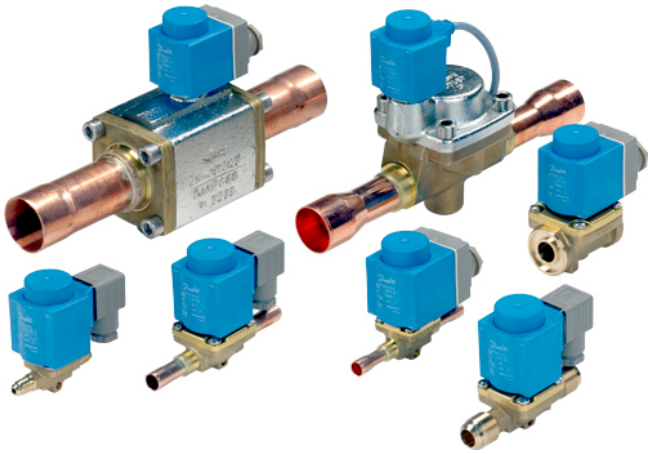
ENGINEERING TOMORROW

Data Sheet

Solenoid valve
Type **EVR 2 - EVR 40**

Version 2



EVR is a direct or servo operated solenoid valve suitable for liquid, suction, and hot gas lines with most refrigerants, including flammable refrigerants.

EVR valves and coils are sold separately.

Features

- Complete range of solenoid valves for refrigeration, freezing and air conditioning plant
- Supplied in versions normally closed (NC) and normally open (NO) with de-energized coil
- Wide choice of coils for AC and DC
- Suitable for most refrigerants, including flammable refrigerants
- Designed for media temperatures up to 105 °C
- Flare connections up to ⅝ in
- Solder connections up to 2 ⅛ in
- Extended ends on solder versions make the installation easy, eliminating the need to dismantle the valve when soldering in
- Available in flare, solder and flange connection versions

Functions

Function

EVR solenoid valves are designed on two different principles:
1. Direct operation
2. Servo operation

1. Direct operation (NC)
EVR 2 – EVR 3 are direct operated. The valves open directly for full flow when the armature (3) moves up into the magnetic field of the coil.

This means that the valves operate with a minimum differential pressure of 0 bar. The seat plate is fitted directly on the armature (3) see Design and material.

Inlet pressure acts from above on the armature and the valve plate. Thus, the inlet pressure and spring force act to close the valve when there is no current in the coil.

2. Servo operation (NC)
EVR 4 – EVR 22 are servo operated with a "floating" diaphragm (4) see Design and material. The pilot orifice of stainless steel is placed in the center of the diaphragm. The seat plate is fitted directly to the armature (3) see Design and material. When there is no current in the coil, the main orifice and pilot orifice are closed. The pilot orifice and main orifice are held closed by the armature spring force and the differential pressure between inlet and outlet sides.

When current is applied to the coil, the armature is drawn up into the magnetic field and opens the pilot orifice. This relieves the pressure above the diaphragm, i.e. the space above the diaphragm becomes connected to the outlet side of the valve.

The differential pressure between inlet and outlet sides then presses the diaphragm away from the main orifice and opens it for full flow. Therefore a certain minimum differential pressure is necessary to open the valve and keep it open. For EVR 4 – EVR 22 valves the minimum differential pressure for safe operation is 0.03 bar.

When the current is switched off, the pilot orifice is closed. Via the equalization holes in the diaphragm, the pressure above the diaphragm rises to the same value as the inlet pressure and the diaphragm closes the main orifice.

EVR 25, EVR 32 and EVR 40 are servo operated piston valves. The servo piston (16) see Design and material with sealing face closes against the valve seat by means of the differential pressure between inlet and outlet side of the valve and the force of the compression spring. When the coil is switched on, the pilot orifice opens. This relieves the pressure on the piston spring side of the valve. The differential pressure will then open the valve. The minimum differential pressure for safe operation is 0.2 bar.

