

Operating and Installation Instructions

Diaphragm Vacuum Pumps

and Compressors

Type Ranges:

UN026ANI EX	UN026.1.2ANI EX	UN026.2STI EX
UN026ATI EX	UN026.1.2STI EX	UN026.2ANI EX
UN026STI EX		UN026.3ST.9I EX
UN026ST.9I EX		



Fig. 1: UN026STI EX

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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 “PU” or “MPU”) 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.

i 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.

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, 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 are not suitable for transferring dusts.

The pumps are not suitable for transferring liquids.

Custom pumps with three-phase motor can be provided for the operation with frequency converter.

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 leads 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>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>Therefore, 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 KNF Technical Support.</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>
Certifications	<p>Motors are UL listed and cUL certified.</p>
Customer service and repairs	<p>Repairs should only be carried out by the KNF Factory responsible.</p> <p>Use only genuine parts from KNF for servicing work.</p>

4. Technical Data

Pump materials

Pump type	Material*			
	Pump head	Diaphragm	Valve	Gasket
UN026ANI	Aluminium	CR	Stainless Steel	CR
UN026.1.2ANI				
UN026.2ANI				
UN026ATI	Aluminium	PTFE- coated	Stainless Steel	FPM
UN026STI	Stainless Steel	PTFE-coated	PTFE	FEP/FEM**
UN026ST.9I**				
UN026.1.2STI				
UN026.2STI				
UN026.3ST.9I**				

Tab. 2

*according to DIN ISO 1629 und 1043.1

**where used

Pneumatic values

Pump type	Delivery rate* (l/min) at atm. pressure	Max. permissible operating pressure (bar g)	Ultimate vacuum (mbar abs.)
UN026ANI EX	20	2.5	100
UN026ATI EX	17	2.5	100
UN026STI EX			
UN026ST.9I EX			
UN026.2ANI EX	39	2	-
UN026.2STI EX	31.2	2	-
UN026.1.2ANI EX	39	2	100
UN026.1.2STI EX	31.2	2	100
UN026.3ST.9I EX	18.7	-	25

Tab. 3

*Liters in standard state (1,013 mbar)

Electrical data

Parameter	Value one-headed pumps	Value two-headed pumps
Voltage / Frequency* EX-Proof AC motor	115/230 V 50/60 Hz	115/230 V 50/60 Hz
Power EX-Proof AC motor	125 W	125 W
Operating current EX-Proof AC motor	2.6/1.3 A	2.6/1.3 A

Tab. 4

* see type plate

The pumps are fitted as standard with a thermal cut-off 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 UN026_..9I EX (tested)	$< 6 \times 10^{-3}$ 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 required to verify that the original standard of gas-tightness has been achieved.

5. Design and Function

Design UN026S__I EX

- 1 Pneumatic pump outlet
- 2 Pneumatic pump inlet
- 3 Electrical connection
- 4 Motor
- 5 Flow direction indicator

