

Instruction Manual

QT Pump

HMP-0567E

Read this manual before use

Sumitomo Precision Products Co., Ltd.

< Industrial Hydraulic Systems >

Tokyo Marketing Section

Office Tower Y8F Harumi 1-8-11 chuoku ,Tokyo, 104-6108 Japan
Tel(03)6220-0724 Fax(03)6220-0734

Osaka Marketing Section

1-10, Fuso-cho, Amagasaki, Hyogo 660-0891 Japan
Tel(06)6489-5946 Fax(06)6489-5998

Engineering Group

1-10, Fuso-cho, Amagasaki, Hyogo 660-0891 Japan
Tel(06)6489-5862 Fax(06)6489-5905

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The SUMITOMO-high pressure internal gear pump (QT pump) features high pressure, low noise, and long life.

This pump will display option performance if operated in accordance with the procedure specified in the following.

Please read the instructions before operating the pump.

1. Before use

1) Introduction

Before use, please read this Operation Manual carefully to use QT pump safety.




- a) This Operation Manual is for correct and safe use of QT Pump.
- 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 QT Pump in a method not described in this Operation Manual and/or deviating from the restrictions described in this Operation Manual. If you use QT Pump 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 QT Pump 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 QT Pump, please compare your order with model number written in the nameplate of QT Pump.


3) Safety matters

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


- | | |
|---|--|
|  | : Serious danger which may result in death or serious injury if not avoided. |
|  | : Potential danger which may result in death or serious injury if not avoided. |
|  | : Potential danger which may result in minor or moderate injury or damage to property. |


2. Notes concerning safety

1) Notes to handle the pump


 **DANGER** : If you carry the pump over 20kg weight, please do not lift it up by hands and use a whist, etc..
While you hang and carry the product (the product is being hung), please do not approach it.


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


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

 **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 and viscosity of hydraulic fluid, etc.. If you use beyond this range, it may cause malfunction, damage to product and fire.

 **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 becomes very hot during operation, please do not touch them by bare hands.

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

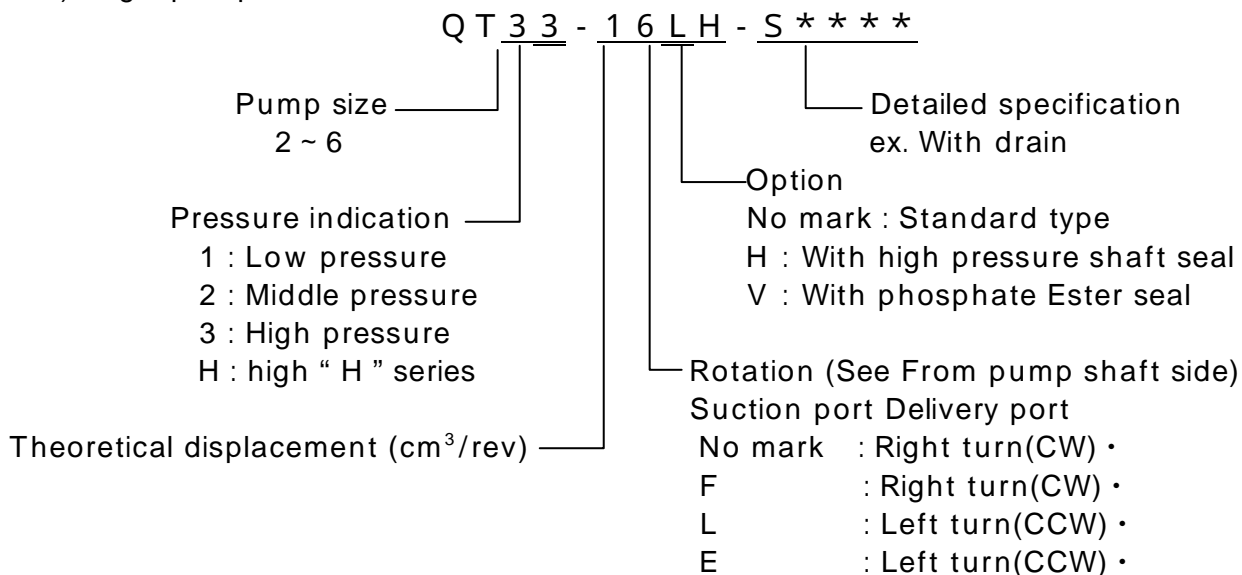


CAUTION : Please observe the following cautions for handling and use.

