

# FM 50

INSTALLATION INSTRUCTIONS

# DIAPHRAGM PUMP



Before operating the pump and the accessories, please read the Installation Instructions and safety precautions.



<b>Table of contents</b>		<b>Page</b>
<b>1</b>	<b>General</b> .....	<b>4</b>
1.1	Information about the instructions	4
1.2	Warnings	4
1.3	Disclaimer	5
1.4	Manufacturer's address	5
1.5	Supporting documents	5
<b>2</b>	<b>Safety</b> .....	<b>6</b>
2.1	Intended use	6
2.2	Reasonably foreseeable misuse	6
2.3	Responsibility of the user	6
2.4	Product-specific risks	6
2.5	Customer service and repairs	7
<b>3</b>	<b>Installation</b> .....	<b>8</b>
3.1	Installation location	8
3.2	Mechanical mounting	9
3.3	Connecting the fluid system	9
3.4	Electrical connection	9
<b>4</b>	<b>Initial start-up</b> .....	<b>10</b>
<b>5</b>	<b>Maintenance</b> .....	<b>12</b>
5.1	Cleaning	12
5.2	Preparing for dismantling	13
5.3	Dismantling the pump head	13
5.4	Assembling the pump head	13
<b>6</b>	<b>Rectifying transfer problems</b> .....	<b>15</b>
<b>7</b>	<b>Accessories</b> .....	<b>16</b>
<b>8</b>	<b>Spare parts</b> .....	<b>16</b>
<b>9</b>	<b>Returning the pump</b> .....	<b>17</b>

## 1 General

### 1.1 Information about the instructions

Content	The Installation Instructions describe the requirements for installing the product correctly and safely into the complete machine.
Storage location	These Installation Instructions are a part of the product. The safety-relevant information should be taken over for the documentation of the complete machine.
Project pumps	With customer-specific project pumps (pump types which begin with "PL" or "PML"), there may be differences from the Installation Instructions.

### 1.2 Warnings

Warnings in the Installation Instructions are marked by the hazard symbol, the keywords, and the color. These features provide information about the extent of the hazard.



#### **⚠ DANGER**

This indicates a dangerous situation that will directly cause death or serious injury if not prevented.



#### **⚠ WARNING**

This indicates a dangerous situation that may cause death or serious injury if not prevented.



#### **⚠ CAUTION**

This indicates a dangerous situation that may cause moderate or slight injuries if not prevented.

#### **NOTICE**

This indicates a situation that may cause damage to property if not prevented.

### 1.3 Disclaimer

The manufacturer accepts no liability for damage or malfunctions that are caused by non-compliance with the Installation Instructions.

The manufacturer accepts no liability for damage or malfunctions that are caused by modifications to or conversions of the device or by improper handling.

The manufacturer accepts no liability for damage or malfunctions that are caused by using spare parts or accessories that are not approved by the manufacturer.

### 1.4 Manufacturer's address

KNF Flodos AG  
Wassermatte 2  
6210 Sursee, Switzerland  
Phone +41 (0)41 925 00 25  
Fax+41 (0)41 925 00 35  
[www.knf.com](http://www.knf.com)

### 1.5 Supporting documents

The listed documents must also be observed. The valid versions are available at [www.knf.com](http://www.knf.com).

- Data sheet
- 3D model

The following must also be observed:

- Local T&Cs
- Sales documents and agreement between KNF and the customer
- Drive specification

## 2 Safety

### 2.1 Intended use

The pump is intended solely for the following uses:

- Transferring liquids and gases
- For operation in accordance with the operating parameters specified in the technical data of the supporting documents

### 2.2 Reasonably foreseeable misuse

The pump must not:

- be operated in an explosive atmosphere
- be used to transfer explosive media
- be used to transfer media whose compatibility with the pump head, valves, diaphragm, and seals has not been proven

### 2.3 Responsibility of the user

The user is responsible for ensuring that the safety precautions in these Installation Instructions are complied with. Applicable safety, accident prevention, and environmental protection regulations must be complied with.

### 2.4 Product-specific risks

Remaining risks that were determined in a risk assessment are described in this section. Safety precautions and warnings in this section and in the other sections of the Installation Instructions must be observed to prevent dangerous situations.