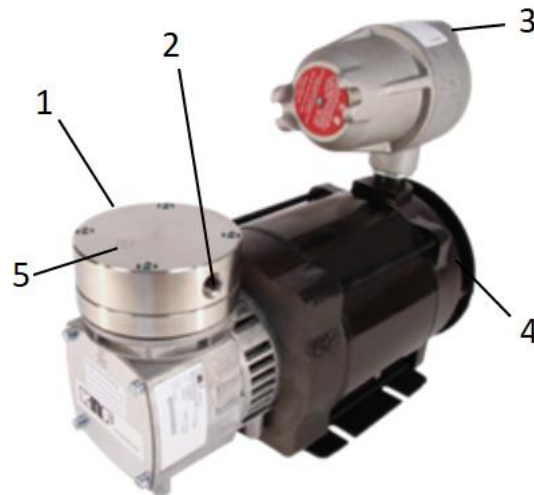


Fig. 2: Diaphragm Pump UN026STI EX

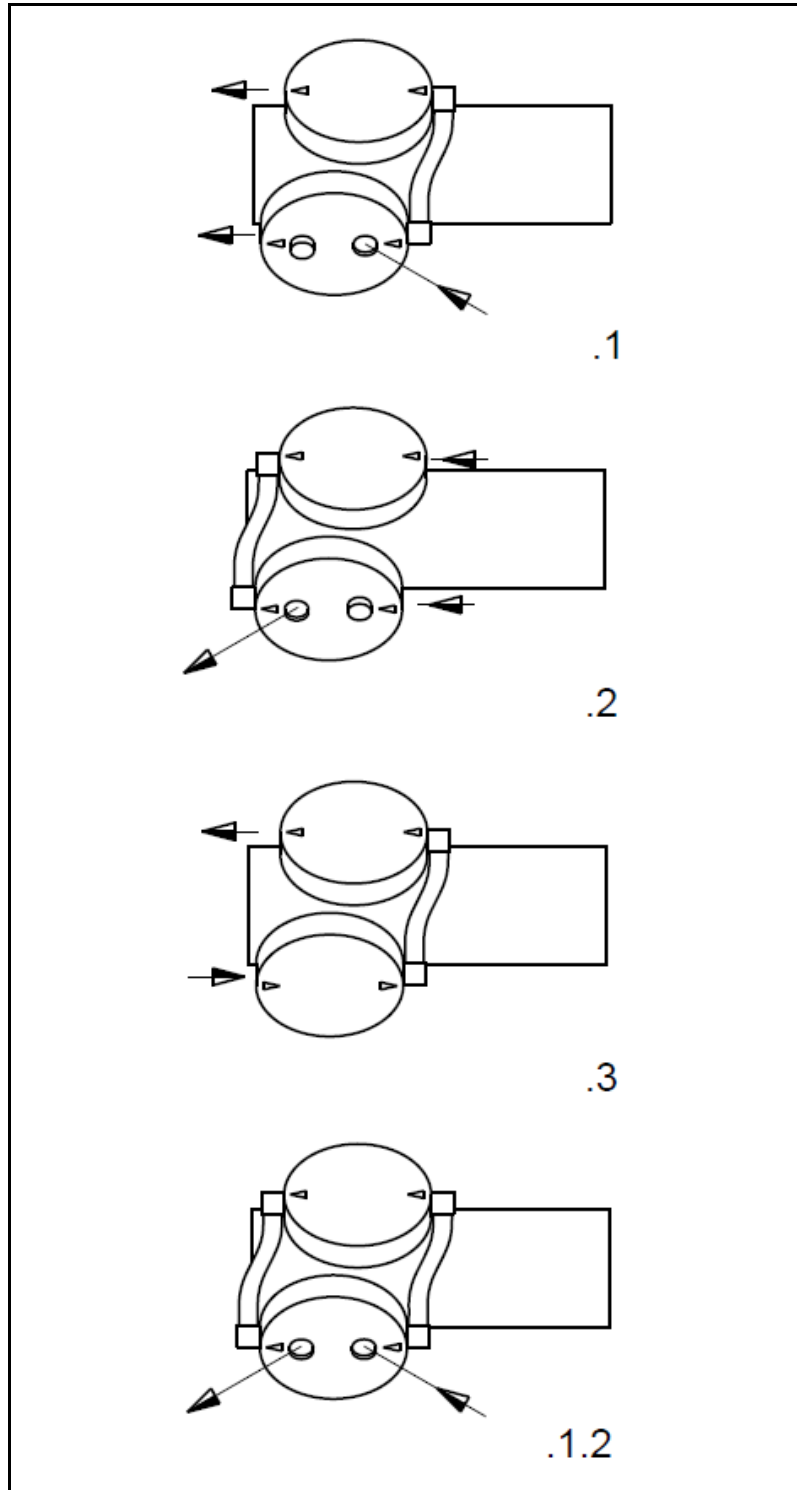


Fig. 3: Pneumatic connection of two-headed pumps

Function diaphragm pump

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

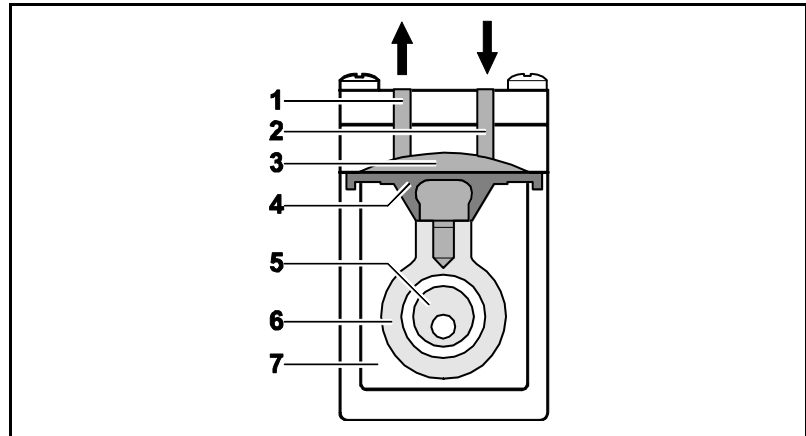


Fig. 4: Pump head

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 housing (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 of the pump