EVR (NO) has the opposite function to EVR (NC), i.e. it is open with de-energized coil. EVR (NO) is available with servo operation only.

2.1. Bi-flow operation
Bi-flow operation with EVRC EVRC is a servo operated solenoid valve with a special diaphragm with built-in non-return valve. The valve is for use in liquid lines in refrigeration plants.

EVRC allows flow in both directions and can be used in liquid lines in refrigeration plants with hot gas or gas defrost.

During the refrigeration period EVRC works as a normal solenoid valve, while during defrost it allows the condensed liquid to return to the liquid manifold.

During the defrosting period the coil for EVRC must be energized.

2.2. Manual stem operation for EVR 6 - EVR 25 NC
EVR 6 - EVR 25 NC are available with optional manual stem operation to manually force the NC valve open when the coil is de-energized.

The protective cap should be removed and the manual stem (12) Design and material should be rotated until the valve is fully open. It takes approx. 6 cycles from fully closed, to reach the fully open position.

After manual operation is completed, the valve should manually be closed again and the protective cap mounted.

NOTE:
Alternatively, all EVR NC and NO valves can be manually operated by removing the coil and force the valve open or closed by using a solenoid valve tester (permanent magnet) code no. 018F0091.

Media

Refrigerants
R1234yf, R1234ze(E), R125, R134a, R152a, R22, R290, R32, R404A, R407C, R407F, R407H, R410A, R413A, R417A, R422A, R422B, R422D, R438A, R422A, R422B, R422D, R438A, R442A, R444B, R447A, R447B, R448A, R449A, R449B, R450A, R452A, R452B, R454A, R454B, R454C, R455A, R463A, R507A, R512A, R513A, R513B, R515A, R515B, R516A, R600, R600a.

For a complete list of approved refrigerants, visit store.danfoss.com and search for individual code numbers, where refrigerants are listed as part of technical data.

NOTE:
Special note for R1234yf, R1234ze, R152A, R290, R32, R444B, R452B, R454A, R454B, R454C, R455A, R516A, R600 and R600a: This product is validated in accordance to ATEX, ISO 5149, IEC 60335-2-24, IEC 60335-2-40 and UL. Ignition risk is evaluated in accordance to ISO 5149 and IEC 60335.

The EVR 2 – EVR 22 with solder connections and without manual stem can be applied on systems with R1234yf, R1234ze, R152A, R290, R32, R444B, R452B, R454A, R454B, R454C, R455A, R516A, R600 and R600a as the working fluid.

EVR 2-15 flare connections are only approved for A1 and A2L refrigerants

NOTE:
Excluded from this EVR 22 with connections 1 ⅜ inch / 35mm related to PED requirements.

The EVR 2-EVR 40 versions with solder and flare connection and without manual stem can be applied to oil-free systems : R1234ze(E)

EVR 2 - EVR 22 versions with solder and flare connections and without manual stem can be applied to oil-free systems R513A, R515B, R516A

NOTE:
EVR 2-22 (R516A) and EVR 2-40, R1234ze:
- Excluded from this EVR 22 - EVR 40 with connections 1 ⅜ inch / 35mm and larger connections related to higher PED requirements.

For countries where safety standards are not an indispensable part of the safety system Danfoss recommends the installer gets a third party approval of any system containing flammable refrigerant.

NOTE:
Please follow specific selection criteria stated in the datasheet for these particular refrigerants.

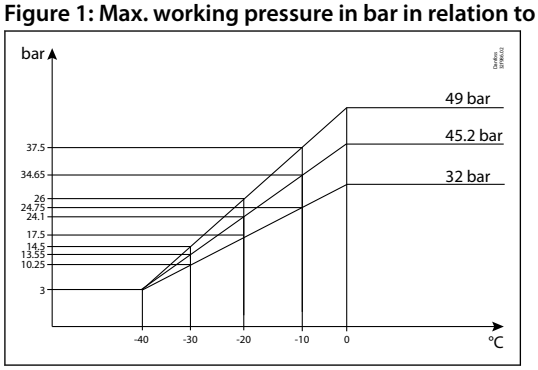
Media temperature
-40 – 105 °C, Max. 130 °C during defrosting
For R1234ze Media temperature: - 20 - 90 °C (105 °C for transient condition).

