

Diaphragm Vacuum Pumps and Compressors

N 145 ANE	N 145.2 ANE
N 145 AN.9 E	N 145.2 AN.9 E
N 145 ATE	N 145.2 ATE
N 145 AVE	N 145.2 AVE
N 145 SNE	N 145.2 SNE
N 145 SN.9 E	N 145.2 STE
N 145 STE	N 145.2 SVE
N 145 ST.9 E	
N 145 SVE	

Operating and Installation Instructions

Read and observe these Operating and Installation Instructions!



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
www.knf.de

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1. About this document

1.1. Using the Operating and Installation Instructions

The Operating and Installation Instructions are part of the pump.

- Pass on the Operating and Installation Instructions to the next owner.

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

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

1.2. Symbols and Markings

Warning



WARNING

A danger warning 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
DANGER	warns of immediate danger	Death or serious injuries and/or serious damage are the consequence.
WARNING	warns of possible danger	Death or serious injuries and/or serious damage are possible.
CAUTION	warns of a possibly dangerous situation	Minor injuries or damage are possible.

Tab. 1

Other information and symbols

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

1. The first step of an activity to be carried out is specified here.
Additional, consecutively numbered steps follow.

- This symbol refers to important information.

2. Use

2.1. Proper use

The pumps are exclusively intended for transferring gases and vapors.

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.

Make sure that the installation location is dry and the pump is protected against rain, splash, hose and drip water.

Requirements for transferred medium

Before using 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, structured diaphragm and valves with the medium.

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

2.2. Improper use

The pumps may not be operated in an explosive atmosphere.

The pumps are not suitable for transferring dusts.

The pumps are not suitable for transferring liquids.

Pumps designed to create either a vacuum or an overpressure must not be used for these two purposes simultaneously.

An overpressure must not be applied to the suction side of the pump.

3. Safety

i Note the safety precautions in sections 6. *Installation and connection*, and 7. *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	<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 the personnel has read and understood the Operating and Installation Instructions, and in particular the "Safety" chapter.</p>
Working in a safety-conscious manner	<p>Observe the accident prevention and safety regulations when performing any work on the pump and during operation.</p> <p>The pump heads heat up during operation – avoid contact with them.</p>
Handling dangerous media	<p>When transferring dangerous media, observe the safety regulations when handling these media.</p>
Handling combustible media	<p>Be aware that the pumps are not designed to be explosion-proof.</p> <p>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.</p> <p>Note that the temperature of the medium increases when the pump compresses the medium (compressor operation).</p> <p>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 (chapter 4).</p> <p>If necessary, consider any external sources of energy, such as radiation, that may add heat to the medium.</p> <p>In case of doubt, consult the KNF customer service.</p>
Environmental protection	<p>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.</p>
EC Directives / Standards	<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</p>

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.

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 pumps conform to the Directive 2011/65/EU.

The following harmonized standards have been used:

- DIN EN 50581
- DIN EN 55014-1/2
- DIN EN 61000-3-2/3
- DIN EN 60204-1

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

Use only genuine parts from KNF for servicing work.

4. Technical Data

Pump materials

Pump type	Material			
	Pump head	Diaphragm	Valve	Gasket
N 145 ANE	Aluminium	CR	Stainless steel	CR
N 145 AN.9 E				
N 145.2 ANE				
N 145.2 AN.9 E				
N 145 ATE	Aluminium	PTFE-coated	Stainless steel	FPM
N 145.2 ATE	Aluminium	FPM	Stainless steel	FPM
N 145 AVE				
N 145.2 AVE	Stainless steel	CR	CR	-
N 145 SNE				
N 145 SN.9 E				
N 145.2 SNE				
N 145 STE	Stainless steel	PTFE-coated	PTFE	-
N 145 ST.9 E				
N 145.2 STE				
N 145 SVE	Stainless steel	FPM	FPM	-
N 145.2 SVE	Stainless steel	FPM	FPM	-

Tab. 2

Pneumatic values

Pump type	Delivery rate* (l/min) at atm. pressure	Max. permissible operating pressure (bar g)	Ultimate vacuum (mbar abs.)
N 145 ANE	30	7	100
N 145 AN.9 E			
N 145 ANE 3 phase			
N 145 AN.9 E 3 phase			
N 145 SNE			
N 145 SN.9 E			
N 145 SNE 3 phase	27	7	100
N 145 ATE			
N 145 STE			
N 145 ST.9 E			
N 145 ST.9 E 3 phase	30	5	100
N 145 AVE			
N 145 SVE			
N 145 SVE 3 phase	55	7	-
N 145.2 ANE			
N 145.2 ANE 3 phase			
N 145.2 AN.9 E 3 phase			
N 145.2 SNE			
N 145.2 SNE 3 phase			

Tab. 3 (1st part)

*Liters in standard state (1,013 mbar)

Pump type	Delivery rate* (l/min) at atm. pressure	Max. permissible operating pressure (bar g)	Ultimate vacuum (mbar abs.)
N 145.2 ATE	49.5	7	-
N 145.2 ATE 3 phase			
N 145.2 STE			
N 145.2 STE 3 phase			
N 145.2 AVE	55	5	-
N 145.2 AVE 3 phase			
N 145.2 SVE			
N 145.2 SVE 3 phase			

