FP 150, FP 1.150

INSTALLATION INSTRUCTIONS

DIAPHRAGM PUMP

FP 150 DCB-4 / FP 1.150 DCB-4

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

Contents **Page**

1 General information

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 of liability

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

1.5 Supporting documents

The listed documents must also be observed. The valid versions are available at 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.

The risk analysis indicates a risk of explosion due to certain materials and substances.

⚠ DANGER

Danger of injuries and property damage caused by an explosion in the pump

The pump housing is made from aluminium. If the pump diaphragm is damaged, medium can accumulate in the housing and form hydrogen (especially with acids and lye's). This could cause an explosion in the pump housing.

- ➢ Check and monitor the reactivity of the medium with aluminium.
- ➢ No flammable materials in the direct vicinity of the pump or piping.
- ➢ Monitor leaks with the optional leak sensor integrated in the housing.

The pump housing is designed to withstand pressure surges caused by explosions. The probability of a fault that would cause an explosion is deemed to be low. When installed in the system, the risks in the complete system must be assessed.

⚠ CAUTION

Danger from overheated electrical components

Danger from overheated electrical components

If the diaphragm is damaged, medium can reach the electronic board and cause a partial short-circuit. In this case, inadmissibly high currents can occur if the overcurrent protection is insufficient.

- ➢ The pump must be individually protected with an overcurrent protection device as specified on the rating plate.

⚠ DANGER

Danger of injuries and property damage caused by an explosion in the connection lines and in the pump

Evaporation of flammable liquids

- ➢ When flammable liquids are transferred, an explosive atmosphere can form in the pump and in the lines during filling and emptying.
- ➢ With the hoses that are used, pay attention that no electrostatic charges can form (use conductive materials, grounding and potential equalisation).
- ➢ The hoses that are used must be able to withstand the potential pressure of explosion.

⚠ DANGER

Danger of injuries and property damage caused by the pump exploding

If the pump has not been used or has been stored for some time, residual medium may evaporate and form an explosive atmosphere.

- ➢ If the pump has not been used for some time or is stored. Empty the pump and rinse with neutral medium to prevent a subsequent reaction.

⚠ WARNING

Danger of injuries and property damage caused by leaks to the environment

Flammable materials

- ➢ Keep flammable materials away from the direct vicinity of the pump and piping.

⚠ WARNING

Danger from failure of the diaphragms

Injuries or damage to equipment caused by escaping media when the pump diaphragms are damaged.

- ➢ Take precautions in the design of the final system so that any escaping liquids cannot cause a hazard.
- ➢ Detect faults with the leak sensor that is integrated in the housing on a project basis.
- ➢ Provide a drainage opening for the housing on a project basis.

2.5 Compliance

The declaration of standard SJ-T 11364-2024 “Hazardous Substance Disclosure Table 有害物质含量表” is made in accordance with the specifications detailed in the appendix to this document.

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.

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

3.1 Installation location

The installation location must:

- protect the pump against immersion;
- keep away aggressive and flammable liquids and vapors;
- enable hose connections with no tensile or bending loads;
- take into account cooling of the pump drive;
- consider handling of any leaks;
- have appropriate precautions if flammable media are used.

Optimum filling/venting

The following guidance is recommended for optimum filling and venting of the pump head:

