Technical leaflet

Solenoid valves

Type EVU 2, EVU 3, EVU 4, EVU 5 and EVU 6

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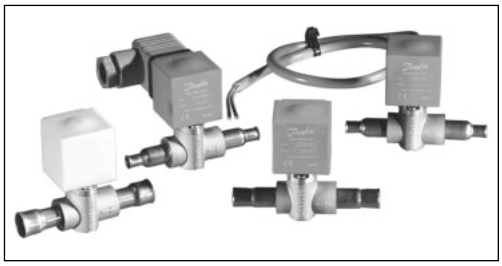
Introduction



The EVU solenoid valve series has been developed and constructed for soldering into semi-hermetically sealed refrigeration plant and where demands on small physical dimensions are essential. EVU 2, 3,4,5 and 6 are compact semi-hermetically sealed sevo operated solenoid valves for liquid, suction, and hot gas lines with fluorinated refrigerants.

EVU can be used in many different refrigeration systems and is especially designed for:

- Traditional refrigeration systems
- Refrigeration appliances
- Liquid coolers
- Ice cube machines
- Mobile refrigeration systems
- Heat pump plant
- Air conditioning units

EVU is supplied as straightway solder version. The valve cannot be serviced.

The standard coil is available with a 3-core cable connection, 0.25 in. US spade and with DIN plug. EVU valves are supplied as separate components, i.e. valve body and coil separately in industrial pack.

Features

- *Compact construction*
  - *small dimensions, low weight for both valve and coil.*
- *Semi-hermetic construction. Stainless steel armature tube top part with combined metal gasket and rubber O-ring fitted on the brass housing. Welded bimetal connections on the brass housing*
  Causes:
  - *high strength of joints and high vibration resistance*
  - *maximum external tightness within the whole temperature and pressure operation range*
- *Bimetal connections simple, fast soldering without the need of wet cloth or refrigration pliers*
- *Servo operated mini piston, sturdy and compact solenoid valve*
- *Universal application for*
  - *liquid, suction, and hot gas applications*
  - *reduced power consumption*
- *Simple and fast mounting of coil*
  - *clip-on/off*
- *Small encapsulated coils with long life time under extreme conditions*
- *Refrigerants*
  R22, R134a, R404A, R507, R407C, R410A and future refrigerants
- *Large MOPD range*
  - *up to 36 bar*

Approvals

c UL us Underwriter laboratories
PED (97/23/EC A3.P3)
The Low Voltage Directive 73/23/EC
with amendments EN 60730-2-8

Technical data

Refrigerants
CFC, HCFC, HFC

Temperature of medium
–40 → +105°C

Ambient temperature
–40 → +60°C

MOPD operating range
0.02 bar up to 36 bar

Type	Opening differential pressure with standard coil Δp bar			Temperature of medium	Max. working pressure PB	k_v-value [1]
	Min.	Max. (=MOPD) liquid [2]		°C	bar	m^3/h
	Min.	6 W a.c.	14 W d.c.			
EVU 2	0.02	36	28	–40 → 105	42	0.2
EVU 3	0.02	36	28	–40 → 105	42	0.3
EVU 4	0.02	36	28	–40 → 105	42	0.5
EVU 5	0.02	36	28	–40 → 105	42	0.65
EVU 6	0.02	36	28	–40 → 105	42	0.8

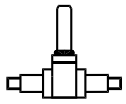
[1]) The k_v value is the water flow in m^3/h at a pressure drop across the valve of 1 bar, ρ = 1000 kg/m^3.
[2]) MOPD for media in gas form is approx. 1 bar greater.

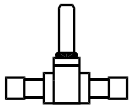
Type	Rated capacity kW														
	Liquid					Suction vapour					Hot gas				
	R22	R134a	R404A/ R507	R407C	R410A	R22	R134a	R404A/ R507	R407C	R410A	R22	R134a	R404A/ R507	R407C	R410A
EVU 2	4.02	2.96	2.24	3.02	3.22	0.45	0.33	0.4	0.43	0.58	1.85	1.47	1.51	1.98	2.79
EVU 3	6.03	5.55	4.2	5.67	6.03	0.68	0.49	0.6	0.64	0.87	2.78	2.2	2.26	2.96	4.19
EVU 4	10.05	9.25	7.0	9.45	10.05	1.3	0.82	1.0	1.07	1.45	4.63	3.67	3.77	4.94	6.99
EVU 5	13.07	12.03	9.1	12.29	13.07	1.46	1.06	1.3	1.39	1.89	6.01	4.77	4.9	6.42	9.81
EVU 6	16.08	14.8	11.2	15.12	16.08	1.8	1.30	1.6	1.70	2.32	7.4	5.86	6.02	7.90	11.18

Rated liquid and suction capacity is based on evaporating temperature t_e = –10°C, liquid temperature ahead of the valve t_l = 25°C, pressure drop in valve Δp = 0.15 bar.

Rated hot gas capacity is based on condensing temperature t_c = 40°C, pressure drop across valve Δp = 0.8 bar, hot gas temperature t_h = 65°C and subcooling of refrigerant Δt_{sub} = 4 K.

