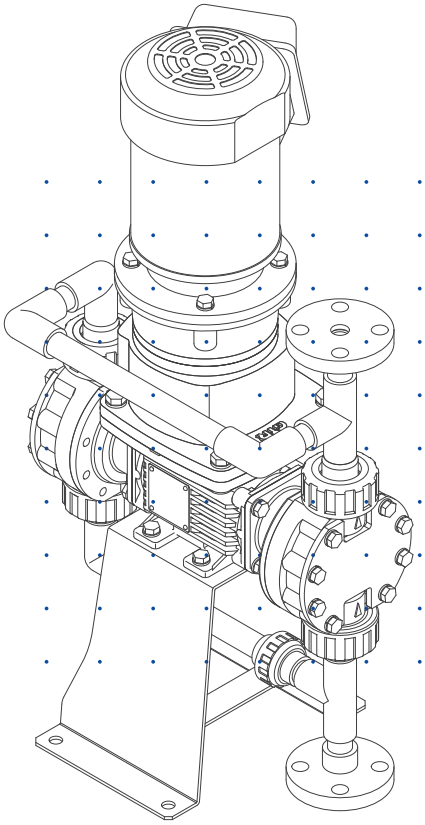
IWAKI PUMPS

IWAKI Metering Pump

TD-F



Instruction manual

Thank you for choosing our product.

⚠ Please read through this instruction manual before use.

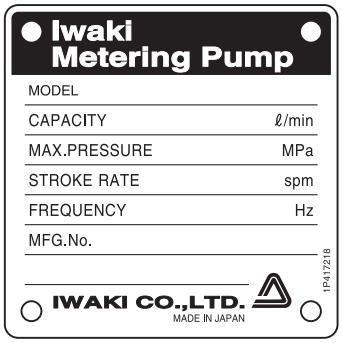
This instruction manual describes important precautions and instructions for the product. Always keep it on hand for quick reference.

Order confirmation

Open the package and check that the product conforms to your order. If any problem or inconsistency is found, immediately contact your distributor.

a. Check if the delivery is correct.

Check the nameplate to see if the information such as model codes, discharge capacity and discharge pressure are as ordered.



b. Check if the delivery is damaged or deformed.

Check for transit damage and loose bolts.

Contents

Operation 22

Maintenance 25

Safety instructions

Read through this section before use. This section describes important information for you to prevent personal injury or property damage.

■ Symbols

In this instruction manual, the degree of risk caused by incorrect use is noted with the following symbols. Please pay attention to the information associated with the symbols.

⚠ WARNING	**Indicates mishandling could lead to a fatal or serious accident.**
⚠ CAUTION	**Indicates mishandling could lead to personal injury or property damage.**

A symbol accompanies each precaution, suggesting the use of "Caution", "Prohibited actions" or specific "Requirements".

Caution marks

Prohibition mark

Requirement mark

⚠ Export Restrictions

Technical information contained in this instruction manual might be treated as controlled technology in your countries, due to agreements in international regime for export control.
Please be reminded that export license/permission could be required when this manual is provided, due to export control regulations of your country.

⚠WARNINGS


Requirement

Turn off power before service

Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.


Requirement

Stop operation

If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.


Prohibited

Do not use the pump in any condition other than its intended purpose

The use of the pump in any conditions other than those clearly specified may result in failure or injury. Use this product in specified conditions only.


Do not remodel

Do not modify the pump

Alterations to the pump carries a high degree of risk. It is not the manufacturer's responsibility for any failure or injury resulting from alterations to the pump.


Wear protectors

Wear protective clothing

Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work. The specific solution will dictate the degree of protection. Refer to MSDS precautions from the solution supplier.


Prohibited

Stay out from under suspended loads

Risk of personal injury. Keep away from the pump while it is lifted up.

⚠WARNINGS


Prohibited

Do not stand on the pump

Do not use the pump as a platform. Injury or damage may result when the pump turns over.


Caution

Do not get access to the inside of the driven unit during operation

Risk of personal injury. A reciprocating diaphragm/shaft may catch the finger or hand.


Requirement

Qualified personnel only

The pump should be handled or operated by qualified personnel with a full understanding of the pump. Any person not familiar with the product should not take part in the operation or management of the pump.


Prohibited

Closed-discharge operation is not allowed

Do not close a discharge line during operation. Otherwise, overpressure will cause liquid leakage or break the pump and piping. Note for the TD series, a discharge valve is not used for controlling a flow rate.

⚠CAUTIONS


Requirement

Use specified power only

Do not apply power other than that specified on the nameplate. Otherwise, failure or fire may result. Ensure the pump is properly grounded.


Prohibited

Do not install/store the pump:

- In a flammable/explosive/corrosive atmosphere.
- In a dusty/humid environment.
- Where ambient temperature can exceed 0-40°C.
- Under mechanical vibrations.


Requirement

Spill precautions

Ensure protection and containment of solution in the event of plumbing or pump damage (secondary containment).


Caution

Do not touch the pump or pipe with bare hands

Risk of burning. The surface temperature of the pump or pipe rises high along with liquid temperature in or right after operation.


Fire ban

Do not bring the pump close to a flammable substance

Keep the pump away from a flammable substance for the prevention of fire. Do not allow a leak of lubricating oil. Observe local rules and regulations for handling of oils.


Electrical shock

Install a GFCI (earth leakage breaker)

An electrical failure of the pump may adversely affect other devices on the same line. Purchase and install an earth leakage breaker separately.


Requirement

Foreign matter

When foreign matters enter the pump, turn off power immediately to remove them. Using the pump with foreign matters may result in failure.

⚠CAUTIONS


Requirement

Preventative maintenance

Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.


Prohibited

Do not use a damaged pump

Use of a damaged pump could lead to an electric shock or death.


Requirement

Disposal of a used pump

Dispose of any used or damaged pump in accordance with local rules and regulations. If necessary, consult a licensed industrial waste disposal company.


Prohibited

Do not cover the pump with cloth

The motor temperature may build up and a fire or an electric/mechanical failure may result.


Requirement

Non freezing

Frozen liquid may damage the pump and piping. Drain liquid before leaving it for a long time or use measures to prevent liquid from freezing in winter.


Requirement

Pressure removal

Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.

Precautions for use

- Electrical work should be performed by a qualified electrician. Otherwise, personal injury or property damage may result.


Caution

- Shipping inspection with tap water is conducted on every pump. Be sure to dry off the pump head before operation, or residual water may cause undesirable reaction when having contact with some chemicals.


Caution

- Use care handling the pump. Do not drop. An impact may affect pump performance. Do not use a pump that has been damaged to avoid the risk of electrical damage or shock.


Caution

- The pump is not waterproof. Do not operate the pump while wet with solution or water, or failure or injury may result. Immediately dry off the pump if it gets wet.


Caution

- Do not clean the pump or nameplate with a solvent such as benzine and thinner. This may discolour the pump or erase printing. Use a dry or a damp cloth or a neutral detergent.


Caution

- Drain liquid before leaving the pump for a long time.


Requirement

Overview

Pump characteristics, features and part names are described in this section.

Introduction

The TD series is the mechanically-driven diaphragm pump. Its pulse-reduction design ensures low flow pulsation without the need of an air chamber. A wide selection range of wet ends allows for delivery of acid, alkaline, viscous liquid, slurry and solvent in various plants or built-in applications.

Pump structure & Operating principle

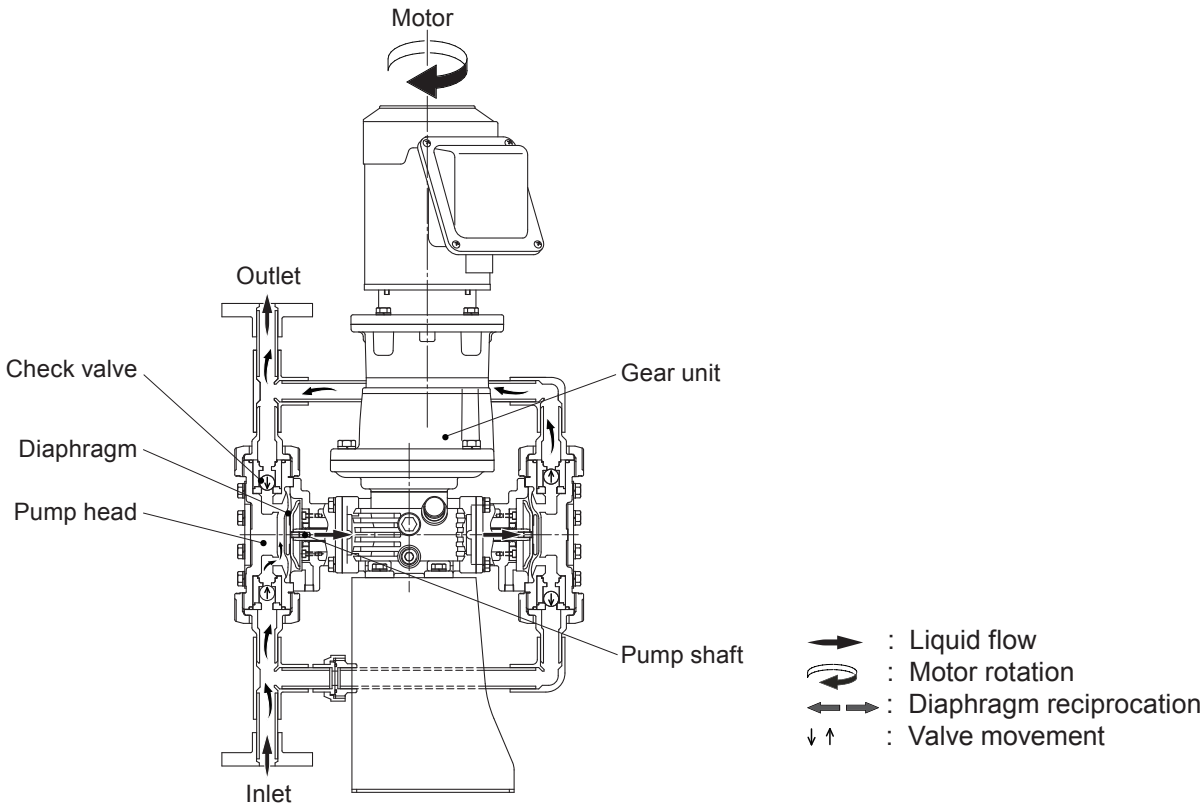
Motor rotation is transmitted to an eccentric cam via a reduction gear and then converted to reciprocating motion. Volumetric change occurs in the pump chamber as the diaphragm moves back and forth, so liquid is delivered through the outlet with the assistance of the suction and discharge check valves.

Suction process

When the diaphragm moves back, negative pressure in the pump head opens the suction check valve to take in liquid while closing the discharge check valve.

Discharge process

When the diaphragm moves forward, positive pressure in the pump head opens the discharge check valve to deliver liquid while closing the suction check valve.

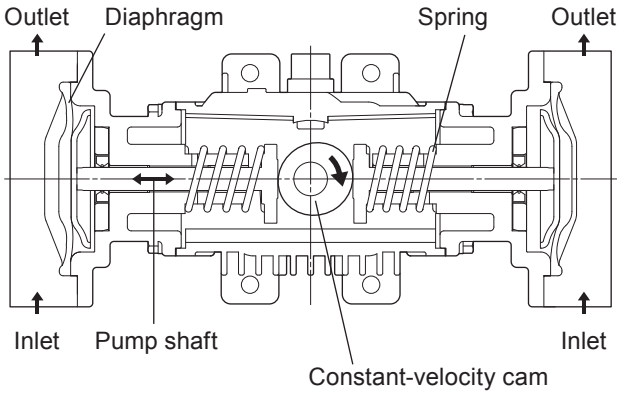


■ Flow pulsation reduction mechanism

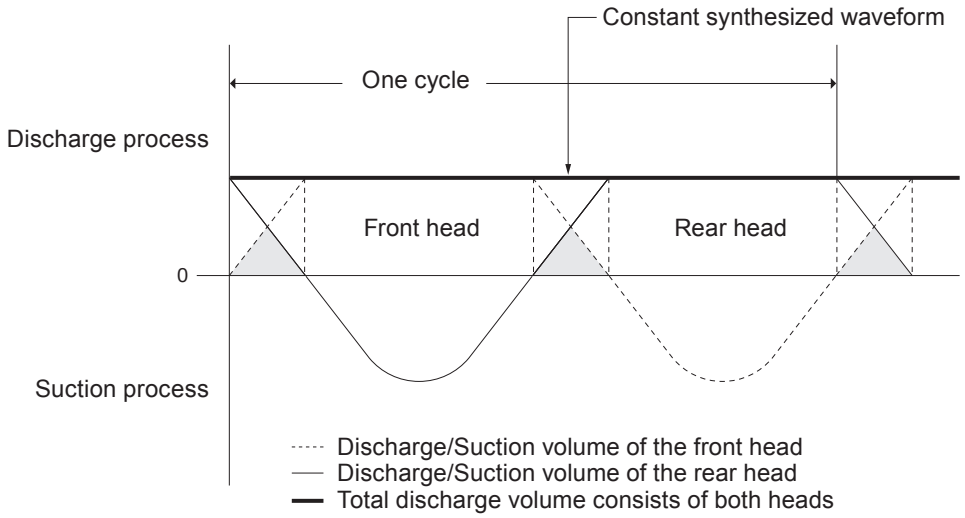
The reduction mechanism consists of the two factors. One is the use of a highly-precise constant-velocity cam, which makes a trapezoidal waveform of each discharge. The other is the phase shift of two different discharge, The rear head moves out of phase with the front by 180 degrees to make a constant synthesized waveform. The flow rate of the TD-F can change with a motor rotation speed (inverter frequency).

*Note suction pulsation is not reduced.

Constant-velocity cam and Phase shift



Discharge/Suction waveform



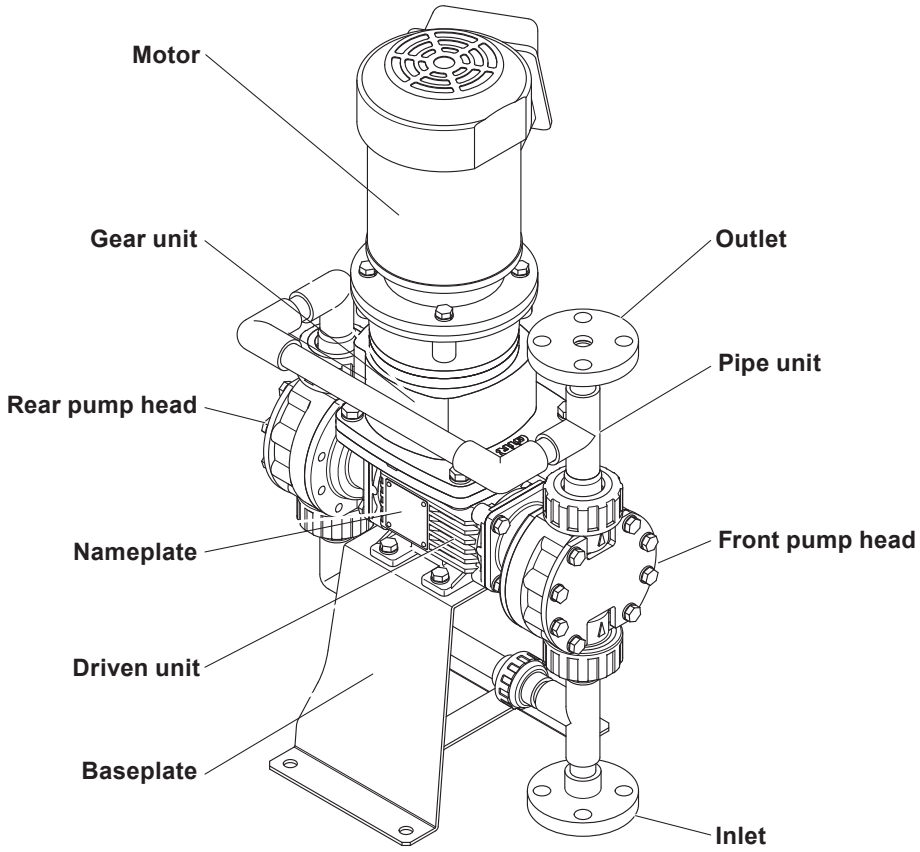
NOTE

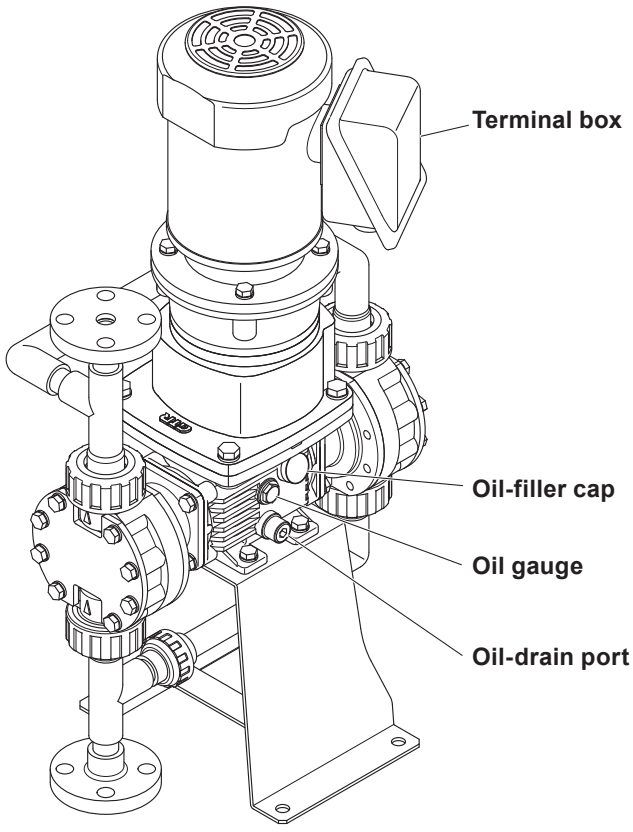
The mechanically-driven diaphragm pump including the TD-F by its nature involves flow pulsation during operation. The reduction mechanism can reduce but can't eliminate the pulsation completely, and the pulsation becomes greater as a discharge pressure gets higher. This is because the diaphragm transiently depressed under a high pressure as with every other mechanically-driven diaphragm pumps.