Tab. 3 (2nd part)

*Liters in standard state (1,013 mbar)

Electrical data

Pump type*	Voltage [V]	Frequency [Hz]	Power P1 [W]	Operating current [A]
N 145 ANE	230	50	320	2.1
N 145 AN.9 E				
N 145 ATE				
N 145 AVE				
N 145 SNE				
N 145 SN.9 E				
N 145 STE				
N 145 ST.9 E				
N 145 SVE				
N 145 ANE 3 phase	230/400	50	300	2.0/1.0
N 145 AN.9 E 3 phase				
N 145 SNE 3 phase				
N 145 ST.9 E 3 phase				
N 145 SVE 3 phase				
N 145.2 ANE 3 phase	230/400	50	350	2.0/1.0
N 145.2 AN.9 E 3 phase				
N 145.2 ATE 3 phase				
N 145.2 AVE 3 phase				
N 145.2 SNE 3 phase				
N 145.2 STE 3 phase				
N 145.2 SVE 3 phase				
N 145.2 ANE	230	50	350	2.1
N 145.2 ATE				
N 145.2 AVE				
N 145.2 SNE				
N 145.2 STE				
N 145.2 SVE				

Tab. 4

* see type plate

Protection class: IP 44

Thermal-switch

i The pumps with capacitor motor are fitted as standard with a thermal-switch to protect against overloading.

Other parameters

Parameter	Values
Permissible ambient temperature	+ 5 °C to + 40 °C
Permissible media temperature	+ 5 °C to + 40 °C
Gas-tightness of pump head (leak rate)* for all pumps except .9 versions (not tested)	approx. 6×10^{-3} mbar l/s
Gas-tightness of pump head (leak rate)* for N 145 __.9 E	< 6×10^{-3} mbar l/s

Tab. 5

* After opening pump head or replacing the diaphragm and reed valves (or valve plate) the gas tightness is no longer guaranteed. A leak test is able to verify that the original standard of gas-tightness has been achieved.

5. Design and Function

Design N 145 __E

- 1 Pneumatic pump outlet
- 2 Pneumatic pump inlet
- 3 Motor
- 4 Terminal box (electrical connection)

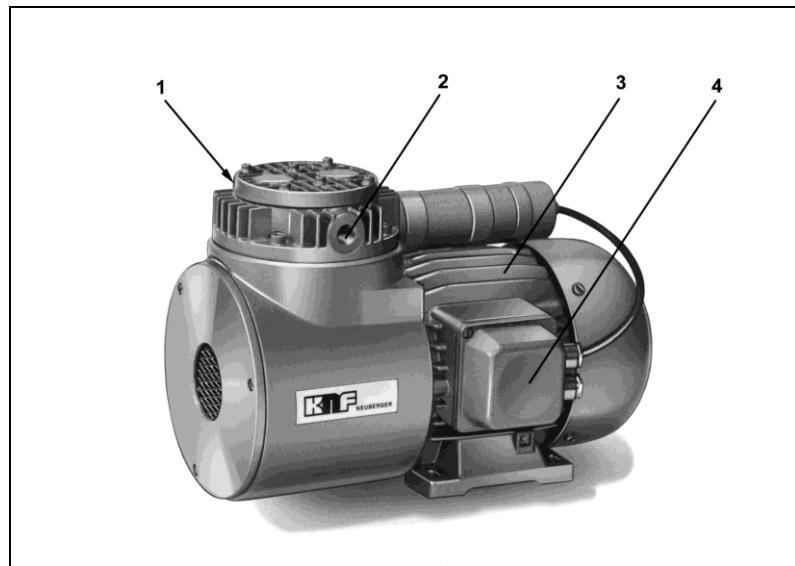


Fig. 1: Diaphragm Pump N 145 ANE

Design N 145.2 __E

- 1 Pneumatic head connection
- 2 Pneumatic pump outlet
- 3 Pneumatic pump inlet
- 4 Motor
- 5 Terminal box (electrical connection)

