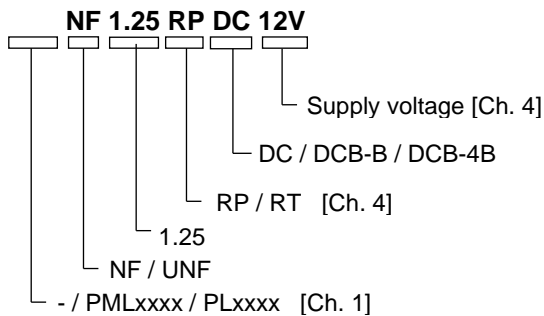


DIAPHRAGM LIQUID PUMP

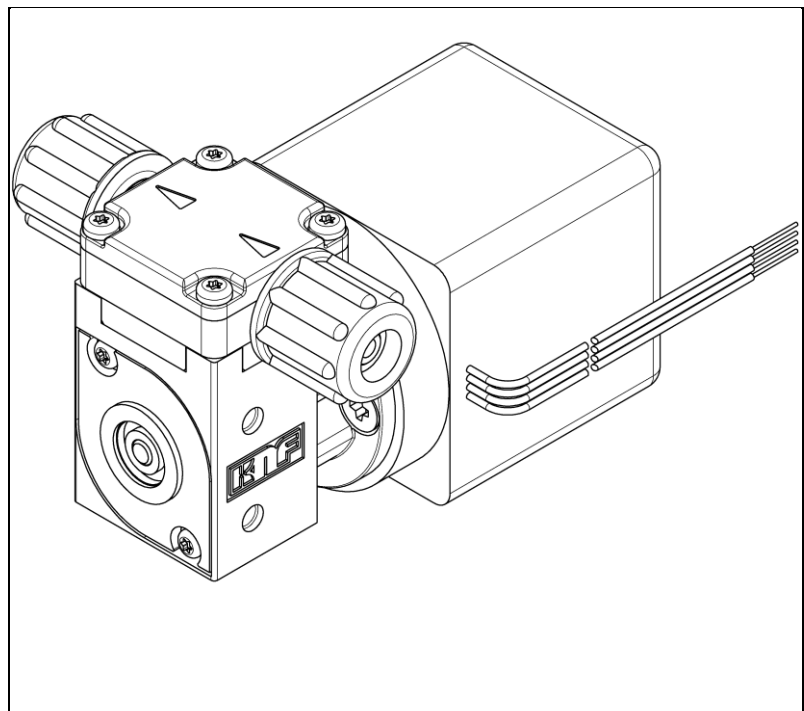
NF 1.25



Operating and Installation Instructions

Read and observe these Operating and Installation Instructions!

An additional letter prefixing the NF model code is a country-specific designation, with no technical relevance.



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1. About this document

1.1. Use of the Operating and Installation Instructions

The Operating and Installation Instructions are part of the pump.

- ➔ Forward the Operating and Installation Instructions to any subsequent owners of the pump.

Project pumps

Customer-specific project pumps (pump models which begin with "PL" or "PML") may differ from the Operating and Installation Instructions.

- ➔ In the case of project pumps, take note of any additionally agreed specifications.

1.2. Symbols and markings

Warning



WARNING

This symbol indicates a potential danger.

It also indicates the possible consequences of failure to observe the warning. The signal word (e.g. "Warning") indicates the level of danger.

- ➔ Here you will see actions for avoiding the danger and potential consequences.

Danger levels

Signal word	Meaning	Consequences if not observed
DANGER	warns of immediate danger	Consequences include death or serious injuries and/or serious property damage
WARNING	warns of potential danger	Death or serious injuries and/or serious property damage are possible
CAUTION	warns of a potentially dangerous situation	Minor injuries or damage to property are possible

Tab. 1

Other information and symbols

- ➔ This indicates an activity (step) that must be carried out.

1. This indicates the first step of an activity to be carried out. Any additional steps required are numbered consecutively.



This symbol indicates important information.

2. Use

2.1. Intended use

The pumps are intended for transferring and metering liquids.

Owner's responsibility

Operating parameters and conditions

Only install and operate the pumps under the operating parameters and conditions described in Chapter 4, Technical data.

Only complete pumps may be taken into service.

Requirements for transferred medium

Before transferring or metering a medium, check whether the medium can be transferred danger-free in the specific application case.