#### DANGER

##### **Danger of injuries and damage to property due to dangerous substances**

Poisoning and chemical burns or unintended reactions caused by leaking dangerous substances

- Observe the safety data sheets of the transferred media.
- Before transferring a medium, check whether it can be transferred safely in the specific application case.
- Ensure that the system is not subject to any risks of explosion – not even under extreme operating conditions (temperature, pressure) or in case of malfunctions.
- Ensure the pump is used only by suitably trained, skilled employees.
- Clarify the chemical resistance of the head materials.
- Check that the pump and the system do not leak at the operating temperature of the transferred medium.
- Check the pump for damage regularly.
- Operate the pump only when you are sure it has no technical malfunctions.
- Operate the pump in accordance with the technical data.
- Work on the pump or fluid circulation system only after they have been decontaminated and/or a decontamination declaration is present.



**⚠ DANGER****Danger of injuries and damage to property due to leaks at the interfaces to the pump head**

Poisoning and chemical burns or unintended reactions caused by leaking dangerous substances

- Wear personal protective equipment.
- Connect the pump correctly.
- Operate the pump only when you are sure it has no technical malfunctions.
- Operate the pump in accordance with the technical data.

**⚠ DANGER****Danger of injuries and damage to property due to uncontrolled flow while the pump is not in operation**

Poisoning and chemical burns or unintended reactions caused by leaking dangerous substances

- Construct the fluid system so that the operating pressure at the pressure side of the pump is higher than at the suction side.
- Install a shut-off valve in the fluid circulation system.

## 2.5 Customer service and repairs

All repairs to the pumps must be carried out by the responsible KNF customer service team.

Use only genuine parts from KNF for servicing work.

### 3 Installation

#### ⚠ WARNING

##### Danger from incorrect installation

Injuries or damage to property from leaking media

- After installation, check the system for leaks with a safe medium.
- Observe the requirements for intended use.
- Take precautions in the design of the end device so that leaking liquids cannot come into contact with live components.
- Use only connections that are specified in the data sheet. G1/8" thread is recommended. Do not use NPT threads or sealing tape, as cracks can occur at the plastic connections.



The following requirements apply to all activities described in this section:

#### 3.1 Installation location

The installation location must:

- protect the pump against immersion
- keep aggressive and flammable liquids and vapors away
- allow hoses to be connected without tensile or bending stress
- take account of cooling the pump drive
- ensure that any leaks can be handled
- have appropriate precautions if flammable media are used

#### Mounting orientation

The following points are recommended for optimal filling and venting of the pump head.

- horizontal mounting position
- Filling / emptying pump with nominal rpm (nominal voltage).

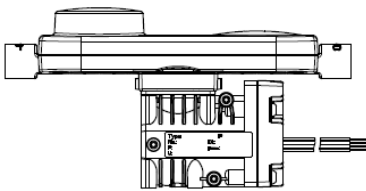


Figure 1: Horizontal orientation



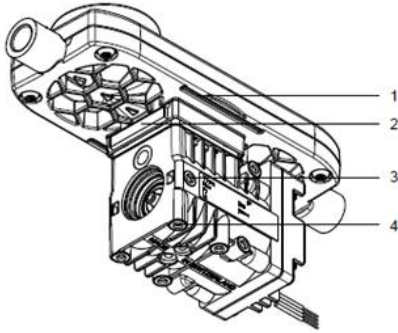


Figure 2: Mounting

### 3.2 Mechanical mounting

- Protect the product against impacts, knocks, and strong vibrations.
- Please refer to the product data sheet for dimensions, installation positions, and fluid connections.

Following mounting options are available

- Groove (1) for mounting of clip (for detail information and availability contact KNF).
- Guiding rail (2) for side mounting of clip. See accessory in chapter 7).
- Holes (3) and (4) for standard PT30 screws. Hole spacing and depth of holes see data sheet FM 50. Torque 0.6Nm. Mounting Plate available on request.

### 3.3 Connecting the fluid system

Use suitable means to check the fluid connection for leaks.

Connections for G1/8" thread and more information regarding dimensions, please refer to the data sheet.

### 3.4 Electrical connection

For terminal assignment, output data, and control requirements, please refer to the data sheet.

Observe the regulatory requirements for electrical installations:

- Overload protection and separating protective devices according to current value on the type plate. The pumps must be fused individually.
- Contact protection and additional insulation
- Ground connections
- Protection against vibrations, tensile stress, and corrosion

For detailed information about control, please refer to the drive specification (available from your local KNF dealer).

## 4 Initial start-up

The product must not be started up until it has been ensured that the machine in which the product is to be installed meets the requirements of the Machinery Directive 2006/42/EC, if applicable.