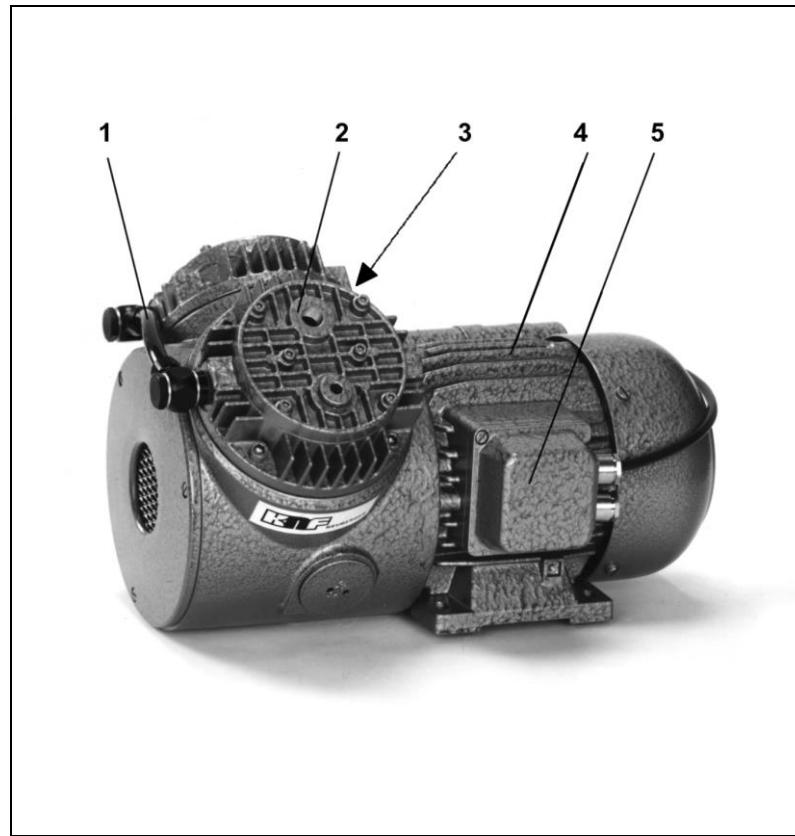


Fig. 2: Diaphragm Pump N 145.2 ANE

Function diaphragm pump

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

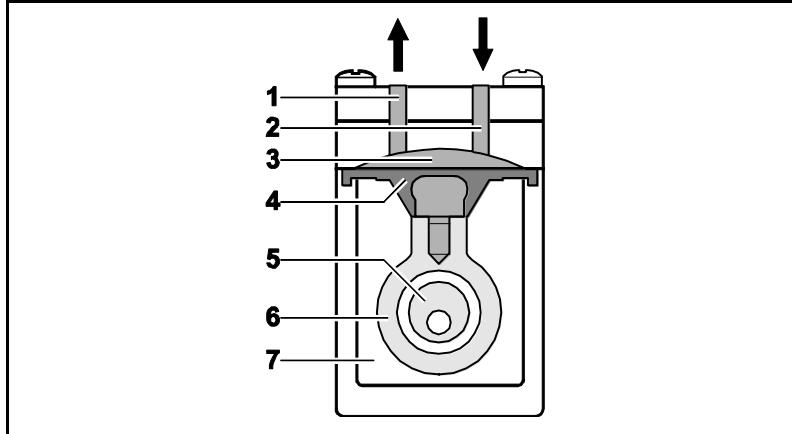


Fig. 3: Pump head

The pump transfers, compresses (depending on pump version) and evacuates gases and vapors.

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 gas to be transferred via the inlet valve (2). In the upward stroke, the diaphragm presses the medium out of the pump head via the outlet valve (1). The transfer chamber (3) is hermetically separated from the pump drive (7) by the diaphragm.

6. Installation and connection

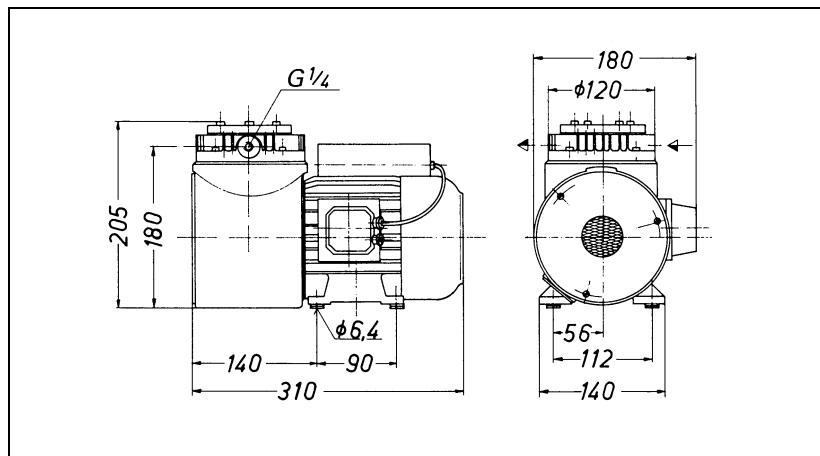
Only install and operate the pumps under the operating parameters and conditions described in chapter 4, Technical data.

Observe the safety precautions (see chapter 3).

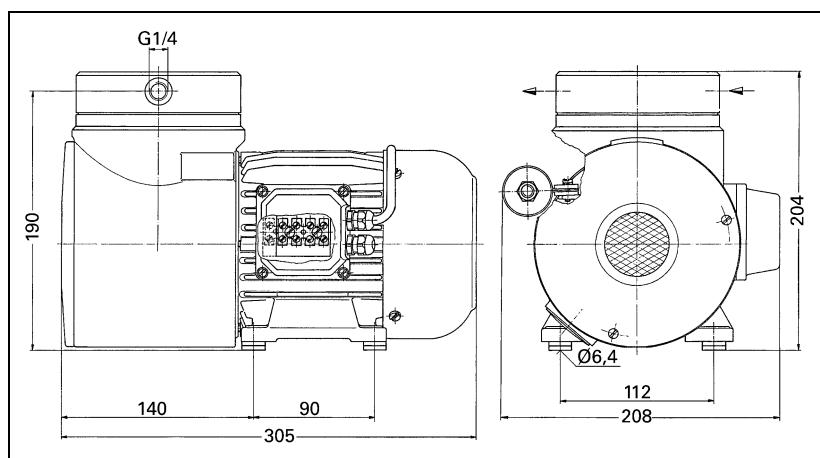
6.1. Installation

- Before installation, store the pump at the installation location to bring it up to room temperature.
- Mounting dimensions (see figs. 4 to 7).

