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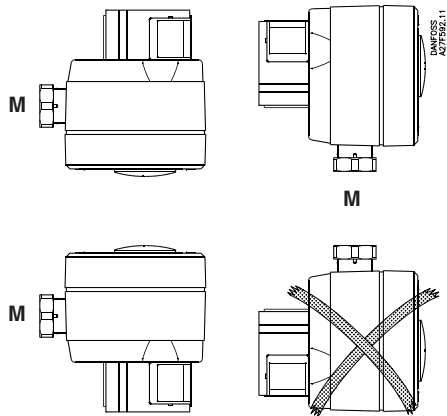
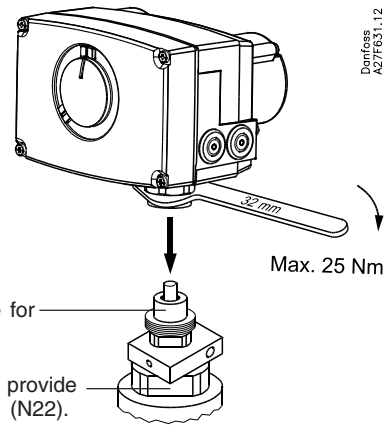


Fig. 1 M = motor spindle



Distance piece for MEV 80 only.

Use this nut to provide counter torque (N22).

Fig. 2

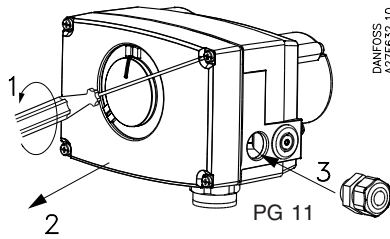
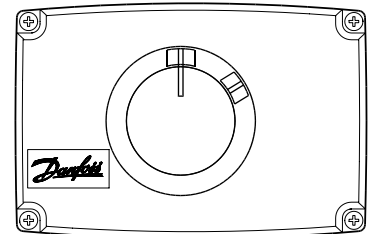
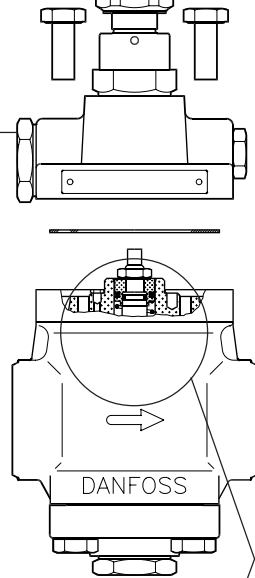


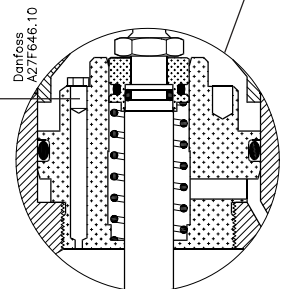
Fig. 3 Isolate power supply before removing cover.



