

Mini-Diaphragm vacuum pump(dry-running)

Type VP-TF4.2-24V-0,05kW

Article- no.: 1.41.2.0043

Read carefully before starting the vacuum pump!



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Mini-Diaphragm vacuum-pump

The following tips will help you operate this high quality product safely, and reliably over a long period of time. Carefully study the operating and installation instructions before using the pumps and observe at all times the relevant instructions to avoid dangerous situations.

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1. Concept and areas of use

The Mini Diaphragm Vacuum Pumps from Fezer are based on a simple principle – an elastic diaphragm, fixed on its edge, moves up and down its central point by means of an eccentric. In this way the medium is transferred using automatic valves.

The pumps are equipped with the patented stress-optimised structured diaphragm, resulting in a high pneumatic performance, a durable product and compact size. Special valves ensure that the product can cope easily with vapour and condensation.

Thanks to the Fezer modular system, the parts used to transfer the gases can be made from materials with varying degrees of durability. The pump is driven by a DC motor.

Features:

The pumps transfer and evacuate 100% oil-free. In operation they are gas-tight, and maintenance-free.

The pumps are fitted with thermal switch to protect against overloading

Very quiet and little vibration.

Copes well with vapour and condensation

Cool running motor even when in constant use

Can operate in any installed positions.

1.1. Electrical Equipment

See the motor-plate for full electrical data.

Protection class of standard versions is IP00

1.2. Operating Conditions

Handling air, gases, and vapours at temperatures between
+ 5 °C + 40 °C.

For maximum permissible operating pressure, ultimate vacuum, and flow capacity see section 10.

The pumps must not be used in areas where there is a danger of explosion.

The pumps are not suitable for aggressive media. For aggressive media there are other pumps in the KNF product programme - please ask us for detail.

For vacuum pumps, the exhaust gases must be safely disposed.

Before pumping a medium, the compatibility of materials of pump head, diaphragm and valves with the medium must be checked (for pump materials: section 10).

The pumps must not be used for liquids.

If your potential application lies outside the above limits discuss it with our technical adviser.

1.3. Ambient Conditions

When the pump is operating the following ambient conditions must be maintained:

- Ambient temperature during operation: between + 5 °C + 40 °C.
- The pumps must not be used in areas where there is a danger of explosion.
- The pumps must be protected from the effects of dust and water.

During operation an adequate supply of air for cooling must be provided

1.4. Pump Materials

See section 10.

2. Safety

The pumps have no protection against water. In this case, as far as is relevant, measures to protect the pump must be taken before putting it into service.

Note that the pumps may only be used for their intended purpose.

The pumps must not be used in areas where there is a danger of explosion.

The pumps are not suitable for aggressive media.

Components connected to the pump must be designed to withstand the pneumatic performance of the pump.

For vacuum pumps, the exhaust gases must be safely disposed.

Take care that safety regulations are observed when connecting the pump to the electricity supply.

For pumps with a thermal switch: When the operation of the pump is interrupted by the thermal switch, the pump will re-start automatically after cooling down. Take all care necessary to prevent this leading to a dangerous situation.

Specific safety instructions for the media being handled must be observed.

Use only original Fezer spare parts.

The pumps conform to the safety regulations of the EC Low Voltage Directive 2004/108/EC concerning Electromagnetic Compatibility and to the safety regulations contained in the EC Low Voltage Directive 2006/95/EC.

3. Installation

The pumps are OEM models intended for installation in equipment. When installing them make certain that accident prevention regulations, and safety instructions, including those for subsequent operation are observed. The safety instructions must be observed.