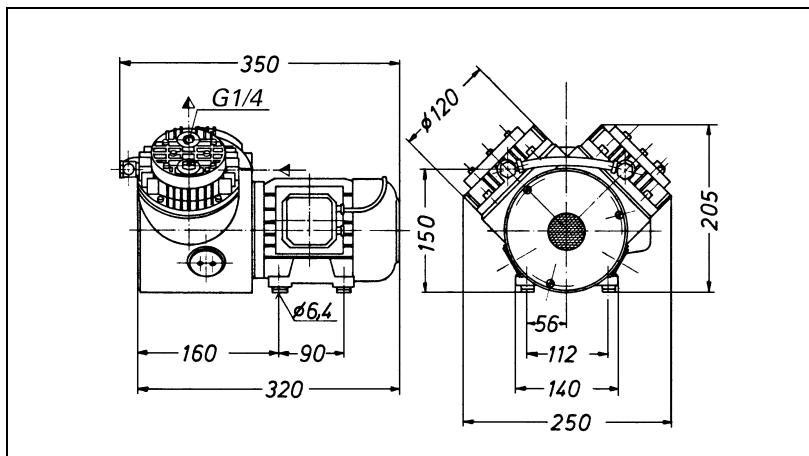
Mounting dimensions



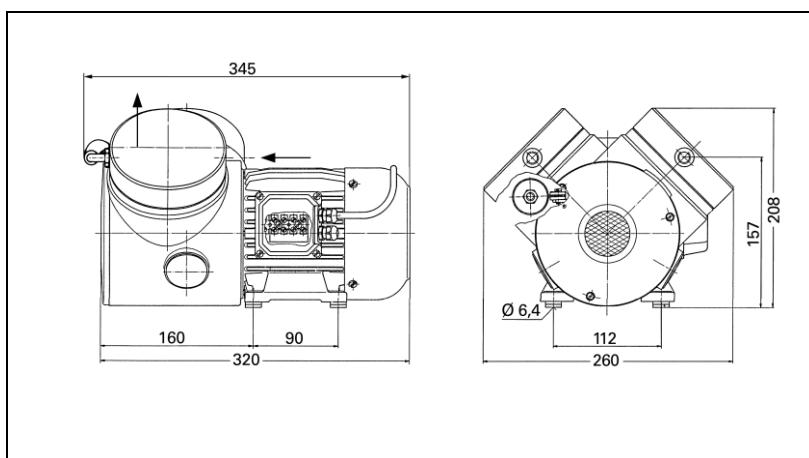
*Fig. 4: Mounting dimensions N 145_A_E including .9 versions
(All dimensional tolerances conform to DIN ISO 2768-1,
Tolerance Class V)*



*Fig. 5: Mounting dimensions N 145_S A_E including .9 versions
(All dimensional tolerances conform to DIN ISO 2768-1,
Tolerance Class V)*



*Fig. 6: Mounting dimensions N 145.2 A_E including .9 versions
(All dimensional tolerances conform to DIN ISO 2768-1,
Tolerance Class V)*



*Fig. 7: Mounting dimensions N 145.2 S_E
(All dimensional tolerances conform to DIN ISO 2768-1,
Tolerance Class V)*

- | | |
|-----------------------|---|
| Cooling air supply | → Install the pump so that the motor fan can intake sufficient cooling air. |
| Installation location | <ul style="list-style-type: none"> → Make sure that the installation location is dry and the pump is protected against rain, splash, hose and drip water. → Install the pump at the highest point in the system to prevent condensate from collecting in the pump head. → Protect the pump from dust. → Protect the pump from vibrations and jolts. |

6.2. Electrical connection



Extreme danger from electrical shock

- 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 standards, directives, regulations, and technical standards must be observed.
- ➔ In the electrical installation, arrangements (complying with EN 60335-1) must be made for disconnecting the pump motor from the electrical supply.
- ➔ KNF recommends that a fuse is installed in the motor supply circuit (overcurrent release).
- i ➔** For operating current see type plate or data sheet.

Connecting pump

1. Compare the supply data with the data on the motor-plate. For operating current see type plate.
- i** The voltage must not vary by more than + 10% and - 10% from that shown on the type-plate.
2. Open terminal box cover.
3. All pumps except versions with 3 phase motor:
Connect the mains cables to the connections L1 and N of the pump motor.
4. Connection of pumps with 3 phase motor according to figs. 8 or 9.
5. Connect the earth (ground) wire to the motor.
6. Close the terminal cover box.