➔ Before installation, store the pump at the installation location to bring it up to room temperature.

Mounting dimensions

➔ Mounting dimensions (see figs. 5 to 8).

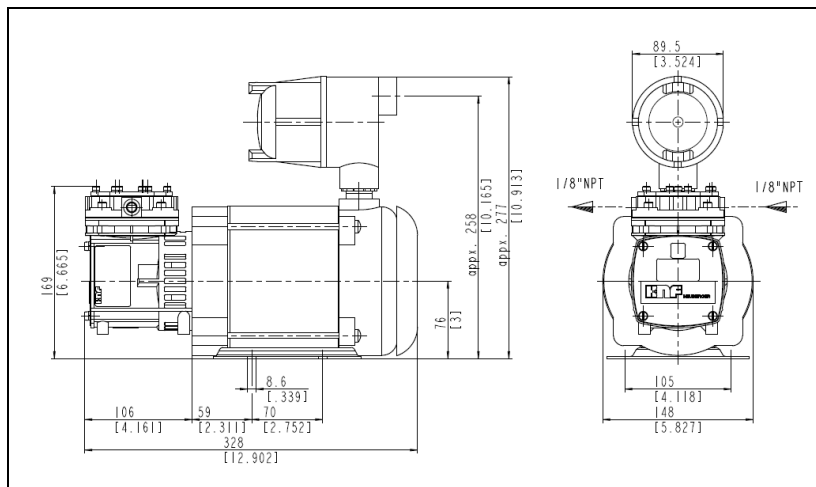


Fig. 5: Mounting dimensions UN026A_I EX including .9 versions (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)

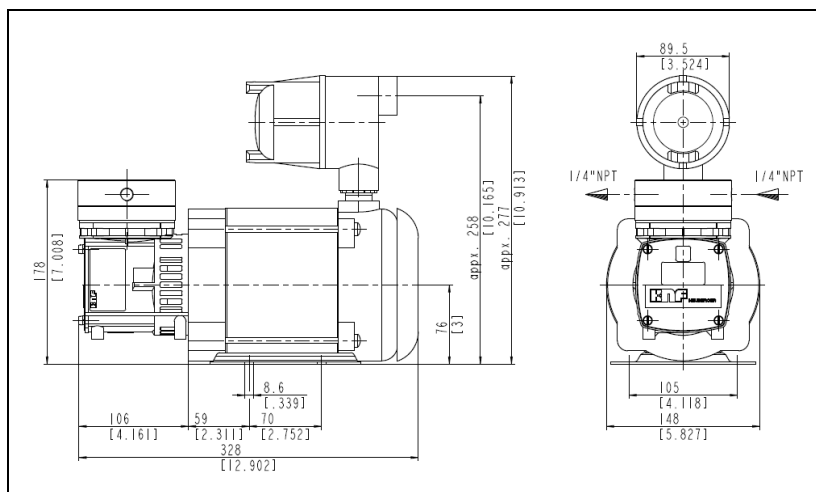


Fig. 6: Mounting dimensions UN026S_I EX including .9 versions (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)