Before using a medium, check the compatibility of the materials of the pump head, pump housing, diaphragm and valves with the medium.

The temperature of the medium must lie within the permissible temperature range (see Chapter 4).

The pumped medium should not contain particles as these can prevent the pump from working correctly. If this cannot be ensured, a < 50 µm filter with a sufficiently large filter area must be used upstream of the pump.

2.2. Improper use

The pumps must not be operated in an explosive atmosphere.

For special modifications outside the standard technical specifications, please contact your KNF technical adviser.

3. Safety

i Observe the safety precautions in Chapters 6. Installation and connection, and 7. Operation.

The pumps are built according to the generally recognised rules of technology and in accordance with the pertinent 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	<p>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.</p> <p>Make sure that all personnel have read and understood the Operating and Installation Instructions, and in particular the "Safety" chapter.</p>
Working in a safety-conscious manner	Always ensure adherence to all pertinent accident prevention and safety regulations when working on and operating the pump.
Handling dangerous media	When transferring dangerous media, observe the safety regulations for handling such media.
Notes	Always ensure adherence to all information stickers on the pumps, such as flow direction arrows and type plates, and keep stickers in legible condition.
Environmental protection	All replacement parts should be properly stored and disposed of in accordance with the applicable environmental protection regulations. Ensure adherence to the pertinent national and international regulations. This especially applies to parts contaminated with toxic substances.
Disposal	<p>Dispose of all packaging in an environmentally-appropriate manner. The packaging materials are recyclable.</p> <p>Ensure that the old appliance is disposed of in an environmentally-appropriate manner. Use appropriate waste collection systems for the disposal of end-of-life equipment. Used pumps contain valuable recyclable materials.</p>



EU directives/standards	<p>The pumps are in accordance with the requirements of the guidelines 2011/65/EU (ROHS2)</p> <p>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 conforms to the provisions of the Machinery Directive 2006/42/EC. The essential requirements of Annex I of Directive 2006/42/EC (general principles) are applied and observed.</p> <p>The following harmonised standards are met:</p> <p>NF 1.25 DC</p> <ul style="list-style-type: none">▪ EN 55014 <p>NF 1.25 DCB-B / DCB-4B</p> <ul style="list-style-type: none">▪ IEC/EN 61000-6-2▪ IEC/EN 61000-6-3
Customer services and repairs	<p>All repairs to the pump(s) must be carried out by the relevant KNF Customer Service team.</p> <p>Only use genuine parts from KNF for servicing work.</p>

4. Technical data

Pump materials

The pump type **RP** stands for:

Assembly	Material ¹⁾
Pump head*	PPS
Anchor valves / seals	EPDM
Diaphragm	EPDM
Resonating diaphragm	EPDM

Tab. 2

1) according to DIN ISO 1629 and 1043.1

* Pump head (Fig. 1) comprises an intermediate plate and a connecting plate

The pump type **RT** stands for:

Assembly	Material ¹⁾
Pump head*	PPS
Anchor valves / seals	FFKM
Diaphragm	PTFE-coated
Resonating diaphragm	FFKM

Tab. 3

1) according to DIN ISO 1629 and 1043.1

* Pump head (Fig. 1) comprises an intermediate plate and a connecting plate

Hydraulic ratings

Parameter	Value
Flow rate DC [ml/min] ^{1), 2)}	≥ 300
Flow rate DCB-B [ml/min] ^{1), 2)}	≥ 300
Flow rate DCB-4B [ml/min] ^{1), 2)}	≥ 50-300
Permissible pressure [bar g]	6
Permissible pressure (with restricted operating time) [bar g]	10
Suction head [mWG]	3

Tab. 4

1) Measured with water at 20°C / at atmospheric pressure

2) Flow rates may vary from the values shown, depending on fluid viscosity, pump head material and the hoses / hose connectors used.