### WARNING

#### **Danger that the fluid system could rupture due to excess pressure**

The pump builds up pressure. With a closed system, the max. permitted operating pressure can be exceeded. This may cause injuries to personnel, or damage to the pump or the system.

- Prevent operation against a closed system.
- In the case of parts that are in contact with the fluid, use only those that are designed to withstand at least the operating pressure of the pump.
- If necessary, take suitable measures to limit the maximum system pressure.



### CAUTION

#### **Danger of unexpected chemical reactions with water**

Residues of water in the pump that come from testing in the factory may react with the transferred medium.

- Before starting the pump for the first time, rinse it with a medium that is uncritical as regards water.



### VORSICHT

#### **Danger of automatic restart**

Pumps with brushless DC-motor have a thermal overload protection with automatic recovery to protect the motor from overheating. After cooling down the motor starts automatically.

- Ensure that this does not cause a hazardous situation



**⚠ CAUTION****Danger from hot surfaces**

The pump becomes hot during operation. Burns from hot surfaces or injuries from uncontrolled movements are possible.

- Do not touch the pump while it is operating.
- Ensure a sufficient supply of cool air and keep a safe distance between the pump and neighboring components.
- Operate the pump in accordance with the technical data.
- If the temperature of the medium is above 50°C, take safety precautions to prevent burns of fluid components.

Before switching on the pump, verify the following:

- All hoses are attached properly.
- Pump is mechanically fixed in place.
- Specifications of the power supply correspond with the data on the pump's type plate.
- Pump outlet is not blocked.
- All cables are attached properly.
- Contact protection for electrical connections and moving parts is installed.

**⚠ CAUTION****Danger of scalding from hot medium leaks**

In the terminal system, check the fluid system for leaks at the operating temperature of the medium.

## 5 Maintenance

Ask your KNF representative about the availability of spare parts for this product.

Use only genuine parts from KNF for servicing work.

### 5.1 Cleaning



#### WARNING

##### **Danger due to dangerous substances in the pump**

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

- If necessary, wear protective equipment, such as safety gloves.
- Work on the pump or fluid circulation system only after they have been decontaminated and/or a decontamination declaration is present.
- Rinse the pump with a neutralizing liquid and then pump it empty.



#### WARNING

##### **Danger from medium spraying in the environment**

Due to pressure in the pump and adjacent parts, medium can spray out if hydraulic parts are manipulated or opened.

- Always depressurize the hydraulic parts of the system before carrying out any work.
- Disconnect the pump from the power supply and make sure that it cannot be switched on again inadvertently.

Clean the pump.

1. Clean and dry the parts with a cloth. Do not use solvents for cleaning, as they can harm plastic parts.
2. If compressed air is available, blow out the components.

### 5.2 Preparing for dismantling

1. Rinse the pump with a suitable neutralizing liquid and make sure that there are no dangerous substances left in the pump (see warnings above).
2. Pump the unit empty in horizontal mounting position with nominal rpm (nominal voltage). See also Chapter 3.1.
3. Disconnect electrical connections.
4. Remove hoses from pump head.

