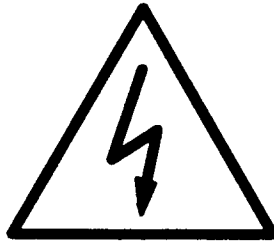




8) High Voltage Device Caution Label

The STP control unit is equipped with a high voltage device. This label warns operators to pay attention to the high voltage device.



9) Battery Instruction Label

This label instructs operators to replace batteries once a year. The next replacement date of batteries is specified upon delivery of the STP pump. Record the next replacement date (after one year) of batteries in the blank of the label when replacing them. This label describes precautions for use of external batteries.

| | | | |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--|--|
|  注意 |  CAUTION | | |
| ◇ バッテリーは1年毎に交換してください。 | ◇ Change batteries every year. | | |
| ◇ 内部バッテリーと外部バッテリーを同時に使用しないでください。 | ◇ Do not use external batteries in combination with internal batteries. | | |
| 次回交換日 / Next exchange date | | | |
| | | | |
| | | | |

10) Rotational Direction Instruction Label

This label describes the rotational direction of the STP pump. The STP pump rotates in this direction.



11) Voltage Rating Label

This label describes the rated voltage of the STP control unit.
Use voltage specified in this label.

200~240V

200 V specification

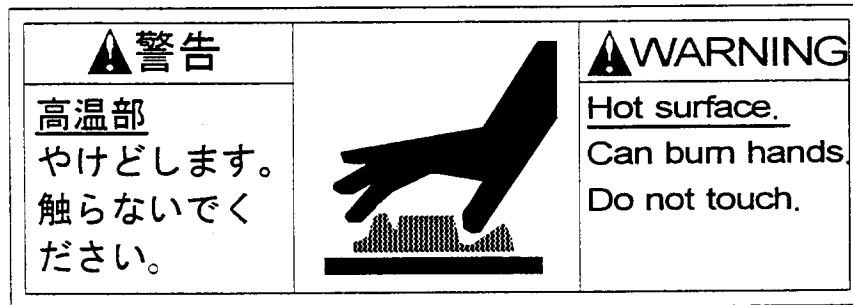
12) Hot Surface Warning Label

This label instructs operators so as not to touch the hot surface of the STP pump.

The use of the baking heater (optional accessory) may lead to a considerable rise in temperatures outside the STP pump.

This label warns operators so as not to burn hands.

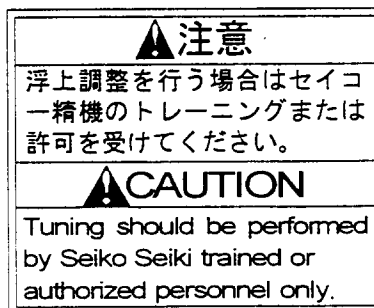
(only when using the baking heater.)



13) Tuning Caution Label

This label describes precautions for performing the tuning.

Tuning should be performed by Seiko Seiki trained or authorized personnel only.



Section 2 Unpacking

2.1 Unpacking the STP Pump

Check the following before unpacking the STP pump.

- 1) Check the package for bruises, breakage, wetness, etc.
If there is any abnormality/error or it is judged necessary to return the product, contact Seiko Seiki.
- 2) Check the contents of the package.
See Section 16.3, "Accessories."



- ◇ The net weight of the STP pump is approx. 30 kg. Use a crane or other appropriate means to lift the STP pump.
Lift the STP pump with an eyebolt or a similar tool that uses the fitting hole attached to the inlet port flange.
Lift it with the aid of a suspension tool under the base when installing the STP pump without fitting hole.
- ◇ Observe national laws/regulations, safety standards and so on when lifting the STP pump.
- ◇ Use a crane or other appropriate means sufficient enough to withstand the load when lifting the STP pump.
- ◇ Always lift the STP pump in stable places free of excessive shock or vibration to prevent it from shaking or dropping.
- ◇ Have at least two people lift the STP pump when doing so by hand.

NOTICE

- ◇ Be careful not to scratch the flange of the STP pump. Before installing the STP pump, check whether or not there are scratches on the surface.
- ◇ It is recommended to keep the packaging materials, such as the corrugated fiberboard container and cushioning material for possible reuse.

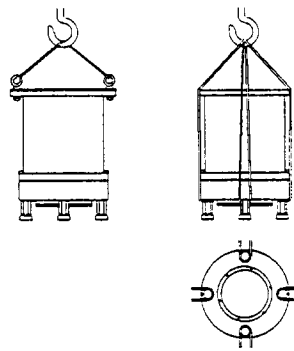


Figure 2.1 Example of Lifting the STP Pump

2.2 Unpacking the STP Control Unit

Check the following before unpacking the STP control unit.

