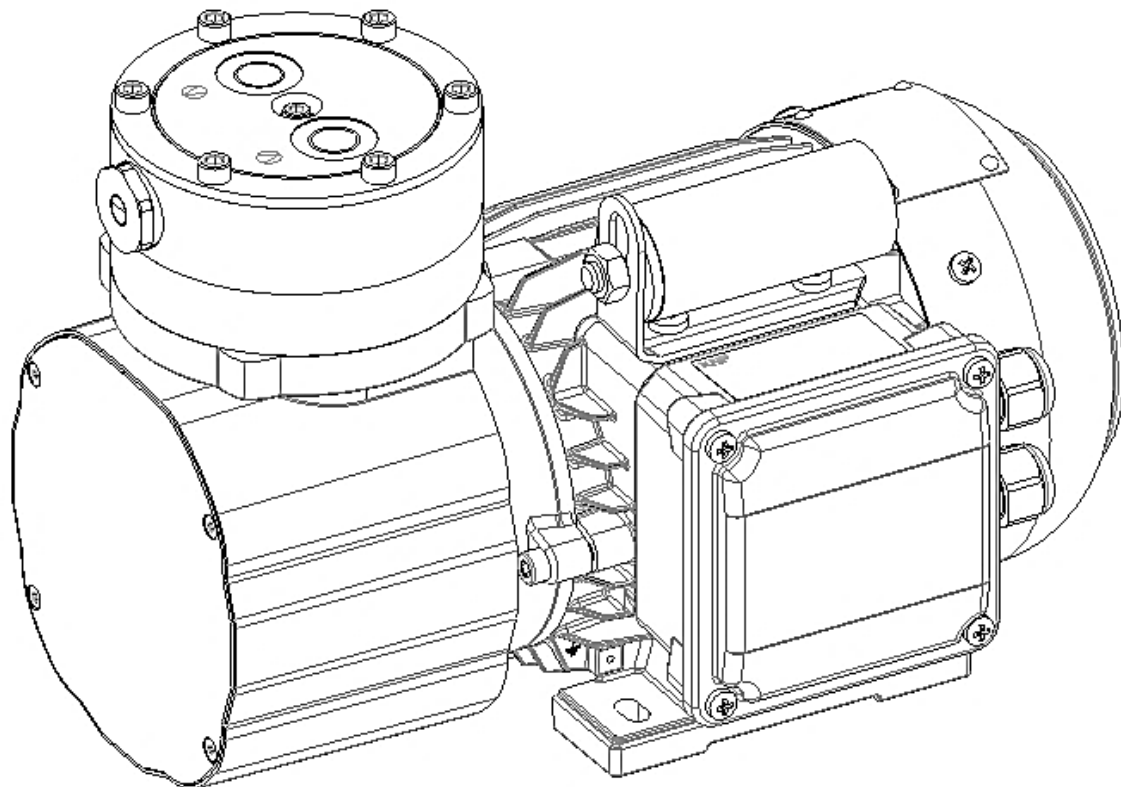


**OEM**

**N 922**  
**TRANSLATION OF ORIGINAL OPERATING AND**  
**INSTALLATION INSTRUCTIONS**  
**ENGLISH**

# DIAPHRAGM PUMP



***Note!***

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

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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 pump

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 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 injuries and/or serious damage are the consequence.
<b>WARNING</b>	warns of possible danger	Death or serious injuries and/or serious damage are possible.
<b>CAUTION</b>	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 parameter 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 as well as other pollutions.

The gas-tightness of the connections between the application pipes and the pump (or the pump connection) must be checked regularly; with leaky connections, there is a danger that hazardous gases or vapors may escape from the pump system.

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 may not be operated in an explosive atmosphere.

The pumps are not suitable for transferring dusts.

The pumps are not suitable for transferring liquids.

The pumps are not suitable for transferring aerosol.

The pumps are not suitable for transferring biological and microbiological substances.

The pumps are not suitable for transferring fuel.

The pumps are not suitable for transferring explosive and combustible materials.

The pumps are not suitable for transferring fibers.

The pumps are not suitable for transferring oxidizing agent.

The pumps are not suitable for transferring foodstuffs.

The pumps must not be used to create vacuum and overpressure simultaneously.

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

### 3. Safety

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

The pumps are built according to the generally recognized rules of the 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.

Components connected to the pump must be designed to withstand the pneumatic performance of the pump.

Take care that safety regulations are observed when connecting the pump to the electricity supply.

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

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

**Working in a safety conscious manner** Observe the accident prevention and safety regulations when performing any work on the pump and during operation.

Ensure that the pump is separated from the mains and is de-energized.

The pump heads heat up during operation – avoid contact with them.

Make sure that there are no hazards due to flow with open gas connections, noises or hot gases.

Ensure that an EMC-compatible installation of the pump is ensured at all times and that this cannot lead to a hazardous situation.

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

If the diaphragm ruptures, the transferred medium will mix with the air in the environment.

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

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

Make sure the temperature of the medium is always sufficiently below the ignition temperature of the medium, to avoid ignition or explosion. This also applies for unusual operational situations.

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

Hence, make sure the temperature of the medium is sufficiently below the ignition temperature of the medium, even when it is compressed to the maximum permissible operating pressure of the pump. The maximum permissible operating pressure of the pump is stated in the technical specifications (Chapter 4).

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

When the operation of the pump is interrupted by the thermal switch (1~ motor) or the triggering device of PTC sensors (3~ motor), 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 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.

#### EU/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.

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 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.
- 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).

The following harmonized standards were taken as a basis:

- EN IEC 63000

- EN IEC 61000-6-1/2/3/4
- EN 60204-1
- EN 60034-1
- EN 60034-30-1 only 3~ motor)

Customer service and  
repairs

The pump is maintenance-free. But KNF recommends, checking the pump regularly with regard to conspicuous changes in noise and vibrations.

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

Housing with voltage-carrying parts may be opened by technical personnel only.

Use only genuine parts from KNF for servicing work.



## 4. Technical Data

### Pump materials

Assembly	Material
Pump head	Modified PTFE
Diaphragm	PTFE-coated
Valve plate/sealing	FFPM
O-ring (only .29 version)	FFPM

Tab. 2

### Pneumatic values

Parameter	Value N 922 16L		Value N 922 8L	
Max. permissible operating pressure [bar g]	2.0		1.5	
Ultimate vacuum [mbar abs.]	≤ 200		≤ 350	
Delivery rate at atm. pressure [l/min]*: -open bypass -closed bypass	50 Hz	60 Hz	50 Hz	60 Hz
	10 ± 10%	12 ± 10%	3 ± 15%	4 ± 15%
	16 ± 10%	18 ± 10%	7.5 ± 10%	9 ± 10%
Delivery rate at max. permissible operating pressure [l/min]*	6.5 ± 10%	8 ± 10%	0	0

Tab. 3

\*Liters in standard state (1013 mbar)

### Pneumatic Connections

Pump type	Value: EU	Value: US
N 922 FTE/ N 922 FT.29E	G 1/4	NPT 1/4

Tab. 4

### Electrical data

Parameter	Value 1~ motor		Value 1~ motor		Value 3~ motor
Voltage (V)*	115	230	100	220	230/400
Frequency (Hz)*	50/60	50/60	50/60	50/60	50/60
Power P <sub>1</sub> (W)	195	185	200	220	185
Operating current (A)	2.7	1.35	2,6	1,2	0.83/0.48
Protection class Motor	IP 55				
Protection class Pump	IP 54				
Maximum permitted mains voltage fluctuations	See operating instructions motor				

Tab. 5

\*further voltage and frequency versions on demand

Thermal switch / PTC sensors



The pumps are fitted as standard with a thermal-switch (1~motor) or PTC sensors (3~motor) to protect against over-loading (see operating instructions of the motor).