Part names

Pump

■ **TD-F**





Identification codes

Each code represents the following information.

TD - F 2 VC FF 1 _ - 04 _
a b c d e f g h i

a. Series name

TD

b. Drive unit

F : Inverter motor

c. Diaphragm size

01, 03, 05, 1, 2, 4, 6, 8

d. Wet end materials

Code	Pump head	Valve	Valve seat	O ring	Valve gasket	Diaphragm
VC	PVC	CE	FKM: 01-1 (*DS) PVC: 2-8 (*DS)	FKM	PTFE	PTFE+EPDM
V6	PVC	SUS316	EPDM: 01-1 (*DS) PVC: 2-8 (*DS)	EPDM	PTFE	PTFE+EPDM
VS	PVC	SUS316	SUS304	EPDM	PTFE	PTFE+EPDM
S6	SUS316/SCS14	SUS316	SUS316	-	PTFE	PTFE+EPDM

*DS stands for diaphragm size

Material code

PVC : Polyvinyl chloride
SUS304 : Austenitic stainless steel
CE : Alumina ceramics
EPDM : Ethylene-propylene rubber
SUS316 : Austenitic stainless steel
SCS14 : Stainless cast steel (SUS316)
FKM : Fluorine-contained rubber
PTFE : Polytetrafluoroethylene

e. Connection type

FF : JIS flange inlet/outlet

UU : Union inlet/outlet

HH : Tube inlet/outlet

*These three connection codes are standard options. Other codes such as FU or UH can be selectable as necessary. In this case the first code represents the inlet and the second code the outlet, e.g. FU means JIS flange inlet + union outlet.
*Any union connection is not available for the pumps with 2, 4, 6 and 8 diaphragm sizes and of the S6 type.
*Any tube connection is not available for the pumps with 2, 4, 6 and 8 diaphragm sizes and of the S6 type.

f. Connection direction

1 : Horizontal inlet and outlet

2 : Vertical inlet and outlet

3 : Horizontal inlet and Vertical outlet

4 : Vertical inlet and Horizontal outlet

*The 3rd option is available only for pumps with UU or HH connection type.

g. Special version (pump head)

No code : Standard
S : Custom design (e.g. special check valves or pipe I.D.)

h. Motor

0.4 : 0.4kW

i. Special version (drive unit)

No code : Standard
S : Custom design (e.g. special motors or baseplates)

Installation

This section describes the installation of the pump, piping and wiring. Read through this section before installation is performed.

Points to be observed

Observe the following points when installing the pump:

- Be sure to turn off power to stop the pump and related devices before installation is performed.
- If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems.
- Do not place explosive or flammable material near the pump.
- Do not use a pump that has been damaged to avoid the risk of electrical damage or shock.
- Use care handling the pump. Do not drop. An impact may affect pump performance.
- Keep the pump as level and as low as possible when it must be lifted up.
- Fumes or vapours can be hazardous with certain solutions. Ensure proper ventilation at the operation site.
- Observe information on the appropriate drawing and specification sheet.

Pump mounting

Before installation

Check if installation doesn't adversely affect facility, surrounding equipment and the pump. Install the pump according to the following instructions to ensure the optimum performance, safety and service.

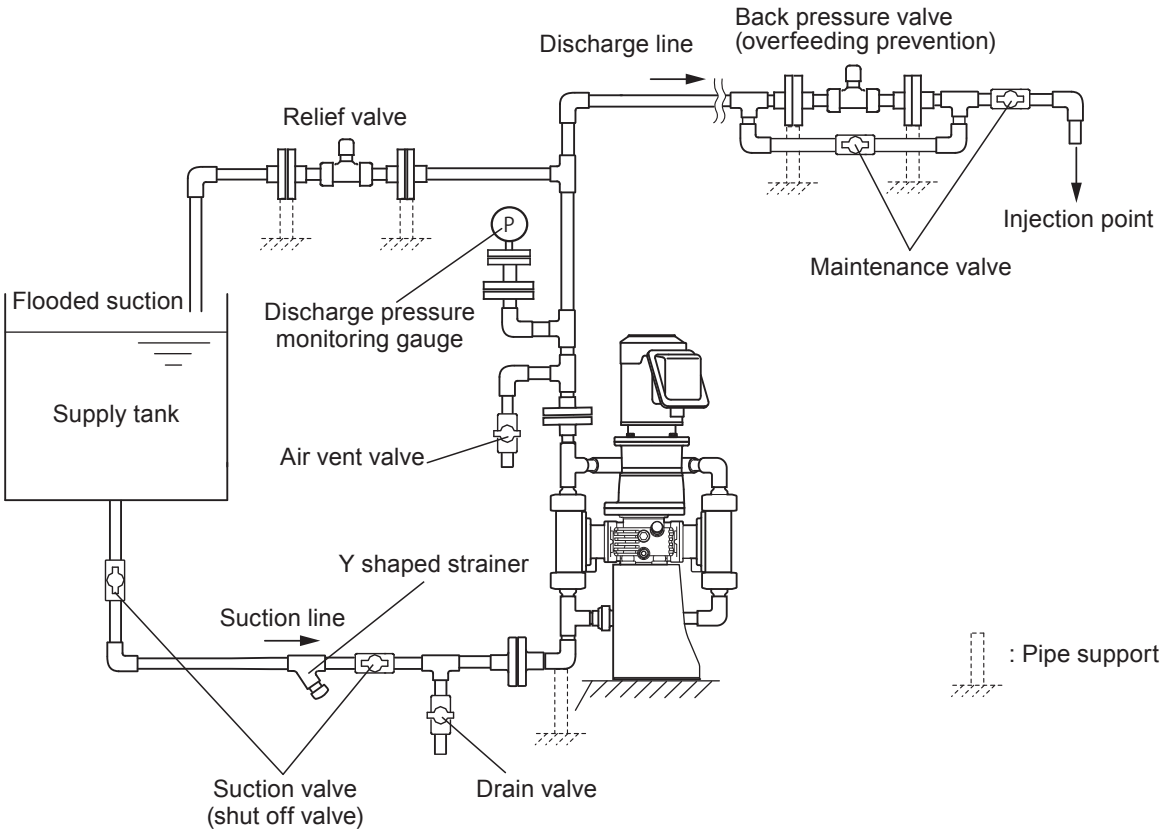
- Allow sufficient space around the pump for easy access and maintenance.
- Select a level location, free from vibration, that won't hold liquid. Always use a level gauge.
- Install the pump as close to a supply tank in a flooded suction system.
- Avoid installing the pump:
  - In direct sunlight or wind & rain.
  - In a dusty/humid place.
  - In a corrosive atmosphere.
  - In a place where proper ventilation is not maintained.

Pipework

Pipework must be done according to the following instructions to ensure the optimum performance, safety and service.

Piping layout

Arrange pump and pipework based on the following piping layout for a long period of operation.



NOTE

- Design an optimal layout to meet NPSHr, especially when planning to deliver slurry.
- If pipework directory weighs on the pump, the pump may be damaged. Be sure to install pipe supports.
- Always use flooded suction.

Necessary devices

The following devices are needed to the metering pump. Be sure to install, or personal injury or property damage may result.

■ Relief valve

The metering pump by nature keeps working, exceeding the limit pressure of discharge line if it is blocked. This may damage the pump/piping system and burn out the motor. Install a relief valve close to the pump and fix its set pressure below the maximum allowable pressure of the pump/discharge line.

■ Back pressure valve

Discharge line pressure must be 0.03MPa or higher than suction line pressure. Otherwise, check valve may not check flow and overfeeding may result. Install a back pressure valve on the discharge line to keep the minimum pressure difference as necessary.

■ Strainer

Provide a 40-mesh strainer at the end of a suction line and clean it periodically. Otherwise, clogging may result.

■ Pressure gauge

Install a pressure gauge to monitor the discharge line pressure.

Glossary

Overfeeding is the condition that check valves in the pump head stay open and liquid continues flowing into discharge line. Always keep the discharge line pressure 0.03MPa or higher than a suction line pressure.

Pump inlet/outlet connections

Arrange the pump inlet and outlet according to a piping system in which the pump is incorporated.

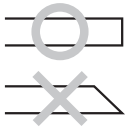
■ Tube connection

1 Cut the tube ends flat.

NOTE

Otherwise a leak may result.

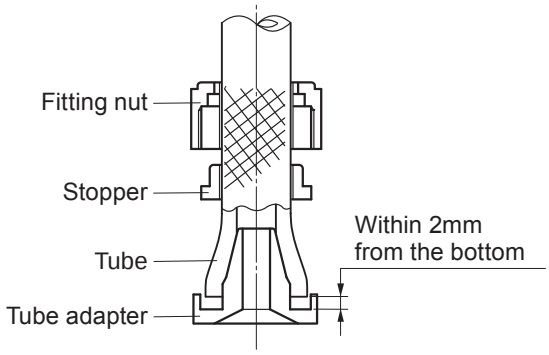
Tube end (Side view)



2 Pass a tube into the fitting nut and stopper and then slide it down to the tube adapter as far as it will go.

NOTE

The tube end must come within at least 2mm from the bottom of the adapter.



3 Place an O ring into the inlet/outlet unit (part # 70/71).

4 Secure the tube end (with the tube adapter) on the inlet/outlet unit by hand-tightening the fitting nut.

NOTE

The plastic fitting nut may be broken if tightened too much.

■ Union connection

Connect the union socket (72) to a plastic flange or joint of your piping system. Use an adhesive to secure the connection.

NOTE

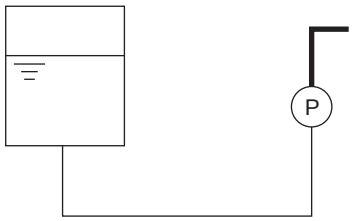
Do not allow an extra amount of adhesive to enter the pump.

Piping precautions

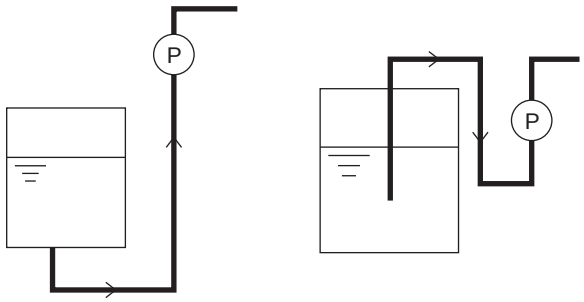
- *Foreign matters such as sand and scale may enter pipework while service is performed. They may cause fatal damage to the pump. Be sure to blow them out before operation. Also, do not apply adhesive too much or leave a screw or nut.*
- *If pipework directory weighs on the pump, the pump may deform. Be sure to install pipe supports.*
- *Flange connection must be free from any tension or distortion, or a leak or pipe damage may result.*
- *The suction line I.D. should be equal to or wider than the I.D. of the pump inlet.*
- *Always keep the inlet of the pump below the liquid level of the supply tank (flooded suction).*
- *The pump suffers greater pressure loss as the piping length gets longer. Excessive piping resistance may damage the pump depending on operating conditions such as liquid viscosity, liquid specific gravity and piping length. Contact us for detail.*

■ Prohibited piping

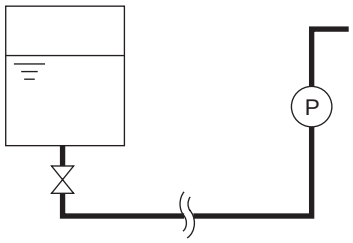
The suction line I.D. is smaller than the I.D. of the pump inlet. Risk of cavitation.



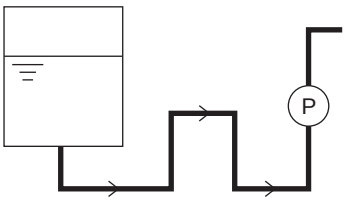
Suction lift application may adversely affect flow accuracy.



The suction line is too long. Risk of cavitation, air ingress or greater flow pulsation.



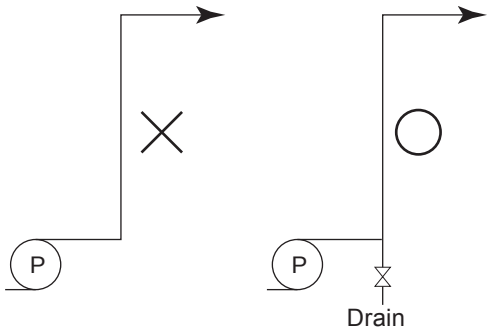
Arched suction line may adversely affect flow accuracy.



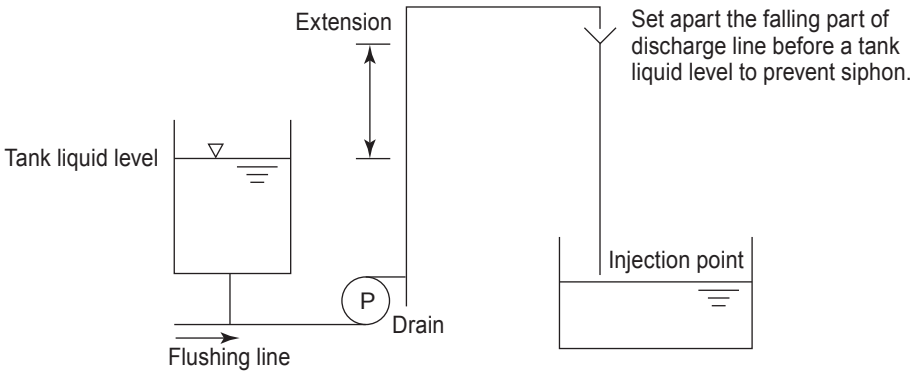
Slurry delivery

The TD-F can deliver slurry with some limitations. Contact us for allowable particle size and concentration.

• Branch a drain line from the discharge line.



• Do not allow any inverted arch line in pipework where slurry can stay.
• Reduce (optimise) the suction and the discharge line I.D. as long as the NPSHr is satisfied in order to obtain the maximum possible speed of flow.
• Install a flushing line (tap water) for removing slurry from the pump and piping after delivery.
• Do not use a back pressure valve. The valve may be damaged or clogged by slurry.
• With no use of a back pressure valve, the minimum differential pressure (0.03MPa or higher discharge pressure than suction pressure) may not be satisfied and overfeeding may occur. In this case extend the discharge line upwards to increase the pressure to the necessary level.
• If the relief valve has opened to release overpressure and been contaminated by slurry, take apart and clean the inside to remove slurry.
• If an injection point at the end of discharge line is located at a lower position than a tank liquid level, siphon will take place. In this case extend the rising part of discharge line over the liquid level and then separate the falling part of it before the tank liquid level.



Wiring

Wiring for the inverter and the motor.

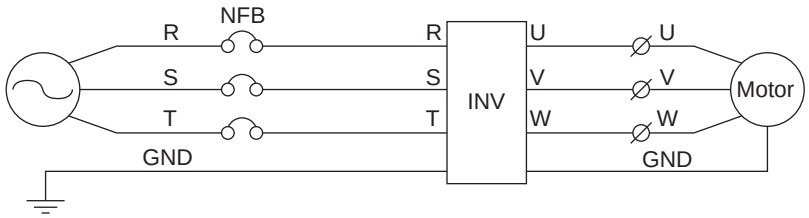
Points to be observed

Observe the following points during wiring work:

- Electrical work should be performed by a qualified electrician. Always observe applicable codes or regulations.
- Do not perform wiring work while electric power is on. Otherwise, an electrical shock or a short circuit may result. Be sure to turn off the power before wiring work.

Inverter-Grid power

Electrically connect the inverter with a grid power through the R, S and T lines. Make sure the connection is properly made before operation. Incorrect connection will cause a reverse rotation of the motor and significant pulsation to the discharge line. See manufacturer's manuals for details of the inverter. Install a NFB for easy maintenance.



NFB: Non-Fuse Breaker
INV: Inverter

Operation

This section describes pump operation and programming. Run the pump after pipework and wiring are completed.

Before operation

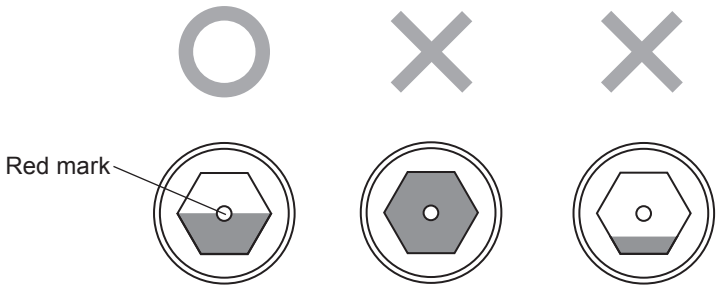
Always check the following items before the first-time operation or resuming operation after a long period of stoppage.

Points to be observed

Observe the following points during operation:

- The pump should be handled or operated by qualified personnel with a full understanding of the pump. Any person not familiar with the product should not take part in the operation or maintenance of the pump.
- Risk of burning. The surface temperature of the pump or motor rises up to 80°C in or right after operation.
- Do not close a discharge line during operation. Otherwise, liquid leakage or pump head/motor/piping breakage may result due to overpressure.
- Do not close a suction line during operation. Otherwise, internal parts are excessively worn by friction heat and fatal pump damage results.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.