- 1) Check the package for bruises, breakage, wetness, etc.
If there is any abnormality/error or it is judged necessary to return the product, contact Seiko Seiki.
- 2) Check the contents of the package.
See Section 16.3, "Accessories."



- ◇ The net weight of the STP control unit is approx. 40 kg. Use a crane or appropriate means to lift the STP control unit. Lift the STP control unit using the two handles attached to the front panel.
- ◇ Observe national laws/regulations, safety standards and so on when lifting the STP control unit.
- ◇ Use a crane or appropriate means sufficient enough to withstand the load when lifting the STP control unit.
- ◇ Always lift the STP control unit in stable places free of excessive shock or vibration to prevent it from shaking or dropping.
- ◇ Have at least two people lift the STP control unit when doing so by hand.



- ◇ It is recommended to keep the packaging materials, such as the corrugated fiberboard container and cushioning material for possible reuse.

Section 3 Installation of the STP pump

3.1 Name and Function of Each Part

(See Figure 3.1.)

- ① Inlet Port Flange (ICF^{*1}, VG^{*2}, ASA, ISO, etc.)
- Connected to the vacuum equipment (at the high vacuum side).



- ◇ A splinter shield is attached to the inlet port flange to prevent foreign particles from falling into the STP pump. NEVER remove it.

- ② Outlet Port Flange (KF^{*2} 40)
- Connected to the inlet port side of the auxiliary pump.
- ③ STP Connector (41 pins)
- Connected to the STP connection cable.
- ④ Motor Connector (5 pins)
- Connected to the motor connection cable.
- ⑤ Purge Port (KF^{*2} 10)
- Introduces a purge gas.
In order to protect the inside of the STP pump when sucking reactive or corrosive gases.
The STP pump is delivered with a blank flange attached to this port.
- ⑥ Cooling Water Port (PT^{*2} (R/C) 1/4 Female Screw)
- Connected to the STP pump cooling water pipe.
This port is used when water cooling the STP pump.
- ⑦ Emergency Vent. Valve
- Protects the STP pump.
It functions immediately after any abnormality/error occurs inside the STP pump.
- ⑧ Ground Terminal
- Used for grounding.
Connect the ground cable between this terminal and the ground terminal of the STP control unit.
The ground terminal is marked with ⊕ label.

^{*1}: JVIS

^{*2}: JIS

⑨ Temperature Sensor Connector (optional accessory)

- A temperature sensor is attached.

For use with the Temperature Management System (TMS) unit only.