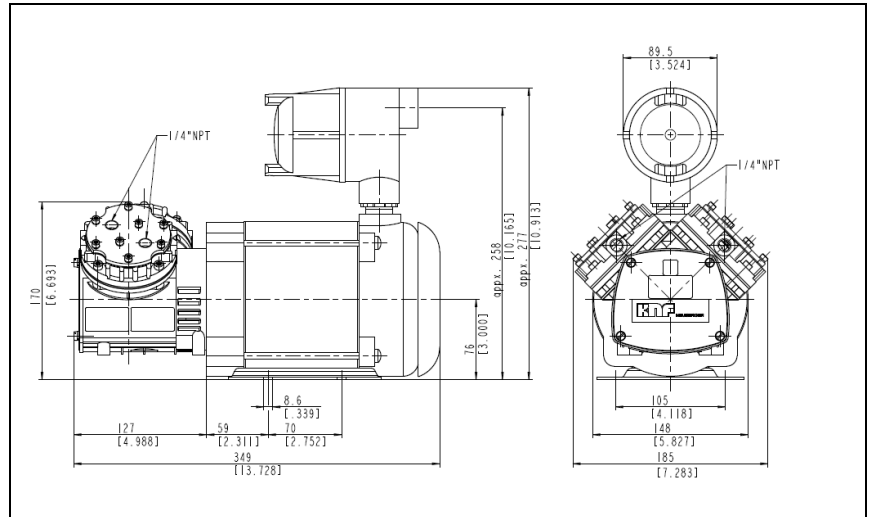


Fig. 7: Mounting dimensions UN026_A_I EX including .9 versions. See head connection diagram. (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)

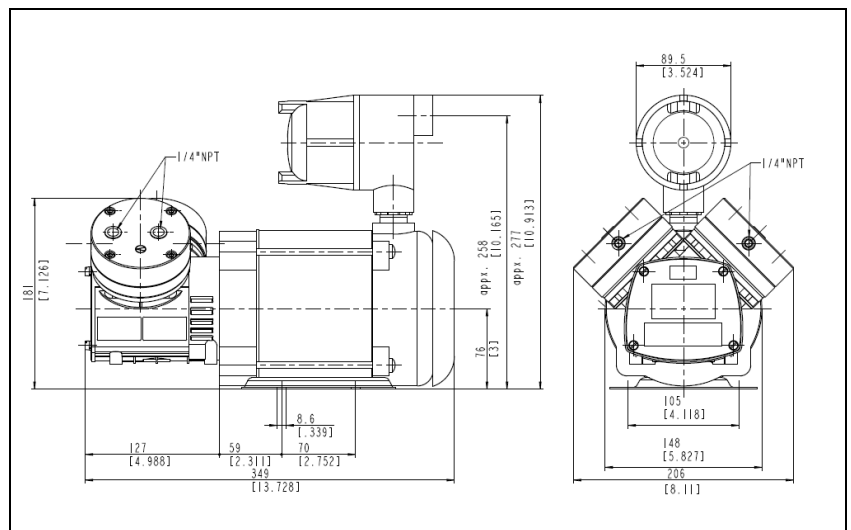


Fig. 8: Mounting dimensions UN026_S_I EX including .9 versions. See head connection diagram. (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)

- | | |
|-----------------------|---|
| Cooling air supply | ➔ Install the pump so that the motor fan can intake sufficient cooling air. |
| Installation location | ➔ 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

DANGER

→ 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 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. Connect pumps according to figs. 9 or 10.

Note: Black and red wires can be incorrectly swapped for counter clock-wise rotation, which can negatively affect performance

