

**Thermostatic expansion valves
for ammonia**
Type TEA

Introduction

Thermostatic expansion valves regulate the injection of refrigerant liquid into evaporators. Injection is controlled by the refrigerant superheat.

Therefore the valves are especially suitable for liquid injection in „dry“ evaporators where the superheat at the evaporator outlet follows the evaporator load proportionally.


Features

- *Large temperature range: -50 to +30°C*
Can be used in both freezing and refrigeration systems.
- *Interchangeable orifice assemblies*
- *Interchangeable thermostatic element*
- *Rated capacities from 3.5 to 295 kW, 1 to 85 tons (TR).*
- *External superheat setting*
Can be matched to all evaporators to give optimum evaporator utilization.
- *Patented double contact bulb*
Fast and easy to install. Good temperature transfer from tube to bulb.

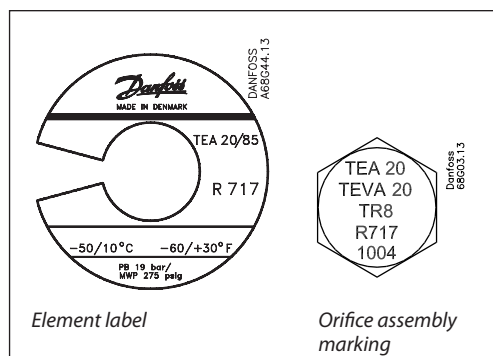
Materials

Valve housing made of GGG40.3

Gaskets are non asbestos

Technical data

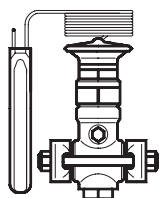
- *Refrigerant*
R 717 (NH₃)
- *Evaporating temperature range*
D: -50 to 0°C
P: -20 to +30°C
- *Capillary tube length*
5 m
- *Connection for external pressure equalization*
¼ in. or Ø 6.5 / Ø 10 mm weld nipple.
An 8 mm self-cutting union can also be used.
- *Max. bulb temperature*
100°C
- *Max. working pressure*
PS/MWP = 19 bar
- *Max. test pressure*
28.5 bar

Identification


The thermostatic element has a white label attached to its top. The colour refers to the refrigerant for which the valve is designed: R 717 (NH₃).

The orifice assembly is marked with

- valve type (TEA 20)
- rated capacity (8 TR = 28 kW)
- refrigerant R 717 (NH₃)
- date stamp

Ordering


| Type and rated capacity in tons (TR) | Rated capacity ¹⁾ kW | Connection weld flanges | | Code no. | | | |
|---|--|-------------------------|-------------------|-----------------|---------------------------------|---------------------------|-------------------------------|
| | | Inlet in. | Outlet in. | Assembled valve | Separate strainer ²⁾ | Separate orifice assembly | Separate thermostatic element |

TEA 20, range: -50 to 0°C

| | | | | | | | |
|-----------|------|-----|-----|-----------------|-----------------|-----------------|-----------------|
| TEA 20-1 | 3.5 | 1/2 | 1/2 | 068G6000 | 006-0042 | 068G2050 | 068G3250 |
| TEA 20-2 | 7 | 1/2 | 1/2 | 068G6001 | | 068G2051 | |
| TEA 20-3 | 10.5 | 1/2 | 1/2 | 068G6002 | | 068G2052 | |
| TEA 20-5 | 17.5 | 1/2 | 1/2 | 068G6003 | | 068G2053 | |
| TEA 20-8 | 28 | 1/2 | 1/2 | 068G6004 | | 068G2054 | |
| TEA 20-12 | 42 | 1/2 | 1/2 | 068G6005 | | 068G2055 | |
| TEA 20-20 | 70 | 1/2 | 1/2 | 068G6006 | 068G2056 | | |