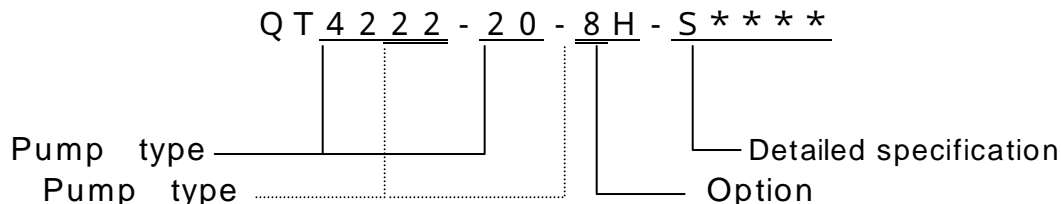
1) Explanation of Model No.

1) Pump type and its specification

a) Single pump



b) Double pump



2) Installation of Pump.

Install the pump on a rigid mount.

3) Connecting to the driving shaft.

- a) The pump shaft should be aligned with the driving shaft as accurately as possible , and using a flexible coupling for the connection is recommended. Pulley and Gear drive shall not used.

b) Carefully make the alignment of both shafts , and see Fig.1.

- c) When making the coupling , it's mating holes and outer diameter should be carefully machined.

- d) Alignment of pump shaft and driving shaft shall be as shown in Table 1. The difference of max. and min misalignment. Should be kept 0.10mm. Alignment shall be rechecked when moving pump , repiping and the other.

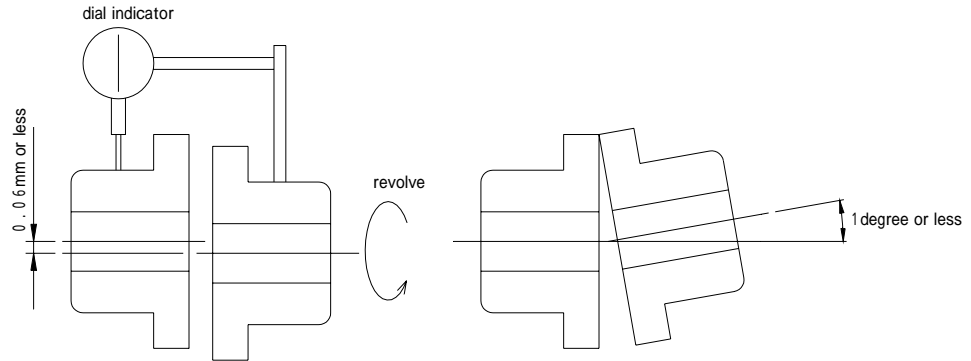


Fig.1 Alignment of pump shaft and driving shaft.

- e) Tolerance the coupling holes should be such that the coupling can be easily slipped onto the pump shaft by hand without using a hammer.

Pump Size	Hole dimensions		Key groove dimension				Main dimensions of Coupling hole
	A (mm)	Tolerance (μ)	B (mm)	Tolerance (μ)	C (mm)	Tolerance (μ)	
2	20	+ 28 + 9	6	+ 40 + 10	22.6	+ 100 0	
3	25	+ 28 + 9	8	+ 46 + 10	28.3	+ 200 0	
4	32	+ 34 + 11	10	+ 46 + 10	35.2	+ 200 0	
5	40	+ 34 + 11	12	+ 53 + 10	43.2	+ 200 0	
6	50	+ 40 + 11	14	+ 53 + 10	53.7	+ 200 0	

Table-1 Main dimensions of coupling hole and recommended tolerance.