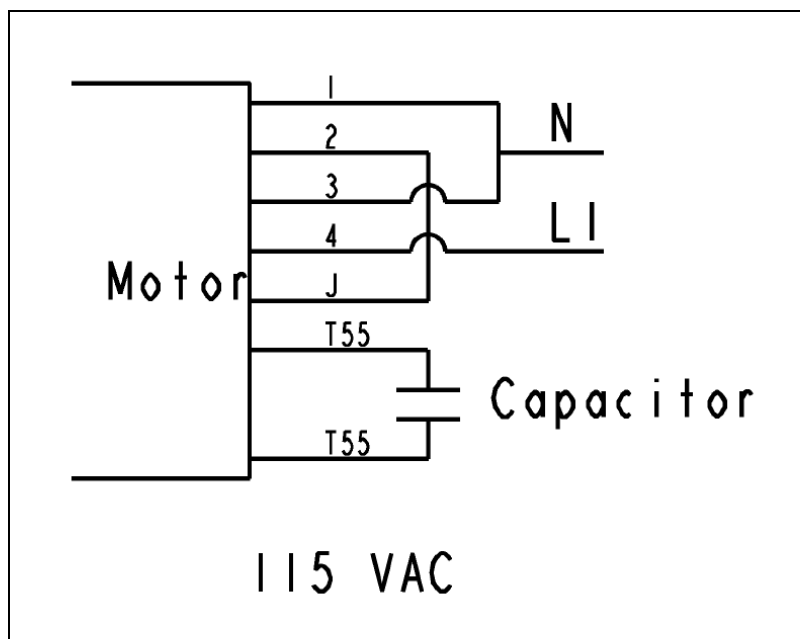


Fig. 9: 115V Connection

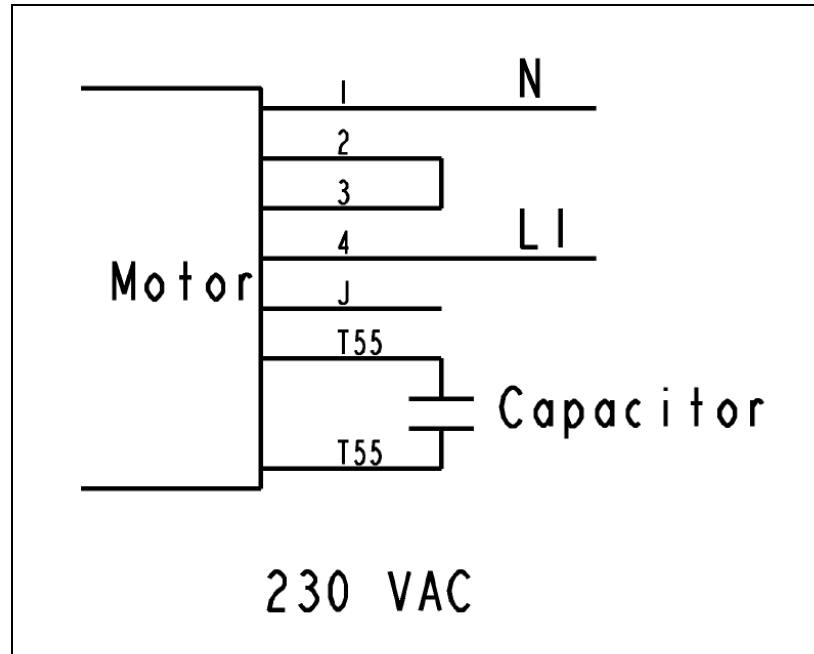


Fig. 10: 230V Connection

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. For two-headed pumps fig. 3 shows the pneumatic connections.

1. Remove the protective plugs from the hose connection threads.
2. The 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 UN026.2), mount the silencer at the pressure side if necessary. If the pump is used as a compressor (not permitted with series UN026.1 and UN026.3), mount the filter at the suction side if necessary.

3. Connect the suction line and pressure line (thread size of aluminum one-headed head pumps of: 1/8 NPT; thread size of all stainless steel and two-headed pumps: 1/4 NPT)
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.

i 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 thermo switch (special design):



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 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 and valve plates or reed valves	Replace at the latest, when pump output decreases
Silencer/filter	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

When transferring aggressive media, flush the pump under atmospheric conditions for a few minutes with air (or, if necessary for safety reasons, with an inert gas) prior to switch-off to increase the service life of the diaphragm.

8.2.2. Cleaning Pump

- ➔ Only clean head parts with solvents that will not attack head materials. (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 aluminum head

UN026_ANI EX UN026_ATI EX

UN026._ANI EX UN026._ATI EX

- 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
Reed valve	(M,P)	2
Gasket	(V)	1

Tab. 7

*According to Spare parts list, chapter 10

**According to Fig. 11

***Not for .9 versions

Tools

Quantity	Tools/Material
1	Allen key 3 mm
1	Allen key 4 mm
1	Screwdriver blade width 6.5
1	Screwdriver blade width 4.0
1	Socket wrench 5.5 mm
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, goggles, etc.
- ➔ Flush pump with air before replacing the diaphragm and reed valves (see section 8.2.1).