Remove plug and substitute with EVM pilot



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Remove drain plug

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Fig. 6

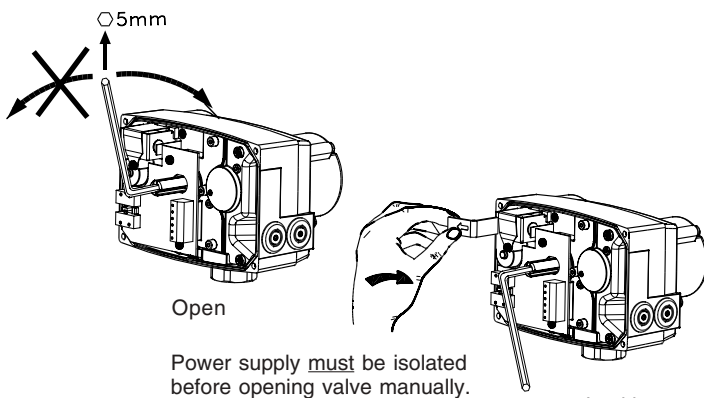


Fig. 4

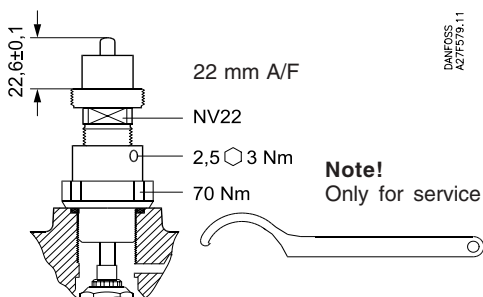


Fig. 5

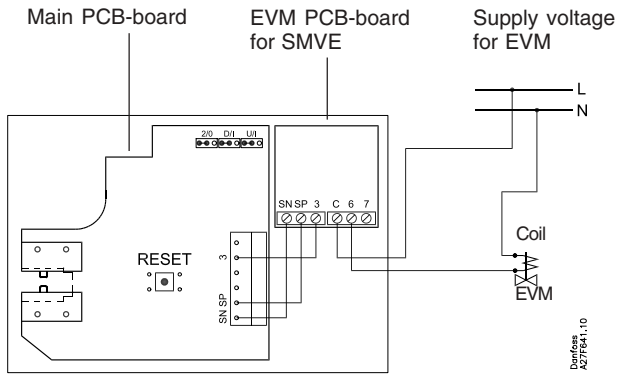


Fig. 7

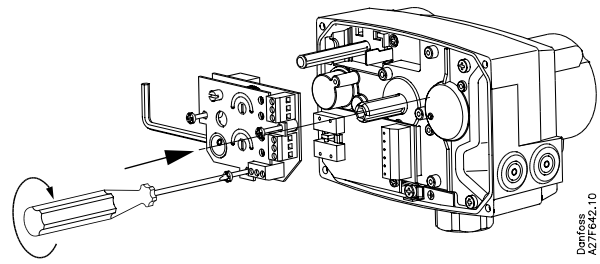


Fig. 8

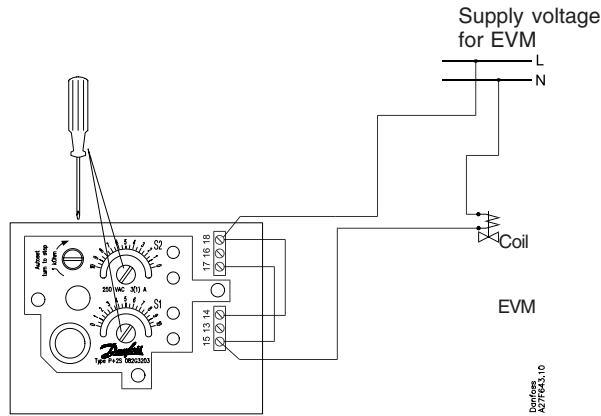


Fig. 9

Push pin seal assembly

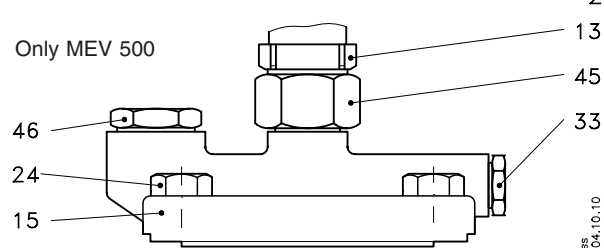
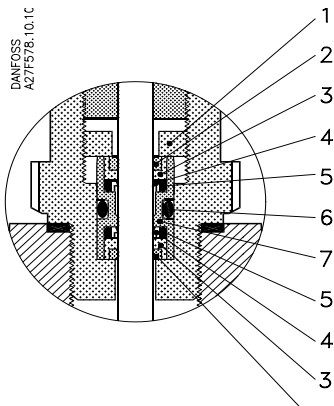
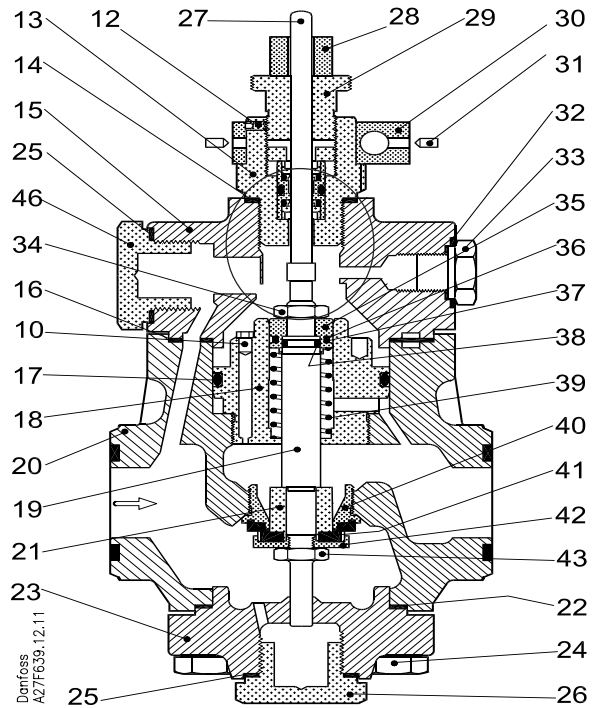