TEA 20, range: -20 to +30°C

| | | | | | | | |
|-----------|------|-----|-----|-----------------|-----------------|-----------------|-----------------|
| TEA 20-1 | 3.5 | 1/2 | 1/2 | 068G6137 | 006-0042 | 068G2050 | 068G3252 |
| TEA 20-2 | 7 | 1/2 | 1/2 | 068G6133 | | 068G2051 | |
| TEA 20-3 | 10.5 | 1/2 | 1/2 | 068G6134 | | 068G2052 | |
| TEA 20-5 | 17.5 | 1/2 | 1/2 | 068G6138 | | 068G2053 | |
| TEA 20-8 | 28 | 1/2 | 1/2 | 068G6139 | | 068G2054 | |
| TEA 20-12 | 42 | 1/2 | 1/2 | 068G6140 | | 068G2055 | |
| TEA 20-20 | 70 | 1/2 | 1/2 | 068G6135 | 068G2056 | | |

TEA 85, range: -50 to 0°C

| | | | | | | | |
|-----------|-----|-----|-----|-----------------|-----------------|-----------------|-----------------|
| TEA85-33 | 115 | 3/4 | 3/4 | 068G6007 | 006-0048 | 068G2057 | 068G3250 |
| TEA 85-55 | 190 | 3/4 | 3/4 | 068G6008 | | 068G2058 | |
| TEA 85-85 | 295 | 3/4 | 3/4 | 068G6009 | | 068G2059 | |

TEA 85, range: -20 to +30°C

| | | | | | | | |
|-----------|-----|-----|-----|-----------------|-----------------|-----------------|-----------------|
| TEA85-33 | 115 | 3/4 | 3/4 | 068G6141 | 006-0048 | 068G2057 | 068G3252 |
| TEA 85-55 | 190 | 3/4 | 3/4 | 068G6142 | | 068G2058 | |
| TEA 85-85 | 295 | 3/4 | 3/4 | 068G6143 | | 068G2059 | |

- ¹⁾ The rated capacity is the valve capacity at -15°C evaporating temperature and +32°C condensing temperature. The capacities are based on approx. 4 K subcooling ahead of valve.
- ²⁾ The filter is supplied with gaskets, bolts and nuts.

Note:

Subcooling of the liquid in front of the valve is essential for the function of the valve. Lack of subcooling will lead to malfunction of the valve, and increased wear on the orifice.

R 717 (NH₃)

