ORION

Operating Manual

Circulating Type Liquid Cooling Equipment
(With Built-In Water Tank)

ORION DC Inverter Chiller

RKE11000B-V
RKE15000B-V

(Photo: RKE11000B-V)

CAUTION

- This product is for industrial use only. Please take all necessary precautions during installation and handling.
- Read operating manual thoroughly before operating this equipment.
- Be sure to retain the operating manual for future reference.

The product warranty is printed at the end of this manual.
Be sure to keep it in a safe place.

This operating manual is divided into the following 2 main sections:

Operating Instructions ····· Page 1
Installation ·····Page 74

03111545010

Thank You for Purchasing this ORION Product.

Thank you for your purchase of this ORION product. To ensure proper and safe operation, be sure to carefully read and follow the directions in this operating manual.

Safety Precautions

Before using the product, be sure to read the section, "Important Safety Guidelines" and operate the product according to those guidelines.

- The important precautions shown herein are to help ensure the product is safely and correctly used in order to prevent injuries, losses, or damages to you and others.

Important safety precautions are classified into two categories, ⚠ WARNINGS and ⚠ CAUTIONS.

⚠WARNING Failure to follow instructions contained in a WARNING may result in death or serious injury.

⚠CAUTION Failure to follow instructions contained in a CAUTION may result in injury to the operator or damage to property.

Also note that items noted in ⚠ CAUTIONS can result in very serious consequences depending on the particular situation.

Both CAUTIONS and WARNINGS pertain to serious potential safety issues and therefore both must be heeded.

- After reading this operating manual, be sure to keep it where anyone who needs to refer to it may find it easily.
- When either transferring or loaning out this product, keep the operation manual affixed to it in a clearly visible place so that the new user can refer to it in order to ensure safe and proper operation.

■ Warning Symbols

	△ symbols inform you of WARNINGS or CAUTIONS to observe. The illustration within and near the triangle shows the nature of the precaution and the action to be avoided. (For example, the symbol at the left indicates possible danger from rotating fan blades.)
	⃠ symbols inform you or prohibited actions. The illustration within the circle shows the nature of the action which is prohibited. (The example to the left indicates that user disassembly is prohibited.)
	● symbols indicate actions which must be taken. The illustration within the black circle indicates the necessary action. (The example to the left indicates that the equipment must be properly grounded.)
IMPORTANT	▬ symbols indicate important points other than CAUTIONS or WARNINGS.

■ Although model RKE11000B-V is used as description pictures and figures in the manual, the other models in the RKE-series are operated the same way as RKE11000B-V if there is no note.

■ The product mechanism and specifications are subject to change without notice. If mechanism or specifications are changed, contents of this manual may not match the actual product.

Operating Instructions

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Important Safety Guidelines

Notes Regarding Usage

⚠ WARNING

Failure to follow instructions contained in a WARNING may result in death or serious injury.

	Do not modify this product Modifying this product will void the product warranty. **All disassembly or repairs must be performed by your dealer or other qualified persons.** Improper disassembly or repair work can lead to abnormal operation, which in turn may lead to personal injury, electric shock, or fire, or other problems.
	Do not operate switches or perform other actions with wet or damp hands. Also, do not touch electrical components. Failure to follow this warning can lead to electric shock. **Do not touch the inverter directly with fingers.** The inverter should not be touched directly as it will be very hot during operation and for some time after the power is removed. Contact with hot surfaces can cause burns.
	Do not operate with the panels open. Touching components inside the product may lead to injury or electric shock. **Do not use water directly on the product or in the component area of the product.** Do not wash with water. Failure to follow this warning may lead to electric shock, fire, or other problems. **Do not damage or modify the power cord.** Placing heavy objects on the cord, exposing it to heat, pulling, or pinching it can result in damage to the cord and possibly lead to electric shock, fire, or other problems.
	Take measures against refrigerant leaks. If the product is to be installed in a machine room or similar location, measures should be taken to ensure that even if there is a refrigerant leak, refrigerant concentrations won't become critically high. If by some chance there is a refrigerant leak and concentrations become critically high, an accident due to lack of oxygen could result. **If abnormal operation is observed, stop operation and consult your dealer or a qualified repair person.** Continued operation when the product is performing abnormally can lead to electric shock, fire, or other problems. **If the earth leakage breaker is tripping, please seek the advice of your dealer or a qualified repair person.** Operation by continued power recovery can lead to electric shock, fire, or other problems. **When moving the product, please consult your dealer or other qualified professionals.** Improper installation can lead to water leakage, electric shock, fire, or other problems. Always drain the water tank completely before moving or transporting the product. Moving the product while water remains in the tank can result in damage to the tank or other components from the water sloshing or splashing about. Also, if the water freezes, it could result in damage to the pump, valves, or other components. If the product can be expected to receive physical shock or damaged while moving, package the product in order to protect it from such damage. **Cut off the power source before performing cleaning, maintenance, or inspections.** Failure to do so can result in electric shock, injury, burns, or other problems. Components inside the inverter will maintain a high voltage for some time after the power is cut off. Therefore, wait at least 10 minutes after cutting off power before performing any inspection. Touching the inverter soon after power to it has been cut off can result in burns or electric shock.

Important Safety Guidelines

Notes Regarding Usage

⚠ CAUTION

Failure to follow instructions contained in a CAUTION may result in injury to the operator or damage to property.

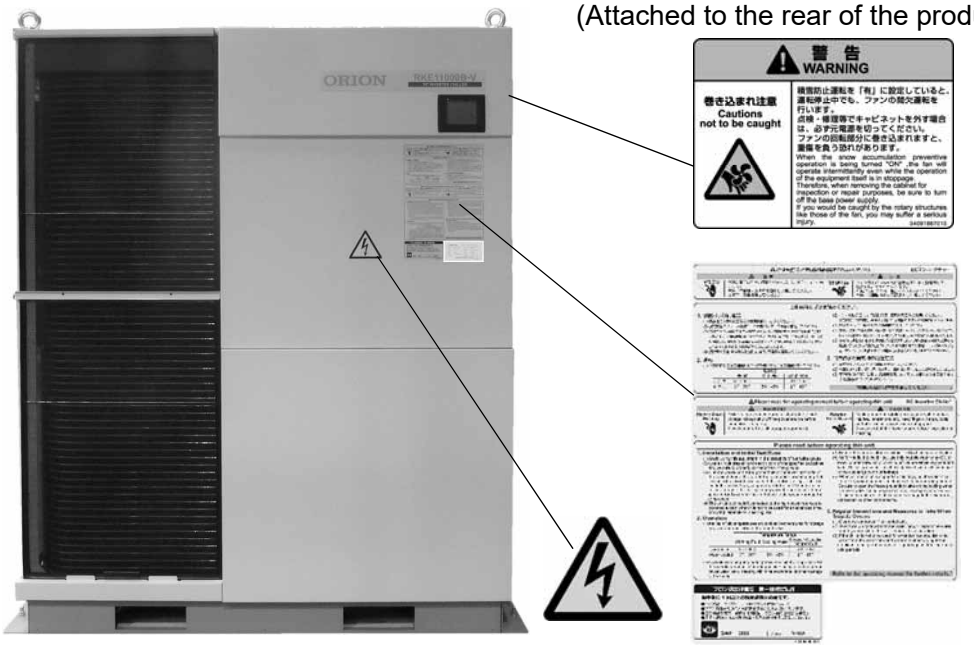
	Only use with designated liquids. Liquid suitable to be cooled (chilled water) is either clean water (according to the Japan Refrigeration and Air Conditioning Industry Association's Water Quality Standard [see page 4]) or a 30 to 40 % ethylene glycol solution. Alternatively, if RO treated (deionized) water is to be used, it should have a conductivity of at least 1 μS/cm. Cooling non-approved liquids can result in product damage, liquid leakage, electric shock, or electrical shorts. (Excluding special specifications) **Do not operate the product when the chilled water circuit is blocked.** Operating with the chilled water circuit blocked will result in pump damage and leakage of chilled water. **Do not climb onto or place things on the product.** Doing so can lead to injuries from the falling or the product tipping over, and may cause electric shorts or other problems from water spilling out. **Do not use combustible sprays near this product.** Also, do not place combustible items near the product. A spark from a switch or other operations could ignite combustibles and cause a fire. **Do not use fuses over the rated amperage.** Using metal objects instead of fuses can lead breakdown or fire. **Do not used chilled water as a source of drinking water or as a supply of hot water.** Drinking such liquids can lead to adverse effects. **Do not operate in places that are very dusty or have corrosive atmospheres.** Doing so may damage the product.
	When cleaning the condenser, do not touch the fins with bare hands. Failure to follow these warnings can lead to injury. **Do not touch internal components during operation or just after the power has been cut off.** Areas around the compressor will be very hot and touching such areas could cause burns.
	Do not stick fingers or other objects into the ventilation air intake or outlet. An internal fan is running at high speed and contacting it could lead to injury.
	Wear protective gloves when opening the cabinet. Sheet metal edges are sharp and could cause injury. **Regularly test the earth leakage breaker to confirm it is working properly.** Operating with a faulty earth leakage breaker can result in an electric shock if the breaker fails to activate during electrical trouble. **Be sure to include the operating manual when transferring this product.** When either transferring or loaning out this product, put this operating manual in a bag and tape it to the product in a clearly visible place so that the new user can refer to it to ensure safe and proper operation. **Be sure to follow local regulations when disposing of diluted ethylene glycol solutions.** Please remember that illegal disposal not only breaks the law, but can also have adverse effects on the environment and people's health. **Contact your dealer for installation of items purchased separately.** Failure to follow this warning can lead to injury or electric shock.

Product Warning Label Locations

⚠ Product Warning Label Locations

The following warning label has a selection of the most important warnings printed on it. Be sure to read before operating. If any of the labels become so dirty or damaged that they are not clearly readable, then please contact your dealer and replace the labels with new ones.

(Attached to the rear of the product.)



Ensuring the Product Performs to Specifications

WARNING

1. Liquid suitable to be cooled (chilled water) is either clean water (see the water quality standard chart below) or a 30 to 40 % ethylene glycol solution. Alternatively, if RO treated (deionized) water is to be used, it should have a conductivity of at least 1 μS/cm. Cooling non-approved liquids can result in product damage, liquid leakage, electric shock, or electrical shorts.

Clean Water Quality Standard
(The Japan Refrigeration and Air Conditioning Industry Association JRA-GL-02-1994 excerpt)

Standard Components	PH 〔25 °C〕	Electrical Conductivity 〔25 °C〕 μS/cm	Chloride Ion ($mgCl^-$/L)	Sulfate Ion ($mgSO_4^{2-}$/L)	Acid Consumption (PH4.8) ($mgCaCO_3$/L)	Total Hardness ($mgCaCO_3$ /L)	Calcium Hardness ($mgCaCO_3$ /L)	Silica Ion ($mgSiO_2$/L)
Circulating Water	6.8～8.0	400 or lower	50 or lower	50 or lower	50 or lower	70 or lower	50 or lower	30 or lower

Reference Components	Iron (mgFe/L)	Copper (mgCu/L)	Sulfide ion (mgS^{2-}/L)	Ammonium Ion ($mgNH_4^+$/L)	Residual Chlorine (mgCl/L)	Free Carbon Dioxide ($mgCO_2$/L)
Circulating Water	1.0 or lower	1.0 or lower	Not detected	1.0 or lower	0.3 or lower	4.0 or lower

2. When using RO treated (deionized) water, use liquid that has a conductivity of at least 1 μS/cm (low purity). Using water where the conductivity is too low (overly pure water) can damage the evaporator and discharge pump and cause sticking of mechanical seals or other problems. Furthermore, it is important to understand that there is no built-in means to prevent the efflux of metal ion from wetted parts within the product, even when operating within designated operating ranges. (However there would be no problem regarding the mechanical strength of the product.)
3. Note the operating ranges and always operate the product within these ranges. Operating outside the designated ranges can damage the product.

Ambient Temp. Range	(°C)	-20 to 45
Liquid Temp. Range	(°C)	3 to 35 (when using clean water), 0 to 35 (when using antifreeze)
Power Source	(V・Hz)	Three-phase 200 to 220±10 %・50 / 60 (Phase unbalance within ±3 %)
Discharge Pump Operating Pressure	(MPa)	0.08 to 0.80

4. Do not use aluminum parts for parts that will be wetted with the chilled water or cooling water. The chilled water and cooling water circuits operate with parts made of copper or copper alloys, so if user-installed wetted parts containing aluminum are present, the resulting copper ions will lead to electrolytic corrosion and copper deposits, which can cause water leakage around mechanical seals and clogging in the heat exchanger.

IMPORTANT

- **Do not operat when the discharge pump circuit (chilled water inlet/outlet) is blocked. Operating with the circuit blocked can result in freezing or damage to the condenser, breakdown of the discharge pump or disconnection of hoses.**

5. In cases where the ambient temperature may fall to 0°C or lower, it is recommended that a low concentration solution of industrial-use ethylene glycol be used in order to prevent freezing. The recommended concentration is 30 to 40 %.
6. Frequent switching on and off can lead to breakdown. Allow at least 5 minutes between subsequent operations of the product. If the product is started or stopped in less than 5 minutes of previously beginning stopped or started, warning "C064" or "C065" will be generated.
7. Always fill the water tank and check the water level before operating. If the liquid level gauge goes below the "E" mark, then alarm “E006" will be displayed and the product cannot be operated.
8. The water pressure at the water supply port should 0.50 MPa or less. Too high pressure will result in the water supply failing to shut off or cause water leakage.
9. Always keep the water clean, inspect the water circuits monthly, and replace the water when necessary. (See page 50, "Chilled Water Circuit Inspection".)
10. Clean the condenser filter every month. (See page 49, "Cleaning the Condenser Filter".)
11. In summer or other times of high ambient temperatures, the water in the water tank can rise to surrounding temperatures when the product is stopped. When started in such a condition, an alarm may occur and the product might not be able to operate. In such cases, take measures to lower the temperature of the water in the water tank such as adding water to the tank.

Ensuring The Product Performs To Specifications

WARNING

- **Cut off power to the product before performing cleaning, servicing, or inspections. Failure to do so can lead to electric shock or other injury from the fan.]**

12. Operate the product in an ambient temperature range of -20 to 45 °C.
    Operating in an ambient temperature below -20 °C can result in compressor breakdown. And operating in temperatures over 45 °C will result in a drop in the effectiveness of thermal radiation of the condenser. Built-in safety devices may activate causing the product to shut down. In addition, operating continuously under these conditions will result in product breakdown. If the ambient temperature will be above 45 °C, install ducting to take hot air outside. (See page 83, "Ducting Design Points"). In such cases, please consult your dealer or a qualified installation person.
13. Consult your dealer if operation stops due to activation of a built-in safety device.
14. The water level in the tank may go down if water pipes are long or after starting the product for the first time. In such cases, stop operation, fill the tank, and start operation again.
15. When opening the product cabinet, be sure to follow the directions outlined in the operating manual.
16. If the product is not to be used for an extended period, drain the water from the water tank and water circuit.
17. Take measures to prevent external water pipes from freezing. If measures such as insulation are taken to prevent freezing, be sure to do so such that the connection to the water supply port is removable.

WARNING

- **Never operate when cabinet panels are open or removed. Touching components inside the product may lead to injury or electric shock.**

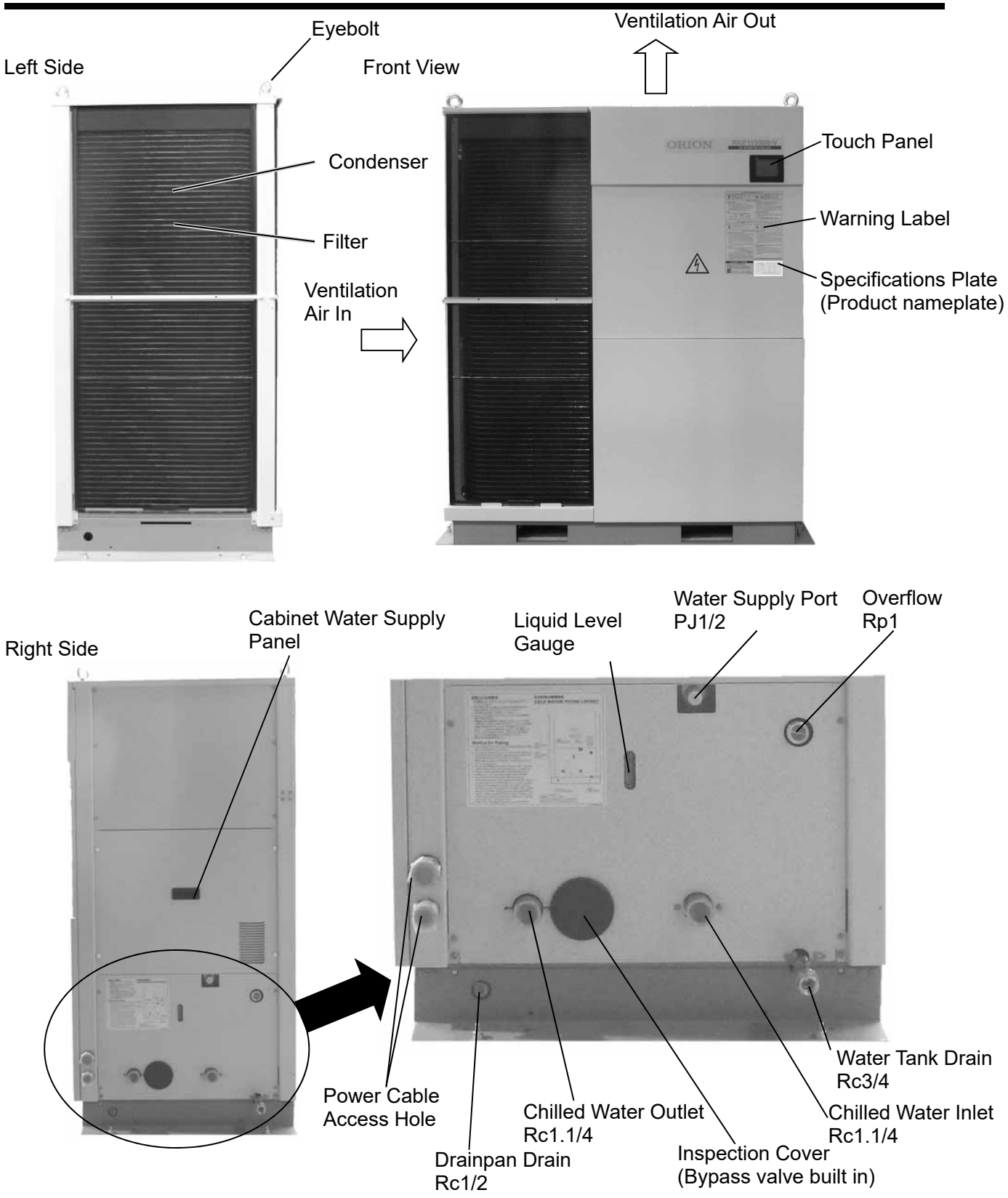
IMPORTANT

- **When using the product for the first time, or when power to the product has been cut off for 24 hours or more, always apply power to the product 12 hours before starting operation*. Failure to do so can result in compressor breakdown. The product should be left connected to the main power source and powered except when it is not to be used for an extended time, or during inspections, cleaning, etc.**
  - * **Liquid refrigerant inside the compressor will be evaporated by the heater. The heater will turn ON and OFF depending on ambient temperature. (RKE11000B-V only)**
  - * **Liquid refrigerant inside the compressor will be evaporated by the heater. Heating will occur by passing it through the motor coils. The heater will turn ON and OFF depending on ambient temperature. (RKE15000B-V only)**
- **When operating for the first time, or after storing for a long period, or after the water has been replaced, there can be air in the water pipes even if the water tank was topped off. If the product is operated in that state, there might be no circulation of chilled water, which could lead to freezing and breakdown of the evaporator and breakdown of the discharge pump. In such cases, run the discharge pump alone first and sufficiently circulate the chilled water in order to sufficiently purge air from the water pipes. See page 10, "Draining Air Within the Chilled Water Pipes", for further information.**

Main Parts

External Features

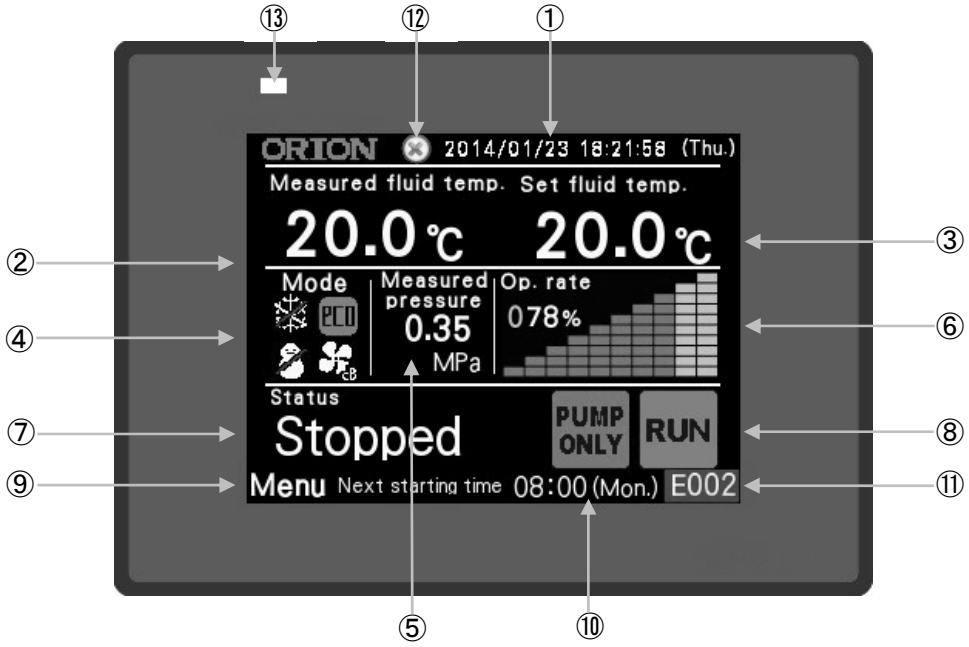
External Features



Main Parts

Touch Panel Parts and Functions

Touch Panel Parts and Functions



① Time Display	Shows the date and time. (To adjust, see page 16.)
② Measured Liquid Temp. Display	Shows the measured water temperature. If touched: Changes to the Graph screen. (See page 16.)
③ Set Liquid Temp. Display	Shows the set water temperature. If touched: Changes to the Temperature Setting screen. (See page 18.)
④ Mode Display	If touched: Changes to the Mode screen. (See page 18.)
⑤ Measured Pressure Display	Shows the measured pressure. (Chilled water outlet pressure.) If touched: Changes to the Flow Rate / Pressure / Frequency screen. (See page 19.)
⑥ Operating Rate Display	Digital display of the operating rate %. If touched: Changes to the Monitor screen. (See page 22.)
⑦ Operating Conditions Display	Shows operating conditions of the product. (See page 22.)
⑧ RUN Button	Will show "RUN", "STOP", or "PUMP ONLY" depending on the current operating state. (See page 23.)
⑨ Menu Display	If touched: Changes to the Menu screen. (See page 24.)
⑩ Start / Stop Time Display	Will, depending on operating conditions, show start or stop time. If touched: Changes to the Start / Stop Time Setting screen. (See page 28.)
⑪ Alarm Number Display	Shows the alarm number when an alarm condition has occurred. If touched: Changes to the Alarm screen. (See page 28.)
⑫ Control Board and Communications Conditions Display	No icon shown: Normal communications. Icon shown: Communications abnormal.
⑬ Power Lamp	Lamp is on when power is applied to the product.

* See page 16, "Touch Panel Operation" for information on how to operate the touch panel.

- If English is not displayed, use the following procedure to change the display language.

<How to Change the Display Language>

1. Touch “Menu” on the lower left of the screen.
2. From the Menu Screen, touch “Language option”.
3. Touch “English” from the list of languages.
4. Touch “Home”in the lower left of the screen to return to the home screen.

Operation

Running for the first time, or after being stored.

WARNING

- **Do not operate controls with damp hands. Also, do not touch electrical components. Failure to follow this warning can lead to electric shock.**

WARNING

- **Never operate when cabinet panels are open or removed. Touching components inside the product may lead to injury or electric shock.**
- **Do not allow water to contact the product component area directly, and do not wash the product with water. Failure to follow this warning may lead to electric shock, fire, or other problems.**

WARNING

- **If operation is abnormal, stop operation, cut off the power source, and then consult your dealer or a qualified repair person. Continued operation when the product is performing abnormally can lead to electric shock, fire, or other problems.**

Running for the first time, or after being stored.

Before first operating the product, confirm and carry out the following points as required.

1. When using the product for the first time, or when power to the product has been cut off for 24 hours or more, always apply power to the product 12 hours before starting operation*. Failure to do so can result in compressor breakdown. The product should be left connected to the main power source and powered except when it is not to be used for an extended time, or during inspections, cleaning, etc.
   * Liquid refrigerant inside the compressor will be evaporated by the heater. The heater will turn ON and OFF depending on ambient temperature. (RKE11000B-V only)
   * Liquid refrigerant inside the compressor will be evaporated by the heater. Heating will occur by passing it through the motor coils. The heater will turn ON and OFF depending on ambient temperature. (RKE15000B-V only)
2. Along with operation preparations, be sure to supply water and check the water level with the water level gauge.
3. Ensure there is no water leaking from piping.
4. When connecting to the power source with an electrical plug, always plug in the product first and then switch on the earth-leakage breaker.

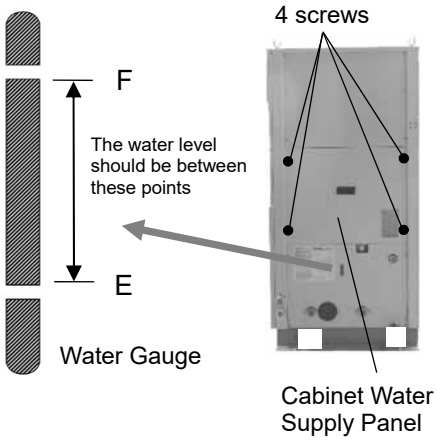
IMPORTANT

- **When operating for the first time, or after storing for a long period, or after the water has been replaced, there can be air in the water pipes even if the water tank was topped off. Operating in such a condition can cause freezing in the evaporator or breakdown. In such cases, see page 10, "Draining Air Within the Chilled Water Pipes", and be sure to release the air by circulating enough water through the pipes.**

Preparing for Operation

■ Checking the Water Supply

Check the liquid level on the water gauge.
The gauge level should be between the "E" and "F" marks. If below the "E" level, supply water to the water tank until the water level gauge shows a water level between the "E" and "F" levels.
If the water level goes above the "F" mark and the overflow pipe is closed, the water tank may overflow. Also, if the water level goes below the "E" mark, problems such as air entering the product could result, which could prevent normal cooling from occurring.
Confirm the water level both when the product is stopped as when it's running.



■ How to Supply Water

1. If automatic water supply piping has been installed:
   (1) Open the (user installed) water supply valve. Water supply is automatic so the water flow will stop when the water tank is filled. Water will also be automatically supplied when the water level is low.
2. If automatic water supply piping has not been installed (manual water supply):
   (1) Remove the Cabinet Water Supply Panel.
   (2) Remove the water tank cover.
   (3) Supply water to the water tank directly from a container that has a hose or spout. In particular, when supplying water to the product for the first time or after it has been in storage for a long time, check the liquid level gauge again after sufficiently circulating the water in the circuit, and add water again as required. See page 12, "Discharge-Pump-Only Operation" for information on how to circulate the water.

■ Draining Air Within the Water Pipes

When operating for the first time, or after storing for a long period, or after the water has been replaced, there can be air in the water pipes even if the water tank was topped off. In such cases, before starting operation, conduct the following initial test run on the discharge pump.

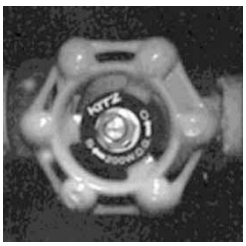
1. Remove the inspection cover. (See page 7.)
2. Fully open the bypass valve.
3. Ensure that the water level of the water tank is between "E" and "F" on the water level gauge. (See page 10, "Checking the Water Supply" for details.)
4. Turn on the main power source.
5. Press and hold down the "PUMP ONLY" button for 3 seconds to start Discharge-Pump-Only operation. (See page 12, "Discharge-Pump-Only Operation" for details.)
6. Water will start to circulate, air within the pipes will be purged, the water pressure will rise, and the pressure will stabilize.

