ENGINEERING
TOMORROW

Catalogue

Expansion valves for Industrial Refrigeration

Contents **Page**

ENGINEERING TOMORROW

Thermostatic expansion valves for ammonia

Type TEA

Contents **Page**

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ENGINEERING TOMORROW

Danfoss

Thermostatic expansion valves for ammonia

Type TEA

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 – 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

Materials

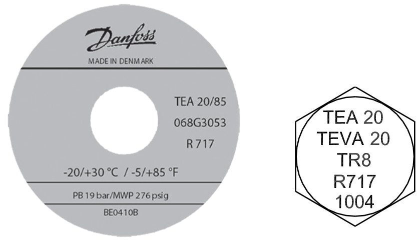
Valve housing made of GGG40.3

Gaskets are non asbestos

Technical data

- Refrigerant
  R717 (Ammonia)
- Evaporating temperature range
  D: -50 to 0 °C
  P: -20 to 30 °C
- Capillary tube length
  5 m
- Connection for external pressure equalization
  $^1/_4$ inch or ∅ 6.5 / ∅ 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



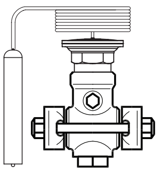
Element label

Orifice assembly marking

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_3)
- date stamp

Ordering



Type and rated capacity in tons (TR)	Rated capacity 1) [kW]	Connection weld flanges Inlet [in]	Connection weld flanges Outlet [in]	Code no. Assembled valve	Code no. Separate strainer 2)	Code no. Separate orifice assembly	Code no. Separate thermostatic element
TEA 20, range: -50 to 0 °C							
TEA 20-1	3.5	1/2	1/2	**068G6000**		**068G2050**	
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**	**006-0042**	**068G2053**	**068G3250**
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**		**068G2050**	
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**	**006-0042**	**068G2053**	**068G3252**
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**		**068G2057**	
TEA 85-55	190	3/4	3/4	**068G6008**	**006-0048**	**068G2058**	**068G3250**
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**		**068G2057**	
TEA 85-55	190	3/4	3/4	**068G6142**	**006-0048**	**068G2058**	**068G3252**
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 (NH_3)

Capacity in kW, range -50 – 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 Δt = 4K ahead of the valve.

Example

Given:
Refrigerant = R 717 (NH_3)
Evaporator capacity Q_e = 265 kW (75.3 TR)
Evaporating temperature t_e = -20 °C
(~p_e = 1.9 bar)
Condensing temperature t_c = 32 °C
(~p_c = 12.4 bar)
Subcooling Δt = 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
$\Delta p = p_c - p_e - p_1$
$\Delta p = 12.4 - 1.9 - 0.5 = 10$ bar.

Now, from the capacity table at an evaporating temperature t_e = -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.

Capacity in kW, range -20 – 30 °C

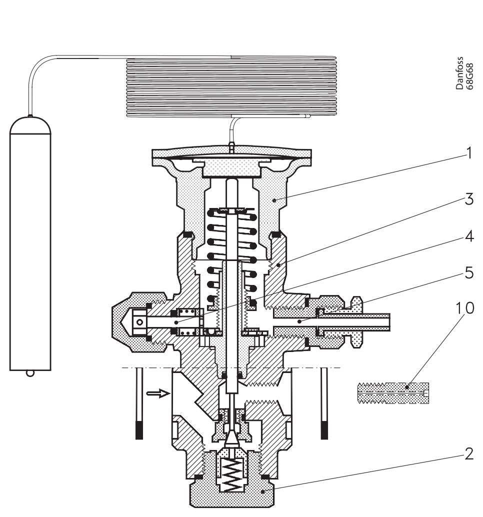
R 717 (NH_3)

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

TEA 20 / TEA 85



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

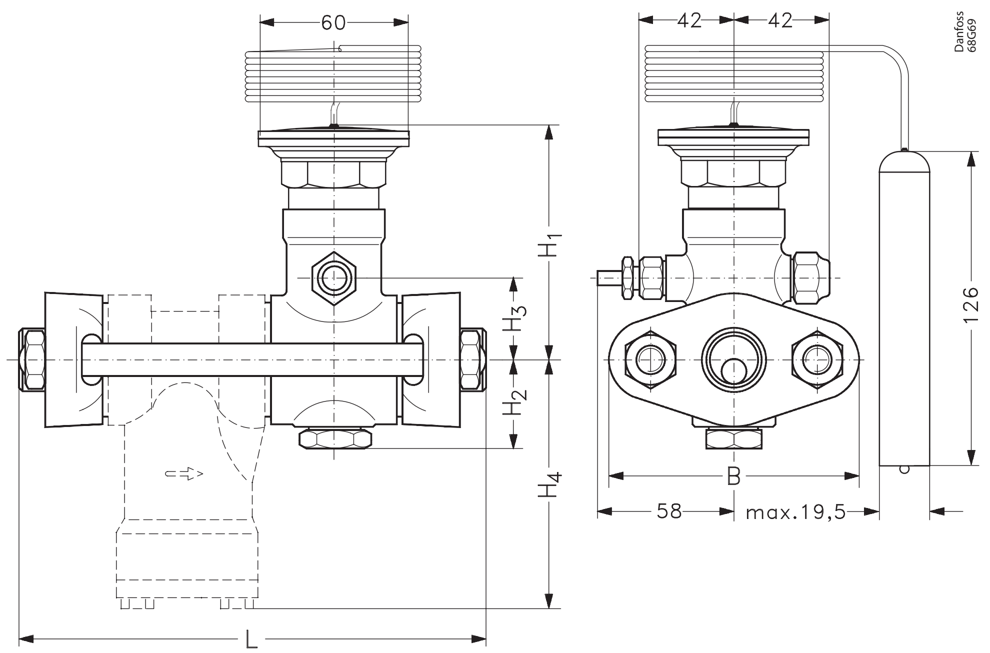
The valve has external equalization.
A separate outlet orifice assembly (10) is for use with TEA 20-1 (3.5 kW) only.

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	H_2	H_3	H_4	L		B	Weight	
					Excl.strainer	Incl. strainer		Excl.strainer	Incl. strainer
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]	[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

ENGINEERING
TOMORROW

Desuperheating valve
Type TEAT

Contents **Page**

AI172886419299en-000401 | 2015.09

Desuperheating valve
Type TEAT

Refrigerant injection into the suction line
TEAT valves are used to inject refrigerant into the suction line of the refrigeration system to reduce the high discharge temperatures that can occur when the system operates with highly superheated suction vapour.

This applies when, for example:
– a compressor runs either with low suction pressure or with high condensing temperature
– a compressor runs with both low suction pressure and high condensing temperature. This applies especially to systems with R 22
– a compressor receives highly superheated suction vapour
– a compressor runs with capacity regulation by hot gas bypass

Two-stage refrigeration plant
TEAT valves are also used in two-stage refrigeration plant to control liquid injection into the intercooler. The bulb is installed on the discharge line from the high-pressure compressor. The theoretically obtainable discharge temperature for given operating conditions can be found in the h, log p diagram for the refrigerant concerned.