- *Check for transit damage, loose bolts and an oil leak.*
- *Check the motor rated voltage corresponds to the power voltage supplied to the inverter. See motor nameplate.*
- *Electrical wiring must be correct. See the "Wiring" section on page 21 and inverter manufacturer's manual.*
- *Check a liquid level in the supply tank.*
- *Check if the discharge and suction lines are laid correctly.*
- *Check the oil gauge on the driven unit. An oil level should be at the middle of the gauge (marked in red).*



Operation

Read this section before operation.

Starting procedure

Start the pump by the following procedure.

1 Open the suction and discharge valves.

2 Turn on the inverter power.

3 Push the start key to run the pump.

NOTE

Set the frequency dial to about 10Hz at the start. Increase the drive frequency as necessary in later steps.

4 Check the rotational direction of the motor.

Clockwise seen from the motor end (positive rotation) is the correct direction.

NOTE

For the pumps with a fanless motor, check output from the pump. Significant output pulsation may be a sign of reverse motor rotation. Correct motor wiring as necessary.

5 Expel air from the pump head.

Take in liquid into the pump head with an open air vent line. At this time change the motor speed in the sequence of : 60Hz for 1 min→10Hz for 1 min→60Hz for 1 min→10Hz for 1 min.

6 Close the air vent line after air is expelled and the pump head is filled with liquid.

Liquid starts to flow to the discharge line.

NOTE

Closed-discharge operation may result! Always stop the pump and check the discharge line is open before closing the air vent line.

7 Check if the rated discharge pressure is satisfied.

After the rated pressure is met, check for abnormal conditions for about 5 minutes. Increase or decrease the motor speed with an inverter between 10-60Hz to expel remaining air as necessary.

NOTE

- Air will not be expelled from the TD-F01/-F03/-F05 types unless it's in a flooded suction system.
- Observe the maximum discharge pressure of the pump and the rated amperage of the motor. See spec label of each component.
- In cold climates, an electric current to the motor can double right after the start of operation. This over-current results when gear-oil temperature is too low. Run the pump with no discharge pressure until the oil warms up.

8 Set the motor speed to a desired rate with the inverter.

9 Use a calibration cylinder to measure discharge capacity.

Repeat measurement. The pump and system are ok when the measured discharge capacity does not change. If it fluctuates, the air may have not been expelled completely. In this case, go back to the 4th step.

NOTE

Observe the above instructions to keep the optimal operating conditions. If you notice any abnormal or dangerous conditions, suspend operation immediately and inspect/solve problems. See page 25 "Troubleshooting" or contact us.

Before stoppage

- *After everyday operation, release the liquid and pressure from the pump and pipework and turn off power.*
- *Before a long period of stoppage, flush the inside of the pump and pipework with clean water or cleaning liquid. Completely drain and depressurize them afterwards.*
- *Frozen liquid may damage the pump and piping. Remove liquid completely in winter.*
- *Band heaters can be used to keep the pump and piping warm when suspending operation just for a short period of time in winter.*

Resumption after a long period of stoppage

When operation is resumed after a long period of stoppage (one week later), do not run the pump without commissioning. Always make sure air in the pump is expelled before full operation.

Maintenance

This section describes troubleshooting, maintenance, wear part replace- ***ment, exploded views and specifications.***

Points to be observed

Observe the following points during maintenance work:

- Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before/during service is performed. See below.
- Risk of burning. Do not touch the pump or pipe with bare hands. The surface temperature of the pump or pipe rises high along with liquid temperature in or right after operation.

Troubleshooting

First check the following points. If the following measures do not help remove problems, contact your nearest distributor.

States	Possible causes	Solutions
Motor does not starts to run.	Disconnection	Replace/reconnect motor wires as necessary.
	Power fuse has blown.	Inspect/solve the root cause of the blowout.
	Power voltage reduction	Inspect/solve the root cause of the reduction.
	Overpressure (discharge line)	Check a discharge line or check valves.
	Out of frequency range.	Observe the allowable frequency.
	Inverter is not working.	Repair the inverter. Replace as necessary.
Flow is too low.	NPSHr is not satisfied.	Review the pump and piping system to meet the NPSHr.
	A check valve and valve seat have been worn.	Replace with new ones.
	Foreign matters in the check valve	Take apart and clean the valve.
	Clogged suction line or strainer	Take apart and clean them.
	Air ingress from the suction line.	Check for loose connections and retighten as necessary.
	Different liquid is used.	Use the optimal pump according to liquid characteristics.
	A relief valve is open.	Check/reset the set pressure.
	Damaged diaphragm	Replace with new one.
	Damaged gaskets or O rings	Replace with new ones.
Flow is too high.	Minimal differential pressure of 0.03MPa is not kept and overfeeding results.	Keep the minimal differential pressure. Use a back pressure valve as necessary.
	Different liquid is used.	Use the optimal pump according to liquid characteristics.
Flow fluctuates.	NPSHr is not satisfied.	Review the pump and piping system to meet the NPSHr.
	A check valve and valve seat have been worn.	Replace with new ones.

States	Possible causes		Solutions
No discharge	Air ingress from:	gaseous liquid	Perform degassing.
		a suction line (imperfect joint or sealing)	Check for an imperfect joint/sealing and retighten as necessary.
		an empty tank	Refill the supply tank. Degassing is required before resuming operation.
	No discharge from:	Clogged suction line or strainer	Take apart and clean them.
		Foreign matters in a check valve	Take apart and clean the valve.
		A damaged check valve and valve seat	Replace with new ones.
	A leak from:	a damaged diaphragm	Replace with new one.
Great pulsation	Reverse motor rotation.		Correct wiring.
	A check valve and valve seat have been worn.		Replace with new ones.
	Foreign matters in the check valve		Take apart and clean the valve.
	Suction line vibration is too big.		Support the suction lines.
Discharge pressure is too low.	A check valve and valve seat have been worn.		Replace with new ones.
	Foreign matters in the check valve		Take apart and clean the valve.
	Pressure gauge has failed.		Replace with new one.
	Clogging in a pressure gauge		Remove clogging.
	A relief valve is open.		Check/reset the set pressure.
	Damaged diaphragm		Replace with new one.
Liquid leaks.	Overpressure (discharge line)		Inspect/solve the root cause of overpressure.
	Damaged diaphragm		Replace with new one.
	Damaged gaskets or O rings		Replace with new ones.
	Misarranged valve assembly		Rebuild it in correct order.
	Loose connection of the inlet and outlet		Tighten them as necessary.
	Loose pump-head-fixing-bolts		Tighten them as necessary.
A noise level is too high.	Motor failure		Replace with new one.
	NPSHr is not satisfied.		Review the pump and piping system to meet the NPSHr.
	Damaged driven unit		Repair or replace with new one.
	Overpressure (discharge line)		Inspect/solve the root cause of overpressure.
	Oil level, grade or quality is wrong.		Check if it is proper. Replace as necessary.
Oil leaks.	Damaged gaskets or O rings		Replace with new ones.
No suction	A check valve and valve seat have been worn.		Replace with new ones.
	Foreign matters in the check valve		Take apart and clean the valve.
	Clogged suction line or strainer		Take apart and clean them.
	Air ingress from a suction line.		Check for loose connections and retighten as necessary.
	Damaged diaphragm		Replace with new one.
	Damaged gaskets or O rings		Replace with new ones.
	Entrained air in the pump head.		Perform degassing.
	Misarranged valve assembly		Rebuild it in correct order.
Motor temperature is too high (80°C or more).	Overpressure (discharge line)		Inspect/solve the root cause of overpressure.
	Target frequency is too high or low.		Reset the dial to a proper position.

Inspection

Perform daily and periodic inspection to keep pump performance and safety.

Daily inspection

Check the following points. Upon sensing abnormality, stop operation immediately and remove problems according to "Troubleshooting".
When wear parts come to the life limit, replace them with new ones. Contact your distributor for detail.

No.	Inspection items	Points to be checked
1	Noise and vibration	• If abnormal noise or vibration occurs. They are signs of abnormal operation.
2	Air ingress from pump head joints and a suction line	• If leakage occurs. • If pump head bolts or nuts are loose. Tighten with a torque wrench as necessary.
3	Pressure gauge/Flow meter/Ammeter	• If the rated discharge pressure, flow rate and a motor load current on the spec labels are observed. If not, remove problems.
4	Oil gauge on the driven unit	• If an oil level is proper and oil is not leaked or deteriorated.
5	Spare pump condition	• If it is usable. Run it from time to time to keep it ready for operation at any time when needed.

Periodic inspection

Check wear parts such as valve set (a check valve, valve guide, valve seat and valva gasket), diaphragm and tubing for heavy damage or wear at least every 6 months.

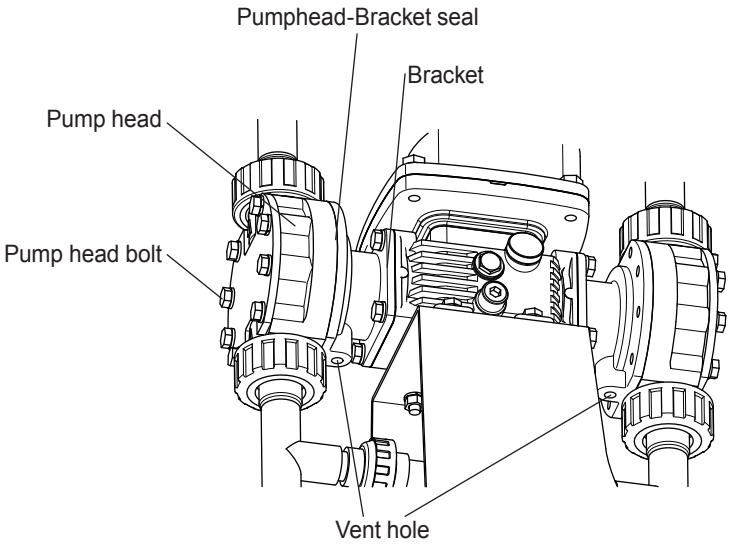
Part names	Points to be checked	Measures
Check valve, valve guide, valve seat, valve gasket, O ring	If they are damaged or worn.	Replace as soon as possible if pump performance has reduced. Note their lives change with operating conditions such as liquid characteristics.
Diaphragm	If it is damaged or worn.	Replace as soon as possible if pump performance has reduced. Note its life changes with operating conditions such as liquid characteristics.
Tubing	If it is hardened or discoloured by ultraviolet-ray or chemical liquid. If it is damaged by high pressure.	Replace as soon as possible if pump performance has reduced. Note its life changes with operating conditions such as liquid characteristics.

Maintenance of gear unit

The NLGI #0 extreme pressure lithium base grease is used in the gear unit. This long life grease can be used up to 10,000 hours of operating time or 3-5 years of useful life, but then needs replaced after either period has passed. Note replacement of the grease must be conducted by a skilled engineer. Contact us or your distributor.

NOTE

- Tighten the pump head bolts (parts# 20) when a leak is found from the pumphead-bracket seal. See the exploded view pages for the rated tightening torque at each pump model. If it can't stop a leak, replace the diaphragm.
- A leak from the vent hole is the sign of diaphragm rupture. Stop the pump immediately and replace the diaphragm.



Oil replacement (drive unit)

Replace the lubricating oil in the drive unit every 4000 hours operation or 1 year after delivery, whichever comes first.

- The specified oil volume is about 220mL.

NOTE

Always use the oil brand below. Otherwise, pump damage or in the worst case fair may result.

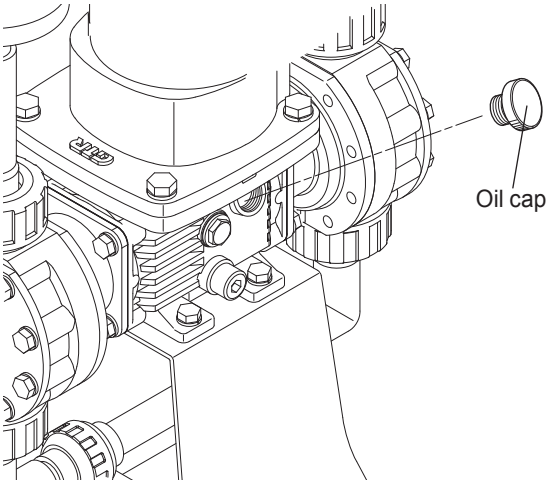
Specified oil brand

Oil company	Brand name
SUMICO LUBRICANT CO., LTD.	Molyoil F320

■ Replacement procedure

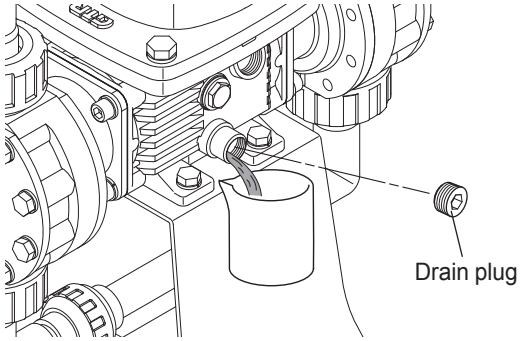
Prepare a container to receive used oil in advance.

1 Remove the oil cap.



2 Remove the drain plug.

Use a container to collect used oil.

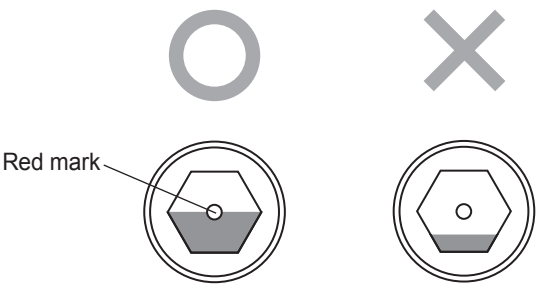


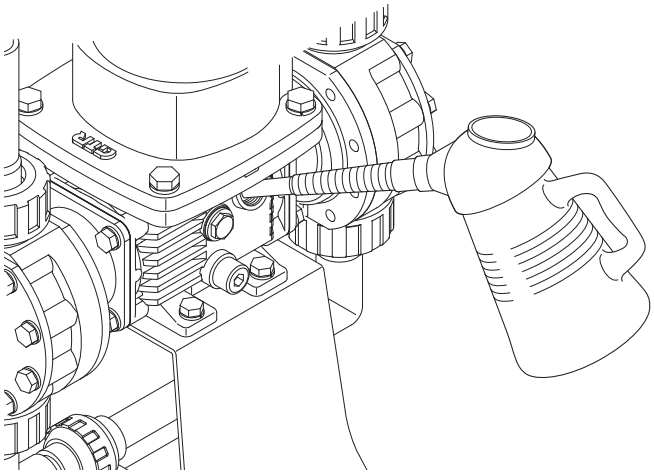
3 Replace the drain plug after the drive unit is emptied.

Remove old seal tape from the drain-plug threads and apply new one before refitting the plug.

4 Refill gear oil.

The specified oil volume is about 220ml. Always check an oil level comes to the middle of the oil gauge, or the driven unit may fail to operate properly.





Maintenance

Wear part replacement

To run the pump for a long period, wear parts need to be replaced periodically.
Contact your distributor with the following information for wear part replacement.

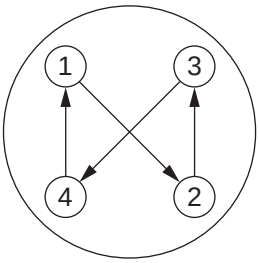
1. Part names and part number (see the "**Exploded view**" section.)
2. Pump model identification code and manufacturing number (see pump nameplate.)
3. Drawing number if you have our approval drawing

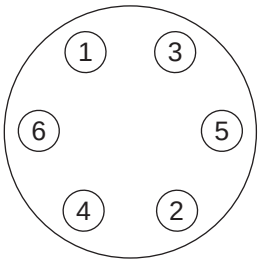
Precautions

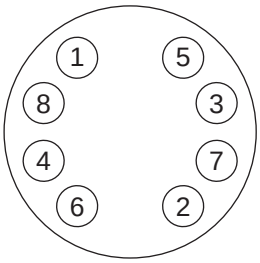
- Solution in the discharge line may be under pressure. Release the pressure from the discharge line before disconnecting plumbing or disassembly of the pump to avoid solution spray.
- When dismantling the pump, pay attention to the residual liquid in the pump head.
- Always wear protective clothing such as an eye protection, chemical resistant gloves, a mask and a face shield during disassembly, assembly or maintenance work.
- Follow instructions in this manual for replacement of wear parts. Do not disassemble the pump beyond the extent of the instructions.
- Risk of electrical shock. Be sure to turn off power to stop the pump and related devices before service is performed.