Operation

Preparing for Operation

■ Adjusting the Water Supply Pressure (Flow Rate)

If it is necessary to adjust the water supply pressure using the bypass valve, do so according to the following steps.

How to Adjust	
Control Valve	Bypass Valve (Located inside the product) Inspection cover （Built-in Bypass Valve） Open ⟷ Close  Bypass Valve
Increase the water supply pressure (flow rate).	Close the bypass valve ⬇ The water pressure (flow rate) will increase as the value on the touch panel increases.
Decrease the water supply pressure (flow rate)	Open the bypass valve. ⬇ The water pressure (flow rate) will decrease as the value on the touch panel is decreases.

IMPORTANT

- **Do not operated with the discharge pump circuit (chilled water inlet/outlet) blocked. Operating with the circuit blocked can result in warning "C034" and alarm "E034" forming, and freezing or damage to the evaporator, breakdown of the discharge pump or disconnection of hoses. Make sure that even if piping is blocked that specified operating ranges (see page 96) are not exceeded by controlling (user installed) inlet and outlet valves and the bypass valve.**
- **Air may be trapped in water piping even if the water tank is full, and if operation is started in this condition, freezing could result inside the product, and alarms "E049" and "E055" could occur.**
- **When supplying water, watch out for water splashing on the floor from the overflow, etc. It is recommended that overflow and/or drain piping be installed in order to avoid water splash.**
- **Consult a specialist if drain or other piping is to be installed.**

■ Setting The Water Temperature

1. Turn on the product.
   After a few seconds, “Welcome to ORION” will be displayed on the touch panel, and then the Home screen will appear.
2. Set the water temperature.
   (1) Touch "Liquid temp. setting" from the Home screen.
   The display will change to the temperature setting screen.
   (2) Enter the desired temperature on the numeric keypad and touch the SET button.
   The possible set water temperature range will depend on the chilled water option. (See page 20 for details.)
   (3) Press the Apply button.
   The display will return to the Home screen and the setting will be finalized.
   *The water temperature setting is stored so it is not necessary to change the setting each time the product is used.
   *See page 16, "Touch Panel Operation" for information on how to operate the touch panel.

IMPORTANT

- **If parameter "F099" (settings lock) is set to "LOCKED" then the water temperature setting cannot be changed. This parameter should be set to "Unlocked" before the water temperature setting can be changed. (The factory default setting is "Unlocked")**

Operation Via the Touch Panel Display

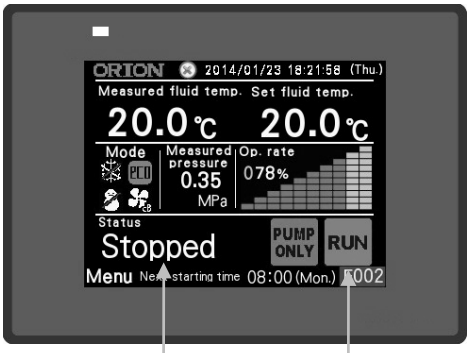
The touch panel can be used if "Main Unit" under parameter "F002" is enabled, as shown by a ☑. (The factory default setting is ☑ [enabled])

■ Starting Operation

From the Home screen, press and hold the RUN button for about 0.5 sec.

The Status display will indicate Running, and the product will be operating.

* Operation will occur automatically by the thermo-controller, and the water temperature will automatically be maintained.



The operating status will be displayed.

Press the RUN button.

■ Stopping Operation

From the Home screen, press and hold the STOP button for about 0.5 sec.

The Status display will indicate OFF, and operation will stop.

IMPORTANT

- **If the "Main unit" option under parameter "F002" (Operation control setting) is disabled (□) then the product cannot be operated via the touch panel. (The factory default setting is ☑ [enabled].) See page 24, "Changing Parameter Settings" for further information.**
- **When applying power, a clicking sound can be heard from the component area of the product. This is the sound of the initialization of the electronic valves and is part of normal operation.**
- **Frequent starting and stopping can lead to breakdown. Allow at least 5 minutes between starting and stopping operations. If the product is started or stopped in less than 5 minutes of previously being stopped or started, warning "C064" or "C065" will be generated.**

■ Discharge-Pump-Only Operation

1. From the Home screen, press and hold the Pump-Only button for 3 seconds.
   The Status display will indicate Pump-only operation, and the chiller will be operating in the pump-only operating mode.
2. To stop operation, press the "STOP" button for 0.5 sec.
   The Status display will indicate OFF, and the chiller will stop operating.
   * To change from pump-only operation to standard operation, from the Home screen, press the RUN button for 0.5 seconds., and the product will resume normal operation.

Operation

Remote / Combined Local and Remote Operation

Remote Switch

When the "Remote switch" option of parameter "F002" is enabled (☑), the product can be operated as follows:

■ Starting Operation
Turn on (short) the remote operation switch. (Short terminals 20 and 21 for at least 1 second.)

■ Stopping Operation
Turn off (open) the remote operation switch. (Open terminals 20 and 21 for at least 1 second.)

IMPORTANT

1. When employing remote operation, please have the required wiring performed by a qualified service person.
2. If the "Remote operation switch" option under parameter "F002" (Operation control setting) is disabled (□) then the product cannot be operated via the remote operation switch. (The factory default setting is ☑ [enabled].) See page 24, "Changing Parameter Settings" for further information.

■ Discharge-Pump-Only Operation Via the Pump-Remote
1. Turn on (short) the pump-remote operation switch. (Short terminals 22 and 23 for at least 1 second.)
2. To stop, turn off (open) the pump-remote switch. (Open terminals 22 and 23 for at least 1 second.)

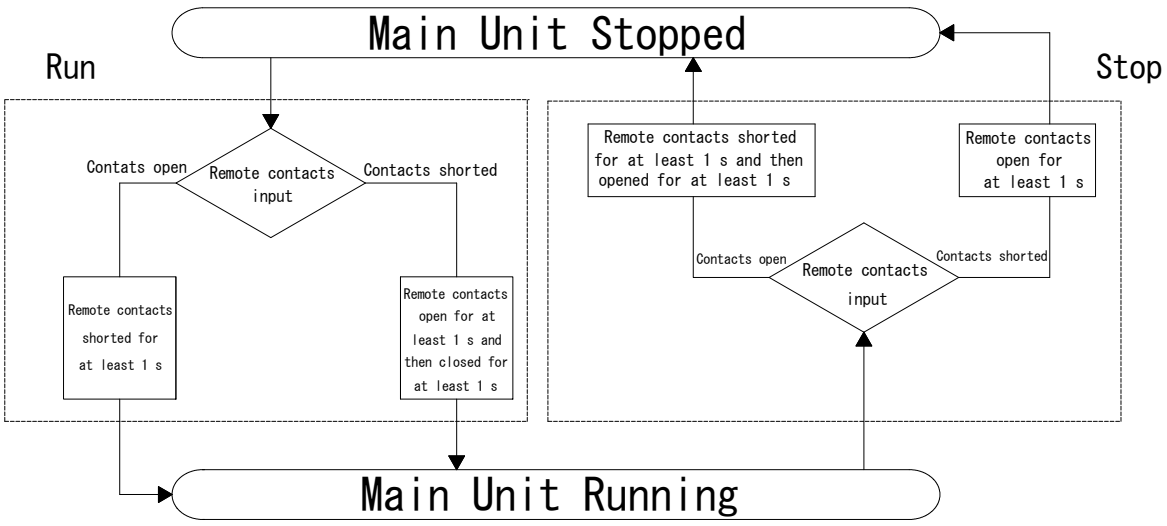
Combined Local and Remote Operation

When the "Main unit" and "Remote switch" option within unit parameter "F002" are enabled (☑) (the factory default setting), the product can be operated as follows:

■ Starting Operation
1. When the remote operation switch is OFF (terminals 20 and 21 are open) and the product is off:
Press the RUN button on the touch panel, or switch on the remote operation switch (by shorting terminals 20 and 21 for at least 1 second) to start operation.
2. When the remote operation switch is on (terminals 20 and 21 are closed) and the product is off:
Press the RUN button on the touch panel, or switch off the remote operation switch (by opening terminals 20 and 21 for at least 1 second), and then switch the remote operation switch on again (by shorting terminals 20 and 21 for at least 1 second) to start operation.

■ Stopping Operation
1. When the remote operation switch is on (terminals 20 and 21 are closed) and the product is on:
Either press the STOP button on the touch panel, or turn off the remote operation switch (by opening terminals 20 and 21 for at least 1 second) to stop operation.
2. When the remote operation switch is off (terminals 20 and 21 are open) and the product is operating:
Either pressing the off button on the touch panel, or turn on the remote operation switch (by shorting terminals 20 and 21 for at least 1 second) and then turn it off again (by opening terminals 20 and 21 for at least 1 second) to start operation.

Remote Control Operation Flow Chart



Operation

Others.

Other

■ Warning Signal
In the event of abnormal operation, the alarm number will appear on the alarm number display and the corresponding alarm signal will be output. (See page 84, "Remote Operation".)
* Note that warnings other than "C093", "C094", and "C095" will not be output.

■ Notes Regarding Usage
1. Keep the water consistently clean by periodically washing and cleaning components of the water circuit and condenser (filters), etc.
2. In the event that a built-in safety device activates and the product shuts down, be sure to note the displayed error code before cutting off power. After doing so, refer the section on page 54, "Troubleshooting". Operation can resume after the problem is resolved.
3. The water level in the tank may go down and alarm "E006" may occur if water pipes are long or after starting the product for the first time. If this happens, resupply the water tank with water and cancel the warning.
4. Do not attempt to switch the product on and off by switching on and off the main power source. Doing so may damage the product.

■ Freeze Prevention of Cold Water When the Product Is Stopped
Operate in the freeze-prevention operation mode when the product is to be stopped during cold periods where there is a chance that freezing can occur within the water circuit.
(See page 33, "F010", Freeze-Prevention Mode for details.)

IMPORTANT

- **If there is a chance that power will be cut off at night or other times, then the water should be drained from the water tank and pipes. See page 70, "Storage" for further information on draining water.**

Other and (Optional) Remote Operation

The remote control can be used to operate the product if the remote control setting for parameters "F002", "F007", and "F008" or enabled (☑). For information regarding the operation and installation of the remote control, please refer to the remote control operating manual.

■ Remote Control Functions
By connecting a remote control to the product, the product can be run and other operations can be conducted similarly to the product control panel (with some limitations), but from a distance. Operating parameters can also be displayed.
1. Remote Control Operation Limitations
   (1) The following subset of parameter functions cannot be changed. These parameter settings can be changed from the (local) control panel on the product.
      ① "F002" Operation Control Setting
      ② "F007" Independent Operation / Control Setting
      ③ "F008" Setting Changes Enable/Disable
   (2) A single remote control cannot be used to control multiple chiller units. Prepare one remote control unit for each chiller unit to be controlled.

Operation by Remote Control(Option)

2. Display During Abnormal Operation

If an abnormality occurs in the connection between the remote control and product, the remote control display will appear as described in the table below.

Description of Abnormality	Display	Details
Break in Power Line	Nothing Displayed	No audible feedback when pushing a button.
Product Power Is Off	Nothing Displayed	No audible feedback when pushing a button.
Communications Abnormal		Transmission Data Fault There is no response from the unit or there is a break in the wiring.

IMPORTANT

- **The remote control unit is not water resistant. Do not use in areas where it may be exposed to water.**
- **In order to connect the remote control, the Remote Control Set is required. See page 73, "Optional Equipment" for order details and place an order.**

Remote Control Set

Safety Devices

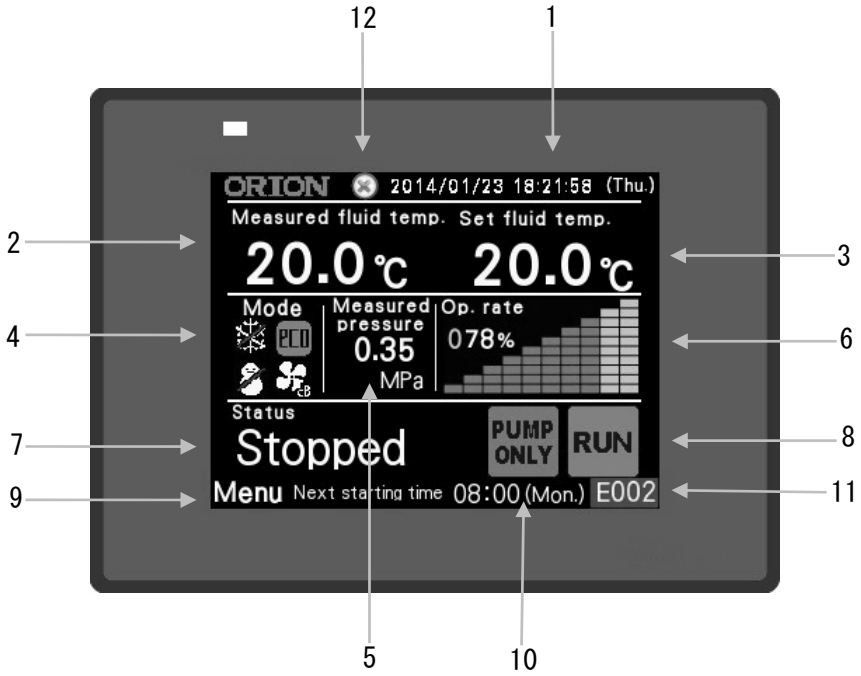
Name of Safety Device	Function	Error Display	Product State * (Alarm processing pattern)	Actions to Take When a Safety Device Activates
High-Pressure Pressure Switch	This safety function will be activated if there is an abnormal rise in refrigerant temperature due to high ambient temperature or fan trouble, etc., causing the electric circuit to be cut off and the compressor operation to be stopped.	E002	2 (3)	Please refer to Page 54, "Breakdown and Abnormal Operation Diagnoses and Remedies"
Float switch	Stops all product operation If the water level drops.	E006	3	
Fuse	Protect the control board by blowing the fuse when an over-current occurs on the control board.	Touch panel OFF	3	

* Refer to page 56, "Operating Under Alarm Conditions" for information regarding the operating state (alarm processing pattern). The product state (alarm processing pattern) in parentheses are when parameter "F004" is set to "All Stopped".

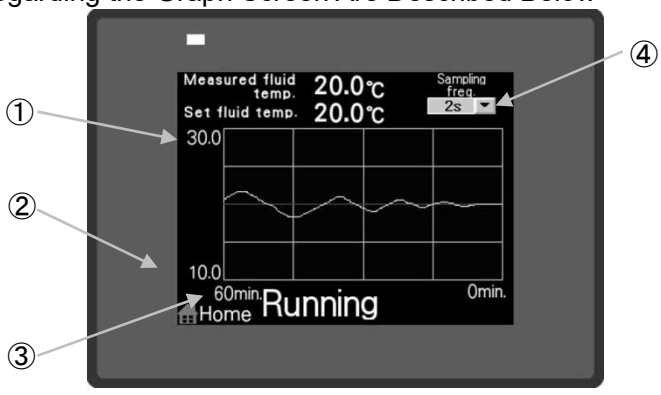
Touch Panel Operation

Touch Panel Operation

The product can be operated, and settings can be changed and confirmed by operating the touch panel.



1. Time Display
   The Year/Month/Day Hours:Minutes:Seconds (Day-of-week) is displayed.
   (The time can be adjusted by touching "Touch panel setting" from the Menu screen. [For details, see page 25, "Touch Panel Settings".])
2. Changing to the Measured Liquid Temperature Display and Graph Screen
   (1) Normally the current measured liquid temperature is displayed.
   (2) Touching "Measured fluid temp." will bring up the Graph screen.
   Circled ○ Numbered Points Regarding the Graph Screen Are Described Below



Touch Panel Operation

① Measured Temp. Upper Limit

① Touching this point will bring up the numeric keypad, after which, the desired upper limit can be entered. After that, touching the “SET” button will finalize the setting.

Default Value	35.0 °C
Setting Upper Limit	99.9 °C
Setting Lower Limit	0.0 °C

② Measured Temp. Lower Limit

② Touching this point will bring up the numeric keypad, after which, the desired lower limit can be entered. After that, touching the “SET” button will finalize the setting.

Default Value	5.0 °C
Setting Upper Limit	99.9 °C
Setting Lower Limit	0.0 °C

③ Graph Horizontal Axis Display Time

The maximum display time can be automatically displayed depending on ④, the sampling frequency.

④ Sampling Frequency

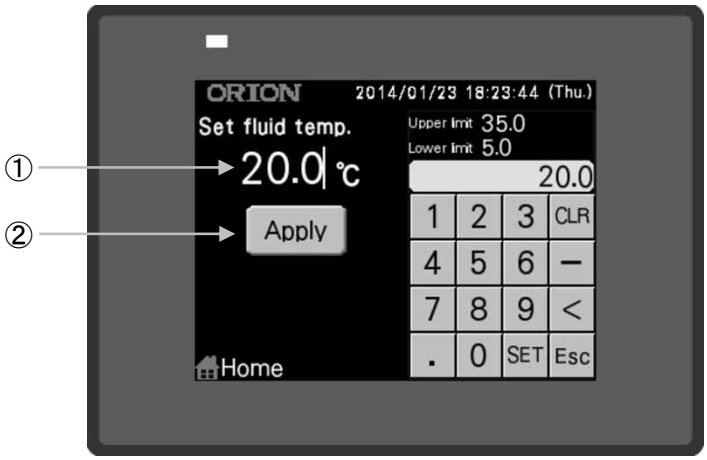
Touching ▼ will display a drop-down list from which the frequency can be selected.

Default Value	2 s
Setting	2 s
	3 s
	4 s
	5 s
	10 s
	30 s
	60 s
	120 s
	300 s
	600 s

* The sampling frequency and set time base determine the frequency of the liquid temperature measurement and graph update.
* Graphing will start once power is applied to the product.

Touch Panel Operation

3. Change to the Fluid Temperature Display and Liquid Temperature Change Screen
   (1) The current set liquid temperature is shown.
   (2) Touching Set Fluid Temp. will bring up the Fluid Temp. Change screen, where the temp. setting can be changed.
   Details of Circled Numbered Fluid Temp. Settings



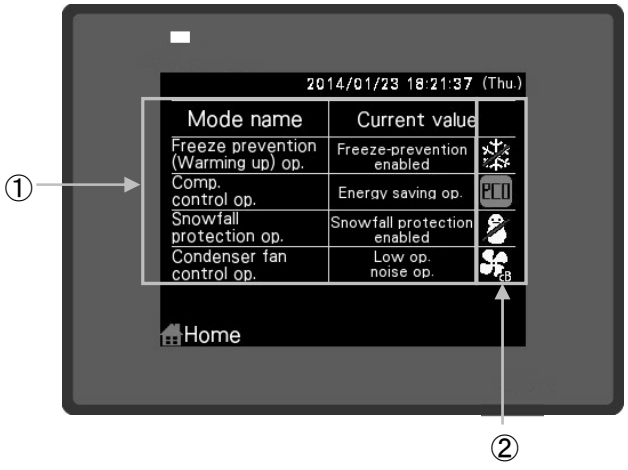
① Set Fluid Temp. Display
Enter the fluid temperature via the numeric keypad, and touch the SET button to change the setting.

Type of Chilled Water Used*	Clean Water	Antifreeze
Default Value	20.0 °C	20.0 °C
Setting Upper Limit	35.0 °C	35.0 °C
Setting Lower Limit	3.0 °C	0 °C

(*See page 20 for details)

② Apply Button
After the desired value is entered, touch the Apply button to finalize the setting and return to the Home screen.

4. Mode Display and Changing to the Mode Details Screen
   (1) Icons are displayed showing the currently active modes. (Icons will not be shown for inactive modes or for normal operating modes.)
   (2) Touching the Mode Display area will bring up the Mode Details screen.
   Details regarding the parts of the Mode Details screen indicated by circled numbers.



Touch Panel Operation

① Mode Table

Names of modes indicated by icons and current setting conditions.

Mode Name	Relevant Parameter
Freeze-Prevention Operation	"F010" (See page 33.)
Warm-up Operation	"F011" (See page 33.)
Compressor Control Operation	"F015" (See page 35.)
Snowfall Protection Operation	"F013" (See page 34.)
Condenser Fan Control Operation	"F014" (See page 34.)

② Mode Icons

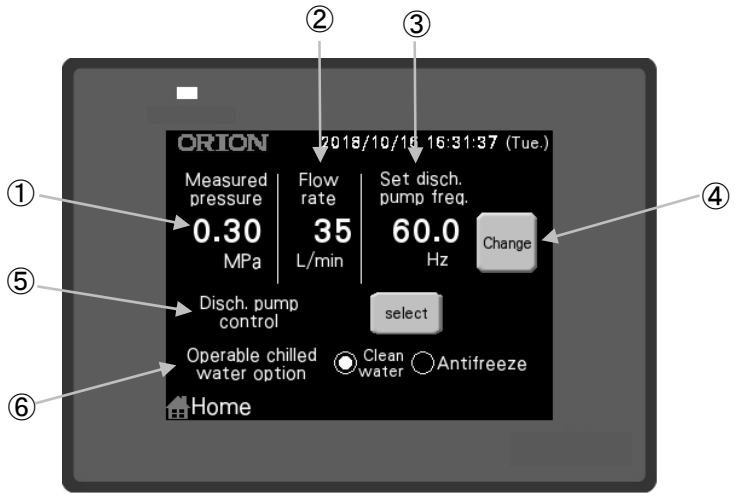
Icons Displayed on the Home Screen

5. Changing to the Measured Pressure and Flow Rate / Pressure / Frequency Screen

(1) The current chilled water pressure is displayed.

(2) Touch the Measured Pressure area to bring up the "Flow rate / Pressure / Frequency screen.

Circled ○ Numbered Points Regarding the Flow Rate / Pressure / Frequency Screen Are Described Below



① Measured Pressure Display

Displays the current chilled water pressure.

② Flow Rate Display

Displays the current flow rate. (Not an actual measured value. For reference only.) Note that if additives are added to the working water, then the actual flow rate may differ from the displayed flow rate depending on the addivite type, concentration, and water temperature.

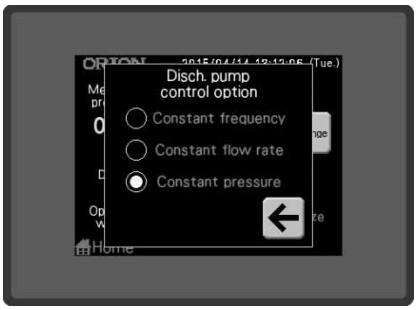
③ Discharge Pump Set Frequency / Flow Rate / Pressure Display

Depending on the choice of ⑤, will show either the current discharge pump set frequency, set flow rate, or set pressure.

④ Discharge Pump Set Frequency / Flow Rate Pressure Setting Button
By touching the SET button, either the Discharge Pump Speed Control screen, the Discharge Pump Speed Control screen, or the Flow Rate Setting screen, or the Pressure Setting screen will be displayed, depending on the selection of point ⑤.

1. Enter the desired value on the numeric keypad and then touch the SET button. Refer to the chart below for the upper and lower limits of the setting.
2. Touching the Apply button will finalize the setting.
   * To return to the Flow Rate / Pressure / Frequency Display screen without updating the setting, touch the left arrow button.

Control Option Pop-Up Screen



⑤ Discharge Pump Control Options Button
Touching the Select button will cause a pop-up window to be displayed. Touch the desired item. The selected item will be indicated by a ◉ mark.

⑥ Chilled Water Type Option Button
Either Clean Water or Antifreeze can be chosen as the operating liquid.
Touch the desired item. The selected item will be indicated with by a ◉ mark.
As shown in the table below, the setting range will differ according to the setting.

		RKE11000B-V		RKE15000B-V	
		Set to Clean Water	Set to Antifreeze	Set to Clean Water	Set to Antifreeze
Discharge Pump Set Freq. (Hz)	Default Value	50.0		60.0	
	Upper Limit	60.0		60.0	
	Lower Limit	30.0		30.0	
Set Flow Rate (L/min)	Default Value	140		200	
	Upper Limit	230		230	
	Lower Limit	100		100	
Set Pressure (MPa)	Default Value	0.40		0.40	
	Upper Limit	0.80		0.80	
	Lower Limit	0.08		0.08	
Set Water Temp. (°C)	Default Value	20.0		20.0	
	Upper Limit	35.0		35.0	
	Lower Limit	3.0	0.0	3.0	0.0

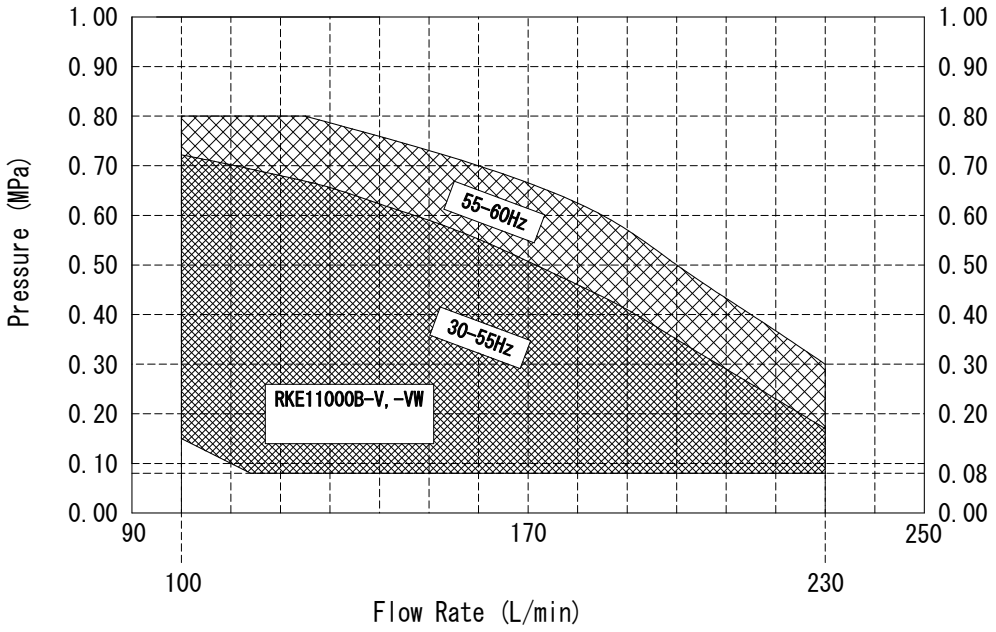
IMPORTANT

- **If the bypass valve is open, there will be a return flow of water back to the water tank, and therefore the discharge flow from the unit outlet will be less than the amount displayed.**
- **It may not be possible to achieve the settings under "Constant Flow Rate Control" and "Constant Pressure Control" depending on pressure losses in piping outside the product.**
- **When starting "Constant Pressure Control", undershooting and overshooting can occur when there are pressure fluctuations.**

Touch Panel Operation

- **If the ambient temperature goes above 40 °C then the alarm may stop, therefore set the frequency to 55 Hz or lower using "constant frequency control". If operating under "constant flow control" and "constant pressure control", set the flow rate or pressure so that the operating frequency is below 55 Hz.**

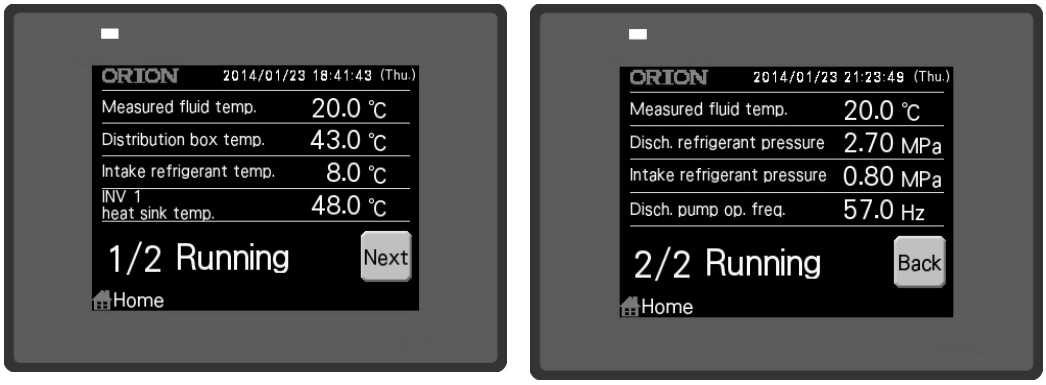
Cold Water Flow Char



Example: Under "uniform flow rate control" and a setting of 170 L/min, confirm that the pressure is at 0.50 MPa or lower. If the pressure is 0.50 MPa or higher, lower the flow rate setting and adjust so that operation is within the "30-55 Hz" range indicated in the chart above. The discharge pump operating frequency can be checked from the "Monitor Screen". (See page 24 for details.) (Can also operate in the "55-60 Hz" range if the ambient temperature or cooling water temperature are at 40 °C or lower.)