Temperature regulation of the medium
TEAT valves have a further application: the temperature regulation of the medium, e.g. the temperature of the oil in a screw compressor.

Materials

Valve housing made of GGG40.3

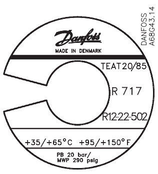
Gaskets are non asbestos.

Technical data

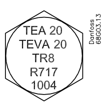
- Refrigerants
  Applicable to HCFC, non flammable HFC and R717 (Ammonia)
- Regulation ranges
  See ordering table
- P band
  20 °C
- Capillary tube length
  5 m
- Max. bulb temperature
  150 °C

- Max. working pressure
  PS = 20 bar
- Max. test pressure
  p' = 30 bar
- Classification: DNV, CRN, BV, EAC etc.
  To get an updated list of certification on the products please contact your local Danfoss Sales Company

Identification



Element label



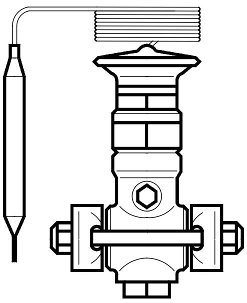
Orifice assembly marking

The thermostatic element
has a label giving valve type, temperature range and max. test pressure.

The orifice assembly
is common to TEAT, TEA and TEVA. The rated capacity, e.g. 8 TR (= 28 kW) for the refrigerant ammonia is given on the orifice assembly.

The orifice assembly can be used for both ammonia and fluorinated refrigerants.

Ordering TEAT



Type and rated capacity (TR)	Regulating range [°C]	Flange connection	Code no. Assembled valve	Code no. Separate orifice assembly	Code no. Separate thermostatic element
TEAT 20-1	35 – 65	1/2 × 1/2	1)	**068G2050**	**068G3262**
	55 – 95	1/2 × 1/2	1)	**068G2050**	**068G3260**
	90 – 130	1/2 × 1/2	1)	**068G2050**	**068G3261**
TEAT 20-2	35 – 65	1/2 × 1/2	**068G6125**	**068G2051**	**068G3262**
	55 – 95	1/2 × 1/2	**068G6062**	**068G2051**	**068G3260**
	90 – 130	1/2 × 1/2	**068G6065**	**068G2051**	**068G3261**
TEAT 20-3	35 – 65	1/2 × 1/2	1)	**068G2052**	**068G3262**
	55 – 95	1/2 × 1/2	1)	**068G2052**	**068G3260**
	90 – 130	1/2 × 1/2	1)	**068G2052**	**068G3261**
TEAT 20-5	35 – 65	1/2 × 1/2	**068G6126**	**068G2053**	**068G3262**
	55 – 95	1/2 × 1/2	**068G6061**	**068G2053**	**068G3260**
	90 – 130	1/2 × 1/2	**068G6127**	**068G2053**	**068G3261**
TEAT 20-8	35 – 65	1/2 × 1/2	**068G6128**	**068G2054**	**068G3262**
	55 – 95	1/2 × 1/2	**068G6063**	**068G2054**	**068G3260**
	90 – 130	1/2 × 1/2	**068G6066**	**068G2054**	**068G3261**
TEAT 20-12	35 – 65	1/2 × 1/2	1)	**068G2055**	**068G3262**
	55 – 95	1/2 × 1/2	1)	**068G2055**	**068G3260**
	90 – 130	1/2 × 1/2	1)	**068G2055**	**068G3261**
TEAT 20-20	35 – 65	1/2 × 1/2	**068G6068**	**068G2056**	**068G3262**
	55 – 95	1/2 × 1/2	**068G6064**	**068G2056**	**068G3260**
	90 – 130	1/2 × 1/2	**068G6067**	**068G2056**	**068G3261**
TEAT 85-33	35 – 65	3/4 × 3/4	**068G6129**	**068G2057**	**068G3262**
	55 – 95	3/4 × 3/4	**068G6070**	**068G2057**	**068G3260**
	90 – 130	3/4 × 3/4	**068G6072**	**068G2057**	**068G3261**
TEAT 85-55	35 – 65	3/4 × 3/4	**068G6130**	**068G2058**	**068G3262**
	55 – 95	3/4 × 3/4	**068G6073**	**068G2058**	**068G3260**
	90 – 130	3/4 × 3/4	**068G6131**	**068G2058**	**068G3261**
TEAT 85-85	35 – 65	3/4 × 3/4	**068G6069**	**068G2059**	**068G3262**
	55 – 95	3/4 × 3/4	**068G6071**	**068G2059**	**068G3260**
	90 – 130	3/4 × 3/4	**068G6132**	**068G2059**	**068G3261**

1) This valve size must be ordered as a complete valve + a separate orifice assemble in the required size.
Example: TEAT 20-3 must be ordered as **068G6125** + **068G2052.**
The orifice in the complete TEAT 20-2 valve must then be changed with the separate orifice assemble.

Separate filter with gaskets, staybolts and nuts
for TEAT 20, code no. **006-0042**
for TEAT 85, code no. **006-0048**.

Stainless steel bulb pocket, gasket, and union nut, code no. **993N3615**, for screwing into G 1/2 socket welded to tube or tank.

Rated capacity in kW

Type and rated capacity (TR)	Rated capacity in kW 1) at Δp = 8 bar R717 (NH_3)	R22	R134a	R404A	R12	R502
TEAT 20-1	3.3	0.8	0.7	0.6	0.5	0.6
TEAT 20-2	6.4	1.5	1.2	1.1	0.9	1.1
TEAT 20-3	9.7	2.3	1.7	1.6	1.3	1.6
TEAT 20-5	16.0	3.6	3.0	2.9	2.3	2.7
TEAT 20-8	25.6	6.2	4.6	4.4	3.5	4.4
TEAT 20-12	38.4	9.2	6.9	6.7	5.3	6.5
TEAT 20-20	64.0	15.4	13.1	12.6	10.0	10.8
TEAT 85-33	106	26	19.5	18.8	14.9	18.0
TEAT 85-55	173	42.4	31.8	30.6	24.3	27.4
TEAT 85-85	274	66.3	50.3	48.4	38.4	46.5

1) Rated capacity is valve capacity at 5 °C evaporating temperature, and 4K subcooling of the liquid in front of the valve.

2) 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 orifice.

