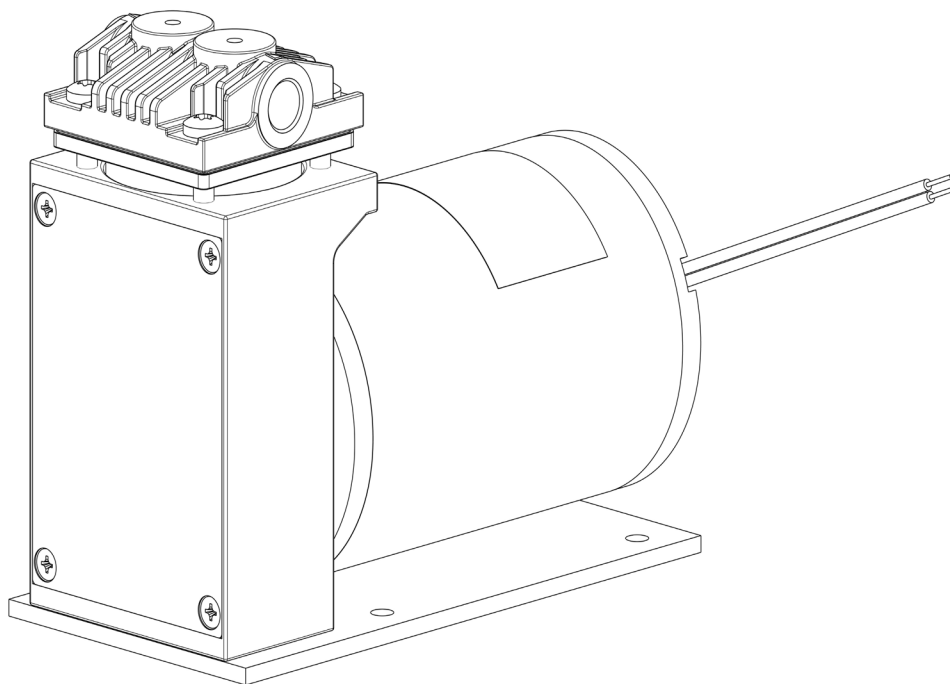


**OEM**

**NPK 09  
TRANSLATION OF ORIGINAL OPERATING AND  
INSTALLATION INSTRUCTIONS  
ENGLISH**

# SWING PISTON PUMP



**Note!**

*Before operating the pump and the accessories, please read the operating instructions and pay attention to the safety precautions!*

KNF Neuberger GmbH  
Alter Weg 3  
D-79112 Freiburg  
Germany  
Phone +49/(0)7664 / 5909-0  
Fax +49/(0)7664 / 5909-99

E-Mail: [info@knf.de](mailto:info@knf.de)  
[www.knf.de](http://www.knf.de)

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## 1. About this document

### 1.1. Using the operating and installation instructions

The Translation of original Operating and Installation Instructions are part of the pump.

- ➔ In the event of uncertainties with regard to the content of the Translation of original Operating and Installation Instructions, please contact the manufacturer (contact data: see [www.knf.com](http://www.knf.com)). Please have the type and serial number of the pump ready.
- ➔ Read the Translation of original Operating and Installation Instructions before you commission the pump.
- ➔ Give the Translation of original Operating and Installation Instructions only completely and unchanged to the next owner.
- ➔ Keep the Translation of original Operating and Installation Instructions within reach at all times.

#### Project pumps

For customer-specific project pumps (pump models that begin with "PJ" or "PM"), there may be deviations from the operating and installation instructions.

- ➔ For project pumps, also observe the agreed upon specifications.

### 1.2. Exclusion of liability

The manufacturer assumes no liability for damages and malfunctions resulting from failure to observe the Translation of original Operating and Installation Instructions. The manufacturer assumes no liability for damages and malfunctions resulting from changes or modifications to the device and improper handling. The manufacturer assumes no liability for damages and malfunctions resulting from impermissible spare parts and accessories.

### 1.3. Symbols and markings

#### Warning notice



#### **WARNING**

A notice that warns you of danger is located here.

Possible consequences of a failure to observe the warning are specified here. The signal word, e.g. warning, indicates the danger level.

- ➔ Measures for avoiding the danger and its consequences are specified here.

**Danger levels**

Signal word	Meaning	Consequences if not observed
<b>DANGER</b>	warns of immediate danger	Death or serious injury or serious damage will result.
<b>WARNING</b>	warns of possible danger	Death, serious injury or serious damage is possible.
<b>CAUTION</b>	warns of a possibly dangerous situation	Minor injuries or damage are possible.
<b>NOTICE</b>	warns of possible damage	Damage is possible

*Tab. 1***Other notices and symbols**

➔ An activity to be carried out is specified here (a step).

1. The first step of an activity to be carried out is specified here.  
Follow other sequentially numbered steps.

**i** This symbol indicates important information.

## 2. Use

### 2.1. Proper use

The pumps are intended exclusively for transferring gases and vapors.

#### Responsibility of the owner

Operating parameters and conditions

Only install and operate the pumps in accordance with the operating parameters and conditions described in Chapter 4. Technical Data.

Only pumps that are fully assembled and in the condition as delivered may be operated.

Make sure that the installation location is dry and the pump is protected against rain, splash, gushing, and drip water as well as from other contaminants.

Check the tightness of the connections between the pipes of the application and the pump (or the connection of the pump) at regular intervals. Leaky connections carry the risk of releasing dangerous gases and vapors from the pump system.

Requirements for transferred medium

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

Risk of dangerous gas mixtures during pump operation if sealing lip breaks: Depending on the medium being transferred, breakage of the sealing lip

can result in a dangerous mixture if the medium mixes with the air in the compressor housing or the surroundings.

Only transfer gases which remain stable under the pressures and temperatures that arise in the pump.

## 2.2. Improper use

The pumps are not allowed to be operated in explosive atmospheres.

The pumps are not suitable for transferring:

- Dusts
- Liquids
- Aerosols
- Biological and microbiological substances
- Fuel
- Explosives and flammable materials
- Fibers
- Oxidants
- Food

Pumps that can produce both vacuum as well as overpressure may not be used to simultaneously produce vacuum and overpressure.

This function can be made possible on a project basis following consultation with KNF Customer Service.

No overpressure may be applied to the suction side of the pump.

This function can be made possible on a project basis following consultation with KNF Customer Service.

### 3. Safety

**i** Note the safety precautions in Chapters 7. Installation and connection, and Chapter 8. Operation.

The pumps are produced according to the generally recognized rules of engineering as well as the occupational health, safety and accident prevention regulations. Nevertheless, dangers can arise during their use which lead to injuries to the user or third parties or to damage to the pump or other property.

Only use the pumps in perfect technical condition, for their intended use, safely and aware of the dangers and in observation of the operating and installation instructions.

The components that are to be connected to the pumps must be designed according to the pneumatic data of the pumps.

When connecting the pumps to the electrical power, observe the corresponding safety rules.

**Personnel** Make sure that only specially trained and instructed personnel work on the pumps. This applies, in particular, to assembly, connection and service work.

Make sure that the personnel have read and understood the operating and installation instructions, particularly the chapter on safety.

**Working in a safety-conscious manner** Observe the regulations on accident prevention and safety during all work on the pumps and during operation.

Avoid contact with the heads and housing parts, as the pump heats up during operation and may remain hot for some time after operating.

When working on the pump, make certain that the pump is disconnected from mains and without power.

Ensure that no hazards arise from gas flowing when gas connections are open, from the effects of noise or from hot, corrosive, dangerous and environmentally hazardous gases.

Make sure that an EMC-compliant installation of the pump is ensured at all times to prevent the occurrence of dangerous situations.