Fig. 10



ENGLISH

- | | | | |
|------------------|--------------------|---------------------------------|--------------------------|
| 1 Nut | 15 Top cover | 26 Bottom plug | 36 Piston seal |
| 2 Dirt seal | 16 Gasket | 27 Push pin | 37 O-ring |
| 3 Bush | 17 O-ring | 28 Distance piece (MEV 80 only) | 38 O-ring |
| 4 Seal | 18 Cylinder liner | 29 Adjusting screw | 39 Spring |
| 5 O-ring | 19 Spindle | 30 Heating element housing | 40 Valve seat |
| 6 O-ring | 20 Valve body | 31 Locking screw | 41 Sealing disc |
| 7 Insert | 21 Regulating cone | 32 Gasket | 42 Valve plate |
| 10 Drain plug | 22 Gasket | 33 Blanking plug | 43 Nut |
| 12 Locking screw | 23 Bottom cover | 34 Nut | 45 Nipple (MEV 500 only) |
| 13 Nipple | 24 Bolt | 35 Balancing piston | 46 Blanking plug |
| 14 Gasket | 25 Gasket | | |

EVM solenoid kit for MEV motor valve

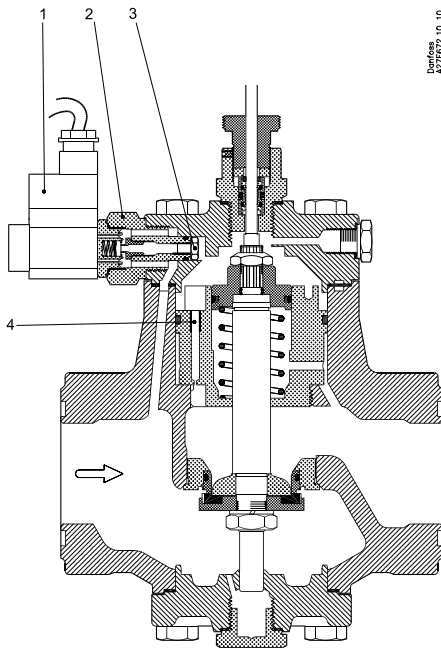
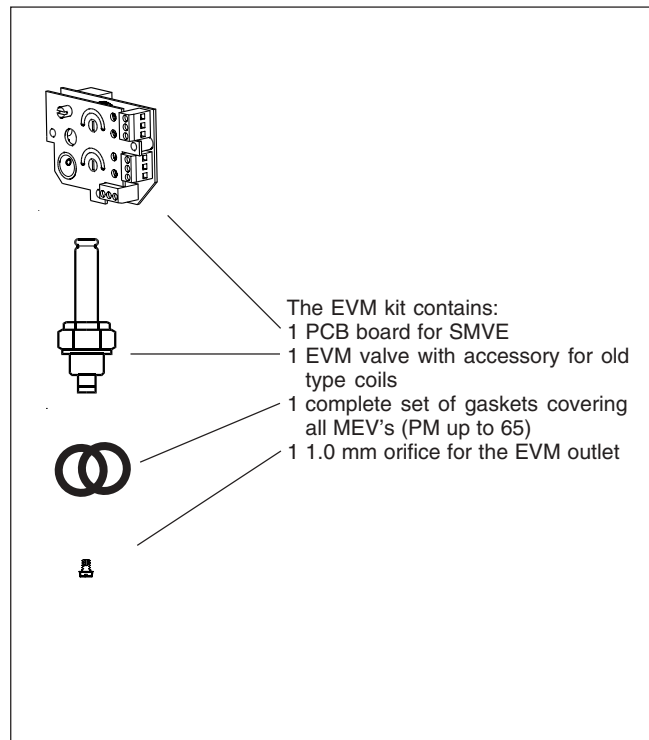


Fig. 11

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- 1 Coil according to motor power supply
- 2 EVM NC
- 3 1.0 mm orifice inserted
- 4 Blind screw (removed)



All MEV valves can be fitted with an EVM kit. The function of the kit is to either:

1. increase the closing forces of the valve during standstill. Please refer to "MEV with EVM solenoid valve" (page 6) for further explanation of the installation.
2. or to balance orifices in MEV sizes 125-500 to make the MEV close at high differential pressures. The EVM kit must be fitted with a 1.0 mm orifice (pos. 3) if the differential pressure exceeds 10 bar. MEV 80 does not need an EVM kit for this purpose. Please refer to the table in the technical leaflet regarding differential pressure and sizes.