**Weight**

Pump type	Value
N 922 FTE/ N 922 FT.29E	7.3 kg

Tab. 6

**Other parameters**

Parameter	Value
Permissible ambient temperature	+ 5°C to + 60°C 0°C if noncondensing (frost-protected)
Permissible media temperature	0°C to + 60°C
Dimensions N 922 FTE (1~ motor) N 922 FTE (3~ motor) N 922 FT.29E (1~ motor) N 922 FT.29E (3~ motor)	See Fig. 3, Chap. 7.1 See Fig. 4, Chap. 7.1 See Fig. 5, Chap. 7.1 See Fig. 6, Chap. 7.1
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]	1000 2000*
Gas-tightness** of pump head	Leak rate < 6 x 10 <sup>-3</sup> mbar l/s***
Start up against: -pressure -vacuum	0.5 bar g 800 mbar abs.

Tab. 7

\* Ambient temperature only permissible up to + 55°C

\*\*After opening the pump head or replacing the diaphragms and valve plates/sealings the gas-tightness is no longer guaranteed. A leak test is able to verify that the original standard of gas-tightness has been achieved.

\*\*\*Values valid for helium leak test

**Variants**

- .29 versions: adjustable flow rate through integral bypass-valve.

## 5. Design and function

- 1 Pneumatic Pump outlet
- 2 Pneumatic pump inlet
- 3 Pump head
- 4 Motor
- 5 Capacitor (only 1~ motor)
- 6 Electrical terminal box
- 7 Adjusting screw for flow (only .29 versions)

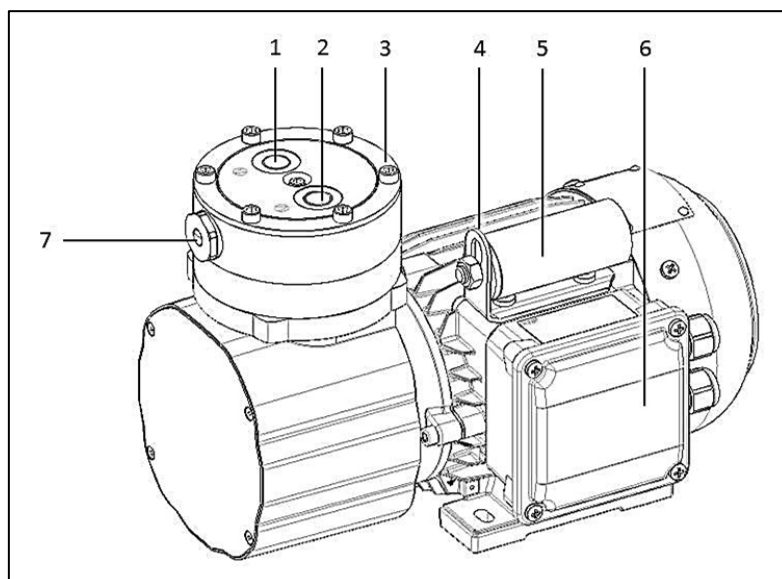


Fig. 1: Diaphragm Pump N 922 FT.29E (1~ motor)

### Function Diaphragm Pump

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

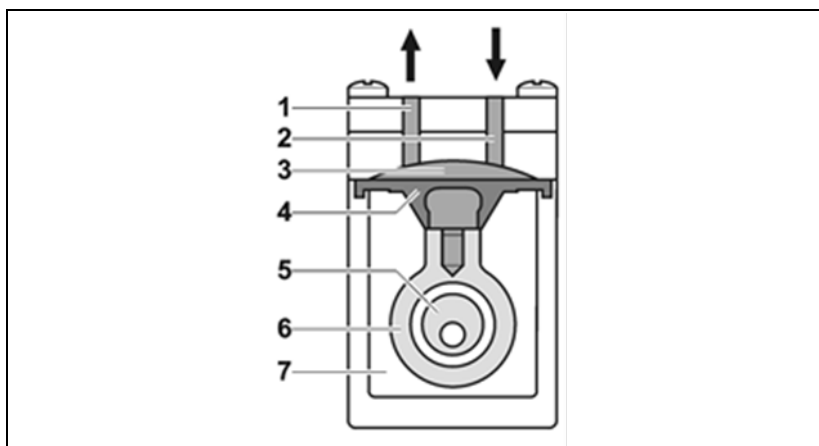


Fig. 2: Pump head

Diaphragm pumps transfer, compress (depending on pump version) and evacuate gases and vapors.

The elastic diaphragm (4) is moved up and down by the eccentric (5) and the connection 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. Transportation

**CAUTION**

Danger of injury due to sharp edges on the package

When handling or opening the package there is the possibility of injury by cutting at sharp edges.

- ➔ If necessary, wear proper personal protective equipment (e.g. safety gloves).

**CAUTION**

Personal injury and/or damage to property because of false or improper transportation of the pump

Due to false or improper transportation the pump can fall down, become damaged and injure people.

- ➔ If necessary, use suitable aids (eyebolt, harness, lifting device, etc.).
- ➔ If necessary, wear proper personal protective equipment (e.g. safety gloves, safety shoes).

- ➔ Check the pump for transport damages after receipt.
- ➔ Document occurred transport damages in writing and with pictures.
- ➔ Carry the pump in the original packaging up to its place of installation.
- ➔ Retain the original packaging of the pump (e.g. for later storage).

## 7. Installation and connection

Only install and operate the pumps under the pneumatic operating parameters and conditions described in Chapter 4, Technical Data. Observe the safety precautions (see Chapter 3).

### 7.1. Installation of the pump

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

Mounting dimensions ➔ See Fig. 3 to Fig. 6 for mounting dimensions.