Product specification

Technical data

Ambient temperature and enclosure for coil
See separate data sheet for solenoid and ATEX coils.

Max. working pressure
Figure 1: Max. working pressure in bar in relation to media temperature in °C.



WARNING:
Special note for EVR PED version: The EVR 2 - EVR 22 versions with solder connections and without manual stem can be applied to 49 bar MWP.

NOTE:
Excluded from this EVR 22 with connections 1 ⅜ inch / 35 mm related to higher PED requirements.

Capacity
For K_v values refer to the tables in Ordering.
The K_v value of the water flow in [m^3/h] at a pressure drop across valve of 1 bar, ρ = 1000 kg/m^3.

See extended capacity tables on Coolselector®2.

Table 1: MOPD

Type	Opening differential pressure with standard coil Δp [bar]		
	Min.	Max. (= MOPD) liquid	
		AC coil [10 W]	DC coil [20 W]
EVR 2 NC	0.00	38	33
EVR 3 NC	0.00	38	18
EVR 4 NC	0.03	38	28
EVR 6 NC	0.03	38	28
EVR 6 NO	0.03	21	21
EVR 8 NC	0.03	38	28
EVR 10 NC	0.03	38	20
EVR 10 NO	0.03	21	21
EVR 15 NC	0.03	38	20
EVR 15 NO	0.03	21	21
EVR 18 NC	0.03	38	20
EVR 20 NC	0.03	38	20
EVR 20 NO	0.03	19	19
EVR 22 NC	0.03	38	20
EVR 22 NO	0.03	19	19
EVR 25 NC	0.2	38	17
EVR 32 NC	0.2	38	17
EVR 40 NC	0.2	38	17

NOTE:
For higher MODP 12 W and 20 W AC coils are available on request

Valve selection based on capacity calculation

As for extended capacity calculations and valve selection based on capacities and refrigerants, please refer to Coolselector®2. Rated and extended capacities are calculated with the Coolselector®2 calculation engine to ARI standards with the ASEREP equations based on laboratory measurements of selected valves.

Rated capacity [kW]

Table 2: Rated capacity [kW]