Before assembly/disassembly

- *Inch the motor or rotate the motor fan by hand to extend the pump shaft to the maximum length when removing the diaphragm.*
- *Inch the motor or rotate the motor fan by hand to contract the pump shaft to the minimum length when replacing the pump head to the bracket.*
- *When a new diaphragm is mounted, clean the diaphragm-side retainer surface and apply the grease; Dow Corning Toray MOLYKOTE® HP-500. Always apply a screw burning protective agent to the diaphragm shaft.*
- *Observe the mounting direction of the valve assembly. If the outlet valve assembly is mounted upside down, the pump falls into closed-discharge operation and excessive pressure may damage the pump or cause personal injury when it bursts.*
- *Always fasten the pump head to the specified tightening torque (see the exploded view pages) in diagonal order. Repeat the procedure once again to make sure the possibility of a leak is eliminated.*



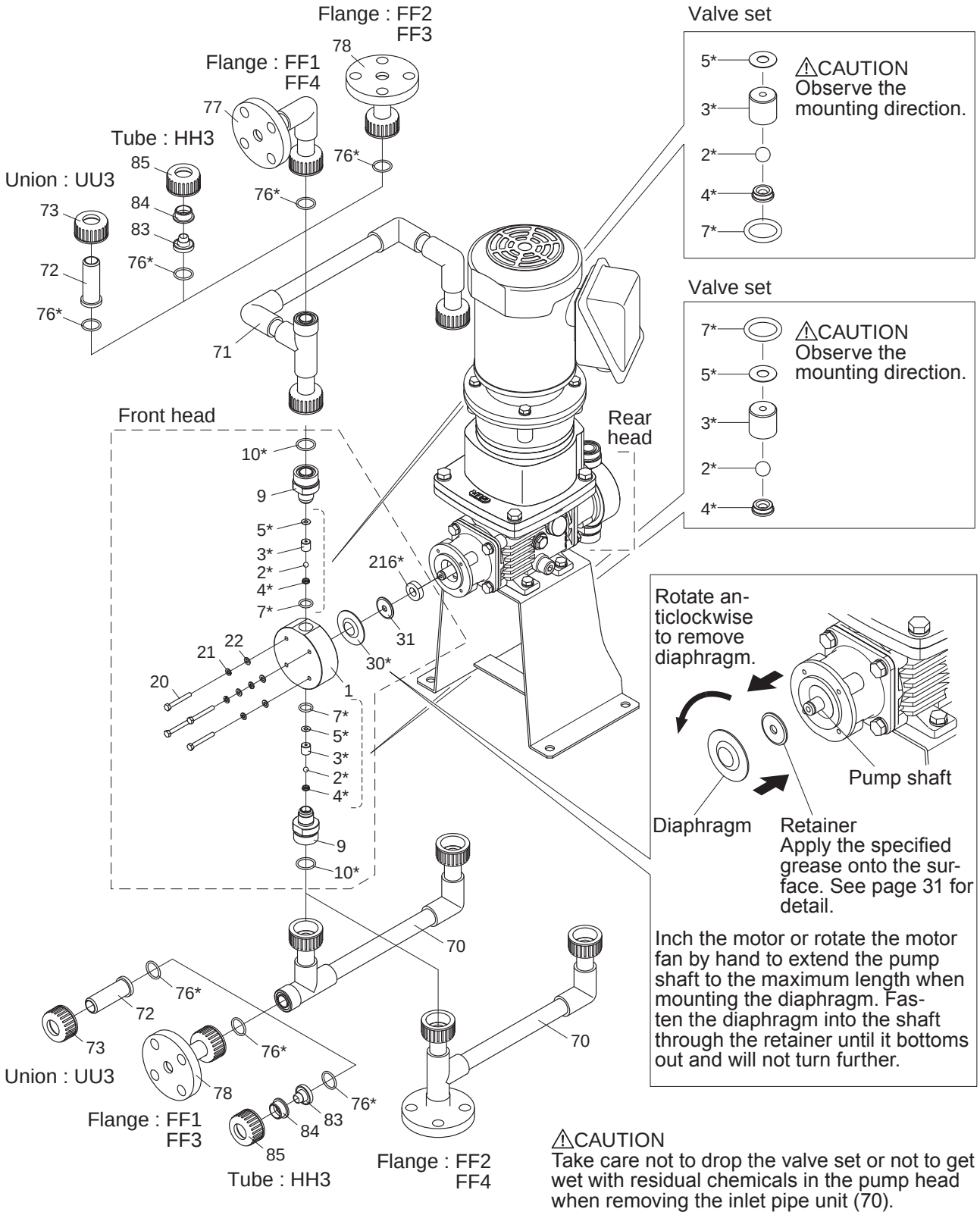




Exploded view

Pump head

■ TD-F01/-F03 VC/V6



⚠CAUTION
Take care not to drop the valve set or not to get wet with residual chemicals in the pump head when removing the inlet pipe unit (70).

*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials		Estimated life
1	Pump head	1	PVC		-
2*	Valve	2	VC	V6	8000hrs or 1 YR
			Alumina ceramics	SUS316	
3*	Valve guide	2	PVC		8000hrs or 1 YR
4*	Valve seat	2	VC	V6	8000hrs or 1 YR
			PVC	PVC	
5*	Valve gasket	2	PTFE		8000hrs or 1 YR
7*	O ring	2	VC	V6	8000hrs or 1 YR
			FKM	EPDM	
9	Fitting	2	PVC		-
10*	O ring	2	VC	V6	8000hrs or 1 YR
			FKM	EPDM	
20	Hexagon bolt	4	Stainless steel		-
21	Spring washer	4	Stainless steel		-
22	Plain washer	4	Stainless steel		-
30*	Diaphragm	1	PTFE+EPDM		4000hrs or 6 months
31	Retainer	1	SUS304		-
70	Flanged/Unflanged inlet pipe unit	1	-		-
71	Outlet pipe unit	1	-		-
72	Union socket	2	PVC		-
73	Nut	2	PVC		-
76*	O ring	2: FF1/FF3/ HH3/UU3 1: FF2/FF4	VC	V6	8000hrs or 1 YR
			FKM	EPDM	
77	Flange elbow unit	1	PVC		-
78	Flange unit	1: FF1/FF2 2: FF3	PVC		-
83	Tube adapter	2	PVC		-
84	Stopper	2	SS400		-
85	Fitting nut	2	CFRPVDF		-
216*	Oil seal	1	NBR		8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.

*The listed number of parts is required to consist of one single pump head except for parts #70, 71, 72, 73, 76, 77, 78, 83, 84, and 85.

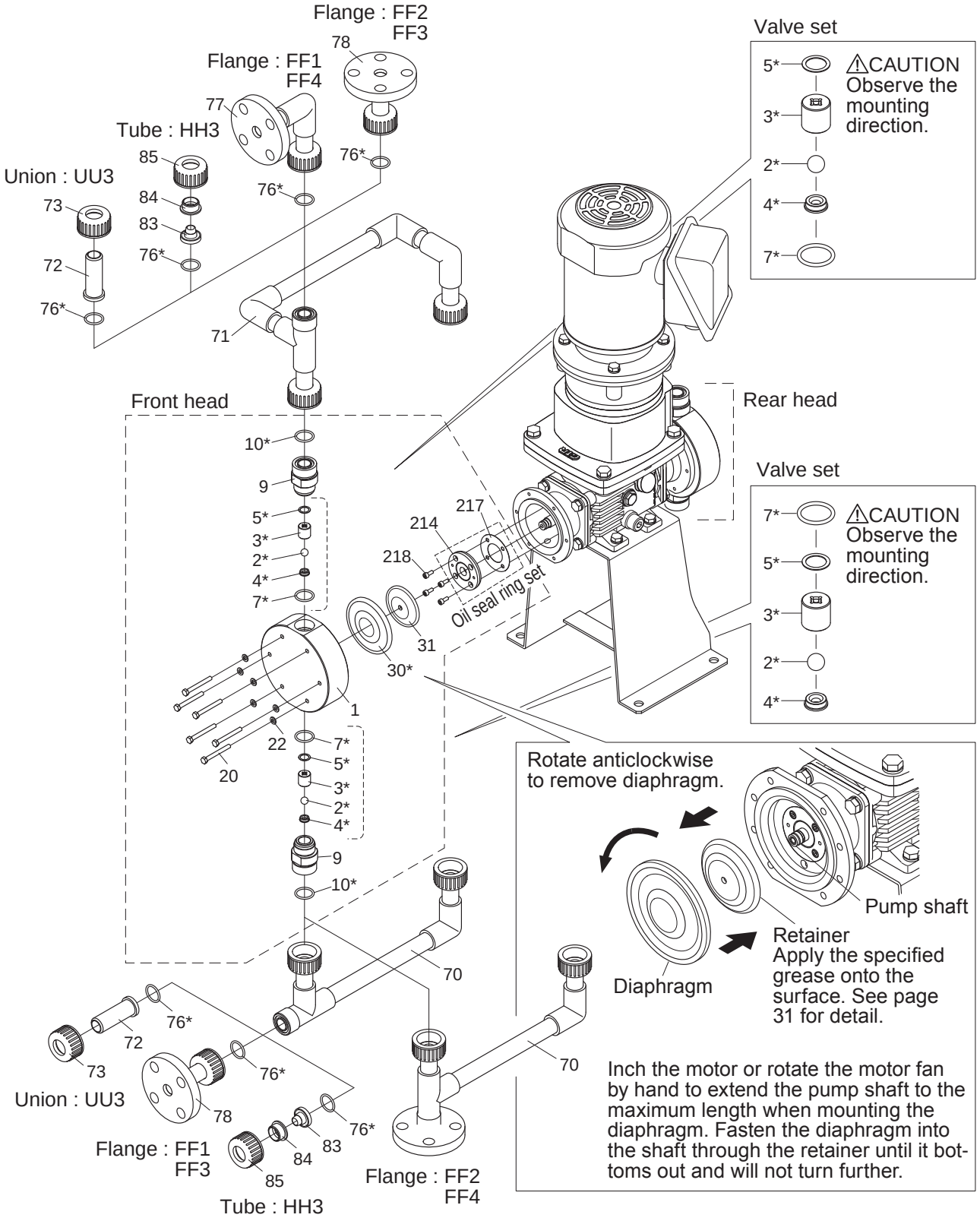
NOTE

Retighten the bolts/parts evenly to the following torque.

Tightening torque

Part No.	Torque
#9	5 N•m
#20	2.9 N•m

■ TD-F05/-F1 VC/V6/VS



⚠CAUTION
Take care not to drop the valve set or not to get wet with residual chemicals in the pump head when removing the inlet pipe unit (70).

*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials			Estimated life
1	Pump head	1	PVC			-
2*	Valve	2	VC	V6	VS	8000hrs or 1 YR
			Alumina ceramics	SUS316	SUS316	
3*	Valve guide	2	PVC			8000hrs or 1 YR
4*	Valve seat	2	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	SUS304	
5*	Valve gasket	2	PTFE			8000hrs or 1 YR
7*	O ring	2	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	EPDM	
9	Fitting	2	PVC			-
10*	O ring	2	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	EPDM	
20	Hexagon bolt (SW)	6	Stainless steel			-
22	Plain washer	6	Stainless steel			-
30*	Diaphragm	1	PTFE+EPDM			4000hrs or 6 months
31	Retainer	1	SUS304			-
70	Flanged/Unflanged inlet pipe unit	1	-			-
71	Outlet pipe unit	1	-			-
72	Union socket	2	PVC			-
73	Nut	2	PVC			-
76*	O ring	2: FF1/FF3/ HH3/UU3 1: FF2/FF4	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	EPDM	
77	Flange elbow unit	1	PVC			-
78	Flange unit	1: FF1/FF2 2: FF3	PVC			-
83	Tube adapter	2	PVC			-
84	Stopper	2	SS400			-
85	Fitting nut	2	CFRPVDF			-
214	Oil seal assy	1	-			8000hrs or 1 YR
217	Oil seal gasket	1	Nonasbestos			8000hrs or 1 YR
218	Hex socket head bolt	4	Steel			-
214 +217	Oil seal ring set	1	-			8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.

*The listed number of parts is required to consist of one single pump head except for parts #70, 71, 72, 73, 76, 77, 78, 83, 84, and 85.

NOTE

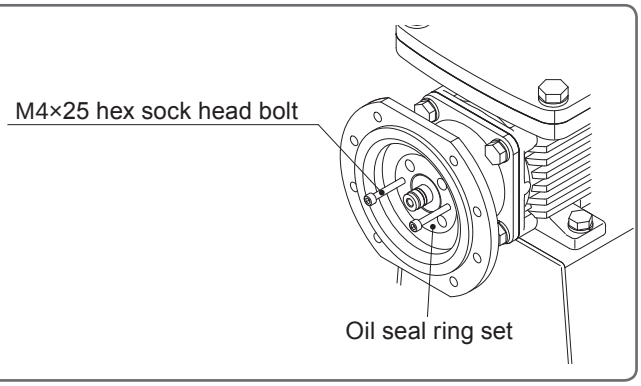
Retighten the bolts/parts evenly to the following torque.

Tightening torque

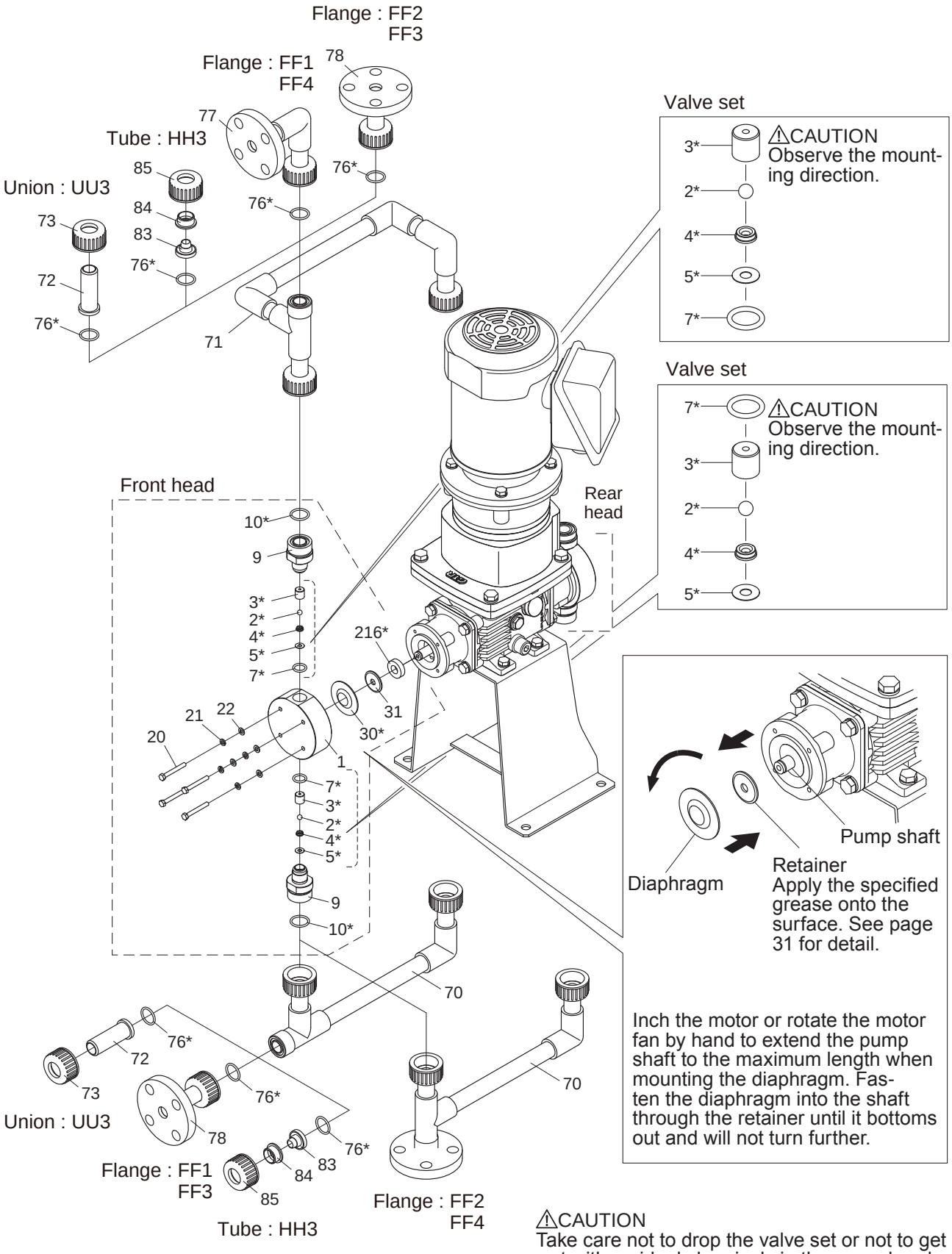
Part No.	Torque
#9	9 N•m
#20	2.9 N•m
#218	1.5 N•m

Removal of the Oil seal ring set

Screw in the attached two M4 hex sock head bolts as below to remove the oil seal ring set.



■ TD-F01/-F03 VS



*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials	Estimated life
1	Pump head	1	PVC	-
2*	Valve	2	SUS316	8000hrs or 1 YR
3*	Valve guide	2	PVC	8000hrs or 1 YR
4*	Valve seat	2	SUS304	8000hrs or 1 YR
5*	Valve gasket	2	PTFE	8000hrs or 1 YR
7*	O ring	2	EPDM	8000hrs or 1 YR
9	Fitting	2	PVC	-
10*	O ring	2	EPDM	8000hrs or 1 YR
20	Hexagon bolt	4	Stainless steel	-
21	Spring washer	4	Stainless steel	-
22	Plain washer	4	Stainless steel	-
30*	Diaphragm	1	PTFE+EPDM	4000hrs or 6 months
31	Retainer	1	SUS304	-
70	Flanged/unflanged inlet pipe unit	1	-	-
71	Outlet pipe unit	1	-	-
72	Union socket	2	PVC	-
73	Nut	2	PVC	-
76*	O ring	2: FF1/FF3/ HH3/UU3 1: FF2/FF4	EPDM	8000hrs or 1 YR
77	Flange elbow unit	1	PVC	-
78	Flange unit	1: FF1/FF2 2: FF3	PVC	-
83	Tube adapter	2	PVC	-
84	Stopper	2	SS400	-
85	Fitting nut	2	CFRPVDF	-
216*	Oil seal	1	NBR	8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.

*The listed number of parts is required to consist of one single pump head except for parts #70, 71, 72, 73, 76, 77, 78, 83, 84, and 85.