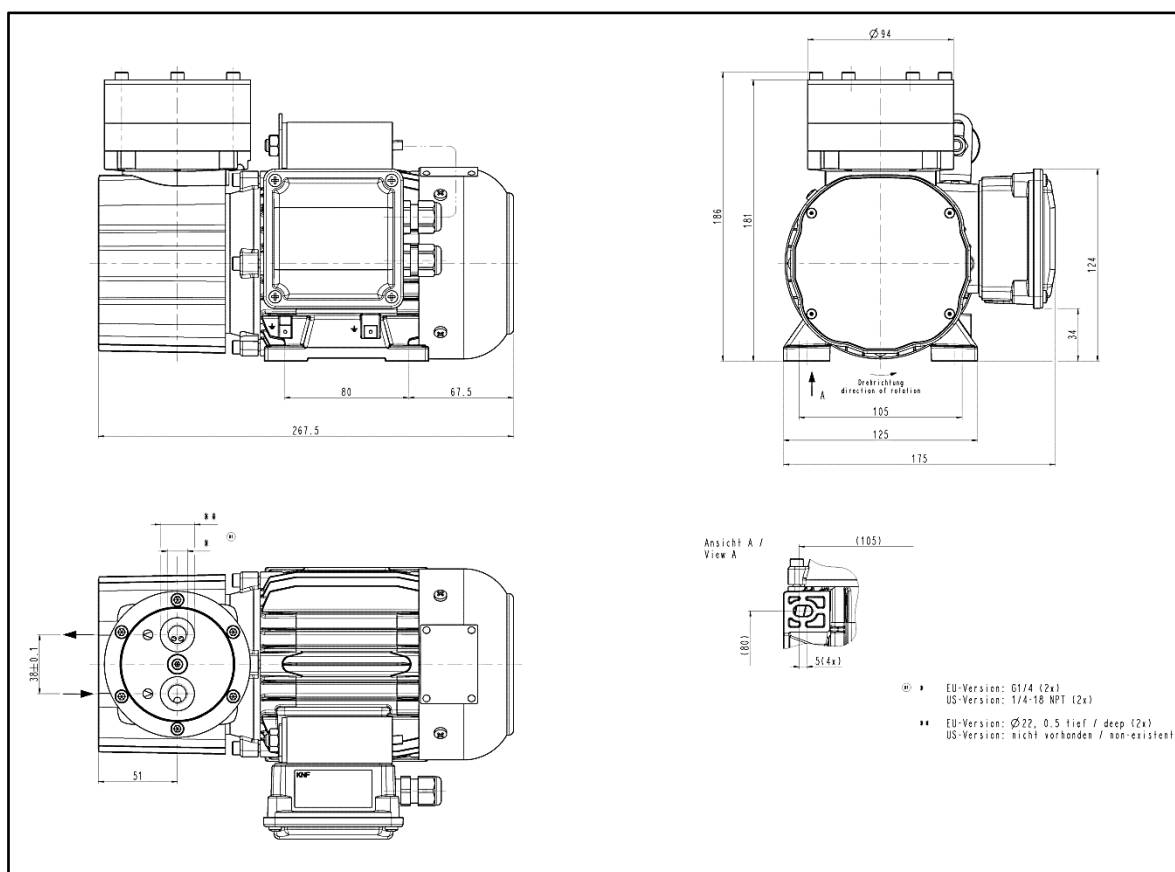
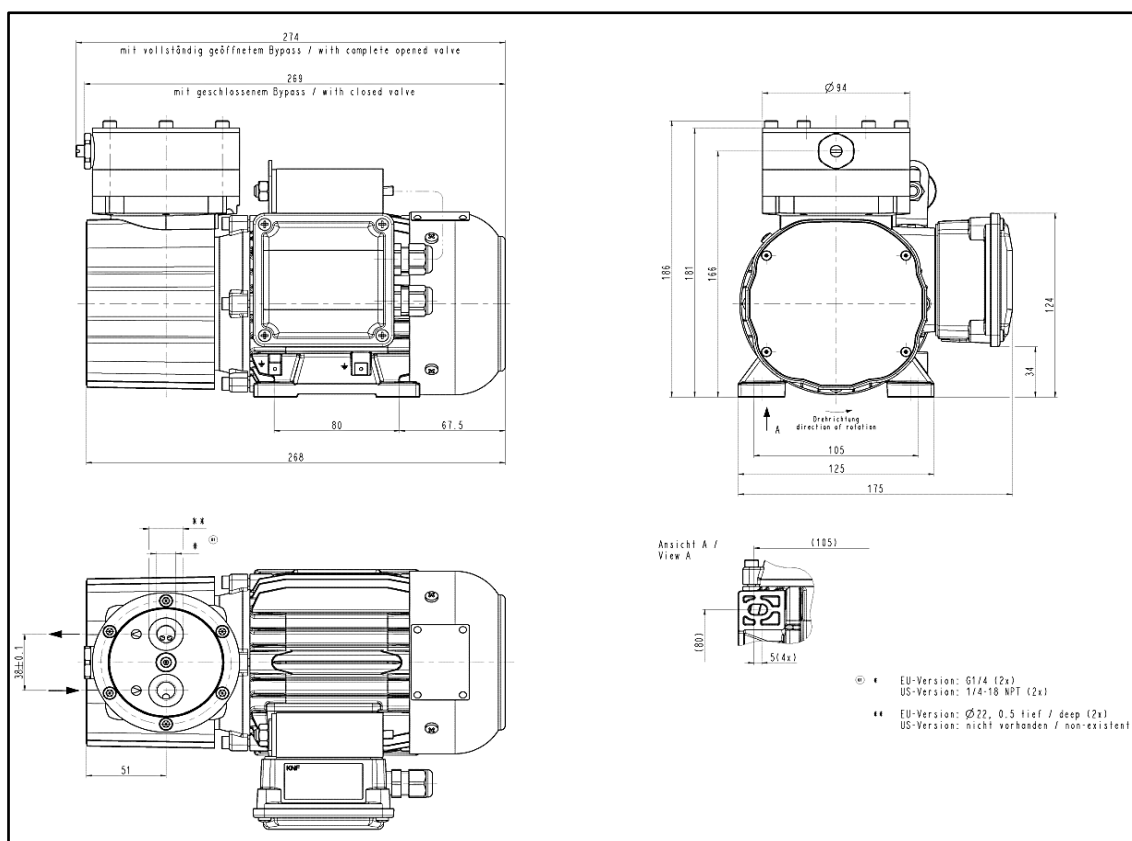
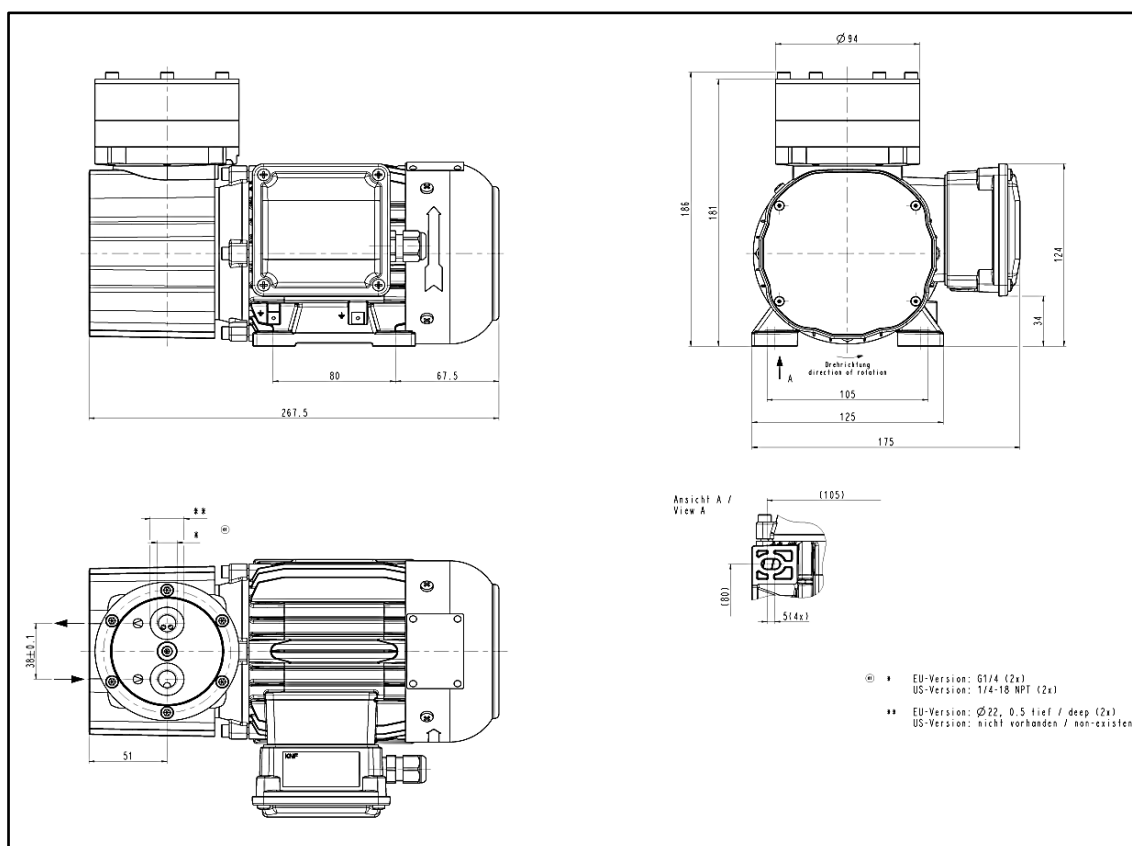