Ordering
Valve





Normally colosed (NC) with a.c. coil

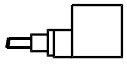
Type	Connection		**Code no.**	
	in.	mm	in.	mm
EVU 2	1/4	6	**032F5043**	**032F5053**
EVU 3	1/4	6	**032F5024**	**032F5025**
	3/8	10	**032F5026**	**032F5027**
EVU 4	1/4	6	**032F5034**	**032F5035**
	3/8	10	**032F5036**	**032F5037**
	1/2	12	**032F5039**	**032F5038**
EVU 5	3/8	10	**032F7000**	**032F7001**
	1/2	12	**032F7002**	**032F7003**
EVU 6	3/8	10	**032F5046**	**032F5047**
	1/2	12	**032F5049**	**032F5048**

Ordering
Coils

Alternating current a.c.

Type	Voltage V	Frequency Hz	Code no. Industrial pack (40 stk.) with DIN plug[1] IP 65	Code no. single pack	Power consumption
EVU 2,3,4,5 and 6	24	50/60	**042N8608**	**042N7608**	Holding: 6W 12VA Inrush indkobling: 26VA
	48		**042N8609**	**042N7609**	
	115		**042N8612**	**042N7612**	
	230		**042N8601**	**042N7601**	
	240		**042N8602**	**042N7602**	

[1] The three pins on the coil can be fitted with spade tabs, 6.3 mm wide (to DIN 46247). The two current carrying pins can also be fitted with spade tabs, 4.8. mm wide. Max. lead cross section: 1.5 mm^2. If DIN plug is used (DIN 43650) the leads must be connected in the socket. The socket is fitted with a Pg 11 screwed entry for 6 to 12 mm.



Alternating current a.c.

Type	Voltage V	Frequency Hz	Code no. Industrial pack (40 pcs.) with1 m cable and DIN plug IP 67	Code no single pack	Power consumption
EVU 2, 3, 4, 5 and 6	24	50/60	**042N8658**	**042N7658**	Holding 6W 12VA Inrush: 26VA
	48		**042N8659**	**042N7659**	
	115		**042N8662**	**042N7662**	
	230		**042N8651**	**042N7651**	
	240		**042N8652**	**042N7652**	
	100*)		**042N8671**	**042N7671**	
	200*)		**042N8674**	**042N7674**	

*) 0.5 m cable with 2 x 0,75 wire

Ordering

Coils (continued)

DIN

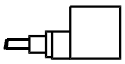
Alternating current a.c.

Type	Voltage V	Frequency Hz	Code no. Indust. pack 40-off	Code no. Single pack	Power consumption
EVU 2, 3, 4, 5, 6	208-240	50/60	**042N8201**	**042N4201**	Holding: 7 W 14 VA Inrush: 28 VA
	110-120		**042N8202**	**042N4202**	
	24		**042N8203**	**042N4203**	

0,25" US spade

Alternating current a.c.

Type	Voltage V	Frequeny Hz	Code no. Industripak (40 stk.)	Code no. Single pack	Power consumption
EVU 2, 3, 4, 5, 6	208-240	50/60	**042N8211**	**042N4211**	Holding: 7 W 14 VA Inrush: 28 VA
	110-120		**042N8212**	**042N4212**	
	24		**042N8213**	**042N4213**	



Direct current d.c.

Type	Voltage V	Code no. Industr. pack 40-off With 1 m cable IP 67	Code no. Single pack	Power consumption
EVU 2, 3, 4, 5, 6	12	**042N8696**	**042N7696**	14 W
	24	**042N8697**	**042N7697**	

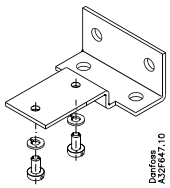
DIN

Direct current d.c.

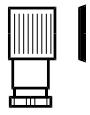
Type	Voltage V	Code no. Industr. pack 40-off With DIN plug IP 65	Code no. Single marking	Power consumption
EVU 2, 3, 4, 5, 6	12	**042N8686**	**042N7686**	14 W
	24	**042N8687**	**042N7687**	

DC coils with 0.25" US spade can be supplied on request.

Accessories



Socket for fixing of valve, industrial pack (40 pcs)
Code no. **032F5065.**



DIN plug, code no. **042N0156**

O-ring for sealing the coil. Industrial pack (50 pcs.)
Code no. **032F6115**

Capacity

Liquid capacity Q_o kW

R 22

Type	Liquid capacity Q_o kW at pressure drop across valve Δp bar					
	0.1	0.15	0.2	0.3	0.4	0.5
EVU 2	3.28	4.02	4.66	5.7	6.58	7.36
EVU 3	4.92	6.03	6.99	8.55	9.87	11.04
EVU 4	8.2	10.05	11.65	14.25	16.45	18.4
EVU 5	10.66	13.07	15.15	18.53	21.39	23.92
EVU 6	13.12	16.08	18.65	22.8	26.32	29.44

Liquid capacity Q_o kW

R 134a

Type	Liquid capacity Q_o kW at pressure drop across valve Δp bar					
	0.1	0.15	0.2	0.3	0.4	0.5
EVU 2	2.43	2.96	3.42	4.21	4.85	5.42
EVU 3	4.56	5.55	6.42	7.89	9.09	10.17
EVU 4	7.6	9.25	10.7	13.15	15.15	16.95
EVU 5	9.88	12.03	13.91	17.10	19.70	22.04
EVU 6	12.16	14.8	17.12	21.04	24.24	27.12

Liquid capacity Q_o kW

R 404A/R 507

Type	Liquid capacity Q_o kW at pressure drop across valve Δp bar					
	0.1	0.15	0.2	0.3	0.4	0.5
EVU 2	1.84	2.24	2.59	3.18	3.66	4.11
EVU 3	3.45	4.2	4.86	5.97	6.87	7.71
EVU 4	5.75	7.0	8.1	9.95	11.45	12.85
EVU 5	7.48	9.10	10.53	12.94	14.89	16.71
EVU 6	9.2	11.2	12.96	15.92	18.32	20.56