Extended capacities in kW

R717 1)

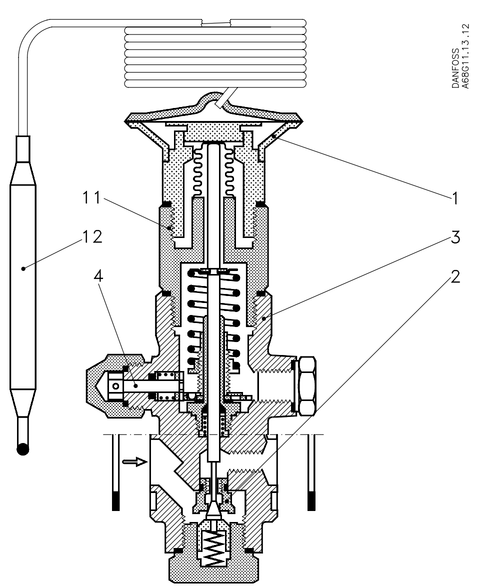
Valve size	Pressure drop across valve Δp bar				
	4	6	8	11	15
20 - 1	2.3	2.8	3.3	3.6	4.7
20 - 2	4.8	5.7	6.4	7.2	7.9
20 - 3	7.2	8.5	9.7	10.8	11.7
20 - 5	12.1	14.2	16.0	18.0	19.8
20 - 8	18.6	22.1	25.6	28.5	31.4
20 - 12	29.1	33.7	38.4	43.0	47.1
20 - 20	47.7	57.0	64.0	72.1	79.1
85 - 33	80.2	94.2	106.4	118.6	130.3
85 - 55	136.1	157.0	176.8	197.7	215.2
85 - 85	203.5	239.6	274.5	302.4	334.9

1) The rated capacity is valve capacity at 5 °C evaporating temperature, 32 °C condensing temperature and 4K subcooling of the liquid in front of the valve.

R22 1)

Valve size	Pressure drop across valve Δp bar				
	4	6	8	11	15
20 - 1	0.6	0.7	0.8	0.9	1.0
20 - 2	1.2	1.4	1.5	1.7	1.9
20 - 3	1.7	2.0	2.3	2.6	2.9
20 - 5	2.7	3.1	3.6	4.0	4.8
70 - 8	4.4	5.2	6.2	6.9	7.6
20 - 12	7.0	8.1	9.2	10.4	11.3
20 - 20	11.5	13.7	15.4	17.2	18.8
85 - 33	19.3	22.4	25.6	28.5	31.4
85 - 55	32.6	37.8	42.4	47.7	52.3
85 - 85	48.8	58.2	66.3	72.1	81.4

Design / function



TEAT

1. Thermostatic element (diaphragm)
2. Orifice assembly
3. Valve body
4. Setting spindle
11. Intermediate section
12. Bulb

Temperature variations in the discharge pipe where the bulb is placed act on the thermal charge in the bulb (12). This changes the pressure in the thermostatic element (1) and thus gives modulating liquid injection.

If leakage in the thermostatic element does occur, it will not result in refrigerant loss.

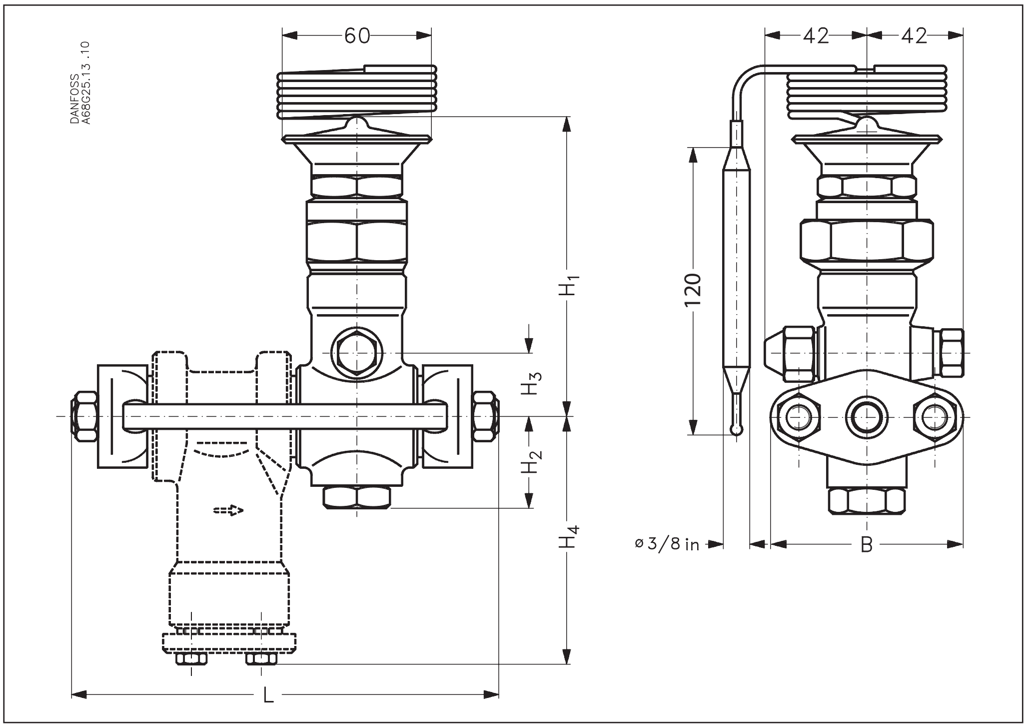
The thermostatic element is screwed to the intermediate section (11) of the valve. A bellow on the intermediate section means that the suction pressure cannot influence the valve setting.

The movement of the setting spindle (4) is transferred through a gearwheel mechanism.

The orifice assembly (2) is identical to that of TEA thermostatic expansion valves.

Note: The TEAT is not able to close completely tight, so a solenoid valve is needed to shut off liquid supply, when the system 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]
TEAT 20	121.5	37	25	96	110	164	80	2.1	3.0
TEAT 85	131.5	37	35	106	125	199	95	3.0	4.5

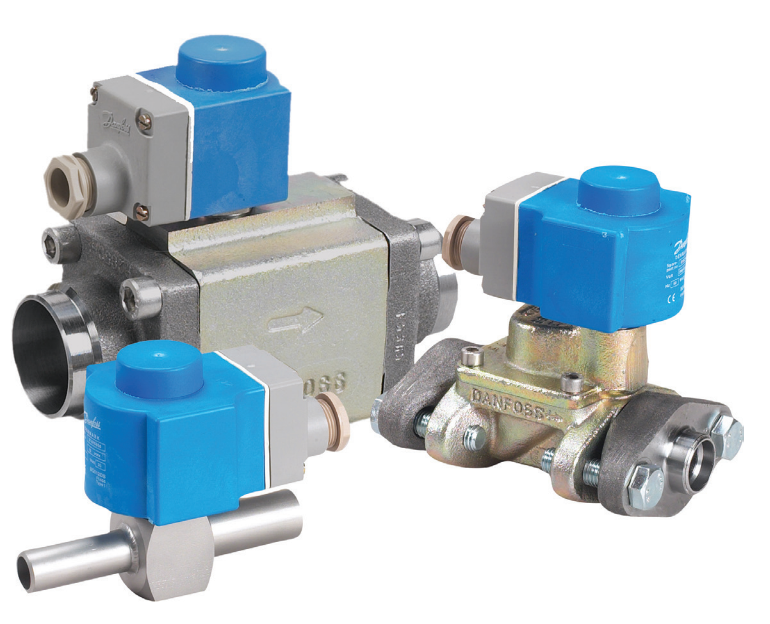
Electric expansion valves
Types AKVA 10, 15 & 20

Contents **Page**

AI183786440857en-000607 | 2018.10

ENGINEERING
TOMORROW

Electric expansion valves
Types AKVA 10, 15 & 20



AKVA are electric expansion valves designed for ammonia refrigerating plant.