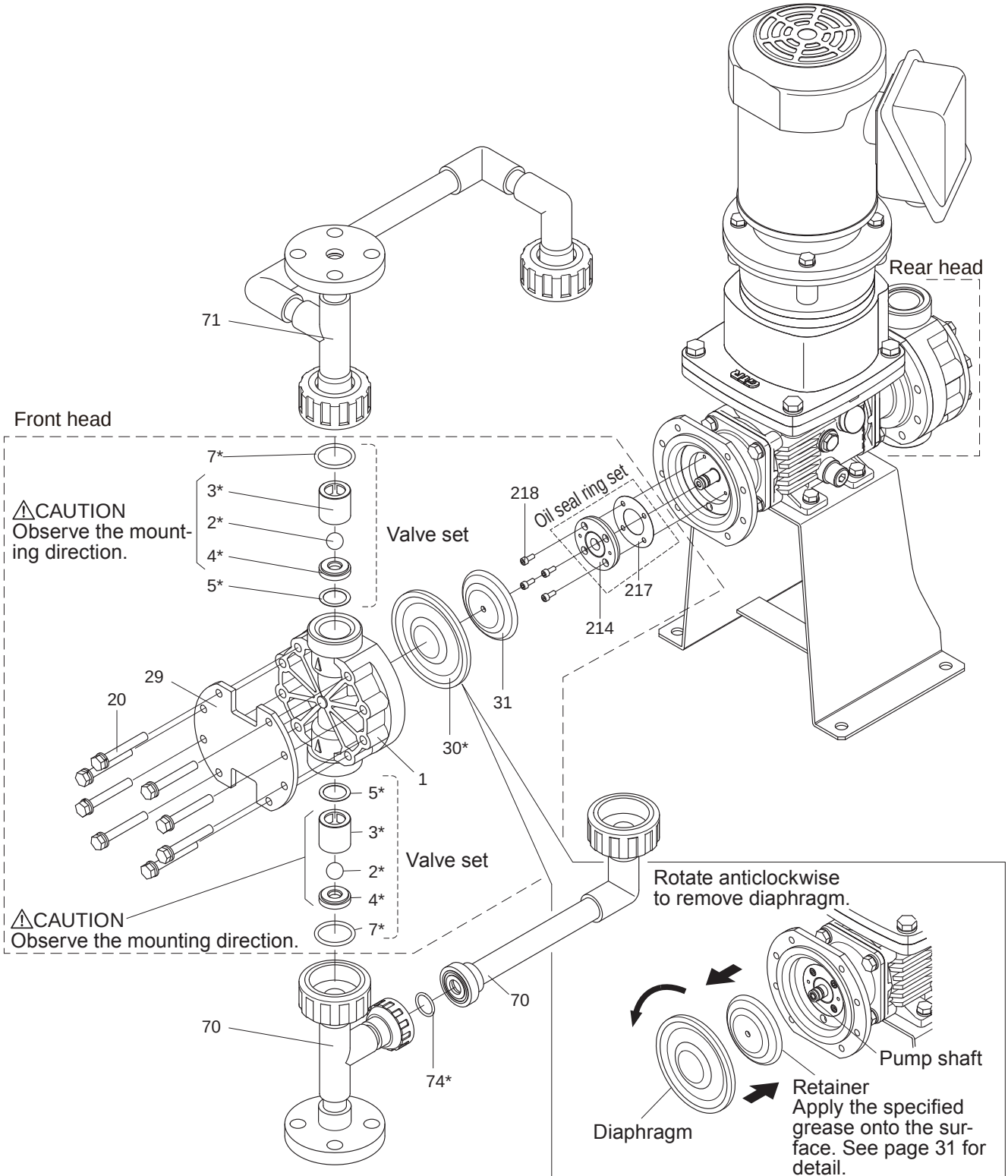
NOTE

Retighten the bolts/parts evenly to the following torque.

Tightening torque

Part No.	Torque
#9	5 N•m
#20	2.9 N•m

■ TD-F2/-F4/-F6/-F8 VC/V6/VS



⚠CAUTION
Take care not to drop the valve set or not to get wet with residual chemicals in the pump head when removing the inlet pipe unit (70).

*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials			Estimated life
1	Pump head	1	PVC			-
2*	Valve	2	VC	V6	VS	8000hrs or 1 YR
			Alumina ceramics	SUS316	SUS316	
3*	Valve guide	2	PVC			8000hrs or 1 YR
4*	Valve seat	2	VC	V6	VS	8000hrs or 1 YR
			PVC	PVC	SUS304	
5*	Valve gasket	2	PTFE			8000hrs or 1 YR
7*	O ring	2	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	EPDM	
20	Hexagon bolt	8	Stainless steel			-
29	Reinforcing plate	1	SS400			-
30*	Diaphragm	1	PTFE+EPDM			4000hrs or 6 months
31	Retainer	1	SUS304			-
70	Flanged inlet pipe unit	1	-			-
71	Flanged outlet pipe unit	1	-			-
74*	O ring	1	VC	V6	VS	8000hrs or 1 YR
			FKM	EPDM	EPDM	
214	Oil seal assy	1	-			8000hrs or 1 YR
217	Oil seal gasket	1	Nonasbestos			8000hrs or 1 YR
218	Hex socket head bolt	4	Steel			-
214 +217	Oil seal ring set	1	-			8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.
*The listed number of parts is required to consist of one single pump head except for parts # 70, 71, and 74.

NOTE

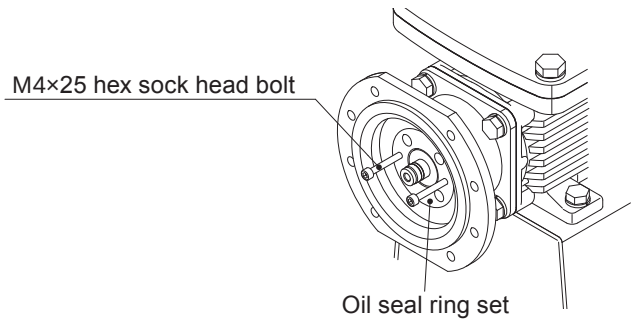
Retighten the bolts/parts evenly to the following torque.

Tightening torque

Part No.	Torque
#20	12 N•m
#218	1.5 N•m

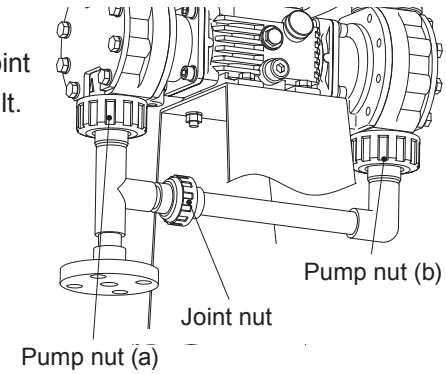
Removal of the Oil seal ring set

Screw in the attached two M4 hex sock head bolts as below to remove the oil seal ring set.

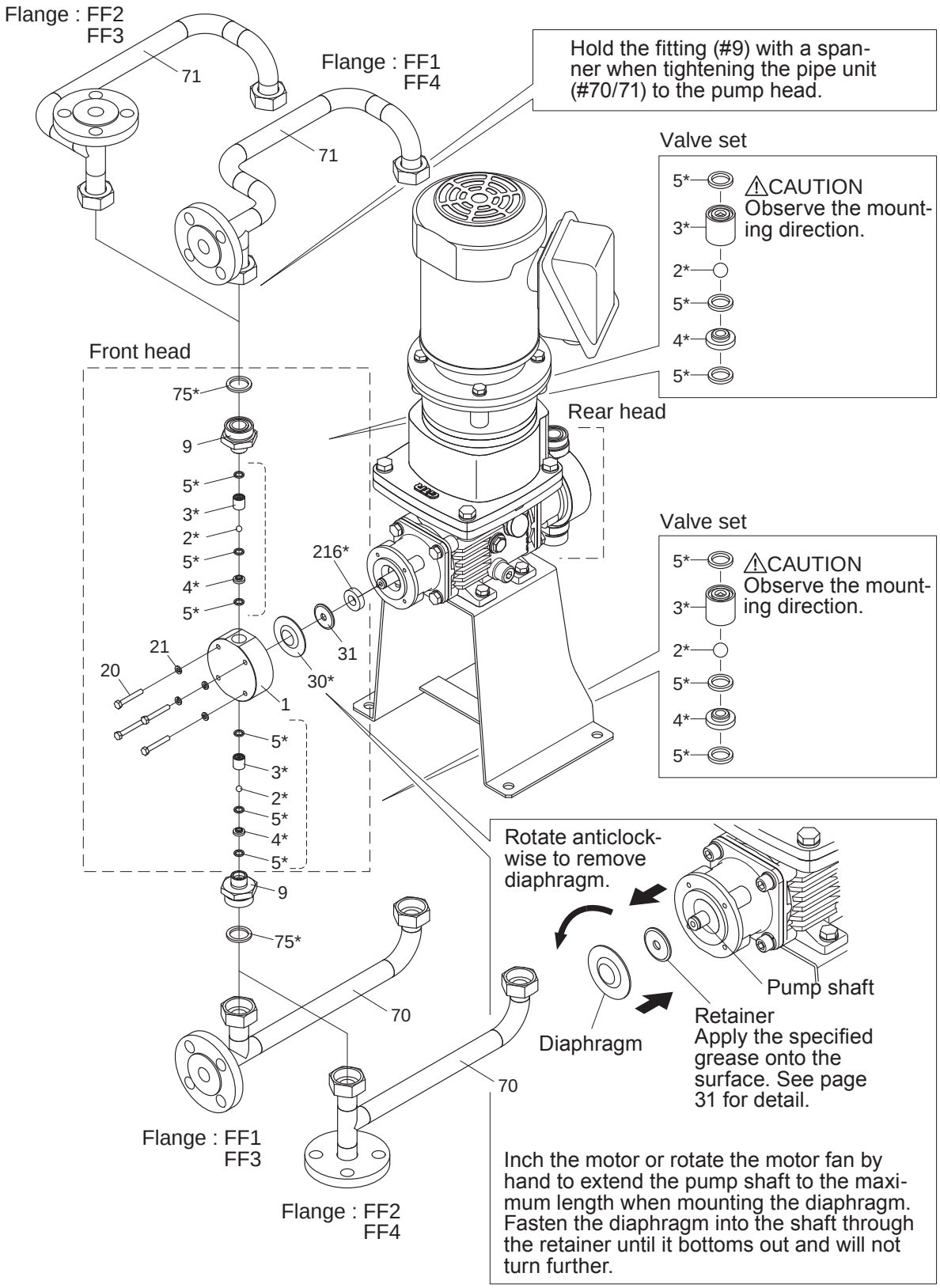


Suction line mounting

Hand-tighten the pump nut (a) and (b), and then joint nut. If the joint nut is fastened first, a poor flow rate or poor suction head may result.



■ TD-F01/-F03 S6



⚠CAUTION
Take care not to drop the valve set or not to get wet with residual chemicals in the pump head when removing the inlet pipe unit (70).

*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials	Estimated life
1	Pump head	1	SUS316	-
2*	Valve	2	SUS316	8000hrs or 1 YR
3*	Valve guide	2	SUS316	8000hrs or 1 YR
4*	Valve seat	2	SUS316	8000hrs or 1 YR
5*	Valve gasket	6	PTFE	8000hrs or 1 YR
9	Fitting	2	SUS316	-
20	Hexagon bolt	4	Stainless steel	-
21	Spring washer	4	Stainless steel	-
30*	Diaphragm	1	PTFE+EPDM	4000hrs or 6 months
31	Retainer	1	SUS304	-
70	Flanged inlet pipe unit	1	SUS316	-
71	Flanged outlet pipe unit	1	SUS316	-
75*	Gasket	2	PTFE	8000hrs or 1 YR
216*	Oil seal	1	NBR	8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.
*The listed number of parts is required to consist of one single pump head except for parts # 70 and 71.

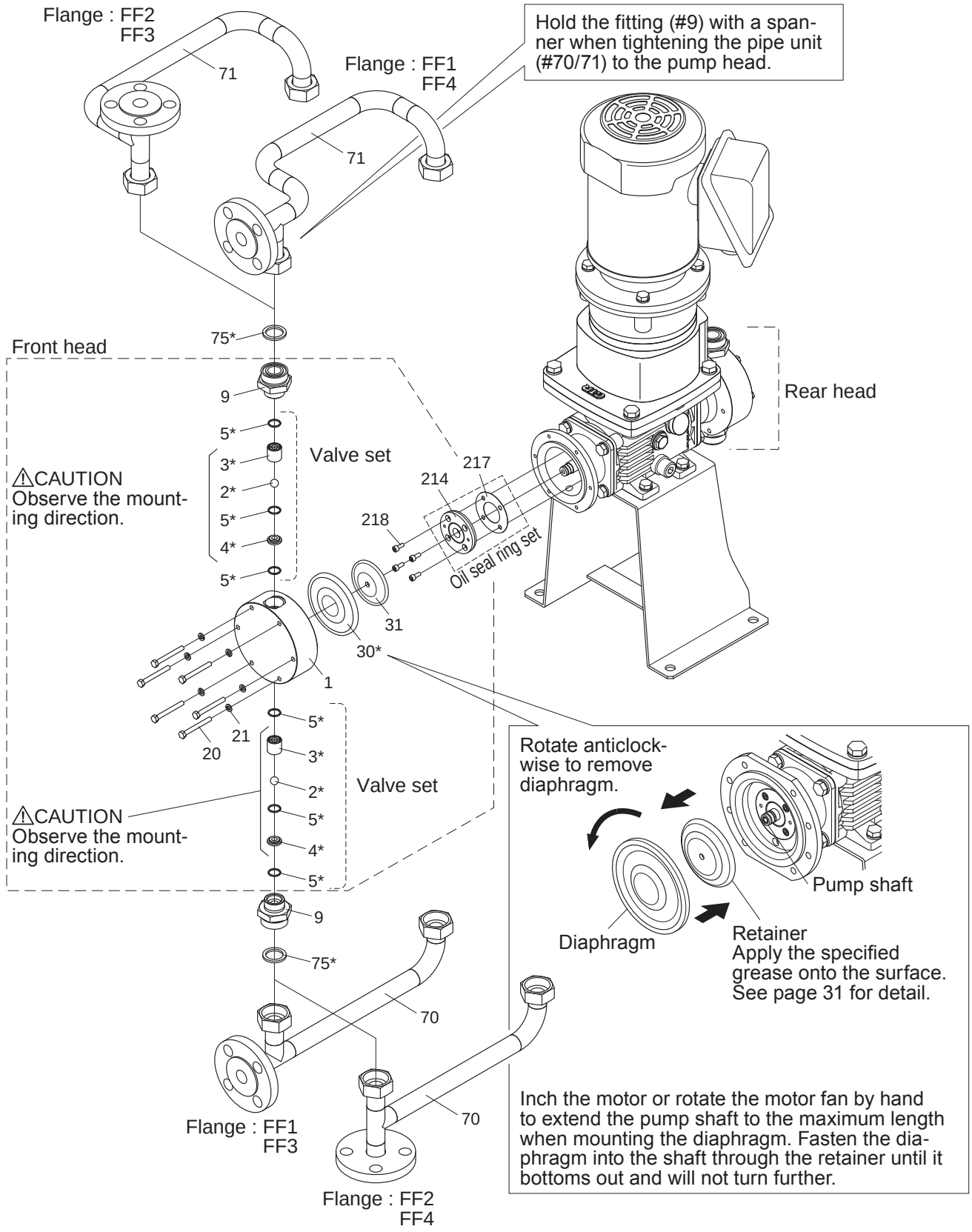
NOTE

Retighten the bolts/parts evenly to the following torque.

Tightening torque

Part No.	Torque
#9	25 N•m
#20	2.9 N•m
#70	25 N•m
#71	25 N•m

■ TD-F05/-F1 S6



⚠CAUTION
Take care not to drop the valve set or not to get wet with residual chemicals in the pump head when removing the inlet pipe unit (70).

*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials	Estimated life
1	Pump head	1	SUS316	-
2*	Valve	2	SUS316	8000hrs or 1 YR
3*	Valve guide	2	SUS316	8000hrs or 1 YR
4*	Valve seat	2	SUS316	8000hrs or 1 YR
5*	Valve gasket	6	PTFE	8000hrs or 1 YR
9	Fitting	2	SUS316	-
20	Hexagon bolt	6	Stainless steel	-
21	Spring washer	6	Stainless steel	-
30*	Diaphragm	1	PTFE+EPDM	4000hrs or 6 months
31	Retainer	1	SUS304	-
70	Flanged inlet pipe unit	1	SUS316	-
71	Flanged outlet pipe unit	1	SUS316	-
75*	Gasket	2	PTFE	8000hrs or 1 YR
214	Oil seal assy	1	-	8000hrs or 1 YR
217	Oil seal gasket	1	Nonasbestos	8000hrs or 1 YR
218	Hex socket head bolt	4	Steel	-
214 +217	Oil seal ring set	1	-	8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.
*The listed number of parts is required to consist of one single pump head except for parts # 70 and 71.

NOTE

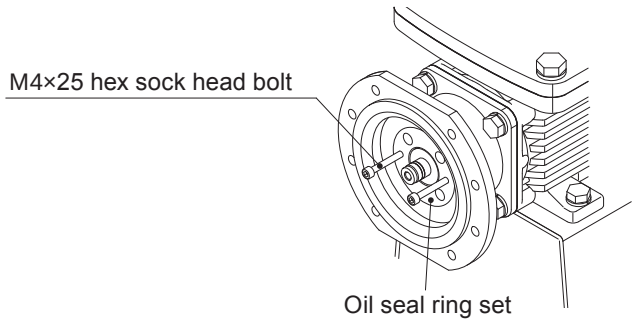
Retighten the bolts/parts evenly to the following torque.