Mechanical	<p>The dimensions of the mountings are given in Data Sheet.</p> <p>Install the pump so that the fan can draw in sufficient cooling air.</p> <p>For pumps with fan: Install the pump so as accidental finger contact is with the fan is impossible.</p> <p>the pump at the highest point in the system, so that condensate cannot collect in the head of the pump - that prolongs working life.</p>
Electrical	<p>When making the electrical installation the safety regulations must be observed. In particular make sure that the electricity supply is isolated before trying to connect the pump.</p> <p>Compare the supply data with the data on the motor-plate. The voltage must not vary by more than +10 % and –10 % from that shown on the type-plate.</p> <p>With dc motors the wires must be connected to the correct poles.</p> <p>In the electrical installation, arrangements (complying with EN 60335-1) must be made for disconnecting the pump motor from the electrical supply.</p> <p>The pump must be installed so that contact with live parts (connection, possibly windings) is impossible.</p>
Pneumatic	<p>Remove the protection plugs from the port threads.</p> <p>The accessories silencer, and hose connectors (if existing) are screwed into the port threads.</p>

Connect the suction and pressure lines. For flow direction see marking on the pump head or data sheet.

Arrange the suction and pressure lines (thread size G1/8) so that condensate cannot run into the pump (sloping lines).

For vacuum pumps, the exhaust gases must be safely disposed.

4. Operation

The pumps must not be used in areas where there is a danger of explosion.

Specific safety instructions for the media being handled must be observed.

If combustible media are used:

- Hazard of fires and explosions due to excessively high media temperature.
- Be aware that the pumps are not designed to be explosion-proof.
- Make sure the temperature of the medium is always sufficiently below the ignition temperature of the medium, to avoid ignition or explosion. This also applies for unusual operational situations.
- Note that the temperature of the medium increases when the pump compresses the medium.
- Hence, make sure the temperature of the medium is sufficiently below the ignition temperature of the medium, even when it is compressed to the maximum permissible operating pressure of the pump.
- The maximum permissible operating pressure of the pump is stated in the technical specifications (section 10).
- If necessary, consider any external sources of energy, such as radiation, that may add heat to the medium.
- In case of doubt, consult the Fezer customer service.

Before pumping a medium, the compatibility of materials of pump head, diaphragm and valves with the medium must be checked (for pump materials: see section 10).

The pump must not start against pressure or vacuum. When it is switched on the pressure in the suction and pressure lines must be atmospheric. This must be so even when the pump restarts after the power has been cut off for a short period.

The maximum permissible operating pressure (see section 10) must not be exceeded.

To prevent the maximum permissible operating pressure being exceeded, restriction or control of the air or gas flow should only be carried out in the suction line.

If restriction or control of the air or gas flow is made on the pressure side ensure that the maximum permissible operating pressure is not exceeded.

When the pump is at a standstill the inlet and exhaust must be at normal atmospheric pressure.

For vacuum pumps, the exhaust gases must be safely disposed

For pumps that may be employed as vacuum pump and compressor must not be used to produce vacuum and pressure at the same time.

For pumps with a thermal switch: when the operation of the pump is interrupted by the thermal switch, it will restart automatically after cooling down. Take all care necessary to prevent this leading to a dangerous situation.

Diaphragm and valve plates/sealings are the only parts subject to wear. Wear is usually indicated by a drastic reduction in the pneumatic performance. When replacing parts proceed as described in section 5.

Ambient conditions: see section 1.3.

5. Servicing

(versions with pump head made of plastic)

Diaphragm and valve plates/sealings are the only parts of the pump subject to wear. They are simple to change.

Always change valve plates/sealings and diaphragm at the same time. In the case of models with two pump heads service both heads at the same time. If the diaphragm is not changed in both heads at the same time or the diaphragm and the valve plates/sealings are not changed at the same time, the nominal performance of the pump is not guaranteed after the servicing.

If aggressive, toxic or other types of gases hazardous to health have been pumped please observe:

1. Clean the pump and its components before servicing.
2. Ensure that the service personnel is not subject to a health hazard during diaphragm and valve plate changes. Apply the necessary safety measures (example: the use of protective gloves).
3. Ensure that the discarded parts and materials are safely and correctly disposed of.