- Pump vertical with pump head facing up or down

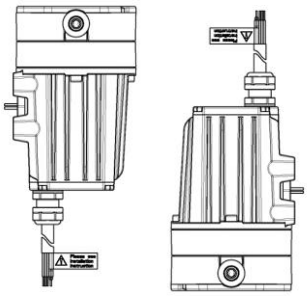

Fig. 1

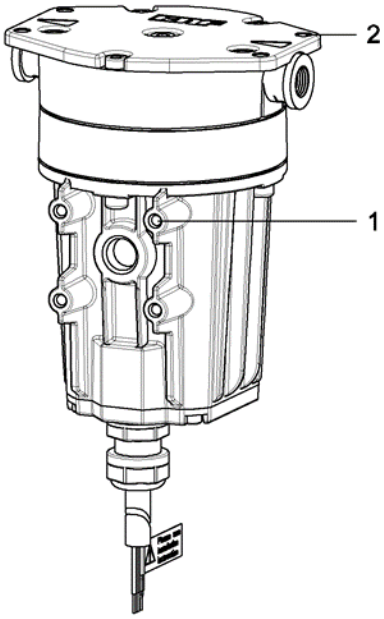

Fig. 2

3.2 Mechanical fixture

Protect the product against shocks, impacts and strong vibrations.

The following fixture options are available:

- Thread holes for M4 bolts on motor base (**1**)
- Through-holes for M4 bolts on pump head (**2**)

The following fixtures are available as project pumps:

- Mounting plate ID 177712 for M4 thread-holes (**1**)
- Fixing clamp

3.3 Connecting the fluid system

Use suitable means to check the fluid connection for leaks.

For more information about dimensions, refer to the data sheet.

3.4 Electrical connection

For performance specifications, refer to the data sheet.

Observe the regulatory requirements for electrical installations:

- Overload protection and separating protective devices according to the current value on the rating plate. The pump must be individually protected.
- Contact protection and additional insulation
- Ground connections
- Protection against vibration, tensile loading and corrosion

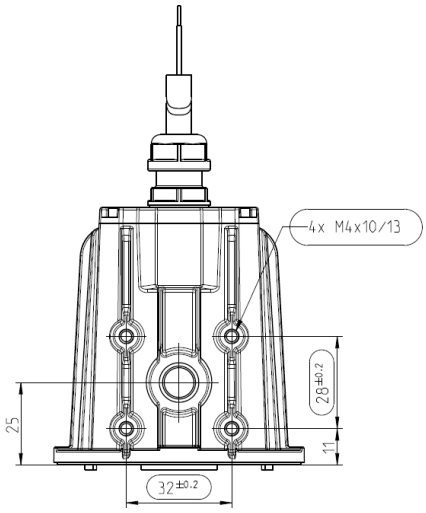

Fig. 3

Terminal assignment

Lead	Signal	Description
red	+VS	+ Supply voltage
black	- VS /GND	- Supply voltage
white	Vctrl	Control voltage 0…5V
green	FG	Speed output
blue	PMW inverse	Control signal PWM inverse. If this control signal is to be used, the connection to +VS must be separated and Vctrl must be connected with -VS/GND.

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

4 Initial start-up

The product may not be put into service until it has been determined that the machine in which the product is to be installed complies with the provisions of the Machinery Directive 2006/42/EC.

⚠ 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.

⚠ 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 unexpected start-up of the pump

- ➢ Disconnect supply voltage to pump for safe standstill.

5 Accessories/options

5.1 Leak sensor (1)

ID 174542

- The integrated leak sensor offers protection against escaping medium if the diaphragm ruptures.
- In case of a fault, the pump housing is sealed to the outside; however, the housing seals are not resistant to aggressive media.
- The sensor outputs a signal if the housing fills with medium. In such a case, the pump must be switched off within 5 minutes and the system pressure must be relieved to prevent medium escaping.
- To ensure that the leak sensor functions correctly, install the pump vertically or horizontally as shown in Fig. 3.

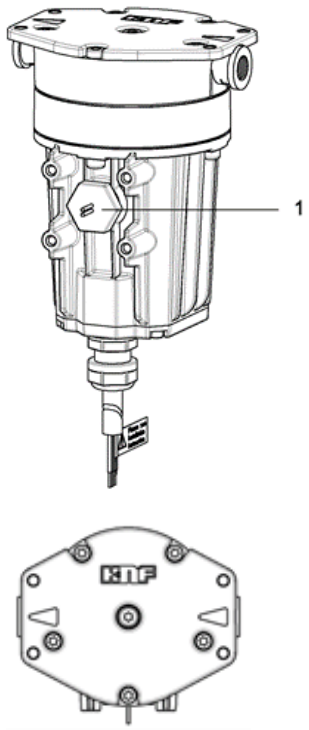

Fig. 4

5.2 Mounting option on project basis

- Mounting plate ID 177712 with M4 screw on motor foot(**1**)

Mounting clamp ID 321050 with M8-M10 thread

The data sheets are available at www.knf.com.