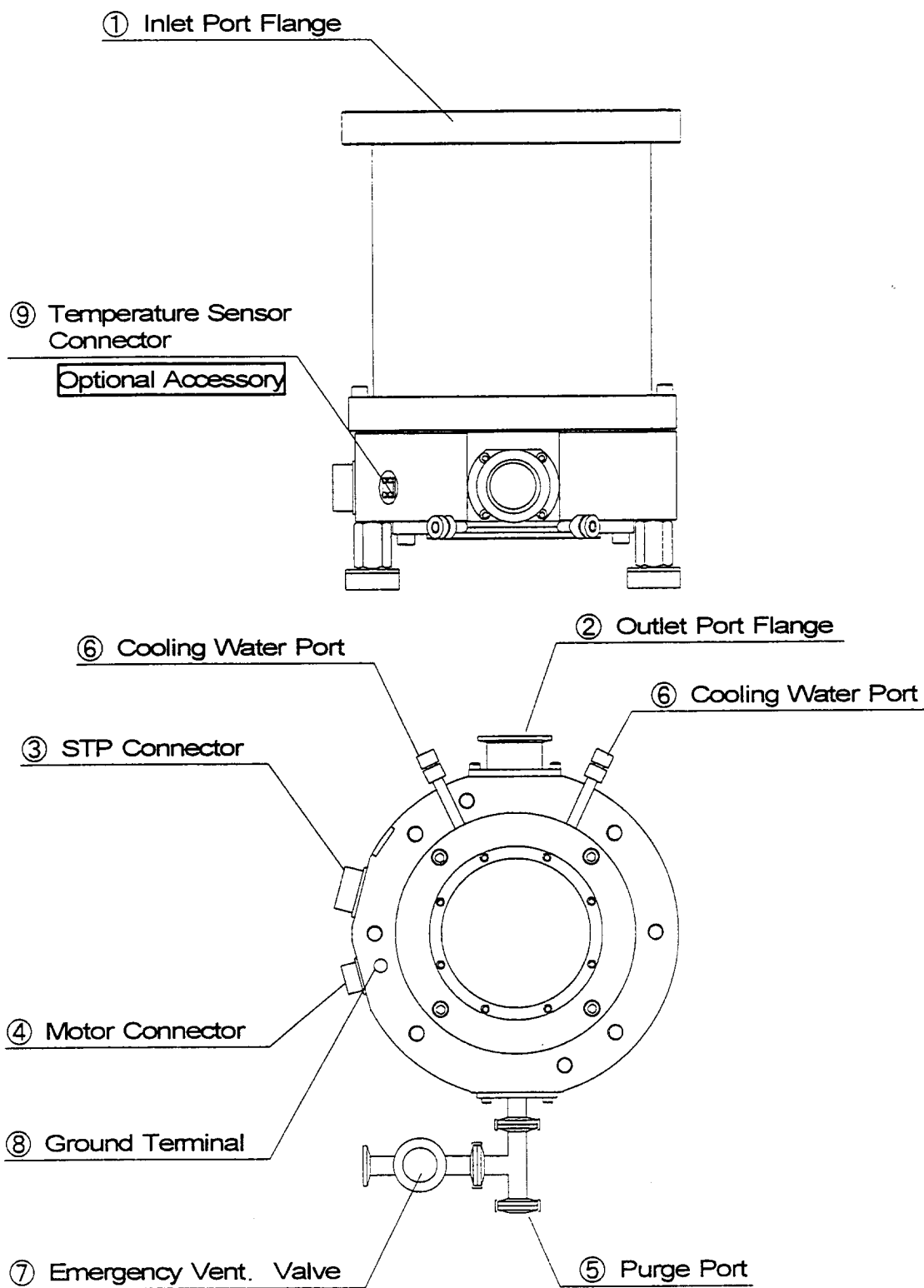


Figure 3.1 Configuration of the STP Pump

3.2 Precautions Before Installation

3.2.1 Operating Environment



- ◇ Chlorine or fluorine system gases can be used in chemical specific pumps (type C). When you use gases including alkaline metals, but excluding Li, gases including Ga, Hg, Sn, or HBr, contact Seiko Seiki.
- ◇ NEVER use corrosive gases (chlorine, fluorine, or other system gases) in the STP-H600/STP-H1000 pump or other models without anti-corrosion treatment (see Section 1.1, "Usable Gases").

Install the STP pump in a place meeting the following requirements:

| | |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient Temperature | 0 to 40 °C |
| Ambient Relative Humidity | 30 to 95 % (no dew condensing) |
| Environment | <ul style="list-style-type: none"> • A place free of externally-applied mechanical shock. • A place free of a heat source (Keep clean of the heat source or attach a thermal shield plate). • A place free of a strong magnetic field (Range: up to <u>150 gauss (15 mT) in the axial direction</u>, and up to <u>30 gauss (3 mT) in the radial direction</u> with respect to the rotational axis of the STP pump). • A place free of a strong electric field. • A place free of exposure to radiation. • No discharge of high voltage (more than 500 V) (If more than 500 V is discharged, contact Seiko Seiki). |
| STP Pump Installation Equipment Conditions | <ul style="list-style-type: none"> • Install the STP pump securely so that foreign particles will easily fall into the STP pump (Ex.: Si wafers or samples are positioned above the STP pump) (To prevent foreign particles from falling into the STP pump, design a shield plate with large conductance). |

3.2.2 Installation Area

Leave enough space for the following in addition to that for the STP pump:

- Space for maintenance and inspection
- Space for connecting cables



- ◇ The minimum bending radius of the STP connection cable is 150 mm (see Figure 16.1, "External Appearance of the STP Pump" [bending dimensions of the STP connection cable]).
DO NOT excessively bend the cables and beware of any obstacles when installing the STP pump.
Also, leave enough space to install other cables without bending them excessively.

3.2.3 Bench

A bench must be prepared by the customer to secure the STP pump. The shape and size of the bench differ depending upon the type of STP pump. Follow the precautions of the WARNING, CAUTION, or NOTICE (See Section 3.3.3. "How to Secure the STP Pump").



- ◇ The STP pump is provided with a high-speed rotor. Any internal abnormality/error may result in a jump in rotational torque leading to personal injury or peripheral equipment damage.
The torque generated due to an abnormality/error is 3.4×10^3 N·m at maximum.
Design and secure the bench for the STP pump so that it can withstand the maximum torque generated due to the occurrence of an abnormality/error.



- ◇ Secure the customer-prepared bench and the vacuum equipment on the floor or peripheral equipment and other equipment in accordance with the customer application. NEVER move them while the STP pump is in operation.
Use fitting bolts with a strength equal to or higher than SUS 304*1.

*1: JIS

NOTICE

- ◇ The screw hole for leg for securing the STP pump is M12*¹, and the depth is 24 mm (8 positions).
For the external appearance of the STP pump, see Figure 16.1, "External Appearance of the STP Pump."

¹: JIS

3.3 How to Install the STP Pump

Install the STP pump to the vacuum equipment as shown in Figure 3.2.