Capacity in kW, range -50 to 0°C

| Type and rated capacity in tons (TR) | 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 0°C | | | | | | | | | Evaporating temperature -10°C | | | | | | | | |
| TEA 20-1 | 2.1 | 2.9 | 3.3 | 3.7 | 4.1 | 4.3 | 4.5 | 4.8 | | 2.7 | 3.0 | 3.3 | 3.6 | 4.0 | 4.2 | 4.4 | |
| TEA 20-2 | 4.1 | 5.6 | 6.5 | 7.4 | 8.1 | 8.6 | 9.0 | 9.3 | | 5.2 | 6.0 | 6.8 | 7.5 | 8.0 | 8.3 | 8.7 | |
| TEA 20-3 | 5.9 | 8.3 | 9.9 | 11.2 | 12.1 | 13.0 | 13.5 | 14.0 | | 7.8 | 9.1 | 10.1 | 11.2 | 12.0 | 12.6 | 13.0 | |
| TEA 20-5 | 10.5 | 14.1 | 16.7 | 18.6 | 20.2 | 21.5 | 22.4 | 23.3 | | 12.9 | 15.1 | 17.1 | 18.7 | 20.0 | 20.8 | 21.5 | |
| TEA 20-8 | 15.7 | 22.1 | 26.2 | 29.7 | 32.0 | 34.3 | 36.1 | 37.2 | | 20.9 | 24.4 | 27.9 | 30.2 | 31.7 | 33.1 | 34.3 | |
| TEA 20-12 | 24.4 | 33.1 | 39.5 | 44.5 | 48.3 | 51.8 | 54.7 | 56.4 | | 31.4 | 36.6 | 41.9 | 45.0 | 47.7 | 50.0 | 52.3 | |
| TEA 20-20 | 40.7 | 55.0 | 66.3 | 74.4 | 80.9 | 86.1 | 90.2 | 93.7 | | 51.8 | 60.5 | 68.6 | 75.1 | 79.1 | 83.3 | 85.6 | |
| TEA 85-33 | 69.3 | 92.8 | 110 | 122 | 134 | 145 | 151 | 157 | | 85.6 | 101 | 113 | 122 | 134 | 140 | 145 | |
| TEA 85-55 | 114 | 151 | 180 | 204 | 221 | 238 | 250 | 256 | | 145 | 169 | 186 | 204 | 221 | 233 | 244 | |
| TEA 85-85 | 180 | 238 | 285 | 320 | 343 | 366 | 384 | 395 | | 221 | 256 | 291 | 314 | 337 | 355 | 372 | |
| Evaporating temperature -20°C | | | | | | | | | Evaporating temperature -30°C | | | | | | | | |
| TEA 20-1 | | 2.2 | 2.6 | 2.9 | 3.1 | 3.3 | 3.5 | 3.7 | | | 2.0 | 2.2 | 2.4 | 2.6 | 2.8 | 2.9 | |
| TEA 20-2 | | 4.3 | 4.9 | 5.6 | 6.2 | 6.6 | 6.9 | 7.1 | | | 4.1 | 4.5 | 4.9 | 5.2 | 5.5 | 5.6 | |
| TEA 20-3 | | 6.5 | 7.4 | 8.5 | 9.4 | 10.0 | 10.4 | 10.6 | | | 6.2 | 6.9 | 7.4 | 7.9 | 8.3 | 8.5 | |
| TEA 20-5 | | 11.0 | 12.9 | 14.4 | 15.6 | 16.5 | 17.2 | 17.7 | | | 10.1 | 11.3 | 12.3 | 13.1 | 13.7 | 14.3 | |
| TEA 20-8 | | 17.4 | 20.4 | 22.7 | 25.0 | 26.2 | 27.3 | 27.9 | | | 16.3 | 18.0 | 19.8 | 20.9 | 22.1 | 22.7 | |
| TEA 20-12 | | 25.6 | 30.8 | 34.9 | 37.2 | 39.5 | 41.9 | 43.0 | | | 25.0 | 27.9 | 30.2 | 31.4 | 32.6 | 33.7 | |
| TEA 20-20 | | 44.2 | 51.2 | 57.6 | 61.6 | 65.7 | 68.6 | 72.1 | | | 40.7 | 45.4 | 49.4 | 52.3 | 54.7 | 57.0 | |
| TEA 85-33 | | 72.1 | 84.9 | 94.9 | 103 | 109 | 114 | 116 | | | 68.6 | 75.0 | 80.9 | 85.6 | 90.2 | 94.2 | |
| TEA 85-55 | | 116 | 145 | 163 | 174 | 180 | 186 | 192 | | | 114 | 128 | 140 | 145 | 151 | 157 | |
| TEA 85-85 | | 180 | 221 | 244 | 267 | 279 | 291 | 302 | | | 174 | 192 | 209 | 221 | 233 | 244 | |
| Evaporating temperature -40°C | | | | | | | | | Evaporating temperature -50°C | | | | | | | | |
| TEA 20-1 | | | 1.3 | 1.7 | 1.9 | 2.0 | 2.2 | 2.3 | | | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | |
| TEA 20-2 | | | 3.1 | 3.5 | 3.8 | 4.0 | 4.2 | 4.4 | | | 2.4 | 2.7 | 2.8 | 3.0 | 3.1 | 3.3 | |
| TEA 20-3 | | | 4.8 | 5.2 | 5.7 | 6.0 | 6.4 | 6.6 | | | 3.7 | 4.1 | 4.3 | 4.5 | 4.8 | 5.0 | |
| TEA 20-5 | | | 8.0 | 8.7 | 9.4 | 10.1 | 10.6 | 11.0 | | | 6.0 | 6.6 | 7.1 | 7.6 | 7.9 | 8.3 | |
| TEA 20-8 | | | 12.8 | 14.0 | 15.1 | 16.3 | 16.9 | 17.4 | | | 9.3 | 10.5 | 11.0 | 11.6 | 12.2 | 12.8 | |
| TEA 20-12 | | | 19.2 | 20.9 | 22.7 | 24.4 | 26.2 | 27.3 | | | 14.5 | 15.7 | 16.9 | 18.0 | 19.2 | 20.4 | |
| TEA 20-20 | | | 32.0 | 35.5 | 38.4 | 40.7 | 43.0 | 44.8 | | | 24.4 | 26.2 | 27.9 | 29.7 | 31.4 | 32.6 | |
| TEA 85-33 | | | 52.3 | 58.2 | 61.6 | 65.1 | 68.6 | 72.1 | | | 39.5 | 43.6 | 46.5 | 49.4 | 51.8 | 54.1 | |
| TEA 85-55 | | | 86.8 | 96.5 | 104 | 110 | 116 | 122 | | | 66.3 | 72.1 | 77.8 | 81.9 | 86.1 | 89.6 | |
| TEA 85-85 | | | 134 | 151 | 163 | 174 | 180 | 186 | | | 104 | 113 | 122 | 128 | 134 | 140 | |