Type	R22/R407C	R134a	R404A/R507	R410A	R32	R290	R600a
Liquid							
EVR 2	3.02	2.79	2.04	2.96	4.23	3.36	3.38
EVR 3	5.43	5.02	3.68	5.32	7.61	6.05	6.09
EVR 4	13.68	12.66	9.26	13.41	19.17	15.23	15.33
EVR 6	17.90	16.56	12.12	17.55	25.09	19.93	20.07
EVR 8	21.32	19.73	14.44	20.90	29.88	23.74	23.90
EVR 10	37.62	34.80	25.47	36.88	52.71	41.88	42.17
EVR 15	57.93	53.60	39.23	56.79	81.18	64.49	64.94
EVR 18	75.84	70.16	51.36	74.35	106.26	84.43	85.01
EVR 20	120.29	111.29	81.46	117.93	168.56	133.92	134.85
EVR 22	137.19	126.92	92.90	134.49	192.23	152.73	153.79
EVR 25	149.23	138.06	101.06	146.30	–	–	–
EVR 32	254.97	235.89	172.66	249.96	–	–	–
EVR 40	368.74	341.15	249.71	361.49	–	–	–
Suction vapour							
EVR 2	0.33	0.24	0.29	0.42	0.54	0.41	0.23
EVR 3	0.60	0.44	0.52	0.75	0.96	0.73	0.41
EVR 4	1.51	1.10	1.32	1.90	2.43	1.85	1.03
EVR 6	1.98	1.44	1.72	2.48	3.18	2.42	1.35
EVR 8	2.35	1.71	2.05	2.96	3.78	2.88	1.60
EVR 10	4.15	3.02	3.62	5.22	6.67	5.09	2.83
EVR 15	6.40	4.65	5.57	8.03	10.28	7.83	4.36
EVR 18	8.37	6.09	7.30	10.52	13.45	10.26	5.70
EVR 20	13.28	9.66	11.57	16.68	21.34	16.27	9.04
EVR 22	15.15	11.02	13.20	19.02	24.34	18.55	10.31
EVR 25	16.33	11.79	14.25	20.58	–	–	–
EVR 32	27.90	20.14	24.35	35.16	–	–	–
EVR 40	40.35	29.12	35.21	50.85	–	–	–
Hot gas							
EVR 2	1.35	1.04	1.10	1.65	2.18	1.54	0.94
EVR 3	2.42	1.87	1.99	2.98	3.92	2.76	1.70
EVR 4	6.10	4.70	5.01	7.50	9.86	6.96	4.28
EVR 6	7.99	6.16	6.56	9.81	12.91	9.11	5.61
EVR 8	9.51	7.33	7.81	11.68	15.37	10.85	6.68
EVR 10	16.78	12.94	13.78	20.61	27.12	19.14	11.78
EVR 15	25.85	19.93	21.22	31.74	41.77	29.48	18.14
EVR 18	33.84	26.08	27.77	41.55	54.67	38.59	23.75
EVR 20	53.68	41.37	44.05	65.91	86.72	61.21	37.67
EVR 22	61.22	47.18	50.24	75.17	98.91	69.81	42.96
EVR 25	87.87	67.73	72.12	107.91	–	–	–
EVR 32	150.17	115.75	123.24	184.40	–	–	–
EVR 40	217.22	167.43	178.27	266.74	–	–	–

Rated liquid and suction vapor capacity is based on:

- vaporating temperature t_e = -10 °C
- liquid temperature ahead of valve t_l = 25 °C
- pressure drop in valve Δp = 0.15 bar

Rated hot gas capacity is based on:

- condensing temperature tc = 40 °C
- pressure drop across valve Δp = 0.8 bar
- hot gas temperature th = 65 °C
- subcooling of refrigerant Δtsub = 4 K