6 Maintenance

⚠ 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.

Qty	Tools
1	Torque wrench
1	Socket wrench insert (bit) Torx T20

6.1 Preparations for disassembly

1. Flush the pump with a suitable neutralizing liquid, and make sure that no dangerous substances are left in the pump.
2. Empty the pump.
3. Separate the electrical connections.
4. Disconnect hoses from pump head.

6.2 Disassembling the pump head

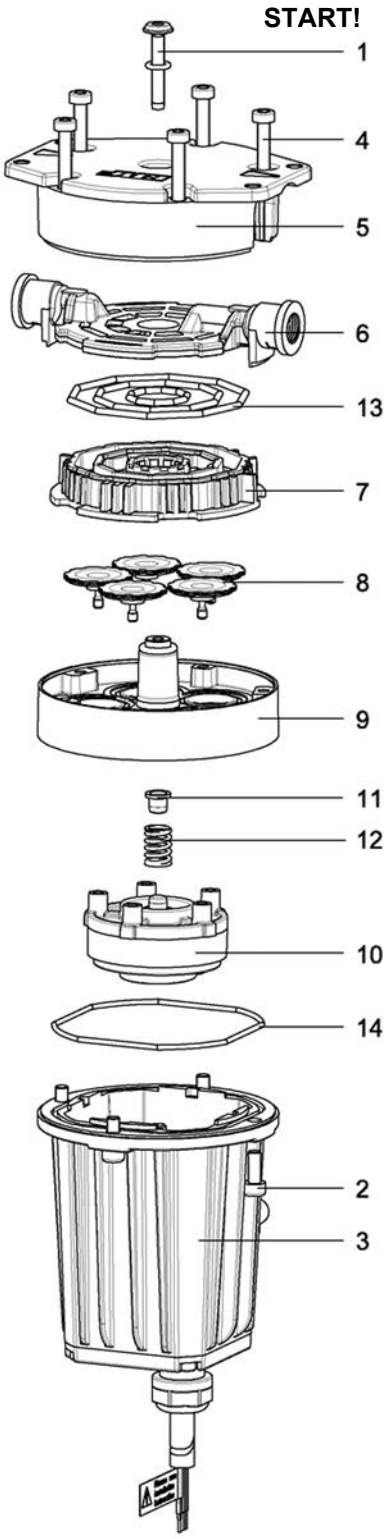

Fig. 5

1. **First step:** Undo center screw (**1**).
2. Undo the four motor fastening screws (**2**).
3. Separate the pump head from the motor (**3**).
4. Undo head screws (**4**).
5. Remove the cover plate (**5**), connecting plate (**6**) and intermediate plate (**7**).
6. Loosen the diaphragms (**8**) by hand if they are to be replaced.
7. Put the diaphragm adapter (**9**) and wobble disk (**10**) aside together. Spring cap (**11**) and spring (**12**) are between them.
8. Clean the intermediate plate (**7**) with integrated valves well, removing all residues. Blow out with compressed air (max. 1.5 bar) and allow to dry.

