Operation Manual

Coolant Pump with motor

(Bell-housing Type)

HMP-0980E

Please read this manual before you use this pump.

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1. Before use

1) Introduction

Before use, please read this Operation Manual carefully and use Coolant Pump with motor after you understand all the contents.

a) This Operation Manual is for correct and safe use of Coolant Pump with motor.
b) Please observe method of use and restrictions described in this Operation Manual.
c) Method of use not described in this Operation Manual and use deviating from the restrictions described in this Operation Manual will result in a risk of human injury and/or damage to property due to stop of function and/or damage of pump, etc..
Do not use Coolant Pump with motor in a method not described in this Operation Manual and/or deviating from the restrictions described in this Operation Manual.
If you use Coolant Pump with motor in a method not described in this Operation Manual, it is fully due to your responsibility.
d) As a result of design change or improvement, the product you bought may differ from the contents described in this Operation Manual.
e) If you have any question about Coolant Pump with motor you bought or the contents of this Operation Manual, please do not hesitate to contact us.

2) Comparison with the article

When you receive the Coolant Pump with motor, please compare your order with model number written in the nameplate of Coolant Pump and motor.

3) Safety matters

In this Operation Manual, necessary matters to use this Coolant Pump with motor correctly and safely are marked with the following symbols.

⚠ DANGER	:	Serious danger which may result in death or serious injury if not avoided.
⚠ WARNING	:	Potential danger which may result in death or serious injury if not avoided.
⚠ CAUTION	:	Potential danger which may result in minor or moderate injury or damage to property.

2. Notes concerning safety

1) Notes on mounting, removal and installation of product

For mounting, please hang by means of hanging bolt of motor and just bolt the motor to mounting base by means of mounting holes of bell-housing.
Since not only weight of pump and motor but also motive load during operation will apply to mounting base, it may cause vibration. Therefore, mounting base must be of solid construction.

⚠ DANGER	:	When you carry the pump, please do not lift the pump up by hands. Please make sure to use hanging bolt of motor and hang the pump up by whist, etc.. While you hang and carry the product (the product is being hung), please do not approach it.

⚠ WARNING : When using hanging bolts, please use them after you check they are firmly tightened. After installation of product to the machine, please do not hang up the whole machine by hanging bolts of motor.
It may result in damage to hanging bolts, injury due to overturn, and damage of the machine.

⚠ WARNING : Don't place in the condition which stood a product.
It may cause a tumble of the product.

⚠ WARNING : Please do not lift up only the pump sides and do not subject it to impact. It may cause trouble.

⚠ WARNING : Personnel having expertise must mount, remove and install the product.

⚠ WARNING : Before mounting, removal and installation of the product, please make sure to turn the power OFF and take action to remove the remaining pressure in the circuit. After operation, since Coolant Pump, motor and coolant may be very hot, please take that action after you check an appropriate temperature (30℃～40℃) is achieved.

⚠ WARNING : Please do not put flammable objects around the motor. It may cause a risk of fire.

⚠ WARNING : Please do not put objects which disturb free air draft around motor.
It will disturb the cooling and it may cause a risk of explosion, fire or scald due to abnormal heating.

⚠ CAUTION : Please do not get on, beat or apply a force to the product.
It may cause an human injury and/or damage to product.

2) During operation

⚠ WARNING : Please use product within the range of specified operating conditions such as ambient temperature, temperature of coolant, etc..
If you use beyond this range, it may cause malfunction, damage to product and fire.

⚠ WARNING : In case of power failure, make sure to stop the operation immediately.
In case of sudden recovery, the pump and the motor may begin to work and it may cause human injury.

⚠ WARNING : In case of abnormal condition, make sure to stop the operation immediately.
It may cause a risk of electrical shock, human injury and fire.

⚠ CAUTION : Since the pump and the motor becomes very hot during operation, please do not touch them by bare hands.

⚠ CAUTION : Please do not put fingers etc. in a fan cover.
This may cause a risk of human injury and damage of the motor.