Fig. 3: Mounting dimensions pump series N 922 FTE (1~ motor) (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)



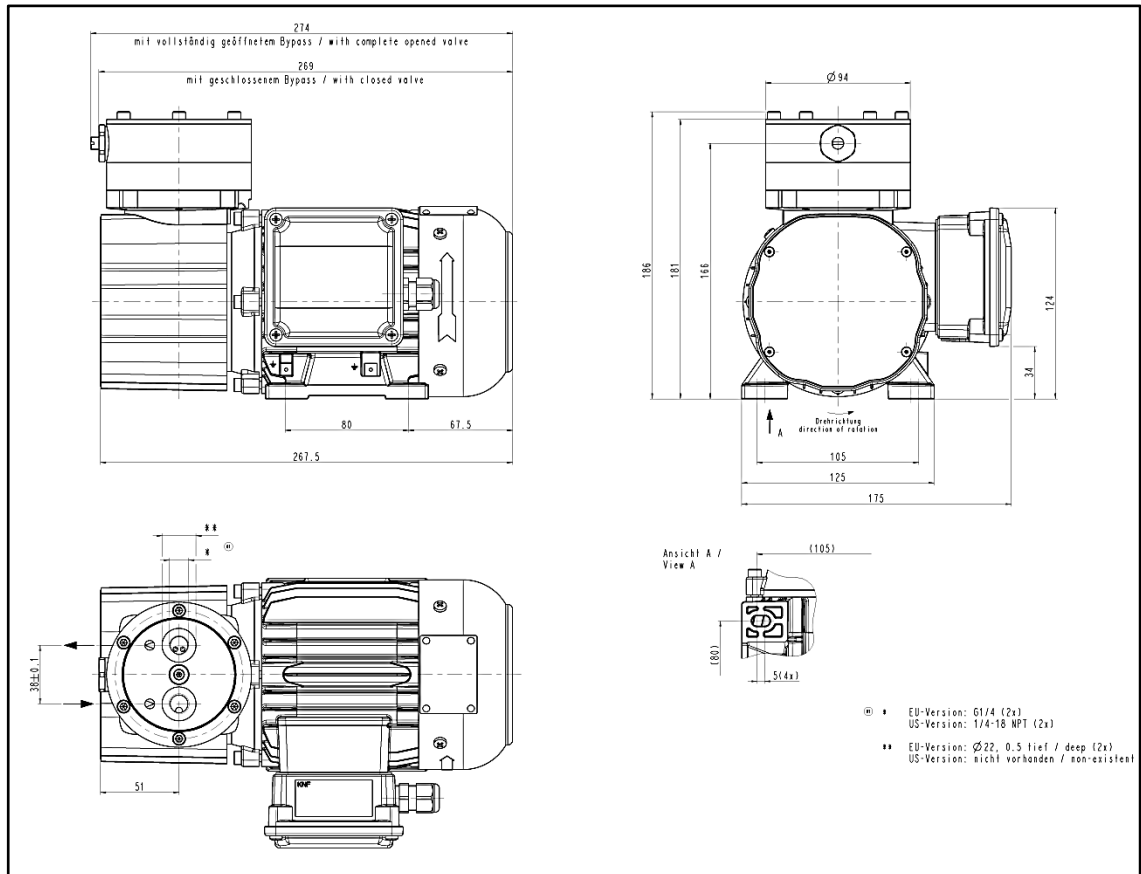


Fig. 6: Mounting dimensions pump series N 922 FT.29 E (3~ motor) (All dimensional tolerances conform to DIN ISO 2768-1, Tolerance Class V)

#### Cooling air supply



Danger of burns from hot surfaces

Hot surfaces may be caused by overheating of the pump.

#### WARNING

→ Install the pump so that the motor fan can intake sufficient cooling air.

Immediate ambient of the hot pump parts

→ When installing, make sure that there are no combustible or thermally malleable objects placed in the immediate ambient of the hot pump parts (head, motor).

Installation location

→ Make sure that the installation location is dry and the pump is protected against rain, splash, hose and drip water as well as other pollutions.

→ Make sure, that the installation location is accessible for maintenance and service.

**i** The IP protection class of the pump motor is indicated on the type plate.

→ 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.

**WARNING**

Personal injury and/or damage to property because of vibration

In conjunction with adjacent components, vibration of the pump may result in crushing and/or damage to these components.

- ➔ Make sure that vibrations of the pump do not result in hazards associated with adjacent components.

Foreign matter protection

- ➔ Protect the pump against contact and intrusion of foreign matter.

## 7.2. Aligning the compressor housing

Tools

Quantity	Tool/Material
1	Allen key 2
1	Allen key 4

Tab. 8

**i** If the pump is used to transfer moist gases, condensation may form in the pump head during operation. Among other things, this reduces the pump capacity.

To ensure optimum suction performance, it is advisable to align the pump head downwards so that the condensation can simply run out of the pump head. To do this, the compressor housing and pump head (depending on the installation situation) can be rotated and assembled in 90° increments.