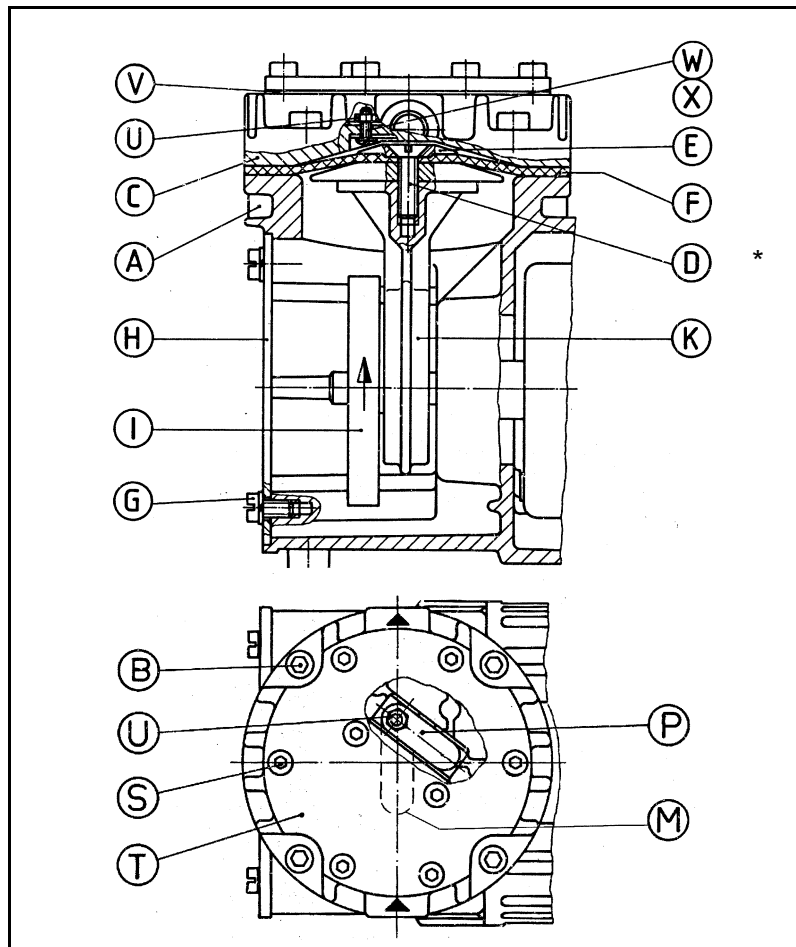


Fig. 11: Pump parts for single-head versions with aluminium head
*not for .9 versions

1. For pumps UN 026_ AT1:
At one pump head pull off the hose of pneumatic head connection.
2. For pumps UN 026_ AN1:
At one pump head loosen the hose clamp of pneumatic connection and pull the hose off.
3. Mark the position of the diaphragm head C in relation of the housing A with a pencil.

4. Loosen the four Allen screws B and remove the diaphragm head C.
5. For all pumps except .9 versions: Unscrew the countersunk screw D, remove the retainer plate E and the diaphragm F.
6. For pumps UN 026 A_.9I: To undo the retainer plate E use the wrench for retainer plate to turn it counter-clockwise; remove retainer plate and diaphragm F.
7. Loosen the four screws G and remove the cover plate H.
8. Turn the counterweight I so that the connection rod K is in the mid-position; fit the new diaphragm F.
9. For all pumps except .9 versions: Place the retainer plate E on the diaphragm F and carefully but firmly tighten the new countersunk screw D (torque: 5.0 Nm).