Hydraulic connections

Parameter	Value
Hose connection NF1.25 ID / OD [mm]	4 / 6
Hose connection UNF1.25 ID / OD [Inch]	1/8" / 1/4"

Tab. 5

Specifications NF 1.25 DC

Motor voltage	12V	24V
Power consumption [W]	4.9	4.9
Max. I load [A]	0.41	0.20
Protection class [-]	IP00	
Weight [g]	157	

Tab. 6

Specifications NF 1.25 DCB-4B

Motor voltage	DCB-B	DCB-B	DCB-4B
Supply voltage [V]	12	24	10..26.4
Power consumption [W]	5.8	6.2	7.0
Max. I load [A]	0.48	0.26	0.53..0.25
Protection class [-]	IP50		
Weight [g]	185		

Tab. 7

Electrical specifications for motor DCB-4B

Electrical connections			
Lead assignment			
Function	Wire colour	Signal name	Size
+ Supply voltage	red	+ Vs	AWG 24
- Supply voltage	black	- Vs / GND	AWG 24
Speed control – input signal	white	Vctrl	AWG 24
Frequency output – output signal	green	FG	AWG 24
DC control input Vctrl			
Control voltage range DC	[VDC]	0..10	
Speed range	[rpm]	250..4500	
Resistant to surge voltages	[VDC]	± 30	
Input resistance (Vctrl ≤ 11.1VDC)	[kΩ]	102	
Threshold voltage	[VDC]	0.19	
Control voltage characteristic			
<p>The graph plots Speed [rpm] on the y-axis (0 to 4000) against Vctrl [V] on the x-axis (0 to 5). A blue line shows a linear relationship. At Vctrl = 0, Speed is 0. At Vctrl = 0.19, there is a small vertical jump to approximately 250 rpm. From Vctrl = 0.19 to Vctrl = 5, the speed increases linearly to approximately 3300 rpm.</p>			

FG frequency output		
FG pulses per mech. revolution	[]	6
Pulse length "low"	[%]	50
Output series resistance	[kΩ]	2.2
Output level 'high'	[V]	≥ 2.8
Output level 'low'	[V]	≤ 0.5

Tab. 8

i In the case of type NF 1.25 DCB-4B the *supply voltage* is not designed for operation with pulse-width modulated voltages (PWM).

It is permissible to actuate the *control voltage* with a PWM signal (frequency: 1 ... 20kHz).

i Electrostatic sensitive components (ESD)

Other parameters

Parameter	Value
Permissible ambient temperature range [°C]	+ 5 to + 40
Permissible media temperature range [°C]	+ 5 to + 80
Permissible kinematic viscosity of medium [cSt]	≤ 150

Tab. 9

5. Assembly and function

Basic elements

- 1 Outlet
- 2 Inlet
- 3 Connecting plate
- 4 Drive
- 5 Connecting leads
- 6 Head plate
- 7 Intermediate plate

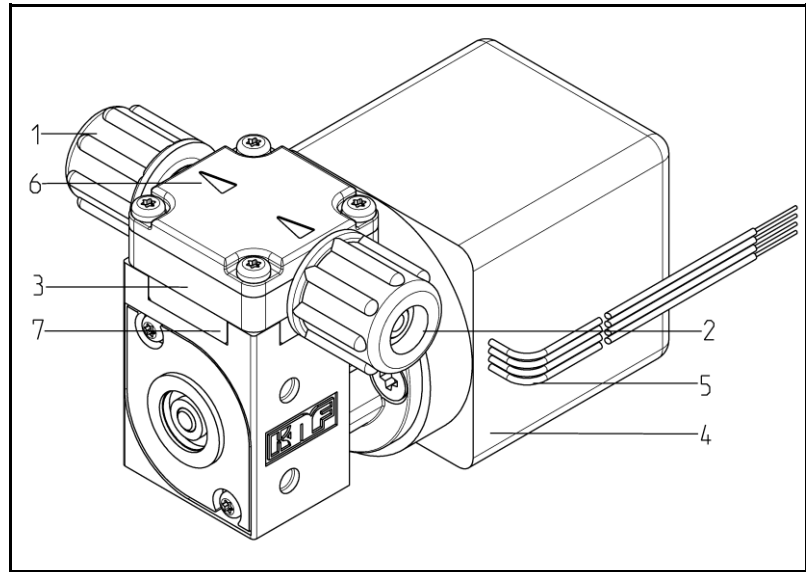


Fig. 1: Diaphragm liquid pump NF1.25

- 1 Outlet valve
- 2 Inlet valve
- 3 Working chamber
- 4 Diaphragm
- 5 Eccentric
- 6 Connecting rod
- 7 Pump drive