Key

1	Center screw
2	Motor fastening screws
3	Motor
4	Head screws
5	Cover plate
6	Connecting plate
7	Intermediate plate
8	Diaphragms
9	Diaphragm adapter
10	Wobble disk
11	Spring cap
12	Spring
13	O-rings
14	Motor seal

6.3 Installing the pump head

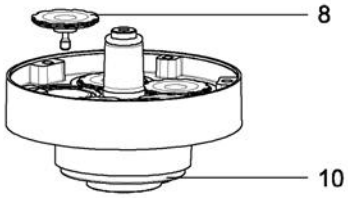

Fig. 6

1. Screw diaphragms (**8**) by hand into the wobble disk (**10**) and tighten.

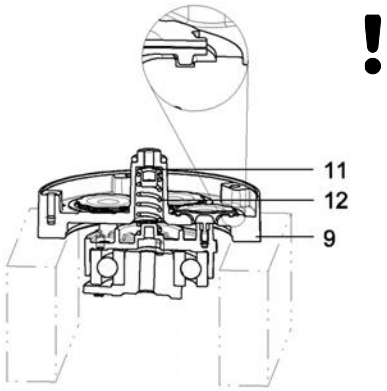

Fig. 7

2. As shown in Fig. 6, place diaphragm adapter (**9**) on a suitable surface.

   Make sure that the wobble disk (**10**) hangs on the diaphragms only (**8**) and that the diaphragms (**8**) sit properly in the grooves of the diaphragm adapter (**9**).
3. Make sure that the spring cap (**11**) and spring (**12**) are inserted.

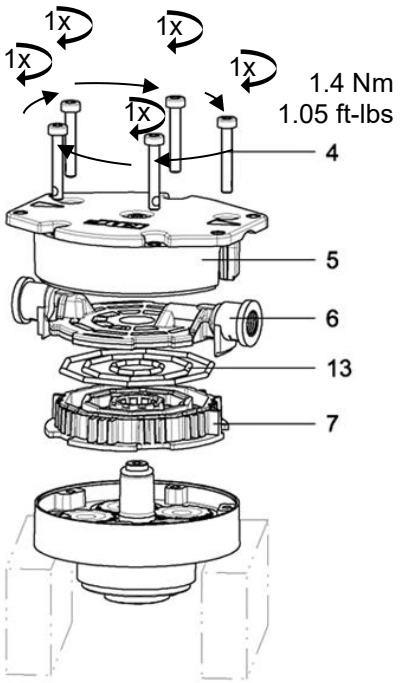

Fig. 8

4. Position the intermediate plate (**7**) on the diaphragm adapter (**9**). Make sure that the five tappets and pockets are aligned correctly.
5. Replace the three O-rings (**13**) in the connecting plate (**6**) to achieve an optimum seal.
6. Place the connecting plate (**6**) on the intermediate plate (**7**).
7. Guide the cover plate (**5**) over the connecting plate (**6**).
8. Place the head screws (**4**) in the cover plate (**5**) and tighten only slightly at this time.
9. Alternate tightening each head screw (**4**), only one rotation at a time, until all the screws are tightened with a torque of 1.4 Nm. This procedure is important to ensure that the diaphragms are compressed equally.

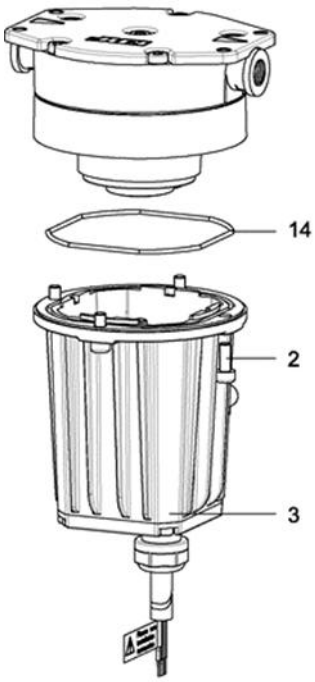

Fig. 9

10. Place the pump head on the motor (**3**). Make sure that the motor sealing ring (**14**) is positioned correctly.
11. Tighten the motor fastening screws (**2**) to 1.4 Nm.

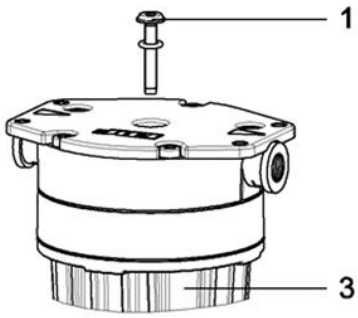

Fig. 10

12. **Final step:** Tighten the center screw (**1**) to 1.4 Nm.