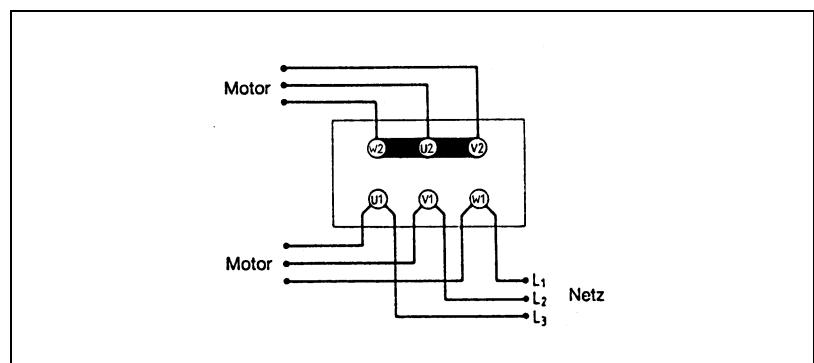


Fig. 8: Y-Connection (high voltage)

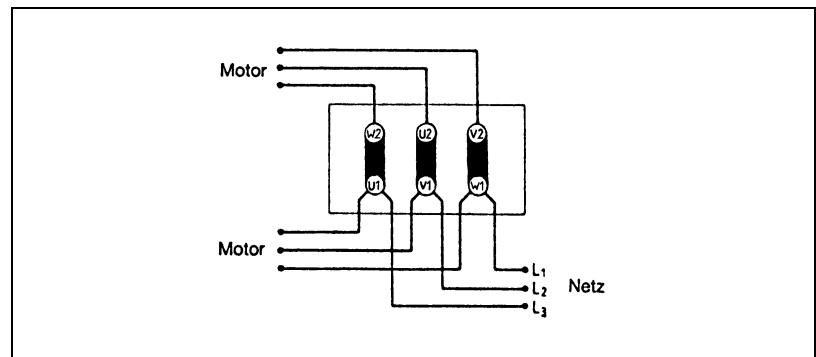


Fig. 9: Δ-Connection (low voltage)

6.3. Pneumatic connection

Connected components ➔ Only connect components to the pump which are designed for the pneumatic data of the pump (see section 4).

Pump exhaust ➔ If the pump is used as a vacuum pump, safely discharge the pump exhaust at the pump's pneumatic outlet.

Connecting pump

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

1. Remove the protective plugs from the hose connection threads.

2. The accessories silencer, filter, and hose connectors (where applicable) are screwed into the port threads.

i If the pump is used as a vacuum pump (not permitted with series N 145.2), mount the silencer at the pressure side if necessary. If the pump is used as a compressor, mount the filter at the suction side if necessary.

3. Connect the suction line and pressure line (thread size G 1/4)
4. Lay the suction and pressure line at a downward angle to prevent condensate from running into the pump.

7. Operation

- Only operate the pump under the operating parameters and conditions described in chapter 4, Technical data.
 - Make sure the pumps are used properly (see section 2.1).
 - Make sure the pumps are not used improperly (see section 2.2).
 - Observe the safety precautions (see chapter 3).
-

**WARNING**

Hazard of the pump head bursting due to excessive pressure increase

- Do not exceed max. permissible operating pressure (see section 4).
 - Monitor pressure during operation.
 - If the pressure exceeds the maximum permissible operating pressure, immediately shut down pump and eliminate fault (see chapter 9. 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 of the pump is not exceeded.
-



Excessive pressure (with all of the related hazards) can be prevented by placing a bypass line with a pressure-relief valve between the pressure and suction sides of the pump. For further information, contact our technical adviser.

Pump standstill

- With the pump at a standstill, open pressure and suction lines to normal atmospheric pressure.

For pumps with thermal-switch:

**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.
-

Switching pump on

i The pump may not start up against pressure or vacuum during switch-on. This also applies in operation following a brief power failure.

- Make sure that no pressure or vacuum is present in the lines during switch-on.

Switching off the pump

- KNF recommends: When transferring aggressive media, flush the pump prior to switch-off to increase the service life of the diaphragm (see section 8.2.1).
- Open pressure and suction lines to normal atmospheric pressure.

8. Servicing

8.1. Servicing Schedule

Component	Servicing interval
Pump	Regular inspection for external damage or leaks
Diaphragm, reed valves (valve plate)	Replace at the latest, when pump output decreases
Silencer/filter (accessory)	Change if it is dirty

Tab. 6

8.2. Cleaning

- i** When cleaning, make sure that no liquids enter the inside of the housing.

8.2.1. Flushing Pump

- Before switching off the pump, flush it with air (if necessary for safety reasons: with an inert gas) for about five minutes under atmospheric conditions (ambient pressure).

8.2.2. Cleaning Pump

- Only use solvents for cleaning if the head materials cannot be attacked (check the resistance of the material!).
→ If compressed air is available, blow out the components.

8.3. Changing Diaphragm and Valves

8.3.1. Pumps with aluminium head

N 145 ANE	N 145.2 ANE
N 145 AN.9 E	N 145.2 AN.9 E
N 145 ATE	N 145.2 ATE
N 145 AVE	N 145.2 AVE

- Conditions
- Pump is switched off and mains plug is removed from the socket
 - Pump is clean and free of hazardous materials
 - Tubes removed from pump's pneumatic inlet and outlet

Spare parts	Spare part*	Position**	Quantity per pump head
Diaphragm	(F)		1
Countersunk screw***	(D)		1
Reed valve	(L,P)		2
Gasket	(V)		1

Tab. 7

* According to Spare parts list, chapter 10

** According to Fig. 10

*** Not for .9 versions

Tools	Quantity	Tools/Material
	1	Allen key 3 mm
	1	Allen key 4 mm
	1	Allen key 5 mm
	1	Screwdriver blade width 6.5
	1	Screwdriver blade width 4.0
	1	Fork wrench 16 mm (only for two-headed pumps)
	1	Pencil
	1	Adjustable pin-wrench for two-hole nuts or KNF wrench for retainer plate (see accessory, section 10) (only for .9 versions)

Tab. 8

Information on procedure With multi-head pumps, parts of the individual pump heads can be confused.