**Handling hazardous media** Upon breakage of the sealing lip, the transferred medium mixes with the air in the surroundings and/or in the pump housing. Make sure that a dangerous situation cannot arise as a result. When pumping hazardous media, observe the safety regulations for the handling of said media.

**Handling of combustible media** Note that the pumps are not designed to be explosion-proof.

Make sure that the temperature of the medium is always sufficiently below the ignition temperature of the medium so as to prevent ignition or explosion. This also applies for abnormal operating situations.

Note that the temperature of the medium increases when the pump compresses the medium.

Therefore, make certain that the temperature of the medium also remains 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 Chapter 4. Technical Data.

Make certain that the permissible ambient temperature (Chapter 4. Technical Data) is not exceeded.

Where applicable, also take into account external energy sources (such as radiation sources) that could additionally heat the medium.

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.

In case of doubt, consult the KNF Customer Service.

#### Environmental protection

Store and dispose of all replacement parts in accordance with the environmental regulations. Observe the respective national and international regulations. This applies in particular to parts that are 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. / 1.5.1.\* / 1.5.2.\* / 1.5.8. / 1.5.9. / 1.7.4. / 1.7.4.1. / 1.7.4.3.  
(\* only for pumps with AC motor)

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.

The safety objectives of the following Directive(s) have been met:

- Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Annex II amended by Commission Delegated Directive (EU) 2015/863).
- Only for pumps with AC motor:  
Directive 2014/35/EU on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits in accordance with Annex I, No. 1.5.1. of the Directive 2006/42/EC.



The following harmonized standards were taken as a basis:

NPK 09 DC	NPK 09 AC
EN 55014-1/2	EN IEC 55014-1/2
EN 60034-1	EN IEC 61000-3-2
EN IEC 61000-6-1/2	EN 61000-3-3
EN IEC 63000	EN IEC 63000
	EN 60335-1

Tab. 2

#### Customer service and repairs

The pumps are maintenance-free. However, KNF recommends periodic inspection of the pump for obvious changes in noise or vibration.

Only have repairs to the pumps performed by qualified KNF personnel.

Housings with electrically live components may only be opened by specialist personnel.

Use only genuine spare parts from KNF when performing servicing work.

## 4. Technical Data

### Pump materials

Assembly	Material
Ribbed head; intermediate plate	Aluminium
Housing	Aluminium
Valve plate	1.4310
Gasket	NBR compound
O-ring	FPM
Sealing lip	PTFE compound

Tab. 3

### Pneumatic values

Pump type	Delivery rate at atm. Pressure [l/min]*	Max. permissible operating pressure [bar g]	Ultimate vacuum [mbar abs.]
NPK09	12	7	100
NPK09 DC	15		
NPK09.1	24	-	-
NPK09.2		7	-
NPK09.1.2			100

Tab. 4

\* Liters in standard state (1,013 mbar)

### Pneumatic connections

Pump type	Suction side	Pressure side
NPK09	Thread size G1/8"	
NPK09 DC	Thread size G1/8"	
NPK09.1	For hose ID6	Thread size G1/8"G1/8"
NPK09.2	Thread size G1/8"	For hose ID6
NPK09.1.2	For hose ID6	

Tab. 5

### Electrical parameters

Parameter	Value
Electrical data	See type plate
Protection class	IP00

Tab. 6

**Thermal-switch** The AC-motors of the pumps are fitted as standard with a thermal-switch to protect against overloading.

**Dimensions**

Pump type	Dimensions [L x W x H]
NPK09	See Fig. 5, Chapter 7.1
NPK09 DC	See Fig. 6Chapter 7.1
NPK09.1	See Fig. 7, Chapter 7.1
NPK09.2	
NPK09.1.2	

Tab. 7

**Weight**

Pump type	Weight [kg]
NPK09	approx. 1.8
NPK09 DC	approx. 1.6
NPK09.1	approx. 2.2
NPK09.2	
NPK09.1.2	approx. 2.4

Tab. 8

**Other parameters**

Parameter	Values
Permissible ambient temperature	+ 5 °C to + 40 °C
Permissible media temperature	+ 5 °C to + 40 °C
Maximum permissible ambient relative humidity	80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C
Max. altitude of site [m above sea level]	2000

Tab. 9

## 5. Design and function

### Design NPK 09 DC

- 1 Outlet
- 2 Pump head
- 3 Inlet
- 4 Motor

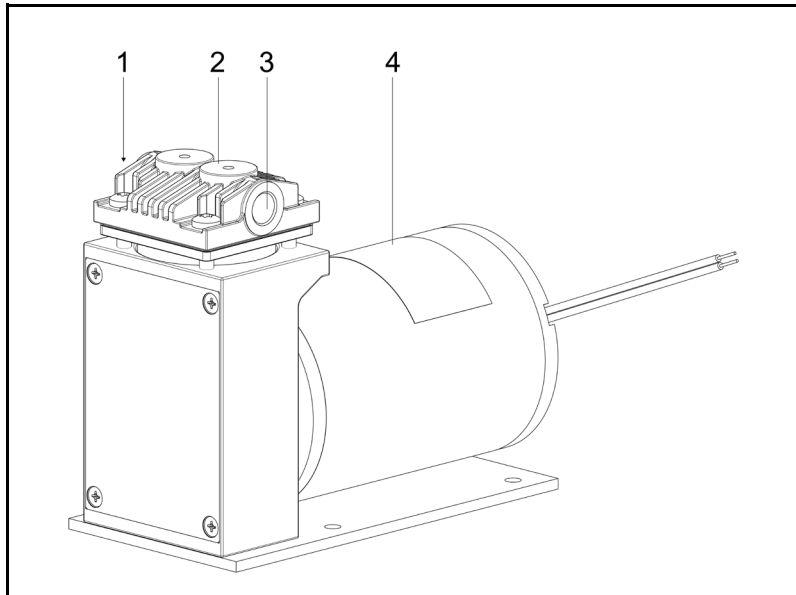


Fig. 1: Swing Piston Pump NPK 09 DC

### Design NPK 09 AC

- 1 Outlet
- 2 Pump head
- 3 Inlet
- 4 Pneumatic head connection
- 5 Motor
- 6 Pneumatic head connection
- 7 Pump head