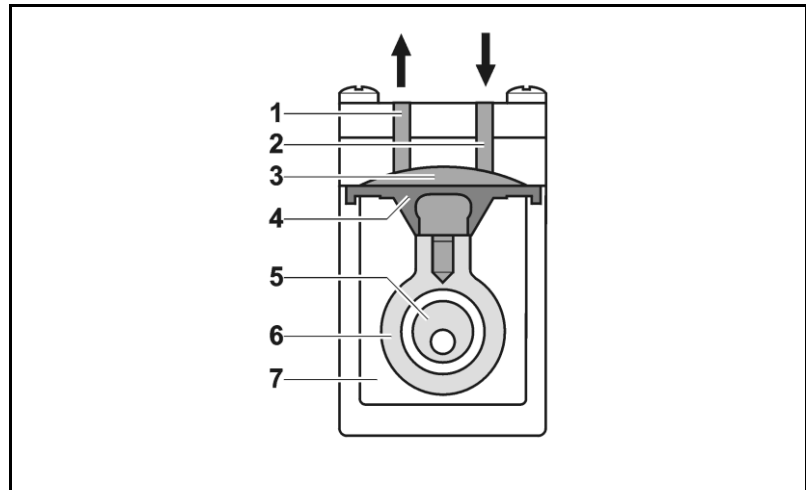


Fig. 2: Pump assembly

Diaphragm liquid pumps are based on reciprocating displacement pump technology. The elastic diaphragm (4) is moved up and down by the eccentric (5) and the connecting rod (6). In the downward stroke it aspirates the medium to be transferred via the inlet valve (2). In the upward stroke, the diaphragm pushes the medium out of the pump head via the outlet valve (1). The diaphragm hermetically seals off the working chamber (3) from the pump drive (7).

6. Installation and connection

Only install the pumps under the operating parameters and conditions described in Chapter 4, Technical data.

Observe the safety precautions (see Chapter 3).

6.1. Installation

→ Before installation, store the pump at the installation location to bring it up to ambient temperature.

Mounting dimensions

→ Mounting dimensions (see Fig. 3 to 5)