Liquid capacity Q_o kW

R 407C

Type	Liquid capacity Q_o kW at pressure drop across valve Δp bar					
	0.1	0.15	0.2	0.3	0.4	0.5
EVU 2	2.48	3.02	3.49	4.29	4.94	5.54
EVU 3	4.65	5.67	6.54	8.04	9.27	10.38
EVU 4	7.75	9.45	10.9	13.4	15.45	17.3
EVU 5	10.08	12.29	14.17	17.42	20.09	22.49
EVU 6	12.4	15.12	17.44	21.44	24.72	27.68

Liquid capacity Q_o kW

R 410A

Type	Liquid capacity Q_o kW at pressure drop across valve Δp bar					
	0.1	0.15	0.2	0.3	0.4	0.5
EVU 2	2.62	3.22	3.73	4.56	5.26	5.89
EVU 3	4.92	6.03	6.99	8.55	9.87	11.04
EVU 4	8.2	10.05	11.65	14.25	16.45	18.4
EVU 5	10.66	13.07	15.15	18.53	21.39	23.92
EVU 6	13.12	16.08	18.64	22.8	26.32	29.44

Capacity is based on
liquid temperature t_l = + 25°C ahead of valve,
evaporating temperature t_e = –10°C
superheat 0 K.

Correction factors
When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of valve/evaporator. When the corrected capacity is known, the selection can be made from the table.

Correction factor for liquid temperature t_l

t_V°C	–10	0	10	15	20	25	30	35	40	45	50
R 22	0.76	0.82	0.88	0.92	0.96	1.0	1.05	1.1	1.16	1.22	1.3
R 134a	0.73	0.79	0.86	0.9	0.95	1.0	1.06	1.12	1.19	1.27	1.37
R 404A	0.65	0.72	0.81	0.86	0.93	1.0	1.09	1.2	1.33	1.51	1.74
R 507	0.65	0.73	0.81	0.87	0.93	1.0	1.08	1.19	1.31	1.47	1.69
R 407C	0.71	0.78	0.85	0.89	0.94	1.0	1.06	1.14	1.23	1.33	1.46
R 410A	0.73	0.79	0.86	0.9	0.95	1.0	1.06	1.14	1.23	1.33	1.47

Capacity
(continued)

Suction vapour capacity Q_e kW

R 22

Type	Pressure drop Δp bar	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
		–40	–30	–20	–10	0	+10
EVU 2	0.1	0.18	0.24	0.30	0.38	0.45	0.53
	0.15	0.22	0.28	0.35	0.45	0.55	0.65
	0.2	0.24	0.33	0.40	0.50	0.63	0.75
EVU 3	0.1	0.27	0.35	0.45	0.56	0.68	0.79
	0.15	0.33	0.41	0.53	0.68	0.83	0.98
	0.2	0.37	0.49	0.6	0.75	0.94	1.13
EVU 4	0.1	0.46	0.59	0.75	0.94	1.13	1.32
	0.15	0.55	0.69	0.88	1.13	1.38	1.63
	0.2	0.61	0.82	1.0	1.25	1.57	1.88
EVU 5	0.1	0.59	0.77	1.35	1.22	1.46	1.71
	0.15	0.71	0.90	1.57	1.46	1.79	2.11
	0.2	0.79	1.06	1.79	1.63	2.04	2.44
EVU 6	0.1	0.73	0.94	1.2	1.5	1.8	2.1
	0.15	0.87	1.1	1.4	1.8	2.2	2.6
	0.2	0.98	1.3	1.6	2.0	2.5	3.0

Suction vapour capacity Q_o kW

R 134a

Type	Pressure drop Δp bar	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
		–40	–30	–20	–10	0	+10
EVU 2	0.1	0.12	0.16	0.21	0.28	0.35	0.43
	0.15	0.13	0.19	0.25	0.33	0.43	0.50
	0.2	0.15	0.22	0.28	0.38	0.48	0.60
EVU 3	0.1	0.17	0.24	0.32	0.41	0.53	0.64
	0.15	0.2	0.28	0.38	0.49	0.64	0.75
	0.2	0.22	0.33	0.41	0.56	0.71	0.9
EVU 4	0.1	0.29	0.4	0.53	0.69	0.88	1.07
	0.15	0.33	0.47	0.63	0.82	1.07	1.25
	0.2	0.37	0.55	0.69	0.94	1.19	1.5
EVU 5	0.1	0.38	0.51	0.68	0.90	1.14	1.38
	0.15	0.43	0.60	0.81	1.06	1.38	1.63
	0.2	0.47	0.71	0.90	1.22	1.55	1.95
EVU 6	0.1	0.45	0.63	0.84	1.10	1.4	1.70
	0.15	0.53	0.74	1.0	1.30	1.70	2.0
	0.2	0.58	0.87	1.10	1.50	1.90	2.4