- ➔ Replace the diaphragm and reed valves of the individual pump heads consecutively.

**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 pump before replacing the diaphragm and
reed valves (see section 8.2.1).

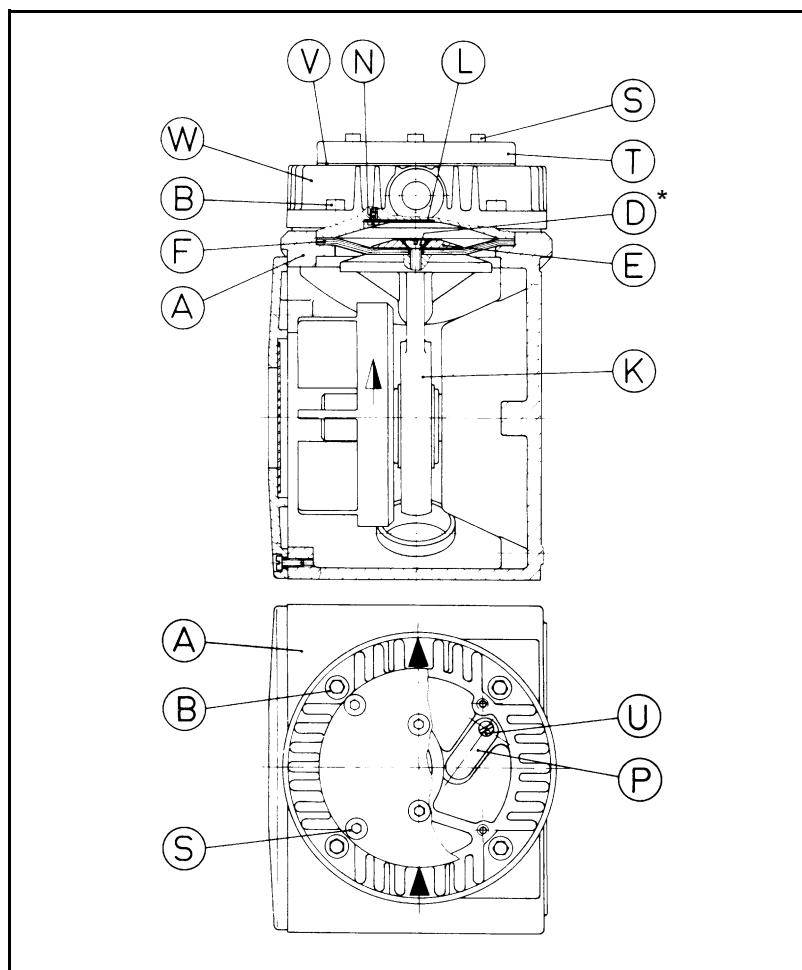


Fig. 10: Pump parts for versions with aluminium head

*not for .9 versions

1. For pumps N 145.2 A_E:
On the pneumatic head connection, open the head connection union nut on one pump head and pull the hose off.
2. Mark the position of the diaphragm head W in relation of the housing A with a pencil.
3. Loosen the four allen screws B and remove the diaphragm head W.
4. For all pumps except .9 versions: Unscrew the countersunk screw D, remove the retainer plate E and the diaphragm F.

5. For pumps N 145 __.9 E: To undo the retainer plate E use the wrench for retainer plate to turn it anti-clockwise; remove retainer plate and diaphragm F.
 6. Remove the fan cover of motor.
 7. Turn the fan blade so that the connection rod K is in the mid-position; fit the new diaphragm F.
 8. For all pumps except .9 versions: Place the retainer plate E on the diaphragm F and tighten the new countersunk screw D (torque: 6.0 Nm).
- i** The self-locking screw D can only be used once.
9. For pumps N 145 __.9 E: Place the retainer plate E on the diaphragm F. Screw on the retainer plate E with the wrench for retainer plate uniformly and diagonally (torque: 6.0 Nm).
 10. Change lower reed valve:
 - Undo the cheese head screw N and exchange the reed valve L.
 11. Change upper reed valve:
 - Loosen the allen screws S, remove the cover plate T and the gasket V.
 - Undo the cheese head screw U and exchange the reed valve P; tighten the cheese head screw U.
 - Replace the cover plate T with a new gasket V and tighten the allen screws S.
 12. Place the diaphragm head W on the diaphragm F according to the marks made previously and tighten the screws B uniformly and diagonally (torque: 10.0 Nm).
 13. Turn the fan blade to check that the pump run freely.
 14. For pumps N 145.2 A_E:
Carry out steps 2 to 13 for the second pump head.
 15. Replace fan cover of motor.
 16. For pumps N 145.2 A_E:
Reattach the tube of pneumatic head connections onto the hose connector and tighten the union nut.