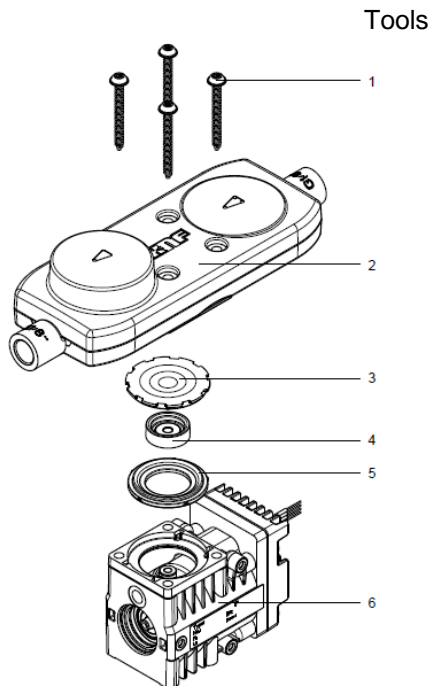


Figure 3

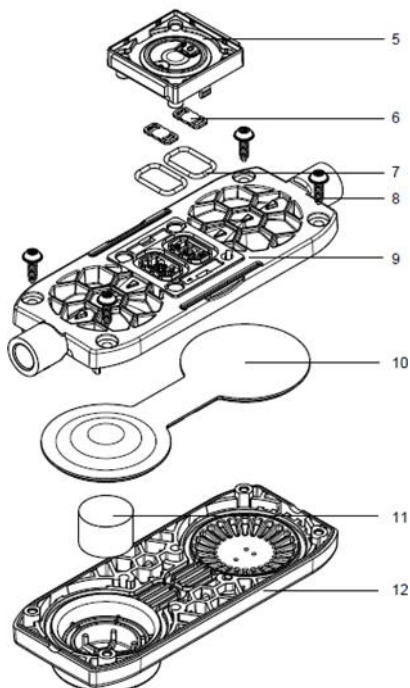


Figure 4

Qty	Tools
1	Torx screwdriver T10

Table 1

### 5.3 Dismantling the pump head

1. Undo the four head screws (1) and remove the complete head (2) from the pump housing (6).
2. Carefully grip the diaphragm (3) and remove by turning counterclockwise.
3. Remove the connecting rod disc (4). Insert ring (5) can remain in the housing (6).
4. Rotate head (2) like shown in Figure 4.
5. Remove the intermediate plate (5) from the connecting plate (9).
6. Remove both valves (6) and both O-rings (7) from the connecting plate (9).
7. Undo the four damper screws (8) and remove them from the connecting plate (9)
8. Remove resonating diaphragm (10) and dampening element (11) form the head plate (12).

To ensure maximum tightness after opening the pump head, we recommend replacing all elastomer parts. See chapter 8 for spare parts kit.

9. Clean all the parts with a cloth, making sure that all residues are removed and blow them off with compressed air.

### 5.4 Assembling the pump head

1. Place the insert ring (5) into the housing (6) if it was previously removed during dismantling in chapter 5.3.
2. Correctly place the connecting rod disc (4) on the diaphragm (3). Insert the diaphragm (3) and tighten it well by hand.

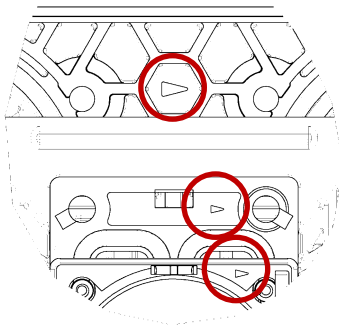


Figure 5: Direction of arrow

3. By slightly pressing on the diaphragm, the ridge on the underside of the diaphragm can be positioned into the groove of the housing.
4. Place the head plate (12) according to Figure 4.
5. Insert the dampening element (11) into the cylindrical part of the head plate (12).
6. Place the resonating diaphragm (10) on the head plate (12). Make sure that the ridge on the underside is properly placed in the groove of the head plate (12). Additionally, make sure that the protruding part of the resonating diaphragm is placed on the side of the dampening element.
7. Place the connecting plate (9) on the head plate (12). Observe the direction of the arrow ► on both parts for easier assembly. The arrows must point in the same direction.
8. Tighten the four damper screws (8) in a diagonal sequence. Tightening torque 1.2Nm.
9. Place both valves (6) and both O-rings (7) into the connecting plate (9).
10. Snap the intermediate plate (5) into the connection plate (9). Observe the direction of the arrow ► on both parts for easier assembly. The arrows must point in the same direction.
11. Place complete head (2) onto the pump housing (6).
12. Insert the four head screws (1) and tighten the screws in a diagonal sequence. Tightening torque 1.0Nm.
13. Re-connect the hoses to the pump head.



### ▲ CAUTION

#### Caution, escaping liquid

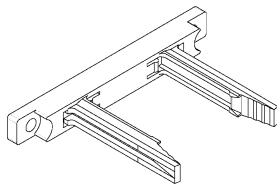
After assembly, the pump may not be leak-tight due to incorrect assembly, damaged or soiled seal faces, or other reasons.

- Run the pump for several minutes with a harmless medium at maximum operating pressure.
- Check that the pump is leak-tight.