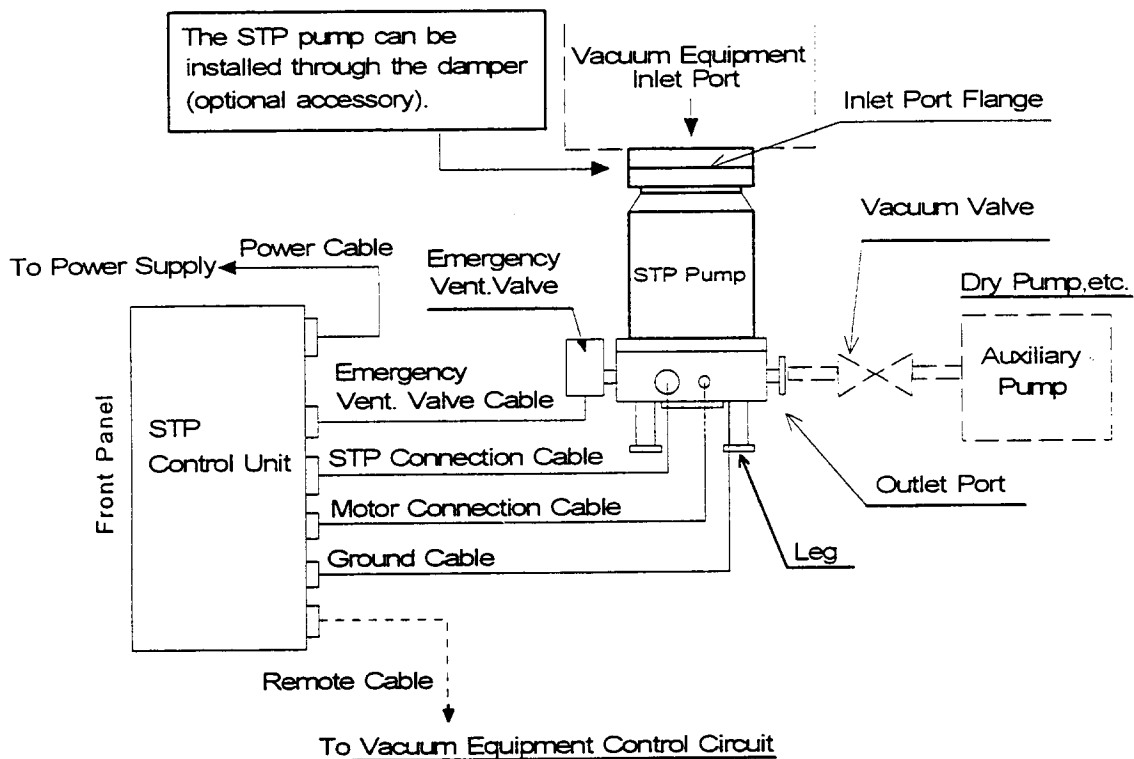


Figure 3.2 Installation of the STP Pump to the Vacuum Equipment

CAUTION

- ◇ Chlorine or fluorine system gases can be used in chemical specific pumps (type C). When you use gases including alkaline metals, but excluding Li, gases including Ga, Hg, In, or Sn, or HBr, contact Seiko Seiki.
- ◇ NEVER use corrosive gases (chlorine, fluorine, or other system gases) in the STP-H600/H1000 pump or other models without anti-corrosion treatment (see Section 1.1, "Usable Gases").
- ◇ When you use the STP pump in a place subjected to exposure to radiation, contact Seiko Seiki.
- ◇ DO NOT open the STP pump through the flange to atmospheric air while the STP pump is running.
If atmospheric air flows into the STP pump, it may not function normally.
- ◇ Depending upon the type of the auxiliary pump used, atmospheric air may reverse flow into the STP pump when the auxiliary pump stops. Attach a vacuum valve to the middle of the piping between the STP pump outlet port flange and the auxiliary pump, and close the vacuum valve when the auxiliary pump stops.

NOTICE

- ◇ The STP pump cannot be used with the outlet port open to atmospheric air.
Always use the auxiliary pump (dry pump or similar one).
- ◇ Use an auxiliary pump with a pumping speed of 240 lit./min. or more.
- ◇ Depending upon the type of the auxiliary pump used, oil vapor may contaminate the inside of the STP pump. Some oil viscosity could cause a malfunction when there is a strong reverse flow of oil.
Take the following measures to ensure the correct flow of oil:
 - Attach a vacuum valve to the middle of the piping between the STP pump outlet port flange and the auxiliary pump.
 - Attach an absorption trap adjacent to the vacuum valve.

3.3.1 Cleaning the Seal

Inspect the seals of inlet and outlet port flanges for dirt or oil spots before installing the STP pump in the vacuum equipment.