⚠ WARNING

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.

7 Rectifying transfer problems

Symptom	Cause	Remedy
Pump does not work, no movement, or noise can be heard.	No or incorrect control	Check that voltage and signal shape comply with the specification.
Pump does not work; drive becomes very hot.	Motor is controlled with the wrong signal.	Check that voltage and signal shape comply with the specification.
Pump does not suck or vacuum is not sufficient.	External valve is closed.	Check external valves.
	Counter-pressure on pressure side too high	Change pressure conditions on pressure side.
	Particles in the pump head	Rinse pump head. Use preventive pre-filters. Dismantle and clean pump head.
Pump does not transfer.	External valve is closed, or filter is blocked or too small.	Check external valves and filters.
	Connections or hoses are blocked.	Check connections and hoses. Remove blockage.
Flow rate is insufficient or unstable.	Incorrect control	Check that voltage and signal shape comply with the specification.
	Cross-section of hydraulic hoses or connectors too narrow or restricted	Disconnect the pump from the system and determine output values. Remove restriction (e.g. valve), if necessary. If applicable, use larger-diameter hoses or connectors.
	Counter-pressure in the system higher than assumed for the design	Contact KNF dealer.
	Particles in the pump head	Rinse pump head. Use preventive pre-filters. Dismantle and clean pump head. Install new intermediate plate (spare part).
	Pump has reached the end of its service life.	Replace pump.
	Diaphragm defective	Replace pump.

If the fault cannot be rectified, please contact your local KNF dealer (www.knf.com).

8 Returning the pump

KNF undertakes to repair the pump only under the condition that the customer provides a certificate of the pumped medium and cleaning of the pump. For this purpose, please follow the instructions on www.knf.com/repairs.

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

9 Appendix

9.1 RoHs Declaration for China

SJ-T 11364-2024 Hazardous Substance Disclosure Table / SJ-T 11364-2024 有害物质含量表

This declaration is valid for the KNF products produced by:
本声明适用于由以下KNF公司生产的产品:

KNF Flodos AG CH-6210 Sursee Switzerland

The following information has been made available to comply with SJ-T 11364-2024 the Marking for Control of Pollution Caused by Electronic Information Products as required by China's Management Methods for the Control of Pollution from Electronic Information Products.
提供以下信息旨在遵守中国《电子信息产品污染控制管理办法》所要求的 SJ-T 11364-2024《电子信息产品污染控制标识》标准。

Part Name 部件名称	Hazardous Substances Table 有害物质含量表						EFUP / 环境友好使用期限	China RoHS comment / 中国RoHS注释	EU RoHS compliant / 符合欧盟RoHS指令
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 (Cr(VI))	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴二苯醚 (PBDE)			
Pump head / 泵头	X	O	O	O	O	O	20	Lead within EU RoHS exemption limit / 铅含量在欧盟RoHS豁免限值以内	Yes / 是
Pump housing / 泵体	X	O	O	O	O	O	20	Lead within EU RoHS exemption limit / 铅含量在欧盟RoHS豁免限值以内	Yes / 是
Pump motor / 泵的电机	X	O	O	O	O	O	20	Lead within EU RoHS exemption limit / 铅含量在欧盟RoHS豁免限值以内	Yes / 是
Additional components for systems / 系统附加部件	X	O	O	O	O	O	20	Lead within EU RoHS exemption limit / 铅含量在欧盟RoHS豁免限值以内	Yes / 是
	O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ-T 11364-2024. 表示该有害物质在该部件所有均质材料中的含量均在 SJ-T 11364-2024 规定的限量要求以下。 X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ-T 11364-2024. 表示该有害物质至少在该部件的某一均质材料中的含量超出 SJ-T 11364-2024 规定的限量要求。 EFUP /环境友好使用期限: Environment Friendly Using Period / 环境友好使用期								