The AKVA valves are normally controlled by a controller from Danfoss' range of ADAP-KOOL® controllers.

The AKVA valves are supplied as a component programme, as follows:
- Separate valve
- Separate coil with terminal box or cable
- Spare parts in the form upper part, orifice and filter

The individual capacities are indicated with a number forming part of the type designation. The number represents the size of the orifice of the valve in question.

A valve with orifice 3 will for example be designated AKVA 10-3.

The orifice assembly is replaceable.

Features

- For HCFC, HFC, R717 (Ammonia) and R744 (CO_2)
- The valve requires no adjustment
- Wide regulation range
- Replaceable orifice assembly
- Wide range of coils for DC and AC
- Quick reaction in whole range of stated capacity.
- In some applications AKVA can be used both as expansion valve and solenoid valve.
- Classification: DNV, CRN, BV, EAC etc.
  To get an updated list of certification on the products please contact your local Danfoss Sales Company.

Approvals

DEMKO, Denmark
SETI, Finland
SEV, Switzerland

AKVA 20 are CE marked according to Pressure Equipment Directive 97/23

c UL us LISTED UL listed to U8.S. og Canadian standards (separate code. nos.)

Technical data

The AKVA 10 valves covers a capacity range from 4 kW to 100 kW (R 717) and are divided up into 8 capacity ranges.

The AKVA 10 valve bodies are made in stainless steel and have weld connections.

The AKVA 15 valves have flange connections. The valve covers a capacity range from 125 kW to 500 kW (R 717) and are divided up into 4 capacity ranges.

The AKVA 20 valves cover a capacity range from 500 kW to 3150 kW (R 717) and are divided up into 5 capacity ranges.

The AKVA 20 valve has weld connections.

The AKVA valves can be used for:

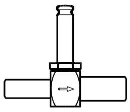
- Flooded evaporation (high / low pressure)
- Pump separators
- Direct expansion. See appendix

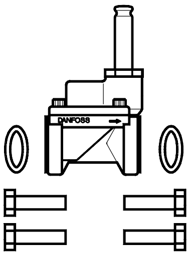
If AKVA has to be used in chillers please contact Danfoss.

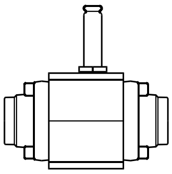
The AKVA can be used for HCFC, HFC, R717 (Ammonia) and R744 (CO_2).

Valve type	AKVA 10	AKVA 15	AKVA 20
Tolerance of coil voltage	10 / –15%	10 / –15%	10 / –15%
Enclosure to IEC 529	Max. IP 67	Max. IP 67	Max. IP 67
Working principle (Pulse-width modulation)	PWM	PWM	PWM
Recommend period of time	6 seconds	6 seconds	6 seconds
Capacity (R717)	4 to 100 kW	125 to 500 kW	500 to 3150 kW
Regulation range	10 – 100%	10 – 100%	10 – 100%
Connection	Weld	Weld	Weld
Media temperature	-50 – 60 °C	-40 – 60 °C	-40 – 60 °C
Ambient temperature	-50 – 50 °C	-40 – 50 °C	-40 – 50 °C
Leak of valve seat	< 0.02% of K_v-value	< 0.02% of K_v-value	< 0.02% of K_v-value
MOPD	18 bar	22 bar	18 bar
Filter	Internal 100 μm replaceable	external 100 μm	external 100 μm
Max. working pressure	PS = 42 bar g	PS = 42 bar g	PS = 42 bar g

Rated capacity and ordering

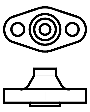






Valve type	Rated capacity[1])		k_v-value	Connections Inlet x outlet	Code no.	Connections Inlet x outlet	Code no.
	[kW]	[tons]	[m³/h]	[in]		[in]	
AKVA 10-1	4	1.1	0.010	3/8 × 1/2	**068F3261**	1/2 × 3/4	**068F3281**
AKVA 10-2	6.3	1.8	0.015	3/8 × 1/2	**068F3262**	1/2 × 3/4	**068F3282**
AKVA 10-3	10	2.8	0.022	3/8 × 1/2	**068F3263**	1/2 × 3/4	**068F3283**
AKVA 10-4	16	4.5	0.038	3/8 × 1/2	**068F3264**	1/2 × 3/4	**068F3284**
AKVA 10-5	25	7.1	0.055	3/8 × 1/2	**068F3265**	1/2 × 3/4	**068F3285**
AKVA 10-6	40	11.4	0.103	3/8 × 1/2	**068F3266**	1/2 × 3/4	**068F3286**
AKVA 10-7	63	17.9	0.162			1/2 × 3/4	**068F3267**
AKVA 10-8	100	28.4	0.251			1/2 × 3/4	**068F3268**
AKVA 15-1	125	35	0.25	Flange	**068F5020**[2])		
AKVA 15-2	200	60	0.40	Flange	**068F5023**[2])		
AKVA 15-3	300	90	0.63	Flange	**068F5026**[2])		
AKVA 15-4	500	140	1.0	Flange	**068F5029**[2])		
AKVA 20-1	500	140	1.0	1 1/4 × 1 1/4	**042H2101**		
AKVA 20-2	800	240	1.6	1 1/4 × 1 1/4	**042H2102**		
AKVA 20-3	1250	350	2.5	1 1/4 × 1 1/4	**042H2103**		
AKVA 20-4	2000	600	4.0	1 1/2 × 1 1/2	**042H2104**		
AKVA 20-5	3150	900	6.3	2 × 2	**042H2105**		

[1]) Rated capacities are based on
Condensing temperature t_c = 32 °C
Liquid temperature t_l = 28 °C
Evaporating temperature t_e = 5 °C
[2]) Incl. bolts and gaskets but without flanges



Flange set for AKVA 15

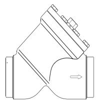
Valve type	Connection (in.)	Code no.
AKVA 15-1 to 4	3/4	**027N1220**
	1	**027N1225**

Ordering *(continued)*
Accessories

Strainer
On plants with ammonia and similar industrial plant a strainer must be mounted in front of AKVA 15 and AKVA 20.

AKVA 10 has built-in strainer and external strainer is not necessary.