- 1 Housing cover
- 2 Allen screw
- 3 Eccentric
- 4 Motor mounting screws

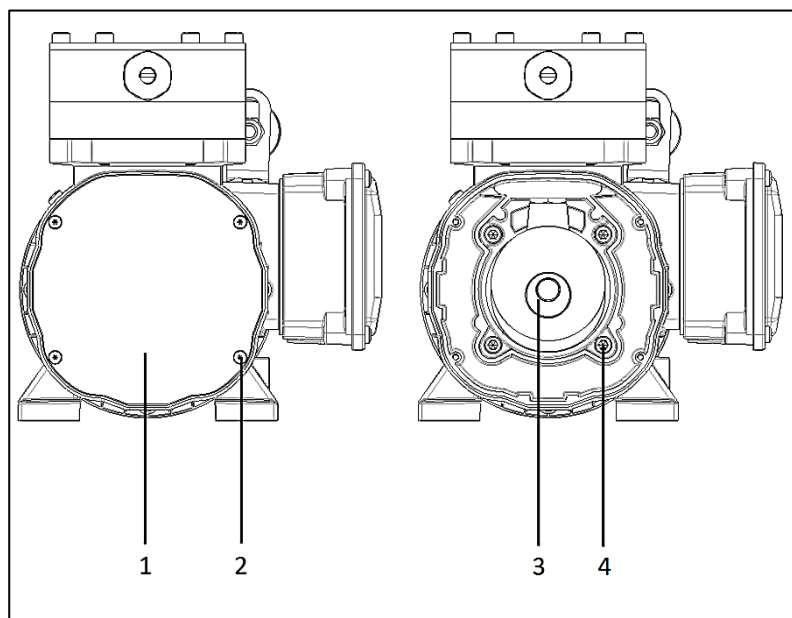


Fig. 7:

1. Undo and remove the four Allen screws (Fig. 7/2) from the housing cover (Fig. 7/1).



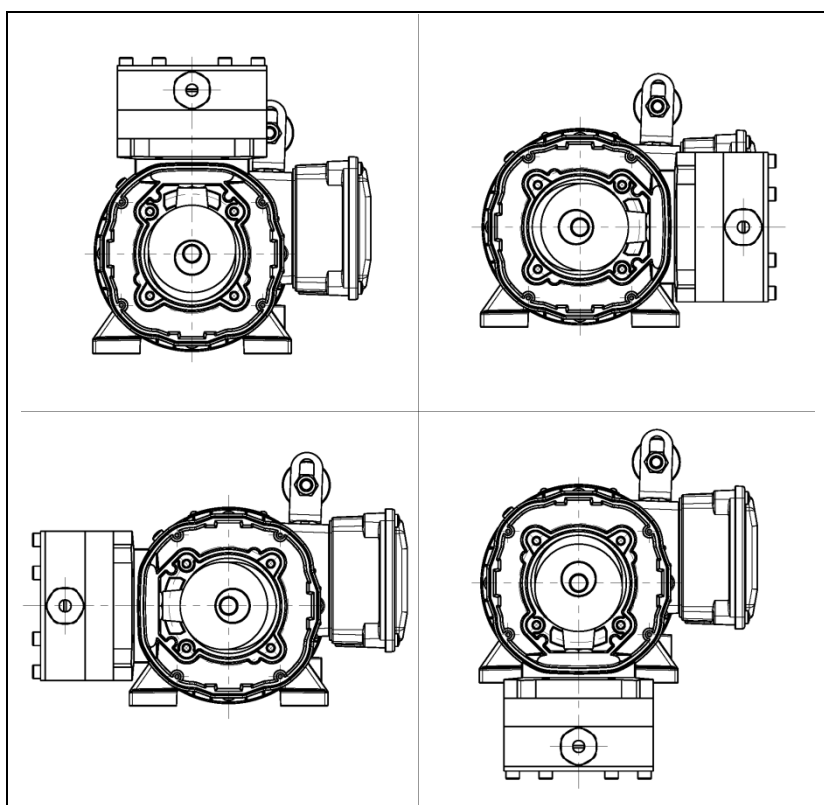
2. Remove the housing cover (Fig. 7/1)

**i** The eccentric crank assembly (Fig. 7/3) and the four motor mounting screws (Fig. 7/4) are visible.

3. Undo and remove the four motor mounting screws (Fig. 7/4).

4. Rotate the housing to the required position.

**i** The compressor housing can be rotated completely around its own axis in 90° increments in relation to the motor (see Fig. 8).



*Fig. 8: Installation positions of the compressor housing*

5. Reinsert and tighten the four motor mounting screws (Fig. 7/4) (tightening torque: 6 Nm)
6. Replace the housing cover (Fig. 7/1) and tighten with the four Allen screws (Fig. 7/2) (tightening torque: 15 Ncm).

### 7.3. 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 (complying with EN 60204-1) must be made for disconnecting the pump motor from the electrical supply.
- The motors of the pump must be protected according to EN 60204-1 (protection against excess current, or overloading).
- i** For max. operating current of the pump see pump's type plate.
- It is recommended that an additional "Emergency Stop" switch is installed.
- The pump must be installed so that contact with live parts is impossible.

Attach connection cables

- Fasten the connection cables so that:
  - the cables do not contact moving or hot parts.
  - the cables will not chafe or be damaged on sharp edges or corners.
  - no pulling or pushing forces are exerted on the cable's connection points (strain relief).

**i** The pumps are fitted as standard with a thermal switch (1~ motor) or PTC sensors (3~ motor) to protect against overloading (connection according to operating instructions of the motor).

**i** The 3~ motors are provided for the operation with frequency converter.

#### Connecting pump

1. Compare the supply data with the data on the motor plate. For maximum operating current of the pump see pump's type plate.
- i** See operating instructions of the motor for permissible deviation of the supply voltage.
2. Open terminal box cover.
3. Connect the earth (ground) wire to the motor.

4. All pumps except versions with 3~ motor:  
Connect the mains cables to the connections L1 and N of the pump motor.
5. Connection f pumps with 3~ motor according to Fig. 9 or Fig. 10.
6. Close the terminal cover box.