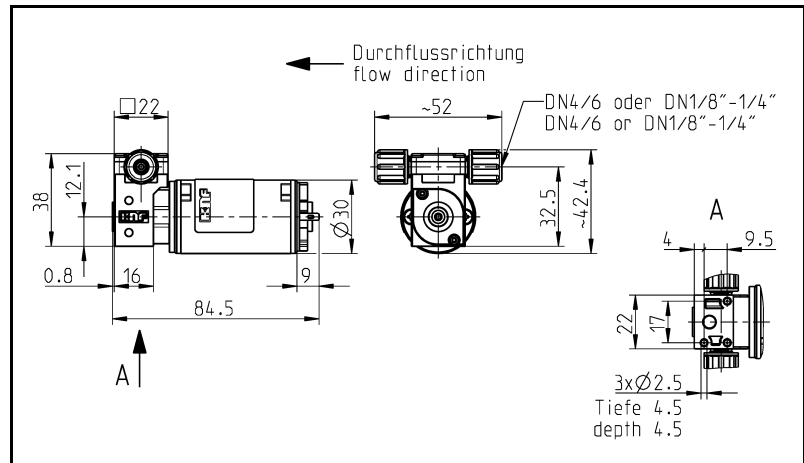


Fig. 3: Mounting dimensions NF 1.25 DC

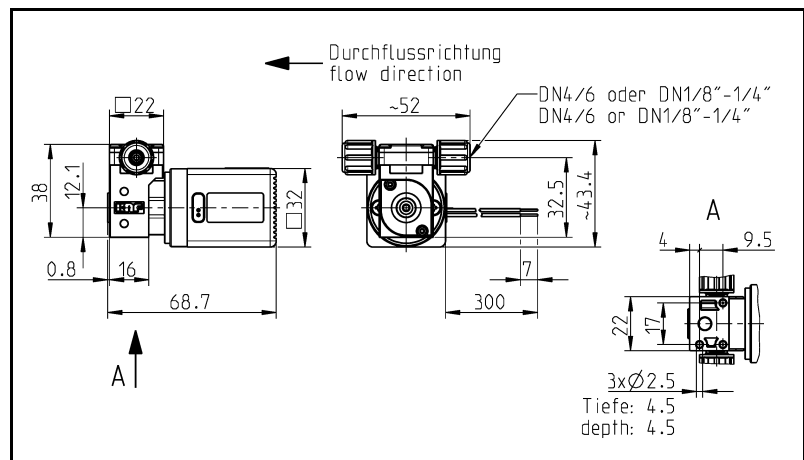


Fig. 4: Mounting dimensions NF 1.25 DCB-B

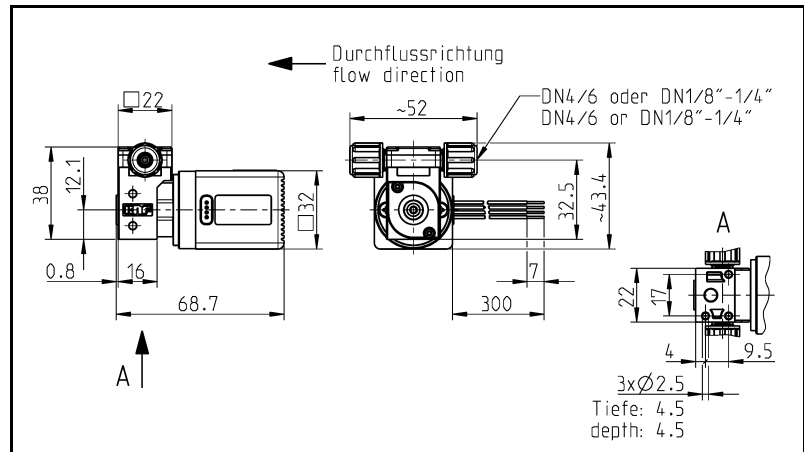


Fig. 5: Mounting dimensions NF 1.25 DCB-4B

Installation location

- Make sure that the installation location is dry and the pump is protected against water in the form of rain, spray, splashes and drips.
- Protect the pump against dust.
- Protect the pump against vibration and impact.

Installation position

- Generally speaking, the pump can be mounted in any installation position. For maximum precision and rapid venting, install pump as shown in the illustration (Fig. 5).

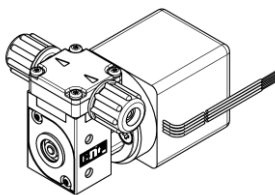


Fig. 6: Optimal mounting orientation

6.2. Electrical connection

- Only have the pump connected by an authorized specialist.
- Only have the pump connected when the power supply is disconnected.
- When connecting the device to a power source, the relevant norms, directives, regulations and technical standards must be observed.

Connecting the pump

1. Make sure that the power supply data match the data on the motor's type plate. The current consumption can be found on the type plate.
2. Connect the motor cables. For electrical data see Chapter 4.

- i** Note the proper polarity.
For DC motors:
red motor cable: +
black motor cable: -

In the case of brushless DC motors:
incorrect polarity may damage the electronics!

6.3. Hydraulic connection

- Connected components → Only connect components to the pump that are designed to handle the hydraulic data of the pump (see Chapter 4, Technical data).
- Hoses → Only use hoses that are suitable for the maximum operating pressure of the pump (see Chapter 4).
→ Only use hoses that are sufficiently chemically resistant to the liquids being pumped.

6.3.1. Connecting the pump

- i** Arrows on the pump head indicate the flow direction.
1. Remove the protective caps from the connections.
 2. Connect the suction and pressure lines.
- i** Keep the suction line as short as possible in order to keep the priming process as brief as possible.
3. If the pump is used to build up pressure, make sure that all transition joints between hose and pump are secure in order to ensure that the hoses cannot come off.
 4. Check that the hoses and transition joints are fitted correctly and securely.
 5. Check that the system is leak-tight.

7. Operation

- Operate the pumps only under the operating parameters and conditions described in Chapter 4, Technical data.
- Make sure the pumps are being used properly (see Chapter 2.1).
- Avoid improper use of the pumps (see Chapter 2.2).
- Observe the safety precautions (see Chapter 3).
- The pumps are components that are intended to be incorporated into another machine. Before putting them into service it must be established that the machinery or equipment in which they are installed meet the relevant regulations.



Risk of burning
The drive heats up.

CAUTION

- Avoid contact with the pump drive.
- Avoid contact with flammable materials.



WARNING

Danger of bursting of the fluid system due to overpressure.

The pump builds up pressure. A closed system can cause the max. permitted operating pressure to be exceeded. This can cause injuries or damage to the pump and the system.