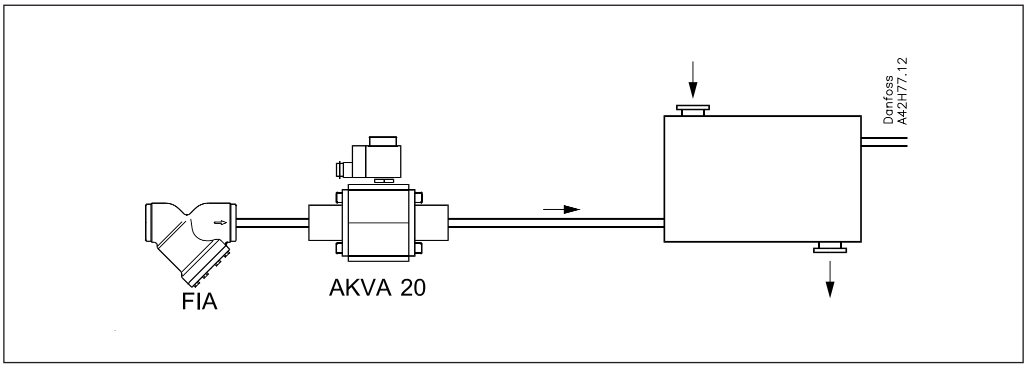
Recommended strainer for AKVA 15 / 20



Strainer type	Code no.	
	House	Strainer insert 100 µm
FIA 20 D STR	**148B5343**	**148H3122**
FIA 25 D STR	**148B5443**	
FIA 32 D STR	**148B5544**	**148H3123**
FIA 40 D STR	**148B5625**	
FIA 50 D STR	**148B5713**	**148H3157**

For further information: see Danfoss catalogue AI222586432958

Examples of combinations

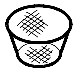


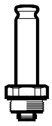
Ordering *(continued)*
Spare parts

AKVA 10

Orifice

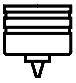
Type	Code no.	Contents
AKVA 10-1	**068F0526**	1 pcs. orifice 1 pcs. Al. gasket 1 pcs. cap for coil
AKVA 10-2	**068F0527**	
AKVA 10-3	**068F0528**	
AKVA 10-4	**068F0529**	
AKVA 10-5	**068F0530**	
AKVA 10-6	**068F0531**	
AKVA 10-7	**068F0532**	
AKVA 10-8	**068F0533**	

Filter	Code no.	Contents
	**068F0540**	10 pcs. filters 10 pcs. Al. gaskets

Upper part	Code no.	Contents
	**068F5045**	1 pcs. armature 1 pcs. armature tube 1 pcs. Al. gasket

AKVA 15

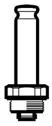
Piston

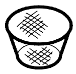


Type	Code no.	Contents
AKVA 15-1	**068F5265**	1 pcs. piston assembly 1 pcs. gasket 1 pcs. O-ring 2 pcs. labels
AKVA 15-2	**068F5266**	
AKVA 15-3	**068F5267**	
AKVA 15-4	**068F5268**	

Gasket set	**068F5264**	Complete gasket set

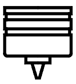
Orifice set	Code no.	Contents
	**068F5261**	Main orifice Pilot orifice Al gaskets O-rings Gasket

Upper part	Code no.	Contents
	**068F5045**	1 pcs. armature 1 pcs. armature tube 1 pcs. Al. gasket

Filter	Code no.	Contents
	**068F0540**	10 pcs. filters 10 pcs. Al. gaskets

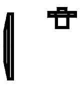
AKVA 20

Piston



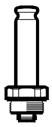
Type	Code no.	Contents
AKVA 20-0.6	**042H2039**	1 pcs. piston assembly 3 pcs. O-rings
AKVA 20-1	**042H2040**	
AKVA 20-2	**042H2041**	
AKVA 20-3	**042H2042**	
AKVA 20-4	**042H2043**	
AKVA 20-5	**042H2044**	

Orifice set



Type	Code no.	Contents
AKVA 20-0.6	**068F5270**	Main orifice, dia. 8 mm Pilot orifice, dia. 1.8 mm 2 pcs. Al. gaskets O-ring
AKVA 20-1	**068F5270**	
AKVA 20-2	**068F5270**	
AKVA 20-3	**068F5270**	
AKVA 20-4	**068F5271**	Main orifice, dia. 14 mm Pilot orifice, dia. 2.4 mm 2 pcs. Al. gaskets O-ring
AKVA 20-5	**068F5271**	

Gasket set	**042H0160**	Complete gasket set for new and old valves

Upper part	Code no.	Contents
	**068F5045**	1 pcs. armature 1 pcs. armature tube 1 pcs. Al. gasket

Ordering *(continued)*
Coils for AKVA valves

DC coils	Code no.	AKVA 10-1 10-2 10-3 10-4 10-5	AKVA 10-6	AKVA 10-7 10-8	AKVA 15-1 15-2 15-3 15-4	AKVA 20-1 20-2 20-3	AKVA 20-4 20-5
220 V DC 20 W, standard with terminal box	018F6851	+	+	+	+	+	+
100 V DC 18 W, special with terminal box with DIN plugs	018F6780	+	+	+	+	+	+
230 V DC 18 W, special with terminal box with DIN plugs	018F6781[1]) 018F6991[1])	+	+	+	+	+	+
230 V DC 18 W, special with 2.5 m cable with 4.0 m cable with 8.0 m cable	018F6288[1]) 018F6278[1]) 018F6279[1])	+	+	+	+	+	+

[1]) Recommended for commercial refrigeration plant

AC coils	Code no.	AKVA 10-1 10-2 10-3 10-4 10-5	AKVA 10-6	AKVA 10-7 10-8	AKVA 15-1 15-2 15-3 15-4	AKVA 20-1 20-2 20-3	AKVA 20-4 20-5
240 V AC 10 W, 50 Hz with terminal box with DIN plugs	018F6702 018F6177	+	+	–	+	–	–
240 V AC 10 W, 60 Hz with terminal box with DIN plugs	018F6713	+	+	–	+	–	–
240 V AC 12 W, 50 Hz with terminal box	018F6802	+	+	+	+	+	–
220 V AC 10 W, 50 Hz with terminal box with DIN plugs	018F6701 018F6176	+	+	–	+	–	–
220 V AC 10 W, 60 Hz with terminal box with DIN plugs	018F6714 018F6189	+	+	–	+	–	–
220 V AC 12 W, 50 Hz with terminal box	018F6801	+	+	–	+	+	–
220 V AC 12 W, 60 Hz with terminal box	018F6814	+	+	–	+	+	–
115 V AC 10 W, 50 Hz with terminal box with DIN plugs	018F6711	+	+	–	+	–	–
115 V AC 10 W, 60 Hz with terminal box with DIN plugs	018F6710 018F6185	+	+	–	+	–	–
110 V AC 12 W, 50 Hz with terminal box	018F6811	+	+	–	+	+	–
110 V AC 12 W, 60 Hz with terminal box	018F6813	+	+	–	+	+	–
24 V AC 10 W, 50 Hz with terminal box with DIN plugs	018F6707 018F6182	+	–	–	+	–	–
24 V AC 10 W, 60 Hz with terminal box with DIN plugs	018F6715	+	–	–	+	–	–
24 V AC 12 W, 50 Hz with terminal box	018F6807	+	–	–	+	+	+
24 V AC 12 W, 60 Hz with terminal box	018F6815	+	–	–	+	+	+
24 V AC 20 W, 50 Hz with terminal box	018F6901	+	+	+	+	+	+
24 V AC 20 W, 60 Hz with terminal box	018F6902	+	+	+	+	+	+