3) Maintenance

⚠ CAUTION : Please do not disassemble or reconstruct the product without our approval in writing. If the product is disassembled or reconstructed without our approval, since it is beyond the scope of our warranty, we shall not have no responsibility to such disassembly or reconstruction.

3. Notes on handling and use

⚠ CAUTION : Please observe the following cautions for handling and use.

1) Explanation of Model No.

CQTM 5 3 - 63 F + 15 - 2- T-6 M C 400 - S**** - A

- Basic type
- Pump size: 4～6
- Pressure: 2: Medium, 3: High
- Theoretical displacement (cm^3/rev)
- Direction of delivery port to suction port: None : same direction; F : opposite direction
- Bell-housing type
- Motor output
- Direction of suction port of pump (See "Fig.1"): Terminal box on the left, viewing from the pump side; 1: Upper side, 2: Left side, 3: Right side, 4: Lower side
- Motor poles: None: 4P, 6 : 6P
- Mounting method of motor: Flange mounting (Vertical type)
- Motor maker: T : Toshiba, M : Mitsubishi, H : Hitachi, F : Fuji
- Motor standard: None: standard, C : CE correspondence, N : NEMA correspondence
- Motor voltage: None:200/220V, 400: 400/440V
- Special Spec. No.
- Design No.

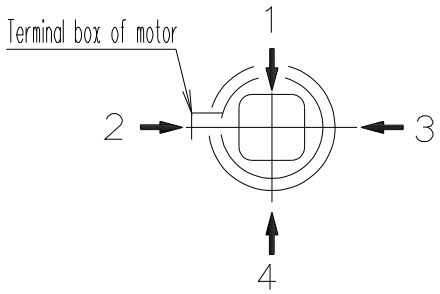


Fig 1. Direction of suction port of pump

2) Suction pressure of pump

Please set the suction pressure of pump to –0.03～+0.03MPa (-0.3～+0.3kgf/cm^2).

3) Suction filter

a) Please make sure to install suction filter to pump suction side.
b) For mesh size, please choose the range of 60～150 meshes according to installation environment and operating conditions of the unit.
c) For the capacity of filter, please select enough size in consideration of clogging of filter .

4) Piping

a) For suction line, please set the flowing speed in the pipe to within 1.5m/sec..
b) Please make sure that constrained force by piping does not apply to the pump.
c) In order to reduce vibration and noise of the unit and to avoid constraint force on the pump, we recommend you to use rubber hose in pressure line.
d) Please install the pipes after washed by acid and neutralized in advance.
e) Please make sure to lay a pipe of external drain for the back pressure to be equal to or less than 0.03MPa as follows.

Pump size	3	4	5	6
Caliber of pipe and fitting(mm)	min 4	min 8	min 10	min 14

And please make sure to lay a pipe in the position which is higher than the pump partially to fill the pump with coolant.

5) Wiring

⚠ WARNING : Please check the voltage and frequency written in nameplate are consistent with those you supply.
It may cause a risk of burn or fire.

⚠ WARNING : Please connect the power cable and lead wire of motor according to connection diagram in terminal box or Operation Manual.
Otherwise, it may cause a risk of electric shock and/or fire.

⚠ WARNING : Do not bend, pull, or pinch the power cable or lead wire of motor forcibly.
It may cause a risk of electrical shock.

⚠ WARNING : Wiring must be conducted by personnel having expertise.
It may cause a risk of burn or fire.

⚠ WARNING : When measuring insulation resistance, do not touch the terminals.
It may cause a risk of electrical shock.

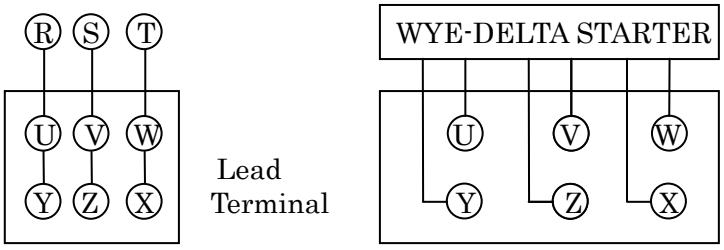
⚠ WARNING : Please note motor is not provided with protection device.
Please make sure to provide overload protection device.
We recommend you also provide protection device other than for overload(earth leakage breaker etc.).