Tightening torque

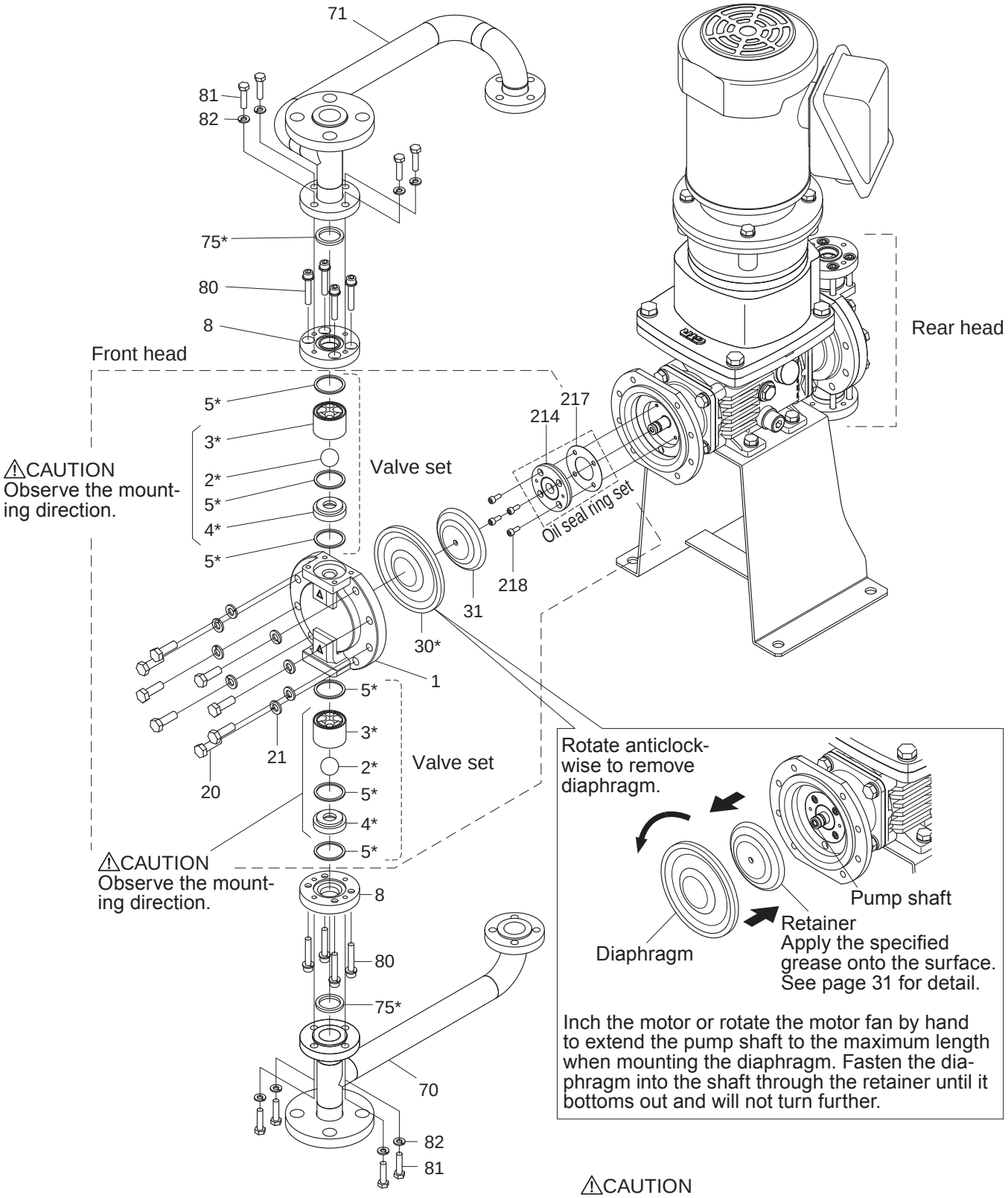
Part No.	Torque
#9	25 N•m
#20	3.5 N•m
#70	25 N•m
#71	25 N•m
#218	1.5 N•m

Removal of the Oil seal ring set

Screw in the attached two M4 hex sock head bolts as below to remove the oil seal ring set.



■ TD-F2/-F4/-F6/-F8 S6



*The parts denoted by an asterisk are wear parts and need replaced periodically (every time the service life has passed). See the next page for the estimated life of each part based on operation with clean water at room temperature.

*The front and rear pump heads consist of the same component parts and assembly sequence.

Parts list

No.	Part names	# of parts	Materials	Estimated life
1	Pump head	1	SUS316/SCS14	-
2*	Valve	2	SUS316	8000hrs or 1 YR
3*	Valve guide	2	SUS316	8000hrs or 1 YR
4*	Valve seat	2	SUS316	8000hrs or 1 YR
5*	Valve gasket	6	PTFE	8000hrs or 1 YR
8	Valve support	2	SUS316	-
20	Hexagon bolt	8	Stainless steel	-
21	Spring washer	8	Stainless steel	-
30*	Diaphragm	1	PTFE+EPDM	4000hrs or 6 months
31	Retainer	1	SUS304	-
70	Flanged inlet pipe unit	1	SUS316	-
71	Flanged outlet pipe unit	1	SUS316	-
75*	Gasket	2	PTFE	8000hrs or 1 YR
80	Hex socket head bolt	8	Stainless steel	-
81	Hexagon bolt	8	Stainless steel	-
82	Spring washer	8	Stainless steel	-
214	Oil seal assy	1	-	8000hrs or 1 YR
217	Oil seal gasket	1	Nonasbestos	8000hrs or 1 YR
218	Hex socket head bolt	1	Steel	-
214 +217	Oil seal ring set	1	-	8000hrs or 1 YR

*The parts with an estimated life are wear parts and need to be replaced periodically.
*The listed number of parts is required to consist of one single pump head except for parts # 70 and 71.

NOTE

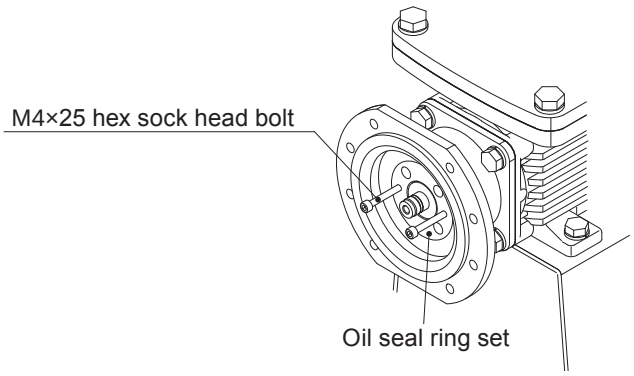
Retighten the bolts/parts evenly to the following torque.

Tightening torque

Part No.	Torque
#20	12 N•m
#80	5 N•m
#81	TD-F2/-F4: 5 N•m TD-F6/-F8: 12 N•m
#218	1.5 N•m

Removal of the Oil seal ring set

Screw in the attached two M4 hex sock head bolts as below to remove the oil seal ring set.



Specifications/Outer dimensions

Specifications

Information in this section is subject to change without notice.

■ Pump

TD-F VC/ V6/ S6

		TD-F01	TD-F03	TD-F05	TD-F1	TD-F2	TD-F4	TD-F6	TD-F8
Flow rate*1	l/h	9	18	30	60	132	246	366	492
	l/min	0.15	0.3	0.5	1	2.2	4.1	6.1	8.2
Max discharge press.	MPa	1.0					0.5	0.4	0.3
Repeatability		±2% FS							
Linearity		±2% FS							
Max allowable viscosity*2 (Newtonian liquid)	VC	300mPa•s							
	V6	500mPa•s							
	S6	500mPa•s				1000mPa•s			

*1 Represents the discharge capacity based on pumping clean water at 25°C and the max discharge pressure, and may increase as the pressure reduces.

*2 Flow rate reduces by about 10-30% of the rated values above when viscous liquid is delivered.

* The above information is based on use of a 3-phae Mitsubishi Electric inverter motor and a Mitsubishi inverter, and may change if a different combination is used.

TD-F VS

		TD-F01	TD-F03	TD-F05	TD-F1	TD-F2	TD-F4	TD-F6	TD-F8
Flow rate	l/h	7.2	14.4	24	48	132	246	366	492
	l/min	0.12	0.24	0.4	0.8	2.2	4.1	6.1	8.2
Max discharge press.	MPa	1.0					0.5	0.4	0.3
Repeatability		±2% FS							
Linearity		±2% FS							
Max allowable viscosity (Newtonian liquid)	VS	300-1000mPa•s							

* The above information is based on operation with silicone oil (Newtonian liquid) of 1000mPa•s at 25°C with our plumbing system and may change with plumbing conditions or when a different liquid is used.

* When liquid viscosity gets lower, a flow rate increases and repeatability becomes worse.

* The above information is based on use of a 3-phase Mitsubishi Electric inverter motor and a Mitsubishi inverter, and may change if a different combination is used.

TD-F VC/ V6/ S6/ VS

			TD-F01	TD-F03	TD-F05	TD-F1	TD-F2	TD-F4	TD-F6	TD-F8
Flow control method			Motor rpm control							
Control range*1	Turndown ratio		1:10							
	Frequency	Hz	6-60							
	Stroke rate*2	spm	12-116				7-70	12-116	9-87	12-116
Reduction ratio			1:15				1:25	1:15	1:20	1:15
Stroke length		mm	1.2	2.3	1.2	2.3	6			
Diaphragm effective dia.		mm	ø30		ø60		ø72		ø100	
Connection	Flange JIS10K	Outlet	15A						25A	
		Inlet	15A				15A (VS:25A)	25A		
	Tube	VC/V6/VS	ø12×ø18				-			
	Union	VC/V6/VS	VP16				-			
Allowable liquid temperature		VC/V6/VS	0-40°C							
		S6	0-80°C							
Allowable ambient temperature			0-40°C							
Allowable ambient humidity			95%RH or below (non-condensing/non-vaporing)							
Max suction lift*3			1m*4							
Pump colour			RAL5002 or Munsell colour system 7PB2/11							
Gear unit colour			Munsell colour system 9B6/0.5							
Weight*5	kg	VC/V6/VS	26		27		30		35	
		S6	30		32		35		43	

*1 The above information is based on use of a 3-phase Mitsubishi Electric inverter motor and a Mitsubishi inverter, and may change if a different combination is used.

*2 Represents the stroke rate per pump head.

*3 Represents the allowable highest lift with clean water at 25°C that will not adversely affect the pump performance.

*4 The TD-F01/-F03/-F05 delivers a small amount of liquid per shot, and so air can be easily trapped in the suction line. Always install these pumps with a smaller diaphragm in a flooded suction system to expel air from the pump and the line. See page 23 for detail of degassing.

*4 Represents the total weights of the pump unit plus the motor unit.

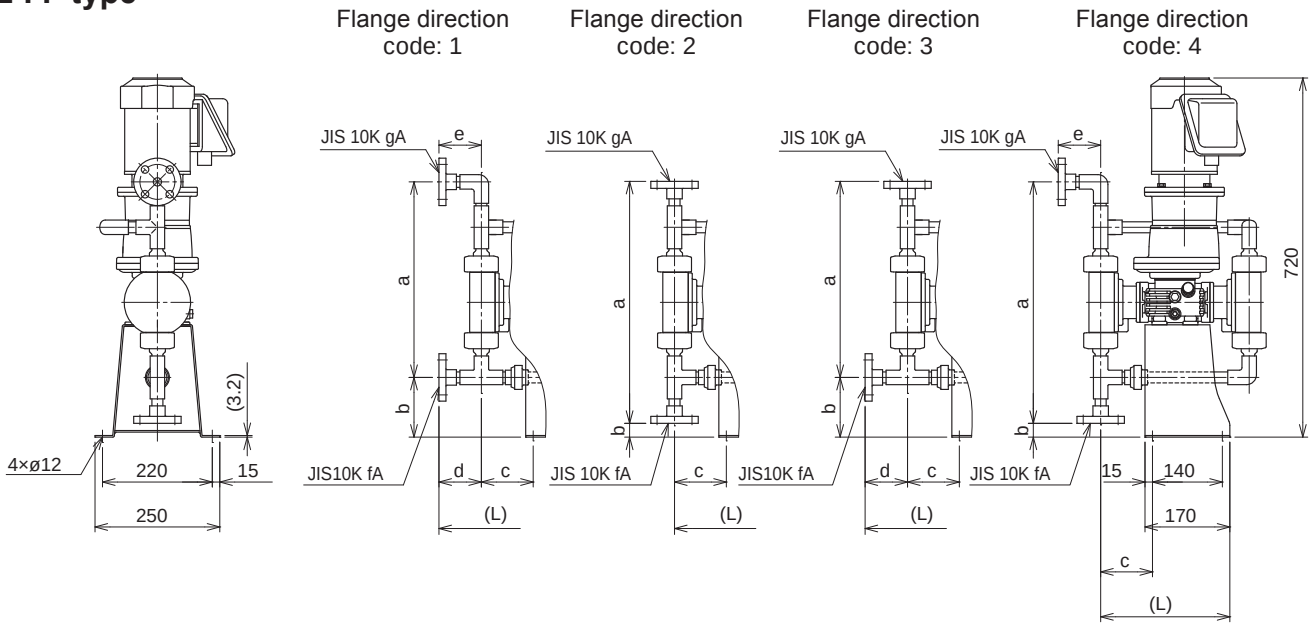
■ Inverter

Applicable motors	3-phase inverter motors
Motor size/IEC flange	71M/FF130
Structure	Vertical flange mount
Rated output	0.4kW
Number of poles	4

Outer dimensions

Information in this section is subject to change without notice.

■ FF type



Dimensions in mm

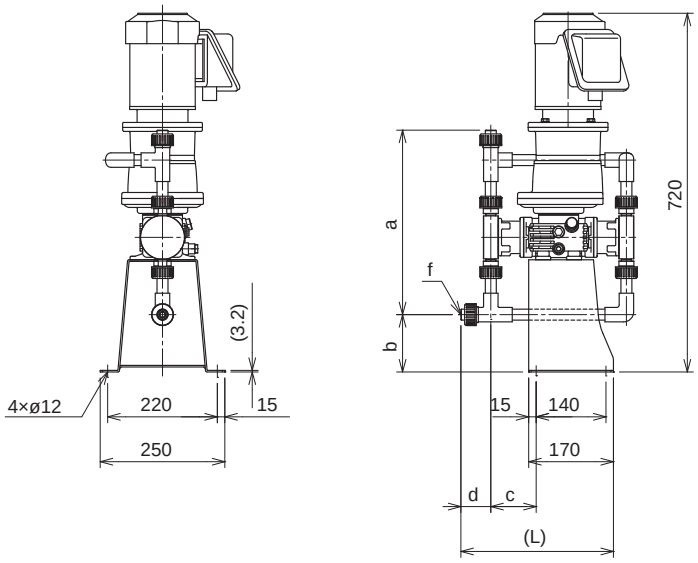
WEM*1	VC/V6/VS																											
CD*2	1								2						3							4						
Size	L	a	b	c	d	e	f	g	L	a	b	c	f	g	L	a	b	c	d	f	g	L	a	b	c	e	f	g
TD-01	361	433	115	91	115	89	15		246	493	47	91	15		361	425	115	91	115	15		246	501	47	91	89	15	
TD-03	361	433	115	91	115	89	15		246	493	47	91	15		361	425	115	91	115	15		246	501	47	91	89	15	
TD-05	361	467	98	91	115	89	15		246	527	30	91	15		361	459	115	98	115	15		246	535	30	91	89	15	
TD-1	361	467	98	91	115	89	15		246	527	30	91	15		361	459	115	98	115	15		246	535	30	91	89	15	
TD-2	344	391*3	120*4	104	85	85	15*5	15	259	484	28	104	15*5	15	344	392*6	120*4	104	85	15*5	15	259	483	28	104	85	15*5	15
TD-4	344	398	113	104	85	85	25	15	259	484	28	104	25	15	344	399	113	104	85	25	15	259	483	28	104	85	15	15
TD-6	373	446	93	118	100	100	25		273	524	8	118	25		373	439	93	118	100	25		273	531	8	118	100	25	
TD-8	373	446	93	118	100	100	25		273	524	8	118	25		373	439	93	118	100	25		273	531	8	118	100	25	

*1 WEM stands for Wet End Material code
*2 CD stands for Connection Direction code
*3 398mm for the VS type
*4 113mm for the VS type
*5 25mm for the VS type
*6 399mm for the VS type

WEM*1	S6																											
CD*2	1								2						3							4						
Size	L	a	b	c	d	e	f	g	L	a	b	c	f	g	L	a	b	c	d	f	g	L	a	b	c	e	f	g
TD-01	302	234	153	91	55	55	15		246	345	98	91	15		302	290	153	91	55	15		246	290	98	91	55	15	
TD-03	302	234	153	91	55	55	15		246	345	98	91	15		302	290	153	91	55	15		246	290	98	91	55	15	
TD-05	302	264	138	91	55	55	15		246	375	83	91	15		302	320	138	91	55	15		246	320	83	91	55	15	
TD-1	302	264	138	91	55	55	15		246	375	83	91	15		302	320	138	91	55	15		246	320	83	91	55	15	
TD-2	370	314	113	95	119	119	15		250	430	55	95	15		370	372	113	95	119	15		250	372	54	95	119	15	
TD-4	370	314	113	95	119	119	25	15	250	451	33	95	25	15	370	372	113	95	119	25	15	250	393	33	95	119	25	15
TD-6	358	348	96	115	88	88	25		270	488	26	115	25		358	418	96	115	88	25		270	418	26	115	88	25	
TD-8	358	348	96	115	88	88	25		270	488	26	115	25		358	418	96	115	88	25		270	418	26	115	88	25	