4) Suction pressure of pump

- a) Please set the suction pressure of pump to $\cdot 0.03 \sim +0.03\text{MPa}$ ($-0.3 \sim +0.3\text{kgf/cm}^2$) in consideration of increase of viscosity in winter or clogging of filter.
- b) If it exceeds $+0.03\text{MPa}$, please specify High pressure shaft seal (proof pressure: $0 \sim +0.2\text{MPa}$).

5) Suction filter

- a) Please make sure to install suction filter to pump suction side.
- b) For mesh size, please choose the range of 100 ~ 200 meshes according to installation environment and operating conditions of the unit.
- c) For the capacity of filter, please select enough size in consideration of increase of viscosity in winter or clogging of filter .

6) Line and return filter

Generally, for the purpose of protection of the pump, you do not need to install the filter for pressure line and return line. If installation environment of pump is not good or in case of system provided with servo valve, etc., we recommend you install line filter and/or return filter according to hydraulic equipment.

7) 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) For pressure line, we recommend you install air releasing valve.
- d) 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.
- e) Please install the pipes after washed by acid and neutralized in advance.

8) Outlet Pressure

a) Rated pressure and Maximum pressure

Rated pressure : Can use constantly work.

Maximum Pressure : You can use under 1/3 time of cycle and to be less than 20 sec continuous operating

Type of Pump	MPa(kgf/cm ²)			
	Q T * 1 (Low)	Q T * 2 (Middle)	Q T * 3 (High)	Q T * H (Super high)
Rated Pressure	6.9 (70)	13.7 (140)	24.5 (250)	34.3 (350)
Max. Pressure	7.8 (80)	15.7 (160)	31.4 (320)	34.3 (350)

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 hydraulic equipment. Give your consideration to design of hydraulic circuit to avoid surge pressure possibly.

9)Speed of shaft

Shaft speed is required to be over 1000rpm and less than 1800rpm

10) Hydraulic fluid

a) Type of hydraulic fluid

Please use hydraulic fluid corresponding to ISO VG46 ~ 68 of viscosity grade (more than 90 of viscosity index).

If you use phosphate ester hydraulic fluid, you need to change the sealing material to fluoro rubber. Please mark " V " for option and order.

For use of fire resistant fluid (water glycol, W/O emulsion etc.), please contact us each time.

b) Viscosity

Please use hydraulic fluid within the range of 20 ~ 500mm²/s of viscosity.

c) Temperature of hydraulic fluid

Please use hydraulic fluid within the range of 0 ~ 60 of temperature.

d) Pollution degree

Please use clean hydraulic fluid (within class NAS 1638 grade 11).

1 1) Operation environment



: 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 hydraulic fluid into the tank.

2) Putting hydraulic fluid

- a) Considering the capacity of actuator, please put clean hydraulic fluid sufficiently.
- b) If putting hydraulic fluid by electrical pump, etc., the oil 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.

The correct rotating direction 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

 **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 hydraulic fluid 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 hydraulic fluid or cleaning of suction filter, please release the air as follows and start the continuous operation.

a) Start the inching of pump

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

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.

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.

- a) 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 hydraulic fluid has not disappeared sufficiently. Please correct the sealing failure and operate again after the foam disappears.

- b) If a big actuator is provided, air may return from actuator to inside of the tank at trial operation. In this case, please release the air from pipe and actuator with low pressure as possible. If a big amount of air returns, please start the trial operation after foams disappear.

- c) In case of unit provided with cooler, water pipes may not be provided at trial operation. In this case, please be careful that temperature of hydraulic fluid increases immediately.

Please use the hydraulic fluid with the following range of temperature and viscosity.

Temperature : 0 ~ 60
Viscosity : 20 ~ 500mm²/s

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 hydraulic equipment and installation environment, etc.. In general, you should check the filter once per 1 ~ 3 months.