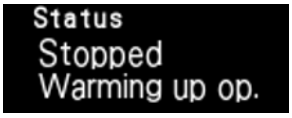
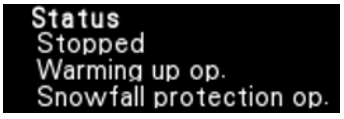
Touch Panel Operation

6. Changing from the Operating Rate Display to the Monitor Screen
   (1) The current operating rate is shown in a graph of 100 parts divided into 10 steps.
   (2) Touching the Operating Rate area will bring up the Display screen.
   - Monitor Screen Details



The illustrations above details the contents of the monitor functions.
Switch between the two screens by touching the Next or Back button in the lower right of the respective screen.

7. Operation Conditions Display
   The various current operating conditions of the chiller will be displayed as shown below.

Stopped	Running	Discharge-Pump-Only Operation
Stopped Freeze-Prevention Operation *1	Stopped Warm-Up Operation *2	Stopped Snow Protection Operation *3
		
Stopped Freeze-Prevention Operation *1 Snow Protection Operation *3	Stopped Warm-Up Operation *2 Snow Protection Operation *3	Discharge-Pump-Only Operation Snow protection operation *3
		

*1 For information regarding freeze-protection, refer to page 33, “F10” Freeze-prevention Mode Option”.
*2 For information regarding warm-up operation, refer to page 33, “F011” Warm-up Mode Option”.
*3 For information regarding falling-snow protection, refer to page 34, “F013” Snow Protection Mode Option”.

Touch Panel Operation

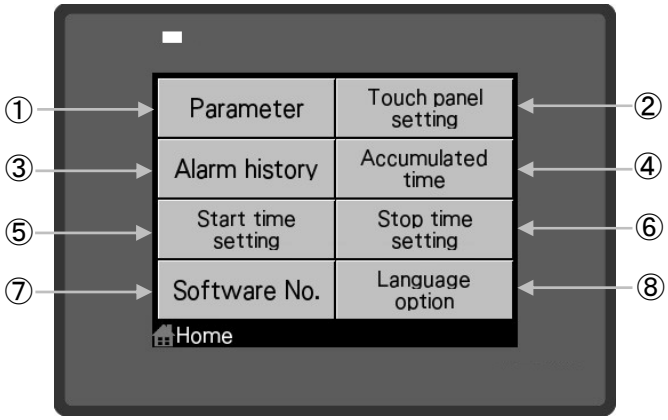
8. Operation Control Buttons

Use these buttons to start and stop operation, and also to start and stop pump-only operation. The actual buttons displayed will change according to the current operating conditions.

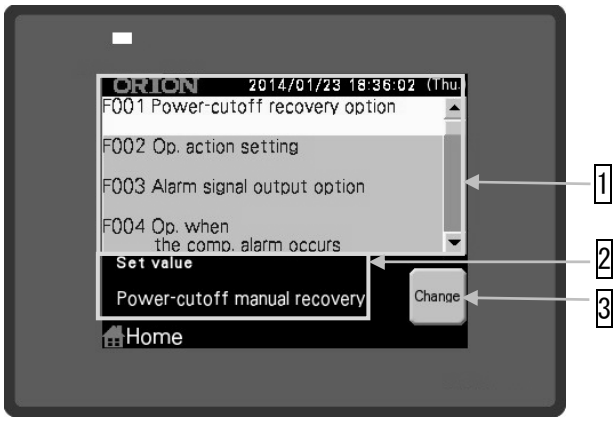
Button-Name	When the Button Is Displayed	Operation	Button-Icon	
Stop Button	① During operation ② During pump-only operation	Press for 0.5 seconds.		
RUN Button	① Operation stopped. ② During pump-only operation	Press for 0.5 seconds.		
Pump-Only Operation Button	① Operation stopped	Press and hold for 3 seconds.	Normally	While Button Touched

Touch Panel Operation

9. Changing to the Menu Screen
Touching the Menu area will bring up the Menu screen.
Details of Circled Numbered Points



① Parameter
Touching the Parameter button will bring up the Parameter screen.
・ Parameter List Screen



1 Touch the ▲ and ▼ buttons to scroll between the list items and select the desired parameter by touching it.
2 The current setting of the chosen parameter will be displayed.
3 Touching the Apply button will bring up the setting screen for the selected parameter.
* The target setting screen will differ depending on the parameter selected.
・ Example of Parameter Setting Screen
◎ Inputting Values Via the Numeric Keypad

Step 1 Enter the desired value on the numeric keypad and then touch the SET button.
Step 2 Touching the Apply button will finalize the setting.
* To return to the parameter list without updating the setting, touch the left arrow button.

Touch Panel Operation

◎ Entering Multiple Simultaneous Options

Step 1 Touch the desired item. The selected item will be indicated by a ☑ mark.
Step 2 Touching the Apply button will finalize the setting.
* To return to the parameter list without updating the setting, touch the left arrow button.

◎ Choosing Alternate Options

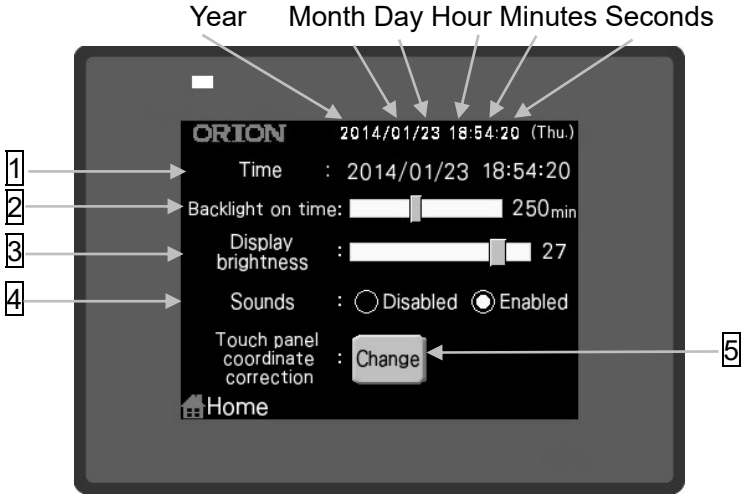
Step 1 Touch the desired item. The selected item will be indicated with a ◉ mark.
Step 2 Press the APPLY button to finalize the setting.
* To return to the Parameter setting screen without updating the setting, press the left arrow button.

* See page 30, "Parameter Functions" for further details regarding individual parameters.

② Touch Panel Settings

Touching the Touch Panel Settings button will bring up the Touch Panel Settings screen.

・ Touch Panel Environment Settings Screen



1 Time/Date Setting: Touching any of the desired items of Year/Month/Day Hour:Minutes:Seconds, will bring up the numeric keypad. Enter the desired value, and then touch the Apply button.

2 Backlight ON time: Determines how long before the touch panel backlight will turn off when the touch panel has not been touched. Touching the touch panel will make the backlight turn on again. (During an alarm condition, the backlight will remain ON until the alarm is cleared regardless of the time the backlight has been ON.)

The backlight ON time can be changed with either the scrollbar or via the numeric keypad by first touching the number value on the screen, entering the desired value with the numeric keypad, and then touching the Apply button.

Default Value	10 min
Upper Limit	600 min
Lower Limit	0 min. (Always on)

3 Screen Brightness: Adjust the brightness of the touch panel display.
The screen brightness can be changed with either the scrollbar or via the numeric keypad by first touching the number value on the screen, entering the desired value with the numeric keypad, and then touching the Apply button.

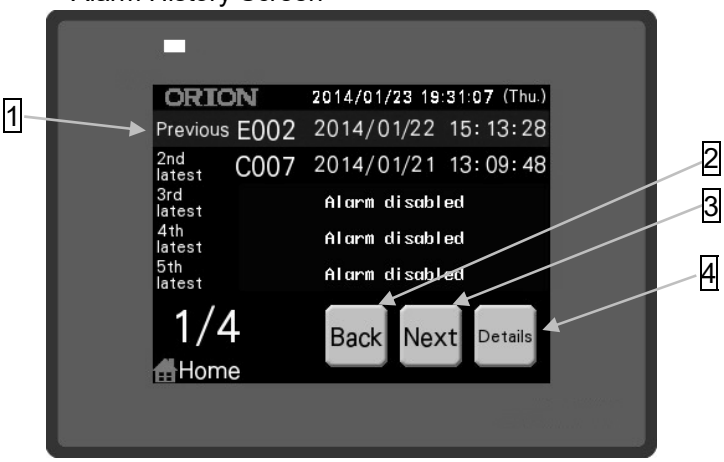
Default Value	8
Upper Limit	32
Lower Limit	0

4 Operation Sound Setting: Press either Disabled or Enabled. (The selected option will be surrounded with a 「◉」.)
※ Default setting: Enabled

5 Touch Panel Coordinate Correction: Only use if the touch panel is not operating properly.
Touching the Apply button will bring up the Calibration (white) screen. Touching the "+" at the top of the screen will cause the "touch" sound to be sounded. Keep touching the "+" until it disappears and "TP Adjust Success!" is displayed.

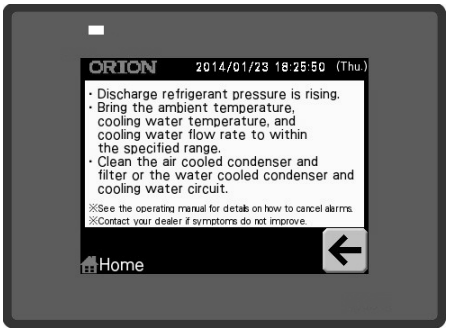
③ Alarm History
Touching the Alarm History button will bring up the Alarm History screen.

- Alarm History Screen



All of the alarms which have occurred until the present time will be displayed. (The first item will be the most recent alarm. Up to 20 previous alarms can be displayed.)
2 or 3 will scroll through the previous 1-5, 6-10, 11-15, or 16-20 items in the error history.
1 The alarm number and timestamp of the alarm will be displayed. Touching inside the 1 area and then touching 4, the Details button, will bring up the Alarm History Details screen.

- Alarm History Details Screen



Will display the description associated with the alarm number and possible remedies to the problem.

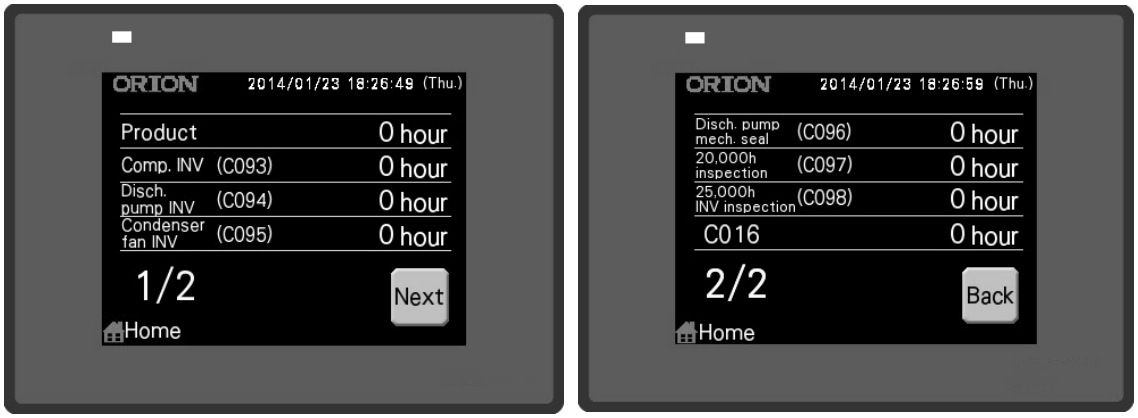
* Touch the arrow button to return to the Alarm History screen.

※ For details regarding specific alarms, see page 54, "Troubleshooting".

④ Accumulated Time

Touching the Accumulated Time button will bring up the Accumulated Time screen.

- Accumulated Time Display Screen

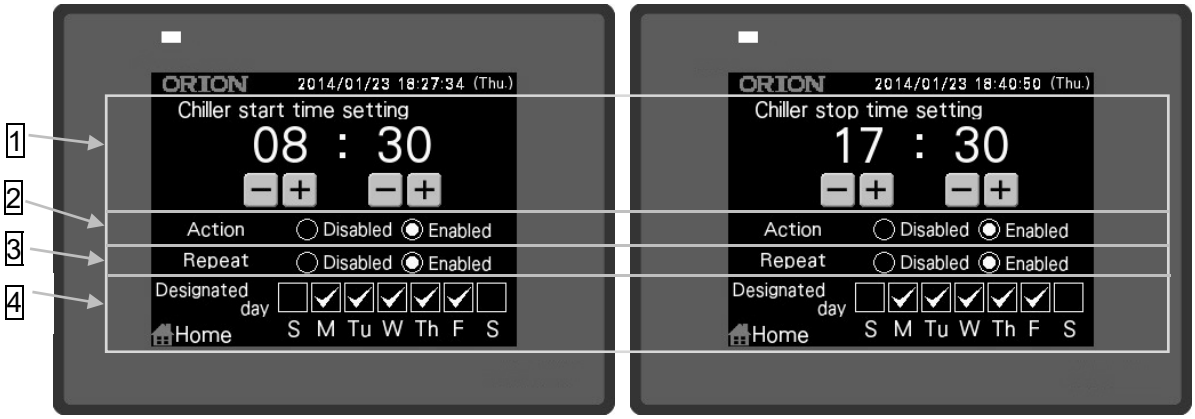


The illustration above detail the contents of the accumulated time screen.
Switch between the screens by pressing the Next or Prev buttons in the lower right of the screen.
* "C016" has a clear option. (See page 62 for details.)

⑤ Start Time Setting

⑥ Stop Time Setting

Touching the Start Time Setting or Stop Time Setting Buttons will bring up the Start Time or Stop Time Setting screen.



1 Change the hour or minutes settings by pressing the [-] or [+] buttons.
Touching any of the digits directly will bring up the numeric keypad, from which the value can be changed.

Default Value	0 : 00
Upper Limit	23 : 59
Lower Limit	0 : 00

2 Action Select: Set by touching either Disabled or Enabled. (The selected option will be surrounded by 「◉」.)
* Default setting: Disabled

3 Repeat Function: When the timer elapses, either the Enable setting can be maintained, or Disable can be touched. The selected option will be surrounded by 「◉」.)
* Default setting: Disabled

4 Repeat Day: Determines the day the timer should be activated. Touch the box □ of the desired day(s). The set day(s) will be marked with a check ☑.

* The timer will not be valid on unselected days. Be sure to enter this setting.

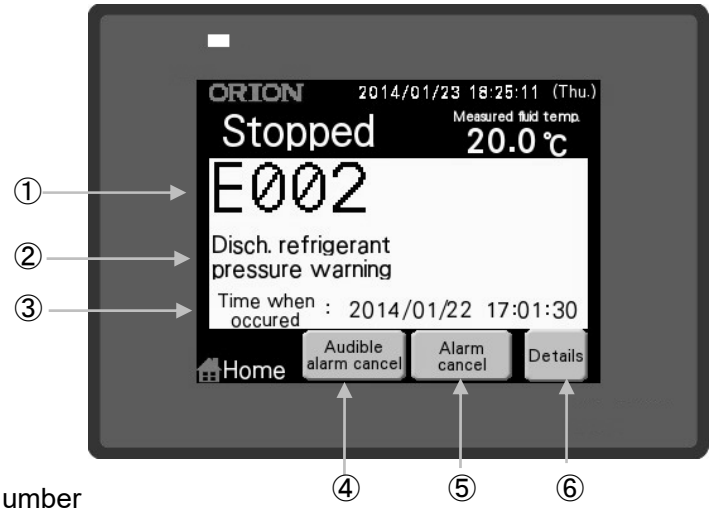
⑦ Software Version
This screen shows the control board and touch panel software versions and the current control board dip switch settings.

⑧ Touching the Language Option button will bring up the Language Select screen.
Touch the desired language

10. Changing between the Run/Stop Time Display and the Run/Stop Time Setting Screens
(1) The start or run times will be displayed if they are set.
(2) If displayed, touching this area will bring up the respective start or stop time setting screen. (See page 27, "Start Time Setting" or "Stop Time Setting" for details on how to change these settings.)

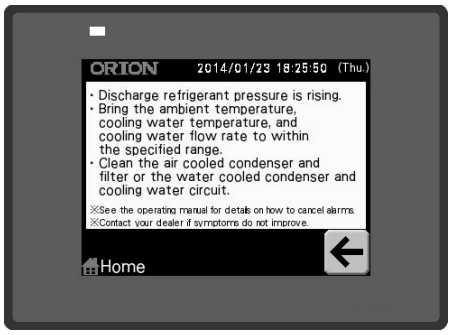
11. Changing Between the Alarm Number Display and Alarm Occurrence Screen
(1) The alarm number will be displayed if an alarm condition arises.
(2) If an alarm number is displayed, and the alarm number is touched, the Alarm Occurrence screen will be displayed.

- Alarm Occurrence Screen



① Alarm Number
② Alarm Name
③ Alarm Occurrence Timestamp
④ Cancel Audible Alarm: If there is an audible alarm, touching this button will turn off the alarm sound.
⑤ Cancel Alarm: After the cause of the alarm has been removed, press this button to cancel the alarm.
⑥ Alarm Details: Touching this button will bring up the Alarm Details screen.

・ Alarm Details Screen



Will display details associated with the alarm and possible remedies to the problem.

※Touch the arrow button to return to the Alarm Occurrence screen.

* The Alarm Occurrence screen may automatically be shown depending on the specific alarm.

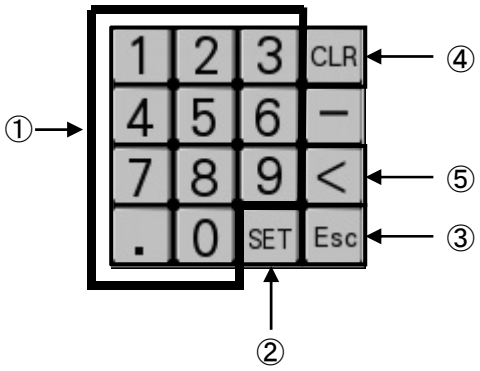
12. Control Board and Communications Conditions Display

If a signaling problem occurs between the control board and touch panel, an icon will appear.

Normal Communications	Communications Error
No Icon	

* If the icon is displayed, the touch panel cannot be operated. After the icon is displayed, if the communications problem between the control board and the touch panel is resolved, the icon will automatically disappear.Please consult your dealer if the icon fails to go out for an extended period of time.

● Operating the Numeric Keypad



① Number and decimal point buttons
② SET: Registers the entered value.
③ Esc: Close the numeric keypad. (Touching a setting value will cause the numeric keypad to reappear.)
④ CLR: Clears the any entered value.
⑤ < : Delete the previous digit.

IMPORTANT

● From a screen other than the Home screen, the display will return to the Home screen under any of the following conditions:

・ If the Home button in the lower left corner is touched.
・ If the Apply button is touched from any setting screen.
・ If the touch panel is not touched for 30 seconds.

Parameter Functions

Parameter Functions and Types

Parameter Functions and Types

1. Parameter List (Settings can be changed while the product is running.)

Parameter No.	Item	Setting Range	Units	Factory Default Setting
F001	Power Outage Recovery Setting	Power Outage Manual Recovery / Power Outage Automatic Recovery / Remote Switch Priority	—	Power Outage Manual Recovery
F002	Operation Action Settings	Main Unit Control: Enable/Disable Remote Control: Enable/Disable Communications Signal Control: Enable/Disable Remote Switch Control: Enable/Disable	—	All Enabled
F003	Alarm Signal Output Options	Relay During Alarm Output: ON/OFF	—	Relay During Alarm Output: ON
F004	Compressor Related Alarm Action Option	All Stopped / Depends on Alarm Processing Action Pattern	—	Depends on the Alarm Processing Action Pattern
F005	Audible Alarm ON/OFF Option	Main Unit: Audible Alarm: ON/OFF Remote Control: Audible Alarm: ON/OFF	—	Main Unit and Remote Control Audible Alarms: Enabled
F006	Audible Warning ON/OFF Option	Main Unit: Audible Alarm: ON/OFF Remote Control: Audible Alarm: ON/OFF	—	Main Unit and Remote Control Audible Alarms: Enabled
F007	Independent Operation / Action Setting	Local Control from Main Unit: Enable/Disable Remote control: Enable/Disable Communications Signal Control: Enable/Disable Pump Remote Switch Control: Enable/Disable	—	All Enabled
F008	Settings Lock Setting	Setting Changes from Main Unit: Enabled/Disabled from Remote Control: Enabled/Disabled from Communications Signal: Enabled/Disabled	—	All Enabled
F010	Freeze-Prevention Mode Option	Freeze-Prevention Operation: Enabled/Disabled	—	Freeze-Prevention Operation: Disabled
F011	Warm-Up Mode Option	Warm-Up Operation: Disabled/Enabled	—	Warm-Up Operation: Disabled
F012	Warm-Up Temp. Setting	10.0 to 35.0	°C	20.0
F013	Snow Protection Mode Option	Snowfall Protection Operation: Disabled/Enabled	—	Snowfall prevention operation: Disabled
F014	Low Noise Operation Mode Oprion	Normal Mode / Low-Noise Operation Mode	—	Normal mode
F015	Energy Saving Mode Option	High Accuracy Mode / Energy Saving Mode	—	High Accuracy Mode
F020	Fluid Temp. Upper/Lower Limit Warning Option	Alarm Detect: Disabled Relative Value Alarm Standby Sequence: Enabled Phase Value Alarm Standby Sequence: Disabled Absolute Value Alarm Standby Sequence: Enabled Absolute Value Alarm Standby Sequence: Disabled	—	Alarm Detect: Disabled
F021	Liquid Temp. Upper/Lower Limit Warning Relative Value	0.1 to 5.0	°C	5.0
F022	Liquid Temp. Upper/Lower Limit Warning Absolute Value Upper Limit Value	<F023> + 0.2 to 40.0	°C	35.0
F023	Liquid Temp. Upper/Lower Limit Warning Absolute Value Lower Limit Value	-2.0 to <F022> - 0.2 (When "Clean Water" option is selected.) -5.0 to <F022> - 0.2 (When "Antifreeze" option is selected.)	°C	3.0
F031	Time Elapsed Warning Time Setting	0 to 30,000	h	0
F053	Inverter Replacement Warning Signal Option	Alarm Signal: Disabled / Enabled	—	Alarm Signal: Enabled
F054	Inspection Warning Detect Option	Inspection Warning: Disabled/Enabled	—	Inspection Warning: Enabled
F090	Communications Device Address	0 to 31	—	0
F091	External Communications Baud Rate	38400/9600	bps	38400
F099	Settings Lock	Settings Changes: OK / Settings Locked	—	Setting Changes: Unlocked (Settings can be changed)
F120	Temperature Warning Signal Output Option	Relay State when "C007" Occurs: ON/OFF	—	Relay State when "C007" Occurs: ON

* If functions related to F012, F021, F022, and F023 are not in effect, the relevant parameters won't be displayed. Please see the following sections for further details.

Parameter Functions

Parameter Functions and Types

2. Parameter Function Details

■ "F001" Blackout or Power-Cutoff Recovery Setting (Relevant parameters: "F002" and "F007".) Selects recovery pattern after power outage.

"F001" Setting	Operation State Before Power Outage	Remote Operation State	Remote Pump Independent Operation State	Operation State After Power Recovery	Display After Power Recovery
Power Outage Manual Recovery	Running	—	—	All Stopped	E014
	Pump-Only Operation	—	—	All Stopped	E014
	Stopped	—	—	All Stopped	—
Automatic Recovery After Power Outage	Running	—	—	Automatic Restart	—
	Pump-Only Operation	—	—	Pump-only operation will automatically resume.	—
	Stopped	—	—	All Stopped	—
Remote Switch Priority	Running	Remote ON	—	Automatic Restart	—
		Remote OFF	Remote Pump-Only Operation ON	Pump-only operation will automatically resume.	—
			Remote Pump-Only Operation OFF	All Stopped	—
	Pump-Only Operation	Remote ON	—	Automatic Restart	—
		Remote OFF	Remote Pump-Only Operation ON	Pump-only operation will automatically resume.	—
			Remote Pump-Only Operation OFF	All Stopped	—
	Stopped	Remote ON	—	Automatic Start	—
		Remote OFF	Remote Pump-Only Operation ON	Pump-only operation will automatically resume.	—
			Remote Pump-Only Operation OFF	All Stopped	—

* Factory default setting: Manual Recovery after Power Outage.

〈 Setting Restrictions 〉

"F002 and "F007".

"F002" and "F007" Settings	"F001" Possible Settings
"F002" and "F007": Remote Operation Disabled	Automatic or manual recovery possible after power outage.
Other Than Above Mentioned Settings	All Settings Possible

■ "F002" Operation Control Settings (Related parameter: "F001") "Main Unit", "Remote Control", "Remote Signal", or "Remote Switch" Enable/Disable options can be selected.

"F002" Setting	Description
Action Enabled	Checkbox Checked
Action Disabled	Checkbox Unchecked

* Factory default setting: All Enabled.

*1 Settings can only be changed via the main unit touch panel.

*2 If all operating parts (Main Unit／Remote Control／External Communications／Remote Switch) are disabled, then the product can only be operated from the main unit.

Note that when the remote switch setting of "F002" is disabled, then when "F001" is set to remote priority, "F001" will automatically be set for automatic recovery after power outage.

■ "F003" Alarm Signal Output Select The contact state of the alarm signal terminals can be selected.

"F003" Setting	Description
Relay During Alarm Output: ON	Select the desired option.
Relay During Alarm Output: OFF	

* Factory default setting: Relay ON During Alarm.

For either setting, the relay will be OFF when the product is unpowered.

Parameter Functions

Parameter Functions and Types

■ "F004" Compressor Related Alarm Occurrence Operation Option These options determine if the unit will fully shut down when an alarm occurs, or if unit functions capable of continued operation will continue to do so.

"F004" Setting	Description
All Stopped	All Stopped
Depends on the alarm processing action pattern. *1	Components that are able to operate will continue operating.

* Factory default setting: Depends on the alarm processing pattern.
*1 For details on specific alarms and consequences to unit operation, please see page 51, "■ Alarm Processing".

■ "F005" Audible Alarm Enabled/Disabled (Related parameter: "F006") Select whether the audible alarm is enabled or disabled on the main unit and remote control when an alarm condition occurs. (For all alarms except for "C064" and "C065")

"F005" Settings	Description
Audible Alarm Disabled *1	Checkbox Unchecked
Audible Alarm Enabled *2	Checkbox Checked

* Factory default setting: Audible alarm enabled on main unit and remote control.
*1 If the audible alarm is disabled, then parameter "F006" will be invalid.
*2 Regardless of this setting, there will be no audible alarm for warning conditions "C064" and "C065".

■ "F006" Audible Warning Enabled/Disabled Select whether the audible warning is enabled when C*** warnings occur.

"F006" Setting	Description
Audible Alarm Disabled	Checkbox Unchecked
Audible Alarm Enabled	Checkbox Checked

* Factory default setting: Audible alarm enabled on main controller and remote controller.
(1) This setting is only relevant to “C * *” type warnings. (Regardless of this setting, there will be no audible alarm for warning conditions "C064" and "C065".)
(2) If the parameter "F005" is set so that the audible alarm is disabled, then parameter "F006" will be invalid.

■ "F007" Pump-only operation enabled/disabled (Relevant parameter: "F001")
Selects whether pump-only operation can be enabled/disabled via the main controller, remote controller, external communications signal, or the remote switch.

"F007" Setting	Description
Action Enabled	Checkbox Checked
Action Disabled	Checkbox Unchecked

* Factory default setting: All enabled.
(1) Settings can only be changed via the touch panel.
(2) If all operating parts (Main control／Remote control／External communications／Remote switch) are disabled, then the product will take a setting such that it can only be operated from the main controller.
(3) Warning: Note that when the remote switch setting of "F007" is disabled, when "F001" is set to remote priority, "F001" will automatically be set for automatic recovery after power outage.

■ "F008" Settings Changes Enable/Disable
Selects from where settings can be changed, among the Main Control, Remote Control, or Remote Communications Signal.