For other refrigerants, please refer to Coolselector®2

Design and material

Figure 2: EVR 2 - EVR 3 Solder and flare connection

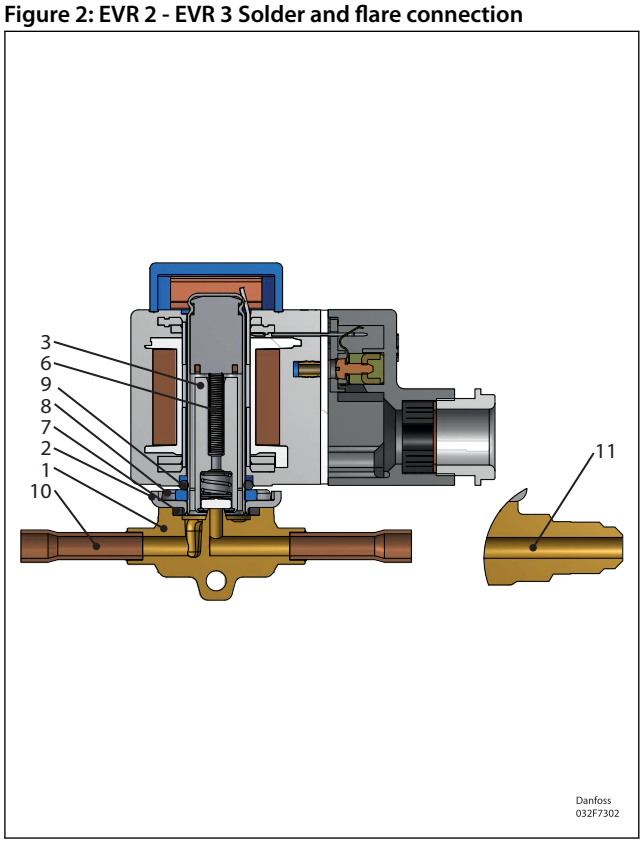


Figure 3: EVR 4 - EVR 6 - EVR 8 Solder and flare connection

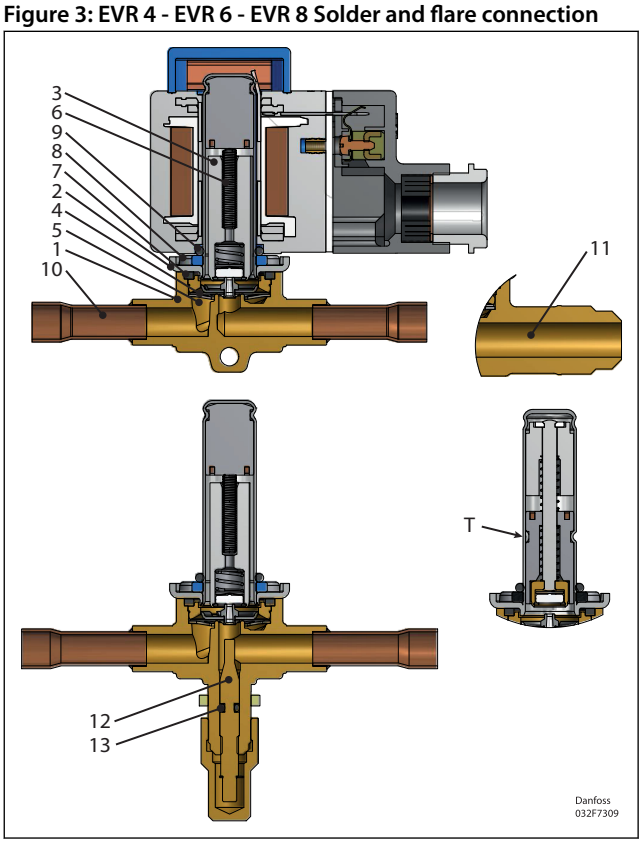


Table 3: Design and material for EVR 2, EVR 3, EVR 4, EVR 6, EVR 8

Pos. no.	Description	Material
1	Valve housing assembly	Brass
2	Cover	Stainless steel
3	Armature assembly	Stainless steel/PTFE
4	Diaphragm assembly	Stainless steel/PTFE
5	Support washer	Stainless steel
6	Armature spring	Stainless steel
7	Seal	Chloroprene rubber
8	Screws	Stainless steel
9	O-ring	EPDM rubber
10	Solder connection	Copper
11	Flare connection	Brass
12	Manual stem [1]	Brass
13	O-ring	Chloroprene rubber
T	Normally Open (NO) tube design	