 1) Subcooling $\Delta t = 4K$ ahead of the valve.

Example

Given:
 Refrigerant = R 717 (NH₃)
 Evaporator capacity $Q_e = 265 \text{ kW (75.3 TR)}$
 Evaporating temperature $t_e = -20^\circ\text{C}$
 ($\sim p_e = 1.9 \text{ bar}$)
 Condensing temperature $t_c = +32^\circ\text{C}$
 ($\sim p_c = 12.4 \text{ bar}$)
 Subcooling $\Delta t = 4K$
 If the pressure drop Δp_1 across pipelines, etc. is calculated, for example, as 0.5 bar, the effective pressure drop across the thermostatic valve becomes
 $\Delta p = p_c - p_e - p_1$
 $\Delta p = 12.4 - 1.9 - 0.5 = 10 \text{ bar.}$

Now, from the capacity table at an evaporating temperature $t_e = -20^\circ\text{C}$ and $\Delta p = 10 \text{ bar}$, the capacity is 267 kW.

The column on the far left of this point gives the valve designation: TEA 85-85.

The ordering table gives the code no. for TEA 85-85: 068G6009.

Generally, the maximum capacity of a valve is approx. 20% higher than the value given in the table.

If a different capacity is subsequently required, a separate orifice assembly with a suitable rated capacity can be ordered to replace the one fitted in the installed valve.

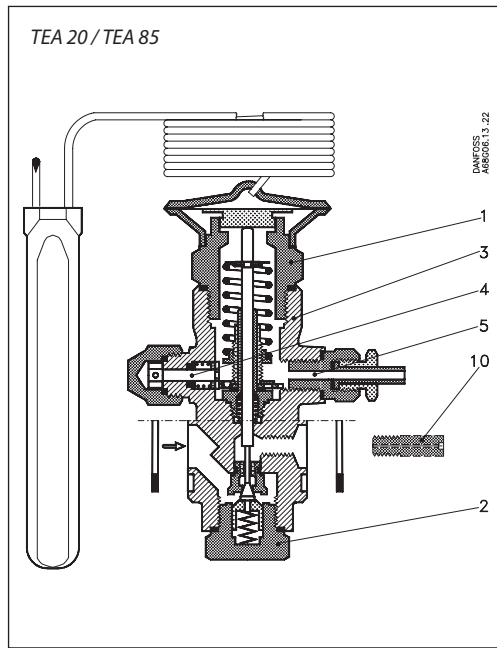
R 717 (NH₃)