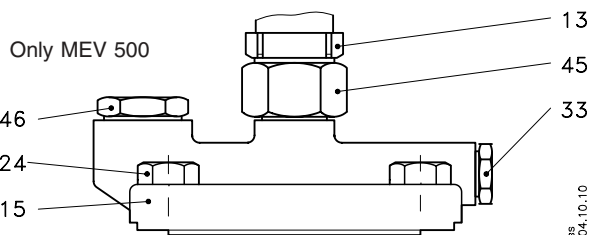
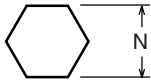
The content of the kit has been extended with the orifice as from now. Previous EVM kits (before 15th October, 2002) do not comprise an orifice.

Fig. 11 shows how the orifice is fitted into the outlet of the EVM. It is very important that the blind screw (pos. 4) closing the channel going from the top to the outlet side is removed to form a balance with the orifice in the EVM. The EVM kit has no function if the blind screw is not removed.

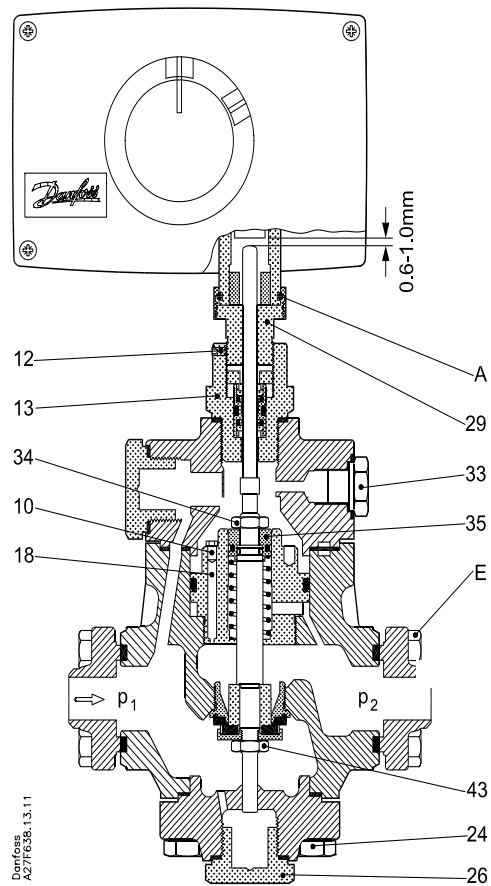
Care should be taken to install the EVM kit correctly, especially the wiring and connection inside the motor. The coil (pos. 1) is adding additional load on the power supply and especially for 24 VAC it should be checked that a surplus in the supply is present.

SMV/SMVE motor spindle speed at:

50 Hz	3 s/mm
60 Hz	2.4 s/mm



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Pos.	MEV 80				MEV 125				MEV 200				MEV 300				MEV 500			
	T	M	N	L	T	M	N	L	T	M	N	L	T	M	N	L	T	M	N	L
A	M 30 × 1.5	25	32	-	M 30 × 1.5	25	32	-	M 30 × 1.5	25	32	-	M 30 × 1.5	25	32	-	M 30 × 1.5	25	32	-
E	M 12 × 1.75	60	18	45	M 12 × 1.75	60	18	45	M 12 × 1.75	60	18	45	M 14 × 2	80	21	65	M 14 × 2	80	21	70
12	M 5	3	X	5	M 5	3	X	5	M 5	3	X	5	M 5	3	X	5	M 5	3	X	5
13	M 24 × 1.5	70	S	12	M 24 × 1.5	70	S	12	M 24 × 1.5	70	S	12	M 24 × 1.5	70	S	12	M 24 × 1.5	70	S	12
18	M 39 × 1.5	60	S	-	M 48 × 1.5	100	S	-	M 52 × 2	100	S	-	M 64 × 2	100	S	-	M 80 × 2	100	S	-
24	M 10 × 1.5	45	16	30	M 10 × 1.5	45	16	30	M 12 × 1.75	60	18	35	M 12 × 1.75	60	18	35	M 14 × 2	80	21	40
26	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-
29	M 20 × 1	-	22	-	M 20 × 1	-	22	-	M 20 × 1	-	22	-	M 20 × 1	-	22	-	M 20 × 1	-	22	-
31	-	-	X	-	-	-	X	-	-	-	X	-	-	-	X	-	-	-	X	-
33	R 1/2	30	19	12	R 1/2	30	19	12	R 1/2	30	19	12	R 1/2	30	19	12	R 1/2	30	19	12
34	M 10 × 1.5	30	16	-	M 10 × 1.5	30	16	-	M 10 × 1.5	30	16	-	M 10 × 1.5	30	16	-	M 10 × 1.5	30	16	-
35	-	-	18	-	-	-	18	-	-	-	18	-	-	-	18	-	-	-	18	-
43	M 10 × 1.5	30	16	-	M 12 × 1.75	40	18	-	M 12 × 1.75	40	18	-	M 16 × 2	50	24	-	M 16 × 2	60	24	-
45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M 24 × 1.5	70	36	-
46	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 24 × 1.5	50	36	-	M 20 × 1.5	50	36	-