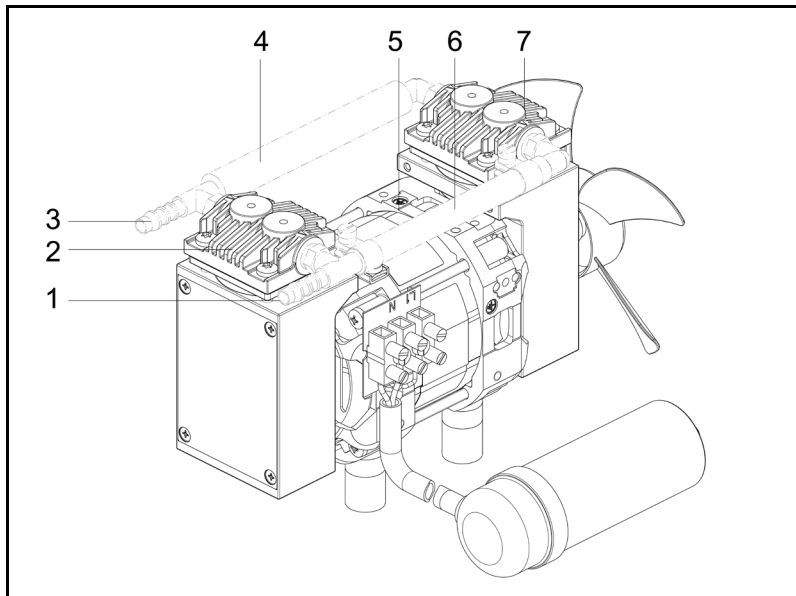


Fig. 2: Swing Piston Pump NPK 09 AC

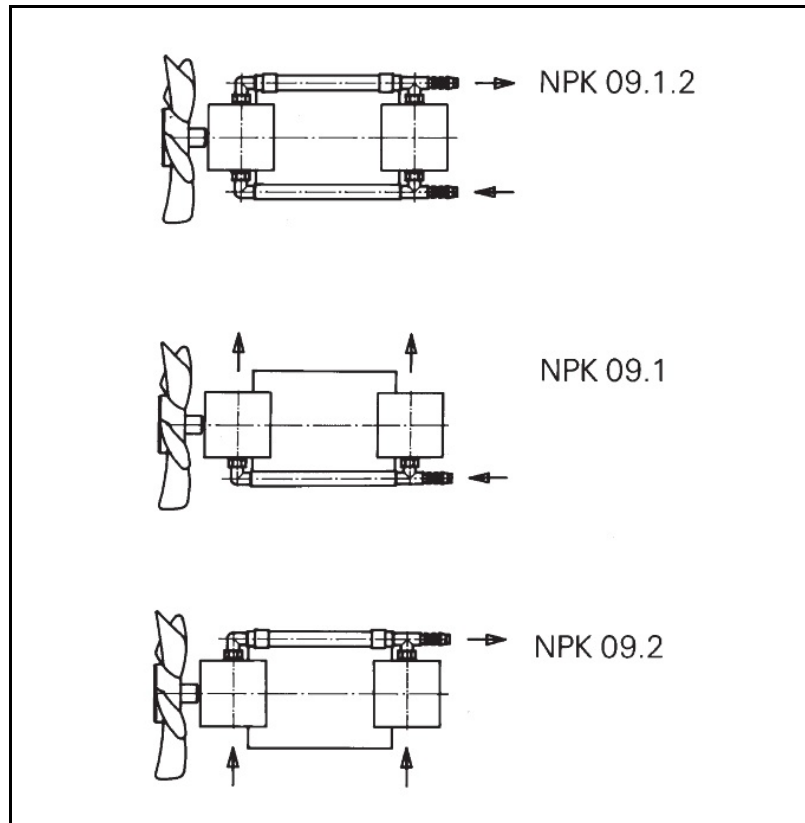


Fig. 3: Pneumatic connection of two-headed pumps

#### Function of a Swing Piston Pump

- 1 Inlet valve
- 2 Outlet valve
- 3 Working chamber
- 4 Retainer plate
- 5 Sealing lip
- 6 Eccentric
- 7 Connecting rod
- 8 Compressor housing

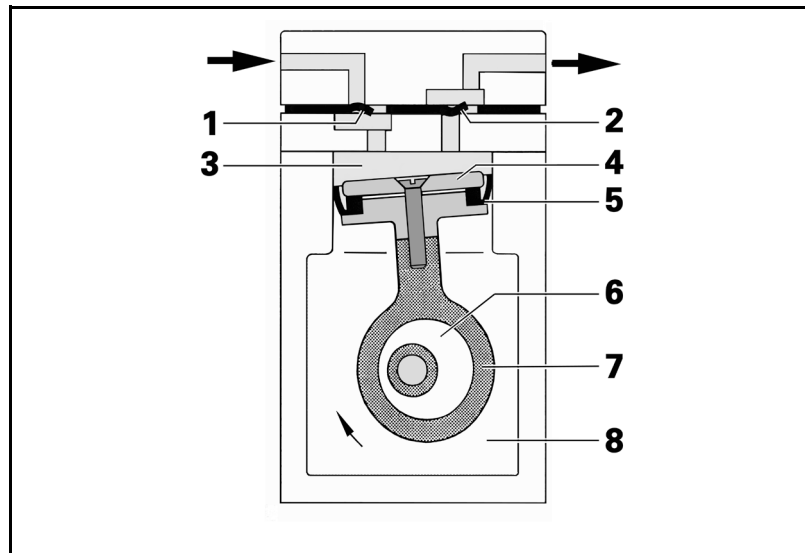


Fig. 4: Function of a Swing Piston Pump

Swing Piston Pumps transfer, compress and evacuate air.

The sealing lip, consisting of retainer plate (4) and sealing lip (5), is moved up and down by the eccentric (6) and the connecting rod (7). In the downward stroke the swing piston aspirates the medium to be transferred via the inlet valve (1). In the upward stroke, the swing piston presses the medium out of the pump head via the outlet valve (2). The swing piston is sealed off from the compressor housing by a sealing lip (5) and operates oil-free.

## 6. Transport

### General



#### CAUTION

Personal injury and/or property damage due to incorrect or improper transport of the pump

In the event of incorrect or improper transport, the pump can fall down, be damaged or injure persons.

- ➔ Use suitable auxiliary means if necessary (carrying strap, lifting gear, etc.).
- ➔ Where appropriate, wear suitable personal protective equipment (e.g., safety shoes, safety gloves).



#### CAUTION

Risk of injury from sharp edges on the packaging

There is a risk of injury from cutting on the sharp edges when grabbing corners or when opening the packaging.

- ➔ Where appropriate, wear suitable personal protective equipment (e.g., safety shoes, safety gloves).

- ➔ Transport the pump in the original packaging to the installation location.
- ➔ Store the original packaging of the pump (e.g., for later storage).
- ➔ Inspect the pump for transport damage after receiving it.
- ➔ Document any transport damage in writing.
- ➔ Remove any transport safeguards on the pump prior to commissioning.

### Parameter

Parameter	Value
Storage temperature [°C]	+ 5 to + 40
Transport temperature [°C]	- 10 to + 60
Permissible humidity (non-condensing) [%]	30 to 85

Tab. 10

- i** Prior to commissioning, make sure that the pump has reached the ambient temperature (see 4. Technical Data).

## 7. Installation and connection

Install the pumps only in accordance with the operating parameters and conditions described in Chapter 4. Technical Data.

→ Observe the safety precautions (see Chapter 3. Safety).



**DANGER**

Risk of dangerous gas mixtures during pump operation

Depending on the medium being transferred, breakage of the media-contacting components can result in a dangerous mixture if the medium mixes with the air in the compressor housing or the surroundings.

→ Before using a medium, check the compatibility of the media-contacting components (see 4. Technical Data) with the medium.

---

### 7.1. Installing the pump

- ➔ Store the pump at the same ambient temperature as the installation to mitigate condensation.

Mounting dimensions

- ➔ For mounting dimensions, see the following figures:

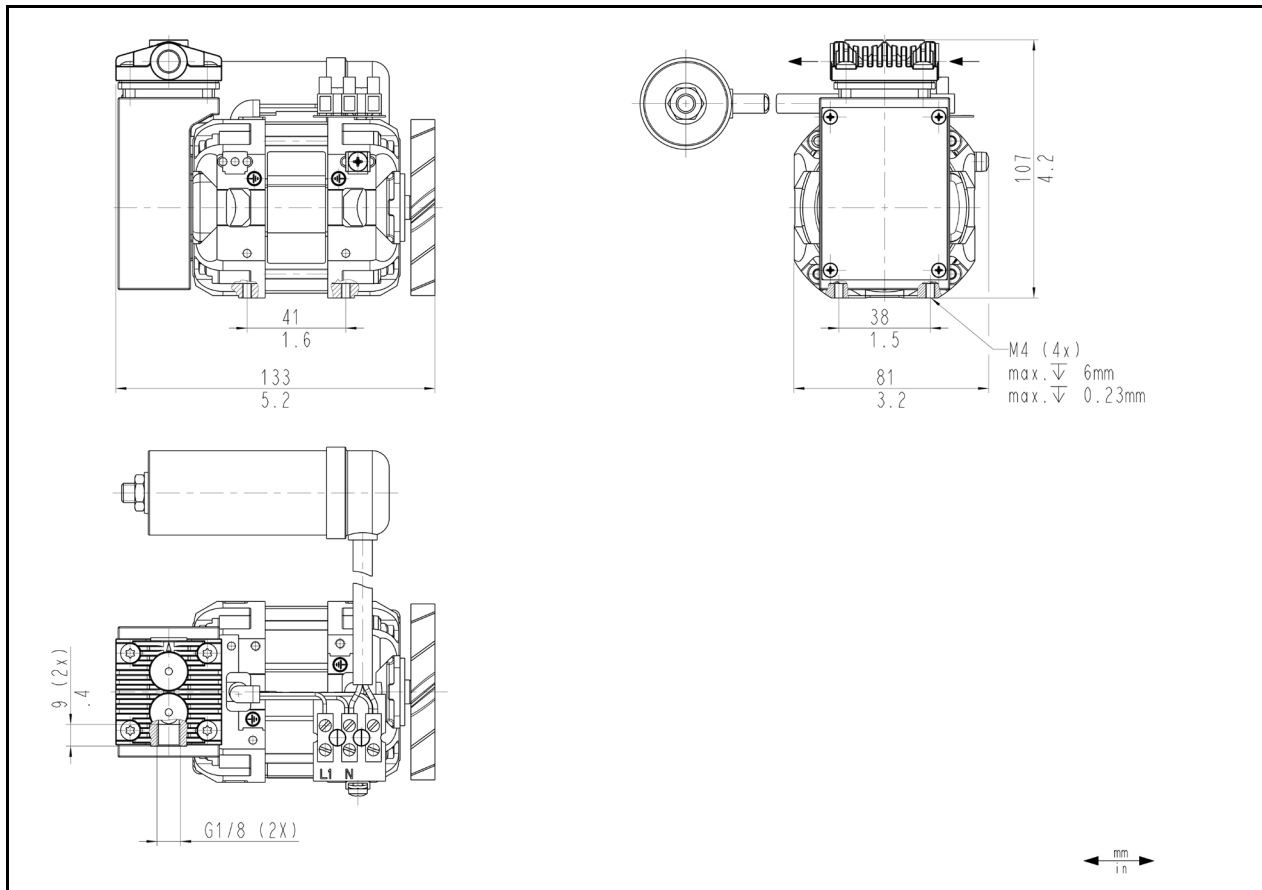


Fig. 5: Mounting dimensions NPK09



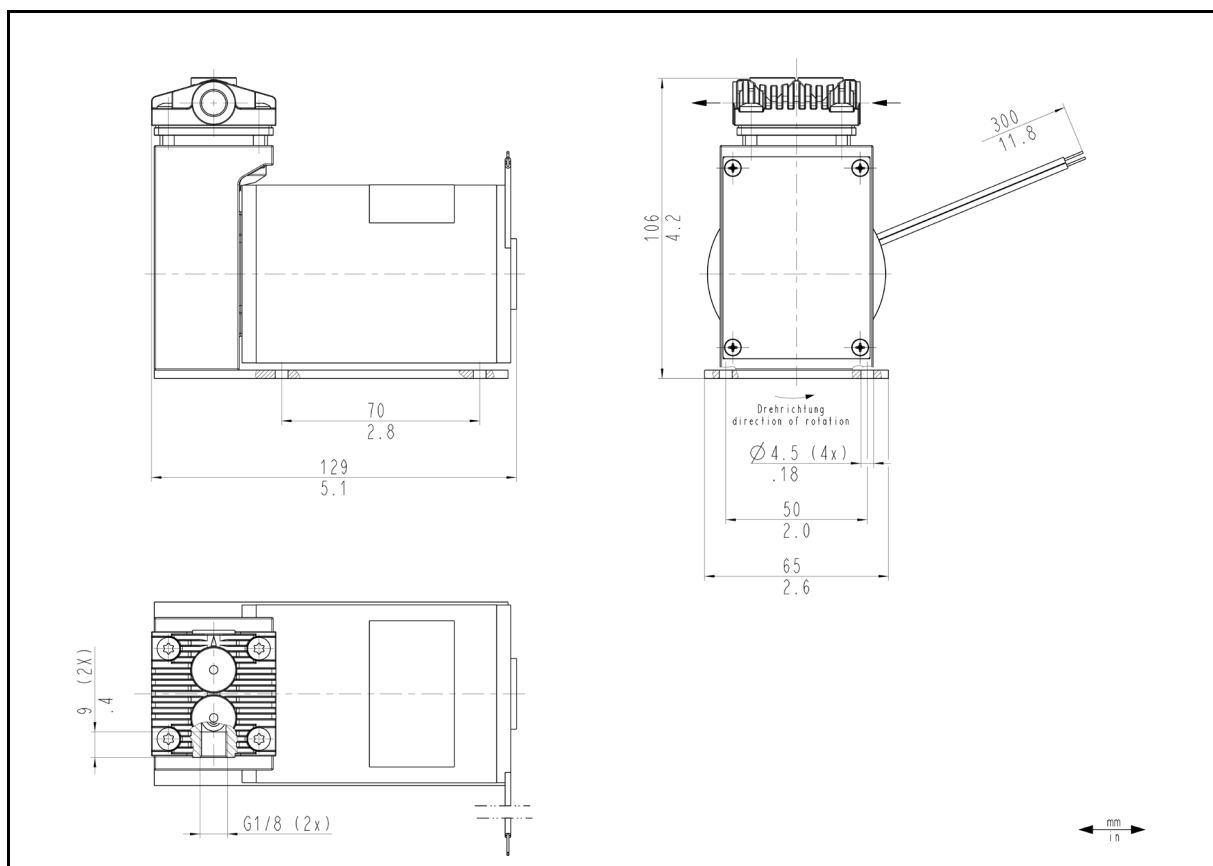


Fig. 6 Mounting dimensions NPK09 DC

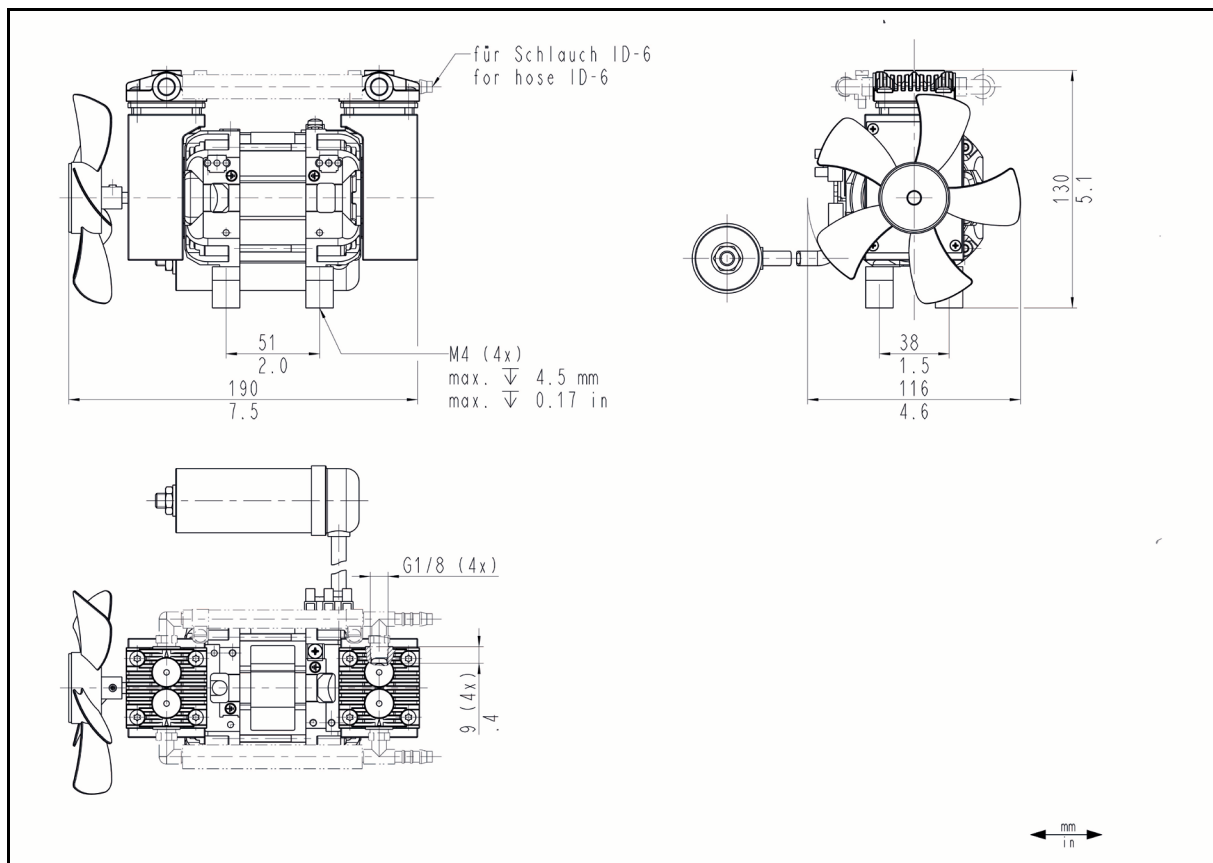




Fig. 7 Mounting dimensions NPK09.1, NPK09.2, NPK09.1.2

	→ Install the pump so as accidental finger contact is with the fan is impossible.
Cooling air supply	<hr/> <div>  <p><b>WARNING</b></p> </div> <p>Danger of burning on hot surfaces</p> <p>Hot surfaces could occur if the pump overheats.</p> <p>→ When installing the pump, make sure that sufficient cooling air infeed and discharge is ensured.</p> <hr/>
Immediate environment of the hot pump parts	→ During installation, make sure that no combustible or thermally deformable objects are positioned in the immediate area of the hot pump parts (head, drive).
Installation location	<p>→ Make sure that the installation location is dry and the pump is protected from rain, splash water, dripping water and other contamination.</p> <p>→ Make sure the pump location in the instrument allows access for periodic maintenance and inspection.</p> <p><b>i</b> The IP protection class of the pump motor is specified on the type plate.</p> <p>→ Mount the pump at the highest point in the system to prevent condensate from collecting in the pump head.</p> <p>→ Protect the pump from dust.</p> <p>→ Protect the pump from vibration and impact.</p> <p>→ Choose a safe location (flat surface) for the pump.</p> <hr/> <div>  <p><b>WARNING</b></p> </div> <p>Personal injury and/or damage to property because of vibration</p> <p>In conjunction with adjacent components, vibration of the pump may result in crushing and/or damage to these components.</p> <p>→ Make sure that vibrations of the pump do not result in hazards associated with adjacent components.</p> <hr/>
Foreign matter protection	→ Protect the pump against contact and intrusion of foreign matter.

## 7.2. Electrical connection



Danger to life from electric shock

**DANGER**

→ Only have the pump connected by an authorized specialist.

→ Only have the pump connected when the power supply is disconnected.

- When connecting to a power source, observe the applicable regulations, directives, and technical standards.
- Install a device for separating the pump motor from the electrical mains in the electrical installation (e.g., in accordance with EN 60335-1).
- Protect the pump motors, e.g., in accordance with EN 60204-1 (overcurrent protection, overload protection).
- i** Refer to the type plate for the maximum current consumption of the pump.
- It is recommended that an additional “Emergency Stop” switch is installed.
- Mount the pumps in such a way that it is not possible to touch electrically live parts (electrical connection).
- Fastening the connection cables** → Fasten the connection cables so that
  - the cables do not come into contact with movable or hot parts.
  - the cables cannot be worn or damaged on sharp corners or edges
  - no tensile and pressure forces are exerted on the connection point of the cables (strain relief)
- Thermal switch** **i** The pumps are fitted as standard with a thermal switch to protect against overloading (connection according to operating instructions of the motor).

### Connecting the pump

1. Confirm that the supply voltage meets the parameters listed on the pump nameplate. Refer to the pump nameplate for the rated current consumption.
- i** The voltage must not vary by more than + 10% and - 10% from that shown on the type-plate.