"F008" Setting	Description
Setting Changes Enabled	Checkbox Checked
Setting Changes Disabled (Settings locked).	Checkbox Unchecked

* Factory default setting: All enabled.
(1) Settings can only be changed via the touch panel.
(2) If all operating parts (Main control／Remote control／External communications) are disabled, then the product will take a setting such that it can only be operated from the main controller.

Parameter Functions

Parameter Functions and Types

■ "F010" Freeze prevention mode select (Related parameter: "F011")

Freeze prevention operation is used to prevent water in the product from freezing when the product is not being operated during cold months. When in this mode, the discharge pump is automatically cycled in order to prevent water in the product from freezing.

"F010" Settings	Description
Freeze-Prevention Operation: Disabled	Select the desired option.
Freeze-Prevention Operation: Enabled	

* Factory default setting: Freeze prevention mode is disabled.

(1) When the freeze prevention mode is enabled, the discharge pump will operate depending on the measured temperature, based on the following guidelines:

Water Temp.	3 °C or lower	3 to 10 °C	10 °C or higher
Discharge Pump Operating State	Sustained Operation * Heat from the discharge pump will raise the water temperature, and the pump will stop when it reaches 5 °C.	Repeated Cycle of 28 Minutes Off, 2 Minutes On	Completely Stopped

(2) How to stop the discharge pump while in the freeze prevention mode. Set the freeze prevention mode parameter to "Disabled" to stop the discharge pump from operating in this mode.

(3) When the freeze prevention mode is enabled, it will be indicated by showing the freeze prevention mode icon on the Home screen.

(4) If parameter "F011", Warm-Up Mode, is enabled, then parameter "F010" cannot be enabled.

IMPORTANT

- **Note that the chilled water outlet sensor is located inside the product. Therefore, if insulation on external pipes is inadequate, then there is a chance that those external pipes may freeze.**
- **If the water level in the water tank drops and alarm "E006" occurs, the product will not be able to enter the freeze-prevention mode. Therefore, ensure that the water level inside the water tank is always between E and F.**
- **If the setting for freeze-prevention operation is "Enabled", then make sure that the water pipes are not closed or blocked when the product is not operating. In addition to ruining the effectiveness of the freeze-prevention mode, there could be an abnormal rise in water pressure when the discharge pump is running which could lead to water leaks or other problems.**
- **If there is a chance that the ambient temperature will fall below -5 °C, freeze-prevention should be handled by activating the warm-up mode (F011). However, note that freezing cannot be prevented if the ambient temperature goes to -20 °C or lower.**
- **The product should be operated in an ambient temperature of –10 to 45 °C. Operating the chiller outside this temperature range can lead to breakdown of the compressor or other trouble.**

■ "F011" Warm-Up Mode Select (Relevant parameters: "F010" and"F012")

The warm-up operation function is used during cold months or other times when the ambient temperature is low in order to avoid letting the water cool down during times when the product is off. The water temperature will be maintained at the temperature set in parameter "F012" by automatically running the discharge pump.

Doing so shortens the time it takes to increase the water temperature when operation is started.

"F011" Setting	Description
Warm-Up Operation: Disabled	Select the desired option.
Warm-Up Operation: Enabled	

* Factory default setting: Warm-Up Operation: Disabled.

(1) How to turn off the pump during warm-up operation:
Changing the Warm-Up Operation setting to "Disabled" while the unit is operating will disable the pump.

(2) If Warm-Up Operation parameter is set to "Enabled", the Warm-up icon will be displayed under the Mode display of the Home screen.

(3) If "F010" is set to "Freeze-Prevention Operation: Enabled", then "F011" cannot be set.

Parameter Functions

Parameter Functions and Types

IMPORTANT

- **If the water level in the water tank drops and alarm "E006" occurs, then the product will not be able to enter the freeze-prevention mode. Therefore, ensure that the water level in the water tank is between "E" and "F" on the water level gauge.**
- **If Warm-Up Operation is set to enabled, then make sure that the water pipes are not closed or blocked. In addition to ruining the effectiveness of the warm-up function, there could be an abnormal rise in water pressure when the discharge pump is running which could lead to water leaks or other problems.**

■ "F012" Warm-Up Temp. Setting (Relevant parameter: "F011")

If parameter "F011" is set to "Warm-Up Operation: Enabled", then, when the product is stopped, the water temperature will be maintained at the temperature indicated by this parameter by automatic operation of the discharge pump.

"F012" Possible setting rage: 10.0 °C to 35.0 °C (Minimum setting interval: 0.1 °C)

* Factory default setting: 20.0°C.

Regarding the "F012" setting: The discharge pump will start operating at 2.0 °C below the set temperature and will stop operating when the temperature goes past +2.0 °C over the set temperature.

■ "F013" Snow Protection Mode Option

When enabled, and when the product is stopped, the fan will periodically and automatically start in order to blow fallen snow from the upper exhaust port.

"F013" Settings	Description
Snowfall Prevention Operation: Disabled	Select the desired option.
Snowfall Prevention Operation: Enabled	

* Factory default setting: Snow protection operation is disabled.

(1) If set to “Snowfall prevention operation: Enabled” then the fan will operate independently, even when the product is not operating. The fan will operate on a repeating cycle of 27 min off, and 3 min on (when the temperature inside the distribution box is 10 ℃ or lower, or when the discharge refrigerant pressure is 1.0 MPa or lower.)

(2) How to turn off the fan during snow protection operation:
Changing the snow protection operation to "Disabled" while the product is operating will disable the fan.

(3) When the snow protection mode is enabled, it will be indicated by showing the snow protection mode icon on the Home screen.

WARNING

- **Always remove power to the product before inspecting or repairing the product. Getting caught in a rotating fan can result in serious injury.**

■ "F014" Low Noise Operation Mode Option

Reduces the fan noise is lowered by reducing the maximum fan speed to 40Hz (normally 60Hz). Note that in this mode, compressor output (cooling capacity) will drop to a maximum of 80%.

"F014" Settings	Description
Normal Mode	Select the desired option.
Low noise Operation Mode	

* Factory default setting: Normal mode.

(1) If the outside air temperature is low, the fan speed will be low, even when in "Normal mode". Therefore under such conditions, the noise level might not be reduced even if the "Low noise Operation mode" is enabled.

(2) If the outside air temperature is high, then operating in the "Normal mode" is recommended. Operating under the "Low noise Operation mode" in such conditions may cause built-in safety devices to activate.

(3) After changing the low noise mode setting, please stop and then restart operation in order to activate the desired mode. Changing the mode during operation may cause the high pressure switch to be activated (resulting in error condition E002) and the product may shut down.

(4) When the low noise operation mode is enabled, it will be indicated by showing the low noise operation mode icon on the Home screen.

■ "F015" Energy Saving Mode Option

This function will stop the compressor if the cooling load is low in order to save energy. Enabling this function will result in the estimate working cooling load to be below about 30 % of the rated cooling capacity (written on the specifications plate on the front right side of the product). (The exact amount may differ some depending on the ambient temperature or fluid temperature setting.) This is effective in cases when the maximum cooling load is large but when there are sometimes drops in the cooling load.

"F015" Setting	Description
High Accuracy Mode	Select the desired option.
Energy Saving Mode	

* Factory default setting: High accuracy mode.

(1) In the energy saving operation mode, during times when the compressor is in the process of running and stopping, the fluid temperature may fluctuate by as much as ±2.0 °C of the set temperature.

(2) When the energy saving mode is enabled, it will be indicated by showing the energy saving mode icon on the Home screen.

IMPORTANT

- **During conditions like when the outside air temperature is low and if the piping external to the product is inadequately insulated, the fluid temperature may go beyond the above-mentioned range**

■ "F020" Liquid Temp. Upper/Lower Limit Warning Select (Relevant parameters: "F021", "F0022", "F023")

This parameter setting will determine how an abnormal liquid temperature is detected. The detection temp. is set through parameters "F021", "F022", and "F023".

"F020" Setting	Description
Alarm Detect: Disabled	Select the desired option.
Relative Value Alarm Standby Sequence: Enabled	
Relative Value Alarm Standby Sequence: Disabled	
Absolute Value Alarm Standby Sequence: Enabled	
Absolute Value Alarm Standby Sequence: Disabled	

* Factory default setting: Alarm detect: Disabled.accuracy mode.

(1) The alarm display will show “C007”.The alarm will be displayed and there will be an audio alarm (depending on parameter settings F005 and F006) and product operation will continue. See page 51, "Alarm Processing Table" for details.

(2) If a standby sequence is enabled, the alarm detection will start after the fluid temperature initially reaches a normal value, after which time an alarm will be generated if the temperature goes out of range.

(3) The detection warning will not occur when the product is stopped.

< When Standby Sequence Applies >

1. When "Relative Value Alarm Standby Sequence: Enabled":
   ① The alarm will not be output during startup time until the temperature initially goes over the "F021" temperature setting.
   ② After the initial startup temperature has been reached, the alarm will occur if the temperature subsequently goes ±0.1 °C outside the "F021" water temperature setting.
2. When "Absolute Value Alarm Standby Sequence: Enabled":
   ①The alarm will not be output during startup time even if the temperature goes beyond the "F022" or "F023" temperature settings.
   ②Once startup has completed such that the temperature has initially gone to within ±0.1 °C of the desired range, from that time on, if the temperature goes beyond the range of "F022" or "F023" the alarm will occur.
   * When the standby sequence is enabled, the alarm can be cleared by touching the Alarm Cancel button on the Alarm Occurrence screen. In such cases, the conditions described in section ① above apply, and if the conditions in ② occur again, the warning will be output again.

■ "F021" Fluid Temp. Relative Value Upper/Lower Limit Warning (Relevant parameter: "F020")

"F020" is active when the relative value alarm is enabled. Generates a warning when the water temperature varies from the set water temperature by this relative amount."F021" possible setting rage: 1.0 °C to 5.0 °C. (Minimum setting interval: 0.1 °C.)

* Factory default setting: 5.0 °C.

For example, with a setting of 3.0 °C, the alarm would occur if the water temperature went beyond ±3.0°C of the set temperature.

Parameter Functions

Parameter Functions and Types

■ "F022" Fluid Temp. Absolute Value Upper/Lower Limit Warning Upper Limit Value (Relevant parameter: "F020" and "F023")
"F020" is active when the absolute value alarm is enabled. The warning will occur if the water temperature goes above this set temperature regardless of the actual set water temperature."F022" possible setting rage: The value of "F023" + 2.0 °C to 40.0 °C. (Minimum setting interval: 0.1 °C.)
* Factory default setting: 35.0 °C.

■ "F023" Fluid temperature absolute value upper/lower limit warning lower limit value (Relevant parameter: "F020" and "F022")
"F020" is active when the absolute value alarm is enabled. The warning will occur if the water temperature goes below this set temperature regardless of the actual set water temperature."F023" possible setting range: Set to Clean Water : -2.0 °C to "F022" set value minus 0.2 °C. Set to Antifreeze : -5.0 °C to "F022" set value minus 0.2 °C (minimum setting interval: 0.1 °C)
* Factory default setting: 3.0 °C.

■ "F031" Elapsed Time Warning Set Time
If the elapsed time of operation goes over this time setting, then warning “C016” will occur. The product can continue to operate while this warning is displayed. See page 51, "Alarm Processing Table" for details.

"F031" Setting	Description
0	Warning Disabled
1 to 30,000	Alarm "C016" Can Occur.

* Factory default setting: 0.

■ "F053" Inverter Replacement Warning Signal Option
This setting determines whether or not an alarm signal will be generated after the product has accumulated 60,000 hours of running time.

"F053" Setting	Description
Alarm Signal: Disabled	Select the desired option.
Alarm Signal: Enabled	

* Factory default setting: Alarm signal enabled
If set to "Alarm Signal: Disabled", then the alarm will not be output. However, warnings "C093" and "C095" can occur.

■ "F054" Inspection Warning Option
Determines the warning output if the set time of warnings “C096”, “C097”, or “C098” have been exceeded.

"F054" Setting	Description
Inspection Warning: Disabled	Select the desired option.
Inspection Warning: Enabled	

* Factory default setting: Inspection warning: enabled
If set to "Inspection Warning: Disabled", then the alarm will not be output. Warnings "C096", "C097", and "C098" will not occur.

■ "F090" Communications Device Address
Enables communications functions and selects the address number of the unit when multiple units are connected together. Any address from 0 to 31 can be freely chosen for a maximum of 32 units.
* Factory default setting: 0.
Please see page 36, "Communications Functions" for further details regarding communications functions.

■ "F091"External Communications Baud Rate
When optional chiller communications software is used when multiple units are connected, the parameter is used to select the product baud rate. The baud rate can be selected from either "38400" or "9600". This setting must be the same as other connected units.
* Factory default setting: 38400.

■ "F099" Settings lock Prevents changes to parameter and fluid temperature settings.

"F099" Setting	Description
Setting Changes: Unlocked (Settings can be changed.)	Select the desired option.
Setting Changes: Locked (Settings cannot be changed.)	

* Factory default setting: Setting changes enabled
Settings can only be changed from the main unit touch panel.

■ "F120" Temp. Warning Signal Output Option
Determines the open/closed state of contacts when a temperature warning signal is present.

"F120" Setting	Description
Relay State When "C007" Occurs: ON	Select the desired option.
Relay State When "C007" Occurs: OFF	

* Factory default setting: Relay ON during "C007" warning.
For either setting, the relay will be OFF when the product is unpowered.

Communications Functions

Overview of Communications Functions

This product supports optional communications software which, if installed onto a PC, and by connecting from 1 to a maximum of 32 of these units to that PC, the PC can be used to control and monitor those connected units. As shown on the next page under, "Communications Specifications", communications functions can be made to work with a user's specialized control program in order to best suit the requirements of the application at hand. The following is an outline of the functions supported by installation of the optional communications software. For further information, please see the operating manual included with the communications software package.

■ Compatible Hardware

1. OS : Microsoft Windows
2. Display Resolution: 800×600 or higher

■ Operation Control Functions

1. Product Run/Stop
2. Pump-Only Operation Start/Stop
3. Water Temperature Set/Change
4. How to Change Parameter Settings
5. Timer Set/Change

■ Display Functions

1. Product Run/Stop
2. Pump-Only Operation Start/Stop
3. Measured Water Temperature / Set Water Temperature
4. Alarm
5. Operating Rate
6. Graph of Change in Measured Fluid Temperature
7. Timer Setting Enable/Disable

■ Download Operating Data (EXCEL comma separated values (CSV) file)

1. Date
2. Time
3. Outlet Liquid Temperature
4. Set Liquid Temperature
5. Operating State
6. Operating Rate
7. Alarm No.
8. Date and Time of Alarm
9. Start/Stop Timer

IMPORTANT

- **If the "External Communications" option under parameter "F002" (Operation control setting) is disabled, then the product cannot be run or stopped via communications signals.**
- **If the "External Communications" option under parameter "F007" (Pump-only operation control setting) is disabled, then pump-only operation cannot be started or stopped via communications signals.**
- **If the "External Communications" option under parameter "F008" (Operation control setting) is disabled, then product settings cannot be changed via communications signals.**
- **If parameter "F099" (Settings lock parameter) is set to "1" (settings locked) then the water temperature, parameters, and timer cannot be set or changed.**
- **See page 23 for further information on how to change parameter settings.**
- **When performing wiring, keep communications cables away from control and power cords. Bundling communications cables with other cables can make them susceptible to noise and may cause communications errors.**

Communications Specifications

■ Communications Protocols

1. USB Port: USB2.0
2. EIA Standard: RS-422A/485 Standard

■ Communications Method

1. USB: Half duplex point to point connection
2. RS-422A: 4 line, full duplex, multi-drop connection
3. RS-485: 2 line, half duplex, multi-drop connection

■ Communications Rate

38400 bps

■ Data Format

1 start bit, 8 data bits
No parity, 1 stop bit

■ Error Detection And Correction

LRC

■ Number of Units That Can Be Connected

1. USB: 1 unit
2. RS-422A: 32 units
3. RS-485: 32 units

* USB and RS-422A/485 cannot be used together. Adjust the slide switch on the control board to switch between USB and RS-422A/485. (Default setting: USB)

■ Data Types

1. Text: JIS (ASCII) 7 bit encoding
2. Control Codes

Signal Name	Signal Code (16 bit)	Description
STX	02h	Start of Text
ETX	03h	End of Text
EOT	04h	End of Transmission
ENQ	05h	Enquiry
ACK	06h	Acknowledge
NAK	15h	Negative Acknowledge

■ Connector Pin Descriptions

1. USB (Distribution panel marking: CN8)

Pin No.	Signal Name	Comments
1	VBUS	USB Power
2	D-	Data(-)
3	D+	Data (+)
4	GND	Power Ground
5	GND	Power Ground

Communications Specifications

2. RS-422A/485 (Shown as CN7 on the connector in the distribution panel.)

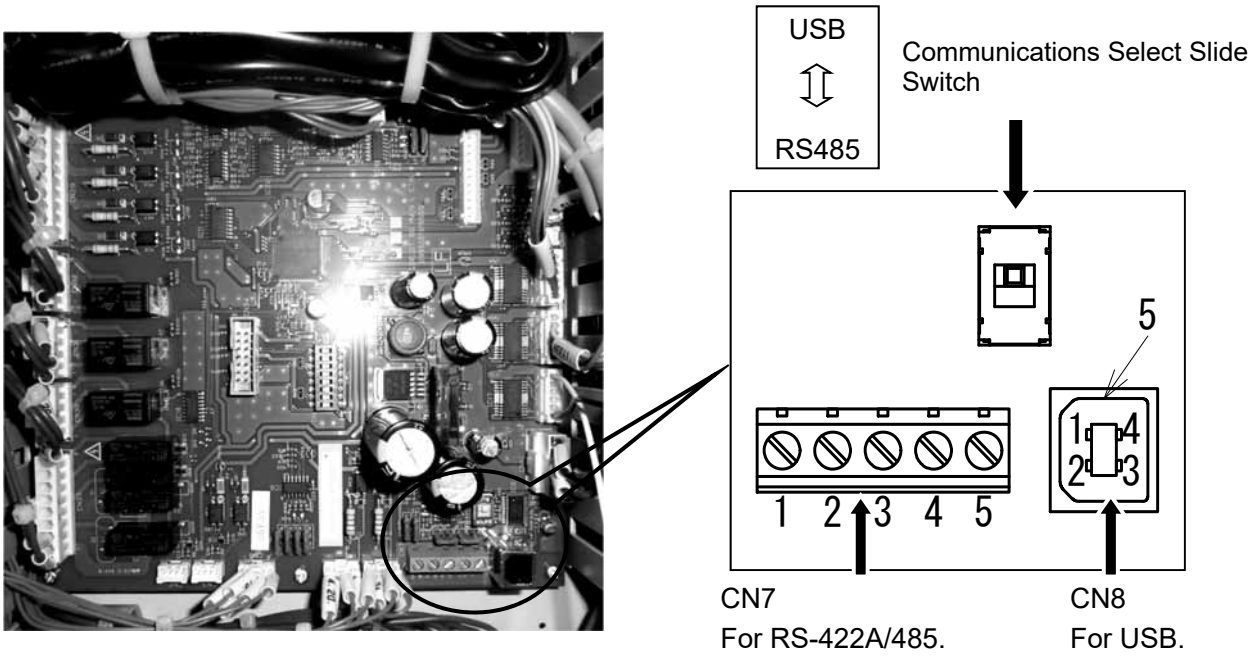
Pin No.	Signal Name	Comments
1	SG	Signal Ground
2	RX+	Receive Data
3	RX-	Receive Data
4	TX+	Transmit Data
5	TX-	Transmit Data

* RS-485 has RX+ connected to TX+, and RX- connected to TX-.

■ Handshaking

There is no handshaking.

■ Connector and Pin Layout in the Distribution Panel



※ Numbers indicate connector number.

■ Communications Logic

1. USB

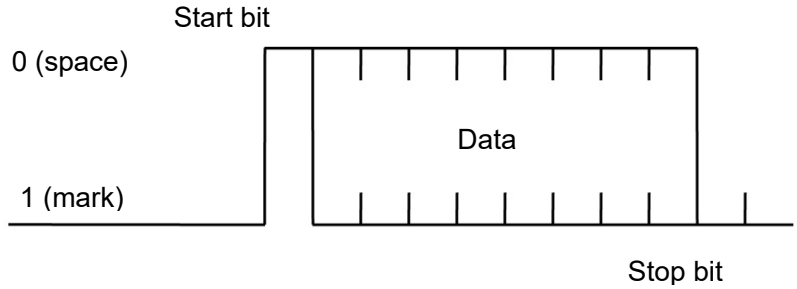
Signal Voltage	Logic
(D-) - (D+) > 200 mV and D- > $V_{IH(min)}$	0 (Space)
(D+) - (D-) > 200 mV and D+ > $V_{IH(min)}$	1 (Mark)

2. RS-422A/485

Signal Voltage	Logic
V(-) > V(+)	0 (Space)
V(+) > V(-)	1 (Mark)

Communications Specifications

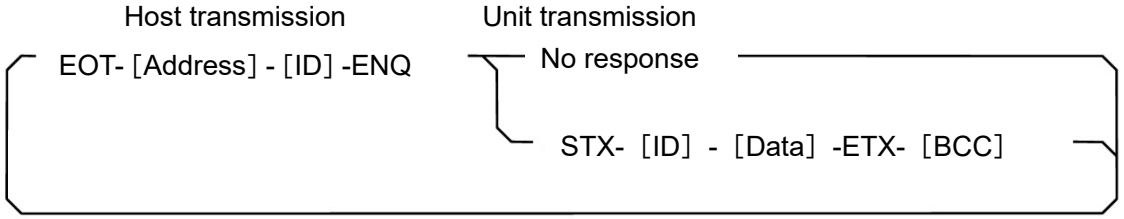
■ Data Configuration



■ Communications Protocol

This product employs the polling/selecting method to establish a data link.

1. The polling host computer selects the desired unit and makes a request to communicate with it.



(1) Polling Procedure

① Before the polling sequence, the host computer initializing the data link will send an EOT signal to the controller in order to initiate a data link.

② Polling Sequence Transmission

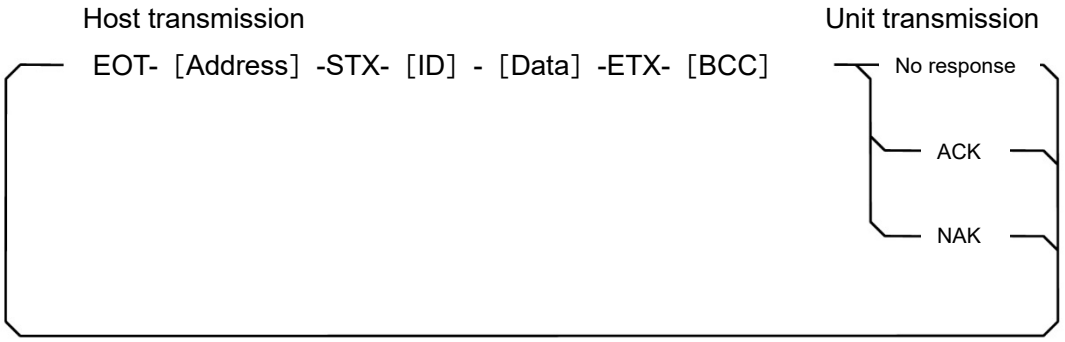
[Address] — [ID] — ENQ

- [Address] : Address of polled device (unit) 2 digit, base 10, JIS character number (00-31)
- [ID]: Identifies the type of data to be sent. See "Communications ID Codes" for further details on the 2 digit, English JIS characters.
- ENQ: After the control character indicating the end of the polling sequence is sent, the host computer will wait for a response from this unit.

③ Main unit data transmission
STX - [ID] - [Data] - ETX - [BCC]

- STX: STX is the control character that indicates the start of the text transmission.
- [ID]: Identifies the type of data to be sent. See "Communications ID Codes" for further details on the 2-digit, English JIS characters.
- [Data]: Indicates the data intended for the unit indicated by the previously sent ID number. 8-digit JIS character.
- ETX: The control character that indicates the end of the text transmission.
- [BCC]: A block check character used to detect any errors by using horizontal parity. It is calculated by performing an exclusive-OR on all characters after STX until ETX.

2. The selecting host computer selects the unit and sends data to it.



(1) Selecting Procedure

① Before the selecting sequence, the host computer initializing the data link will send an EOT signal to the unit controller in order to initiate a data link.

② Selecting sequence transmission [Address] - STX - [ID] - [Data] - ETX - [BCC]

- [Address] : Address of polled device (unit) 2 digit, base 10, JIS character number (00-31)
- STX: STX is the control character that indicates the start of the text transmission.
- [ID]: Identifies the type of data to be sent. See"Communications ID Codes" for further details on the 2-digit, English JIS characters.
- [Data]: Data for the indicated ID (same as in the polling process).
  8-digit JIS character
- ETX: The control character that indicates the end of the text transmission.
- [BCC]: A block check character used to detect any errors by using horizontal parity. It is calculated by performing an exclusive-OR on all characters after STX until ETX.

③ Response From this Unit

- ACK: Acknowledge -- Response from the product indicating that the received data is correct.
- NAK: Negative Acknowledge -- Response from the product indicating that the received data is incorrect.

Communications Specifications

■ Communications ID Codes

ID	Description	Data Range	Polling	Selecting
JŌ	Operating State	0: Stopped 1: Operating 1: Pump-only operation	○	○
ER	Alarm Signal	Displayed Alarm Code	○	×
M1	Liquid Temp. Measured Value	- 99.99 to 99.99	○	×
S1	Liquid Temp. Set Value	3.00 to 35.00 (When clean water option selected) 0.00 to 35.00 (When antifreeze liquid option selected) (Minimum setting increment: 0.01)	○	○

※1 After changing the liquid temperature via a communications function, if the power to the product is cut off, it will revert to the temperature setting before the change. This indicates the end of life of the control board, and the action is intended to prevent breakdown.

■ Communications Data Configuration

1. JŌ: Operating State Data Length: 1 digit (1 byte)
   Data Range: 0 to 9

Example: 1

1
31h

2. ER: Alarm Number Data Length: Fixed, 4 digits (4-byte word)
   Data Range: E000 to E999, C000 to C999, OFF

Example: C064

C	0	6	4
43h	30h	36h	34h

Example: E000

E	0	0	0
45h	30h	30h	30h

Example: OFF
Preparing to Stop

O	F	F	
4Fh	46h	46h	20h

Example: No Alarm

20h	20h	20h	20h

3. M1: Liquid Temp. Measured Value Data Range: －99999 to 999999
   S1: Liquid Temp. Set Value Data Length: 8 digits (8 bytes)
   Minus Position: Fixed at 3rd digit
   Decimal Position: After the 6th digit, or doesn't appear.

Example: 25.33

			2	5	.	3	3
20h	20h	20h	32h	35h	2Eh	33h	33h

Example: -0.44

		-		0	.	4	4
20h	20h	2Dh	20h	30h	2Eh	34h	34h

■ Communications Procedure Example

1. Polling

(1) The host computer sends a request to the unit (device address = 05) for the measured liquid temperature, and the unit responds with the measured temperature (12.34 °C).

Host computer transmission

EOT	Addres		ID		ENQ
	0	5	M	1	
04h	30h	35h	4Dh	31h	05h

Unit transmission

STX	ID		Data								ETX	BCC
	M	1				1	2	.	3	4		
02h	4Dh	31h	20h	20h	20h	31h	32h	2Eh	33h	34h	03h	75h

(2) The host computer sends a request to the product (device address = 27) for the measured fluid temperature, and the product responds with the measured temperature (20.00 °C).

Host computer transmission

EOT	Address		ID		ENQ
	2	7	S	1	
04h	32h	37h	53h	31h	05h

Unit transmission

STX	ID		Data								ETX	BCC
	S	1				2	0	.	0	0		
02h	53h	31h	20h	20h	20h	32h	30h	2Eh	30h	30h	03h	6Dh

(3) The host computer sends a request to the unit (device address = 00) for current operating state, and the main unit responds with the current state (pump-only operation).

Host computer transmission

EOT	Address		ID		ENQ
	0	0	J	$\overline{0}$	
04h	30h	30h	4Ah	4Fh	05h

Unit transmission

STX	ID		Data	ETX	BCC
	J	$\overline{0}$	2		
02h	4Ah	4Fh	32h	03h	34h

(4) The host computer sends a request to the unit (device address = 01) for the alarm code, and the unit responds with the alarm code (E005).