*1 WEM stands for Wet End Material code
*2 CD stands for Connection Direction code

■ HH type



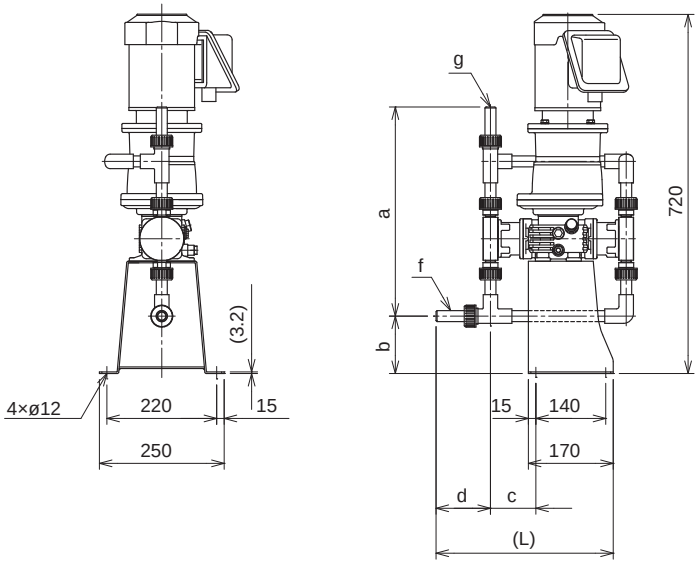
Dimensions in mm

WEM*1	VC/V6/VS						
CD*2	3						
Size	L	a	b	c	d	f	g
TD-F01	306	370	115	91	60	ø12 × ø18	
TD-F03	306	370	115	91	60	ø12 × ø18	
TD-F05	306	404	98	91	60	ø12 × ø18	
TD-F1	306	404	98	91	60	ø12 × ø18	

*1 WEM stands for Wet End Material code

*2 CD stands for Connection Direction code

■ UU type



Dimensions in mm

WEM*1	VC/V6/VS						
CD*2	3						
Size	L	a	b	c	d	f	g
TD-F01	355	419	115	91	109	VP16	
TD-F03	355	419	115	91	109	VP16	
TD-F05	355	453	98	91	109	VP16	
TD-F1	355	453	98	91	109	VP16	

*1 WEM stands for Wet End Material code

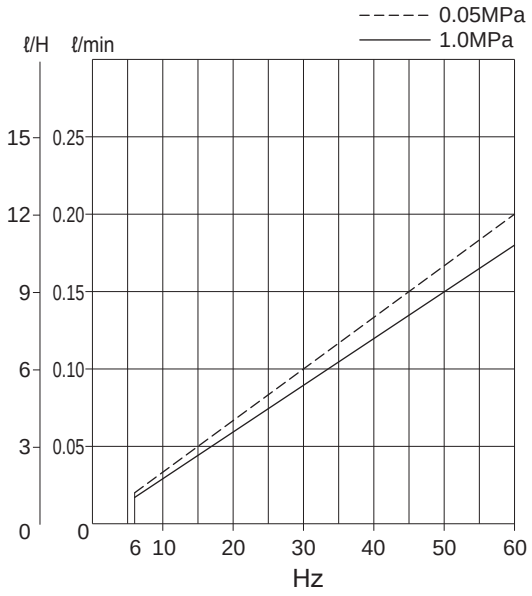
*2 CD stands for Connection Direction code

Performance curves

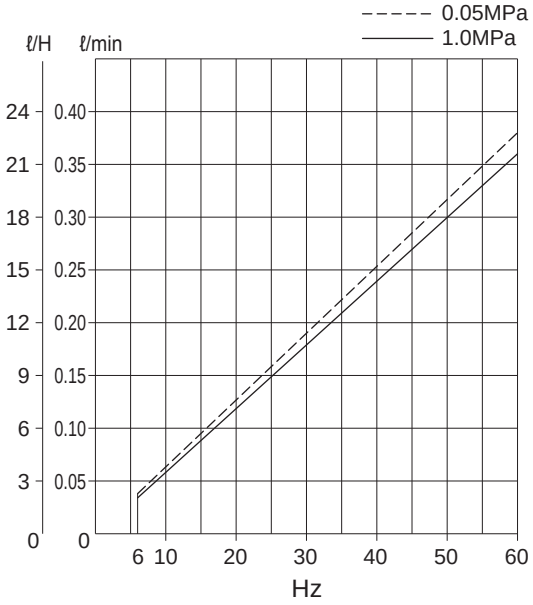
The following performance curves are collected at each diaphragm size in operation with clean water at 25°C and are subject to change with operating conditions and individual differences. Always measure flow rates at each frequency under actual conditions to obtain appropriate inverter setting.