Suction vapour capacity Q_o kW

R 404A/R 507

Type	Pressure drop Δp bar	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
		–40	–30	–20	–10	0	+10
EVU 2	0.1	0.16	0.20	0.28	0.33	0.40	0.50
	0.15	0.18	0.24	0.33	0.40	0.50	0.60
	0.2	0.21	0.28	0.35	0.45	0.58	0.70
EVU 3	0.1	0.23	0.3	0.41	0.49	0.6	0.75
	0.15	0.27	0.36	0.49	0.6	0.75	0.9
	0.2	0.31	0.41	0.53	0.68	0.86	1.1
EVU 4	0.1	0.39	0.5	0.69	0.82	1.0	1.25
	0.15	0.46	0.61	0.82	1.0	1.25	1.5
	0.2	0.52	0.69	0.88	1.13	1.44	1.75
EVU 5	0.1	0.51	0.65	0.90	1.06	1.3	1.62
	0.15	0.59	0.79	1.06	1.3	1.62	1.95
	0.2	0.67	0.90	1.14	1.46	1.87	2.27
EVU 6	0.1	0.62	0.8	1.10	1.30	1.6	2.0
	0.15	0.73	0.97	1.30	1.6	2.0	2.4
	0.2	0.82	1.10	1.4	1.8	2.30	2.8

Capacities are based on liquid temperature t_l = +25°C ahead of evaporator.
The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.
Capacities are based on dry, saturated vapour ahead of valve.
During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Capacity
(continued)

Suction vapour capacity Q_o kW

R 407C

Type	Pressure drop Δp bar	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
		–40	–30	–20	–10	0	+10
EVU 2	0.1	0.12	0.20	0.28	0.35	0.43	0.50
	0.15	0.18	0.24	0.33	0.43	0.53	0.63
	0.2	0.20	0.28	0.35	0.45	0.60	0.73
EVU 3	0.1	0.18	0.30	0.41	0.53	0.64	0.75
	0.15	0.27	0.36	0.49	0.64	0.79	0.94
	0.2	0.30	0.41	0.53	0.68	0.90	1.09
EVU 4	0.1	0.31	0.51	0.69	0.88	1.07	1.25
	0.15	0.45	0.6	0.82	1.07	1.32	1.57
	0.2	0.51	0.69	0.88	1.13	1.5	1.82
EVU 5	0.1	0.40	0.66	0.90	1.14	1.38	1.62
	0.15	0.58	0.77	1.06	1.38	1.71	2.03
	0.2	0.66	0.90	1.14	1.46	1.95	2.36
EVU 6	0.1	0.49	0.81	1.10	1.40	1.70	2.0
	0.15	0.72	0.95	1.30	1.70	2.10	2.50
	0.2	0.81	1.10	1.40	1.80	2.40	2.90

Suction vapour capacity Q_o kW

R 410A

Type	Pressure drop	Suction vapour capacity Q_e kW at evaporating temperature t_e °C					
	Δp bar	–40	–30	–20	–10	0	+10
EVU 2	0.1	0.25	0.31	0.39	0.48	0.57	0.66
	0.15	0.3	0.37	0.46	0.58	0.7	0.82
	0.2	0.3	0.44	0.52	0.65	0.8	0.95
EVU 3	0.1	0.37	0.47	0.59	0.72	0.86	0.99
	0.15	0.45	0.55	0.68	0.87	1.05	1.23
	0.2	0.51	0.65	0.79	0.97	1.19	1.42
EVU 4	0.1	0.62	0.78	0.98	1.21	1.43	1.66
	0.15	0.75	0.92	1.14	1.45	1.75	2.05
	0.2	0.86	1.09	1.31	1.62	1.99	2.37
EVU 5	0.1	0.81	1.01	1.27	1.57	1.86	2.15
	0.15	0.98	1.20	1.48	1.88	2.27	2.66
	0.2	1.11	1.42	1.70	2.1	2.59	3.07
EVU 6	0.1	0.99	1.25	1.56	1.93	2.29	2.65
	0.15	1.2	1.47	1.82	2.32	2.79	3.28
	0.2	1.37	1.74	2.1	2.58	3.18	3.78

Capacities are based on liquid temperature t_l = +25°C ahead of evaporator.
The table values refer to the evaporator capacity and are given as a function of evaporating temperature t_e and pressure drop Δp across valve.
Capacities are based on dry, saturated vapour ahead of valve.
During operation with superheated vapour ahead of valve, the capacities are reduced by 4% for each 10 K superheat.

Correction factors
When sizing valves, the plant capacity must be multiplied by a correction factor depending on liquid temperature t_l ahead of valve/evaporator. When the corrected capacity is known, the selection can be made from the table.

Correction factors for liquid temperature t_l

t_v°C	10	15	20	25	30	35	40	45	50
R 22	0.9	0.93	0.96	1.0	1.04	1.08	1.13	1.18	1.24
R 134a	0.88	0.92	0.96	1.0	1.05	1.1	1.16	1.23	1.31
R 404A	0.84	0.89	0.94	1.0	1.07	1.16	1.26	1.4	1.57
R 507	0.84	0.89	0.94	1.0	1.07	1.16	1.26	1.39	1.57
R 407C	0.88	0.91	0.95	1.0	1.05	1.11	1.18	1.26	1.35
R 410A	0.89	0.92	0.96	1.0	1.05	1.11	1.18	1.26	1.37

Capacity
(continued)