Capacity in kW, range -20 to +30°C

| Type and rated capacity in tons (TR) | 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 +30°C | | | | | | | | | Evaporating temperature +20°C | | | | | | | | |
| TEA 20-1 | 2.6 | 3.4 | 3.9 | 4.3 | 4.6 | 4.8 | 5.0 | 5.2 | 2.7 | 3.4 | 3.9 | 4.2 | 4.5 | 4.8 | 4.9 | 5.1 | |
| TEA 20-2 | 4.7 | 6.5 | 7.5 | 8.1 | 8.7 | 9.2 | 9.6 | 9.9 | 4.9 | 6.6 | 7.5 | 8.1 | 8.7 | 9.1 | 9.5 | 9.9 | |
| TEA 20-3 | 5.6 | 7.8 | 9.3 | 10.4 | 11.4 | 12.2 | 12.9 | 13.5 | 5.9 | 8.0 | 9.6 | 10.8 | 11.7 | 12.5 | 13.2 | 13.9 | |
| TEA 20-5 | 11.6 | 16.0 | 19.0 | 20.9 | 22.2 | 23.4 | 24.5 | 25.4 | 12.1 | 16.5 | 19.3 | 20.9 | 22.2 | 23.4 | 24.4 | 25.4 | |
| TEA 20-8 | 19.9 | 27.3 | 31.3 | 34.4 | 36.6 | 38.6 | 40.3 | 41.8 | 20.7 | 28.1 | 31.5 | 34.2 | 36.5 | 38.4 | 40.1 | 41.6 | |
| TEA 20-12 | 29.1 | 39.6 | 45.3 | 49.2 | 52.2 | 55.2 | 57.7 | 59.8 | 30.2 | 40.2 | 45.0 | 48.8 | 52.0 | 54.8 | 57.2 | 59.3 | |
| TEA 20-20 | 42.9 | 66.2 | 74.6 | 81.1 | 86.4 | 90.9 | 94.8 | 98.3 | 50.7 | 65.9 | 73.8 | 80.0 | 85.2 | 89.7 | 93.7 | 97.2 | |
| TEA 85-33 | 83.0 | 106 | 122 | 133 | 143 | 150 | 158 | 164 | 85.0 | 106 | 120 | 132 | 141 | 149 | 156 | 163 | |
| TEA 85-55 | 134 | 179 | 205 | 222 | 236 | 248 | 259 | 268 | 137 | 181 | 202 | 219 | 233 | 245 | 256 | 265 | |
| TEA 85-85 | 196 | 257 | 297 | 328 | 353 | 374 | 392 | 408 | 200 | 258 | 296 | 326 | 351 | 372 | 390 | 406 | |
| Evaporating temperature +10°C | | | | | | | | | Evaporating temperature 0°C | | | | | | | | |
| TEA 20-1 | 2.6 | 3.3 | 3.8 | 4.2 | 4.4 | 4.7 | 4.9 | 5.0 | 2.6 | 3.2 | 3.7 | 4.1 | 4.3 | 4.6 | 4.8 | 5.0 | |
| TEA 20-2 | 5.1 | 6.6 | 7.4 | 8.0 | 8.6 | 9.0 | 9.5 | 9.9 | 5.2 | 6.4 | 7.2 | 7.9 | 8.4 | 8.9 | 9.4 | 9.7 | |
| TEA 20-3 | 6.1 | 8.3 | 9.8 | 11.0 | 12.0 | 12.8 | 13.5 | 14.1 | 6.3 | 8.5 | 10.0 | 11.2 | 12.1 | 12.9 | 13.6 | 14.2 | |
| TEA 20-5 | 12.5 | 17.0 | 19.1 | 20.7 | 22.0 | 23.2 | 24.3 | 25.2 | 12.9 | 16.8 | 18.7 | 20.3 | 21.7 | 22.9 | 23.9 | 24.9 | |