Take the following measures for cleaning the seals:

- Clean off with a pure gas.
- Wipe with proper solvent (alcohol, etc.).

CAUTION

- ◇ A splinter shield is attached to the inlet port flange to prevent foreign particles from falling into the STP pump.
Always leave the splinter shield attached during operation.

NOTICE

- ◇ The splinter shield cannot perfectly prevent foreign materials from falling into the STP pump.
DO NOT install the STP pump in such a manner that foreign materials can easily fall into it (for example, Si wafers or samples are positioned above the STP pump). If installing the STP pump in such a manner, always attach a shield plate with sufficient conductance above the STP pump to prevent foreign materials from falling into it. Foreign materials falling into the STP pump through the splinter shield may result in product damage.
- ◇ Be careful not to scratch the flange of the STP pump.
Check whether or not there are scratches on the surface, before installing the STP pump.

3.3.2 STP Pump Installation Positions

The STP pump can be installed vertically, horizontally, upside-down and slanted (see Figure 3.3, "STP Pump Installation Positions").

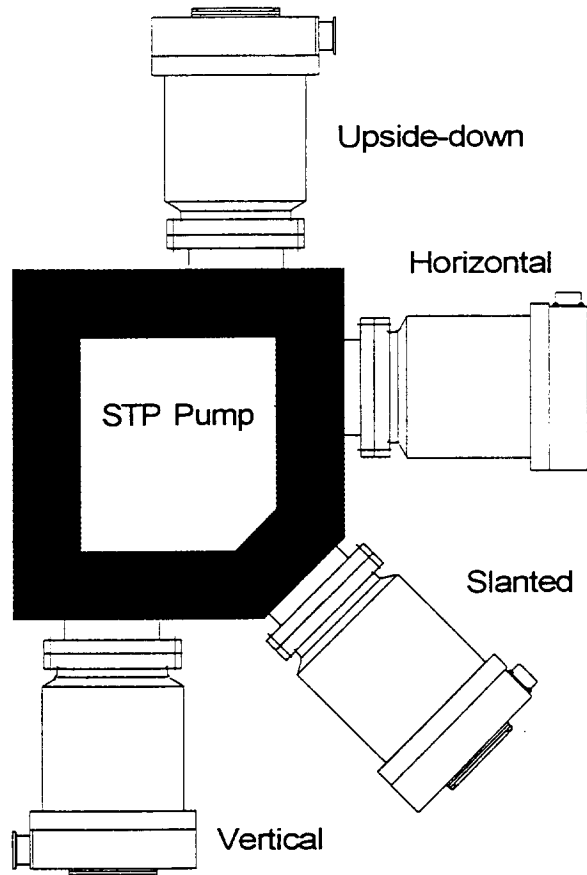


Figure 3.3 STP Pump Installation Positions

When installing the STP pump in a horizontal or slanted position, it is recommended to install it so that the direction of the outlet port is on a vertical or horizontal plane in the direction of the gravity.

This makes it possible to reduce the load on the magnetic bearing and the heat generated by the STP pump (see Figure 3.4, "Positions of the Outlet Port on a Horizontally or Slanted Installed STP Pump").

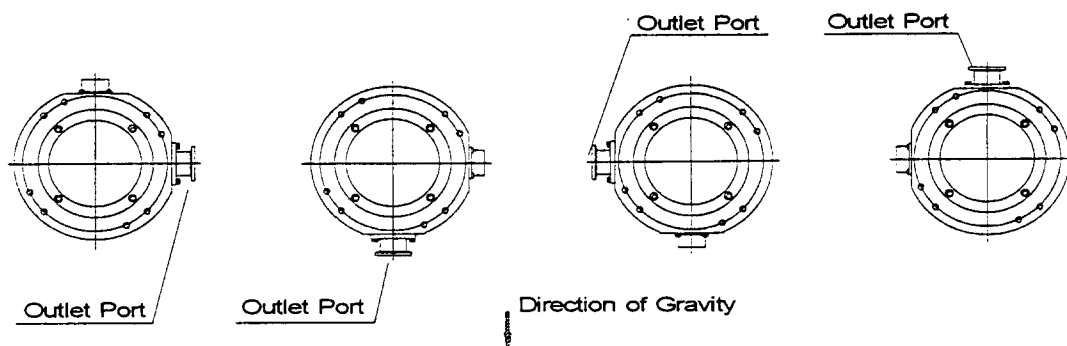


Figure 3.4 Positions of the Outlet Port on the Horizontally or Slanted Installed STP Pump

3.3.3 How to Secure the STP Pump



- ◇ The STP pump is provided with a high-speed rotor. Any internal abnormality may result in a jump in rotational torque leading to personal injury or peripheral equipment damage. The torque generated due to the occurrence of an abnormality/error is 3.4×10^3 N·m at maximum. Design and secure the bench for the STP pump so that it can withstand the maximum rotational torque.