Hot gas capacity Q_h kW

R 22

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW Evaporating temp. t_e = -10°C. Hot gas temp. t_h = t_c +25°C. Subcooling Δt_{sub} = 4 K Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
EVU 2	0.1	0.60	0.63	0.65	0.68	0.70
	0.2	0.85	0.90	0.93	0.85	0.98
	0.4	1.20	1.28	1.33	1.38	1.40
	0.8	1.65	1.70	1.85	1.98	1.98
	1.6	2.33	2.48	1.60	2.70	2.73
EVU 3	0.1	0.9	0.94	0.98	1.01	1.05
	0.2	1.28	1.35	1.39	1.28	1.46
	0.4	1.8	1.91	1.99	2.06	2.1
	0.8	2.48	2.55	2.78	2.96	2.96
	1.6	3.49	3.71	3.9	4.05	4.09
EVU 4	0.1	1.5	1.57	1.63	1.69	1.75
	0.2	2.13	2.25	2.32	2.13	2.44
	0.4	3.0	3.19	3.32	3.44	3.5
	0.8	4.13	4.25	4.63	4.94	4.94
	1.6	5.82	6.19	6.5	6.75	6.82
EVU 5	0.1	1.95	2.03	2.11	2.2	2.27
	0.2	2.76	2.92	3.01	2.76	3.17
	0.4	3.9	4.15	4.31	4.47	4.55
	0.8	5.36	5.52	6.01	6.42	6.42
	1.6	7.56	8.05	8.45	8.77	8.86
EVU 6	0.1	2.4	2.5	2.6	2.7	2.8
	0.2	3.4	3.6	3.7	3.4	3.9
	0.4	4.8	5.1	5.3	5.5	5.6
	0.8	6.6	6.8	7.4	7.9	7.9
	1.6	9.3	9.9	10.4	10.8	10.9

Hot gas capacity Q_h kW

R 134a

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW Evaporating temp. t_e = -10°C. Hot gas temp. t_h = t_c +25°C. Subcooling Δt_{sub} = 4 K Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
EVU 2	0.1	0.47	0.5	0.52	0.53	0.52
	0.2	0.67	0.71	0.74	0.75	0.74
	0.4	0.93	1.02	1.06	1.07	1.06
	0.8	1.32	1.41	1.47	1.54	1.52
	1.6	1.90	2.01	2.09	2.13	2.12
EVU 3	0.1	0.70	0.75	0.78	0.79	0.78
	0.2	1.01	1.07	1.11	1.13	1.11
	0.4	1.4	1.53	1.58	1.61	1.59
	0.8	1.98	2.11	2.2	2.31	2.28
	1.6	2.85	3.02	3.12	3.2	3.17
EVU 4	0.1	1.18	1.25	1.3	1.32	1.31
	0.2	1.68	1.78	1.85	1.88	1.86
	0.4	2.33	2.55	2.64	2.68	2.65
	0.8	3.31	3.52	3.67	3.85	3.8
	1.6	4.76	5.03	5.23	5.33	5.29
EVU 5	0.1	1.53	1.62	1.68	1.72	1.7
	0.2	2.18	2.31	2.4	2.44	2.41
	0.4	3.03	3.32	3.43	3.48	3.44
	0.8	4.3	4.57	4.77	5.00	4.94
	1.6	6.18	6.54	6.8	6.92	6.88
EVU 6	0.1	1.88	1.99	2.07	2.11	2.09
	0.2	2.69	2.84	2.95	3.0	2.97
	0.4	3.73	4.08	4.28	4.28	4.23
	0.8	5.29	5.6	5.86	6.16	6.08
	1.6	7.61	8.05	8.37	8.52	8.46

An increase in hot gas temperature t_h of 10 K, based on t_h = t_c +25°C, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature t_e changes valve capacity; see correction factor table, page 12.

Capacity
(continued)

Hot gas capacity Q_h kW

R 404A/R 507

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW Evaporating temp. t_e = -10°C. Hot gas temp. t_h = t_c +25°C. Subcooling Δt_{sub} = 4 K Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
EVU 2	0.1	0.54	0.55	0.54	0.51	0.47
	0.2	0.76	0.77	0.76	0.73	0.66
	0.4	1.09	1.1	1.09	1.03	0.94
	0.8	1.49	1.51	1.51	1.48	1.34
	1.6	2.09	2.13	2.11	2.03	1.80
EVU 3	0.1	0.81	0.82	0.81	0.77	0.7
	0.2	1.14	1.16	1.14	1.09	0.99
	0.4	1.63	1.64	1.63	1.55	1.41
	0.8	2.23	2.27	2.26	2.22	2.01
	1.6	3.14	3.2	3.16	3.04	2.7
EVU 4	0.1	1.35	1.37	1.35	1.28	1.17
	0.2	1.9	1.93	1.91	1.82	1.65
	0.4	2.72	2.74	2.72	2.58	2.35
	0.8	3.72	3.78	3.77	3.7	3.36
	1.6	5.23	5.33	5.17	5.07	4.5
EVU 5	0.1	1.75	1.77	1.75	1.66	1.51
	0.2	2.46	2.50	2.50	2.36	2.14
	0.4	3.53	3.56	3.56	3.35	3.05
	0.8	4.83	4.91	4.91	4.81	4.36
	1.6	6.8	6.93	6.92	6.56	5.85
EVU 6	0.1	2.16	2.18	2.15	2.05	1.86
	0.2	3.03	3.08	3.05	2.90	2.64
	0.4	4.34	4.38	4.35	4.13	3.76
	0.8	5.94	6.05	6.02	5.92	5.37
	1.6	8.37	8.52	8.43	8.10	7.2