Host computer transmission

EOT	Address		ID		ENQ
	0	1	E	R	
04h	30h	31h	45h	52h	05h

Unit transmission

STX	ID		Data				ETX	BCC
	E	R	E	0	0	5		
02h	45h	52h	45h	30h	30h	35h	03h	64h

2. Selecting

(1) S1 Liquid Temperature Setting The unit (device address=27) is selected, the liquid temperature data (20.0 °C) is transmitted, and the liquid temperature setting is changed.

Host computer transmission

EOT	Address		STX	ID		Data								ETX	BCC
	2	7		S	1				2	0	.	0	0		
04h	32h	37h	02h	53h	31h	20h	20h	20h	32h	30h	2Eh	30h	30h	03h	6Dh

Unit transmission

ACK
06h

In case of a data error, the host computer will reply with the NAK (15h) character.

Examples:
- Incorrect Data Length
- BCC Error
- Incorrect Decimal Point Position
- Data Out of Range

(2) JŌ Operation State The host computer selects the unit (device address = 01), sends the run command ('1') and the unit will operate.

Host computer transmission

EOT	Address		STX	ID		Data	ETX	BCC
	0	1		J	$\overline{0}$	1		
04h	30h	31h	02h	4Ah	4Fh	31h	03h	37h

Unit transmission

ACK
06h

- Selecting operations should be done after confirming the operating state and alarm conditions of the unit through polling operations.
  Example: If during pump-only operation (=2), the run command (=1) is given through a select operation, the unit will respond with ACK. Run and pump-only commands may not be possible during alarm conditions.

Communications Specifications

■ Possible Product Communications Control Operations Based on the Current Product Operating State

When the Equipment is Operating		All Stopped				Running		Pump-Only Operation		
Communications ID State	Unit Operating State (JŌ)	0				1		2		
	Alarm Code (ER)	None	C***	E***		None	C***	None	C***	E***
Touch Panel State	Operation Conditions Display	Stopped				Running		Pump-Only Operation		
	Display	Normal Display	Alarm Output Screen C***	Alarm Output Screen E***	Alarm Output Screen E***	Normal Display	Alarm Output Screen C***	Normal Display	Alarm Output Screen C***	Alarm Output Screen E***
Alarm Processing Pattern		—	0or1	2	3	—	0or1	—	0or1	2
Operation Via Communications Function ○: Action Enabled ×: Action Disabled	Start-up operation	○ ACK	○ ACK	× NAK	× NAK	× ACK	× ACK	○ ACK	○ ACK	× NAK
	Pump-only operation starting up	○ ACK	○ ACK	○ ACK	× NAK	× NAK	× NAK	× ACK	× ACK	× ACK
	Operation stopped	× ACK	× ACK	× ACK	× ACK	○ ACK	○ ACK	○ ACK	○ ACK	○ ACK

*1 ACK state

① The unit could perform the operation it was commanded to do. (On chart: ○ACK)

② The unit has acknowledged the previously requested operation. (Shown by: × ACK)

*2 NAK State

The unit could not perform the operation it was commanded to do.

■ Setting The Device Address

Set parameter "F090". See page 23 for further information on how to change parameter settings.

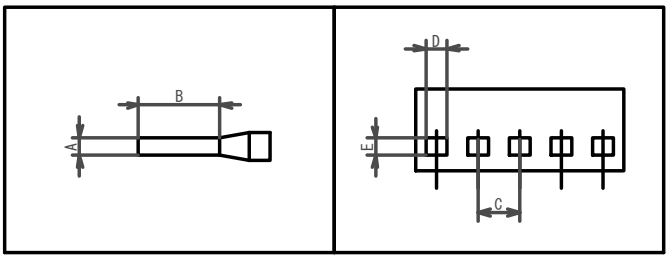
■ Communications (Logic) Timing

1. Response Time After the Device Receives the Request
   (1) Polling: Approx. 125 ms
   (2) Selecting: Approx. 125 ms
2. Time From the Time After the Data Transmission is Complete Until the Output Achieves High Impedance
   (1) Polling: Approx. 8 ms
   (2) Selecting: Approx. 8 ms

Communications Specifications

■ Communications Cables and Connectors

1. USB
   ① Compatible Connector:
   Type B (male) connector
   ② Maximum Cable Length:
   3 m. May be shorter depending on actual operating conditions.
2. RS-422A (RS-485)
   ① Connector
   Terminal Block
   ② Cable Gauge
   AWG16 to 26
   (Use AWG18 to 24 if 2 wires are to be inserted into a single terminal connection.)
   ③ Length of Insulation to Remove From the Cable
   5 to 7 mm
   ④ Attaching the Cables
   Choose either of the following:
   a) Attach the stripped wires as is.
   When performing hookups, twist stripped wire ends and be careful not to allow frayed wires to short out or come into contact with nearby wiring.
   b) Use crimp terminals.
   Use pin or blade type terminals.
   Crimp terminal dimensions and terminal block wiring insertion hole dimensions are maximum values shown below.



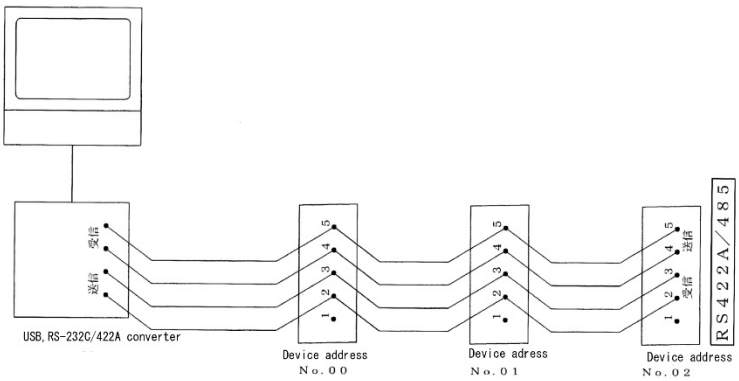
A (Crimp terminal size)	2.1 (max)
	1.1 (min)
B (Crimp terminal size)	10.0
C (Pin hole pitch)	5.08
D (Pin hole width)	2.6
E (Pin hole height)	2.0

Units: mm

* Note that neighboring terminals may interfere with each other and prevent insertion depending on the shape and size of the terminal crimp.
* Regarding lack of insulated wiring between the crimp terminals, if bare (non-insulated) crimp terminals are to be used, it should be noted that there are no protruding insulation spacers between the pin positions to prevent shorting. So ensure there is at least 3.2 mm of insulation on the pins in order to prevent shorting.

⑤ Tightening Torque
0.5 to 0.6 N·m
⑥ Maximum Cable Length
⑤ Max. Cable Length: 100 m. May vary depending on actual operating conditions.
⑦ Connection Example

Host Computer



····· maximum 32 units

* If connecting via RS-422A/485, make the connection by purchasing and using either an RS-232C/422A converter or a USB/422A(485) converter.

Inspection and Maintenance

WARNING

- **Do not operate controls with damp hands. Also, do not touch the power supply terminals or other electrical components. Failure to follow this warning can lead to electric shock.**

WARNING

- **Do not allow water to contact the product component area directly, and do not wash the product with water. Failure to follow this warning may lead to electric shock, fire, or other problems.**

WARNING

- **If the cabinet is opened or removed during inspection or cleaning, be sure to fully close it when finished. Operating while the cabinet is opened or removed can lead to injuries or electric shock due to contact with exposed internal components.**
- **Cut off power to the product before performing cleaning, servicing, or inspections. Failure to do so can result in electric shock, injury, burns, or other problems.**

WARNING

- **The inverter will be hot while running and for a while after power is removed. Do not touch it with bare hands while it is hot. Contact with hot surfaces can cause burns.**
- **When cleaning the filter, do not directly touch the condenser fins with your hands. Failure to follow these warnings can lead to injury.**

IMPORTANT

- **In order to ensure the product always demonstrates enough power, the condenser (filter), water circuit and related components should receive regular maintenance inspections, and depending on how dirty they are, should be thoroughly cleaned. Failure to perform regular inspection and maintenance can lead to reduced thermal efficiency as well as cause built-in safety devices to activate, and could eventually lead to breakdown.**
- **Maintenance inspection types and periods are listed below. Note that adjustment and cleaning of circuits will also be required. Please consult your dealer and arrange a separate service contract.**

■ Inspection and Maintenance Schedule

Part to be Inspected	Point to Inspect	Inspection Period			Comments
		Daily	Monthly	Every 6 Months	
Liquid Level Gauge	Check that the water tank level is between E and F.	○			See page 10 for details.
Touch Panel Measured Pressure (Water pressure)	Should be 0.08 to 0.80 MPa.	○			If out of the range described on the left, see page 11 or 19 for information on how to adjust the pressure.
Condenser (filter)	Check that the filter is not dirty. Check that the product itself is not dirty.		○ *1		See page 49 for details.
Chilled Water Circuit	Confirm the water quality, water temperature, and water level.		○		Replacement Period
Discharge Pump	Check for water leakage.			○	Mechanical seals should be replaced based on inspection results. See page 71 for details.
Inverter Cooling Fan	Check for dirty cooling fins. Check for abnormal cooling fan noise.			○	The inverter cooling fan is among the parts that should be replaced as deemed necessary during inspection. See page 71 for details.
Y-Strainer	Check for dirty strainer.		○		See page 50 for details.

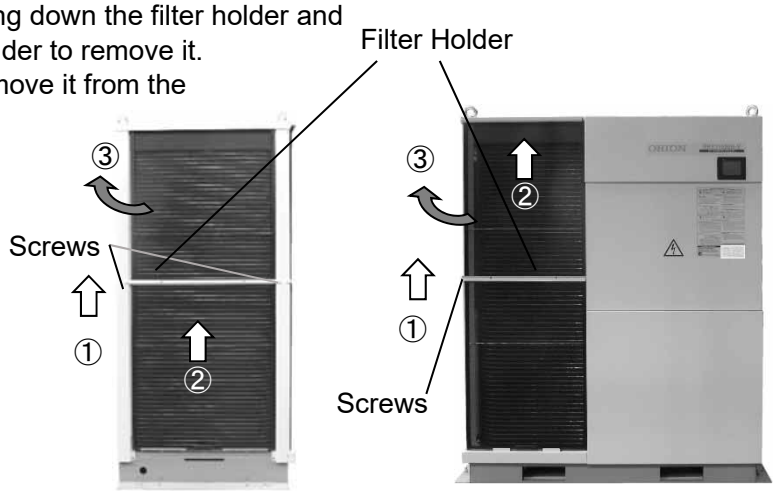
* 1 Inspect monthly, or when the "C000" warning has occurred.

Inspection and Maintenance

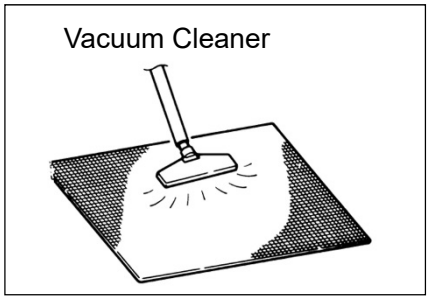
Monthly

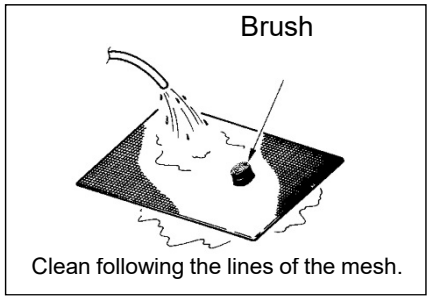
Monthly

1. Wipe off dirt from outside surfaces of the product using a neutral detergent.
2. Condenser Filter Cleaning
   (1) How to Remove the Filter
   ① Loosen the screws holding down the filter holder and then slide up the filter holder to remove it.
   ② Slide the filter up and remove it from the lower catch.
   ③ Pull it toward the front.

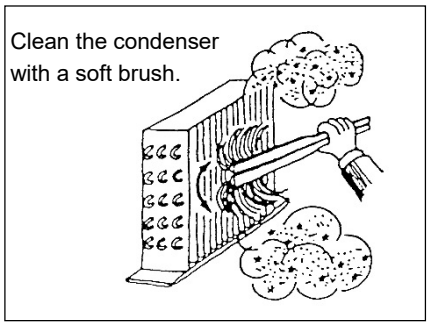


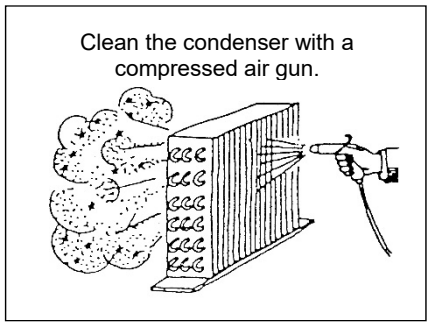
   (2) How to Clean the Filter
   ① Remove the filter, then remove dust with a vacuum.
   ② If the filter is very dirty, it can be cleaned with a solution of water and detergent. Allow to fully dry in the shade before replacing.





3. Condenser Cleaning
   (1) Remove the condenser filter.
   (2) Clean using a long bristled soft brush or a compressed air gun.





* The illustrations are for reference only. In actuality, the condenser cannot be removed.

Inspection and Maintenance

Monthly

IMPORTANT

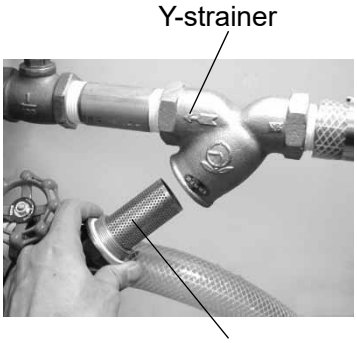
- **If the heat exchanger is clogged with dust or dirt, it will not only reduce product performance, but in severe cases it can cause built-in safety devices to activate which can cause the product to shut down.**
- **Do not attempt to clean with hot water and do not expose to any sort of flame.**
- **Always have the condenser filter installed when operating the product. Dust and dirt entering the product can damage the product.**
- **Do not operate the product with damaged intake or heat exchange filters. Replacement filters are available. (See page 71.) Replace filters as necessary.**

5. Inspect the Chilled Water Circuit
   (1) In order to ensure that the water in the chilled water circuit is always clean, inspect once a month, and replace the water if any of the problems listed below occur.
      ① Slime is detected if a finger is run across the inner wall of the water tank.
      ② Foreign substances are in the tank or parts are sticky.
      ③ The water has changed color.
   (2) If antifreeze or other additives are used, then, depending on particular operating conditions, evaporation or condensation may occur which will cause changes to the level of water and the concentration of such additives, and management of the concentration of additives and addition of water to maintain the water level should be carried out periodically.

IMPORTANT

- **For important information regarding water quality, see page 51, "Water Quality Management".**
- **If water in the chilled water circuit water is particularly dirty and requires frequent replacement, please consult with your dealer to have the water circuit chemically cleaned.**
- **Clogging of the strainer filter inside the Y-strainers at the inlet and outlet ports that results in a pressure difference of 0.1 MPa can result in the strainer filter being damaged.**

6. Clean the Y-customer.
   (1) Close the (customer-supplied) valves at the chilled water inlet and outlet ports.
   (2) Remove the Y-strainer cap and take out the strainer filter.
   (3) Wash off any dirt on the strainer filter.
   (4) Place the strainer filter back into the Y-strainer.
   (5) Open the (customer-supplied) chilled water inlet and outlet valves.



IMPORTANT

- **Be sure to open the (customer-supplied) chilled water inlet and outlet valves before operating the product. Operating with the valves closed can damage the product.**

Every 6 Months

1. Inspect for Leaks from the Discharge Pump.
   ■ Check for Leakage
   (1) Remove the cabinet panel. (See page 58 for further information.)
   (2) Inspect the discharge pump itself for leaking water.
   (3) If leaks are found, contact your dealer.In such cases it will be necessary to replace the mechanical seal with a new one, which is available as a replacement part.

2. Inverter inspection (See page 60, "Main Parts in the Distribution Panel" for further information.)
   (1) Clean the inverter cooling fan and the main product fan.
   ① Cut off the power source.
   ② Remove the front right cabinet panel. (See page 58 for further information.)
   ③ Check the cooling fan and cooling fins for dust or dirt. Clean off any dust or dirt if present.
   (2) Contact your dealer if there is any abnormal noise coming from the cooling fan.
   In this event, the cooling fan requires replacement (and is an item that requires periodic inspection and replacement.)

WARNING

- **Components inside the inverter will maintain a high-voltage for some time after the power is cut off. Therefore, wait at least 10 minutes after cutting off power before performing any inspection. Touching the inverter soon after power to it has been cut off can result in burns or electric shock.**

IMPORTANT

- **Dust or dirt collecting on the inverter cooling fan can result in insufficient cooling of hot components inside the inverter and in extreme cases, can result in built-in protection devices to activate, leading to product shutdown.**

Water Quality Management

CAUTION

- **Liquid suitable to be cooled (chilled water) is either clean water (see the water quality standard chart below) or a 30 to 40 % industrial-use ethylene glycol solution. Alternatively, if deionized water is used, it should have an electrical conductivity of at least 1 μS/cm. Use of non-approved liquids can result in damage to the product, leaking, and possible electric shock or electrical shorts.**

■ Water Quality Standard for Clean Water

	Item		Chilled Water / Circulating Water
Standard Components	pH	(25 °C)	6.8 to 8.0
	Electrical Conductivity	(25 °C) (μS/cm)	400 or lower
	Chloride Ion	(mgCl^-/L)	50 or lower
	Sulfate Ion	(mgSO_4^{2-}/L)	50 or lower
	Acid Consumption	(pH4.8)(mg$CaCO_3$/L)	50 or lower
	Total Hardness	(mg$CaCO_3$/L)	70 or lower
	Calcium Hardness	(mg$CaCO_3$/L)	50 or lower
	Silica Ion	(mgSiO_2/L)	30 or lower
Reference Components	Iron	(mgFe/L)	1.0 or lower
	Copper	(mgCu/L)	1.0 or lower
	Sulfide Ion	(mgS^{2-}/L)	Not detected
	Ammonium Ion	(mgNH_4^+/L)	1.0 or lower
	Residual Chlorine	(mgCl/L)	0.3 or lower
	Free Carbon Dioxide	(mgCO_2/L)	4.0 or lower

Excerpt from JRA-GL-02-1994 guidelines from The Japan Refrigeration and Air Conditioning Industry Association.

IMPORTANT

- **If a problem is found after a regular inspection of the water circuit, clean the water tank and water circuit and replace the water in the tank as necessary. Even if no abnormalities are noticed, evaporation will occur and concentration of impurities will increase. Therefore the water in the water tank should be replaced once every 3 months. See the section on "Inspection and Maintenance" for further details.**
- **Note that if antifreeze or other additives are used, then the lifespan of mechanical seals will be less that it would be if using clean water. Furthermore, depending on particular operating conditions, evaporation or condensation may occur which will cause changes to the level of water and the concentration of such additives, and management of the concentration of additives and addition of water to maintain the water level should be carried out periodically.**

Water Quality Management

3. Refer to the following chart in order to avert future trouble.

Condition of Working Liquid	Description of Trouble	Measures to Take
The working fluid has a lot of particulate (for example, underground water may have a lot of sand, gravel, or other particulate).	The evaporator can become clogged and cooling capacity will drop. In some cases, evaporator damage, and gas or water leaks can also occur. And the discharge pump impeller and sliding parts could become abnormally worn and damaged. This could cause the sliding surfaces of the mechanical seal on the discharge pump to become unevenly worn and leak in a short period of time.	Install the included Y-strainer on supply piping as well as the chilled water inlet piping. If a strainer is installed on the water intake piping on the product, check the water pressure gauge on the product daily to ensure that the chiller discharge pump is not operating at the upper limit of its operating capacity. If the water pressure goes over the prescribed limit of the evaporator, discharge pump, or other components could become damaged.
The working liquid has chloride ion or other corrosive components	The presence of chloride ion or other corrosive components can lead to the corrosion of stainless steel in areas where water passes, and can also lead to water and gas leaks. Even if the concentration of corrosive components is within water quality standards, rust and other floating matter can form and stick to surfaces or scaling can form, and at such places, progressive oxygen concentration cell corrosion can occur.	ORION's water quality standards are designed to help control corrosive substances such as chloride ion, and avoid problems like the progression of scaling as well as other problems related to water quality. Water quality management should be carried out to ensure that working liquids are within the prescribed water quality standards. Install the included Y-strainer that can trap and prevent iron rust and other foreign matter from entering the product.
When using additives (preservatives or anti-rust, etc.) in the working liquid	Depending on concentrations of additives and their components, wearing of sliding contact surfaces of mechanical seals can occur, and these components can also build up on surfaces due to evaporation, leading to leakage from mechanical seals in a relatively short time frame.	Depending on the concentration and type of components in the additive, short-term replacement of mechanical seals may be required. Please consult with ORION or your dealer regarding the use of additives. They can give you specific information regarding the suitability or unsuitability of using specific additives as well as the recommended replacement term of mechanical seals.
When using additives in the working liquid such as antifreeze or other viscous additives.	The discharge pump power (head) will drop. Water leaks from the discharge pump mechanical seal. (As viscous additives such as antifreeze do not evaporate, there may initially be slight seepage from mechanical seals but as the concentration increases, viscosity will also increase, causing the fluid membrane between the sliding contact surfaces of the mechanical seals to thicken, thus increasing the amount of leakage.)	Antifreeze is a 30 to 40 % industrial-use ethylene glycol solution". Antifreeze does not evaporate so periodically replace lost water in the water tank in order to prevent increasing concentrations.
When the discharge pump is not operated for extended periods	Liquid within the discharge pump can deteriorate and sliding contact surfaces of the pump's mechanical seals can stick. As a result, when started again, the pump may lock up or leakage may occur. (If the mechanical seal sliding contact surfaces are sticky, when the discharge pump is restarted, the contact surfaces of the mechanical seal could be forcibly peeled off, resulting in scratches to the surfaces and water leaks. In addition, deteriorated chilled water can lead to increasing concentrations of antifreeze and also cause microorganisms to propagate.)	If the product will not to be operated for an extended period of time, please refer to the section in the operating manual, "Piping" and drain the water from the water tank and discharge pump. Then fill the water tank again with fresh water, run the discharge pump (pump-only operation) for at least 10 minutes, drain again, and then store the product.
When tap water is constantly supplied to the product.	If using tap water to supply the product (one pass), in case the water has a high chlorine concentration, corrosion within the evaporator and leakage can occur.	Therefore, it is not recommended to use tap water (in a single pass) for models with built-in water tanks.

* Regarding Mechanical Seals While the basic function of mechanical seals is to prevent leakage, it is practically impossible to build a device that has absolutely no leakage and a very small amount of leakage is allowable within design guidelines. (Completely eliminating leaks would increase operating temperatures and would damage the mechanical seals.) For general purpose pumps, approximately 0.05 to 0.15 mL/h of leakage would be considered normal. This amount of clean water would readily evaporate and would not normally be visible. However, as the product is used over longer periods of time, the amount of leakage will increase, so periodic changing of the mechanical seals is required. When operating according to the designated water quality standards, the replacement period of the seals is approximately 6,000 to 8,000 hours of use or 1 year.

Troubleshooting

Alarm Types and Resulting Product Operation

WARNING

- **If operation is abnormal, shut down the product, cut off the power source, and then consult with your dealer or a qualified repair person. Continued operation when the product is performing abnormally can lead to electric shock or fire.**
- **After performing necessary measures and clearing alarm conditions, be sure to replace the cabinet panels.**
  Operating the product while the cabinet is opened or removed can lead to injuries or electric shock.
- **Remove power before performing any of these measures. Failure to do so can lead to electric shock or injury from the fan.**

Alarm Types and Resulting Product Operation

■ Warning and Alarm Processing

Alarm No.	Item	Alarm Processing Pattern	Operation Signal	Alarm Signal	Temp. Warning Signal	Recovery
C000	Discharge Refrigerant Pressure Warning	0	○	×	×	Automatic
E002	High-Pressure Pressure Switch Abnormal	2(3)	×	○	×	Manual
E005	Discharge Pump Inverter Alarm	3	×	○	×	Manual
E006	Water Shortage Alarm	3	×	○	×	Manual
C007	Liquid Temp. Upper/Lower Limit Warning	1	○	×	○	Automatic
E011	Outlet Chilled Water Temp Low Temp. Alarm (Sensor disconnected)	3	×	○	×	Manual
E012	Outlet Chilled Water Temp. High Temp. Alarm (Sensor short)	3	×	○	×	Manual
E013	Memory Alarm	3	×	○	×	Re-Apply Power
E014	Power Outage Recovery Alarm	3	×	○	×	Manual
C016	Time Elapse Warning	0	○	×	×	*3
C017	Flow Rate Out of Range Warning	0	○	×	×	Automatic
C021	Distribution Panel Internal High Temp. Warning	0	○	×	×	Automatic
E021	Distribution Panel Internal Temp. Abnormal (Sensor abnormal)	3	×	○	×	Manual
C033	Chilled Water Low-Pressure Pressure Warning	0	○	×	×	Automatic
C034	Chilled Water Pressure -- High-Pressure Warning	0	○	×	×	Automatic
E034	Chilled Water Pressure -- High Pressure Alarm (Sensor abnormal)	3	×	○	×	Manual
E041	Discharge Refrigerant Pressure Operation Alarm	2(3)	×	○	×	Manual
E042	Discharge Refrigerant Pressure Alarm	2(3)	×	○	×	Manual
E043	Discharge Refrigerant Temperature Operation Alarm	2(3)	×	○	×	Manual
E044	Discharge Refrigerant Temperature Alarm	2(3)	×	○	×	Manual
E045	Drop in Degree of Superheat Alarm	2(3)	×	○	×	Manual
E047	Discharge Refrigerant Low Temperature Alarm(Sensor disconnect)	2(3)	×	○	×	Manual
E048	Discharge Refrigerant High Temperature Alarm (Sensor short)	2(3)	×	○	×	Manual
E049	Intake Refrigerant Temp. -- Low-Temp. Alarm (Sensor disconnect)	2(3)	×	○	×	Manual
E050	Inlet Refrigerant Temp. -- High Temp. Alarm (Sensor short)	2(3)	×	○	×	Manual
E053	Discharge Refrigerant Pressure -- Low Pressure Alarm	2(3)	×	○	×	Manual
E054	Discharge Refrigerant Pressure -- High Pressure Alarm	2(3)	×	○	×	Manual
E055	Intake Refrigerant Pressure -- Low Pressure Alarm	2(3)	×	○	×	Manual
E056	Intake Refrigerant Pressure -- High Pressure Alarm	2(3)	×	○	×	Manual
E058	Dip Switch Setting Alarm	3	×	○	×	Re-Apply Power
E061	Discharge/Intake Refrigerant Pressure -- Pressure Sensor Alarm	2(3)	×	○	×	Manual
E062	Discharge Refrigerant Temperature / Intake Refrigerant Temperature Sensor Alarm	2(3)	×	○	×	Manual
C064	Differential Pressure Startup Standby Warning	0	○	×	×	Automatic
C065	User Stop Warning (Compressor operated less than 5 min.)	0	×	×	×	Automatic
E070	Compressor Inverter Alarm	2(3)	×	○	×	Manual
E071		2(3)	×	○	×	Manual
C072		0	○	×	×	Automatic

Troubleshooting

Alarm Types and Resulting Product Operation

Alarm No.	Item	Alarm Processing Pattern	Operation signal	Warning signal	Temp. Warning Signal	Recovery
E072	Compressor Inverter Alarm	2(3)	×	○	×	Manual
C073		0	○	×	×	Automatic
E073		2(3)	×	○	×	Manual
C074		0	○	×	×	Automatic
E074		2(3)	×	○	×	Manual
E078		2(3)	×	○	×	Manual
E080		2(3)	×	○	×	Manual
E081		2(3)	×	○	×	Manual
E082		2(3)	×	○	×	Manual
C083		0	○	×	×	Automatic
E083		2(3)	×	○	×	Manual
C084		0	○	×	×	Automatic
E084		2(3)	×	○	×	Manual
E085		2(3)	×	○	×	Manual
E089		2(3)	×	○	×	Re-Apply Power
C093	Compressor Inverter Replacement Warning	1(0)*1	○	○(×)*1	×	*2
C094	Condenser Fan Inverter Replacement Warning	1(0)*1	○	○(×)*1	×	*2
C095	Discharge Pump Inverter Replacement Warning	1(0)*1	○	○(×)*1	×	*2
C096	Mechanical Seal Replacement Warning	0	○	×	×	*4
C097	20,000 h Fixed Term Inspection Warning	0	○	×	×	*4
C098	25,000 h Inverter Inspection Warning	0	○	×	×	*4
C180	Touch Panel Warning	0	○	×	×	—
C181		0	○	×	×	—
C182		0	○	×	×	—
E241	Condenser Fan Motor Alarm	2(3)	×	○	×	Manual
E250		2(3)	×	○	×	Manual
E254		2(3)	×	○	×	Manual
E255		2(3)	×	○	×	Manual
E260		2(3)	×	○	×	Manual
E262		2(3)	×	○	×	Manual
E264		2(3)	×	○	×	Manual
E270		2(3)	×	○	×	Manual
E271		2(3)	×	○	×	Manual
E272		2(3)	×	○	×	Manual
E273		2(3)	×	○	×	Manual
E274		2(3)	×	○	×	Manual
E275		2(3)	×	○	×	Manual
E280		2(3)	×	○	×	Manual
E281		2(3)	×	○	×	Manual
E282		2(3)	×	○	×	Manual
E284		2(3)	×	○	×	Manual
E285		2(3)	×	○	×	Manual
E286		2(3)	×	○	×	Manual
E288		2(3)	×	○	×	Manual
E289		2(3)	×	○	×	Manual
E290		2(3)	×	○	×	Manual
E291		2(3)	×	○	×	Manual
E294		2(3)	×	○	×	Manual

Troubleshooting

Alarm Types and Resulting Product Operation

Alarm No.	Item	Alarm Processing Pattern	Operation Signal	Alarm Signal	Temp. Warning Signal	Recovery
E341	Discharge Pump Inverter Alarm	3	×	○	×	Manual
E350		3	×	○	×	Manual
E354		3	×	○	×	Manual
E355		3	×	○	×	Manual
E360		3	×	○	×	Manual
E362		3	×	○	×	Manual
E364		3	×	○	×	Manual
E370		3	×	○	×	Manual
E371		3	×	○	×	Manual
E372		3	×	○	×	Manual
E373		3	×	○	×	Manual
E374		3	×	○	×	Manual
E375		3	×	○	×	Manual
E380		3	×	○	×	Manual
E381		3	×	○	×	Manual
E382		3	×	○	×	Manual
E384		3	×	○	×	Manual
E385		3	×	○	×	Manual
E386		3	×	○	×	Manual
E388		3	×	○	×	Manual
E389		3	×	○	×	Manual
E390		3	×	○	×	Manual
E391		3	×	○	×	Manual
E394		3	×	○	×	Manual

* The state (alarm processing pattern) indicated in parentheses is when parameter "F004" is set to "All stopped". (For all alarms except for "C093", "C094", and "C095".)
* A signal will be output in cases where the ○ mark is present.× indicates that the signal is not output.
* Operation and warning signals will be determined independently based on individual alarms.
* Even if an error condition occurs such that the operation signal is continuously output, if another error also occurs that would shut down the compressor, then the operation signal will be cut off.
* "E014" will only occur if parameter "F001" is set to Power Outage Manual Recovery (factory default setting).