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- T Thread
- M Torque
- N Span of jaws, width across flats (A/F)
- L Length of screw
- S Special key needed
- X Hexagonal key needed

Installation

Refrigerants

Applicable to all common non-flammable refrigerants, including R717 and non-corrosive gases/liquids dependent on sealing material compatibility. Flammable hydrocarbons are not recommended. The valve is only recommended for use in closed circuits. For further information please contact Danfoss.

Temperature range

MEV: -60/+120°C (-76/+248°F)

Pressure range

MEV: The valves are designed for a max. working pressure of 28 bar g (406 psi g).

Design

MEV is a balanced valve which is held closed by a built-in spring.

Depending on the control signal requirement, a SMV or SMVE motor can be fitted to open the valve by acting on the valve push pin.

Valve cone

A V-port cone provides optimum regulation accuracy.

Push pin seal assembly

Replaceable seal assembly in stainless steel with double sealing system.

Valve sizes

MEV is available in sizes from MEV 80-2 (k_v : 0.6 m³/h) to MEV 500 (k_v : 23.0 m³/h)

Installation

MEV + SMV/SMVE can be installed in vertical or horizontal pipelines (with motor upwards when mounted horizontally) (fig. 1).

The top cover of the MEV can be turned 90° in any direction without any influence on the valve function.

The MEV valve must be installed with the arrow in the direction of flow. When installing an MEV, refrigerant must not be allowed to escape and dirt must not be allowed to enter the valve. If the temperature of the medium flowing through the valve is less than 0°C a spindle heater must be used.

The valve is designed to withstand a high internal pressure. However, the piping system should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion. It must be ensured that the valve is protected from pressure transients like "liquid hammer" in the system.

The valve can be fitted with an AKS 45 electronic position indicator (available as an accessory).

Assembled motorised valve

The motorised valve must not be installed with the push pin (27) vertically downwards and the SMV/SMVE motor actuator spindle vertically upwards (fig. 1). Secure the SMV/SMVE motor on the neck of the MEV motorised valve with a union nut (32 mm A/F) (max. 25 Nm) using the adjusting screw (22 mm A/F) to provide counter torque (fig. 2).

Technical data

The MEV can be used in suction, liquid, hot-gas and liquid/vapour lines.

The MEV regulates the flow of the medium by modulation or on/off function, depending on the control impulse to the motor.

Function

MEV incorporates a balancing piston (35) that ensures the valve operates with low opening and closing forces. Therefore, the differential pressure across the valve has minimal effect on the valve opening and closing forces.

Inlet pressure P_1 acting on the underside of the regulating cone (21) is led via internal channels in the valve body to the top of the balancing piston. The pressure on the underside of the regulating cone is thus equalised.

In the same way, outlet pressure P_2 , which acts on the top of the regulating cone, is led via an internal channel to the underside of the balancing piston.

The balancing piston operates in a cylinder liner (18) and is fitted with a sealing ring for tight sealing.

MEV is fitted with a spring (39) that closes the valve when the push pin (27) is not activated. The SMV/SMVE motor is fitted with a return spring that forces the motor spindle closed when no voltage is being applied to the motor. This means that the MEV valve closes automatically when, for example, the power fails. (This is a standard function of the SMV/SMVE motor, but can be disconnected, by using the angle bracket accessory, fig. 4).