⚠ WARNING : Make sure to ground the earth terminal.
Otherwise, it may cause a risk of electrical shock.

⚠ WARNING : After connection, make sure to mount the terminal box cover in place again.

a) Power cable
- If the wiring distance is long, because voltage drop becomes high, make sure to use the wire of appropriate diameter.
- Please wire so that the cable is not damaged at cable inlet during operation.

b) Connection of lead wires
- For connection between the power cable and lead wires of motor, please refer to “Fig.2”.



A . Across-the-line Starting B . Wye-Delta Starting

Fig. 2 Connection of lead wires

c) Grounding
You can find earth terminal provided inside the terminal box, then make sure to ground it .

6) Outlet Pressure

a) Maximum working pressure varies according to combination of pump and motor. Please refer to “Table 1”. You can not use the pump at the condition exceeding maximum working pressure and 100% of motor load. (You can use the pump at the condition exceeding 100% of motor load according to working condition. Please contact us.)

b) Surge pressure
When you turn the solenoid valve ON and OFF, surge pressure occurs on pressure line and it will have a bad influence to the pump or other equipment. Give your consideration to design of circuit to avoid surge pressure possibly.

Table 1. List of combinations of pump and motor

Model No.	Motor output (KW)	50Hz(1500rpm) Delivery (L/min)	50Hz(1500rpm) Maximum working pressure at 100% of motor load MPa(kgf/cm2)	60Hz(1800rpm) Delivery (L/min)	60Hz(1800rpm) Maximum working pressure at 100% of motor load MPa(kgf/cm2)
CQTM52-40	5.5	39.3	3.4(35) *	50.8	3.4(35) *
CQTM52-50		54.6	3.4(35) *	70.9	2.9(30)
CQTM52-63		74.0	2.9(30)	93.8	2.5(25)
CQTM52-50	7.5	-	-	69.1	3.4(35) *
CQTM52-63		72.1	3.4(35) *	90.2	3.4(35) *
CQTM53-40		38.8	6.4(65)	53.3	4.4(45)
CQTM53-50		58.4	4.4(45)	74.7	3.4(35)
CQTM53-63		78.1	3.4(35)	97.8	2.5(25)
CQTM53-40	11	37.7	6.9(70) *	49.3	6.9(70) *
CQTM53-50		52.9	6.9(70) *	69.6	5.9(60)
CQTM53-63		73.7	5.4(55)	93.7	4.4(45)
CQTM62-80		85.8	3.4(35) *	108.0	3.4(35) *
CQTM62-100		113.0	3.4(35) *	145.0	2.9(30)
CQTM62-125		149.0	2.9(30)	187.0	2.5(25)
CQTM53-50	15	-	-	67.6	6.9(70) *
CQTM53-63		70.5	6.9(70) *	88.6	6.9(70) *
CQTM62-100		-	-	142.0	3.4(35) *
CQTM62-125		145.0	3.4(35) *	181.0	3.4(35) *
CQTM63-80		84.9	6.4(65)	113.0	4.9(50)
CQTM63-100		120.0	4.4(45)	151.0	3.4(35)
CQTM63-125		155.0	3.4(35)	193.0	2.5(25)
CQTM63-80	18.5	83.1	6.9(70) *	108.0	6.4(65)
CQTM63-100		114.0	5.9(60)	148.0	4.4(45)
CQTM63-125		152.0	4.4(45)	190.0	3.4(35)
CQTM63-80	22	-	-	106.0	6.9(70) *
CQTM63-100		111.0	6.9(70) *	143.0	5.9(60)
CQTM63-125		146.0	5.9(60)	186.0	4.4(45)
CQTM63-100	30	-	-	140.0	6.9(70) *
CQTM63-125		143.0	6.9(70) *	178.0	6.9(70) *

- This table shows the values at 3mm^2/s of viscosity.
- The values marked with * are maximum working pressure of the pump.