2. Connect the earth (ground) wire to the motor (not necessary on dc motors up to 24V).
3. For NPK09 AC:  
Connect the mains cables to the connections L1 and N of the pump motor.
4. For NPK09 DC:  
Connect the positive and negative pole.
- i** Note the proper polarity (see marking on the motor).

Correct connection:

- + red cable
- black cable

### **EMC-compatible Installation (for NPK09 DC)**

The Tests:

- Magnetic field with energy-technical frequency
- Electromagnetic HF field, amplitude-modulated
- Electromagnetic HF field, pulse-modulated
- Discharging of static electricity
- High frequency, asymmetric
- Fast transients

were not carried out, cause the products do not contain electronic modules, which can be affected by these tests.

The Surge-test can only be passed with additional means, or is not mandatory, if: From EN61000-6-1 technical norm for EMC protection, part 1,10 test demands for EMC protection, table 3, EMC protection, D.C.- power in- and outputs. Remark 3: (quotation) Not to be used with input connections which are foreseen for a connection with a battery or a rechargeable battery which has to be removed or disconnected from the device for the recharge.

Devices with a D.C. power input which are foreseen to be operated with an A.C. / D.C. converter have to be tested at an A.C. power input of an A.C. / D.C. converter fixed by the manufacturer. In case the converter was not fixed they have to be tested at an A.C. power input of a typical (usual) A.C. / D.C. converter.

The test is applicable for D C power inputs which are foreseen for a permanent connection to cables which are longer than 10 m.

### 7.3. Pneumatic connection



#### CAUTION

Personal injury or property damage through ejected plugs

If not removed, the plugs on the pressure side of the pump can be ejected during operation by the resulting overpressure.

- ➔ Remove the plugs during installation.
- ➔ Wear appropriate personal protective equipment.

Connected components

- ➔ Only connect components to the pump which are designed for the pneumatic data and thermal requirements of the pump (see Chapter 4. Technical Data).

Pump discharge

- ➔ If the pump is being used as a vacuum pump, safely (relating to the medium and noise) discharge the possibly hot pump discharge via the pneumatic outlet of the pump.

#### Connecting the pump



#### CAUTION

Risk of injury from mixing up suction side and pressure side

Mixing up the suction side and pressure side can result in breakage of connected components on the suction side and pressure side.

- ➔ Observe the marking of inlet and outlet on the pump head.



A marking on the pump head shows the direction of flow.

1. Remove the protective plugs from the hose connection threads.
2. If the accessories silencer, filter, and hose connector are present, screw them onto the corresponding hose connection threads.



The filter or silencer is to be mounted on the suction side or pressure side of the pump head. With multiple-head pumps, this relates to the first pump head or last pump head.

3. Connect the suction line and the pressure line (for mounting dimensions, see Chapter 4. Technical Data).
4. Lay the suction line and pressure line with a descent so that no condensate can run into the pump.



Pneumatic noises can be reduced or dissipated by using a silencer (see Chapter 11. Spare parts and accessories).

## 8. Operation

### 8.1. General

---

**WARNING**

Risk of burns from hot pump parts and/or hot medium

Some pump parts may be hot during or after operation of the pump.