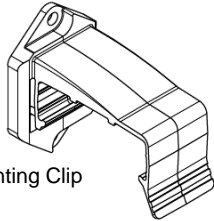
## 6 Rectifying transfer problems

Symptom	Cause	Remedy
Pump does not work; no movement or sounds are detectable.	No or incorrect control	Check that voltage and signal form comply with the specification.
Pump does not work; drive becomes very hot.	Motor is controlled with an incorrect signal.	Check that voltage and signal form comply with the specification.
The pump does not prime, or vacuum is insufficient.	External valve is closed.	Check external valve.
	Counterpressure on pressure side is too high.	Change the pressure conditions on the pressure side.
	Particles in the pump head	Rinse the pump head. Use a preventive preliminary filter.
Pump does not transfer.	External valve is closed, or filter is clogged or too small.	Check external valves and filter.
	Connections or hoses are blocked.	Check connections and hoses. Remove blockage.
Flow rate is insufficient or unstable.	Incorrect control	Check that voltage and signal form comply with the specification.
	Cross-section of hydraulic hoses or connectors too narrow or restricted	Disconnect the pump from the system and determine performance data. Remove restriction (e.g. valve), if necessary. If applicable, use larger-diameter hoses or connectors.
	Higher counterpressure in the system than assumed for the design	Contact KNF representative.
	Particles in the pump head	Rinse the pump head. Use a preventive preliminary filter. Replace pump head.
	Pump has reached the end of its service life.	Replace the pump.
Leak on pump head	Damage to the valve O-rings	Replace the O-rings.
	Diaphragm damaged	Replace the diaphragm.
	Resonating diaphragm damaged	Replace resonating diaphragm.

If the malfunction cannot be rectified, contact your local KNF representative ([www.knf.com](http://www.knf.com)).



Side Mounting Clip



Mounting Clip

Figure 6: Mounting clips

## 7 Accessories

### Mounting clip

Name	Material <i>material</i>	Bestell-Nr. <i>Order-No.</i>
Side Mounting Clip	PP GF30%	332358
Mounting Clip	PA GB40%	351069

## 8 Spare parts

### Spare parts kit “elastomer”

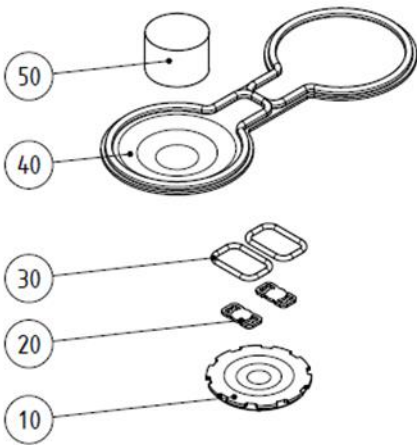


Figure 7: Spare parts kit “elastomer”

Pos	Name	Material	Order-No.	Pieces	Pieces	Pieces
	Kit_P Elastomer		352712			
	Kit_P.51 Elastomer		352711			
	Kit_T Elastomer		352713			
10	Diaphragm	EPDM		-	1	1
		PTFE		1	-	-
20	Valve	EPDM		-	2	2
		FFKM		2	-	-
30	O-Ring ID14x1.5	EPDM		-	2	2
		FKM		2	-	-
40	Resonating Diaphragm	EPDM		-	1	1
		PTFE		-	-	-
		FKM		1	-	-
50	Dampening Element	Sylodyn		1	1	1

### Spare parts kit “plastic”

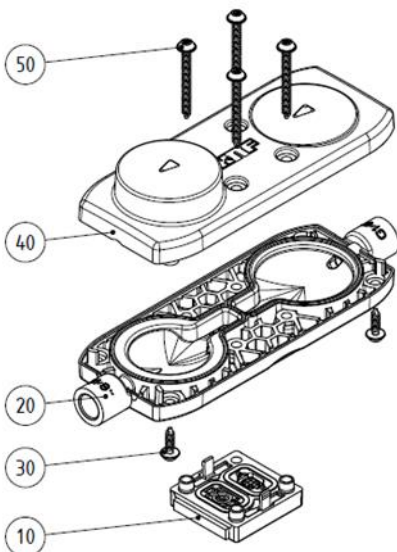


Figure 8: Spare parts kit “plastic”

Pos	Name	Material	Order-No.	Pieces	Pieces
	Kit_K_Plastic		352710		
	Kit_K_.51 Plastic		352714		
10	Intermediate Plate	PPH GF5030 HC		-	1
		PPH GF5030 HC FA		1	-
20	Connection Plate	PPH GF5030 HC		-	1
		PPH GF5030 HC FA		1	-
30	PT Screw 30x10	Inox		4	4
40	Head Plate	PA GF40%		1	1
50	PT Screw 30x29	Inox		4	4



## 9 Returning the pump



KNF undertakes to repair the pump only on condition that the customer provides a certificate of the pumped medium and cleaning of the pump. For this, please follow the instructions on [www.knf.com/repairs](http://www.knf.com/repairs).

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