7) Coolant

a) Density of coolant

In case of using water-soluble coolant, please control the density of coolant to more than 2%.

b) Temperature of coolant

Please use coolant within the range of 0～45℃ of temperature.

c) Pollution degree

We recommend you use coolant filtered by about 20μm filter.

8) Operation environment

⚠ DANGER : Please do not use in explosive atmosphere. Otherwise, it may cause a risk of fire and human injury.

Please do not use in unusual environment such as high temperature and high humidity , etc..
Please use under the following conditions.

Ambient temperature: -15～50℃
Relative humidity : 0～95%RH

This product is intended for indoor use.
Please contact us for use under special environment.

4. Notes on operation

1) Cleaning inside the tank

Please clean the inside of tank before putting coolant into the tank.

2) Putting coolant

a) Please put clean coolant sufficiently.
b) If putting coolant by electrical pump, etc., the coolant may foam.
In this case, operate the pump after foam fade outs.

3) Confirmation of rotating direction

⚠ CAUTION : If operating with reverse rotation, pump function may be impaired.

Please confirm the rotating direction by that of motor fan. The correct rotating direction of motor fan is clockwise.
When checking the rotation, make sure to operate the motor with no load for 5～10 times intermittently. Make sure that operating time of motor during intermittent operation is 0.5～1 second.

4) Start the operation of pump

⚠ WARNING : During operating the pump, make sure to mount the check window cover in place again.
It may cause a risk of human injury .

⚠ CAUTION : Please avoid on-load start. On-load start may cause the damage inside the pump.

⚠ CAUTION : Please avoid to operate in the condition of no coolant in the pump.
it may cause the damage inside the pump.

Before the start of pump, air in suction pipe must be released.
For the first operation of the unit or operation after replacement of coolant or cleaning of suction filter, please release the air as follows and start the continuous operation.

a) Start the inching of pump

① Check the tank is filled with coolant and loosen the adjusting screw of relief valve to let the pressure with no load.

② Operate the motor with no load for 5～10 times intermittently. Make sure that operating time of motor during intermittent operation is 0.5～1 second.

③ When you repeat inching, noise of suction of air will fade out gradually. After the noise fade outs, start the continuous operation. If noise of suction of air does not fade out, there is a leakage of air in suction pipe.

5) Trial operation

After the start of pump, start the trial operation paying your attention to the following.

When you increase the pressure, please be careful of operation noise of pump.
Check there is no noise of air mixture and increase the pressure gradually.

If noise of air mixture does not fade out, there may be a sealing failure on suction pipe or foams of coolant has not disappeared sufficiently.
Please correct the sealing failure and operate again after the foam disappears.

5. Maintenance procedure

Main check items, interval and criterion for determination are shown in “Table 2”.

1) Cleaning the suction filter

If you feel operating noise has changed from that when installed, please check the suction filter.

The status of filter clogging varies due to primary filtration of the chip and installation environment, etc.. In general, you should check the filter once per 1～3 months.

2) Control of coolant

When using coolant for long time, it may rot or sludge may grow in the tank.
Please make sure to renew the coolant at regular interval.

Table 2　Check items, interval and criterion for determination

Item	Method	Interval	Criterion for determination	Note
A) Amount of coolant	level gauge	Always	the level of coolant shall not be lower than lower limit.	
B) Coolant	By seeing	Always	Coolant shall not rot and the sludge shall not grow in tank.	
C) Suction filter	Disassemble and check	1～3 months	No clogging of filter	If the working time of machine tool is long, interval of check should be shortened. If suction filter clogs, operating noise of pump becomes loud.
D)　Operating status of pump				
1) Noise of pump and motor	By hearing	1 month	Comparing with initial operating noise, it shall not be louder.	Be careful of loosening of suction pipes by vibration.
2)temperature of motor	Thermometer	1 month	Comparing with initial operating temperature, it shall not be hotter.	Pressure shall not increase.
3) Vibration of pump and motor	Touch	1 month	No abnormal vibration	Check also delivery pipes of pump.
4) Delivery of pump	Pressure	1～3 months	Pressure does not lower.	
E) Pump disassembling check	Return to manufacturer	2～3 years	Abrasion of components	

6. Troubleshooting

When the following troubles occur, please stop the motor immediately and check according to "Table 3" and "Table 4".

