Operating and Installation Instructions

Micro Diaphragm Gas Sampling Pumps

Typenreihen:	**NMP 05 S**	**NMP 09 S**	**NMP 015 S**
	NMP 05 M	**NMP 09 M**	**NMP 015 M**
	NMP 05 L	**NMP 09 L**	**NMP 015 L**
	NMP 05 B	**NMP 09 B**	**NMP 015 B**

You have selected a high-quality KNF product; the following tips will help you operate it 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. The manual was produced for the serial pumps stated above. With customer-specified projects (pump types starting with “PJ“ or “PM“) there could be differences in detail. For customer-specified projects please therefore take into account any agreed technical specifications, as well as these instructions.

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Translation of original Operating and Installation Instructions, english Keep for future use!

1. Description, Operating Conditions

KNF pumps in the NMP range transfer, evacuate and compress 100% oil-free. In operation they are maintenance-free

- See the type- plate or data sheet for full electrical data.

1.1. 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 data sheet.

Ambient temperature during operation: between + 5 °C…+ 40 °C

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

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

KNF pumps in the NMP range must not be used for liquids. You will find suitable liquid pumps in our Product Program.

If your potential application lies outside the above limits discuss it with our technical adviser (see last page for contact telephone number).

2. Safety

Note the safety precautions in chapters 3. *Installation and connection,* and 4. *Operation*.

The pumps are built according to the generally recognized rules of technology and in accordance with the occupational safety and accident prevention regulations. Nevertheless, dangers can result during their use which lead to injuries to the user or others, or to damage to the pump or other property.

Only use the pumps when they are in a good technical and proper working order, in accordance with their intended use, observing the safety advice within the Operating and Installation Instructions, at all times.

Personnel

Make sure that only trained and instructed personnel or specially trained personnel work on the pumps. This especially applies to assembly, connection and servicing work.

Make sure that the personnel has read and understood the Operating and Installation Instructions, and in particular the "Safety" chapter.

Working in a safety-conscious manner

Observe the accident prevention and safety regulations when performing any work on the pump and during operation.

Handling dangerous media

When transferring dangerous media, observe the safety regulations when handling these media.

Handling combustible media

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.

If necessary, consider any external sources of energy, such as radiation, that may add heat to the medium.

In case of doubt, consult the KNF customer service.

Environmental protection

Store all replacement parts in a protected manner and dispose of them properly in accordance with the applicable environmental protection regulations. Observe the respective national and international regulations. This especially applies to parts contaminated with toxic substances.

EC Directives / Standards

For the purposes of the Machinery Directive 2006/42/EC, pumps are “partly completed machinery,” and are therefore to be regarded as not ready for use. Partly completed machinery may not be commissioned until such time as it has been determined that the machine in which the partly completed machinery is to be assembled is in conformity with the provisions of the Machinery Directive 2006/42/EC. The following essential requirements of Annex I of Directive 2006/42/EC (general principles) are applied and observed:

- General Principles No. 1
- No. 1.1.2. / 1.1.3. / 1.3.1. / 1.3.3. / 1.3.4. / 1.4.1. / 1.5.8. / 1.5.9. / 1.7.4. / 1.7.4.1. / 1.7.4.3.

As these partly completed machinery are OEM-models the power supplies and the equipment for disconnecting and switching-off the partly completed machinery respectively have to be considered when mounting as well as over-current and overload protective gear.

In addition a protection against mechanical parts in motion and hot parts, if existing, has to be provided when mounting.

CE

The pumps conform to the Directive 2011/65/EU (RoHS2).

The pumps conform to the EC Directive 2004/108/EC concerning Electromagnetic Compatibility.

The following harmonized standards have been used:

NMP 05 M NMP 09 M	NMP 05 L NMP 09 L NMP015 L	NMP 05 B NMP 09 B	NMP 015 M
DIN EN 61000-6-3	DIN EN 55022 (Klasse B)	DIN EN 61000-6-1/2/3/4	DIN EN 55014-1
	DIN EN 61000-4-2/3/4/5/6/8		

Tab. 1

Customer service and repairs	Only have repairs to the pumps carried out by the KNF Customer Service responsible.

3. Installation

Pumps in the NMP range 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 dimensions of the mountings are given in Data Sheet.

Fit the pump at the highest point in the system, so that condensate cannot collect in the head of the pump - that prolongs working life.

Compare the supply data with the motor data.

With dc motors the wires must be connected to the correct poles.

For brushless DC motors (type designation ending with B):

- Caution; incorrect lead connection will damage motor electronics.
- Correct connection:

  + red cable

  - black cable

In the electrical installation, arrangements (compyling with EN 60335-1) must be made for disconnecting the pump motor from the electrical supply.

EMC compatible installation (for NMP05/09 B)

The maximum length of the connection leads is limited irrespective of whether the device is to be used in an industrial environment or is for domestic use[1)].

- All connection leads may not exceed a length of 3 m.

Compliance with the performance defined by the CE mark with respect to emission and immunity requires additional EMC measures:

- Ensuring the allowable emission in domestic use can require the use of an EMC filter and / or an EMC suppressor circuit.
- Ensuring the necessary immunity in industrial uses can require use of an EMC suppressor circuit.

Intended environment	Interference type	Action
Domestic use[1)]	Emission	EMC filter
	Immunity	EMC suppressor
Industrial use	Emission	
	Immunity	EMC suppressor

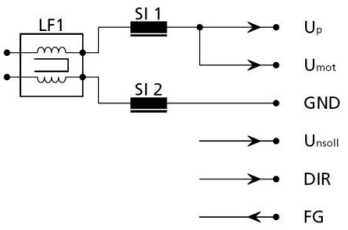
Tab. 2

This table shows which additional EMC measures have to be taken to ensure the equipment fulfils the performance regarding emission and immunity defined by the Directive in the environment in the intended environment.