*1 Depends on the setting of parameter "F053". The alarm code indicated in parentheses is for when parameter "F053" is set to "Alarm Signal: Disabled".

*2 Recovery is not possible if the inverter running time is not reset. Manually clear the inverter running time after the inverter has been replaced.

*3 Recovery is not possible if the accumulated running time is not reset. Clear the accumulated running time after performing inspection or replacement and then recover manually.

*4 Manual recovery after inspection and/or replacement.

■ Operation Under Alarm Conditions

Alarm Processing Pattern	Compressor Operation	Discharge Pump Operation	Fan Operation	Alarm Signal	Temp. Warning Signal
0	○	○	○	×	×
1	○	○	○	×	○
				○	×
2	×	○	×	○	×
3	×	×	×	○	×

・ ○ indicates operation continues.× indicates operation stops.

・ In the event of conflicting alarm processing patterns, the × pattern gets priority.
Example: In the event that alarm processing patterns 2 and 3 are generated, the product will completely stop.

Troubleshooting

Other Display Patterns / Component Locations

Other Display Patterns

■ Nothing is shown on the display even when power is applied to the product.
<Cause>
The earth leakage breaker has tripped or there is an open phase in the power source.
<Measures to Take>
1. Make sure the power source does not have an open phase.
2. In case of something other than the above-mentioned points, there could possibly be an electric short or an overcurrent condition. Please consult your local dealer.

Component Locations

WARNING

- **After performing necessary measures and clearing alarm conditions, be sure to replace the cabinet panels. Operating with the cabinet is opened or removed can lead to injuries or electric shock.**
- **If operation is abnormal, stop operation, cut off the power source, and then consult your dealer or a qualified repair person. Continued operation when the product is performing abnormally can lead to electric shock, fire, or other problems.**
- **Cut off power before undertaking measures to resolve cases where a safety device has been activated. Failure to do so can lead to electric shock or other injury from the fan.**

CAUTION

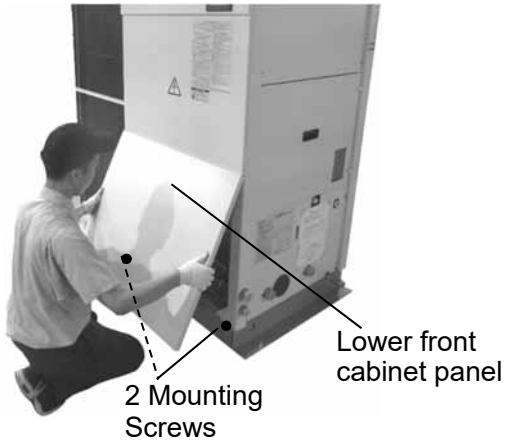
- **Always wear gloves when removing the cabinet or inspecting the inside of the product. Sheet metal edges are sharp and could cause injury.**
- **The inside of the product has hot components (such as the compressor and refrigerant piping). Do not indiscriminately touch. Contact with hot surfaces can cause burns.**

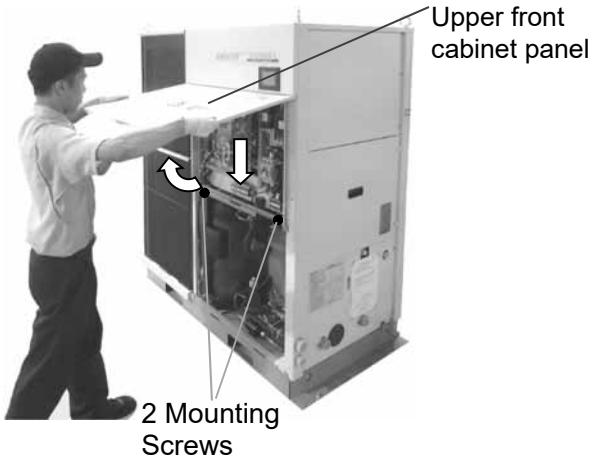
Troubleshooting

Component Locations

■ Removing the Front Cabinet Panel

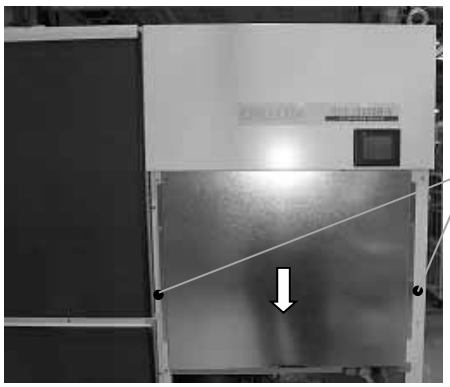
1. Remove the screws holding the lower front cabinet panel.
2. Slightly pull the bottom of the lower front cabinet panel down and pull out diagonally to remove.
3. Remove the screws holding the upper front cabinet panel.
4. Raise the upper front cabinet panel until it is nearly horizontal and then lower the panel to remove it.





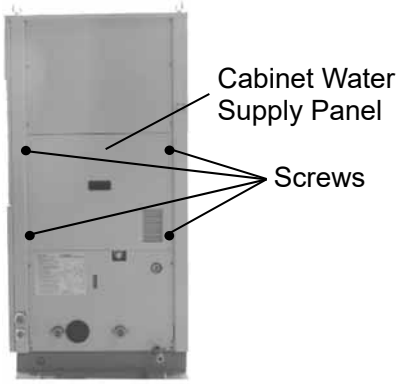
■ Removing the Distribution Panel Front Cover (RKE15000B-V only)

1. Remove the screws securing the distribution panel cover.
2. Pull the lower part of the distribution panel cover out and down.



■ Removing the Cabinet Water Supply Panel

1. Remove the screws holding the cabinet water supply panel.
2. Pull the water supply panel diagonally up to remove.



Troubleshooting

Component Locations

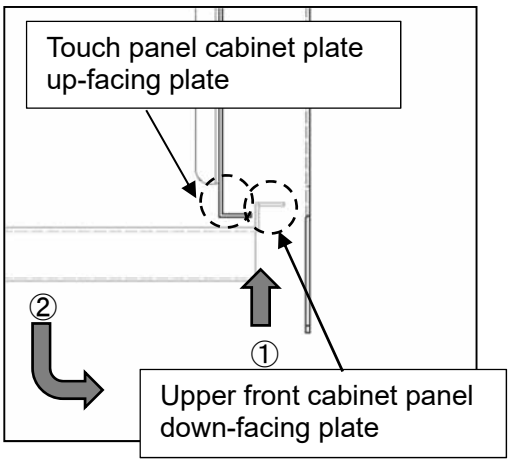
■ How to Install the Front Cabinet Panel (Reverse these steps to remove.)

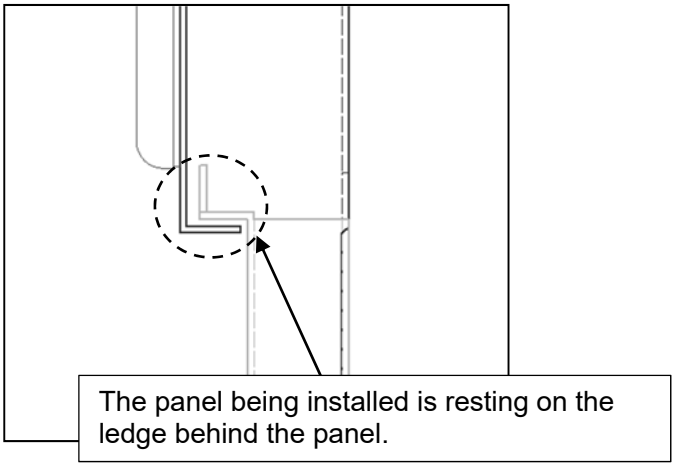
1. Hang the upper front cabinet panel so that it cathes on.
2. Affix the upper front cabinet panel with screws.
3. Install the lower front cabinet panel.
4. Affix the lower front cabinet panel with screws.

IMPORTANT

●A gap will form if the upper front cabinet panel is not installed correctly.
Hang the upper front cabinet panel onto the rail on the panel behind the touch panel ensuring that there is no gap and ensure that the panel is secure.

＜Installation Detail(As viewed from the right side of the product.)＞





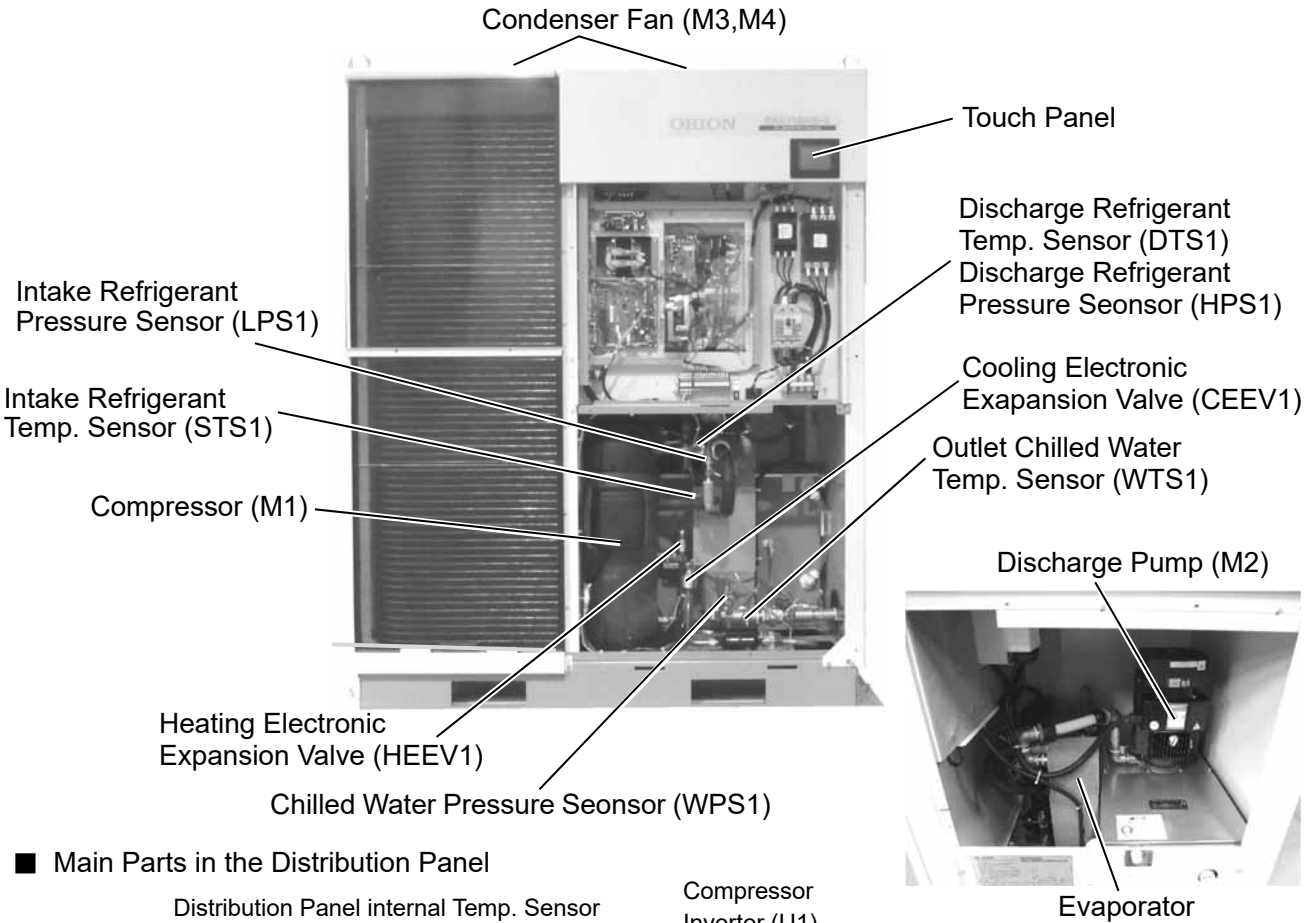
① While the upper front cabinet panel is in a horizontal position, hook its rail onto the ledge behind the panel above it.

② Rest and pivot the angled edge of the panel being installed on the edge of the ledge behind the panel above it, i.e., use the angled edge of the panel being installed as a fulcrum.

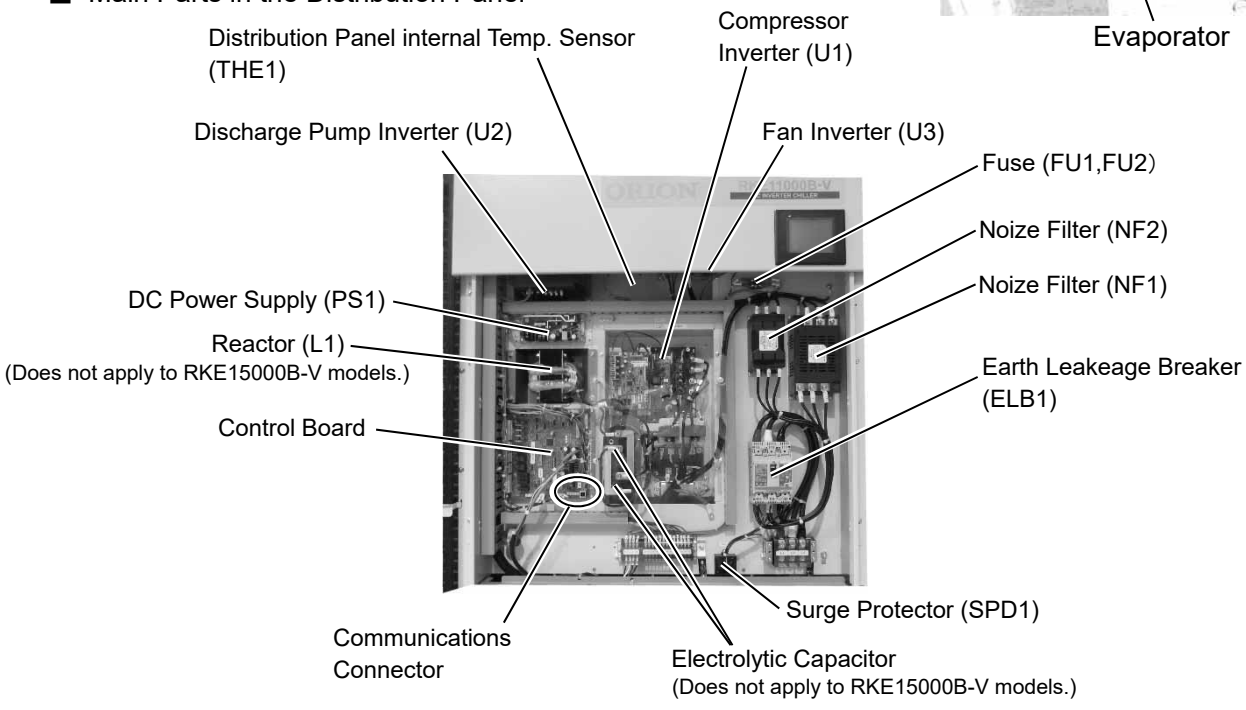
Troubleshooting

Component Locations

■ Main Parts



■ Main Parts in the Distribution Panel



Alarm Causes and Measures to Take

■ **"C000" Refrigerant Discharge Pressure Warning**

<Cause>
The refrigerant discharge pressure has continued to exceed 3.80 MPa for over 1 minute.
<Measures to Take>
Clean the condenser (filter) as shown on page 49.
<Clearing the Alarm>
Either press the "Alarm cancel" button on the Alarm Display screen or temporarily remove and then restore power to the product to clear the alarm. The alarm can be cleared while the product is operating. (The alarm cannot be canceled if the refrigerant discharge pressure does not fall to 3.60 MPa or lower.)

■ **"E002" High-Pressure Pressure Switch Alarm**

<Cause>
1. The refrigerant discharge pressure has risen to over 4.15 MPa and the high-pressure pressure switch has activated.
2. Power source open phase
<Measures to Take>
1. Clean the condenser (filter) according to the directions on page 48, and bring the ambient temperature down.
2. Make sure the power source does not have an open phase.
<Clearing the Alarm>
Either press the "Alarm cancel" button on the Alarm Display screen or temporarily remove and then restore power to the product to clear the alarm. (The alarm cannot be canceled if the refrigerant discharge pressure does not fall to 3.20 MPa or lower.

■ **"E005" Discharge Pump Inverter Alarm (Pre-warning)**

<Cause>
1. Power source open phase
2. The discharge pump inverter alarm has activated.
<Measures to Take>
1. Make sure the power source does not have an open phase.
2. Confirm the display on the inverter unit and contact your dealer.
<Clearing the Alarm>
The alarm will be cleared after power to the product is cut off and then re-applied. Contact your dealer if the alarm does not clear.

■ **"E006" Water Shortage Alarm**

<Cause>
The water level has dropped, causing the float switch (FLTS1) to activate.
<Measures to Take>
Check the water level in the water tank and supply water as required.
<Clearing the Alarm>
After the water level has been confirmed, either press the "Alarm cancel" button on the touch panel Alarm Display screen or temporarily remove and then restore power to the product to clear the alarm.

■ **"C007" Fluid Temperature Upper and Lower Limit Warning**

<Cause>
The fluid temperature has gone beyond the set range. (Range setting parameters: "F020" to "F023")
<Measures to Take>
1. If the water temperature does not fall to the set temperature:
(1) There could be a drop in cooling capacity due to a clogged condenser (filter) or if the ambient temperature is too high. (The "Operating rate display" does not go over around 50 %.) Clean the condenser (filter), and bring down the ambient temperature.
(2) Make sure the heat load does not exceed the cooling capacity of the product.
2. If the water temperature drops too low:
If the heat load is suddenly removed, or if it is too small, the temperature may drop to about 1.5 °C below the set temperature. There is no problem as long as the temperature rises up again to the set temperature.
<Clearing the Alarm>
The alarm will automatically clear when the water temperature goes within the set temperature range.

Troubleshooting

Alarm Causes and Measures to Take

■ **"E011" Outlet Port Refrigerant Low Temperature Alarm (Sensor disconnect)**

<Cause>

Either the measured water temperature has fallen below -30 °C, or the outlet port refrigerant temperature sensor has an open circuit.

<Measures to Take>

1. Check to make sure the product's internal piping is not frozen. During pump-only operation, if the water pressure is 0.5 MPa or greater even with the water circuit fully open, it would indicate that something is frozen. Check for a drop in flow rate from the discharge pump and that the ambient temperature is within the specified range, and improve conditions as required. Also, before re-starting operation, run the pump independently and confirm that there is sufficient water flow.
2. In case there is no freezing, there is an open circuit in the outlet port chilled water temperature sensor. Please consult your local dealer.

<Clearing the Alarm>

Once the measured water temperature display is reading above -30 °C, either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E012"Outlet Port Refrigerant High Temperature Alarm (Sensor short)**

<Cause>

Either the measured water temperature has risen above 50 °C, or the outlet port chilled water temperature sensor has a short circuit.

<Measures to Take>

1. If the water temperature is in fact higher than 50 °C, confirm the points below and take measures such as replacing the chilled water in the water tank in order to lower the water temperature.
   (1) There could be a drop in cooling capacity due to a clogged condenser (filter) or if the ambient temperature is too high. (The "Operating Rate Display" does not go over around 50 %.) Clean the condenser (filter), and bring down the ambient temperature.
   (2) Make sure the heat load does not exceed the cooling capacity of the product.
2. If the water temperature is 50 °C or lower and alarm E012 occurs, the outlet port chilled water temperature sensor is shorted. Please consult your local dealer.

<Clearing the Alarm>

If the outlet port chilled water sensor is not abnormal, either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E013" Memory Error**

<Cause>

There is a problem with the memory contents on the control board.

<Measures to Take>

1. Press the "Alarm cancel" button on the Alarm Display screen on the touch panel.
2. If pressing the Alarm cancel button does not clear the alarm, temporarily cut off power to the product and then reapply power.

<Clearing the Alarm>

If the problem was resolved by cutting off and reapplying power, then the alarm condition will automatically be cleared. Consult your dealer if the alarm cannot be cleared.

■ **"E014" Power Outage Recovery Alarm**

<Cause>

1. Power was interrupted while the product was operating.
2. Power source open phase
   This alarm will only occur when parameter "F001" is set to "Manual Recovery After Power Outage" (the factory default setting).

<Measures to Take>

1. If automatic resumption of operation after restoration of power is desired, change product parameter "F001" according to the instructions on page 30.
2. Make sure the power source does not have an open phase.

<Clearing the Alarm>

Press the "Alarm cancel" button on the Alarm Display screen on the touch panel to clear the alarm. To resume operation, press the RUN button.

■ **"C016" Time Elapse Warning**

<Cause>

Operating time over the time setting of parameter "F031" has elapsed.

<Measures to Take>

1. Press the "Accumulated time" button on the Menu screen on the touch panel.
2. Press the "Next" button on the Accumulated Time Display screen and then press "C016" in the display column.
3. Press the "CLR" button on the lower right of the display.
4. To "Clear?", press, "Yes".

<Clearing the Alarm>

The alarm will automatically clear once the accumulated time value is cleared.

Troubleshooting

Alarm Causes and Measures to Take

■ **"C017" Flow Rate Out of Range Warning**

<Cause>

The combination of the chilled water flow rate and head (water pressure) is out of the specified range.

<Measures to Take>

Check the "Chilled Water Flow Rate Chart" (on page 90), and adjust the flow rate or pump operating frequency so that the flow rate falls within the hatched area on the chart. The bypass valve may also be adjusted.

<Clearing the Alarm>

The alarm will automatically clear once the product returns to the normal operating range.

■ **"C021" Distribution Panel Internal Temperature High Warning**

<Cause>

The temperature inside the distribution panel has risen above 53 °C.

<Measures to Take>

1. Even if warning C021 occurs, it does not indicate a problem with product operation and product operation will continue. However it is possible that alarm E021 may occur after this, therefore it is recommended that if warning C021 occurs, that the ambient temperature be lowered, or the target heat load be reduced.
2. If the product is in direct sunlight, take measures to shade it.

<Clearing the Alarm>

The alarm will automatically clear once the distribution panel internal temperature falls to 52 °C or lower.

■ **"E021" Distribution Panel Internal Temperature Alarm (Sensor abnormal)**

<Cause>

1. The temperature inside the distribution panel has risen above 58 °C or the distribution panel internal sensor has a short circuit.
2. The temperature inside the distribution panel has fallen below -30 °C or the distribution panel internal sensor has an open circuit.

<Measures to Take>

1. Bring the ambient temperature to within –20 to 45 °C.
2. If the product is in direct sunlight, take measures to shade it.
3. Check the temperature on the Monitor screen as shown on page 22 and compare that with the actual temperature. If there is a big difference between the displayed and actual temperatures, then the distribution panel internal sensor is either shorted or has an open circuit. Please consult your local dealer.

<Clearing the Alarm>

Once the temperature inside the distribution panel enters the range of -30 to 58 °C, either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"C033" Chilled Water Low-Pressure Pressure Warning**

<Cause>

The chilled water pressure has stayed below 0.07 MPa for at least 1 minute.

<Measures to Take>

While checking the flow rate and pressure display, adjust the chilled water inlet/outlet valves (user-supplied) or the bypass valve in order to increase the pressure.

<Clearing the Alarm>

The alarm will automatically clear once the pressure rises to 0.08 MPa or higher.

■ **"C034" Chilled Water High-Pressure Pressure Warning**

<Cause>

The chilled water pressure has continued to be above 0.81 MPa for at least 1 minute.

<Measures to Take>

While checking the flow rate and pressure display, adjust the chilled water inlet/outlet valves (user-supplied) or the bypass valve in order to decrease the pressure.

<Clearing the Alarm>

The alarm will automatically clear once the pressure drops to 0.80 MPa or lower.

■ **"E034" Chilled Water High Pressure Alarm**

<Cause>

Operation is continuing with the chilled water circuit mostly closed or there is a short in the chilled water sensor.

<Measures to Take>

1. Confirm that the chilled water inlet and outlet port valves (user-supplied valves) are not closed, and/or confirm that the strainer is not clogged.
2. If alarm "E034" occurs when the actual flow rate is within the specified range, then there is likely a short in the chilled water pressure sensor. Please consult your local dealer.

<Clearing the Alarm>

If the chilled water water pressure sensor is not abnormal, either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

Troubleshooting

Alarm Causes and Measures to Take

■ **"E041" Refrigerant Discharge Pressure Operation Alarm**

<Cause>

Even with protection control, the refrigerant discharge pressure or the compressor current does not go down, and the compressor operating frequency control is completely lost.

<Measures to Take>

1. Clean the condenser (filter) according to the directions on page 49, and bring the ambient temperature down.
2. Confirm that there is not a drop in the power supply voltage.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E042" Refrigerant Discharge Pressure Alarm**

<Cause>

Protection control does not occur in time, and there is an abnormal rise in the discharge refrigerant pressure

<Measures to Take>

Check for an unusual rise in the ambient temperature around the product or abnormal clogging of the condenser filter.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E043" Refirgerant Discharge Temperature Operation Alarm**

<Cause>

Even with protection control, the discharge refrigerant pressure did not drop and the compressor operating frequency could not be controlled at all.

<Measures to Take>

Clean the condenser(filter), and bring down the ambient temperature.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E044" Refirgerant DischargeTtemperature Alarm**

<Cause>

Protection control did not occur in time and there was an abnormal rise in the compressor discharge refrigerant temperature.