8.3.2. Pumps with stainless steel head

N 145 SNE	N 145.2 SNE
N 145 SN.9 E	N 145.2 STE
N 145 STE	N 145.2 SVE
N 145 ST.9 E	
N 145 SVE	

Conditions

- Motor disconnected from mains and de-energized
- Pump is clean and free of hazardous materials

Spare parts

Spare part*	Position**	Quantity per pump head
Diaphragm	(F)	1
Countersunk screw***	(D)	1
Valve plate	(Z)	1

Tab. 9

* According to Spare parts list, chapter 10

** According to Fig. 11

*** Not for .9 versions

Tools

Quantity	Tools/Material
1	Allen key 4 mm
1	Allen key 5 mm
1	Screwdriver blade width 6.5
1	Pencil
1	Adjustable pin-wrench for two-hole nuts or KMF wrench for retainer plate (see accessory, section 10) (only for .9 versions)

Tab. 10

Information on procedure

With multi-head pumps, parts of the individual pump heads can be confused.

- Replace the diaphragm and valve plate of the individual pump heads consecutively.



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 pump before replacing the diaphragm and the valve plate (see section 8.2.1).

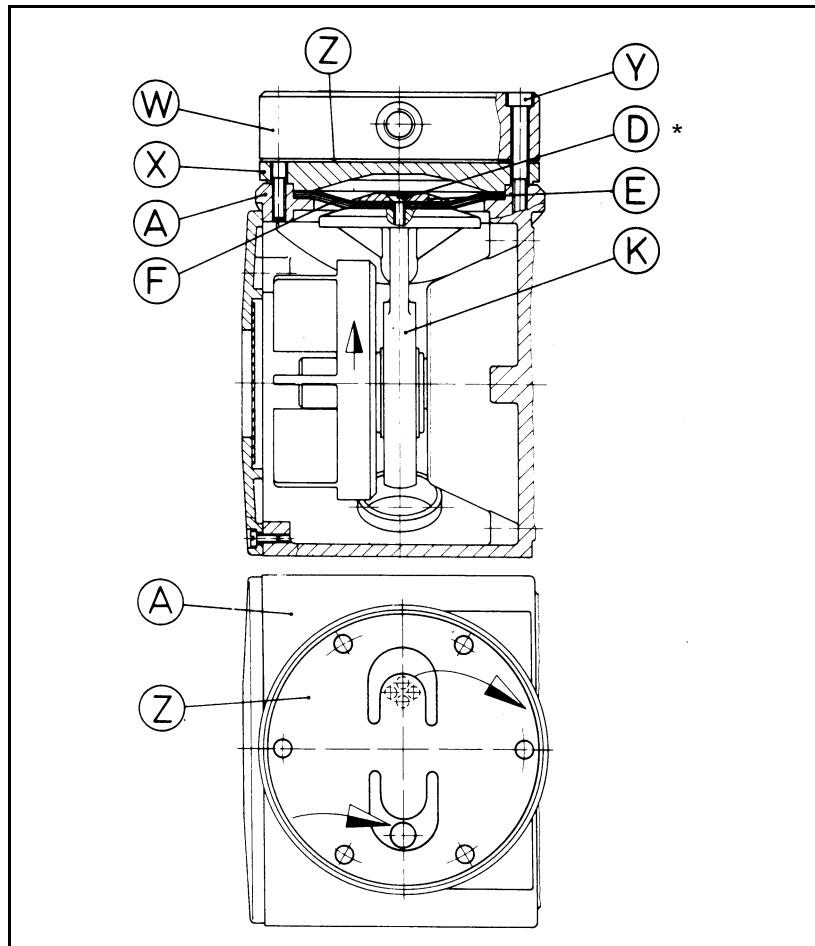


Fig. 11: Pump parts for versions with stainless steel head

*not for .9 versions

1. For the pumps N 145.2 S_E:
Loosen the hose clip and pull the pneumatic head connection hose off one pump head.
2. Mark the position of the head plate W and intermediate plate X in relation of the housing A with a pencil.
3. Loosen the six allen screws Y and remove the head plate head W, valve plate Z and intermediate plate X.
4. For all pumps except .9 versions: Unscrew the countersunk screw D, remove the retainer plate E and the diaphragm F.
5. For pumps N 145 __.9 E: To undo the retainer plate E use the wrench for retainer plate to turn it anti-clockwise; remove retainer plate and diaphragm F.
6. Remove the fan cover of motor.
7. Turn the fan blade so that the connection rod K is in the mid-position; fit the new diaphragm F.
8. For all pumps except .9 versions: Place the retainer plate E on the diaphragm F and tighten the new countersunk screw D (torque: 6.0 Nm).

i The self-locking screw D can only be used once.