1) Coolant is not issued.
2) Pressure does not increase.
3) Noise of pump or motor is big.

⚠ WARNING : Before check, please make sure to turn the power OFF and remaining pressure in circuit is released.

7. Disassembly, assembly and repair

Please contact us for repairing pump and motor.

⚠ CAUTION : Please do not disassemble or reconstruct the pump and motor without our approval.
If the pump and motor are disassembled or reconstructed without our approval, it is beyond the scope of our warranty and we shall be no responsible for such disassembly or reconstruction.

When you remove the pump from motor for replacement of pump only, or when you connect the pump to motor, please refer to construction of connection of pump and motor in "Fig.4", please remove or connect according to the following.

⚠ WARNING : Before removal of pump and motor, please make sure to turn the power OFF and remaining pressure in circuit is released.

<Removal>

a) Remove pipes and coolant pump with motor from the tank.
b) Make a stand to put the coolant pump with motor on, put it on the stand.
c) Remove ②Hexagon head bolts in the condition which raised cart to the pump bottom.
d) ① pump comes off in the condition which had⑤coupling(of the pump side) when lowering the cart. Then, remove④ set screw and ⑤ coupling (of the pump side)
e) Because ⑤ coupling on the side of the motor or pump has spider (made from resin) , be careful not to be lost.

<Connection>

a) Installs ⑤ coupling (of the pump side) to ①pump and fixes ④ set screw.(As for the installation position of ⑤ coupling, refer to figure 3 and table 5.)
b) At this time, put the spider in ⑤ coupling of the pump side.
c) Connect ⑤coupling not to hit the nail of each couplings, while raising the cart and changing the direction of ⑤coupling.
d) Fix ① pump with the ② Hexagon head bolts. The tightening torque is as in table 6.
e) Install coolant pump with motor and lay pipes.
f) Make sure to install the cover of the check window of the ⑥ bell housing before operation.

Table 3. Causes and actions to be taken for general troubles on Coolant pump.

Trouble	Cause	Action
A) Coolant is not issued from pump.	Rotating direction of motor is wrong.	Stop the motor immediately, then repair to correct direction. (Rotating direction of motor fan is clockwise.)
	Level of coolant is low.	Fill coolant to upper limit of level gauge.
	Suction pipe or suction filter clogs.	Clean the suction pipe or suction filter. If the clogging is too terrible, please replace coolant with new one.
	Air is sucked from suction pipe.	Check the amount of the coolant is appropriate by level gauge. Repair the packing of pipe connection or tighten the fitting sufficiently.
	Pump shaft does not rotate.	Check the motor fan can be rotated easily by hands . If it can not, the inside of pump may be damaged.
B) Pressure does not increase.	Set pressure of relief valve is low.	Adjust to correct value by precise pressure gauge.
	Relief valve is stuck.	Disassemble and clean the pressure adjusting part, modify or replace the components.
	There is much leakage inside circuit system.(cylinder･valve)	Block the circuit in order, check the components and modify or replace the components.
C) Noise of pump	Coolant in reservoir is foaming or air is sucked from suction pipe.	Check if coolant is not foaming or air is not sucked from suction pipe.
	Suction pipe or part of suction filter clogs.	Clean suction pipe and suction filter.
D) Abnormal heat of pump	Abrasion of moving part of pump itself.	Replacement of pump
	Over-pressure	Set the pressure again.
	Coolant is not sucked.	See Item A).
E) Remarkable rise of coolant temperature	Abnormal increase of internal leakage due to trouble of pump	Replace the pump.

