

## Data Sheet

Thermostatic expansion valves  
for ammonia Type **TEA**

Regulate and monitor ammonia and fluorinated refrigerants  
in industrial refrigeration systems



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 °C – +30 °C Can be used in both freezing and refrigeration systems
- Interchangeable orifice assemblies
- Interchangeable thermostatic element
- Rated capacities from 3.5 – 295 kW, 1 – 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
- Classification: DNV, CRN, BV, EAC etc. To get an updated list of certification on the products please contact your local Danfoss Sales Company

### Functions

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.

## Media

### **Refrigerants**

Refrigerant R717 - NH<sub>3</sub>(Ammonia)

### **New refrigerants**

Danfoss products are continually evaluated for use with new refrigerants depending on market requirements.

When a refrigerant is approved for use by Danfoss, it is added to the relevant portfolio, and the R number of the refrigerant (e.g. R513A) will be added to the technical data of the code number. Therefore, products for specific refrigerants are best checked at [store.danfoss.com/en/](https://store.danfoss.com/en/), or by contacting your local Danfoss representative.

## Product specification

### Pressure and temperature

Table 1: Pressure and temperature

Evaporating temperature range	<b>D:</b> -50 °C – 0 °C <b>P:</b> -20 °C – 30 °C
Capillary tube length:	5 m
Max. bulb temperature	100 °C
Max. working pressure	PS/MWP = 19 bar
Max. test pressure	28.5 bar

**NOTE:**

Connection for external pressure equalization 1/4 in. or  $\varnothing$  6.5 /  $\varnothing$  10 mm weld nipple. An 8 mm self-cutting union can also be used.

### Design

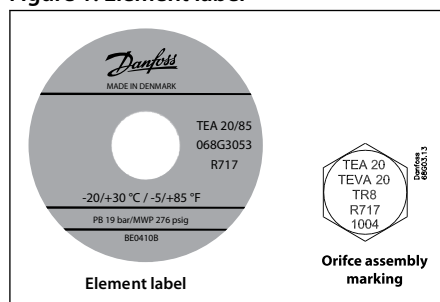
#### Materials

Valve housing made of GGG40.3

Gaskets are non asbestos

### Identification

Figure 1: Element label



#### 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 (Ammonia).

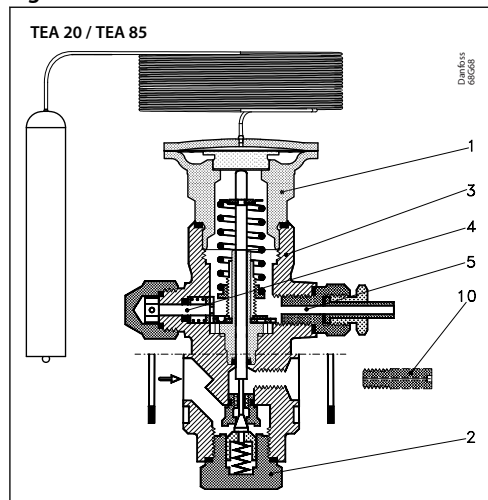
#### The orifice assembly

is marked with

- valve type (TEA 20)
- rated capacity (8 TR = 28 kW)
- refrigerant R717 (NH<sub>3</sub>)
- date stamp

## Material specification

Figure 2: TEA



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

## Dimensions and weights

Figure 3: Dimensions and weights

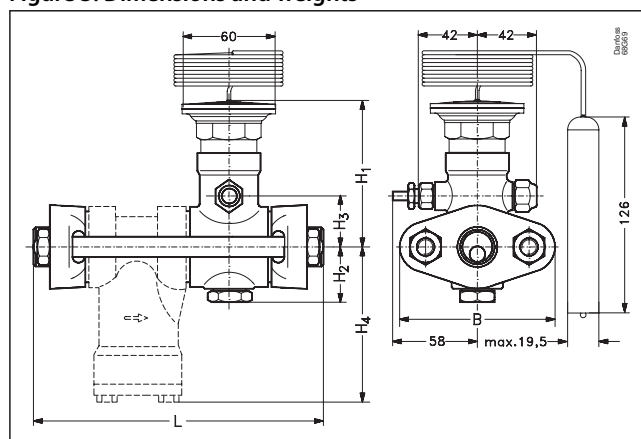


Table 2: Dimensions and weights

Type	H <sub>1</sub> [mm]	H <sub>2</sub> [mm]	H <sub>3</sub> [mm]	H <sub>4</sub> [mm]	L		B [mm]	Weight	
					Excl. strainer	Incl. strainer		Excl. strainer [kg]	Incl. strainer [kg]
					[mm]	[mm]			
<b>TEA 20</b>	94	38	25	96	110	164	80	2.1	3
<b>TEA 85</b>	104	37	35	106	125	199	95	3	4.5