- Avoid operation against a closed system.
- Only use wetted parts that are rated for at least the operating pressure of the pump.
- If necessary, limit the maximum system pressure by suitable measures.

- i** Excessive pressure and the inherent dangers thereof can be prevented by placing a bypass line with a pressure relief valve between the pressure and suction side of the pump. For further information, contact your KNF technical adviser (telephone number: see first page).

- Pump standstill → If the pump stops running, restore the system to normal atmospheric pressure.

For pumps with thermal switch or electronic overload protection:

**WARNING**

Risk of physical injury and damage to the pump due to automatic start

If the pump overheats and pump operation is stopped by the thermal switch / electronics, the pumps will restart automatically as soon as they have had time to cool down.

→ Take steps to ensure that this cannot produce a hazardous situation.

Switching the pumps on and off

Setting and regulating motor speed

The motor speed of the pump, and thus the flow rate, is adjustable and can also be regulated to some extent.

For more details, see Chapter 4, Technical data

Impulse operation

Duty cycle / short cycle operation

KNF pumps are designed for continuous operation.

Short start and stop cycles may adversely affect the service life of the brushed motors.

i If the pump is operated with short cycles in your application, please contact your KNF technical adviser for further information (Telephone number: see first page).

Switching on the pump

→ In order to guarantee that the pump can start every time it is advisable to reduce the back pressure to an acceptable level. If you experience a brief power interruption, check for the presence of pressure or vacuum before restarting.

i For more specific information contact your KNF technical adviser.

Switching off the pump

→ KNF recommends: If transferring aggressive liquids, the pump should be flushed thoroughly prior to switch off (see Chapter 8.2.1), as this will help to lengthen the service life of the diaphragm.

→ Restore the system to normal atmospheric pressure (release hydraulic pressure in pump).