Parts and tools required

Part/tool
1 Service Set*
Phillips screwdriver no. 2
Small screw driver
Felt-tip marker

*Tab. 1: Parts/tools *according to section 8*

Change the structured diaphragm and valve plates/sealings in the following sequence:

- a.) Preparatory steps
- b.) Remove pump head
- c.) Change structured diaphragm
- d.) Change valve plates/sealings
- e.) Refit pump head
- f.) Final steps

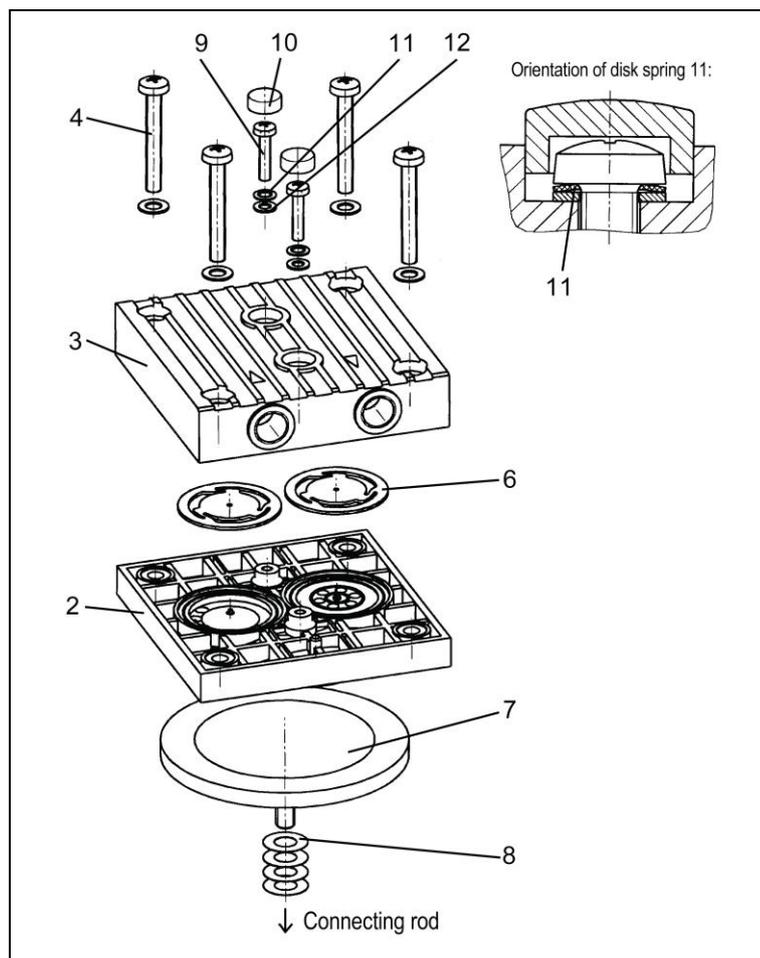


Fig. 6: Pump head made from plastic

Proceed as follows (see figs. 6):

a.) Preparatory steps

- Remove the pumps from the source of electrical power. Make sure the pump is voltage-free and secure it.
- Remove cover (1) from pump housing after loosening the four screws.

b.) Remove pump head

4. Mark the position of the ribbed plate (3), intermediate plate (2) and housing (5) relative to each other by a drawing line with a felt-tip marker. This helps avoid incorrect assembly later.
5. Undo the 4 screws (4) in the ribbed plate (3) and lift the ribbed plate with the intermediate plate off the pump housing.

c.) Change structured diaphragm

6. Turn the fan to bring the structured diaphragm (7) to top dead centre.
7. Lift the edge of the structured diaphragm and, gripping it on opposite sides, unscrew it by turning anti-clockwise.
8. Take the diaphragm spacer(s) (8) off the threaded portion of the structured diaphragm and retain it/them.
9. Check that all parts are free from dirt and clean them if necessary (see section 6. *Cleaning*).
10. Put the diaphragm spacer(s) (8) on the thread of the new structured diaphragm.
11. Turn the fan until the connecting rod (connecting part between motor shaft and structured diaphragm) is at top dead centre.
12. Screw the new structured diaphragm (7), complete with diaphragm spacer(s) (8) into the connecting rod (clockwise) and tighten it by hand.