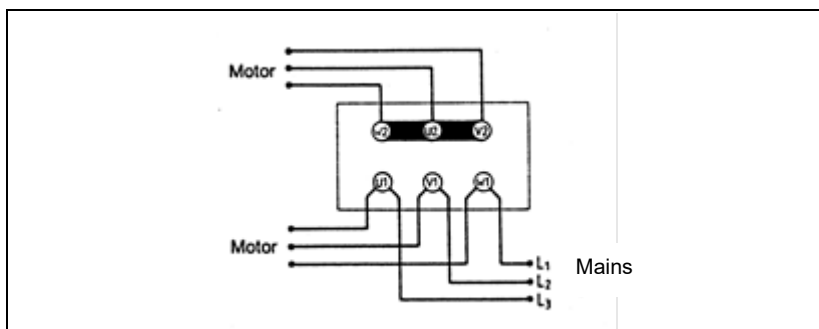


Fig. 9: Y-Connection (high voltage)

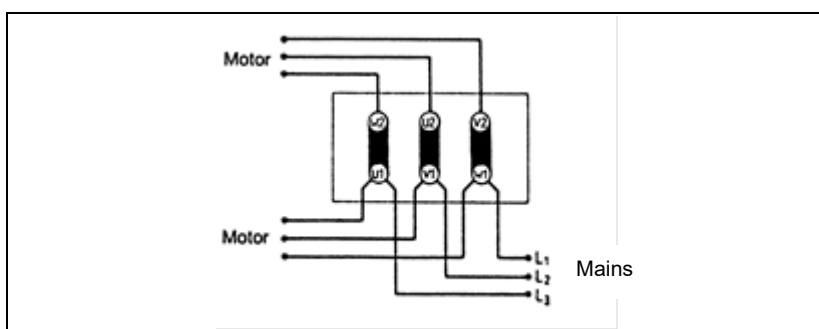


Fig. 10: Δ-connection (low voltage)

## 7.4. Pneumatic connection



### CAUTION

Personal injury or damages to property by ejected protective plugs

If the protective plug at the pressure side of the pump hasn't been removed, it could be ejected because of the overpressure during operation.

➔ Remove the protective plug during the installation.

Connected components	➔ Only connect components to the pump which are designed for the pneumatic data of the pump (see Chapter 4, Technical Data).
Pressure relief device	➔ Protect the pump with a pressure relief device between the pressure connection of the pump and the first shut-off valve.
Pump exhaust	➔ If the pump is used as a vacuum pump, safely discharge the pump exhaust at the pump's pneumatic outlet.
Disengaging	➔ KNF recommends mechanically disengaging the pump from the piping system. This can be achieved with flexible tubing or pipes, for example. This will avoid transferring to the system any pump oscillations that may arise.

### Connecting pump



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



Confusion between suction and pressure sides can lead to breakage of connected components on the suction and pressure sides.

1. Remove the protective plugs from the hose connection threads.
2. Connect the suction line and pressure line (see Chapter 4, Tab. 7 for mounting dimensions).
3. Lay the suction and pressure line at a downward angle to prevent condensate from running into the pump.

## 8. Operation



Danger of burns from hot pump parts or hot medium

During or after operation of the pump, some pump parts may be hot.

### **WARNING**

- Allow the pump to cool after operation.
- Take safety precautions against the contact of hot parts/media.



Injury of the eyes

During excessive approach to the inlet or outlet of the pump, the eyes could be injured by the upcoming vacuum or overpressure.

### **WARNING**

- Don't look into the pump's inlet or outlet during the operation.

- Only operate the pumps under the operating parameters and conditions described in Chapter 4. Technical Data.
- Make sure the pumps are used properly (see Chapter 2.1).
- Make sure the pumps are not used improperly (see Chapter 2.2).
- Observe the safety precautions (see Chapter 3).
- The pumps are intended for installation. Before putting them into service it must be established that machinery or equipment in which they are installed meets the relevant regulations.



Hazard of the pump head bursting due to excessive pressure increase

### **WARNING**

- Do not exceed max. permissible operating pressure (see Chapter 4. Technical Data).
- Monitor pressure during operation.
- If the pressure exceeds the maximum permissible operating pressure, immediately switch off pump and eliminate 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 is not exceeded.
- Ensure that the pump outlet is not closed or constricted.

- 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 (contact data: see [www.knf.com](http://www.knf.com)).

**WARNING**

Automatic starting can cause personal injury and pump damage

When the operation of the pump is interrupted by the thermal switch (1~ motor) or the triggering device for PTC sensors (3~ motor), the pump will restart automatically after cooling down.

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

- Pump standstill ➔ With the pump at a standstill, open pressure and suction lines to normal atmospheric pressure.
- i** The pump may start up against pressure and/or vacuum during switch-on (see Tab. 7, page 10). This also applies in operating following a brief power failure.
- Vapors as media The life of the diaphragm is prolonged the formation of condensate is avoided. Therefore the following precautions should be taken:
- ➔ Run the pump for a few minutes to warm it up before handling saturated or nearly saturated vapors.
- ➔ KNF recommends: When transferring aggressive media, flush the pump prior to switch off (see Chapter 9.2.1) to increase the service life of the diaphragm.

## 8.1. Switching pump on and off

### Switching pump on

- i** The pump may start up against pressure and/or vacuum (see Tab. 7, page 10) during switching on. This also applies in operation following a brief power failure.

### Switching pump off

- ➔ KNF recommends: When transferring aggressive media, flush the pump prior to switch-off (see Chapter 9.2.1) to increase the service life of the diaphragm.
- ➔ Open pressure and suction lines to normal atmospheric pressure.

## 8.2. Setting the flow (.29 version)

Tools	Quantity	Tool/Material
	1	Screwdriver blade width 6.5 mm

Tab. 9

➔ The diaphragm pump is designed so that the flow rate can be adjusted to suit the analysis system it is supplying. If it is necessary to adjust the flow, proceed as follows (Fig. 11):

### To reduce the flow

➔ Turn the adjusting screw X anti-clockwise.

### To increase the flow

➔ Turn the adjusting screw X clockwise.

**i** When the valve is closed as well as completely opened the resistance to turning increases noticeably – to avoid damage do not turn beyond this point.

The corresponding end position is reached.

**X** Adjusting screw

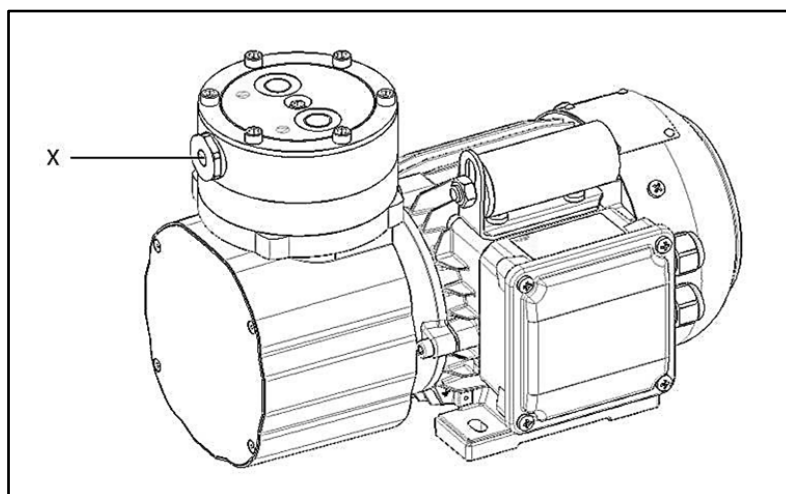


Fig. 11: Setting the flow (N 922 FT.29 E)

## 9. Servicing

### 9.1. Servicing schedule

Component	Servicing interval
Pump	- Regular inspection for external damage or leaks
Diaphragm and valve plates/sealings	- Replace at the latest, when pump output decreases

Tab. 10

### 9.2. Cleaning

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

#### 9.2.1. Flushing pump

➔ When transferring aggressive media, flush the pump under atmospheric conditions some 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.