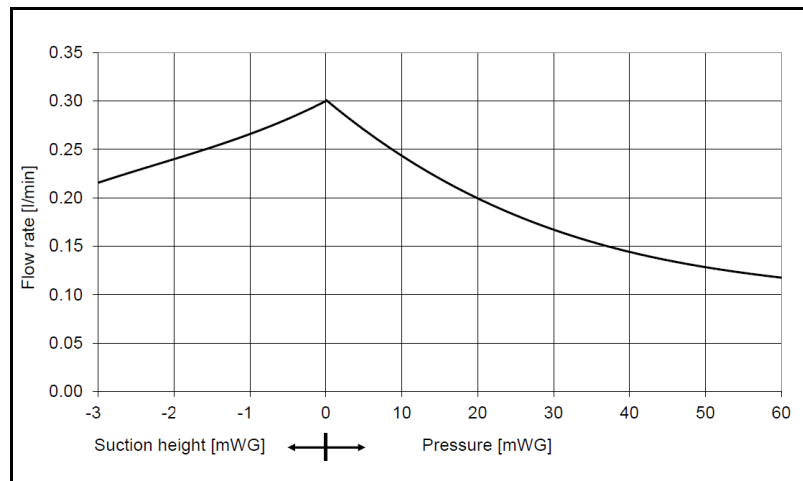
NF1.25 flow rate

Fig. 7: Flow rate of the pump NF 1.25 DC

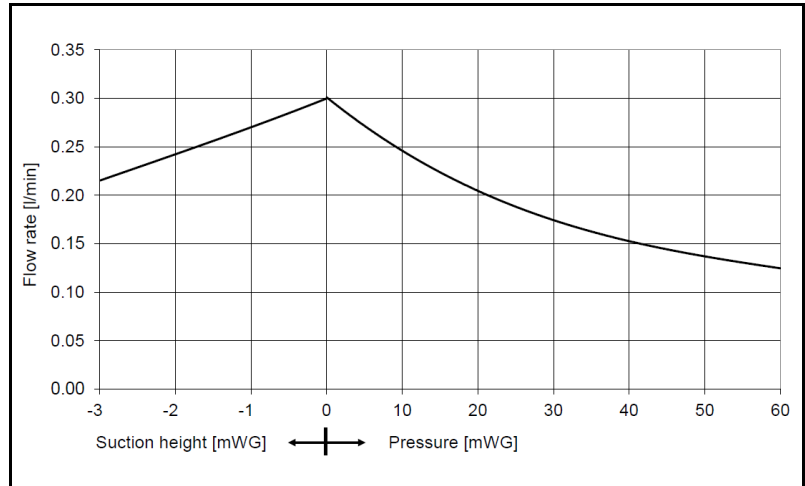


Fig. 8: Flow rate of the pump NF 1.25 DCB-B / DCB-4B

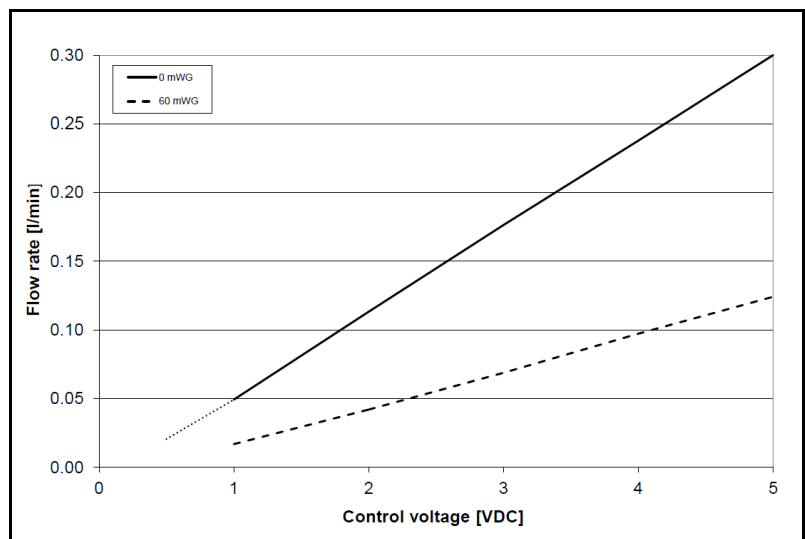


Fig. 9: Flow rate of pump NF 1.25 DCB-4B, depending on control voltage

8. Servicing

8.1. Servicing schedule

Component	Servicing interval
Pump	- Regular inspection for external damage or leaks
Pump head	- Clean if the flow rate decreases, the pump does not work or no vacuum is created (Chapter 8.2)
Diaphragm, anchor valves and seals	- Change as soon as pumping capacity decreases, preferably sooner

Tab. 10

8.2. Cleaning

Information on procedure



WARNING

Health hazard due to dangerous substances in the pump

Depending on the substance transferred, caustic burns or poisoning are possible.

- Wear protective clothing if necessary, e.g. protective gloves.
- Flush the pump with a neutral liquid and pump empty.

8.2.1. Flushing the pump

- If transferring aggressive media, KNF recommends flushing the pump with a neutral fluid under atmospheric conditions for a few minutes before switching off, to extend the service life of valves and diaphragm.

8.2.2. Cleaning the pump

- Where possible, wipe the components with a dry cloth. Do not use cleaning solvents as these may corrode plastic parts.
- If there is compressed air available, blow off components.

Prior requirements

- Pump or drive disconnected from the mains and de-energized.
- The pump must be free of any hazardous substances
- Hoses must be disconnected from the pump head
- We recommend replacing the diaphragm when the head parts are removed.

Tool

Qty.	Tool
1	T6 Torx screwdriver

Tab. 11

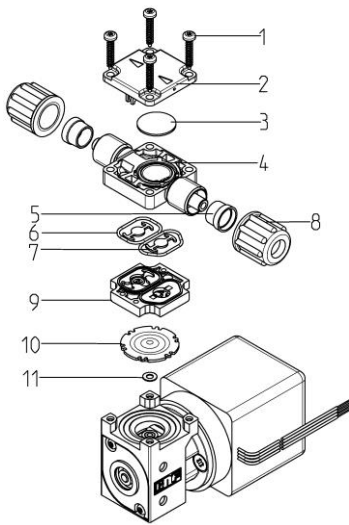


Fig. 10

- 1 Head screws
- 2 Head plate
- 3 Resonating diaphragm
- 4 Connecting plate
- 5 Clamp ring
- 6 Anchor valve seal
- 7 Anchor valve
- 8 Union nut
- 9 Intermediate plate
- 10 Diaphragm
- 11 Washer

8.2.3. Disassemble pump head

1. Undo the four head screws (1) using a Torx screwdriver T6
2. Remove the resonating diaphragm (3) from the connecting plate (4).
3. Remove both anchor valves (7) from the intermediate plate (9) and the connecting plate (4)
4. Remove the two anchor valve seals (6) from the intermediate plate (9)
5. Undo the diaphragm (10) by means of the head plate (2). Make sure that no washers (11) fall into the housing.