The valve is fitted with a spindle for manual opening.

NOTE!

Distance piece must be used for MEV 80 (fig. 2).

When the valve is closed there is 0.6 - 1.0 mm clearance between the SMV/SMVE motor actuator spindle and the MEV motorised valve push pin.

MEV valves are kept closed by a built-in spring.

Power supply **must** be isolated before opening valve manually!

An AKS 45 position indicator can be fitted instead of the MEV bottom plug (26). An output signal (4 - 20 mA) of the exact position of the valve cone can be obtained during operation, together with digital on/off signals for fully open and fully closed valve.

A heating element can be fitted on the MEV valve neck to keep the pressure pin free of ice (for use with media temperatures under 0°C).

MEV has a pressure gauge connection (33) for registering valve inlet pressure P_1 .

Delivery

MEV valves are supplied with flange gaskets and flange bolts. Flanges, motor, and spindle heater if required, are supplied separately.

Welding

If using welding flanges, only materials and welding methods, compatible with the flange material must be welded to the flanges. The flanges should be cleaned internally to remove welding debris on completion of welding and before the valve is inserted.

The valve housing and flanges must be free from stresses (external loads) after installation.

MEV valves must not be mounted in systems where the outlet side of the valve is open to atmosphere. The outlet side of the valve must always be connected to the system or properly capped off, for example with a welded-on end plate.

Manual operation

SMV/SMVE can be operated manually as follows (**NB! Power supply must be isolated before opening valve manually!**):

1. Isolate the SMV/SMVE power supply.
2. Loosen the four screws in the cover (Fig. 3).
3. SMV/SMVE can be operated manually using a 5 mm hex. key and a strip of cardboard (supplied with SMV/SMVE on delivery) (fig. 4). Insert the key in the plastic spindle and turn it clockwise to open the valve. The valve position can then be locked by inserting the cardboard strip as shown in fig. 4.
4. When the cardboard strip is removed the spring return system will always automatically close the valve, provided the SMV/SMVE remains isolated from the power supply.

Insulation

If a spindle heater is fitted it must be outside the insulation material.

Colours and identification

The MEV valves are Zinc-Chromated in the factory. If further corrosion protection is required, the valves can be painted. Precise identification of the valve is made via the ID plate on the top cover. The external surface of the valve housing must be prevented against corrosion with a suitable protective coating after installation and assembly.

Protection of the ID plate when repainting the valve is recommended.

Maintenance

Service

A precise service schedule cannot be given for the valve as service intervals will depend on operating conditions, i.e. how often the valve operates and the amount of impurities and dirt the system carries.

The MEV valves are easy to dismantle and most of its parts are replaceable. When the bottom cover is removed, the strainer can be taken out for cleaning. Do not open the valve while the valve is still under pressure.

- Check that the O-ring has not been damaged.
- Check that the spindle is free of scratches and impact marks.
- If the teflon ring has been damaged, the parts must be replaced.

Push pin seal assembly

The MEV valve seal assembly can only be replaced as a unit; it cannot be dismantled for repair. The spindle seal of a new MEV valve is adjusted at the factory and locked with two locking screws (pos. 12) to ensure the distance between the MEV push pin and the SMV/SMVE motor thrust pad is correct. This adjustment must be made when the seal is replaced.

Replacement of push pin seal assembly (Fig. 5)

1. Relieve pressure on the MEV valve and evacuate refrigerant in accordance with authority requirements.
2. Remove the SMV/SMVE motor, and spindle heater if fitted.
3. Remove the seal by loosening the complete seal housing (pos. 13) with the special key from the seal spare parts set.
4. Fit a new seal assembly and tighten the

complete seal housing (pos. 13) with a torque of 70 Nm. This corresponds to turning it 15 degrees = 1/24 of a turn after finger tightening.

Adjustment of push pin assembly

The push pin must be adjusted so that the height in relation to the seal housing (pos. 13) is correct.

1. Loosen the locking screws (pos. 12) and turn the adjusting screw (pos. 29) until the height of the push pin (pos. 27) is 22.6 +/-0.1 mm above the adjusting screw.
2. Lock the adjusting screw by tightening the locking screws with a torque of 3 Nm.

Replacement of complete MEV-spindle assembly

When servicing the valve the complete spindle assembly must be replaced, i.e. the spindle (pos. 19), balancing piston (pos. 35), piston seal (pos. 36), O-ring (pos. 37), and valve plate (pos. 42).