Table 4. Causes and actions to be taken for general troubles on the equipment

Trouble	Cause	Action
A) The motor does not start with no load.	The motor is not powered.	Check if it is powered.
	Two of jointing wires are bad.	Modify the bad part.
	Error of operation or contact of switches and actuator.	Check the jointing wires and connection.
B) Abnormal noise	Abrasion・damage of bearing. Single phase drive.	Replace the bearing. Check the power supply by voltmeter.
C) Reverse rotation	Wrong wire connection	According to the wiring figure, it wires once more.
D) Fuse is broken.	Coil winding and lead wires are short-circuited. Overload Lack of capacity of fuse	Check the short-circuited point and repair it. Lower the load to appropriate value. Replace with suitable one.
E) Rotation speed does not increase.	Wrong connection of star delta actuator.	Connect properly.
F) Howling	Over-current and heating due to contact of rotor and stator.	Replace and repair the motor.
	The spacing between rotor and stator is not uniform	Replace and repair the motor.
	One phase of coil winding of stator is short-circuited.	Replace and repair the motor.
G) Over-current relay operates. Switch is heating.	Error of picking the relay, lack of capacity of switch. Overload	Replace with suitable one. Lower the load to appropriate value.
H) Overheat	Unbalance of power supply Voltage drop Overload	Contact the electric power company. Contact the electric power company. Lower the load to appropriate value.
I) The speed decreases immediately.	Voltage drop Overload Trouble of star delta actuator	Contact the electric power company. Lower the load to appropriate value. Adjust the contact part.

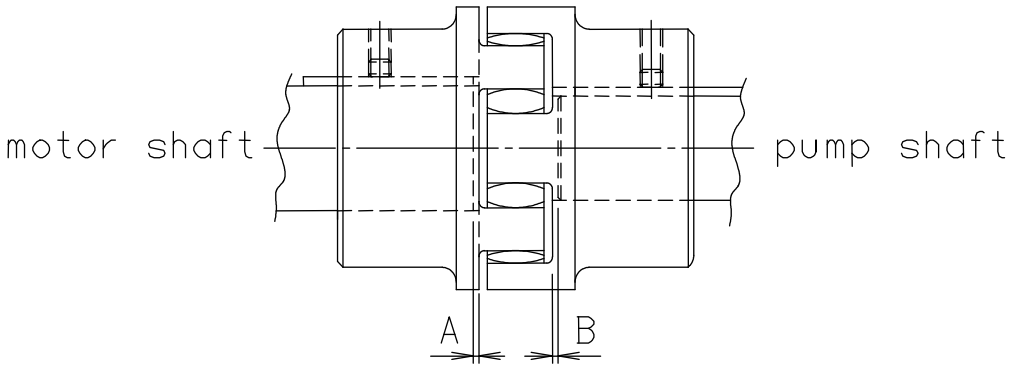


Fig.3 The installation figure of shaft - coupling

Table 5.The installation measure of shaft - coupling(mm)

Model No.	measure "A"	measure "B"
CQTM52-*F+5.5-*-T-****-S****-A CQTM52-*F+7.5-*-T-****-S****-A CQTM53-*F+7.5-*-T-****-S****-A	0	0
CQTM53-*F+11-*-T-****-S****-A CQTM53-*F+15-*-T-****-S****-A	0	0
CQTM62-*F+11-*-T-****-S****-A CQTM62-*F+15-*-T-****-S****-A CQTM63-*F+15-*-T-****-S****-A	0	0
CQTM63-*F+18.5-*-T-****-S****-A CQTM63-*F+22-*-T-****-S****-A	2	0
CQTM63-*F+30-*-T-****-S****-A	0	0

Table 6.②･⑦bolt tightening torque(N-m)

Model No.	②bolt	⑦bolt
CQTM52-*F+5.5-*-T-****-S****-A CQTM52-*F+7.5-*-T-****-S****-A CQTM53-*F+7.5-*-T-****-S****-A	245	93.2
CQTM53-*F+11-*-T-****-S****-A CQTM53-*F+15-*-T-****-S****-A	245	245
CQTM62-*F+11-*-T-****-S****-A CQTM62-*F+15-*-T-****-S****-A CQTM63-*F+15-*-T-****-S****-A	490	245
CQTM63-*F+18.5-*-T-****-S****-A CQTM63-*F+22-*-T-****-S****-A	490	245
CQTM63-*F+30-*-T-****-S****-A	490	245