Capacity

Range: – 40 to 10°C

R 717

Valve type	Capacity in [kW] at pressure drop across valve Δp bar							
	2	4	6	8	10	12	14	16
AKVA 10 - 1	2.2	3.1	3.7	4.1	4.4	4.7	5.0	5.2
AKVA 10 - 2	3.5	4.9	5.8	6.5	7.0	7.5	7.9	8.3
AKVA 10 - 3	5.6	7.7	9.1	10.2	11.1	11.9	12.5	13.1
AKVA 10 - 4	9.1	12.4	14.7	16.5	17.9	19.2	20.2	21.1
AKVA 10 - 5	14.2	19.4	22.9	25.7	28.0	29.9	31.6	33.0
AKVA 10 - 6	23.0	31.2	36.4	41.4	45.0	48.1	50.7	53.1
AKVA 10 - 7	36.6	49.3	58.1	65.0	70.6	75.3	79.4	83.0
AKVA 10 - 8	59.1	78.9	93.5	104	112	120	126	131
AKVA 15 - 1		95.7	113	127	138	148	156	163
AKVA 15 - 2		153	181	203	221	236	250	261
AKVA 15 - 3		231	274	308	335	358	377	395
AKVA 15 - 4		383	455	510	555	593	625	655
AKVA 20 - 1		383	455	510	555	593	625	655
AKVA 20 - 2		612	726	814	886	947	999	1045
AKVA 20 - 3		959	1137	1275	1388	1482	1564	1635
AKVA 20 - 4		1552	1836	2057	2239	2391	2523	2639
AKVA 20 - 5		2479	2921	3267	3550	3789	3994	4174

Correction for subcooling

The liquid injected capacity must be corrected, if the subcooling deviates from 4 K.
Use the actual correction factor indicated in the table.

Multiply the liquid injected capacity by the correction factor to obtain the corrected capacity.

Correction factors for subcooling Δt_{sub}

Correction factor	2K	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
R 717	1.01	1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.87	0.86	0.85

Corrected capacity = liquid injected capacity x correction factor.

Dimensioning

To obtain an expansion valve that will function correctly under different load conditions it is necessary to consider the following points when the valve has to be dimensioned:
These points must be dealt with in the following sequence:

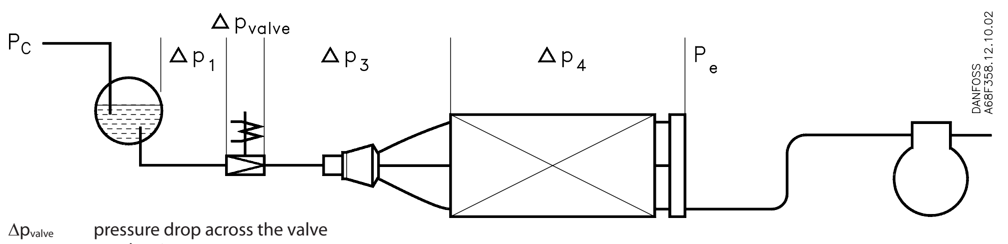
1. Evaporator capacity
2. Pressure drop across the valve
3. Correction for subcooling
4. Correction for evaporating temperature
5. Determination of valve size
6. Correctly dimensioned liquid line

Dimensioning
(continued)

Example for a direct expansion system

1. Evaporator capacity
The evaporator capacity is found in the specifications from the evaporator supplier.

2. Pressure drop across the valve
The pressure drop across the valve directly determines the capacity and must therefore be considered.
The pressure drop across the valve is normally calculated as the condensing pressure less the evaporating pressure and sundry other pressure drops in the liquid line, distributor, evaporator, etc.
It is indicated in the following formula:
$\Delta p_{valve} = p_c - (p_e + \Delta p_1 + \Delta p_3 + \Delta p_4)$



Δp_{valve}	pressure drop across the valve
p_c	condensing pressure
p_e	evaporating pressure
Δp_1	pressure drop across the liquid line
Δp_3	pressure drop across the distributor system
Δp_4	pressure drop across the evaporator

Note!
The pressure drop across the liquid line and the distributor system must be calculated on the basis of the valve's max. capacity, as the valve operates with pulse-width modulation.

Example of calculation
of pressure drop across a valve:
Refrigerant: R 717
Condensing temperature: 35°C (p_c = 13.5 bar)
Evaporating temperature: –20°C (p_e = 1.9 bar)
Δp_1 = 0.2 bar
Δp_3 = 0.8 bar
Δp_4 = 0.1 bar

This will give you the following equation:
$\Delta p_{valve} = p_c - (p_e + \Delta p_1 + \Delta p_3 + \Delta p_4)$
$= 13.5 - (1.9 + 0.2 + 0.8 + 0.1)$
$= 10.5$ bar

The found value for "pressure drop across the valve" is used later in the section "Determination of valve size".

3. Correction for subcooling
The evaporator capacity used must be corrected, if the subcooling deviates from 4 K.
Use the actual correction factor indicated in the table.
Multiply the evaporator capacity by the correction factor to obtain the corrected capacity.

Correction factors for subcooling Δt_{sub}

Correction factor	2K	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
R 717	1.01	1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.87	0.86	0.85

Corrected capacity = evaporator capacity x correction factor.

The corrected capacity is used in the section "Determination of valve size".

Note:
Too little subcooling may cause flash gas.

Example of correction:
Refrigerant: R 717
Evaporator capacity Q_e: 300 kW
Subcooling: 10 K

Correction factor according to the table = 0.98
Corrected evaporator capacity = 300 x 0.98 = 294 kW.

Dimensioning
(continued)

4. Correction for evaporating temperature (t_e)
To obtain a correctly dimensioned valve it is important that the application is considered.

Depending on the application, the valve should have an overcapacity enabling it to cope with the extra amount of refrigeration needed during certain periods, e.g. during the defrost recovery process.

The valve's opening degree should therefore be between 50 and 75% when regulating. In this way
it is ensured that the valve has a sufficiently wide regulation range, so that it can manage changed loads at or near the normal working point.
Correction factors based on the evaporating temperature are indicated below:

Correction factors for evaporating temperature (t_e)

Evaporating temperature t_e °C	5	0	– 10	–15	– 20	– 30	– 40
AKVA 10, AKVA 15, AKVA 20	1.0	1.0	1.0	1.0	1.2	1.3	1.4

5. Determination of valve size
When the valve size meeting the required capacity is selected it is important to note that the capacity indications are the valve's rated capacity, i.e. when the valve is 100% open.
In this section we tell you how the valve's size is determined.
There are three factors that have an influence on the choice of the valve:
- the pressure drop across the valve
- the corrected capacity (correction for subcooling)
- the corrected capacity for evaporating temperature

The three factors have been described earlier in this section on dimensioning. When these three factors have been established, the selection of the valve can be made:
- First you multiply the "corrected capacity" by a value stated in the table.
- Use the new value in the capacity table in combination with the pressure drop value.
- Now select the valve size.

Example of selection of valve
Use as starting point the two earlier mentioned examples, where the following two values have been obtained:
Δp_{valve} = 10.5 bar
$Q_{e\ corrected}$ = 294 kW

From tabel "Correction factors for evaporating temperature", factor 1.2 is given for the evaporating temperature -20°C.

The dimensioned capacity will then be:
1.2 x 294 kW = 353 kW.