1. Relieve pressure on the MEV valve and evacuate refrigerant in accordance with authority requirements.
2. Remove the SMV/SMVE motor, and spindle heater if fitted.

3. Screw off the MEV valve top and bottom covers.
4. Remove the top nut on the spindle (pos. 34) using the balancing piston (pos. 35, 18 mm A/F) to provide counter torque (see "Note").
5. Withdraw the spindle from the bottom of the valve.
6. Take the balancing piston (pos. 35) including piston seal out of the top of the valve.
7. Lubricate the valve internal cylinder with refrigeration machine oil.
8. Insert the new spindle into the housing, from below.
9. Insert the new balancing piston (pos. 35) incl. piston seal in the valve, from above (be careful not to damage the seals during assembly as these must be provide a complete seal during operation).
10. Assemble remaining valve parts in the reverse order to dismantling.

Note! Do not use the nut (pos. 43) to provide counter torque. The valve can only be expected to close tightly if all parts that

comprise a "complete spindle assembly" are replaced at the same time, and the degree of tightening of the nut (pos. 43) holding the valve plate (pos. 42) against the regulating cone (pos. 21) is not changed.

If it becomes necessary, the cylinder liner with O-ring (pos. 18 and 17) for the balancing piston can be changed, but this is not considered to be a part of normal servicing. Special tools have to be made for cylinder replacement. The old cylinder must be screwed out and the new one tightened using the correct torque (MEV 80: 60 Nm, MEV 125 - 500: 100 Nm).

Use only original Danfoss parts, including packing glands, O-rings and gaskets for replacement. Materials of new parts are certified for the relevant refrigerant.

In cases of doubt, please contact Danfoss. Danfoss accepts no responsibility for errors and omissions. Danfoss Industrial Refrigeration reserves the right to make changes to products and specifications without prior notice.

MEV with EVM solenoid valve

The MEV can be fitted with an optional EVM (NC) solenoid valve. EVM provides ON/OFF control and is screwed in directly to the MEV. The EVM provides security against refrigerant leakage through the valve, when the MEV is in the closed position.

EVM is controlled directly by the relevant motor, either SMV or SMVE.

EVM can also be fitted in an existing MEV installation equipped with either motor type.

If an EVM is required it must be ordered separately. The EVM kit used is specific to the motor type used, either SMV or SMVE and must be ordered accordingly.

The EVM kit will always contain the parts mentioned below:

- EVM, NC
- EVM PCB-board (EVM PCB-board for SMVE or EVM PCB-board for SMV).

The EVM will always be of NC type, i.e. the EVM must be delivered as "Normally Closed" execution so there will be no flow through the EVM valve if the power supply to the coil is isolated.

Important:

The coil is not included in the EVM kit. This must be ordered separately according to the voltage used.

Mechanical assembly

To make the EVM solenoid valve operational an orifice inside MEV must be removed before further assembly commences.

Assembly procedure:

1. Isolate and remove motor.
2. Remove top cover.
3. Remove small screw from the cylinder liner (pos. 18).
4. Replace top cover gasket (pos. 16).
5. Reposition and mount top cover (refer to table page 5 for torque).
6. Remove blanking plug (pos. 46).

7. Mount EVM (32 mm wrench, 50 Nm torque).
8. Mount correct coil (check voltage!). Reposition and mount motor (see front page).
9. Open motor and fit electric EVM PCB-board (see "Electrical assembly" below).
10. Install cabling between coil and motor (see "Electrical assembly" below).
11. Reconnect power supply to motor.

Electrical assembly

The EVM valve should always be controlled from the chosen motor type, either SMV or SMVE.

SMVE

1. Disconnect voltage supply to SMVE.
2. Remove SMVE cover.
3. Install the EVM PCB-board for SMVE by the side of the main PCB-board and fasten it with the accompanying screws (fig. 7).
4. Make the connection between main PCB-board and EVM PCB-board (terminals SN, SP and 3).
5. Make the cable connection between EVM PCB-board and SMVE (terminals C and 6), mount EVM coil and connect general voltage supply. Remember to check power supply and coil voltage.
6. Remount SMVE cover.
7. Reconnect voltage supply to SMVE and EVM coil (can be same voltage).

Check

When SMVE is in its extreme top position (MEV is completely closed) EVM must be OFF. That is to say, voltage to EVM must be cut off.

When SMVE is in a position other than top, EVM must be ON. That is to say, voltage for EVM must be connected.