#### 9.2.2. 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.

### 9.3. Replacing diaphragm and valve plates/sealings

- Conditions
- Motor disconnected from mains and de-energized
  - Pump free of dangerous substances

Spare parts	Spare part*	Position**	Quantity
	Zone diaphragm	(6)	1
	Valve plate/sealings	(9)	2
	O-ring (only .29 version)	(10)	1

Tab. 11

\*according to spare parts list, chapter 11

\*\* According to Fig. 12

Tools	<table> <tr> <th>Quantity</th><th>Tools/Materials</th></tr> <tr> <td>1</td><td>Allen key 3 mm</td></tr> <tr> <td>1</td><td>Allen key 4 mm</td></tr> <tr> <td>1</td><td>Felt-tip pen</td></tr> </table>	Quantity	Tools/Materials	1	Allen key 3 mm	1	Allen key 4 mm	1	Felt-tip pen
Quantity	Tools/Materials								
1	Allen key 3 mm								
1	Allen key 4 mm								
1	Felt-tip pen								

Tab. 12

- Information on procedure
- ➔ Always replace the zone diaphragm, valve plates and O-rings (only .29 versions) together to maintain the pump performance.



**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.
- ➔ Clean pump with suitable measures.



The position numbers in the following text refer to Fig. 12.

**Removing pump head**

1. Draw a continuous line between the housing (1), intermediate plate (2), head plate (3), and pressure plate (4) using a felt tip pen to ensure correct assembly.
2. Removing the pump head:  
Undo the six screws (5) and remove the pressure plate (4), head plate (3), and intermediate plate (2) together from the pump housing.


**Replacing the diaphragm**

1. Undo and remove the four Allen screws (Fig. 7/2) from the housing cover (Fig. 7/1).
2. Remove the housing cover (Fig. 7/1).
3. Move the connecting rod (connecting part between the drive shaft and the diaphragm) to the upper dead center.
4. Hold the diaphragm (6) by the sides and unscrew it in an anti-clockwise direction.
5. Inspect all parts for contamination and clean if necessary (see Section 9.2.2).
6. Screw the new diaphragm (6) onto the diaphragm support in a clockwise direction and tighten hand tight.



If the zone diaphragm is tightened too much, there is a risk that the PTFE coating will detach.

**Replacing the valve plate and sealing**

1. Remove the pressure plate (4) and the six screws (5) from the pump head.
  2. Undo the screw (7) and remove together with the washer (8).
  3. Separate the head plate (3) from the intermediate plate (2).
-  Place the head plate down carefully so as not to damage its sealing edge.
4. Remove the valve plates/sealings (9) from the intermediate plate (2).
  5. Only for .29 versions:  
Remove the O-ring (10) from the intermediate plate.

6. Inspect the valve seats, intermediate plate (2), head plate (3) and, if necessary, the O-ring groove for contamination or damage. Clean the parts if necessary.  
Contact KNF in case of unevenness, scratches, or corrosion.  
Order and replace damaged parts.
7. Inserting the valve plate/sealings:  
**i** The valve plates/sealings for the pressure and suction sides are identical; the top and bottom sides of the valve plates/sealings are identical.  
  
Insert new valve plates/sealings (9) into the valve seats of the intermediate plate (2).
8. With a slight horizontal movement of the valve plates/sealings (9), make sure that the valve plates/sealings (9) are centered in the valve seats of the intermediate plate (2).
9. Only for .29 versions:  
Insert the new O-ring (10).
10. Place the head plate (3) onto the intermediate plate (2) in accordance with the guide pin (12) and the felt tip pen mark.
11. Move the head plate (3) slightly sideways to ensure that it is centered.
12. Connect the head plate (3) and intermediate plate (2) with each other by tightening the screw (7) and the washer beneath it (8) (tightening torque: 100 Ncm).
13. Place the pressure plate (4) with the six screws (5) onto the head plate (3) and intermediate plate (2) in line with the felt tip pen mark.
14. Dispose of the old diaphragm, valve plates/sealings, O-ring (if applicable) properly.

### Assembling the pump head

1. Place the pump head onto the housing in line with the felt tip pen mark.
2. Screw in the screws (5) and tighten slightly in a crosswise sequence.
3. Check that the pump runs smoothly by rotating the counterweight.
4. Tighten the screws (5) in a crosswise sequence (tightening torque: 450 Ncm).
5. Replace the housing cover (Fig. 7/1) and tighten with the four Allen screws (Fig. 7/2) (tightening torque: 15 Ncm).

**Final steps**

1. Reconnect suction and pressure line to the pump.
2. Reconnect the pump to the electricity supply.

If you have any questions about servicing call our technical adviser (contact data: see [www.knf.com](http://www.knf.com)).

- 1 Housing
- 2 Intermediate plate
- 3 Head plate
- 4 Pressure plate
- 5 Screw
- 6 Diaphragm
- 7 Center screw
- 8 Shim
- 9 Valve plate/sealing
- 10 O-ring (only .29 versions)
- 11 Throttle valve (only .29 versions)
- 12 Guide Pin

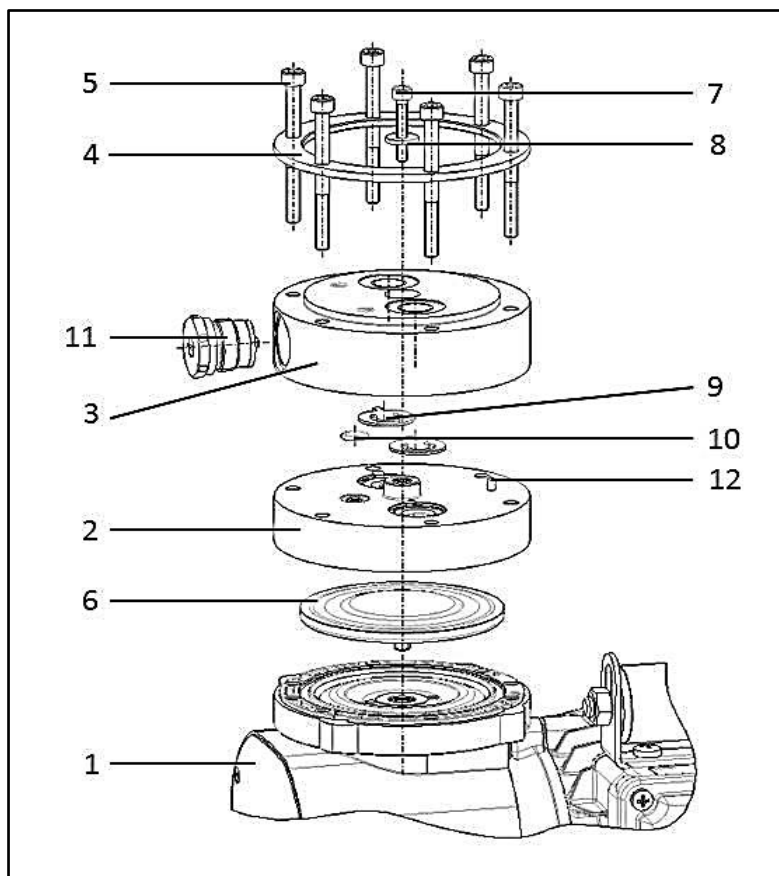


Fig. 12: Pump parts N 922 FT.29E

### 9.4. Changing the throttle valve (.29 versions)

Quantity	Tools/materials
1	Wrench, size 22 mm

Tab. 13

**i** The position numbers in the following instructions refer to Fig. 12.

1. Use the wrench to unscrew the throttle valve (**11**) from the head in an anticlockwise direction.
2. Screw a new throttle valve (**11**) into the head and tighten (tightening torque: 450 Ncm).