[1] Manual stem is not available for EVR 4

Figure 4: EVR 10 Solder and flare connection

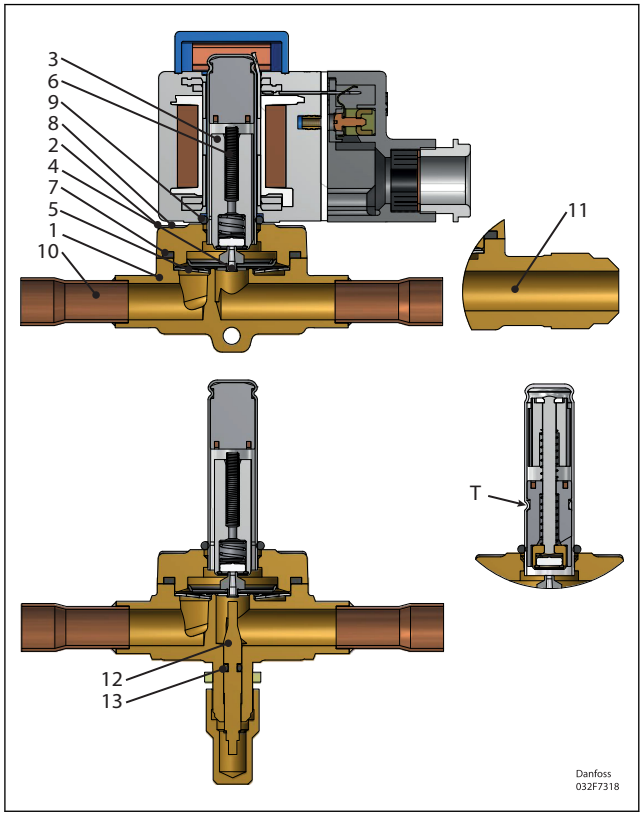


Figure 5: EVR 15 - EVR 18 Solder, flare, and flange

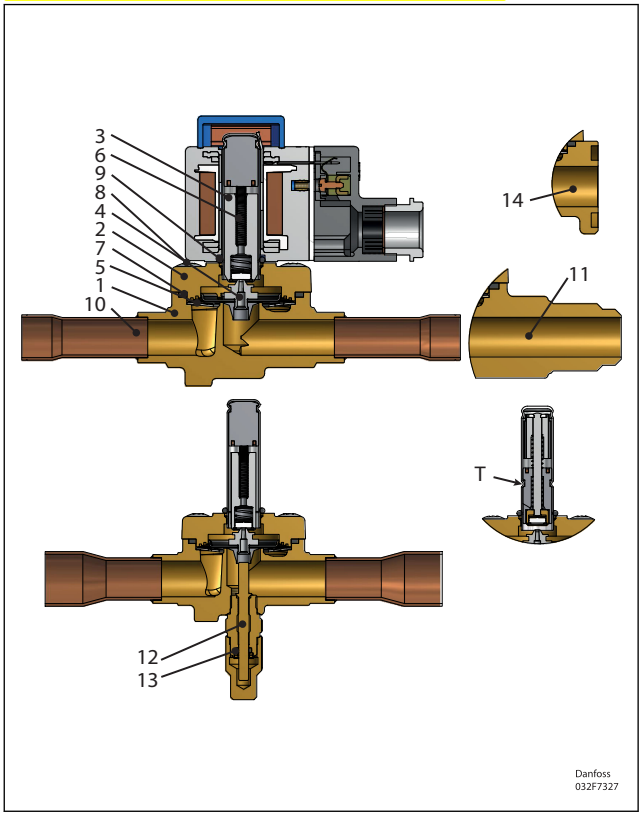


Table 4: Design and material for EVR 10, EVR 15, EVR 18

Pos. no.	Description	Material
1	Valve housing assembly	Brass
2	Cover	Stainless steel
3	Armature assembly	Stainless steel/PTFE
4	Diaphragm assembly	Stainless steel/PTFE
5	Support washer	Stainless steel
6	Armature spring	Stainless steel
7	Seal	Chloroprene rubber
8	Screws	Stainless steel
9	O-ring	EPDM rubber
10	Solder connection	Copper
11	Flare connection	Brass
12	Manual stem	Brass
13	O-ring	Chloroprene rubber
14	Flange connection	Brass
T	Normally Open (NO) tube design	