<Measures to Take>

Check for an unusual rise in the ambient temperature around the product or abnormal clogging of the condenser filter.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E045" Drop in Degree of Superheat Alarm**

<Cause>

1. Poor heat exchange within the evaporator.
2. The electronic expansion valve control may be abnormal.

<Measures to Take>

1. Check for a flow rate drop in the discharge pump and that the ambient temperature is within the specified range.
2. When the product is first powered up, confirm that there is a clanking sound of the electronic expansion valve operating. If there is no such sound, the electronic expansion valve is faulty. Please consult your local dealer.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

■ **"E047" Refirgerant Discharge Low Temperature Alarm (Sensor Disconnect)**

■ **"E048" Refirgerant Discharge High Temperature Alarm (Sensor Short)**

<Cause>

1. The discharge temperature sensor has an open circuit. (E047)
2. The discharge temperature sensor has a short circuit. (E048)

<Measures to Take>

The discharge temperature sensor needs to be replaced. Please consult with your dealer.

<Clearing the Alarm>

When the problem with the sensor has been resolved, either press the “Alarm Cancel” button on the Alarm Display Screen on the touch panel or temporarily cut off and then restore power to the product to clear the alarm.

Troubleshooting

Alarm Causes and Measures to Take

■ **"E049" Refrigerant Intake Low Temperature Alarm (Open circuit in the sensor)**

<Cause>

The refrigerant intake temperature is below -30 °C, or the intake refrigerant temperature sensor has an open circuit.

<Measures to Take>

1. Check to make sure the piping inside the product evaporator is not frozen. If the water pressure does not change when operating under pump-only operation even when the water circuit is fully open, it indicates that freezing has occurred. Check for a drop in flow rate from the discharge pump and that the ambient temperature is within the specified range, and improve conditions as required. Also, before re-starting operation, run the pump independently and confirm that there is a sufficient flow of chilled water.
2. Check the refrigerant intake temperature on the touch panel Monitor screen, and if there is a big difference between the displayed temperature and actual temperature, then the refrigerant intake temperature sensor has an open circuit and needs to be replaced. Please consult your local dealer.

<Clearing the Alarm>

Once the intake refrigerant temperature rises to at least -30 °C, either press the "Alarm cancel" button on the touch panel "Alarm display screen", or temporarily remove and then restore power to the product to clear the alarm.

■ **"E050" Refrigerant Intake Temperature Alarm (Sensor short circuit)**

<Cause>

There is a short circuit in the refrigerant intake temperature sensor.

<Measures to Take>

The intake refrigerant temperature sensor needs to be replaced. Please consult your local dealer.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm. (Do this after the trouble with the sensor has been resolved.)

■ **"E053" Refrigerant Discharge Low Pressure Alarm**

<Cause>

The refrigerant discharge pressure sensor has an open circuit.

<Measures to Take>

The refrigerant discharge temperature sensor needs to be replaced. Please consult your local dealer.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm. (Do this after the trouble with the sensor has been resolved.)

■ **"E054" Refrigerant Discharge High Pressure Alarm**

<Cause>

The refrigerant discharge pressure sensor has a short circuit.

<Measures to Take>

The refrigerant discharge temperature sensor needs to be replaced. Please consult your local dealer.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm. (Do this after the trouble with the sensor has been resolved.)

■ **"E055" Refrigerant Intake Low Pressure Alarm**

<Cause>

The refrigerant intake pressure is either 0 MPa or the sensor has an open circuit.

<Measures to Take>

1. When the compressor is off, if the intake refrigerant pressure and discharge refrigerant pressure are both 0 MPa, then there may be a refrigerant leak. Check the pressure on the touch panel Monitor screen. If this turns out to be the case, please consult your dealer.
2. When the product is first powered up, confirm that there is a clanking sound of the electronic expansion valve operating. If there is no such sound, the electronic expansion valve is faulty. Please consult your local dealer.
3. Check that the ambient temperature around the product is not outside the specified range. See page 5 for the specified ambient temperature range of the product.
4. Confirm that the evaporator internal piping is not frozen. If the water pressure does not change when operating under pump-only operation even when the water circuit is fully open, it indicates that freezing has occurred. Check for a drop in flow rate from the discharge pump and that the ambient temperature is within the specified range, and improve conditions as required. Also, before re-starting operation, run the pump independently and confirm that there is a sufficient flow of chilled water.
5. If none of the above cases apply, the intake refrigerant pressure sensor has an open circuit. Please consult your local dealer.

<Clearing the Alarm>

Once the refrigerant intake pressure rises above 0 MPa, either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

Troubleshooting

Alarm Causes and Measures to Take

■ **"E056" Refrigerant Intake Pressure High-Pressure Alarm**

<Cause>

There is a short circuit in the refrigerant intake pressure sensor.

<Measures to Take>

The intake pressure temperature sensor needs to be replaced. Please consult your local dealer.

<Clearing the Alarm>

Either press the "Alarm cancel" button on the Alarm Display screen on the touch panel or temporarily remove and then restore power to the product to clear the alarm. (Do this after the trouble with the sensor has been resolved.)

■ **"E058" Dip Switch Setting Error**

<Cause>

1. Due to noise or other problem on the control board, the dip switches cannot be read.
2. The dip switch settings are wrong.

<Measures to Take>

Cut off power to the product and then reapply power. Consult your dealer if the alarm occurs repeatedly.

<Clearing the Alarm>

Once the problem is resolved and power is reapplied to the product, the alarm condition will automatically be cleared.

■ **"E061" Refrigerant Discharge/Intake Pressure Sensor Alarm**

■ **"E062" Refrigerant Discharge/Intake Temparuture Sensor Alarm**

<Cause>

If the sensor was replaced for some reason, there was a mistake in the sensor connection.

<Measures to Take>

After cutting off power to the product, confirm the wiring of the sensor and correctly install it.

<Clearing the Alarm>

After the sensor has been properly installed and power restored, the alarm will be cleared. Consult your dealer if the alarm occurs repeatedly.

■ **"C064" Differential Pressure Startup Standby Warning**

<Cause>

The difference between the refrigerant discharge pressure and refrigerant inlet pressure during startup is high.

<Measures to Take>

Operation will automatically start once the pressure difference drops to a suitable operating level. Please wait for operation to start.

<Clearing the Alarm>

Once the product starts operating again, the error will automatically be cleared.

■ **"C065" User-Stop Warning**

<Cause>

The product was stopped less than 5 minutes after starting.

<Measures to Take>

Wait at least 5 minutes after starting the product before stopping it.

<Clearing the Alarm>

The warning will automatically clear after "C065" flashes in the display for about 5 seconds.

IMPORTANT

- **Always allow at least 5 minutes between starting and stopping the product. Frequent starting and stopping can lead to breakdown.**

Troubleshooting

Alarm Causes and Measures to Take

■ **"E070" to "E074", "E078", "E080" to "E085", and "E089" Compressor Inverter Alarms**

<Cause>

1. There is a trouble with either the compressor or the compressor inverter.
2. Power source open phase

<Measures to Take>

1. Confirm that the power supply voltage is within the specified range and also that there is not an open phase on the power supply.: "E072", "E073", "E080", "E083", "E084", and "E085".
2. Ensure the compressor is not locked up.: "E072", "E083", and "E084".
3. Make sure the ambient temperature is within the specified operating range.: "E083" and "E085"
4. The compressor inverter (U1) must be replaced. Please consult your local dealer.: "E070", "E071", "E074", "E078", "E080", "E081", "E082", and "E089".
5. Clean the condenser (filter) as shown on page 48.: "E085"

<Clearing the Alarm>

Press the "Alarm cancel" button on the Alarm Display screen on the touch panel. If the alarm does not clear, cut power to the product for approx. 1 minute and then re-apply power. Consult your dealer if the alarm occurs again.

■ **"C093" Compressor Inverter Replacement Warning** (Does not apply to RKE15000B-V models)

<Cause>

The compressor inverter (U1) has run for over 60,000 hours.

<Measures to Take>

The compressor inverter (U1) must be replaced. Please consult your local dealer.

■ **"C094" Condenser Fan Inverter Replacement Warning**

<Cause>

The condenser fan inverter (U3) has run for over 60,000 hours.

<Measures to Take>

The condenser fan inverter (U3) must be replaced. Please consult your local dealer.

■ **"C095" Discharge pump inverter replacement warning**

<Cause>

The discharge pump inverter (U2) has run for over 60,000 hours.

<Measures to Take>

The discharge pump inverter (U2) must be replaced. Please consult your local dealer.

■ **"C096" Mechanical Seal Replacement Warning**

<Cause>

The mechanical seals have been in use for over 8,000 hours.

<Measures to Take>

Please contact your dealer if there seems to be a drop in the pressure or flow of the chilled water.

<Clearing the Alarm>

Press “Alarm Cancel” button on the Alarm Display Screen on the touch panel to clear the alarm.
Warning "C096" will occur after each cycle of 8,000 hours of operating time.

■ **"C097" 20,000-Hour Fixed Term Inspection Warning**

<Cause>

The 20,000-hour operating time (for fixed term replacement parts) has elapsed.

<Measures to Take>

The 20,000-hour maintenance cycle fixed term replacement parts shown on page 70 should be inspected. Please consult your local dealer.

<Clearing the Alarm>

Press “Alarm Cancel” button on the Alarm Display Screen on the touch panel to clear the alarm.
Warning "C097" will occur after each cycle of 20,000 hours of operating time.

■ **"C098" 20,000-Hour Inverter Inspection Warning**

<Cause>

The 25,000-hour operating time (for fixed term replacement parts) has elapsed.

<Measures to Take>

The 25,000-hour maintenance cycle fixed term replacement parts shown on page 70 should be inspected. Please consult your local dealer.

<Clearing the Alarm>

Press “Alarm Cancel” button on the Alarm Display Screen on the touch panel to clear the alarm.
Warning "C098" will occur after each cycle of 25,000 hours of operating time.

■ **"C180", "C181", and "C182" Touch Panel Warnings**

<Cause>

1. There is abnormal signaling to the touch panel.
2. Power source open phase

<Measures to Take>

1. Press the "Alarm cancel" button on the Alarm Display screen on the touch panel. If the alarm does not clear, cut power to the product and then re-apply power. Consult your dealer if the alarm occurs again.
2. Make sure the power source does not have an open phase.

Troubleshooting

Alarm Causes and Measures to Take

■ **Condenser Fan and Dishcarge Pump Inverter Alarm**

<Cause>

The alarm for either the condenser fan inverter (U3) or the discharge pump inverter (U2) has activated.

<Measures to take>

If any of the following codes are displayed, follow the indicated countermeasure procedure.

Alarm No. Fan/Pump	Inverter Operation Panel Display	Protection Function Name	Protection Function Details	Countermeasure Procedure
E241/E341	ErF(ErF)	Data Save Alarm During an Undervoltage Condition	Memory fault due to power interruption.	・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. Consult with your dealer if the alarm occurs each time the product is powered up.
E250/E350	LU (LV)	Undervoltage Alarm	The voltage is too low.	・Bring the voltage to within specified levels.
E254/E354	OH4(OH4)	PTC Thermistor Alarm	Abnormal motor temperature.	・ Bring the ambient temperature to within specified levels. ・ Please consult with your dealer. ・ Touch the "Cancel Alarm" button or turn the power source off and then on again. ・ If doing so does not clear the alarm,arrange for a replacement
E255/E355	dbH(dbH)	Braking Resistor Overheat Alarm	The braking resistor is faulty.	
E260/E360	Er2(Er2)	Touch Panel Communications Alarm	Data communications error.	・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. ・ Please consult with your dealer.
E262/E362	Er6(Er6)	Operation Alarm	Parameter error.	
E264/E364	Er8(Er8)	RS-485 Communications Alarm	Inverter communications fault.	・ Check communications wiring connections. ・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. ・ Consult with your dealer if the alarm is not cleared.
E270/E370	OC 1(OC1)	Acceleration Overcurrent Alarm	Abnormal inverter output current.	・ Confirm that the pump is not locked up due to foreign matter entering the pump. ・ Bring the voltage to within specified levels. ・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. ・ Please consult with your dealer.
E271/E371	OC3(OC3)	Constant Speed Overcurrent Alarm		
E272/E372	OC2(OC2)	Deceleration Overcurrent Alarm		
E273/E373	OU 1(OV1)	Acceleration Overvoltage Alarm	Inverter DC voltage abnormal.	
E274/E374	OU3(OV3)	Deceleration Overvoltage Alarm		
E275/E375	OU2(OV2)	Constant Speed or Operation-Stopped Overvoltage Alarm		
E280/E380	—	Communications Error	Inverter communications fault.	・ Check communications wiring connections. ・ Ensure there is no electrical noise causing the problem and then either clear the alarm from the touch panel or cut off and then reapply power to the product. ・ If doing so does not clear the alarm, arrange for a replacement.
E281/E381	—			
E282/E382	—			
E284/E384	OLU(OLV)	Inverter Overload Alarm	Abnormal inverter temperature.	・ Bring the ambient temperature to within specified levels. ・ Bring the voltage to within specified levels. ・ Please consult with your dealer.
E285/E385	OH 1(OH1)	Cooling Fan Overheat Alarm	Inverter is overheating.	・ Bring the ambient temperature to within specified levels. ・ Clean the cooling fan and fins. ・ If the ambient temperature is 40 °C or higher, either bring down the ambient temperature, or operate the pump at a frequency of 55 Hz or lower.
E286/E386	OL 1(OL1)	Motor Overload Alarm	There is trouble with the motor.	・ Confirm that foreign matter has not entered the pump, and that it is not locked up. ・ Bring the voltage to within specified levels. ・ Please consult with your dealer.
E288/E388	Er3(Er3)	CPU Alarm	CPU fault.	・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. ・ Consult with your dealer if the alarm is not cleared.
E289/E389	Er 1(Er1)	Memory Alarm	Memory fault.	
E290/E390	L in(L in)	Input Power Open Phase Alarm	There's an open phase on the input power or a power source phase unbalance.	・ Check the wiring connections on the input side of the inverter. ・ Confirm that there is not a power supply open phase on the input power side. ・ Please consult with your dealer.
E291/E391	OPL(OPL)	Output Power Open Phase Alarm	Output power open phase.	・ Check the wiring connections on the output side of the inverter. ・ Please consult with your dealer.
E294/E394	OH2(OH2)	External Alarm	There is a problem with other external equipment connected to this product.	・ Ensure there is no electrical noise causing the problem and cut off and then reapply power to the product. ・ Consult with your dealer if the alarm is not cleared.

<How to Clear the Condenser Fan Inverter and Discharge Pump Inverter Alarm>

Either press the "Alarm cancel" button on the touch panel or temporarily remove and then restore power to the product to clear the alarm.

Storage (Winter Storage and Other Extended Periods of Non-Use)

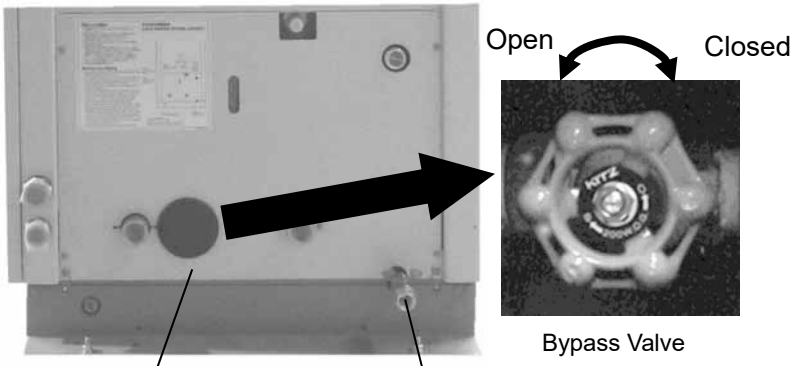
1. Cut off the power source
   Cut off the power source.
2. Freeze Prevention Measures
   Carry out the following to prevent freezing.

■ Check Water Tank Water
If the product is not to be used for a long time, follow the water circuit inspection procedure on page 50 and inspect for dirt. If the tank is dirty, replace all of the water one time and run the pump (pump-only operation) for 10 minutes. After doing so, continue with the following instructions in order to drain all of the water from the product.

IMPORTANT

- **If the water inspection of the water tank and draining of the water circuit is not carried out before storage, the mechanical seal on the discharge pump can become sticky and freezing can occur, which could lead to product damage or leakage. (See page 52, "Water Quality Management" for further details.)**

■ Drain the Chilled Water
Fully open the water tank drain and bypass valve, and drain the water from the tank and water piping. Water remaining in the product can cause valves to freeze, therefore the valves should be left open.



3. Before storing and after taking measures to ensure the product won't freeze during storage, cover the product with a vinyl or other type of cover in order to keep out dust and dirt.
4. Before using the product after it has been stored for a long period, check each component for abnormalities and follow the procedures under, "Operation" (page 9) to resume operation.

Consumables

Parts To Be Replaced Based On Inspection

Part to be replaced based on inspection (These parts will be replaced if they are found to be spent or worn at the time of inspection.)

Part Name	Part Number	Qty / Unit	When to check	Comments	Replacement judgment standard (*1)
Filter(Front)	03108063020	1	Monthly	For model 11000	Presence of damaged or broken parts
	03109598020			For model 15000	
Filter(Left)	03108063010	1	Monthly	For model 11000	Presence of damaged or broken parts
	03109598010			For model 15000	
Y-strainer filter	62022200260	1	Monthly	For model 11000 and 15000	Presence of damaged or broken parts
Mechanical seal replacement kit assembly	03111583010	1	Every 6 months	For model 11000 and 15000	If Discharge Pump is a significant drop in performance, or more after using 8,000 hours
Ventilating Fan (Cooling fan for U2)	20312010030	1	Every 6 months	For model 11000 and 15000	Presence of significant dirt, abnormal sound or after using 20,000 hours
Ventilating Fan (Cooling fan for U3)	20312010030	1	Every 6 months	For model 11000 and 15000	Presence of significant dirt, abnormal sound or after using 20,000 hours
TPL1 assembly	04106454010	1	-	For model 11000 and 15000	20,000 hours of the product being unpowered (*2)

*1 Times represent rough indication values to be reviewed considering application conditions (including ambient temperature and environment surrounding the product). Times assume the operating condition of 10 hours/day or 2500 hours/year without frequent starts and stops (referring to the industrial air conditioner standard defined by the Japan Refrigeration and Air Conditioning Industry Association)

*2 If the internal battery becomes discharged then it is necessary to replace the touch panel as the battery alone cannot be replaced. The battery is used when the product is unpowered and is not used when product is powered. At the end of the battery life, the touch panel will fail to display the correct time, and the start/stop timer functions cannot be used.

Main Component Maintenance Cycles

Approximate replacement times. (Actual replacement time will depend on particular operating conditions and environment.)

Approximate replacement times. (Actual replacement time will depend on particular operating conditions and environment.)

Part Name	Part Number	Qty / product	Comments	When to replace (*)
Compressor (M1)	0A003802000	1	For model 11000	20,000 hours
	0A004047000		For model 15000	
Discharge pump (M2)	0A003804010	1	For models 11000 and 15000	
Condenser fan (M3, M4)	0A003278000	2	For models 11000 and 15000	
Cooling electronic expansion valve main product	0A004230000	1	For model 11000	
	0A004102000		For model 15000	
Cooling electronic expansion valve coil	04108390010	1	For model 11000	
	0A004103000		For model 15000	
Heating electronic expansion valve main product	0A001994000	1	For models 11000 and 15000	
Heating electronic expansion valve coil	0A001998000	1	For models 11000 and 15000	
Electrolytic capacitor (for U1)	0A002126000	2	For model 11000	25,000 hours
Inverter assembly (U2)	04106384010	1	For models 11000 and 15000	
Inverter assembly (U3)	04106385010	1	For models 11000 and 15000	

* Indicates the time when the chance of failure due to wear increases.
Components may not necessarily require replacement after this period of time -- actual replacement time will depend on the operating and environmental conditions of the particular installation. Components should be replaced if an abnormality is discovered at the time of the regular maintenance cycle inspection.

* The number provided here is based on an average operating rate of 10 hours/day, or 2,500 hours/year. (Based on the industrial air conditioner standard defined by the Japan Refrigeration And Air Conditioning Industry Association.)

・ When performing component inspection or replacement, be sure to note the accumulated time taken from the "Accumulated Time Display" as shown on page 27 and write down the time on the inspection chart on page 92 for future reference with regard to replacement time.

Optional Parts

Options (Sold separately)

Options (Sold separately)

■ Optinonal Parts List

Part Number	Part Name	Qty/Unit	Comments
0A003805000	Vibration isolated Table	1	For model 11000
0A004173010		1	For model 15000
03108949010	Remote Control Set (Including Remote Control cable)	1	For all models. Remote control cable length: 20 m.
03108949020		1	For all models. Remote control cable length: 50 m.
03108949030		1	For all models. Remote control cable length: 100 m.
03108881010	Wind Protection Hood Set *1	1	For model 11000
04109802010	Wind Protection Hood B Set *1	1	For model 15000
03108887010	Snow Protection Hood Set *2	1	For model 11000
03109803010	Snow Protection Hood B Set *2	1	For model 15000
04100490010	Water Filter C Set *3	1	For models 11000 and 15000
04100437010	Water Deionizer E Set	1	For models 11000 and 15000
04105970010	Communications Software Set	1	For all models
04106400010	Distribution Panel High-Temperature Set *4	1	For model 11000
04107416010			For model 15000
04100522010	Water Demineralizer Set for Water Supply	1	For all models

For installation of the "Distribution Box High-Temperature Set" for the model listed in the chart below, processing/installation/replacement of the following components is required in addition to the "Distribution Box High-Temperature Set". First confirm the serial number and then obtain the required components as noted.

Compatible Model	Target Serial No.	Pieces / product	Part Number / Name
RKE11000B-V	507*** to 512***	1	03109219010 / Inverter Lower Board
		3	31093401210 / M4 Bind Head Tapping Screws
		2	80000051380 / Nylon Cable Ties, L=100
		1	04106439020 / Control Board Assembly

※ Check the Installation Guide included with the "Distribution Box High-Temperature Set" for details.

Product Disposal

Product Disposal

Product Disposal

When disposing of this product, always follow local disposal regulations and employ a professional industrial waste company for proper disposal.

After-Sales Service

■ Warranty
- The product warranty is printed at the end of this manual. Be sure to keep it in a safe place.
- Note that the user may have to pay for consumable parts even during the warranty period. Please read the warranty carefully.
- The customer will be responsible for charges incurred for repairs conducted after the warranty period has expired. Purchase of a new product may be recommended depending on the area where the repair is to take place, as well as the particulars of the repair and the amount of time the product has been in service, in which case, we ask that you please consult with your dealer.

■ Before Requesting Inspection or Service...
- See page 53, "Troubleshooting".
- If the problem cannot be remedied by taking the noted suggestions, do not attempt to fix the problem yourself; please consult with the dealer where the product was purchased.

■ Spare Parts
- Spare parts are items necessary to maintain the proper function of the product.
- Spare parts for this product will be made available for a period of 7 years from the last day of production of the product.

■ Requesting After-Sales Service
- When requesting inspection or repairs, please provide the following information to the dealer where the product was purchased.
  (1) Product name
  (2) Model designation (shown on nameplate)
  (3) Condition (be as specific as possible)
  (4) Address and phone number
- When ordering replacement parts, please give the following information.
  (1) Product name
  (2) Model designation
  (3) Part name, part number and quantity required

Installation

Installation should be performed by your dealer or other qualified personnel. Improper installation by the user could result in water leaks, electric shock, fire, or other problems.

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Important Safety Guidelines

Notes Regarding Usage

⚠ WARNING

Failure to follow instructions contained in a WARNING may result in death or serious injury.

	Carefully follow the installation directions outlined in this operating manual. Improper installation can lead to water leakage, electric shock, or fire. **For proper installation, ask your dealer or a qualified specialist.** Improper installation by the end user may lead to water leakage, electric shock fire or other problems. **Be certain that all electrical wiring is done in accordance with relevant electrical construction regulations and also follows the contents of this operating manual.** Also, this product should be installed on its own electrical circuit. Installation with an insufficient power supply or improper installation can result in electric shock or fire. **When wiring, use only the prescribed cables** Also, when attaching cables to the equipment, fix cables so there will be no external forces exerted on the contacts. Improper cable connections may lead to electric shock, overheating of the contacts, or fire. **Use eyebolts properly** Suspend the product from all 4 eyebolts and make sure there is at least a 60° angle between the top face of the product and each of the suspension cables. Improper suspension may lead to the product tipping over or falling, which could result in injury. **Take measures against refrigerant leaks.** If the product is to be installed in a machine room or similar location, measures should be taken to ensure that even if there is a refrigerant leak, refrigerant concentrations won't become critically high. If by some chance there is a refrigerant leak and concentrations become critically high, an accident due to lack of oxygen could result.
	Do not modify this product Improper modifications to wiring or piping within the product can lead to electric shock or fire. Furthermore, modifying the product will void the product warranty.
	Do not modify settings of safety features and components of this product. Modifying such settings can lead to an explosion or fire. **Do not install this product in places where flammable gases may be present or could leak out.** If by some chance such gas were to leak and collect near the product, a fire could break out. **Do not operate in places that are very dusty or have corrosive atmospheres.** Doing so may cause damage to the product. **Do not install this product where corrosive gases, organic solvents, or chemical solutions, etc. are present in the air or where such gases or liquids could come into contact with it.** Doing so can cause corrosion of the product, which could lead to electric shock, fire, or refrigerant leakage. **When installing outside, avoid installing in places where there will be direct sunlight, strong wind (wind speed of 8 m/s or higher), or falling snow.** (The product has an IPX4 Equiv. splash-proof rating. Installation of a roof to keep off rain is not required.)
	Always properly ground this product. Do not attach the grounding wire to gas pipes, water pipes, lightning rods, etc. Improper grounding can lead to electric shock. (Installation of a Class-D ground hookup must be performed by a qualified electrician.)

Importnt Safety Guidelines

Notes Regarding Usage

⚠ CAUTION

Failure to follow instructions contained in a CAUTION may result in injury to the operator or damage to property.

	Install in a place that can sufficiently support the weight of the product. Also, be sure to install on a level surface and provide adequate safety measures to ensure that it will not tip over. Failure to install as indicated can result in water leaks or injury etc., from the product tipping over or falling. **Ensure proper water supply and drainage construction** Improper water supply and drainage construction could result in water spraying out, causing water damage to the surrounding area. **Water supply pressure should be at or below 0.50 MPa** Too high pressure can lead to equipment damage, which may lead to water leaks, flooding of the surrounding area, and electric shock. **Wear gloves when removing the outer cabinet.** Sheet metal edges are sharp and could cause injury.
	Do not install this product where freezing may occur. Pipes freezing during operation can result in burst pipes and water splashing out which can cause damage to items in the surrounding area. **Do not climb onto or place things on the product.** Doing so can cause the product to tip or fall and may lead to injury.

Unloading and Placement

Before Unloading

Before Unloading

■ After unpacking, check the nameplate of the product to ensure it is the correct model ordered. (See page 7, "Main Parts".) Also, check that the below mentioned included parts are present.
* Included parts are in a cardboard box located where the water supply port was removed.

Part Name	Specifications	Qty Per Unit
Y-Strainer	40 mesh equiv.	1 pc
Barrel Nipple	1・1/4B×100L (to attach the Y-strainer)	1 pc

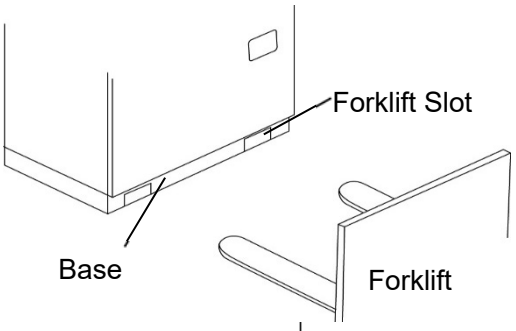
■ It is possible that the product could be damaged during shipping, transport, or other handling. When receiving the product, check to make sure that there are no scratches or other abnormalities. If any damage or abnormality is detected, please contact the dealer where the product was purchased.

Unloading and Placement

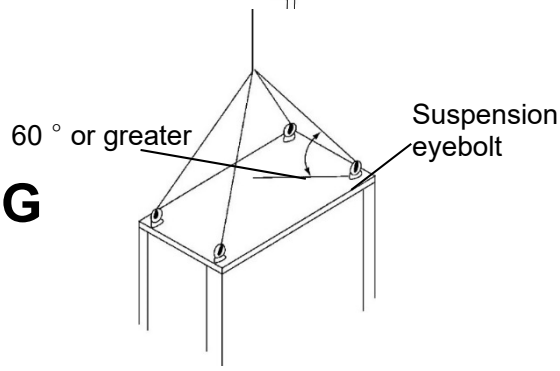
Unloading Procedure

Unloading Procedure

The product is heavy. Please be careful when transporting it. There are rectangular forklift slots at the base of the product to accept forklift tines. Be sure to insert the tines so that they protrude from the other side.