- ➔ Allow the pump to cool after operation.
  - ➔ Take protective measures to protect against touching hot part.
- 

**WARNING**

Injury to eyes

Coming too close to the inlet/outlet of the pump may result in injury to the eyes due to the present vacuum/operating pressure.

- ➔ Do not look into the pump inlet/outlet during operation.
- 

- ➔ Only operate the pumps under the operating parameters and operating conditions described in Chapter 4. Technical Data.
- ➔ Ensure the proper use of the pumps (See Chapter 2.1. Proper use).
- ➔ Eliminate the possibility of improper use of the pumps (see Chapter 2.2).

Improper use).

- Observe the safety instructions (see Chapter 3. Safety).
- The pumps are built-in devices. Before they are commissioned, it must be ensured that the machines or systems into which the pumps are installed comply with the relevant provisions



#### WARNINGS

Risk of the pump head bursting due to excessive pressure increase

- Do not exceed maximum permissible operating pressure (see Chapter 4. Technical Data).
- Monitor the pressure during operation.
- If the pressure exceeds the maximum permissible operating pressure of the pump: immediately switch off pump and remedy the fault (see Chapter 10. Troubleshooting).
- Only throttle or regulate the air or gas quantity in the suction line to prevent the maximum permissible operating pressure from being exceeded.
- If the air or gas quantity in the pressure line is throttled or regulated, make sure that the maximum permissible operating pressure at the pump is not exceeded.
- Ensure that the pump outlet is not closed or restricted.



Excessive pressure with all of the associated hazards can be prevented by means of a bypass line with a pressure relief valve between the pressure and suction sides of the pump. Further information is available from KNF Customer Service (contact data: see [www.knf.com](http://www.knf.com)).



#### WARNING

Risk of dangerous gas mixtures during pump operation if sealing lip breaks

If the sealing lip should break, the medium will mix with the air in the compressor housing or in the surroundings.

- Stop pump immediately.
- Replace the sealing lip prior to further operation (see Chapter 9. Servicing).

**WARNING**

Automatic starting can cause personal injury and pump damage

When the operation of the pump is interrupted by the thermal switch, the pump will restart automatically after cooling down.

- ➔ Take all necessary care to prevent this leading to a dangerous situation.



Operation with open suction-side gas connection can result in contaminants and objects being drawn in.

Pump stoppage

- ➔ With the pump at a standstill, establish normal atmospheric pressure in the lines.

Vapors as a medium

The service life of the sealing lip can be extended, if no condensate forms in the pump. Therefore:

- ➔ Perform any work with saturated or near-saturated vapors only with a warm pump.
- ➔ KNF recommends: When pumping corrosive media, flush the pump before switching off (see Chapter 9.2.1. Flushing the pump) to extend the service life of the sealing lip.

## 8.2. Information on switching the pump on and off

### Switching on the pump

- ➔ Ensure that normal atmospheric pressure is present in the lines when switching on.



The pump may not start up against pressure or vacuum during switch-on. This also applies in operation following a brief power failure. If a pump starts against pressure or vacuum, it may block. This activates the thermal switch, and the pump switches off.

### Switching off/deactivating the pump

- ➔ Establish normal atmospheric pressure in the lines (relieve pump pneumatically).

Recommissioning

- ➔ Before recommissioning, observe the applicable standards, guidelines, regulations and technical standards at the electrical connection.

Inspecting the pump

- ➔ Inspect the pump periodically for external damage or leakage.
- ➔ Sealing lip and valve plates 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 Chapter 9.
- ➔ Change the filter (accessories) if it is dirty.



## 9. Servicing

### **i** Servicing the pump

Damage to the pumps can result from failure to observe the applicable legal regulations and procedures for the location or intervention by untrained or uninstructed personnel.

Servicing may only be performed according to the legal regulations (e.g. work safety, environmental protection) and provisions.

Servicing may only be performed by specialized personnel or trained and instructed personnel.

### 9.1. Servicing schedule



#### **WARNING**

Risk of injury when not using original parts

Failure to use original parts will result in a loss of pump functionality and safety. The validity of the CE conformity is rendered void if genuine parts are not used.

→ Use only genuine spare parts from KNF when performing maintenance/repair work.

Component	Servicing interval
Pump	<p>→ Inspect the pump periodically for external damage or leakage.</p> <p>→ Check regularly for conspicuous changes in the noise and vibrations.</p>
Gas connections	<p>→ Inspect the pump periodically for external damage or leakage.</p>

Tab. 11

## 9.2. Cleaning

### 9.2.1. Flushing the pump

When transferring dangerous and environmentally hazardous media, KNF recommends flushing the pump with air at atmospheric pressure for a few minutes prior to switch-off (if necessary for safety reasons: with an inert gas) to extend the service life of the sealing lip.

→ Discharge the media safely.

---

### 9.2.2. Cleaning the pump

---



Risk of burns from hot pump parts

The pump head or motor may still be hot after operation of the pump.

**CAUTION**

→ Allow the pump to cool after operation.

---



Health hazard due to dangerous substances in the pump

Depending on the medium being transferred, caustic burns or poisoning is possible.

**WARNING**

- Wear protective equipment if necessary, e.g., protective gloves, goggles.
  - Clean the pump with suitable measures.
- 



During cleaning work, ensure that no fluids enter the interior of the housing.

- Only clean the pump with a dry wiping cloth. When cleaning, use no solvents if possible as these can affect the plastic parts.
- Only use solvents during cleaning if head materials are not affected (ensure resistance of the material).
- If compressed air is present, blow out the components.

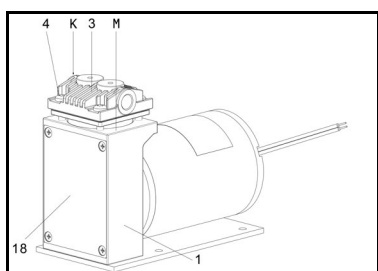


Fig. 8: Pump element (single head types)

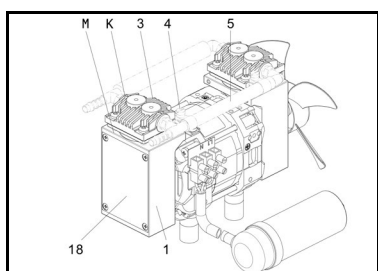


Fig. 9: Pump element (twin head types)

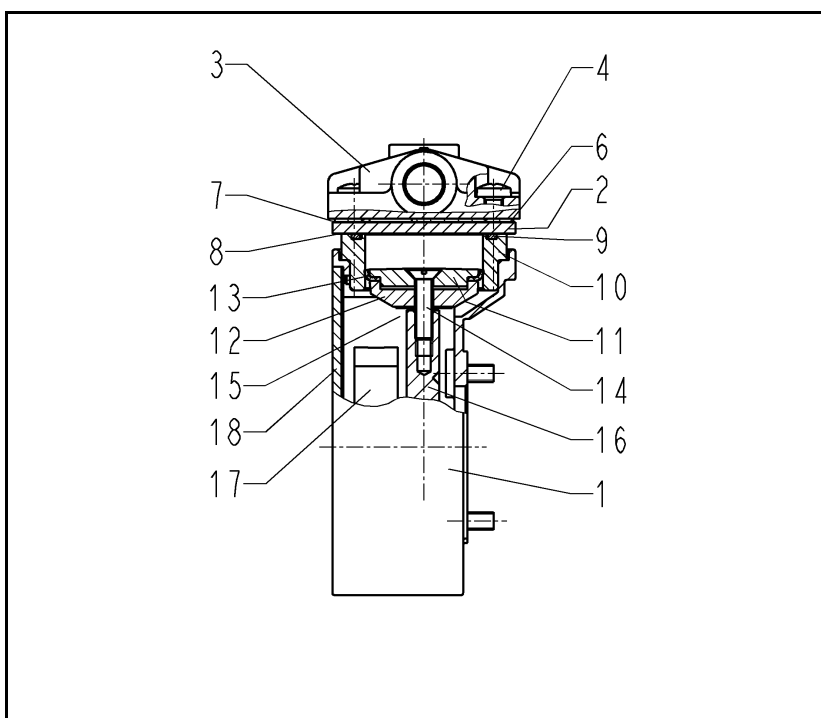


Fig. 10: Pump element (all types)