Dimensions and weights for EVR 15 - EVR 18 Solder connection

Figure 24: EVR and Cable coil

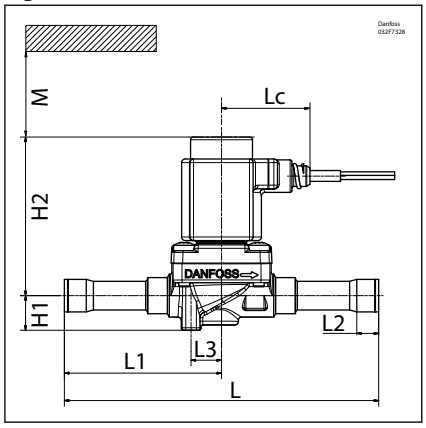


Figure 25: EVR and DIN plug coil

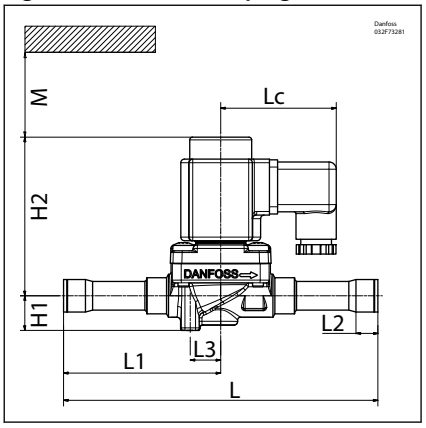


Figure 26: EVR and Terminal box coil

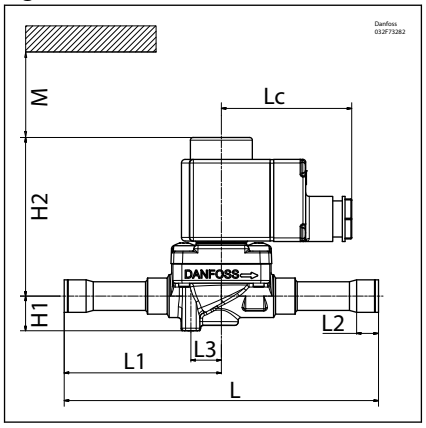


Figure 27: Manual stem

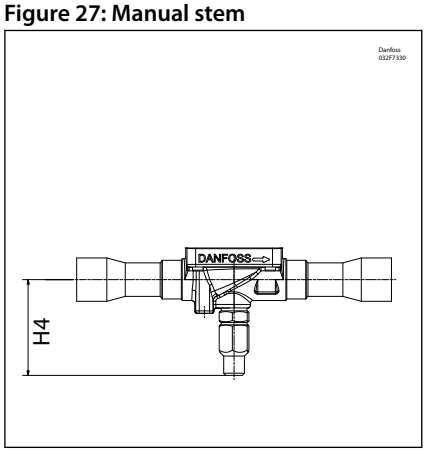


Figure 28: End view

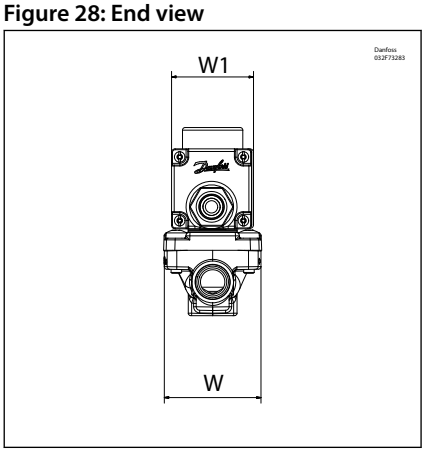


Table 10: Dimensions and weights for EVR 15 - EVR 18 Solder connection

Type	Connection		Manual operation	H1	H2	H4	M min.	L	L1	L2	L3	Lc	W	W1 max.	Net weight without coil[1]
	[in]	[mm]		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
Valve body															
EVR 15	5/8	16	Yes	19	89	54	65	174	87	12	17	–	56	–	0.7
	5/8	16	No	19	89	–	65	174	87	12	17	–	56	–	0.7
	7/8	22	No	19	89	–	65	174	87	17	17	–	56	–	0.7
EVR 18	7/8	22	Yes	19	89	54	65	179	89.5	17	17	–	56	–	0.7
Coil															
Cable coil												49	–	46	–
DIN plug coil												64	–	47	–
Terminal box coil 10 W												72	–	47	–
Terminal box coil 12 / 20 W												80	–	68	–

[1] Net weight of coil for 10 W is approx. 0.3 kg and for 12 and 20 W is approx. 0.5 kg