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

10. For pumps UN 026 A_.9I: 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: 5.0 Nm).
11. Change reed valves M and P:
 - Loosen the Allen screws S, remove the cover plate T and the gasket V.
 - Use a socket wrench to unscrew the nut U, then remove the valve fastening screw W, including washer X, and the reed valves P and M.
 - Fasten the new reed valves P and M with screw W and fit the washer X under the nut U.
 - Replace the cover plate T with a new gasket V and tighten the Allen screws S.
12. Place the diaphragm head C according to the marks made previously and tighten the screws B uniformly and diagonally.
Tightening torque:

UN026._ANI:	6.5 Nm
UN026._ATI:	5.5 Nm
13. Turn the counterweight I to check that the pump run freely.
14. For two-headed pumps:
Carry out steps 3 to 13 for the second pump head.
15. Replace the cover plate H and secure it with the four screws G.
16. For two-headed pumps:
Reattach the tube of pneumatic head connection onto the hose connector.
17. For pump type UN 026_A_I: Retighten the hose clip on the pneumatic head connection.

8.3.2. Pumps with stainless steel head

UN026_ST_I EX UN026._ST_I EX

- 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. 13*

****Not for .9 versions*

Tools

Quantity	Tools/Material
1	Allen key 4 mm
1	Screwdriver blade width 6.5
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. 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, goggles, etc.
- Flush pump before replacing the diaphragm and the valve plate (see section 8.2.1).

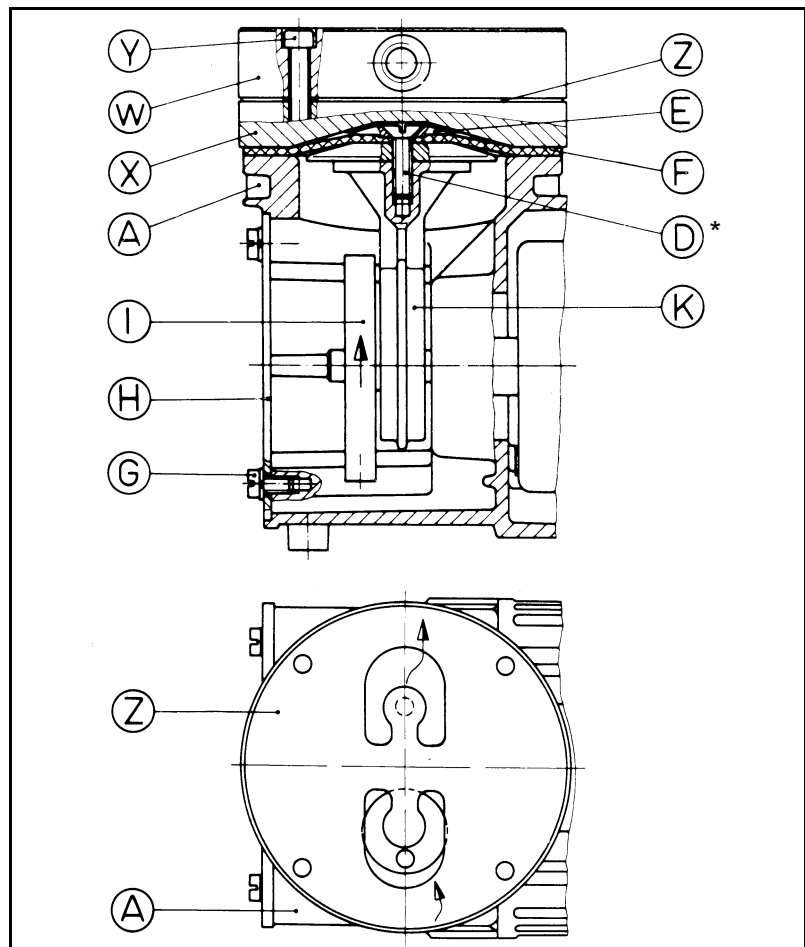


Fig. 12: Pump parts for versions with stainless steel head

*not for .9 versions

1. At one pump head pull off the hose of pneumatic head connection.
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 four Allen screws Y and remove the head plate 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.