## Specifiaction

Pos. Description

- 1 Housing
- 2 Intermediate plate
- 3 Ribbed head
- 4 Screw
- 5 Connection (only twin head models)
- 6 Gasket
- 7 Valve Plate
- 8 Valve Plate
- 9 O-Ring
- 10 Cylinder
- 11 Retainer Plate
- 12 Support
- 13 Sealing lip
- 14 Screw
- 15 Washer(s)
- 16 Connecting rod
- 17 Counter weight
- 18 Cover

- M Mark
- K Compression symbol

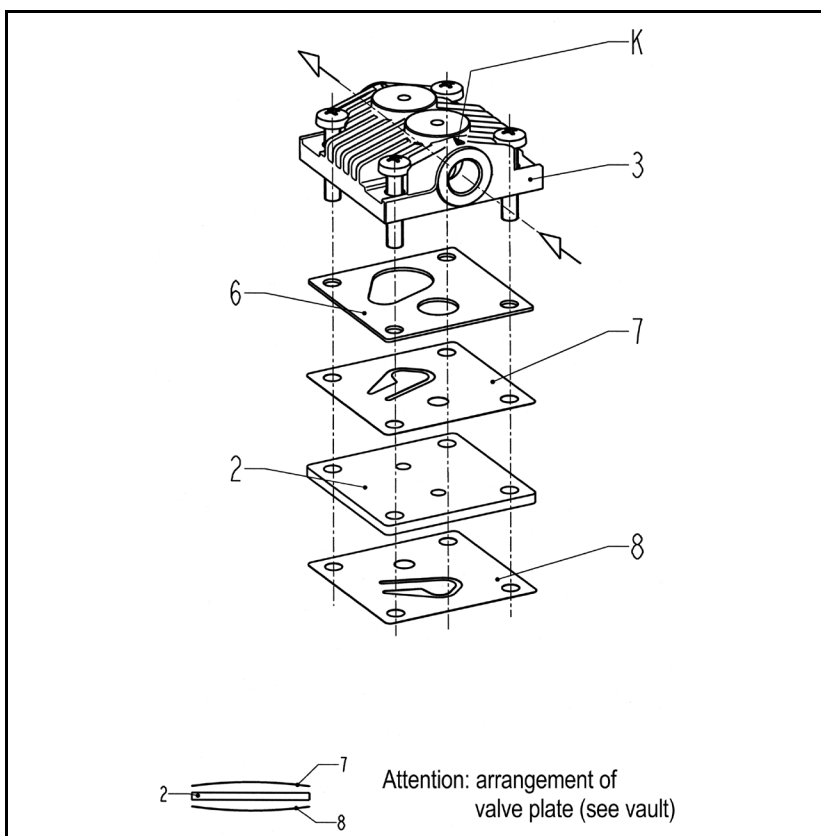


Fig. 11: Pump head (all types)

### 9.3. Changing the sealing lip and the valve plates

#### 9.3.1. Changing the sealing lip

The sealing lip, and to a lesser extent the valve plates are the only parts of the pump subject to wear. They are simple to change.

When changing the sealing lip, check the valve plates for damage (tongues bent, corrosion).

- Requirements
- ➔ Disconnect the motor from mains and ensure that it is voltage-free.
  - ➔ Clean the pump and free the pump of hazardous materials.

Parts required	Spare part*	Quantity
	Sealing lip	1 (twin head pumps: 2)
	Countersunk flat head screw (14)	2 (twin head pumps: 2)

Tab. 12 \* According to Spare parts list, see Chapter 11. Spare parts and accessories

Tools required	Tools/Material
	Screwdriver TX20
	Screwdriver (blade width 5,5 mm)
	Phillips screwdriver no. 1
	Felt-tip pen

Tab. 13

Information on the procedure Always replace the sealing lip together to maintain the performance of the pump.



Risk of burns from hot pump parts and/or hot medium

#### WARNING

Some pump parts may be hot during or after operation of the pump.

- ➔ Allow the pump to cool after operation.
- ➔ Take protective measures to protect against touching hot parts.



Health hazard due to dangerous substances in the pump

#### WARNING

Depending on the medium being transferred, caustic burns or poisoning is possible.

- ➔ Wear protective equipment if necessary, e.g., protective gloves, goggles.
- ➔ Clean the pump with suitable measures.

**i** Disassemble in the following order:

**S**

### Work steps

**i** The item numbers within the following work instruction refer to Fig. 8 to Fig. 11.

**i** Ensure the stable condition of the pump during all servicing work.

1. In the case of twin head models the connecting pipework between the heads must first be removed.
2. Make a mark (**M**) on the ribbed head (**3**), intermediate plate (**2**), and housing (**1**) with a felt-tip pen (see **M** in Fig. 8 and Fig 9). This helps avoid incorrect assembly later.
3. Unscrew the 4 screws (**4**) and take off the ribbed head (**3**).
4. Remove gasket (**6**), valve plate (**7**), intermediate plate (**2**) and valve plate (**8**) from housing (**1**).
5. Only for the pump model NPK09 DC:  
Take off the cover (**18**) after removing the 4 screws securing it.  
For this pump type applies:  
Where reference is made to turning or holding the cooling fan, the necessary operations must be carried out by turning or holding the counter-weight (**17**).
6. Turn the fan to bring the retainer plate (**11**) to top dead centre.
7. Pull the cylinder (**10**) upwards to remove it.
8. Hold the fan, loosen the retainer plate screw (**14**) and remove screw, retainer plate, support (**12**) and washer(s) (**16**).
9. Remove the sealing lip (**13**) from the retainer plate.
10. Check that all parts are free from dirt and clean them if necessary (see Chapter 9.2. Cleaning).
11. Check the valve plates for damage (tongues bent, corrosion); if necessary use new ones when reassembling.

### Assembly

1. Hold the connecting rod (**16**) vertical and replace the cylinder (**10**) on the pump housing (**1**).
2. Re-assemble the "piston assembly":
  - Lay the new sealing lip (**13**) on the retainer plate (**11**) with the sealing lip towards the free surface of the retainer plate.
  - Lay the support (**12**) on the retainer plate/sealing lip assembly.
  - Push the new countersunk flat head screw (**14**) through the assembly and fit the same number of washers as previously used.

3. Insert the piston assembly (retainer plate, support, sealing lip and washer(s) with their screw) into the cylinder from above, on to the connecting rod.

**i** The sealing lip must not be distorted during assembly. It must make contact with the cylinder all round its circumference.

4. Fasten the "piston assembly" by tightening the screw (14).

5. Reassemble the "head assembly":

Stack the following parts on top of each other in the order given - ribbed head (3), gasket (6), valve plate (7), intermediate plate (2), and valve plate (8). Fig. 11 shows the correct orientation of the parts, particularly the valve plates, in relation to the compression symbol on the head plate. Both valve plates are identical, and they can be fitted either way up. The intermediate plate can also be fitted either way up.

**i** The valve plates are identical for the pressure and suction side. The same applies for the top and bottom of the valve plates.

6. Place the "head assembly" on the pump housing (1) - as a guide to orientation see Fig. 8 or Fig 9. Reference point is the compression symbol (indicated with a **K** in the diagrams), or the mark (**M**).