## Ordering

Figure 4: TEA

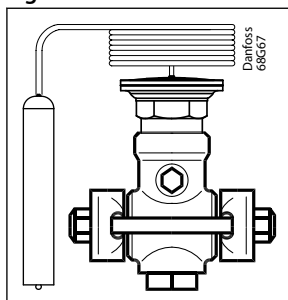


Table 3: Ordering

Type and rated capacity in tons (TR)	Rated capacity <sup>(1)</sup> [kW]	Connection weld flanges		Code no.			
		Inlet [in]	Outlet [in]	Assembled valve	Separate strainer <sup>(2)</sup>	Separate orifice assembly	Separate thermostatic element
<b>TEA 20, range: -50 °C – 0 °C</b>							
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	
<b>TEA 20, range: -20 °C – 30 °C</b>							
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	
<b>TEA 85, range: -50 °C – 0 °C</b>							
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	
<b>TEA 85, range: -20 °C – 30 °C</b>							
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	

<sup>(1)</sup> 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.

<sup>(2)</sup> The filter is supplied with gaskets, bolts and nuts.

### **i** 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.

Table 4: Capacities

Capacity in kW, range -50 °C – 0 °C															<b>R 717 (NH<sub>3</sub>)</b>	
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	3.3	3.6	4	4.2	4.4	
TEA 20-2	4.1	5.6	6.5	7.4	8.1	8.6	9	9.3	5.2	6	6.8	7.5	8	8.3	8.7	
TEA 20-3	5.9	8.3	9.9	11.2	12.1	13	13.5	14	7.8	9.1	10.1	11.2	12	12.6	13	



## Thermostatic expansion valves for ammonia, Type TEA

Capacity in kW, range -20 °C – +30 °C														R 717 (NH <sub>3</sub> )		
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
<b>TEA 20-20</b>	51.6	64.5	72.1	78.2	83.4	88	92	95.6	51.7	62.3	69.8	76	81.3	85.9	90	93.7
<b>TEA 85-33</b>	84	104	118	129	139	147	153	160	82	101	114	126	135	143	151	157
<b>TEA 85-55</b>	140	178	198	214	228	241	251	261	139	172	192	208	223	235	246	256
<b>TEA 85-85</b>	200	255	292	321	346	367	385	401	196	248	285	314	339	360	378	395
	Evaporating temperature -10 °C								Evaporating temperature -20 °C							
<b>TEA 20-1</b>		3.1	3.6	3.9	4.2	4.4	4.6	4.8		2.9	3.2	3.5	3.8	4	4.2	4.4
<b>TEA 20-2</b>		6.1	6.9	7.5	8.1	8.6	9	9.4		5.4	6.2	6.8	7.3	7.8	8.2	8.6
<b>TEA 20-3</b>		8.5	10	11.2	12.1	12.9	13.5	14.1		8.4	9.9	11	11.9	12.5	13	13.4
<b>TEA 20-5</b>		15.6	17.5	19.1	20.4	21.6	22.7	23.6		13.6	15.4	17	18.3	19.4	20.4	21.3
<b>TEA 20-8</b>		24.7	27.8	30.4	32.6	34.6	36.3	37.8		21	24	26.5	28.6	30.4	32	33.4
<b>TEA 20-12</b>		36.9	41.5	45.3	48.6	51.5	54	56.3		32.2	36.7	40.4	43.5	46.3	48.7	50.9
<b>TEA 20-20</b>		59.7	67.3	73.6	79	83.7	87.9	91.7		56.9	64.6	71	76.6	81.4	85.6	89.5
<b>TEA 85-33</b>		97	111	122	131	140	147	154		92	107	118	128	136	144	150
<b>TEA 85-55</b>		165	185	202	216	229	241	251		158	178	196	211	224	235	245
<b>TEA 85-85</b>		239	276	306	331	352	371	388		230	267	297	323	345	364	381

**NOTE:**

Subcooling Δt = 4K ahead of the valve.

### Example

**Table 6: Temperature and cooling data**

Description	Values
Evaporator capacity Q <sub>e</sub>	265 kW (75.3 TR)
Evaporating temperature t <sub>e</sub>	-20 °C (~p <sub>e</sub> = 1.9 bar)
Condensing temperature t <sub>c</sub>	+32 °C (~p <sub>c</sub> = 12.4 bar)
Subcooling Δt	4K

If the pressure drop Δp<sub>1</sub> 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<sub>e</sub> = -20 °C and Δp = 10 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.



## 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.

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**Table 7: Valid approvals**

Type	File name	Document type	Document topic	Approval authority
<b>TEA</b>	RU Д- DK.БЛ08.В.00191_18	EAC Declaration	Machinery & Equipment	EAC
	11-1-0310-2012	Explosive - Safety Certificate		GPN
	068G9603.00	Manufacturers Declaration	RoHS	Danfoss
	UA.TR-089.0993-17	Pressure - Safety Certificate	PED	LLC CDC EURO TYSK
<b>TEA 20</b>	0C14029.523467890YTN	Pressure - Safety Certificate	CRN	TSSA
<b>TEA 85</b>	0C14029.523467890YTN	Pressure - Safety Certificate	CRN	TSSA

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