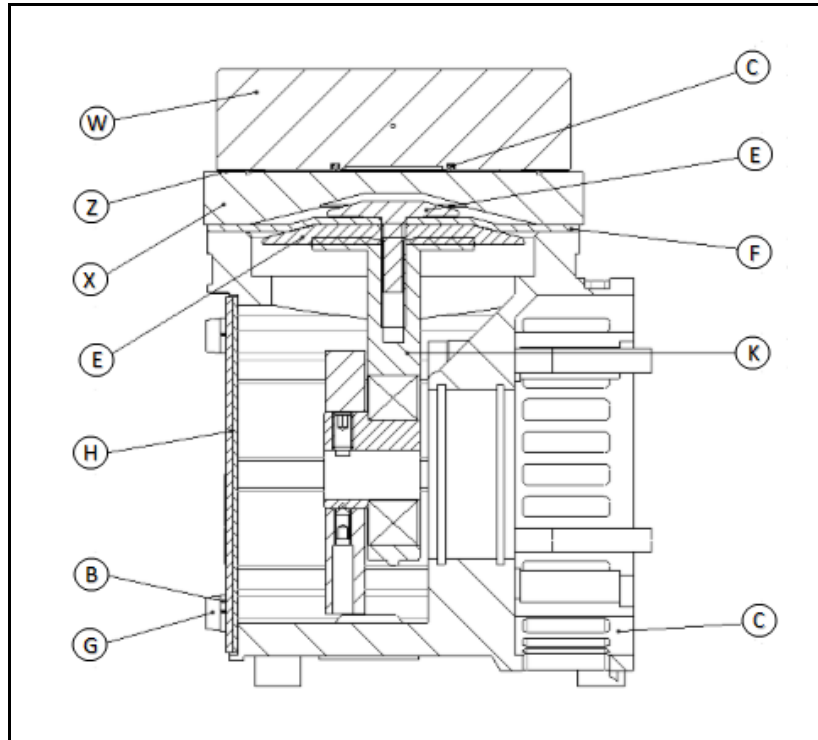


Fig. 13: Pump parts for .9 versions with stainless steel head

5. For pumps UN026__9I: To undo the retainer plate E, use the wrench for retainer plate to turn it counter-clockwise; remove retainer plate and diaphragm F.
6. Loosen the four screws G (with washer B) and remove the cover plate H.
7. Turn the counterweight I 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 carefully but firmly tighten the new countersunk screw D (torque: 5.0 Nm).

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

9. For pumps UN026S__9I: 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: 5.0 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 and O-ring C on the intermediate plate X (for orientation: see fig. 13).
12. Place the head plate head W according to the marks made previously and tighten the screws Y uniformly and diagonally

Tightening torque:

UN026__STI: 5.5 Nm

13. Turn the counterweight I to check that the pump runs freely.

14. For two-headed pumps:
Carry out steps 3 to 14 for the second pump head.
15. Replace the cover plate H and secure it with the four screws G.
16. For two-headed pumps:
Pull the pneumatic head connection hose back onto the hose connector.
18. For UN026.2S_I: pump models: Retighten the hose clip on the pneumatic head connection.

9. Troubleshooting



Extreme danger from electrical shock!

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

DANGER → 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.
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	
The pump does not achieve the output specified in the Technical data or the data sheet.	
Cause	Fault remedy
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 for service.

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. See Chapter 11 for instructions how to return the pump for evaluation and repair.

10. Spare parts and accessories

Spare parts

UN026_ANI EX

Spare part	Position*	Kit Order No.
Diaphragm	(F)	071723
Countersunk screw**	(D)	
Reed valve	(M,P)	
Nut	(U)	
Gasket	(V)	

Tab. 13

* According to Fig. 12

UN026_STI EX

Spare part	Position*	Kit Order No.
Diaphragm	(F)	071721
Valve plate	(Z)	

Tab. 14

* According to Fig. 13

UN026_ST.9I EX

Spare part	Position*	Kit Order No.
Diaphragm	(F)	075065
Valve plate	(Z)	
O-ring	--	

Tab. 15


* According to Fig. 13

For leak tight versions (.9)

Spare part	Position*	Kit Order No.
Spanner wrench	--	018816

Tab. 16

11. Product Return

- KNF provides warranty and non-warranty repair services for all products.
 - KNF shall only undertake to repair the pump on condition that the customer provides certification of the transferred media and the cleaning of the pump. All product returns require prior authorization from KNF. To receive your return authorization, please follow these instructions:
 1. Visit knf.com/en/us
 2. From the KNF Website, use the icon  and select the Region and Country which best matches your location.
 3. Use the menu navigation for "Service".
 4. Follow the instructions provided to you.
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