Parts No.	Q'ty	Description
11	2	warning seal
10	1	name seal
9	1	moter
8	4	spring lock washer
7	4	hex. screw
6	1	bell-housing
5	1	coupling
4	2	set screw
3	2	spring lock washer
2	2	hex. screw
1	1	gear pump

This drowing shows "CQTM53-※F+15-1-T-※-A"

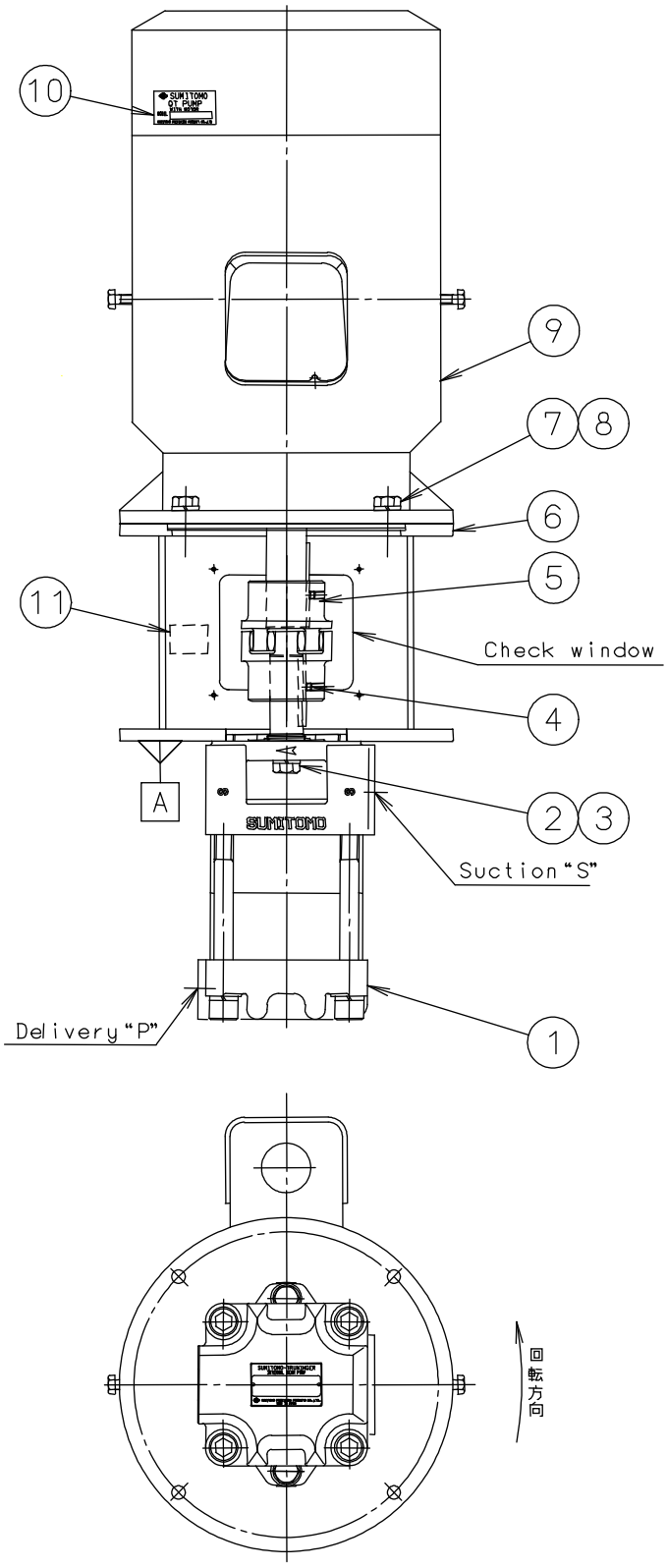


Fig4.Construction of connection of pump and motor