 × 12	068U4535	068U4581
	R407C	3	4.0	1.2	-1 - 8	+30 - +46	-	-	-	10 × 12	068U4532	-
		4	5.3	1.5	-1 - 8	+30 - +46	-	-	-	10 × 12	068U4536	068U4582
	R22/R407C	3	4.1	1.2	0 - 8	+32 - +46	3/8 × 1/2	068U4546	068U4584	-	-	-
		4	5.3	1.5	0 - 8	+32 - +46	3/8 × 1/2	068U4547	-	-	-	-
	R410A	3	10.0	2.9	-1 - 9	+30 - +48	3/8 × 1/2	068U4548	068U4585	10 × 12	068U4528	068U4576
		3			-5 - 5	+23 - +41	3/8 × 1/2	068U4559	-	-	-	-
		4	13.0	3.8	-1 - 9	+30 - +48	3/8 × 1/2	068U4549	068U4586	10 × 12	068U4529	068U4577
		4			-5 - 5	+23 - +41	3/8 × 1/2	068U4558	068U4587	-	-	-
TGHE 10	R407C	11	3.8	1.1	-1 - +10	+30 - +50	5/8 × 5/8	-	067N8313	16 × 16	-	-
	R22/R407C	11	5	1.4	-1 - +10	+30 - +50	5/8 × 5/8	-	067N8314	16 × 16	-	-
	R410A	11	8.4	2.4	-1 - 12	+30 - +54	5/8 × 5/8	-	067N8315	16 × 16	-	-
TGHE 20	R134a	20	5.6	1.6	-1 - +13	+30 - +55	5/8 × 5/8	-	067N8301	16 × 16	-	-
	R404A/R507	20	7.5	2.1	-1 - +7	+30 - +45	5/8 × 5/8	-	067N8302	16 × 16	-	-
	R407C	20	6.5	1.9	-1 - +7	+30 - +45	5/8 × 5/8	-	067N8303	16 × 16	-	-
	R22/R407C	20	8.8	2.5	-1 - +7	+30 - +45	5/8 × 5/8	-	067N8304	16 × 16	-	-
	R410A	20	14.5	4.1	-1 - +7	+30 - +45	5/8 × 5/8	067N8345	067N8305	16 × 16	-	-
TGHE 40	R134a	40	10.7	3.1	-1 - +16	+30 - +61	7/8 × 7/8	067N8322	067N8306	22 × 22	-	-
	R404A/R507	40	15	4.3	-1 - +8	+30 - +46	7/8 × 7/8	-	067N8308	22 × 22	-	-
	R407C	40	13	3.7	-1 - +10	+30 - +50	7/8 × 7/8	-	067N8309	22 × 22	-	-
	R410A	40	28.9	8.3	-1 - +8	+30 - +46	7/8 × 7/8	067N8321	067N8311	22 × 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 $\Delta t_s = 4 \text{ K} / 7^\circ\text{F}$.

Certificates, declarations, and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 20: Certificates, declarations, and approvals

Type	Document name	Document type	Document topic	Approval authority
TUH / TCHE	068U9616.01	Manufacturers Declaration	China RoHS	Danfoss
	068U9615.06	Manufacturers Declaration	PED/RoHS	Danfoss
	068U9903.01	EU Declaration	RoHS	Danfoss
	Д-DK.БЛ08.В.00191_18	EAC Declaration	Machinery & Equipment	EAC
TGHE	033F4011.AD	Manufacturers Declaration	RoHS	Danfoss
	067R1068.AE	Manufacturers Declaration	PED/RoHS	Danfoss
	033F4006	Manufacturers Declaration	China RoHS	Danfoss
	033F4017.AA	Manufacturers Declaration		Danfoss
	033F4004.AA	EU Declaration	PED	Danfoss
	Д-DK.БЛ08.В.00191_18	EAC Declaration	Machinery & Equipment	EAC
	SA7200	Mechanical - Safety Certificate		UL

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