Now select a valve size from tabel "Capacity".

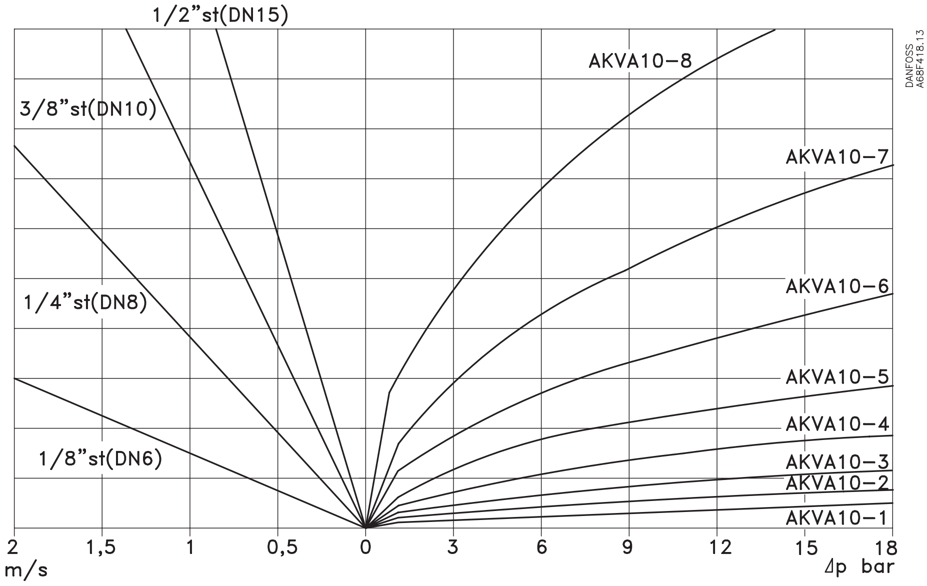
With the given values Δp_{valve} = 10.5 bar and a capacity of 353 kW, AKVA 15 - 4 is selected.

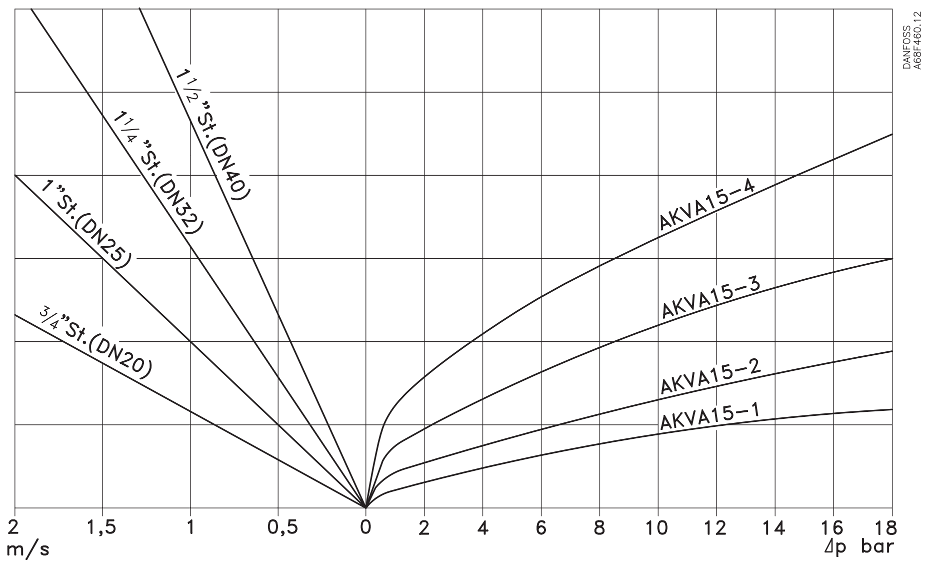
This valve will have a capacity of approx. 555 kW.

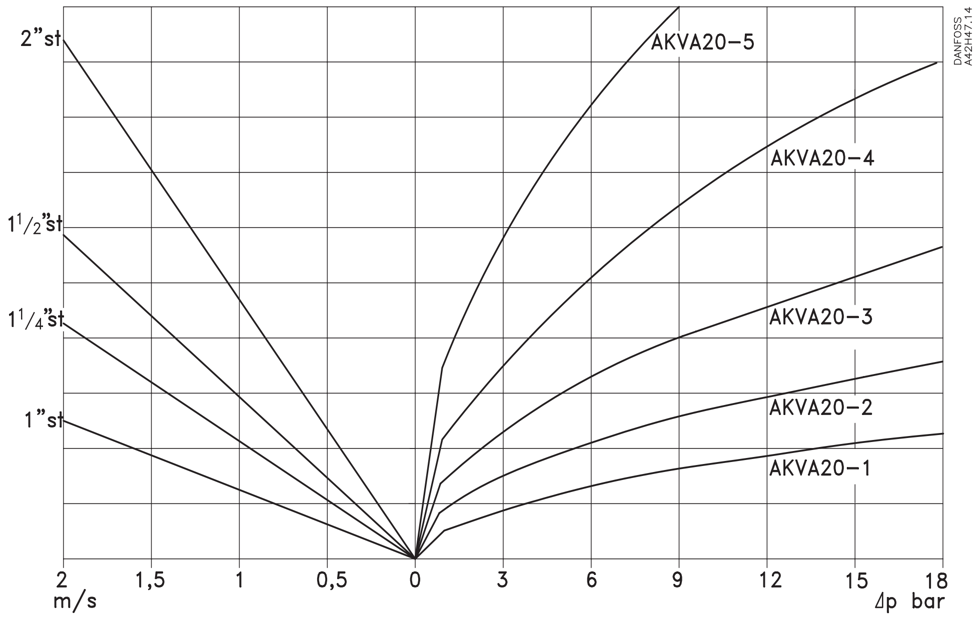
6. Correctly dimensioned liquid line
To obtain a correct supply of liquid to the AKVA valve, the liquid line to the individual AKVA valve must be correctly dimensioned.
The liquid flow rate must not exceed 1 m/sec at a fully open valve.
This must be observed on account of the pressure drop in the liquid line (lack of subcooling) and pulsations in the liquid line.