■ TD-F VC/ V6

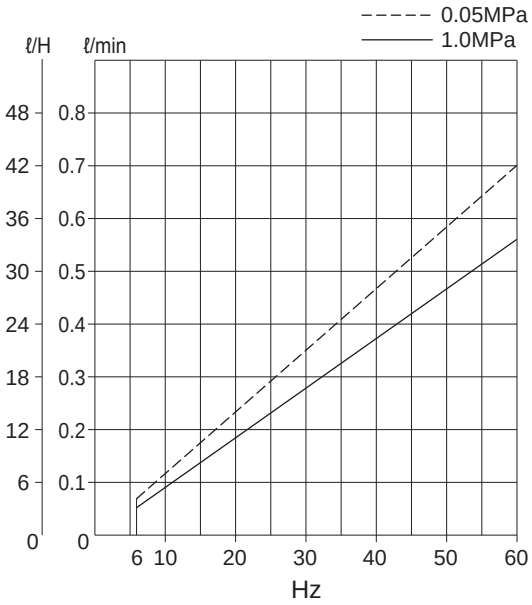
TD-F01



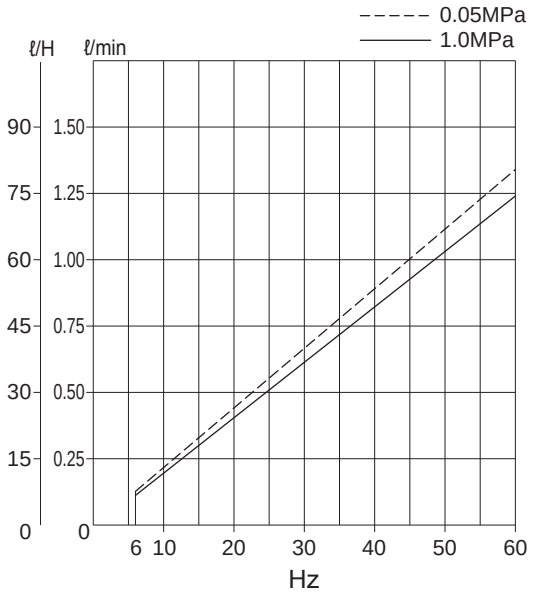
TD-F03



TD-F05

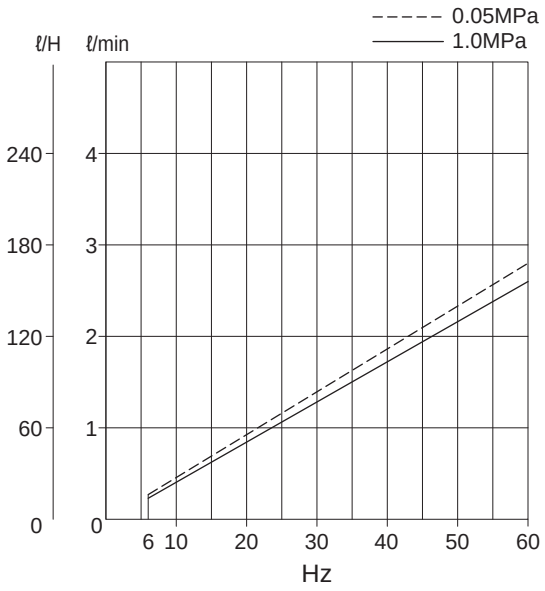


TD-F1

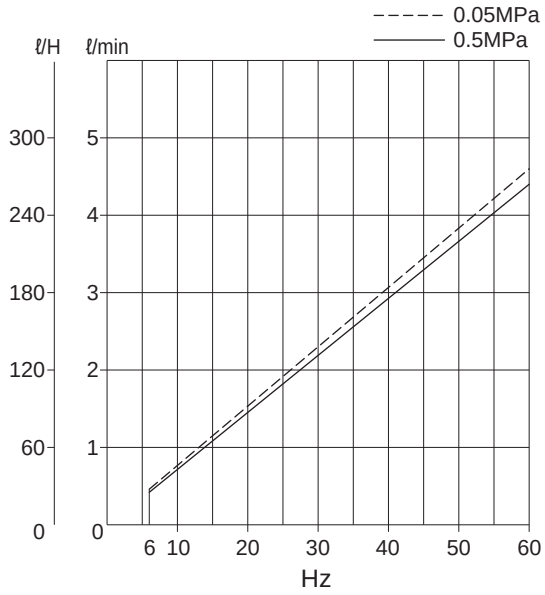


■ TD-F VC/V6

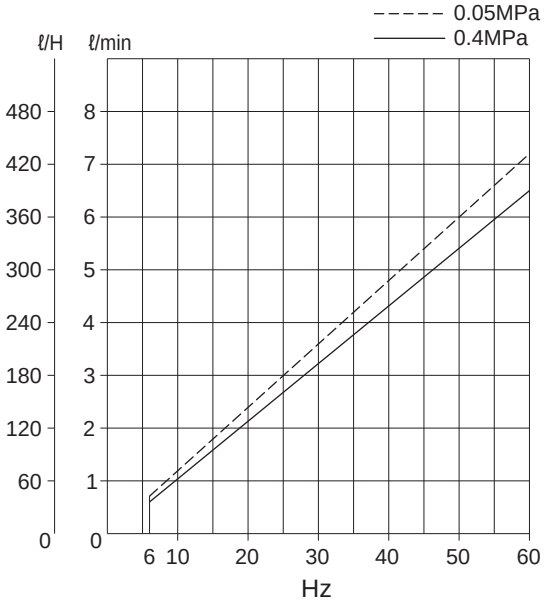
TD-F2



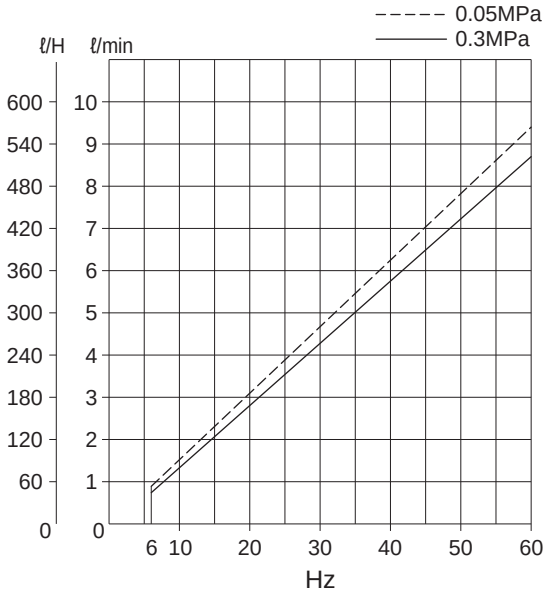
TD-F4



TD-F6

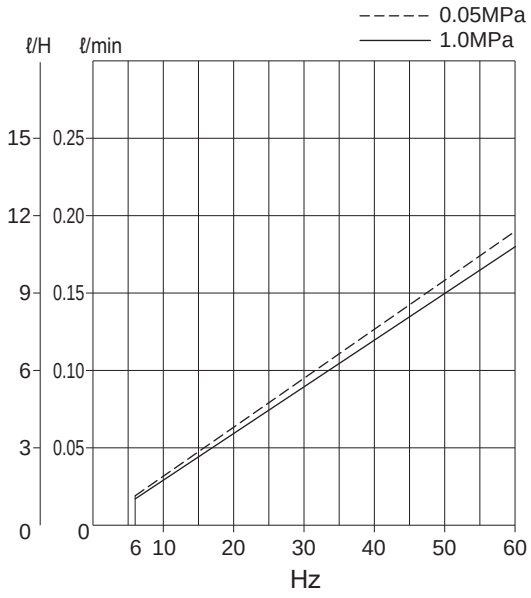


TD-F8

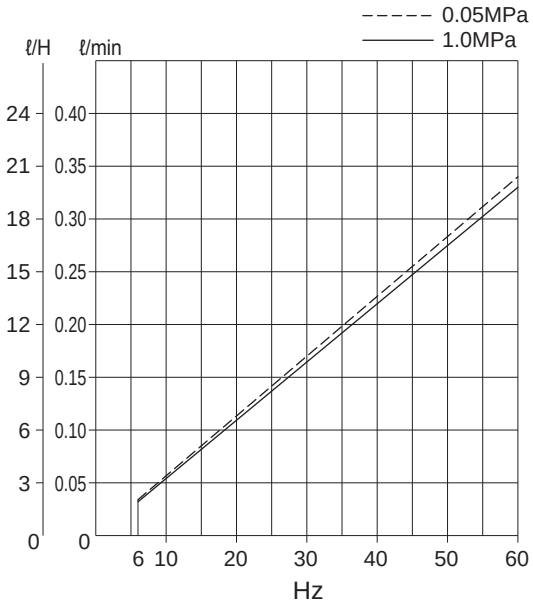


■ TD-F S6

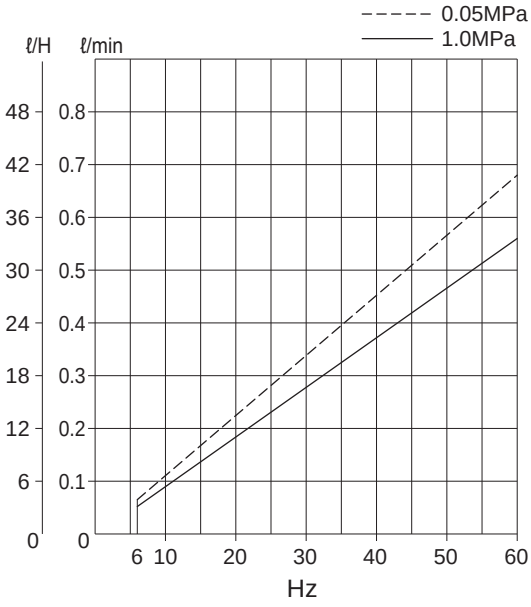
TD-F01



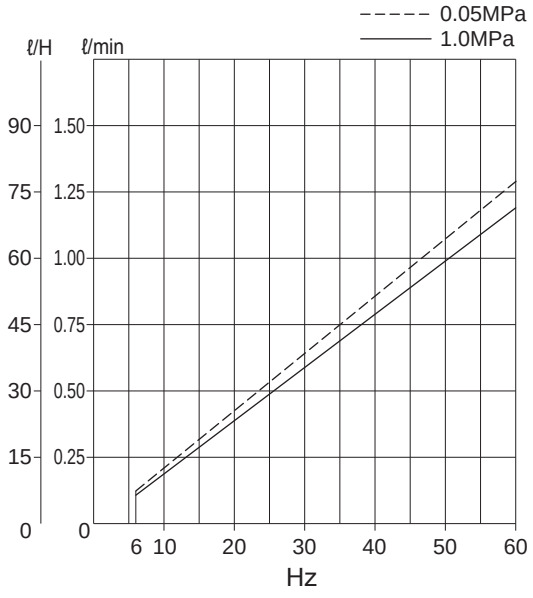
TD-F03



TD-F05

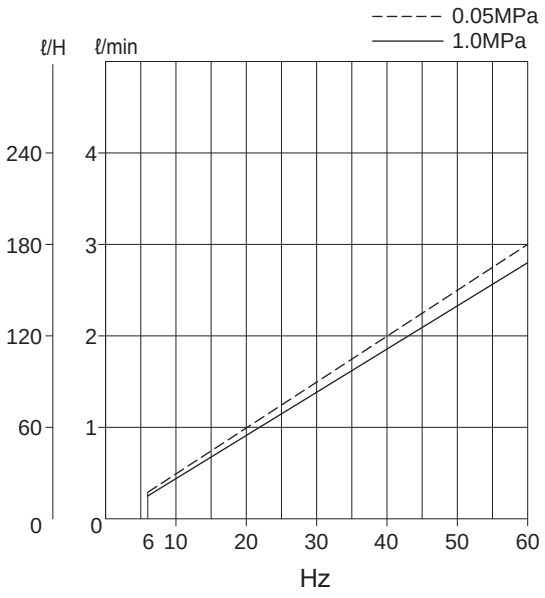


TD-F1

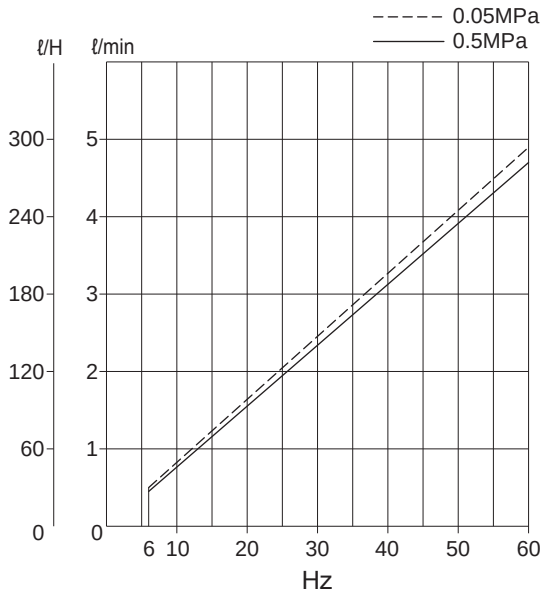


■ TD-F S6

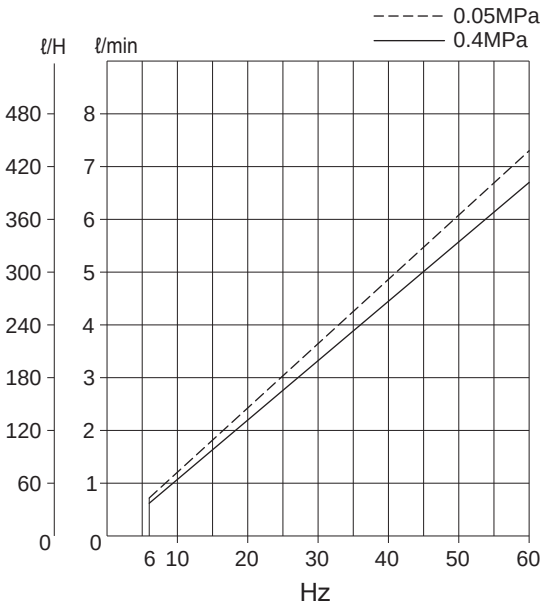
TD-F2



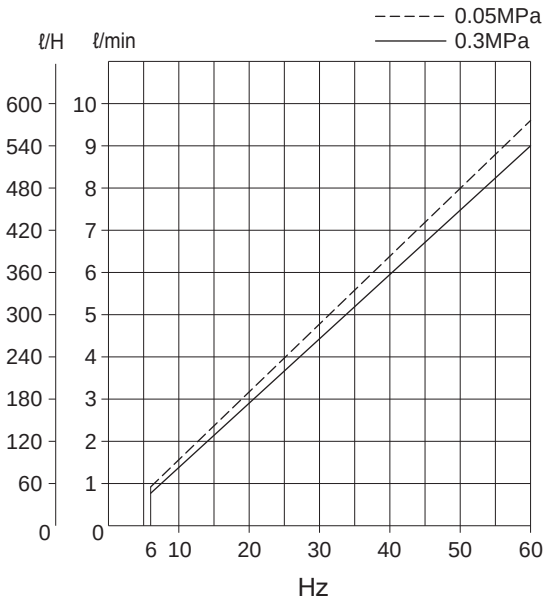
TD-F4



TD-F6

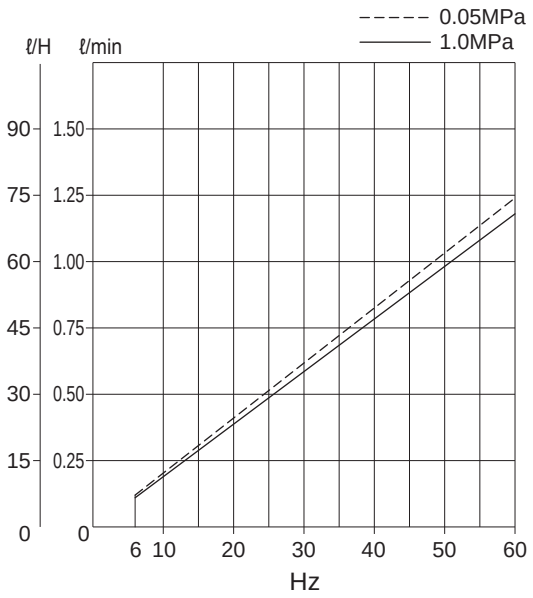


TD-F8

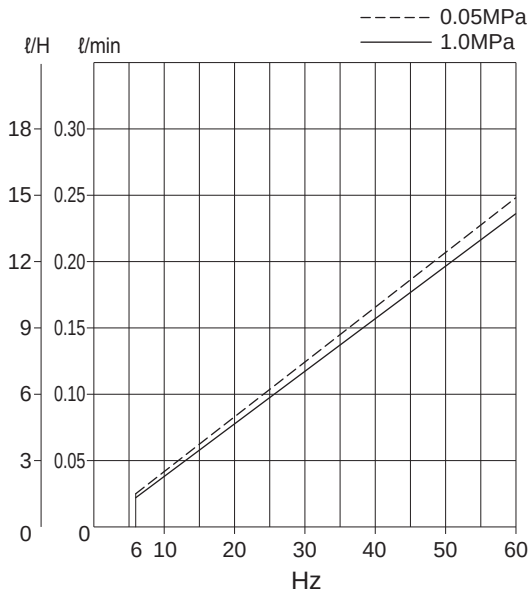


■ TD-F VS

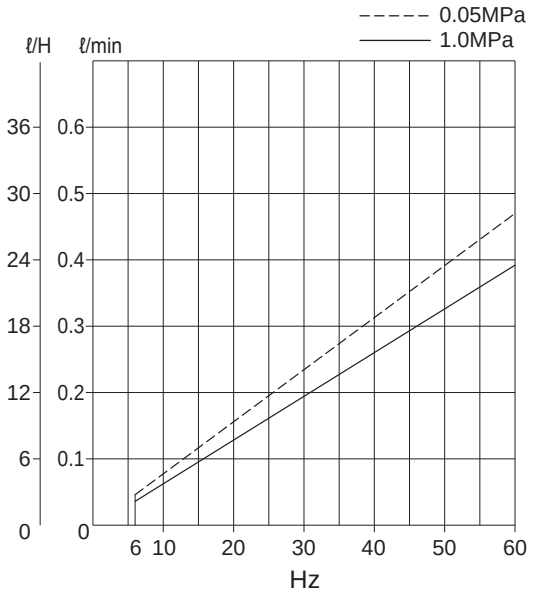
TD-F01



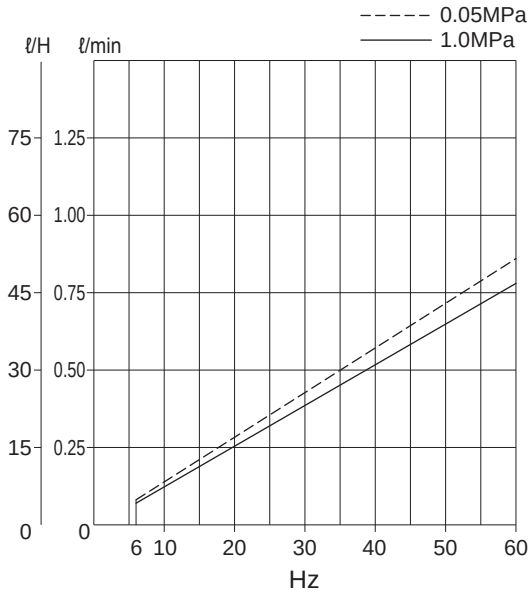
TD-F03



TD-F05

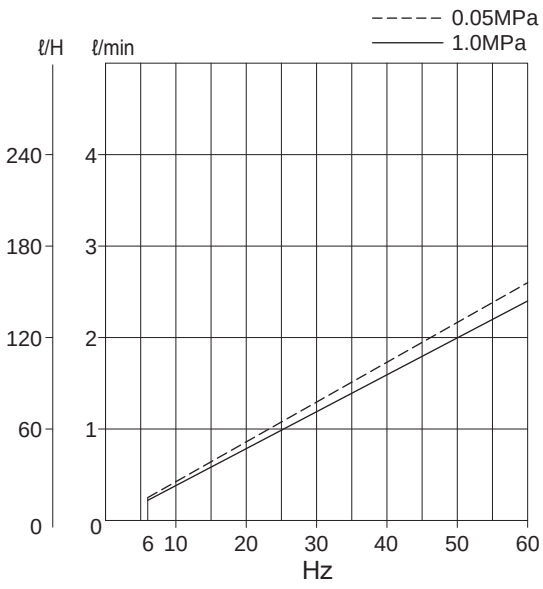


TD-F1

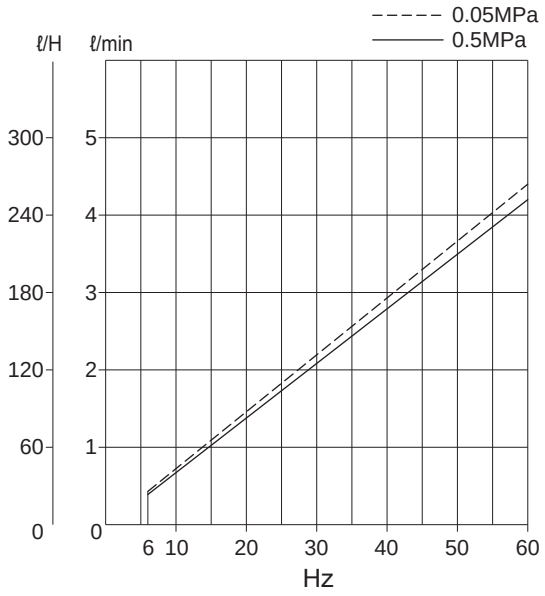


■ TD-F VS

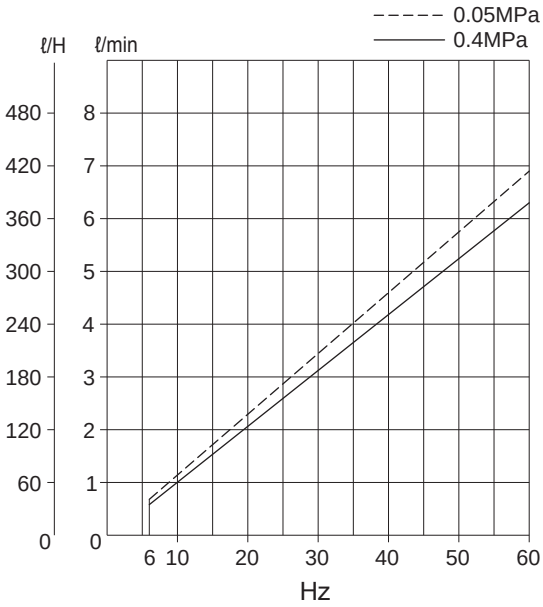
TD-F2



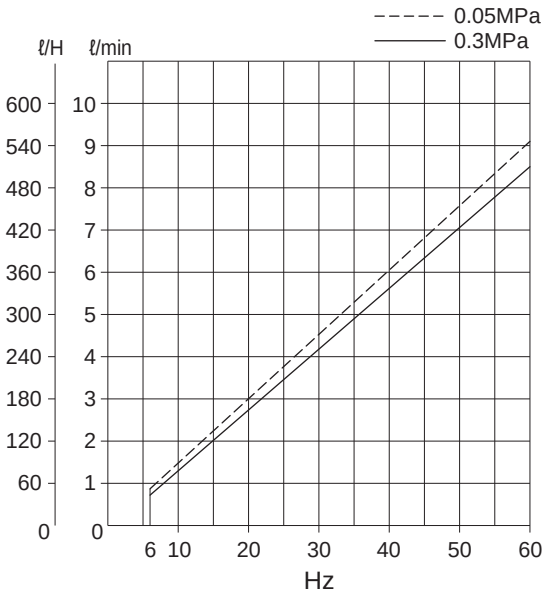
TD-F4

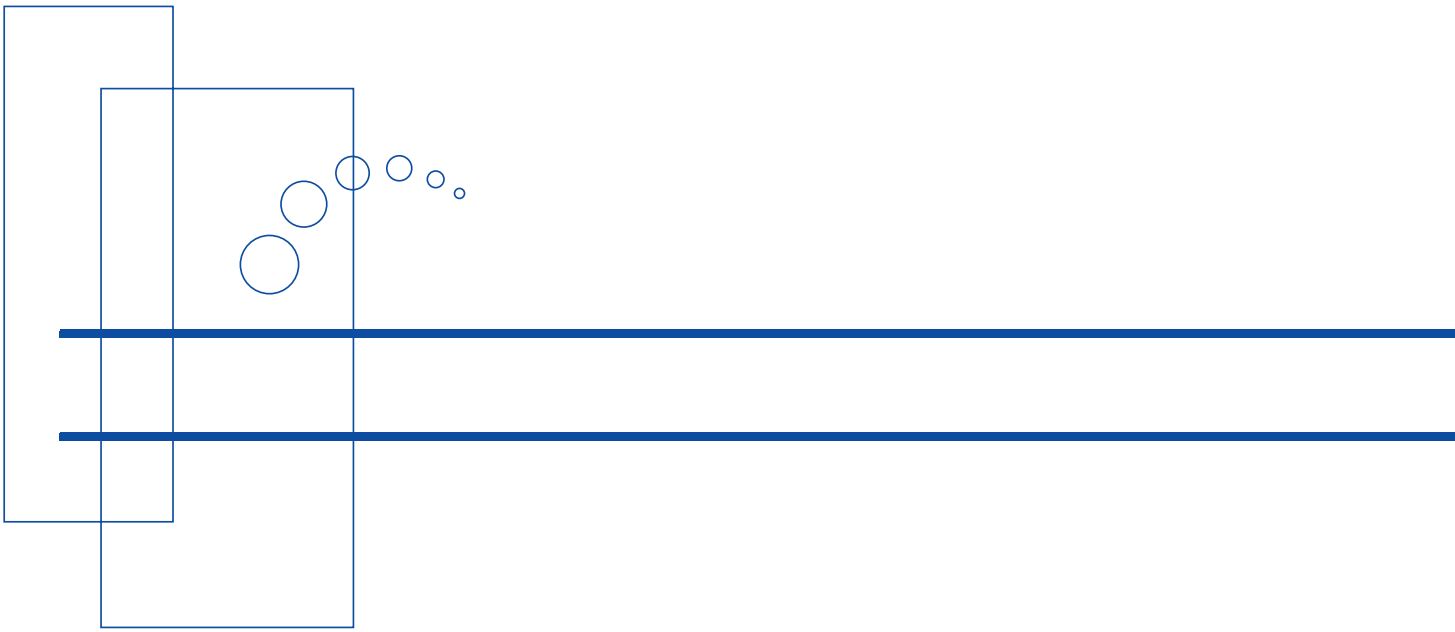


TD-F6



TD-F8





IWAKI PUMPS

http://www.iwakipumps.jp

IWAKI CO.,LTD. 6-6 Kanda-Sudacho 2-chome Chiyoda-ku Tokyo 101-8558 Japan
TEL: +81 3 3254 2935 FAX: +81 3 3252 8892

European office / IWAKI Europe GmbH
TEL: +49 2154 9254 0 FAX: +49 2154 9254 48

Germany / IWAKI Europe GmbH
TEL: +49 2154 9254 50 FAX: +49 2154 9254 55

Holland / IWAKI Europe GmbH (Netherlands Branch)
TEL: +31 74 2420011 FAX: +49 2154 9254 48

Italy / IWAKI Europe GmbH (Italy Branch)
TEL: +39 0444 371115 FAX: +39 0444 335350

Spain / IWAKI Europe GmbH (Spain Branch)
TEL: +34 93 37 70 198 FAX: +34 93 47 40 991

Belgium / IWAKI Belgium N.V.
TEL: +32 13 670200 FAX: FAX: +32 13 672030

Denmark / IWAKI Nordic A/S
TEL: +45 48 242345 FAX: +45 48 242346

Finland / IWAKI Suomi Oy
TEL: +358 9 2745810 FAX: +358 9 2742715

France / IWAKI France S.A.
TEL: +33 1 69 63 33 70 FAX: +33 1 64 49 92 73

Norway / IWAKI Norge AS
TEL: +47 23 38 49 00 FAX: +47 23 38 49 01

Sweden / IWAKI Sverige AB
TEL: +46 8 511 72900 FAX: +46 8 511 72922

U.K. / IWAKI Pumps (U.K.) LTD.
TEL: +44 1743 231363 FAX: +44 1743 366507

U.S.A. / IWAKI America Inc.
TEL: +1 508 429 1440 FAX: +1 508 429 1386

Argentina / IWAKI America Inc. (Argentina Branch)
TEL: +54 11 4745 4116

Singapore / IWAKI Singapore Pte Ltd.
TEL: +65 6316 2028 FAX: +65 6316 3221

Indonesia / IWAKI Singapore (Indonesia Branch)
TEL: +62 21 6906606 FAX: +62 21 6906612

Malaysia / IWAKIm SDN. BHD.
TEL: +60 3 7803 8807 FAX: +60 3 7803 4800

Australia / IWAKI Pumps Australia Pty Ltd.
TEL: +61 2 9899 2411 FAX: +61 2 9899 2421

China (Hong Kong) / IWAKI Pumps Co., Ltd.
TEL: +852 2607 1168 FAX: +852 2607 1000

China (Guangzhou) / GFTZ IWAKI Engineering & Trading Co., Ltd.
TEL: +86 20 84350603 FAX: +86 20 84359181

China / IWAKI Pumps (Shanghai) Co., Ltd.
TEL: +86 21 6272 7502 FAX: +86 21 6272 6929

Korea / IWAKI Korea Co., Ltd.
TEL: +82 2 2630 4800 FAX: +82 2 2630 4801

Taiwan / IWAKI Pumps Taiwan Co., Ltd.
TEL: +886 2 8227 6900 FAX: +886 2 8227 6818

Thailand / IWAKI (Thailand) Co., Ltd.
TEL: +66 2 322 2471 FAX: +66 2 322 2477

Vietnam / IWAKI Pumps Vietnam Co., Ltd.
TEL: +84 613 933456 FAX: +84 613 933399

T858-1 '16/10