**i** The throttle valve (**11**) is adjusted in the factory. Therefore, no changes should be made to the throttle valve before it is installed on the head.

However, if there are deviations or discrepancies, observe the following according to Fig. 13.

1. The thread part (**Y**) and adjusting screw (**X**) must be flush for installation.
2. The valve diaphragm (**Z**) must be completely screwed in and must not be tightened.
3. Adjust the flow rate in accordance with Section 8.2.

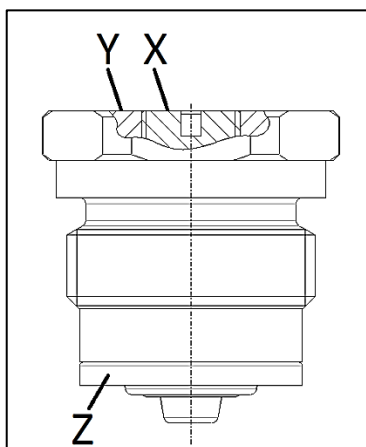


Fig. 13: Throttle valve

## 10. Troubleshooting



**DANGER**

Extreme danger from electrical shock!

- ➔ Disconnect the pump power supply before working on the pump.
- ➔ Make sure the pump is de-energized and secure.

➔ Check the pump (see Tab. 14 and Tab. 15).

<b>Pump does not transfer</b>	
Cause	Fault remedy
Thermal switch or triggering device for PTC sensors of the motor has operated following to over-heating.	<ul style="list-style-type: none"> <li>➔ Disconnect pump from mains.</li> <li>➔ Allow pump to cool.</li> <li>➔ Trace cause of over-heating and eliminate it.</li> </ul>
No voltage in power source.	➔ Check room fuse and switch on if necessary.
Connections or lines blocked.	<ul style="list-style-type: none"> <li>➔ Check connections and lines.</li> <li>➔ Remove blockage.</li> </ul>
External valve is closed or filter is clogged.	➔ Check external valves and filters.
Condensate has collected in pump head.	<ul style="list-style-type: none"> <li>➔ Flush pump (see Chapter 9.2.1).</li> <li>➔ Install pump at highest point in system.</li> </ul>
Diaphragm or valve plates/sealings are worn.	➔ Replace diaphragm and valve plates/sealings (see Chapter 9.3).

Tab. 14

<b>Flow rate, pressure or vacuum too low</b>	
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.	<ul style="list-style-type: none"> <li>➔ Flush pump (see Chapter 9.2.1).</li> <li>➔ Install pump at highest point in system.</li> </ul>
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 or are throttled.	<ul style="list-style-type: none"> <li>➔ Disconnect pump from system to determine 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.	➔ Eliminate leaks.
Connections or lines completely or partially jammed.	<ul style="list-style-type: none"> <li>➔ Check connections and lines.</li> <li>➔ Remove the jamming parts and particles.</li> </ul>
Head parts are soiled.	➔ Clean head components.
Diaphragm or valve plates/sealings are worn.	➔ Replace diaphragm and valve plates/sealings (see Chapter 9.3).

Tab. 15

**Fault cannot be rectified**

If you are unable to determine 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 to free the pump head of dangerous or aggressive gases (see Chapter 9.2.1).
2. Remove the pump.
3. Clean the pump (see Chapter 9.2.2).
4. Send the pump, together with completed Health and Safety Clearance and Decontamination Form, to KNF stating the nature of the transferred medium.

## 11. Spare parts and accessories

### 11.1. Spare parts

A spare parts kit contains all parts needed for complete overhaul of the pump head:

- 1x Diaphragm
- 2x Valve plates/sealings
- 1x O-ring (Ø 5.5 x 2) (only for .29 versions)

Spare parts kit	Order No.
N 922 FTE	313515
N 922 FT.29E	313516

Tab. 16

Spare part	Order No.
Throttle valve (only for .29 versions)	309629

Tab. 17

### 11.2. Accessories

Accessories	Order No.
Hose fitting, PVDF, for tube ID 6 x 1	303623
Assembly kit anti-vibration buffer	313180
Assembly kit anti-vibration buffer and mounting bracket	313181

Tab. 18

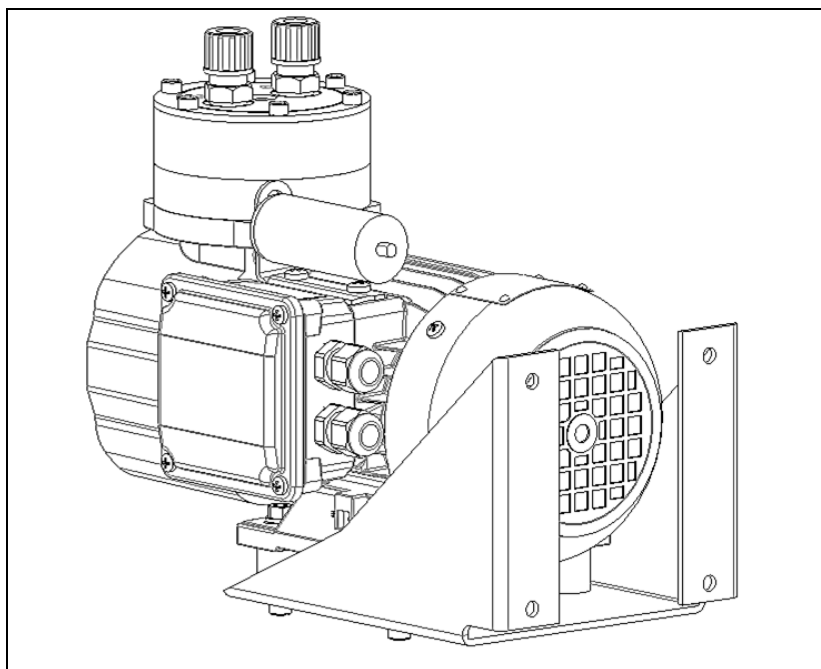


Fig. 14: Pump with accessories  
(illustrated with hose fitting, assembly kit for anti-vibration buffer and mounting bracket)

## 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).
- i** Please contact your KNF sales partner if the pump cannot be flushed due to damage.
2. Remove the pump.
3. Clean up the pump (see chapter 9.2.2).
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. In this case too, old devices can be returned. Please follow the instructions at [knf.com/repairs](https://www.knf.com/repairs) here.

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