Hot gas temperature Q_h kW

R 407C

Type	Pressure drop across valve Δp bar	Hot gas capacity Q_h kW Evaporating temp. t_e = -10°C. Hot gas temp. t_h = t_c +25°C. Subcooling Δt_{sub} = 4 K Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
EVU 2	0.1	0.68	0.70	0.70	0.70	0.68
	0.2	0.95	1.00	1.00	0.95	0.95
	0.4	1.35	1.40	1.43	1.43	1.38
	0.8	1.85	1.88	1.98	2.05	1.93
	1.6	2.60	2.73	2.78	2.80	2.68
EVU 3	0.1	1.01	1.05	1.05	1.05	1.01
	0.2	1.43	1.5	1.5	1.43	1.43
	0.4	2.03	2.1	2.14	2.14	2.06
	0.8	2.78	2.81	2.96	3.08	2.89
	1.6	3.9	4.09	4.16	4.2	4.01
EVU 4	0.1	1.69	1.75	1.75	1.75	1.69
	0.2	2.38	2.5	2.5	2.38	2.38
	0.4	3.38	3.5	3.57	3.57	3.44
	0.8	4.63	4.69	4.94	5.13	4.82
	1.6	6.5	6.82	6.94	7.0	6.69
EVU 5	0.1	2.2	2.27	2.27	2.27	2.2
	0.2	3.09	3.25	3.25	3.09	3.09
	0.4	4.39	4.55	4.64	4.63	4.47
	0.8	6.01	6.1	6.42	6.66	6.26
	1.6	8.45	8.86	9.02	9.10	8.7
EVU 6	0.1	2.70	2.8	2.8	2.8	2.70
	0.2	3.8	4.0	4.0	3.8	3.8
	0.4	5.4	5.6	5.70	5.70	5.50
	0.8	7.4	7.50	7.90	8.2	7.70
	1.6	10.4	10.90	11.10	11.2	10.70

An increase in hot gas temperature t_h of 10 K, based on t_h = t_c +25°C, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature t_e changes valve capacity; see correction factor table, page 12.

Capacity
(continued)

R 410A

Hot gas temperature Q_h kW

Type	Pressure drop across valve	Hot gas capacity Q_h kW Evaporating temp. t_e = -10°C. Hot gas temp. t_h = t_c +25°C. Subcooling Δt_{sub} = 4 K Condensing temperature t_c °C				
		+20	+30	+40	+50	+60
EVU 2	0.1	0.95	0.97	0.98	0.98	0.95
	0.2	1.34	1.4	1.4	1.23	1.32
	0.4	1.9	1.99	2.0	2.0	1.89
	0.8	2.61	2.64	2.79	2.85	2.67
	1.6	3.68	3.84	3.93	3.92	3.68
EVU 3	0.1	1.42	1.46	1.47	1.47	1.42
	0.2	2.02	2.09	2.1	1.85	1.98
	0.4	2.84	2.97	3.00	2.99	2.84
	0.8	3.01	2.95	4.19	4.3	4.00
	1.6	5.51	5.76	5.89	5.87	5.52
EVU 4	0.1	2.37	2.43	2.46	2.45	2.37
	0.2	3.36	3.49	3.5	3.08	3.3
	0.4	4.74	4.95	5.01	4.99	4.73
	0.8	6.52	6.59	6.99	7.17	6.67
	1.6	9.19	9.6	9.82	9.79	9.2
EVU 5	0.1	3.08	3.15	3.19	3.18	3.07
	0.2	4.37	4.54	4.54	4.00	4.28
	0.4	6.16	6.43	6.51	6.49	6.14
	0.8	8.47	8.57	9.08	9.31	8.67
	1.6	11.95	12.47	12.76	12.73	11.96
EVU 6	0.1	3.79	3.88	3.93	3.92	3.78
	0.2	5.38	5.58	5.59	4.93	5.27
	0.4	7.58	7.91	8.01	7.98	7.56
	0.8	10.43	10.54	11.18	11.46	10.67
	1.6	14.70	15.35	15.70	15.66	14.72

An increase in hot gas temperature t_h of 10 K, based on t_h = tc +25°C, reduces valve capacity approx. 2% and vice versa.

A change in evaporating temperature t_e changes valve capacity; see correction factor table below

Corrections factor
When sizing valves, the table value must be multiplied by a correction factor depending on evaporating temperature t_e.

Correction factors for evaporating temperature t_e

t_o °C	–40	–30	–20	–10	0	+10
R 22	0.92	0.95	0.98	1.0	1.02	1.04
R 134a	0.88	0.92	0.96	1.0	1.04	1.08
R 404A	0.85	0.9	0.95	1.0	1.05	1.09
R 507	0.84	0.89	0.95	1.0	1.05	1.1
R 407C	0.89	0.93	0.96	1.0	1.03	1.07
R 410A	0.92	0.95	0.98	1.0	1.02	1.03

R 22

Hot gas capacity G_h kg/s

Type	Hot gas temperature t_h °C	Cond. temp. t_c °C	Hot gas temperature G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
EVU 2	+90	+25	0.04	0.04	0.06	0.07	0.07	0.07	0.07	0.07	0.07
		+35	0.04	0.05	0.07	0.08	0.09	0.09	0.1	0.1	0.1
		+45	0.04	0.06	0.08	0.1	0.11	0.12	0.12	0.12	0.12
EVU 3		+25	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		+35	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
		+45	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04
EVU 4		+25	0.02	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04
		+35	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05
		+45	0.02	0.03	0.04	0.05	0.05	0.06	0.06	0.06	0.06
EVU 5		+25	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05
		+35	0.02	0.03	0.05	0.05	0.06	0.06	0.06	0.06	0.06
		+45	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.08	0.08
EVU 6		+25	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06
		+35	0.03	0.04	0.06	0.07	0.07	0.08	0.08	0.08	0.08
		+45	0.04	0.05	0.07	0.08	0.09	0.09	0.1	0.1	0.1

An increase in hot gas temperature of 10 K, reduces valve capacity approx. 2% and vice versa.