| TEA 20-8 | 21.3 | 27.8 | 31.1 | 33.7 | 36.0 | 37.9 | 39.6 | 41.2 | 21.8 | 27.1 | 30.3 | 33.0 | 35.2 | 37.2 | 39.0 | 40.5 | |
| TEA 20-12 | 30.9 | 39.5 | 44.2 | 47.9 | 51.1 | 53.9 | 56.3 | 58.5 | 31.4 | 38.4 | 42.9 | 46.7 | 49.9 | 52.7 | 55.2 | 57.4 | |
| TEA 20-20 | 51.6 | 64.5 | 72.1 | 78.2 | 83.4 | 88.0 | 92.0 | 95.6 | 51.7 | 62.3 | 69.8 | 76.0 | 81.3 | 85.9 | 90.0 | 93.7 | |
| TEA 85-33 | 84.0 | 104 | 118 | 129 | 139 | 147 | 153 | 160 | 82.0 | 101 | 114 | 126 | 135 | 143 | 151 | 157 | |
| TEA 85-55 | 140 | 178 | 198 | 214 | 228 | 241 | 251 | 261 | 139 | 172 | 192 | 208 | 223 | 235 | 246 | 256 | |
| TEA 85-85 | 200 | 255 | 292 | 321 | 346 | 367 | 385 | 401 | 196 | 248 | 285 | 314 | 339 | 360 | 378 | 395 | |
| Evaporating temperature -10°C | | | | | | | | | Evaporating temperature -20°C | | | | | | | | |
| TEA 20-1 | | 3.1 | 3.6 | 3.9 | 4.2 | 4.4 | 4.6 | 4.8 | | 2.9 | 3.2 | 3.5 | 3.8 | 4.0 | 4.2 | 4.4 | |
| TEA 20-2 | | 6.1 | 6.9 | 7.5 | 8.1 | 8.6 | 9.0 | 9.4 | | 5.4 | 6.2 | 6.8 | 7.3 | 7.8 | 8.2 | 8.6 | |
| TEA 20-3 | | 8.5 | 10.0 | 11.2 | 12.1 | 12.9 | 13.5 | 14.1 | | 8.4 | 9.9 | 11.0 | 11.9 | 12.5 | 13.0 | 13.4 | |
| TEA 20-5 | | 15.6 | 17.5 | 19.1 | 20.4 | 21.6 | 22.7 | 23.6 | | 13.6 | 15.4 | 17.0 | 18.3 | 19.4 | 20.4 | 21.3 | |
| TEA 20-8 | | 24.7 | 27.8 | 30.4 | 32.6 | 34.6 | 36.3 | 37.8 | | 21.0 | 24.0 | 26.5 | 28.6 | 30.4 | 32.0 | 33.4 | |
| TEA 20-12 | | 36.9 | 41.5 | 45.3 | 48.6 | 51.5 | 54.0 | 56.3 | | 32.2 | 36.7 | 40.4 | 43.5 | 46.3 | 48.7 | 50.9 | |
| TEA 20-20 | | 59.7 | 67.3 | 73.6 | 79.0 | 83.7 | 87.9 | 91.7 | | 56.9 | 64.6 | 71.0 | 76.6 | 81.4 | 85.6 | 89.5 | |
| TEA 85-33 | | 97.0 | 111 | 122 | 131 | 140 | 147 | 154 | | 92.0 | 107 | 118 | 128 | 136 | 144 | 150 | |
| TEA 85-55 | | 165 | 185 | 202 | 216 | 229 | 241 | 251 | | 158 | 178 | 196 | 211 | 224 | 235 | 245 | |
| TEA 85-85 | | 239 | 276 | 306 | 331 | 352 | 371 | 388 | | 230 | 267 | 297 | 323 | 345 | 364 | 381 | |