For 3D CAD models on individual code numbers visit store.danfoss.com

Ordering

Ordering EVR solder connection, Normally Closed (NC) - separate valve bodies

Figure 79: EVR 2 / EVR 3

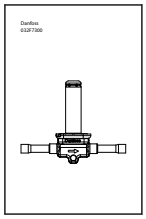


Figure 80: EVR 4 / EVR 6 / EVR 8

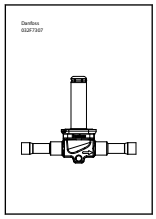


Figure 81: EVR 10

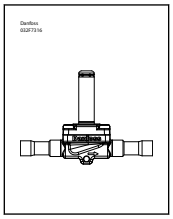


Figure 82: EVR 15 / EVR 18 / EVR 20 / EVR 22

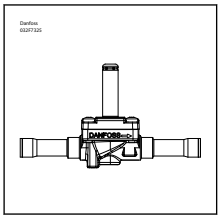


Figure 83: EVR 25

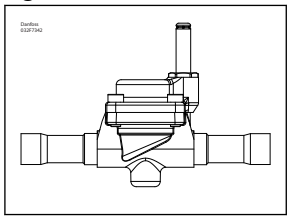


Figure 84: EVR 32 / EVR 40

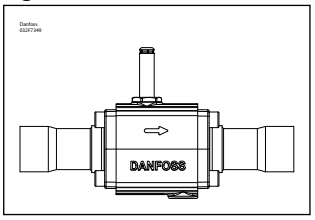


Table 21: Ordering EVR solder connection, Normally Closed (NC) - separate valve bodies

Type	Coil voltage	Connection size		Manual operation	K_v value	Code no.
		[in]	[mm]		[m^3/h]	
EVR 2	AC / DC	1/4	–	No	0.15	032F1201
	AC / DC	1/4	–	No	0.15	032F7100
	AC / DC	–	6	No	0.15	032F1202
EVR 3	AC / DC	1/4	–	No	0.26	032F1206
	AC / DC	3/8	–	No	0.26	032F1204
	AC / DC	–	6	No	0.26	032F1207
	AC / DC	–	10	No	0.26	032F1208
EVR 4	AC / DC	3/8	–	No	0.7	032L7110
EVR 6	AC / DC	3/8	–	No	1.0	032L1212
	AC / DC	3/8	–	Yes	0.87	032L7116
	AC / DC	–	10	No	1.0	032L1213
	AC / DC	–	12	No	1.0	032L1236
	AC / DC	1/2	–	No	1.0	032L1209
	AC / DC	1/2	–	Yes	0.87	032L7144
	AC / DC	5/8	–	No	1.0	032L7117
EVR 8	AC /DC	1/2	–	No	1.15	032L7121
	AC / DC	1/2	–	Yes	1.09	032L7148
	AC / DC	5/8	–	No	1.15	032L7122
EVR 10	AC / DC	3/8	–	No	1.56	032L7125
	AC / DC	–	12	No	2.2	032L1218
	AC / DC	1/2	–	No	2.2	032L1217
	AC / DC	1/2	–	Yes	2.2	032L1188
	AC / DC	5/8	16	No	2.2	032L1214
	AC / DC	5/8	–	Yes	2.2	032L7149
EVR 15	AC / DC	5/8	16	No	3.3	032L1228
	AC / DC	5/8	16	Yes	3.3	032L1227
	AC / DC	7/8	22	No	3.3	032L1225
EVR 18	AC / DC	7/8	–	Yes	3.9	032L1004
EVR 20	AC / DC	7/8	–	No	6.0	032L1240
	AC / DC	7/8	–	Yes	6.0	032L1254
	AC / DC	1 1/8	–	No	6.0	032L1244
	AC / DC	–	28	No	6.0	032L1245

Certificates, declarations, and approvals

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

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

Table 29: Certificates, declarations, and approvals

Document name	Document type	Document topic	Approval authority
MH7648	Electrical - Safety Certificate		UL
TAA0000085 Rev. 2	Marine - Safety Certificate		DNV GL
RMRS 18.10006.262	Marine - Safety Certificate		RMRS

ENGINEERING
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