Capacity
(continued)

Hot gas capacity G_h kg/s

R 134a

Type	Hot gas temperature t_h °C	Cond. temp. t_c °C	Hot gas temperature G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
EVU 2	+60	+25	0.01	0.01	0.01	0.01	0.01				
		+35	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
		+45	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
EVU 3		+25	0.01	0.01	0.02	0.02	0.02				
		+35	0.01	0.01	0.02	0.02	0.02	0.02	0.02		
		+45	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
EVU 4		+25	0.02	0.02	0.03	0.03	0.03				
		+35	0.02	0.02	0.03	0.04	0.04	0.04	0.04		
		+45	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05
EVU 5		+25	0.02	0.03	0.03	0.03	0.03				
		+35	0.02	0.03	0.04	0.04	0.05	0.05	0.05		
		+45	0.03	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.06
EVU 6		+25	0.02	0.03	0.04	0.04	0.04				
		+35	0.03	0.04	0.05	0.06	0.06	0.06	0.06		
		+45	0.03	0.05	0.06	0.07	0.07	0.07	0.07	0.07	0.07

Hot gas capacity G_h kg/s

R 404A/R 507

Type	Hot gas temperature t_h °C	Cond. temp. t_c °C	Hot gas temperature G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
EVU 2	+60	+25	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		+35	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		+45	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03
EVU 3		+25	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
		+35	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04
		+45	0.02	0.02	0.03	0.04	0.04	0.04	0.05	0.05	0.05
EVU 4		+25	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05
		+35	0.02	0.03	0.05	0.05	0.06	0.06	0.06	0.06	0.06
		+45	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.08	0.08
EVU 5		+25	0.03	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.07
		+35	0.03	0.04	0.06	0.07	0.08	0.08	0.08	0.08	0.08
		+45	0.04	0.05	0.07	0.08	0.09	0.09	0.10	0.10	0.10
EVU 6		+25	0.03	0.05	0.06	0.07	0.08	0.08	0.08	0.08	0.08
		+35	0.04	0.05	0.07	0.08	0.09	0.10	0.10	0.10	0.10
		+45	0.04	0.06	0.08	0.10	0.11	0.12	0.12	0.13	0.13

Hot gas capacity G_h kg/s

R 407C

Type	Hot gas temperature t_h °C	Cond. temp. t_c °C	Hot gas temperature G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
EVU 2	+90	+25	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
		+35	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		+45	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
EVU 3		+25	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
		+35	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
		+45	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04
EVU 4		+25	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04
		+35	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05
		+45	0.02	0.03	0.05	0.05	0.06	0.06	0.07	0.07	0.07
EVU 4		+25	0.02	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05
		+35	0.03	0.04	0.05	0.06	0.06	0.07	0.07	0.07	0.07
		+45	0.03	0.04	0.06	0.07	0.08	0.08	0.08	0.09	0.09
EVU 6		+25	0.03	0.04	0.05	0.06	0.06	0.07	0.07	0.07	0.07
		+35	0.03	0.05	0.06	0.07	0.08	0.08	0.09	0.08	0.08
		+45	0.03	0.05	0.07	0.08	0.09	0.10	0.11	0.11	0.11

An increase in hot gas temperature of 10 K, reduces valve capacity approx. 2% and vice versa.

Capacity (continued)

Hot gas capacity G_h kg/s

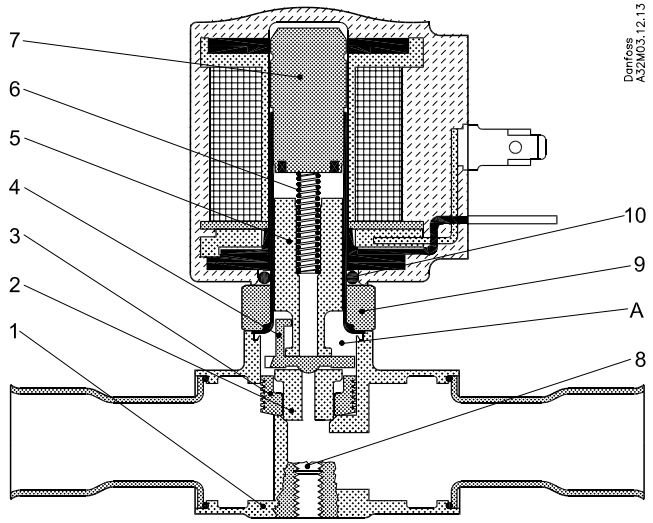
R 410A

Type	Hot gas temperature t_h °C	Cond. temp. t_c °C	Hot gas temperature G_h kg/s at pressure drop across valve Δp bar								
			0.5	1	2	3	4	5	6	7	8
EVU 2	+60	+25	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
		+35	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
		+45	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03
EVU 3		+25	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
		+35	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04
		+45	0.02	0.02	0.03	0.04	0.04	0.04	0.05	0.05	0.05
EVU 4		+25	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05
		+35	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.07	0.07
		+45	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.08	0.09
EVU 5		+25	0.03	0.04	0.05	0.06	0.06	0.07	0.07	0.07	0.07
		+35	0.03	0.04	0.06	0.07	0.07	0.08	0.09	0.09	0.09
		+45	0.03	0.05	0.07	0.08	0.09	0.10	0.10	0.11	0.11
EVU 6		+25	0.03	0.04	0.06	0.07	0.08	0.08	0.09	0.09	0.09
		+35	0.04	0.05	0.07	0.08	0.09	0.10	0.11	0.11	0.11
		+45	0.04	0.06	0.08	0.10	0.11	0.12	0.13	0.13	0.14