If suction filter with clogging indicator , please make sure to clean or replace filter element when clogging indicator becomes yellow. When you start the operation after check of filter, please follow Clause 4.4).

2) Control of hydraulic fluid

Hydraulic fluid will deteriorate and be polluted by accumulation of dusts not filtered, sludge resulted from deterioration of hydraulic fluid, ingress of water, etc..

NAS grade is a measure showing pollution degree of hydraulic fluid. The standard of replacement of hydraulic fluid is NAS grade 12. If the pollution becomes worse than this, there will be a risk of trouble on operation of pump. NAS grades of pollution degree are shown in " Table 3 " .

Table 2 Check items, interval and criterion for determination

Item	Method	Interval	Criterion for determination	Note
A) Oil temperature	Thermometer	Always	More than 20mm ² /s (Less than 60 for hydraulic fluid corresponding to ISO VG 46)	Lack of cooling water Deterioration of performance of cooler Sticking of valve, etc.
B) Hydraulic fluid 1) Pollution degree 2) Viscosity 3) Deterioration 4) Water	Analysis	3 ~ 4 months 6 months 6 months 3 ~ 4 months	Less than NAS grade 11 According to Control standard Of hydraulic fluid manufacturer.	Replacement is required if remarkably polluted or discolored by visual inspection.
C) Suction filter	Disassemble and check	1 ~ 3 months	In case of suction filter with indicator, clean or replace the filter when the indicator is yellow.	If installation environment of system is bad, 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	By hearing	1 month	Comparing with initial operating noise, it shall not be louder.	Be careful of loosening Of suction pipes by vibration, air mixture by abrasion of pump shaft sealing.
2) Temperature of pump	Thermometer	1 month	Within temperature of hydraulic fluid of suction +15	
3) Vibration of pump	Touch	1 month	No abnormal vibration	Check also delivery pipes of pump.
4) Delivery of pump	Speed of Actuator	1 ~ 3 months	Speed of actuator 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 4 ” and “ Table 5 ” .

- 1) Hydraulic fluid is not issued.
- 2) Pressure does not increase.
- 3) Noise of pump is big.
- 4) Pump overheats.



WARNING:

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

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

Trouble	Cause	Action
A) Hydraulic fluid is not issued from pump.	Rotating direction of motor is wrong.	Stop the motor immediately, then repair to correct direction.
	Level of hydraulic fluid is low.	Fill the hydraulic fluid to upper limit of oil level gauge.
	Suction pipe or suction filter clogs.	Clean the suction pipe or suction filter. If the clogging is too terrible, please replace the hydraulic fluid with new one.
	Air is sucked from suction pipe.	Check the amount of Hydraulic fluid is appropriate by oil level gauge. Repair the packing of pipe connection or tighten the fitting sufficiently.
	Pump shaft does not rotate.	Check the motor . If it does not rotate, 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 hydraulic circuit system. (cylinder· valve)	Block the hydraulic circuit in order, check the components and modify or replace the components.

Table 5. Causes and actions to be taken for general troubles on hydraulic equipment

Trouble	Cause	Action
C) Noise of pump	Hydraulic fluid in reservoir becomes cloudy and bubbles mix with it.	Check if air is not sucked From suction pipe.
	Suction pipe or part of suction filter clogs.	Clean suction pipe and suction filter.
	Hydraulic fluid temperature is too low. Viscosity is high.	Keep the hydraulic fluid temperature to appropriate degree. Be careful to pick the hydraulic fluid.
D) Abnormal heat of pump	Abrasion of moving part of pump itself.	Replacement of pump
	Over-pressure	Set the pressure again.
	Oil is not sucked.	See Item A).
E) Remarkable rise of hydraulic temperature	Abnormal increase of internal leakage due to trouble of pump	Replace the pump.
	Cooling water of cooler does not flow.	Let flow the cooling water. Check if the valve opens.
	Cooling pipe of cooler is dirty.	Clean the pipe of cooler.
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	Change two among three power cables.
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.