Dimensioning of the liquid line must be based on the capacity of the valve at the pressure drop with which it is operating (cf. capacity table), and not on the evaporator's capacity, see next page

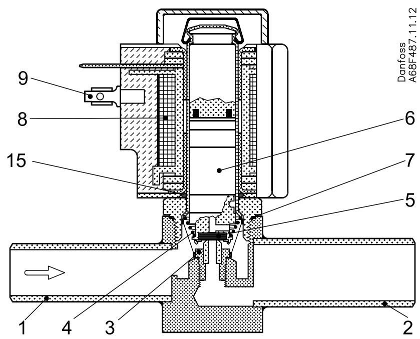
Dimensioning
(continued)



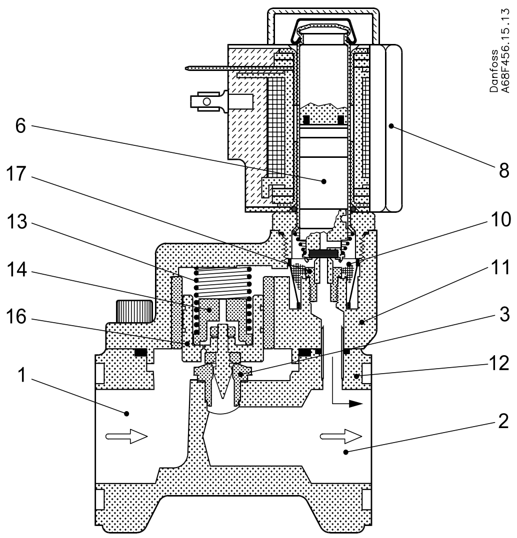




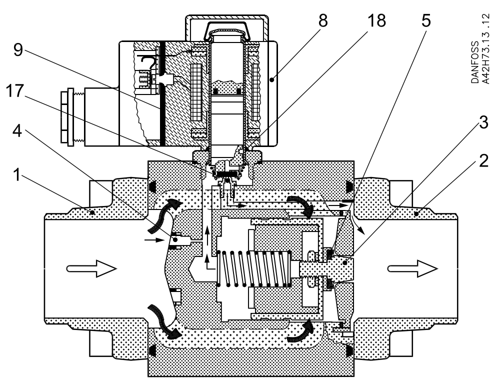
Design



AKVA 10



AKVA 15

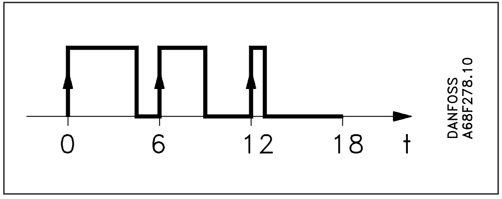


AKVA 20

1. Inlet
2. Outlet
3. Orifice
4. Filter
5. Valve seat
6. Armature
7. Aluminium gasket
8. Coil
9. DIN plug
10. Filter
11. Cover
12. Valve body
13. Spring
14. Orifice assembly
15. O-ring
16. Piston assembly
17. Pilot orifice
18. Pilot valve

Function

The valve capacity is regulated by means of pulse-width modulation. Within a period of six seconds a voltage signal from the controller will be transmitted to and removed from the valve coil. This makes the valve open and close for the flow of refrigerant.

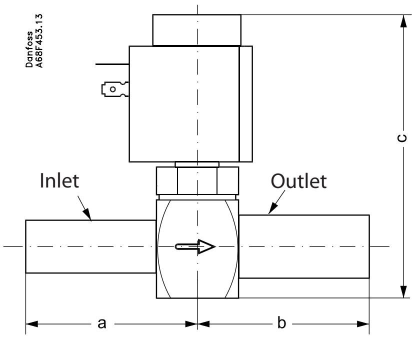


The relation between this opening and closing time indicates the actual capacity. If there is an intense need for refrigeration, the valve will remain open for almost all six seconds of the period. If the required amount of refrigeration is modest, the valve will only stay open during a fraction of the period. The amount of refrigeration needed is determined by the controller.

When no refrigeration is required, the valve will remain closed.

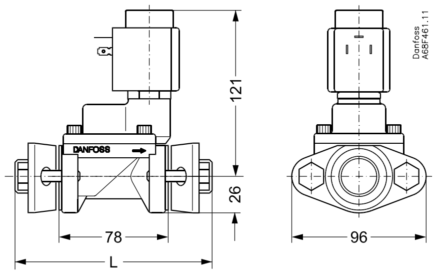
In some applications, AKVA can advantage-ously be used both as expansion valve and solenoid valve. See appendix.

Dimension and weight



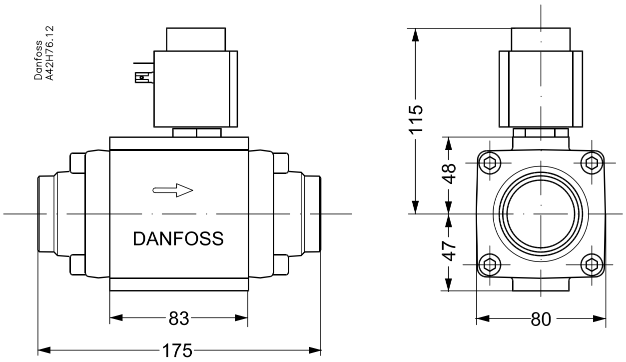
AKVA 10

Valve type		A [mm]	B [mm]	C [mm]	Connection Inlet [in]	Connection Outlet [in]	Weight without coil [kg]
AKVA 10	1 → 6	60	60	113	$^3/_8$	$^1/_2$	0.35
AKVA 10	7 → 8	60	60	113	$^1/_2$	$^3/_4$	0.35



AKVA 15

L = 148 mm
Weight without coil = 2.0 kg



AKVA 20

Weight without coil = 4.1 kg

Appendix

Recommandations

It is important to realize when AKVA is operating, that the valve always is fully open or fully closed.

That means that this way of operation should always be considered during the refrigeration design. (Piping, liquid velocity, sub cooling etc.)

Danfoss have the following recommandations/ guidelines to be taken into considerations.

- In 1:1 applications (1 evaporator, 1 condenser and 1 compressor) chillers with a small amount of refrigerant or installed in front of a Plate Heat Exchangers, it must be observed that every time the AKVA is fully open or closed it will have a significant impact on the hole system. (e.g. pressure variations on suction side).

  Please observe that the performance of such a system is not only related to one component. (e.g. AKVA) Other factors which is very important to include in the overall refrigeration system design:

  – Liquid distribution at and design of evaporator

  – total evaporator coil is of adequate length thus superheat can be controlled within the entered period time (normal 6 sec. or 3 sec.)

  – mounting principle of temperature sensor, to ensure a steady and fast signal can be detected by the electronic system.

- If pressure dependent valves like, PM with pilots like CVP e.t.c., is installed between evaporator and compressor, it can effect the lifetime of PM, because the piston of the PM will operate together with operation of AKVA. Type of refrigerant and evaporator has a big influende of the size of pulsations after the evaporator and in front of the PM.
- AKVA is a direct pressure independent valve unlike TQ, PHTQ and TEAQ, which all are pressure dependent. That means that if non-Danfoss electronic controllers is used, intelligent and fast optimal control is needed, because the quick pressure changes only can be detected and compensated via the electronic control system.
- Liquid lines must be designed according to AKVA capacity and not evaporator capacity.
- To avoid flash-gas ensure sufficient sub-cooling or design liquid lines thus to big pressure drop is avoided, when AKVA is open. If not sufficient subcooling is not obtained (normally 4K) it will have an impact on the lifetime of the vale).
- Where the demand for safety level is extremely high, (e.g. Liquid Level Control in a pump seperator) an extra valve can be installed in front of AKVA to avoid leakage. This valve must be Danfoss type EVRAT.
- Always install a 100 μm filter in front of AKVA 15 and AKVA 20 valves.
- If AKVA has to be used in chillers. Please contact Danfoss.