- ◇ Use fitting bolts with a tensile strength equal to or higher than SUS304^{*1}.



- ◇ When you use any securing method other than that specified in this manual, contact Seiko Seiki.

1) Vertical or Upside-down Installation

- ① When the STP pump installing flange at the vacuum equipment side can withstand the torque generated by the abnormal STP pump (except when using a damper [see ②] and securing the claw clamp [see ③]):

Secure the inlet port flange with all of bolt holes of the size specified in the Inlet Port Flange Standard.

It is not required, but recommended to secure the base with 4 or more screw holes for legs (8-M12^{*1}/Depth 24 mm) or 4 or more attached legs. [See Figure 3.5 a) and Table 3.2.]

- ② When the STP pump installing flange at the equipment side cannot withstand the torque generated by the abnormal STP pump (including the case where bellows and a damper are used):

Secure the inlet port flange with all of bolt holes of the size specified in the Inlet Port Flange Standard.

In order to ensure that the STP pump can withstand abnormal rotational torque, secure the base with 6 or more screw holes for legs (8-M12^{*1}/Depth 24 mm) or 6 or more attached legs. [See Figure 3.5 b) and Table 3.2.]

*1: JIS



- ◇ Use a damper only at the vertically upright position.
- ◇ DO NOT remove the bolts and nuts attached to reinforce the damper.

③ When securing the inlet port flange with a claw clamp (Ex. type ISO):

To secure the inlet port flange, use the required number of claw clamps as specified in Table 3.1. Position the claw clamps evenly on the circumference.

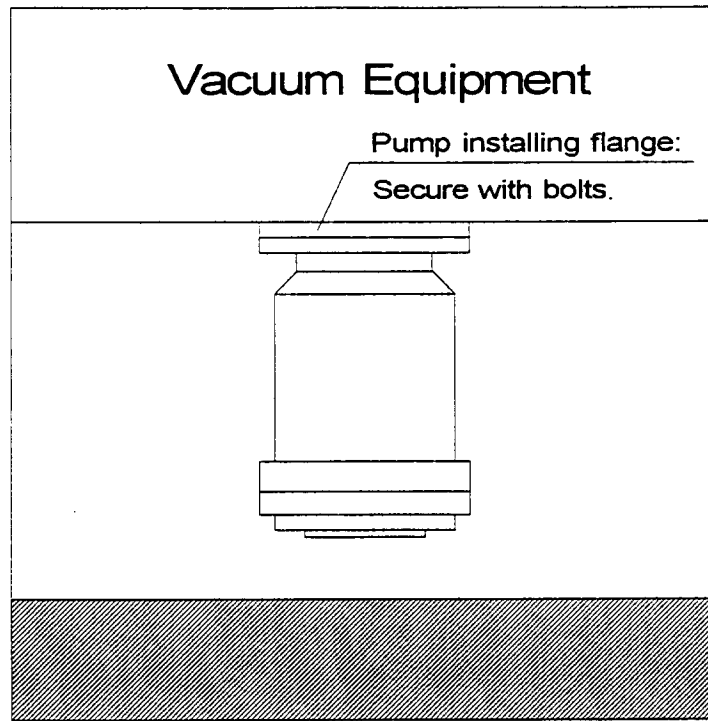
The vacuum equipment cannot withstand abnormal rotational torque only with flange secured if an abnormality/error occurs inside the STP pump. Then, in order to ensure that the STP pump can withstand abnormal rotational torque, secure the base with 6 or more screw holes for legs (8-M12*1 / Depth 24 mm) or 6 or more attached legs.
[See Figure 3.5-b) and Tables 3.1 and 3.2.]

Table 3.1 Number of Claw Clamps by Size of Flange

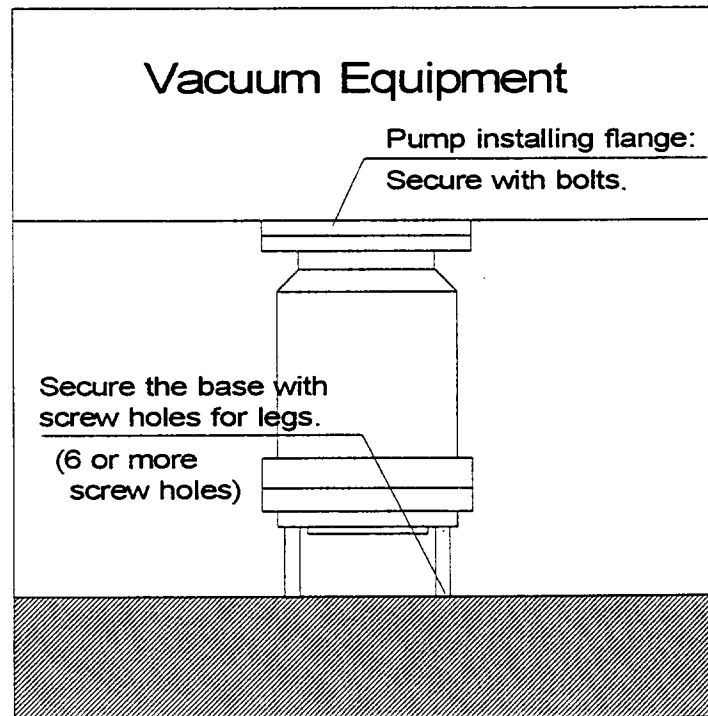
| Size of Flange | Number of Claw Clamps |
|-----------------|-----------------------|
| ISO 160 or less | 4 or more |
| ISO 200 - 250 | 6 or more |
| ISO 320 or more | 8 or more |