Design / Function

1. Valve body
2. Seat plate
3. Piston
4. Pilot plate
5. Armature
6. Spring
7. Armature top
8. Mounting thread
9. Flange
10. O-ring

A Servo chamber



EVU 2, 3, 4, 5, 6

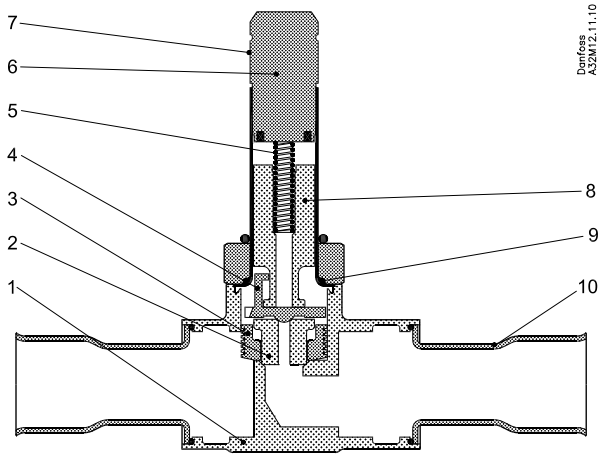
EVU 2, 3, 4, 5 and 6 are servo operated solenoid valves with a "floating" piston. Piston and seat plate are here separated and can be moved independent from each other. This servo principle results in a fast operating and compact valve that is able to open against a high differential pressure. The valve closes rather soft, because the pilot system does not fully close before the main orifice has closed. This reduces force effect and wear of material in the valve.

When the coil is currentless, the main orifice, seat plate (2) and pilot orifice (on the pilot plate (4)) are closed. The pilot orifice and main orifice are held closed by the armature weight, the armature spring force and the differential pressure between inlet and outlet sides.

When current is applied to the coil, the armature (5) is drawn up into the magnetic field and thus lifts the pilot plate (4) and opens for the pilot orifice so that the de-energising of the servo chamber (A) starts and the pressure is relieved to the level of the outlet side. As the inlet pressure that acts on the bottom of the piston (3) now is higher than the pressure in the servo chamber (A), the piston is moved upwards and lifts both the pilot plate (4) and the seat plate (2). When the seat plate is lifted, the main orifice opens for full flow.
Therefore a minimum differential pressure of 0.02 bar is necessary to open the valve and keep it open.

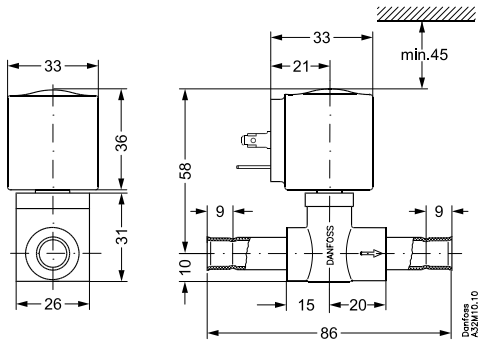
When the current to the coil is switched off, the spring (6) and armature (5) are pressed down towards the pilot plate (4). The pressure in the servo chamber (A) increases and the piston will no longer be able to hold the seat plate (2) in lifted position, by which the main orifice closes. The armature (5) continues its downwards movement untill the pilot orifice on the pilot plate (4) is fully closed.

Material specifications

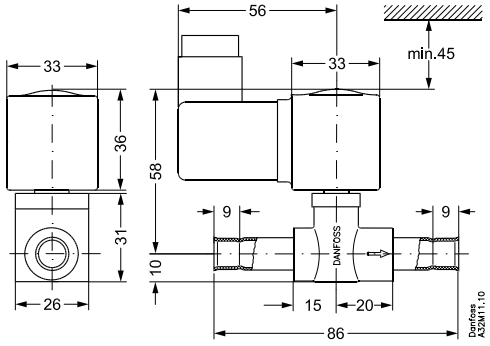


					Standard		
No.	Description	Material	Alloys	Mat. no.	W.no.	DIN	EN
1	Valve body	Brass	CuZn40Pb2	CW617N	2.0402	17672-1	12165
2	Seat plate	Teflon	PTFE				62159
3	Piston	Brass	CuZn39Pb2	CW612N	2.0380	17672-1	12164
4	Pilot plate	Thermoplast	PEEK				
5	Spring	Spring wire stainless	X10CrNi18-8		1.4310		10088
6	Armature top	Stainless steel	X6CrMoS17		1.4105		10088
7	Armature tube	Stainless steel	X6CrMoS17		1.4105		10088
8	Armature	Stainless steel	X4CrMoS18		1.4105 IL		10088
9	O-ring	Rubber	CR				
10	Bimetallic tube	Stainless steel/ Cu					
	Screws	Stainless steel	A2-70			3506	

Dimensions and weight



EVU 2, 3, 4, 5, 6, mounted with coil with DIN plug



EVU 2, 3, 4, 5, 6, mounted with DC coil with DIN plug

Weight of coil
6 W: approx. 0.1 kg
Weight of coil with cable
approx. 0.15 kg
Weight of valve
approx. 0.1 kg

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