d.) Change valve plates/sealings

13. Use a small screwdriver to remove the screw cap (10) on the pump head and then undo the screw(s) (9).
14. Separate the ribbed plate (3) from intermediate plate (2).
15. Remove the valve plates/sealings (6) from the intermediate plate.
16. Check that the valve seats in the ribbed plate and intermediate plate are clean; if scratches or distortion corrosion are evident on these parts they should be replaced.
17. Lay the new valve plates/sealings (6) in the recesses in the intermediate plate (2). The valve plates/sealings for suction and pressure sides are identical, as are upper and lower sides of the valve plates/sealings.
18. Check that the valve plates/sealings are not deformed by moving them gently sideways in their recesses.
19. Place the ribbed plate (3) on the intermediate plate (2), in the position indicated by the marking (M).
20. Check that the ribbed plate (3) is centred by moving it gently sideways.
21. Join the ribbed plate (3) and the intermediate plate (2) by tightening the two screws (9) with disk spring (11) and washer (12).
For orientation of disk spring see fig. 6.
Torque for tightening the screw(s):
N 838___: 35 Ncm.
22. Install the screw cap(s) (10).

e.) Refit pump head

23. Turn the fan to bring the structured diaphragm (8) to top dead centre.
24. Place the pump head (consisting of intermediate plate (2) with valve plates/sealings (6), and ribbed plate (3) on the housing, in the position indicated by the marking (M).
25. Gently tighten the screws (4), evenly and diagonally.
26. Turn the fan to check that the pump rotates freely.
27. Turn the fan again to bring the structured diaphragm to top dead centre.
28. Now tighten screws (4) firmly (torque: 3.5 Nm).

f.) Final steps

- 1 Refix the cover (1).
- 2 Connect the pump to the electrical supply.

If you have any questions about servicing call our technical adviser.

6. Cleaning

When changing structured diaphragm(s) and valve plates/sealings, inspect all parts for dirt before assembling the pump head and clean them if necessary.

As far as possible, clean the parts with a dry cloth. Solvents should not be used as they can attack the plastics, and synthetic rubber parts. If a compressed air line is available, blow the parts out with it.

7. Trouble Shooting

Before working on the pump isolate the power supply securely, then check that the lines are not live.

The following tips for fault-finding are best employed in the sequence shown.

Pump produces no flow

- Thermal switch has opened due to over-heating.
 - ▶ Disconnect pump from mains and allow to cool. Trace cause of over-heating and eliminate it.
- Connections or lines are blocked
- An external valve is closed, or a filter blocked.
- Liquid (condensate) has collected in the pump head.
 - ▶ Let the pump run for a few minutes pumping air (if necessary for safety reasons: pumping an inert gas.)
 - ▶ Install the pump at the highest point in the system.
- Diaphragms or valve plates/sealings are worn.
 - ▶ Section 5 Servicing.

Flow, pressure, or vacuum too low

- Compare the actual performance with the figures in section 10 or the data sheet.
- There is pressure on the pressure side, and at the same time vacuum, or a pressure above atmospheric, on the suction side.
 - ▶ The pump is not designed for this condition.
- Liquid (condensate) has collected in the pump head.
 - ▶ Let the pump run for a few minutes pumping air (if necessary for safety reasons: pumping an inert gas.)
 - ▶ Install the pump at the highest point in the system.
- The cross-section of pneumatic lines, or connected components is too small, or they are restricted.
 - ▶ To measure the performance, disconnect the pump from the system (small diameter tubing or a valve can significantly affect performance).
- There is a leak at a connector, in a line, or in the pump head.
- Diaphragm or valve plate/sealings are worn, or dirt is in the head:
 - ▶ Section 5 Servicing.

If the pump does not operate properly and you cannot find any of the above faults, send it to the KNF Service Department.

In order for Fezer to repair the pump, the customer must provide a statement on the media which were pumped and on pump cleaning. Please fill out the corresponding Fezer form, and submit it together with the pump. A sample statement for copying can be found in section 11 of these operating instructions.

8. Replacement parts

A Service Set contains all replacement parts needed for one complete service; for one-headed pumps: 1 structured diaphragm and 2 valve plates/sealings; for two-headed pumps: 2 structured diaphragms and 4 valve plates/sealings.