Table 3.2 Base Securing Method by Type of Flange
(Vertically or Upside-down Position)

| Type of Flange | Base Securing Method | |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| | When the STP pump installing flange at the vacuum equipment side can withstand torque generated by the abnormal STP pump. | When the STP pump installing flange at the vacuum equipment side cannot withstand torque generated by the abnormal STP pump. |
| VG, ICF, ASA ISO (Bolt-type) | It is recommended to secure the base with 4 or more screw holes for legs. | Secure the base with 6 or more screw holes for legs. |
| ISO (Claw clamp-type) | Secure the base with 6 or more screw holes for legs. | |



a) When the pump installing flange can withstand abnormal torque



b) When the Pump installing flange cannot withstand abnormal torque

Figure 3.5 How to Install the STP Pump Vertically

2) Horizontal and Slanted Installation

(See Figure 3.6.)

- ① When the pump installing flange at the vacuum equipment side can withstand abnormal torque generated by the abnormal STP pump:

Secure the inlet port flange with all of bolt holes of the size specified in the Inlet Port Flange Standard.

For horizontal and slanted installation, secure the base with 4 or more screw holes for legs (8-M12*1 /Depth 24 mm) or 4 or more attached legs. [See Table 3.3]

- ② When the pump installing flange at the equipment side cannot withstand abnormal torque generated by the abnormal STP pump

When securing the inlet port flange with a claw clamp (Ex. type ISO):

Secure the inlet port flange with all of bolt holes of the size specified in the Inlet Port Flange Standard.

For the claw clamp-type, use the required number of claw clamps as specified in Table 3.1. Position the claw clamps evenly on the circumference.

To make the vacuum equipment withstand abnormal torque, secure the base with 6 or more screw holes for legs (8-M12*1/Depth 24 mm) or 6 or more attached legs.

Table 3.3 Base Securing Method by Type of Flange
(Horizontal or Slanted Position)

| Type of Flange | Base Securing Method | |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| | When the STP pump installing flange at the vacuum equipment side can withstand torque generated by the abnormal STP pump. | When the STP pump installing flange at the vacuum equipment side cannot withstand torque generated by the abnormal STP pump. |
| VG, ICF, ASA ISO (Bolt-type) | Secure the base with 4 or more screw holes for legs. | Secure the base with 6 or more screw holes for legs. |
| ISO (Claw clamp-type) | Secure the base with 6 or more screw holes for legs. | |

CAUTION

- ◇ When installing the STP pump horizontally or slanted, secure the STP pump with all of the bolt holes for legs for flanges and screw holes for legs (see Table 3.3).