1) Subcooling Δt = 4K ahead of the valve.

**Design/
Function**



1. Thermostatic element (diaphragm)
2. Orifice assembly
3. Valve body
4. Superheat setting spindle (see „Instructions“)
5. Ext. pressure equalizing connection
10. Separate outlet orifice (for TEA 20-1 only)

General

TEA is equipped with interchangeable orifice assembly and thermostatic element. TEA is built up of three interchangeable main components:

- Thermostatic element (1)
- Orifice assembly (2)
- Valve body (3), with flange connections

The valve has external equalization. A separate outlet orifice assembly (10) is for use with TEA 20-1 (3.5 kW) only.

The double contact bulb gives fast and precise reaction to temperature changes in the evaporator suction line, even with much reduced evaporator load. It also makes fitting the bulb quick and easy.

The valves are able to withstand the effects that normally occur with hot gas defrosting.

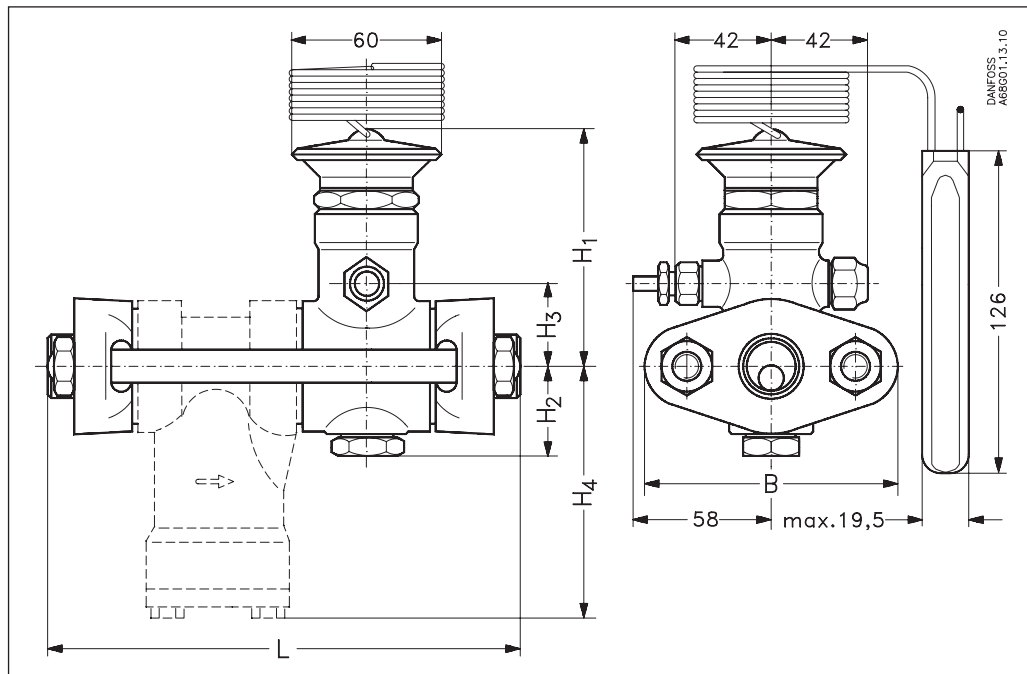
The movement of the setting spindle is transferred by a gearwheel mechanism that ensures smooth superheat setting.

The throttling section of the orifice assembly has a long operating life, the valve cone and seat being made of a special alloy steel with particularly good wear qualities.

Note:

The TEA is not able to close completely tight. Consequently a solenoid valve is needed to shut off liquid supply when systems stops.

Dimensions and weights



| Type | H ₁ mm | H ₂ mm | H ₃ mm | H ₄ mm | L | | B mm | Weight | |
|--------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------|----------------------|----------------------|
| | | | | | Excl. strainer mm | Incl. strainer mm | | Excl. strainer kg | Incl. strainer kg |
| TEA 20 | 94 | 38 | 25 | 96 | 110 | 164 | 80 | 2.1 | 3.0 |
| TEA 85 | 104 | 37 | 35 | 106 | 125 | 199 | 95 | 3.0 | 4.5 |