Service Set for:

N 838 DC

Order-No. 043825

9. Accessories

Description	Order No.
Silencer G 1/8	007006
Hose connector (straight): PA, G 1/8, ID 6)	000360

Tab. 3

10. Technische Daten

Pump type	Max. permissible operating pressure (bar g)	Ultimate vacuum (mbar abs.)	Delivery rate* (l/min) at atm. pressure
N 838 DC	0,5	100	32

Tab. 4: Pneumatic Data

*Litre at STP (1013 mbar)

Pump type	Material*		
	Pump head	Structured diaphragm	Valve plate sealings
N 838 DC	PPS	EPDM	FPM

Tab. 5: Pump materials

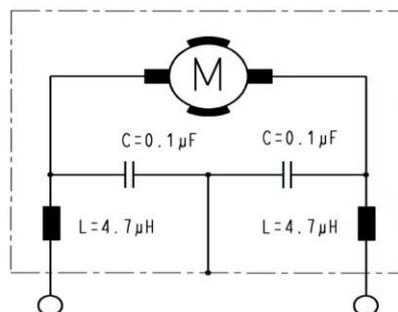
* Material abbreviations according DIN ISO 1629 und 1043.1

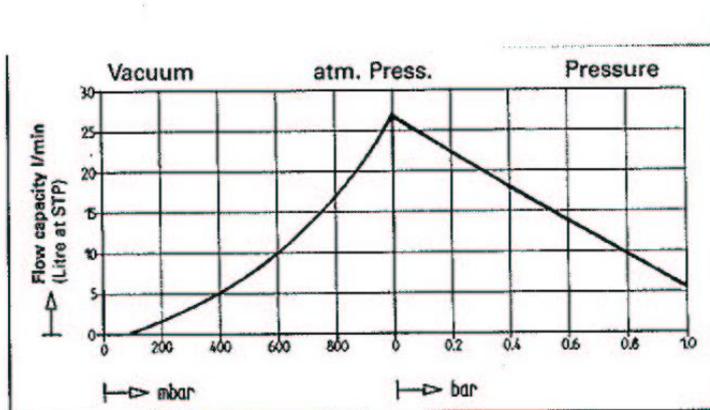
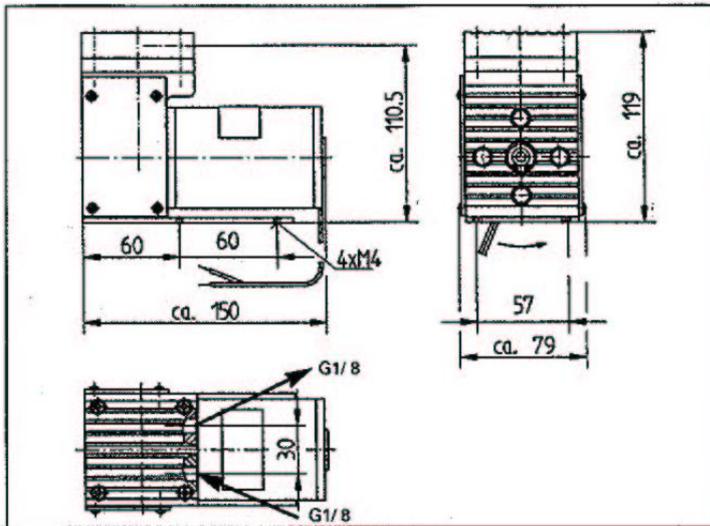
Motor specification:

Voltage: 24 V

I: 2,1 A

Entstörung / :
Radio interference
suppression





11. Decontamination Declaration

i The condition for the repair of a pump by Fezer is the certification of the customer on the transferred media and on the cleaning of the pump (decontamination declaration).

- Copy this page.
- Enter the pump model, the Serial No. and the transferred media in the form below and sent the signed form together with the flushed and cleaned pump to Fezer Customer Service.

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Customer decontamination declaration for repair order

We herewith confirm that the following media have been pumped with the pump listed below, and that the pump has been flushed and cleaned.

Pump model	
Serial No.	
Fed media	

The pump contains neither aggressive, biological, radioactive, poisonous nor other dangerous media

Company	Date/Signature
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