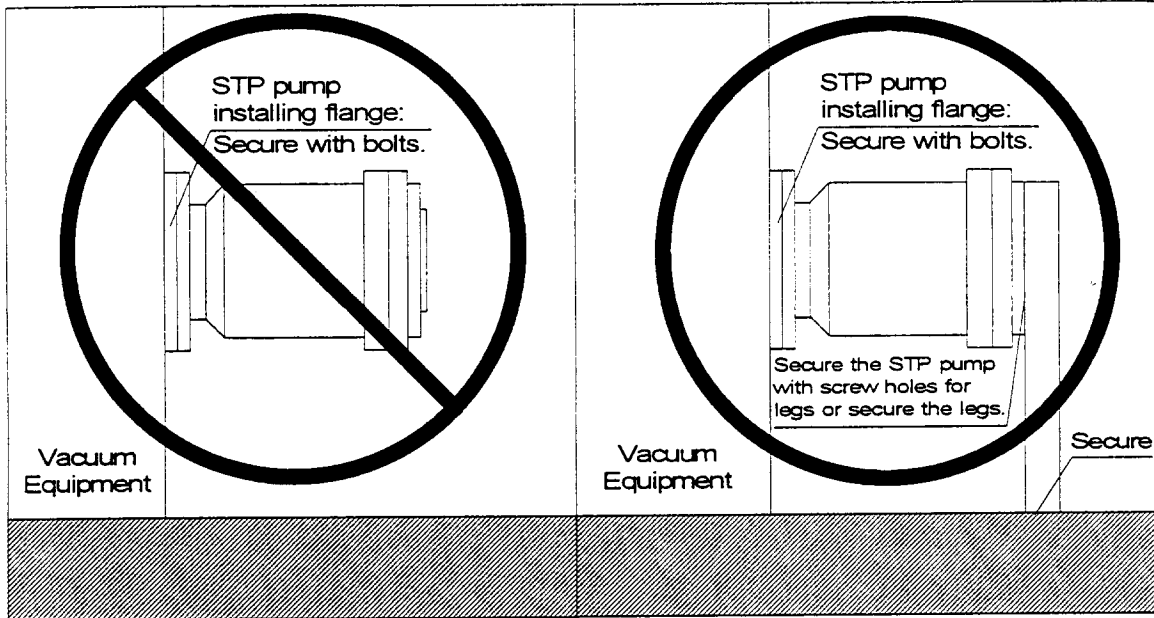


Figure 3.6 How to Install the STP Pump Horizontally or Slanted

3.3.4 Vacuum Piping



- ◇ DO NOT open the STP pump through the flange to atmospheric air while the STP pump is running.
If atmospheric air flows into the STP pump, it may not function normally.
- ◇ Depending upon the type of the auxiliary pump used, atmospheric air may reverse flow into the STP pump when the auxiliary pump stops.
Attach a vacuum valve to the middle of the piping between the STP pump outlet port flange and the auxiliary pump, and close the vacuum valve when the auxiliary pump stops.

In order to let the STP pump bring its performance into full play, follow the precautions below:

- 1) Be careful not to scratch the flange of the STP pump.
Before installing the STP pump, check whether or not there are scratches on the surface.
- 2) Use steel or aluminum tubes with a low gas loss to connect the vacuum equipment to the STP pump.
- 3) Take measures for minimizing leakage. It is also necessary to degrease the tubes as regularly as possible to keep the gas loss as low as possible.
- 4) It is recommended to use an auxiliary pump of 240 lit./min. or more.
However, the pressure at the inlet and outlet ports varies with the flow rate of gas, capacity of the vacuum equipment, length and material of the piping. Select an auxiliary pump in accordance with the capacity and starting method (simultaneous starting, starting after generating roughing vacuum) suitable for the vacuum equipment you use.
- 5) Connect the STP pump and the auxiliary pump using stainless steel or aluminum alloy tubing, flexible tubing, vacuum rubber or Teflon tubing, etc.

The following measures can be used to avoid the transmission of the vibration of the auxiliary pump to the STP pump and the vacuum equipment.

- DO NOT place the auxiliary pump on the same floor as the vacuum equipment.
- Locate the auxiliary pump on a vibration-proof table.
Attain 1/3 or less of the rotational speed of the auxiliary pump, when adjusting the inherent frequency of the auxiliary pump installed on a vibration-proof table.
- Attach a weight to the piping from the auxiliary pump, or secure the piping to a rigid, heavy object free of vibration.
- Use a tube of high flexibility.

- 6) Depending upon the type of the auxiliary pump used, oil vapor may contaminate the inside of the STP pump. Some oil viscosity could cause a malfunction when there is a strong reverse flow of oil.

Take the following measures to ensure the correct flow of oil:

- Attach a vacuum valve to the middle of the piping between the STP pump outlet port flange and the auxiliary pump.
- Attach an absorption trap adjacent to the vacuum valve.

① Piping at the Inlet Port Flange

Attach the inlet port to the high vacuum side.

| | |
|----------------------------------------------------------------|------------------------------------------------------------|
| Maximum working pressure: | 67 Pa [0.5 Torr] (for water cooled) |
| [Pressure at the inlet port flange applicable continuously] | 5.3 Pa [4×10^{-2} Torr] (for air cooled) |
| | 0.9 Pa [7×10^{-3} Torr] (for natural air cooled) |
| | 13 Pa [0.1 Torr] (when TMS unit is used) |

② Piping at the Outlet Port Flange

Attach the outlet port to the inlet port flange of the auxiliary pump (primary side pump).

| | |
|-----------------------------------------------------------------|--------------------------------------------------------------|
| Allowable backing pressure: | 400 Pa [3 Torr] (for water cooled, when TMS unit is used) |
| [Pressure at the outlet port flange applicable continuously] | 267 Pa [2 Torr] (for air cooled, natural air cooled) |



- ◇ To attain the ultimate pressure shown in Table 16.1, "Specifications for STP Pump", set the pressure at the outlet port flange to 1.3 Pa (10^{-2} Torr) or less.