[1)] *Domestic means use in homes, business and commercial areas as well as in small businesses.*

The EMC filter

Circuit diagram 1



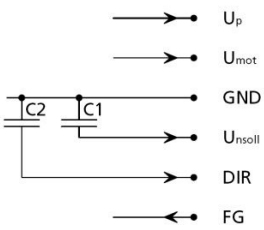
LF1 Current-compensated inductor WE-LF 10 mH
(Würth Elektronik No.: 7446221010)

SI1 Power inductor 1619 µH
(Würth Elektronik No.: 7441110)

SI2 Power inductor 1619 µH
(Würth Elektronik No.: 7441110)

The EMC suppressor circuit

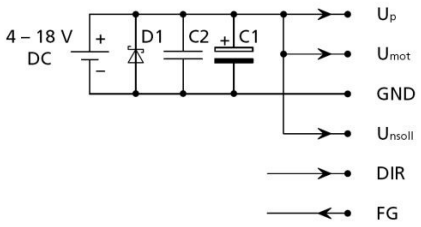
Circuit diagram 2



C1 Ceramic capacitor 220 nF

C2 Ceramic capacitor 220 nF

Circuit diagram 3



C1 Electrolytic capacitor 22 µF, 35 V

C2 Ceramic capacitor 220 nF, 50 V

D1 Suppressor diode P6KE18
(e.g. from ST Microelektronics)

It may not be necessary to implement the additional EMC measures named. If the motor is fed e.g. from a CE-conforming power supply unit which firstly is connected with the motor by the shortest possible connection lead and secondly no other devices are supplied, then the EMC filter (circuit diagram 1) or EMC suppressor circuit (circuit diagram 3) can be dispensable. In this case the power supply unit takes on the function of the EMC filter or the EMC suppressor circuit according to circuit diagram 3.

The same applies accordingly to the EMC suppressor circuit according to circuit diagram 2: The EMC suppressor circuit can be dispensable if other design measures prevent emissions from interfering with the control voltage for the desired speed and the switch input for the direction of rotation.

4. Operation

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

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

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.

The maximum permissible operating pressure (see data sheet) must not be exceeded.
Exception: If the data sheet includes values for intermittent operation, they may employed briefly.

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.

5. Trouble Shooting

Flow, pressure or vacuum are too low, or: Pump produces no flow:

- Connections or lines are blocked.
- There is a leak at a connector, in a line, or in the pump head.
- 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.
- The cross-section of pneumatic lines, or connected components is too small, or they are restricted.
- 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

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 KNF 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 KNF form, and submit it together with the pump. A sample statement for copying can be found in section 7 of these Operating and Installation Instructions.

6. Returns

Pumps and systems used in laboratories and process-based industries are exposed to a wide variety of conditions. This means that the components contacting pumped media could become contaminated by toxic, radioactive, or otherwise hazardous substances.

For this reason, customers who send any pumps or systems back to KNF must submit a Health and safety clearance and decontamination form in order to avoid a hazardous situation for KNF employees. This Health and safety clearance and decontamination form provides the following information, among other things:

- physiological safety
- whether medium-contacting parts have been cleaned
- whether the equipment has been decontaminated
- media that have been pumped or used

and must declare physiological safety. To ensure worker safety, work may not be started on pumps or systems without a signed Health and safety clearance and decontamination form.

For optimal processing of a return, a copy of this declaration should be sent in advance via e-mail, regular mail, or fax to KNF Customer Service (refer to final page for address). In order to avoid endangering employees who open the shipment's packaging, despite any residual hazards, the original version of the Health and safety clearance and decontamination form must accompany the delivery receipt on the outside of the packing.

The template for the Health and safety clearance and decontamination form is included with these operating instructions and may also be downloaded from the KNF website.

The customer must specify the device type(s) and serial number(s) in the Health and safety clearance and decontamination form in order to provide for the unambiguous assignment of the Declaration to the device that is sent to KNF.

In addition to the customer's declaration of physiological safety, information about operating conditions and the customer's application are also of importance to ensure that the return shipment is handled appropriately. Therefore, the Health and safety clearance and decontamination form requests this information as well.

7. Health and safety clearance and decontamination form

Form: Rev. 00 / download: www.knf.com

Health and safety clearance and decontamination form

This declaration must be present and complete (the original must accompany the shipment's delivery receipt) before the returned device can be examined.

Device type: .....

Serial number(s): .....

.....

.....

Reason for returning the device (please describe in detail):

(The device(s) was(were) in operation ☐ yes ☐ no)

.....

.....

.....

.....

.....

We confirm that the above device(s)

☐ has(have) pumped exclusively **physiologically unobjectionable** media and that it(they) are free of hazardous materials and any materials that are harmful to health.

The device(s) was(were) cleaned ☐ yes ☐ no

☐ has(have) pumped media of the following category(categories) which are not physiologically unobjectionable and that cleaning of the device(s) (potentially only media-contacting parts) is required.

Name, chemical formula, Material Safety Data Sheet

☐ aggressive .....

☐ biological .....

☐ radioactive .....

☐ toxic .....

☐ other .....

The device(s) was(were) decontaminated and work can proceed without special measures ☐ yes

Method / proof: .....

.....

The device(s) was(were) not decontaminated and special measures are required before starting work ☐ yes

Measures: .....

.....

Legally binding declaration

We herewith affirm that the information provided in this form is correct and complete. Shipment of the devices and components is in compliance with statutory regulations.

.....	.....	.....	.....	.....
Company (stamp)	Date	Name	Authorized signature	Position

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