7. Tighten the screws (4) at first lightly, then firmly by hand, in a diagonal pattern (max. tightening torque 1.5 Nm).

8. Rotate the fan by hand to check that pump turns easily.

9. Pump model NPK09 DC only:  
refit cover (18) to the housing.

For twin head pumps, repeat the operations described for the second head, and replace the connections between the two heads.

If, after changing the sealing lip, the specified vacuum is not reached, check the following:

- pneumatic connections for tightness
- for twin head models that the head connections are gas-tight
- whether the washer(s) under the support has/have been assembled.

If, after changing the sealing lip, the pump produces no flow, check the position and orientation of gasket (6), valve plate (7), intermediate plate (2) and valve plate (8). See fig. 5,6 and 8.

### 9.3.2. Changing the valve plates

Spare parts

Spare part*	Quantity
Valve plates	2 (twin head pumps: 4)

Tab. 14\* According to Spare parts list, see Chapter 11. Spare parts and accessories

Tool and material

Tools/Material
Screwdriver TX20
Felt-tip pen

Tab. 15

In the case of twin head pumps, both valve plates must always be changed at the same time. The text below describes the operations necessary for one head. To change the valve plates, the following operations of Chapter 9.3.1. Changing the sealing lip must be carried out:

#### Disassembly

Follow the steps 1 to 4 and 10 to 11.

#### Assembly

Follow the steps 5 to 8 using new valve plates (2 for each head).

For twin head pumps, repeat the operations described for the second head, and replace the connections between the two heads.

If, after changing the valve plates, the specified vacuum is not reached, check the following:

- pneumatic connections for tightness
- for twin head models that the head connections are gas-tight

If, after changing the valve plates, the pump produces no flow:

- check the position and orientation of gasket (6), valve plate (7), intermediate plate (2) and valve plate (8). See fig. Fig. 8, Fig 9 and Fig. 11.

#### Final steps

- Reconnect the suction line and the pressure line to the pump.
- Connect the pump to the electrical mains.
- Checking the pump head (pump heads) and pneumatic connections for leaks:



**WARNING**

Risk of injury and poisoning from leaks

→ Before recommissioning the pump, check the pump heads and pneumatic connections for leaks. Leaks may lead to poisoning, chemical burns or similar injuries.

If you have questions with regard to maintenance, please contact your KNF technical adviser (contact data: see [www.knf.com](http://www.knf.com)).

## 10. Troubleshooting



Danger: electric shock can be life-threatening.

→ All work on the pump may only be performed by an authorized specialist.

### **DANGER**

→ Before working on the pump: Disconnect the pump from the power supply.

→ Check and ensure that no voltage is present.

→ Disconnect the pump power supply before working on the pump.

→ Make sure the pump is de-energized and secure.

→ Check the pump (see Tab. 16 and Tab. 17).

<b>Pump does not transfer</b>	
<b>Cause</b>	<b>Troubleshooting</b>
Thermal switch has operated following to over-heating.	→ Disconnect pump from mains. → Allow pump to cool. → Identify and eliminate cause of overheating.
Pneumatic connections or lines are blocked.	→ Check connections and lines. → Remove blockage.
External valve is closed or filter is plugged.	→ Check external valves and filters.
Condensate has collected in the pump head.	→ Separate the source of the condensate from the pump. → Flush the pump with air at atmospheric pressure for a few minutes (if necessary for safety reasons: with an inert gas). → Install the pump at the highest location in the system.
Sealing lip or valve plates are worn or defective.	→ Replace sealing lip and valve plates (see Chapter 9.3. Changing the sealing lip and the valve plates )

Tab. 16



<b>Flow rate, pressure or vacuum too low</b>	
The pump does not reach the performance stated in the technical data or the data sheet.	
Cause	Troubleshooting
Condensate has collected in pump head.	<ul style="list-style-type: none"> <li>➔ Separate the source of the condensate from the pump.</li> <li>➔ Flush the pump with air at atmospheric pressure for a few minutes (if necessary for safety reasons: with an inert gas).</li> <li>➔ Install the pump at the highest location in the system.</li> </ul>
There is overpressure on pressure side and at the same time vacuum or a pressure above atmospheric pressure on the suction side.	<ul style="list-style-type: none"> <li>➔ Change the pneumatic conditions.</li> </ul>
Pneumatic lines or connection parts have an insufficient cross section or are throttled.	<ul style="list-style-type: none"> <li>➔ Disconnect the pump from system to determine the output values.</li> <li>➔ Eliminate throttling (e.g. valve) if necessary.</li> <li>➔ Use lines or connection parts with larger cross section if necessary.</li> </ul>
Leaks occur on connections, lines or pump head.	<ul style="list-style-type: none"> <li>➔ Eliminate the leaks.</li> </ul>
Connections or lines completely or partially clogged.	<ul style="list-style-type: none"> <li>➔ Check the pneumatic connections and lines.</li> <li>➔ Remove any parts or particles that are causing blockages.</li> </ul>
Head parts are soiled.	<ul style="list-style-type: none"> <li>➔ Clean head components.</li> </ul>
Sealing lip or valve plates are worn or defective.	<ul style="list-style-type: none"> <li>➔ Replace sealing lip and valve plates (see Chapter 9.3.2. Changing the sealing lip and the valve plates)</li> </ul>

Tab. 17

**Fault cannot be rectified**

If you are unable to identify any of the specified causes, send the pump to KNF Customer Service (contact data: see [www.knf.com](http://www.knf.com)).

1. Flush the pump with air for a few minutes (if necessary for safety reasons: with inert gas) at atmospheric pressure to free the pump head of dangerous or aggressive gases (see Chapter 9.2.1. Flushing the pump).
2. Remove the pump
3. Clean the pump (see Chapter 9.2.2. Cleaning the pump)
4. Send the pump together with completed Health and Safety Clearance and Decontamination Form to KNF stating the nature of the transferred medium.

## 11. Spare parts and accessories

**i** To order spare parts and accessories, please contact your KNF sales partner or KNF Customer Service (contact data: see [www.knf.com](http://www.knf.com)).

### 11.1. Spare parts

Pos. Nr*	Description	Order-No.
(5)	Connection for NPK09.1	026178
	NPK09.1.2 (suction side)	
	Connection for NPK09.2	026179
	NPK09.1.2 (pressure side)	
(6)	Gasket	052650
(7)(8)	Valve plate	052649
(9)	O-Ring	317559
(10)	Cylinder	318168
(13)	Sealing lip	304346

Tab. 18

\*according to Fig. 10: Pump element (all types)

### 11.2. Accessories

Description	Order-No.
Silencer/Filter (G 1/8)	007005
Hose connector for tube ID 6 mm (G 1/8)	000360

Tab. 19

## 12. Returns

### Preparing for return

1. Flush the pump with air for a few minutes (if necessary for safety reasons: with inert gas) at atmospheric pressure to free the pump head of dangerous or aggressive gases (see Chapter 9.2.1. Flushing the pump).
- i** Please contact your KNF sales partner if the pump cannot be flushed due to damage.
2. Remove the pump.
3. Clean the pump (see Chapter 9.2.2. Cleaning the pump).
4. Send the pump together with the completed Health and Safety Clearance and Decontamination Form to KNF, stating the nature of the transferred medium.
5. Pack the device securely to prevent further damage to the product. If necessary, request original packaging for a fee.

### Returns

KNF shall undertake to repair the pump only under the condition that the customer presents a certificate regarding the medium that is pumped and the cleaning of the pump. Please follow the instructions at [knf.com/repairs](https://knf.com/repairs) here.

Contact your KNF sales partner directly if you require additional support for your return service.

**KNF worldwide**

You can find our local KNF partners at: [www.knf.com](http://www.knf.com)