EVM is controlled by the EVM PCB-board for SMVE.

SMV

1. Disconnect voltage supply to SMV.
2. Remove SMV cover.
3. Install the EVM PCB-board for SMV by the side of the main PCB-board and fasten it with the three accompanying screws. A hexagon key, must be used to secure the EVM PCB-board mechanically to the rotating plastic spindle on SMV (fig. 8).
4. With SMV in its top position, turn S1(on EVM PCB-board for SMV) counter clockwise until disconnection is just made between terminals 15 and 14. After this, due to tolerance it must be turned a little bit more counter clockwise (fig. 9).
5. Now bring the SMV motor manually (see SMV instructions if necessary) to a position where S1 indicator on EVM PCB-board for SMV is at approx. 12. In this position, turn S2 (on EVM PCB-board for SMV) counter clockwise until connection is just made between terminals 17 and 18.
6. Make the connection between terminals 15 and 17 and between terminals 14 and 18 on EVM PCB-board for SMV.
7. Make the cable connection between EVM PCB-board and SMV (terminals 15 and 18), mount EVM coil and connect general voltage supply. Remember to check power supply and coil voltage.
8. Remount SMV cover.
9. Reconnect voltage supply to SMV and EVM coil (can be same voltage).

Check

When SMV is in its extreme top position (MEV is completely closed) EVM must be OFF. That is to say, voltage to EVM must be cut off.

When SMV is in a position other than top, EVM must be ON. That is to say, voltage for EVM must be connected.

EVM is controlled by the EVM PCB-board for SMV.

DECLARATION OF CONFORMITY
The Pressure Equipment Directive 97/23/EC



Name and Address of Manufacturer within the European Community

Danfoss Industrial Refrigeration A/S
Stormosevej 10
PO Box 60
DK-8361 Hasselager
Denmark

Declaration

We hereby declare that below-mentioned equipment are classified for Fluid Group I (all refrigerants (toxic, non-toxic, flammable and non-flammable)), and that all are covered by Article 3, paragraph 3.

For further details / restrictions - see Installation Instruction

Description of Pressure Equipment

Refrigerant main regulating valves
Type **PM, PMC, PMFH, PMFL, MRV, MEV**

Nominal bore **DN ≤ 25 mm.** (1 in)

References of other Technical Standards and Specifications used

prEN 12284 DIN 3158
EN 1563 AD-Merkblätter

Authorised Person for the Manufacturer within the European Community

Name: Morten Steen Hansen **Title:** Production Manager

Signature: Morten Steen Hansen **Date:** 31/01/2002

148B9715 - rev. 1

DECLARATION OF CONFORMITY
The Pressure Equipment Directive 97/23/EC



Name and Address of Manufacturer within the European Community

Danfoss Industrial Refrigeration A/S
Stormosevej 10
PO Box 60
DK-8361 Hasselager
Denmark

Description of Pressure Equipment

Refrigerant main regulating valves
Type PM, PML, PMLX, PMFH, PMFL, MRV, MEV

Nominal bore	DN32-150 mm (1/4 - 6 in.)	
Classified for	Fluid Group I (all refrigerants (toxic, nontoxic, flammable and nonflammable)). For further details / restrictions - see Installation Instruction.	
Temperature range	All	-60°C (-76°F) to 120°C (248°F)
Maximum allowable working pressure		28 bar (406 psi)

Conformity and Assessment Procedure Followed

Category	II	III
Module	D1	B1+D
Certificate ID	D1: 07 202 0511 Z 0009/1/H-0002	B1: 07 202 0511 Z 0074/1/H-0001 D: 07 202 0511 Z 0009/1/H-0001
Nominal bore	DN 32-125 mm (1/4-5 in)	DN150 mm (6 in)

Name and Address of the Notified Body which carried out the Inspection

TÜV-Nord e.V.
Grosse Bahnstrasse 31
22525 Hamburg, Germany



Name and Address of the Notified Body monitoring the Manufacturer's Quality Assurance System

TÜV-Nord e.V.
Grosse Bahnstrasse 31
22525 Hamburg, Germany

References of Harmonised Standards used

References of other Technical Standards and Specifications used

prEN 12284 DIN 3158
EN 1563 AD-Merkblätter

Authorised Person for the Manufacturer within the European Community

Name: Morten Steen Hansen **Title:** Production Manager

Signature: Morten Steen Hansen **Date:** 31/01/2002