9. For pumps N 145 __.9 E: Place the retainer plate E on the diaphragm F. Screw on the retainer plate E with the wrench for retainer plate uniformly and diagonally (torque: 6.0 Nm).
10. Place the intermediate plate X on the top of the diaphragm F so that it corresponds to the marks on the housing.
11. Place the new valve plate Z on the intermediate plate X.
12. Place the head plate head W on the diaphragm F according to the marks made previously and tighten the screws Y uniformly and diagonally (torque: 10.0 Nm).
13. Turn the fan blade to check that the pump runs freely.
14. For two-headed pumps:
Carry out steps 2 to 13 for the second pump head.
15. Replace the fan cover of motor.
16. For two-headed pumps:
Pull the pneumatic head connection hose back onto the hose connector, retighten the hose clip.

9. Troubleshooting



Extreme danger from electrical shock!

DANGER

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

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

→ Check the pump (see Tab. 11 and 12).

Pump does not transfer	
Cause	Fault remedy
No voltage in the power source	→ Check room fuse and switch on if necessary.
For pumps with thermal-switch: Thermal switch has operated following to over-heating.	→ Disconnect pump from mains. → Allow pump to cool. → Trace cause of over-heating and eliminate it.
Connections or lines blocked.	→ Check connections and lines. → Remove blockage.
External valve is closed or filter is clogged.	→ Check external valves and filters.
Condensate has collected in pump head.	→ Flush pump (see Section 8.2.1). → Install pump at highest point in system.
Diaphragm or reed valves (valve plate) are worn.	→ Replace diaphragm and reed valves (valve plate), (see Section 8.3).

Tab. 11

Flow rate, pressure or vacuum too low	
Cause	Fault remedy
The pump does not achieve the output specified in the Technical data or the data sheet.	
Condensate has collected in pump head.	→ Flush pump (see Section 8.2.1). → Install pump at highest point in system.
There is gauge pressure on pressure side and at the same time vacuum or a pressure above atmospheric pressure on suction side.	→ Change the pressure conditions.
Pneumatic lines or connection parts have an insufficient cross section.	→ Disconnect pump from system to determine output values. → Eliminate throttling (e.g. valve) if necessary. → Use lines or connection parts with larger cross section if necessary.
Leaks occur on connections, lines or pump head.	→ Eliminate leaks.
Connections or lines completely or partially jammed.	→ Check connections and lines. → Remove the jamming parts and particles.
Head parts are soiled.	→ Clean head components.
Diaphragm or reed valves (valve plate) are worn.	→ Replace diaphragm and reed valves (valve plate), (see Section 8.3).

Tab. 12

Fault cannot be rectified

If you are unable to determine any of the specified causes, send the pump to KNF Customer Service (see last page for the address).

1. Flush the pump to free the pump head of dangerous or aggressive gases (see Section 8.2.1).
2. Remove the pump.
3. Clean the pump (see Section 8.2.2).
4. Send the pump, together with completed Health and Safety Clearance and Decontamination Form, to KNF stating the nature of the transferred medium.

10. Spare parts and accessories

Spare parts

N 145 ANE

N 145.2 ANE

Spare part	Position*	Order No.
Diaphragm	(F)	004241
Countersunk screw**	(D)	110711
Reed valve	(L, P)	001328
Gasket	(V)	001326

Tab. 13

* According to Fig. 10

** Not for .9 versions

N 145 ATE

N 145.2 ATE

Spare part	Position*	Order No.
Diaphragm	(F)	004237
Countersunk screw**	(D)	110711
Reed valve	(L, P)	001328
Gasket	(V)	011796

Tab. 14

* According to Fig. 10

** Not for .9 versions

N 145 AVE

N 145.2 AVE

Spare part	Position*	Order No.
Diaphragm	(F)	004240
Countersunk screw**	(D)	110711
Reed valve	(L, P)	001328
Gasket	(V)	011796

Tab. 15

* According to Fig. 10

** Not for .9 versions

N 145 SNE

N 145.2 SNE

Spare part	Position*	Order No.
Diaphragm	(F)	004241
Countersunk screw**	(D)	110711
Valve plate	(Z)	001528

Tab. 16

* According to Fig. 11

** Not for .9 versions

N 145 STE

N 145.2 STE

Spare part	Position*	Order No.
Diaphragm	(F)	004237
Countersunk screw**	(D)	110711
Valve plate	(Z)	004248

Tab. 17

* According to Fig. 11

** Not for .9 versions

N 145 SVE

N 145.2 SVE

Spare part	Position*	Order No.
Diaphragm	(F)	004240
Countersunk screw**	(D)	110711
Valve plate	(Z)	004234

Tab. 18

* According to Fig. 11

** Not for .9 versions

Accessories

Accessory	Order No.
Silencer/filter (G 1/4)	000352
Pressure relief valve 4 bar	047601
Pressure relief valve 7 bar	047602
Fine control valve with pressure gauge, pressure side	000356
Fine control valve with vacuum gauge, suction side (not for .2 versions)	000354
Hose connectors (G 1/4)	000362
Hose connectors, stainless steel (G 1/4)	020234
Wrench for retainer plate (.9 versions)	018812

Tab. 19

11. Returns

Prerequisite for repairing a pump by KNF is a completed Decontamination Form.

This is made available on the KNF website as a download. To find the form, select your country on the overview page (www.knf.com). You can find the Decontamination Form in the download area.

If you have questions, please contact your sales partner (contact data: see www.knf.com).