We recommend replacing the diaphragm (10).

8.2.4. Cleaning the parts

6. Clean the anchor valves (7), the anchor valve seals (6) and the diaphragm (10) with a cloth and then blow off with compressed air.
7. Blow off the intermediate plate (9), connecting plate (4) and head plate (2) with compressed air

8.2.5. Mounting the diaphragm

8. Screw diaphragm (10) with washer (11) into connecting rod and tighten firmly. Make sure that no washers (8) fall into the pump housing.
9. Use the head plate (2) to carefully tighten the diaphragm.

8.2.6. Mounting the valves and seals

10. Insert the seals (6) in the connecting plate (4).
11. Insert the anchor valves (7) in the intermediate plate (9) and the connecting plate (4).

8.2.7. Mounting the pump head

12. Insert the intermediate plate (9).
ATTENTION: Make sure that the orientation is correct so that the connections point in the right direction!
A pin and hole system prevents incorrect assembly.
13. Place the connecting plate (4) on top of the intermediate plate (9)
14. Place head plate (2) on connecting plate (4) and secure using the 4 head screws (1)

8.3. Replacing diaphragms, valves and seals

Same procedure as in Chapter 8.2, "Cleaning", except that instead of cleaning the diaphragm (10), anchor valves (7) and seals (6), these components must be replaced.

9. Troubleshooting

- Disconnect the pump power supply before working on the pump.
- Make sure that the pump is de-energised.

Pump does not work	
Cause	Fault remedy
Pump not connected to mains power supply	→ Connect pump to mains supply
Power supply is not switched on	→ Switch on power supply
Connections or hoses are blocked	→ Check connections and hoses → Remove blockage
External valve is closed or filter is clogged.	→ Check external valves and filters
Diaphragm, anchor valves or seals are worn.	→ Replace diaphragm, anchor valves and seals (see Chapter 8.3).

Tab. 12

Pump is not priming	
Cause	Fault remedy
Suction side of pump not connected	→ Connect the suction side of the pump
Liquid in the priming container is too low	→ Fill priming container
Hose connections are not leak-tight	→ Secure transition joints between hose and connections with clamps or other clamping elements
System valve is closed or filter is clogged	→ Open system valve → Clean filter
Pump head is filled with gas: the system is unable to handle the pressure on the pressure side	→ Reduce pressure at pressure side
Particles in the pump	→ Clean the pump head (see Chapter 8.2)
The pump parts are not resistant to the medium to be pumped	→ Replace the pump head with a compatible version
Incorrect interchange of pressure and suction line connections	→ Remove pressure and suction lines and re-connect correctly

Tab. 13

Flow rate, suction head or pressure head is too low	
The pump does not achieve the performance stated in the technical data or on the data sheet.	
Cause	Fault remedy
Components in the system connected to the suction and pressure sides, such as hoses, valves or filters, are causing too much resistance	➔ Modify installation, check cross-sections of components
Hose connections are not leak-tight	➔ Secure transition joints between hose and hose connectors with clamps or other clamping elements
Particles in the pump	➔ Clean the pump head, install suction-side filter if required (see Chapter 8.2).
Viscosity of the transferred medium is too high	➔ Contact KNF
Incorrect interchange of pressure and suction line connections	➔ Remove pressure and suction lines and re-connect correctly
The pump parts are not resistant to the medium to be pumped	➔ Replace the pump head with a compatible version

Tab. 14

Fault cannot be rectified

If you are unable to identify any of the above causes, please send the pump to KNF customer services (see address on last page).

1. Flush the pump to clear the pump head of any hazardous or aggressive fluids (see Chapter 8.2.1).
2. Dismantle the pump.
3. Clean the pump (see Chapter 8.2.2).
4. Send the pump to KNF customer services along with the completed decontamination declaration (see Chapter 10). Please indicate the medium that the pump is used to transfer.

10. Return of the pump

i KNF undertakes to repair the pump only under the condition that the customer provides a certificate of the pumped medium and cleaning of the pump. For this purpose, please follow the instructions on www.knf.com/repairs.

Please contact your KNF sales representative directly if you need additional support for your return service.

KNF worldwide

Please find your local KNF partners at: www.knf.com