Model	Mass (when water tank is empty)
RKE11000B-V	415 kg
RKE15000B-V	460 kg



WARNING

● When making use of the eyebolts, suspend the product from all 4 eyebolts and make sure there is at least a 60° angle between the top face of the product and each of the suspension cables. Improper suspension may lead to the product tipping over or falling, which could result in injury.

Installation

Product Placement

WARNING

● Installation of this product should be performed by your dealer or other qualified personnel. Improper installation by the end user may lead to water leakage, electric shock, fire, or other problems.

Product Placement

WARNING

● Do not install in places where flammable gases may be present or could leak out. If by some chance such gas were to leak and collect near the product, a fire could break out.

● Do not install where corrosive gases, organic solvents, or chemical solutions, etc. are present in the air or where such gases or liquids could come into contact with the product. Doing so can cause corrosion of the product, which could lead to electric shock, fire, or refrigerant leakage.

● When installing outside, avoid installing in places where there will be direct sunlight, strong wind (wind speed of 8 m/s or higher), or falling snow. Installation in such places would not only reduce product performance, but could also lead to electric shock, fire, or damage to the product. (Product has an IPX4 Equiv. rating.)

WARNING

● Take measures against possible refrigerant leaks. If the product is to be installed in a machine room or similar location, measures should be taken to ensure that even if there is a refrigerant leak, refrigerant concentrations won't become critically high. If by some chance there is a refrigerant leak and concentrations become critically high, an accident due to lack of oxygen could result.

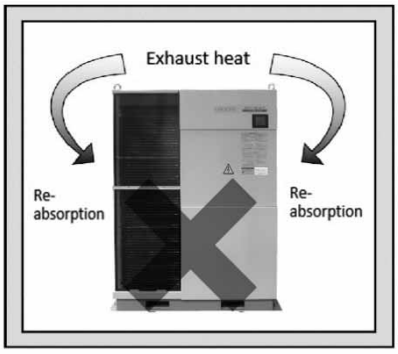
Installation

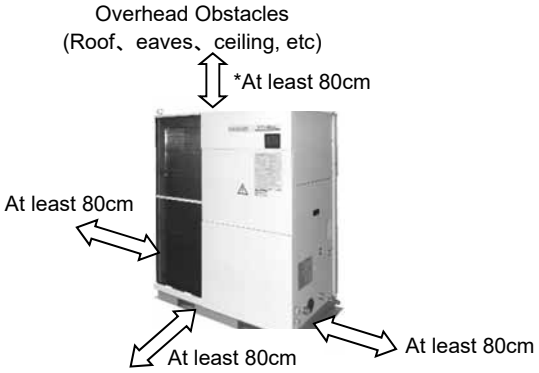
Product Placement

CAUTION

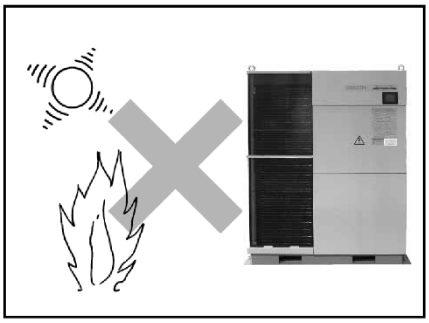
- **Install on a level surface that can adequately support the weight of the product and fix the product down with anchor bolts to prevent it from moving around. Failure to install as indicated can result in water leaks or injury etc., from the product tipping over or falling.**

1. Ensure there is adequate space for heat ventilation as well as sufficient space for maintenance and inspection. Also note that if the product is enclosed as in the illustration below, exhaust heat from the product will be forced back into the product, causing the refrigerant pressure to rise, and eventually causing the operation to stop.

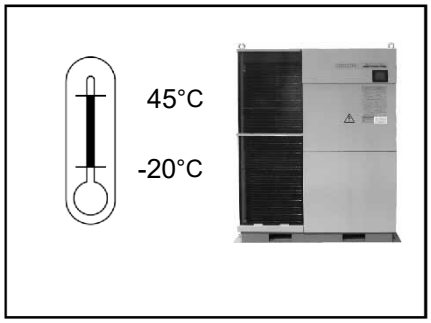




* If there are no obstacles within 150 cm of the front and sides of the product, then the space from the top of the product to the obstacle above can be as low as 100 cm.

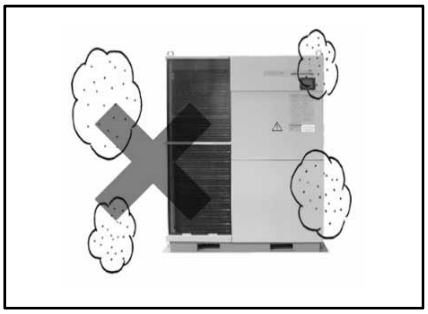


2. If the product will be installed where a wind of 8 m/s or higher will be blown on it, measure to block the wind from hitting it such as installation of a wind-break panel or wall is required.
3. Install out of direct sunlight and do not install where the product would be affected by heat.
   Exposure to direct sunlight or heat can cause the product to perform below the specified performance equal to the amount of the heat exposure. It can also lead to the activation of built-in safety devices which will prevent operation.
4. Operate the product in an ambient temperature range of -20 to 45 °C.
   Operating outside this temperature range can lead to breakdown of the comporessor.
   And operating in temprature over 45 °C will result in a drop in the effectivness of thermal radiation of the condenser. Built-in safety devices may activate causing the product to shut down. If the ambient temperature will be above 45 °C, istall ducting, following the section page 85,"Ducting Design Points".



IMPORTANT

- **When performing ductwork, install such that the piping is not constricted along the way. Failure to follow this rule can also lead to activation of bulit-in safety devices which will stop product operation.**

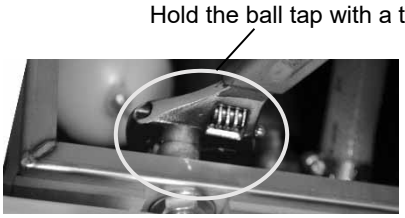


5. Install in a place that is generally free of dust and dirt.
   Installation in places with heavy dust and dirt can result in reduction in performance.
6. Operating the product constantly under the snow-protection mode (see page 34) in areas where there is heavy snow fall will hinder performance. Therefore it is advised to install the product in an area protected from snowfall.

Water Supply and Drainage Construction

CAUTION

- **Reliably install water supply and drainage piping. Improper water supply and drainage construction could result in water spraying out, causing water damage to the surrounding area.**
- **Keep water supply pressure at or below 0.50 MPa. Too high a pressure can damage the product and may lead to water leaks, flooding of the surrounding area, and electric shock.**
- **When installing water piping, be careful to avoid the following points. Failure to do so can result in water leakage.**
  1. **Overtightening the piping connected to the water supply port.**
  2. **Having external forces on the water supply port.**
  3. **Piping installation that does not absorb vibrations of water hammer, etc. For exact piping port positions, see page 7, "Main Parts".**
- **When connecting piping to the water supply port, always use two tools, using one to support the ball tap valve, as shown in the photo to the right.**

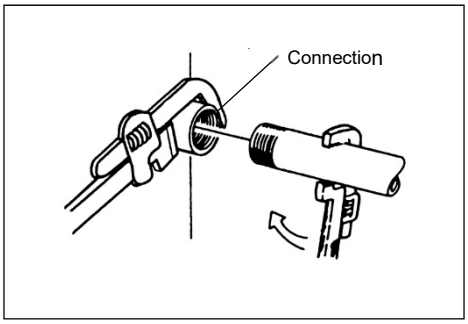


- **After making water supply piping connections, confirm that water supply piping is level. If piping is installed at an angle, the point at which the water supply is stopped will change, which could result in the water shortage alarm being activated or result in water overflow.**

Chilled Water Piping

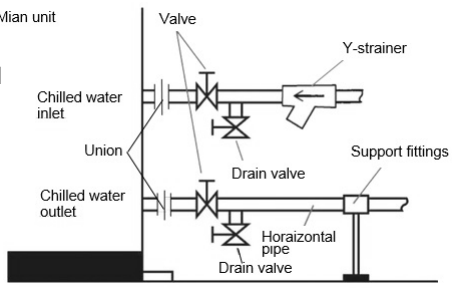
■ Piping Sizes

Piping Item	Piping Size
	RKE11000B-V,RKE15000B-V
Chilled Water Inlet	Rc1.1/4
Chilled Water Outlet	Rc1.1/4
Water Tank Drain	Rc3/4
Overflow	Rp1
Drain Pan Drain Port	Rc1/2
Water Supply Port	PJ1/2



■ Piping Methods

1. Check the chilled water inlet/ outlet.
2. Make pipe lengths as short as possible, and also avoid vertical and curved piping as much as possible.
3. When tightening piping, use 2 pipe wrenches to fully support both sides of the connection.
4. Install inlet/outlet valves and drain valves (user supplied) to the chilled water inlet and outlet ports.
5. Install the included Y-strainer on the chilled water inlet port.
6. Make sure that there is not excessive weight or vibration on the product from the connected piping. Longer lengths of horizontal piping should be supported with additional support hardware or by other means to ensure unreasonable forces are not applied directly to the product's connection ports. Failure to properly support piping can lead to product damage.
7. Insulate piping. (Install the pipe insulation such that there is enough gap to allow the removal of the cabinet water supply port.)
8. If an automatic water supply system is to be installed, be sure to install a valve on the supply port. Also, keep water supply pressure at or below 0.50 MPa.
9. Be sure to install support fittings when installing supply water piping.



Installation

Water Supply and Drainage Construction / Electrical Work

IMPORTANT

- **If connections to the chilled water inlet and outlet ports are reversed, then no cooling will occur.**
- **Be very careful not to let dirt or foreign matter enter the water circuit during piping installation.**
- **Install the included Y-strainer on the chilled water inlet port. Foreign substances entering the piping could cause clogging of the evaporator and product breakdown.**
- **Remove all caps on chilled water piping which were installed when the product was shipped, and install overflow, drain, and any other required piping.**
- **Always install valves (customer supplied) at the chilled water inlet and outlet ports. If there is no valve, the water will have to be drained from the water circuit in order to clean the Y-strainer filter.**
- **The drain valve will be used to drain water from the pipes before long periods of disuse or otherwise when required.**
- **Union Couplings are used, when the chiller is moved for its maintainance etc.**
- **If antifreeze or other additives are used, measures must be taken to prevent drainage from the drain pan drain or overflow port, etc. from flowing into normal water drains or onto the ground, etc.**

Electrical Work

WARNING

- **Ensure that all electrical wiring is done in accordance with relevant electrical construction regulations as well as the directions outlined in this manual. Furthermore, the product must be powered on its own electrical circuit. Installation with an insufficient power supply or improper installation can result in electric shock or fire.**
- **Be sure to connect the prescribed cables in a reliable manner, ensuring that there are no external forces exerted on cables or contact connectors. Improper cable connections may lead to electric shock, overheating of the contacts, or fire.**
- **Make sure the power cord does not come into contact with the motor or refrigerant piping within the product. Contact with hot surfaces could cause the cord to melt, resulting in an electrical short.**

WARNING

- **Do not modify this product. Improper modifications to wiring or piping within the product can lead to electric shock or fire. Furthermore, modifying the product will void the product warranty.**

WARNING

- **Never change the settings of built-in safety devices. Modifying such settings can lead to an explosion or fire.**

WARNING

- **Always properly ground this product. Do not attach the grounding wire to gas pipes, water pipes, lightning rods, etc. Improper grounding can lead to electric shock. (Installation of a Class-D ground hookup must be performed by a qualified electrician.)**

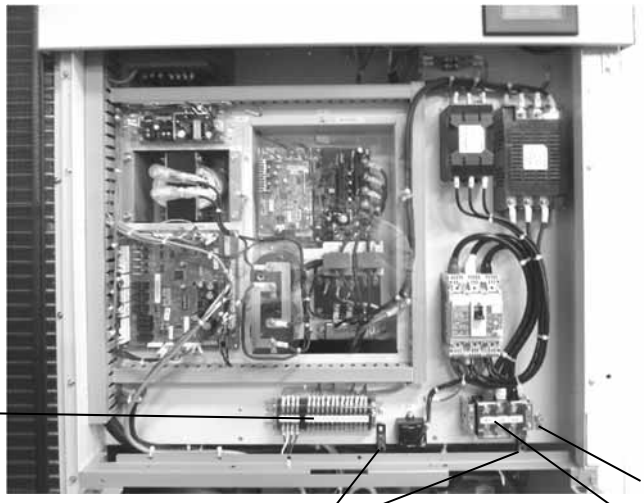
IMPORTANT

- **Connect the product to a commercial power source. (Connection to the secondary side of the inverter will damage the product.)**

Installation

Electrical Work

■ Electrical Wiring



1. There is a combined-use overload protection and earth leakage breaker installed inside the distribution panel and the specifications are on the chart on the right.
2. Select a power cord with a capacity that matches the noted breaker capacity in the chart to the right. Hook up the ground wire to the earth (ground) terminal located in the distribution panel. Also, regarding the power and signal terminal block, refer to the chart on the right for the screw size and terminal block width.
3. Remove the front right cabinet panel by following the instructions on page 57.

			RKE11000B-V	RKE15000B-V
Power Source (V・Hz)			Three-phase 200 to 220V±10 % ・ 50/60	
Terminal Block	Screw Size	Power Source	M6	
		Signal	M3	
	Terminal Block Width (mm)	Power Source	17	
		Signal	5.9	
Breaker capacity (A)			75	100
Current Sensitivity (mA)			30	100
Ground Wire			M6	

4. Route the power cord through the power cord access hole, located on the lower-right part of the product, to the inside of the terminal box. (Use 1 of the 2 available power cord access holes. The other can be used for remote control panel connections, etc.) Connect the power cord to the L1, L2, and L3 terminals on the terminal block. Fix the power cord in place with a cable tie.
5. Always properly ground this product. Connect the ground wire to a proper earth/ground point that has been installed by a qualified electrician. Furthermore, the diameter of the grounding wire must be at least 2 mm.
   * Use ground wiring terminals according to the sizes listed in the chart below.
6. Ensure the source voltage is within ±10 % of the specified voltage. Also make sure the source voltage* phase unbalance is within ±3 %.
   * Phase unbalance (%) = (Maximum voltage [V] - Minimum voltage [V]) ÷ Average voltage of 3 phases (V) × 67.
   (Based on IEC61800-3.)

IMPORTANT

- **Make sure the power cord does not come into contact with the motor or refrigerant piping within the product. Contact with hot surfaces could cause the cord to melt, resulting in an electrical short. (Secure the power cable with the distribution panel cable tie.)**
- **When powering up the product, be sure to follow the guidelines described under the "Operation" section in the "Operating Manual" portion of this guide.**
- **Never operate when the water circuit is empty. Always fill the water tank and confirm the water level before operating.**
- **Do not attempt to perform withstand voltage tests or insulation resistance tests. Doing so can damage the semiconductors used in the chiller control board or inverter. If the tests are deemed necessary, please consult your dealer.**
- **Before powering up the product, confirm that there are not either a reversed phase or open phase.**
- **All models in this product line use three-phase motors which are inverter driven and therefore are not susceptible to problems due to a reversed phase on the power source.**

Installation

Electrical Work

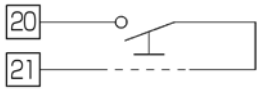
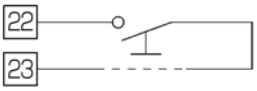
■ If Employing Remote Control Operation

If remote operation and signal output are to be employed, perform the wiring after first confirming the required specifications. *Please prepare terminals that fit M3 size screws.

1. Please confirm the product specifications which are as follows.

Remote Operation Input Specifications	・ No-voltage contacts input (Alternating switch) ・ Maximum cable length: 20 m ・ Input resistance: 1200 Ω ・ Open circuit voltage (Voc): 12 Vdc ・ Short circuit current (Isc): 10 mAdc
Signal Output Specifications	・ No-voltage relay contact output (c contact) ・ 250 Vac / 30 Vdc 5 A (resistance load) (normally open) ・ 250 Vac / 30 Vdc 3 A (resistance load) (normally closed) ・ Minimum operating current (for reference only) 5 Vdc 10 mA

2. Remote operation and signal output terminals are as follows:

Remote Operation Contacts	Remote Operation	
	Remote Discharge Pump Operation	
Signal Output Contacts	Operating signal	24 When power source is cut off: 24-26 closed, 25-26 open 25 Operation is stopped and the product is operating in pump-only mode: 24-26 closed, 25-26 open 26 Equipment operating: 24-26 open, 25-26 closed
	Alarm Signal	27 When power source is cut off: 27-29 closed, 28-29 open 28 No alarm : 27-29 closed, 28-29 open (initial setting) 29 During alarm: 27-29 open, 28-29 closed (initial setting)
	Temp. Warning Signal	30 When power source is cut off: 30-32 closed, 31-32 open 31 No temperature warning: 30-32 closed, 31-32 open (initial setting) 32 During temperature warning: 30-32 open, 31-32 closed (initial setting)

■ When Using Communications Functions

USB	・ Connector: USB type B connector ・ Communications cable max. length: 3 m. * May differ depending on specific operating conditions.
RS-422A (RS-485)	・ Attach the stripped wires and use as is. ・ Data cable wire size: AWG16 to 24 ・ Data cable max. length: 100 m. (from host to the end unit) * May differ depending on specific operating conditions.

* Please see page 36, "Communications Functions" for further details regarding communications functions.

■ If Using the Remote Control (Optional item)

Purchase of optional parts is required. (See page 72, "Optional Equipment" for details.)
Conduct electrical work according to the installation guides of each item.

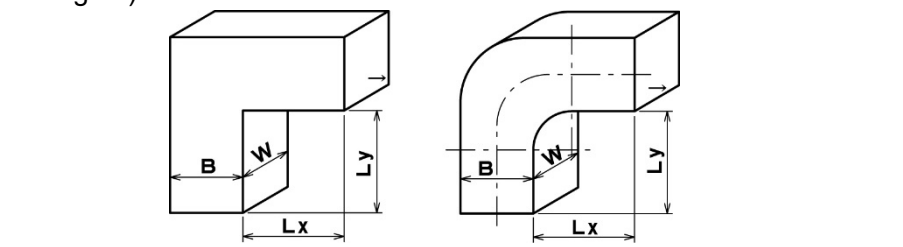
Ducting Design Points (For User-Installed Ducting)

If the installation area is narrow or has a low ceiling, the ambient temperature could raise to above 45 °C from heat coming from the ventilation outlet on the product. In such cases, ducting should be used to move the heat outside of the room or at least away from the product so that the effects of it do not cause the temperature near the product to rise. When planning duct work, plan on a static pressure of 20 Pa or less. See examples below.

1. Duct Cross Sectional Area
   (1) For ducting that rises up:

Model	RKE11000B-V,RKE15000B-V
Minimum cross sectional area (m^2) [B×W]	0.8
Maximum length (m)	20

   (2) Rectangular ducting with bends:
   ①The cross sectional area should be greater than above, and Lx and Ly should be less than 2 m. (See Fig. 1.)



Rectangular duct with straight bend　　Rectangular duct with round bend

Fig. 1 Examples of bent rectangular ducting.

   ② If the length of Lx and Ly go over 2 m, then there should be a 20 cm gap between the hot exhaust air outlet from the product and the duct, and the duct outlet should have a fan motor installed.

Model		RKE11000B-V,RKE15000B-V
Recommended Fan	50Hz power	EWF-50FTA ×2 (Mitsubishi Electric Corporation)
	60Hz power	EWG-50ETA ×2 (Mitsubishi Electric Corporation)
Minimum required airflow (m^3 / min)		119×2

   When using the recommended fan, Lx and Ly should not be longer than 5 m. (See Fig. 2.)
   * The duct in the figure is one example. The particular direction the duct exhaust port goes from the product does not matter, however the following important points must be enforced.

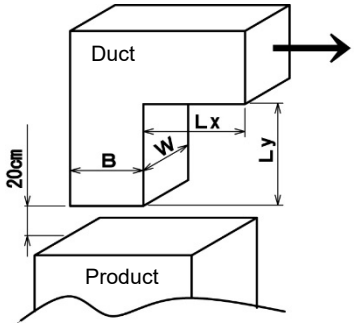


Fig. 2 Installation method when Lx and Ly are longer than 2 m.

IMPORTANT

- **Do not have anything such as walls or other obstacles that could obstruct exhaust output within 2 m of the product in the direction of the duct exhaust output. Failure to follow this rule will result in decreased air flow and insufficient heat ventilation, which can cause built-in safety devices to activate and stop operation of the product.**

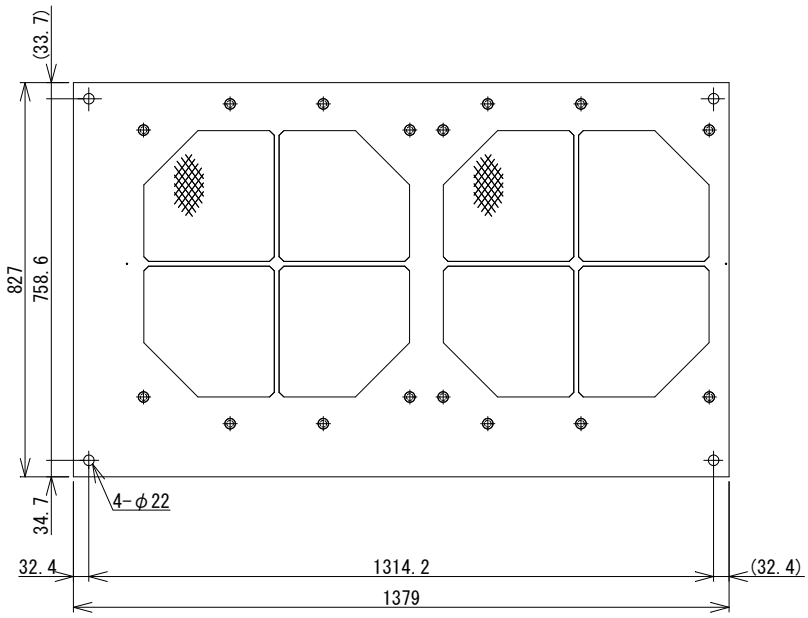
Installing Ducting on the Product

If ducting is to be affixed to the product, first remove the suspension eyebolts from the top and replace them with M size bolts of the appropriate size. In this case, in order to allow for easy fan maintenance and inspection, allow for at least 50 cm of removal space above the product.

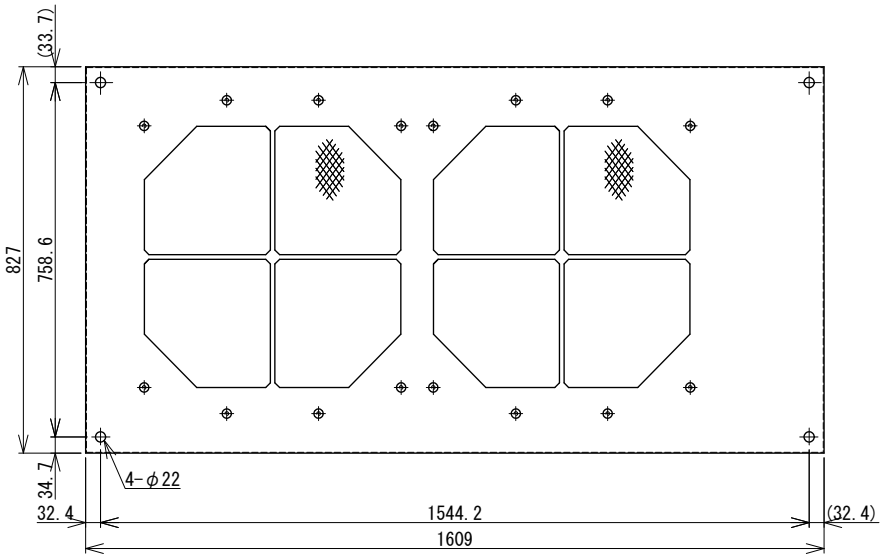
Model	M screw
RKE11000,15000B-V	M16

■ RKE11000B-V

Units : mm



■ RKE15000B-V



IMPORTANT

- **If ducting is to be affixed directly on the product, be sure to install support hardware along the ducting in order to prevent the product from tipping over.**

Specifications

RKE11000B-V

Model				RKE11000B-V		
Cooling capacity *1			kW	37.2		
External paint color				Grey (Munsell No. N8.0) Grey (Munsell No. N5.5)		
External dimensions (H x D x W)			mm	1700×854×1380		
Mass (When water tank is empty)			kg	415		
Ambient temperature range *9, *10			°C	-20 to 45		
				-20 to 50 (when using an option *6)		
Chilled Water	Control Precision *4			±0.1 °C *5 During energy saving mode: ±2.0 °C		
	Temperature Setting Range		°C	3 to 35		
				0 to 35 (When using antifreeze *7)		
	Operable Pressure Range		MPa	0.08 to 0.80 *10		
	Operable Flow Rate Range		L/min	100 to 230 *10		
	Water Inlet and Outlet Connection Dia.			Rc1.1/4		
Electrical Ratings	Power Source *2		Phase	3		
			Hz		50	60
			V	Rating	200 to 220	200 to 220
			%	Tolerance	±10	±10
	Power Consumption *1		kW	14.4		
	Current *1		A	47.0		
	Power Supply Capacity *3		kVA	19.5		
Operation control method				Compressor rotational speed control		
Product Specifications	Compressor	Structure		Fully hermetic, scroll type		
		Output	kW	7.46 (Inverter drive)		
	Condenser			Fin and tube type, forced air cooling		
	Evaporator	Structure		Plate type		
		Material		SUS316 (with copper brazing)		
	Discharge pump	Structure		Multistage centrifugal immersion type		
		Output *1	kW	4.0 (Inverter drive)		
	Fan Motor Output		kW	0.4×2 (Inverter drive)		
	Water Tank Capacity *8		L	Approx. 100		
	Water Supply Method			Ball tap (water supply pressure: 0.50 MPa or less.)		
	Refrigeration Control Method			Electronic expansion valve (Direct stepping motor control type)		
	Refrigerant			R410A		
	Thermostat			Touch panel type electronic temperature control (with alarm monitor)		
Communication	Communications Standard			EIA Standard RS-422A/RS-485		
				USB2.0		
	Maximum Number of Connected Units			RS-422A/RS-485	32 units	
				USB (TYPE B)	1 unit	
Safety Devices	Compressor			Electronic thermostat for inverter		
	Discharge Pump			Electronic thermostat for inverter		
	Fan Motor			Electronic thermostat for inverter		
	Inverter			Overload cutoff		
	Electric Circuit			Earth leakage breaker, Overload cutoff		
	Refrigeration Cycle			High-pressure pressure switch		
	Water Circuit			Float switch (for low water level alarm)		
Accessories	1. Y-shape strainer 1.1/4B (40 mesh or equiv.): 1piece 2. Nipple 1.1/4B×100L (to mount Y-strainer): 1 piece					
Remarks	*1 Operating conditions: Chilled water temp.: 20 °C. Ambient temp.: 32 °C. Chilled water flow rate: 140 L/min. Cooling capacity is at least 95 % of listed figures. *2 Source voltage phase unbalance should be within ±3 %. *3 At maximum driving current within specifications. *4 The setting can be changed by changing parameter F015. *5 When the continuous current load fluctuation is within ±10 %, the ambient temperature and power source, etc. are stable, and the chilled water flow is at least 120 L/min. However, note that the following cases are excluded: ① The first 4 minutes (approx.) after the compressor starts. (Temperature control will start approx. 4 minutes after the compressor starts.) ② When the refrigeration load is small, and the compressor is switching on and off, or when the heating-side electronic expansion valve is switching between fully closed to open or open to fully closed. ③ When the current load varies more than ± 10 %. At such times, the temperature will be within ± 2.0 °C. ④ When the water temperature setting is changed. *6 Distribution Panel High-Temperature Set installed. (Optional part) *7 Antifreeze is a 30 to 40 % ethylene glycol solution. *8 Level gauge at F position. *9 Not frozen. *10 Keep the ambient temperature and cooling water temperature at 40 °C or lower if operating with a pump frequency of 55 Hz or higher.						

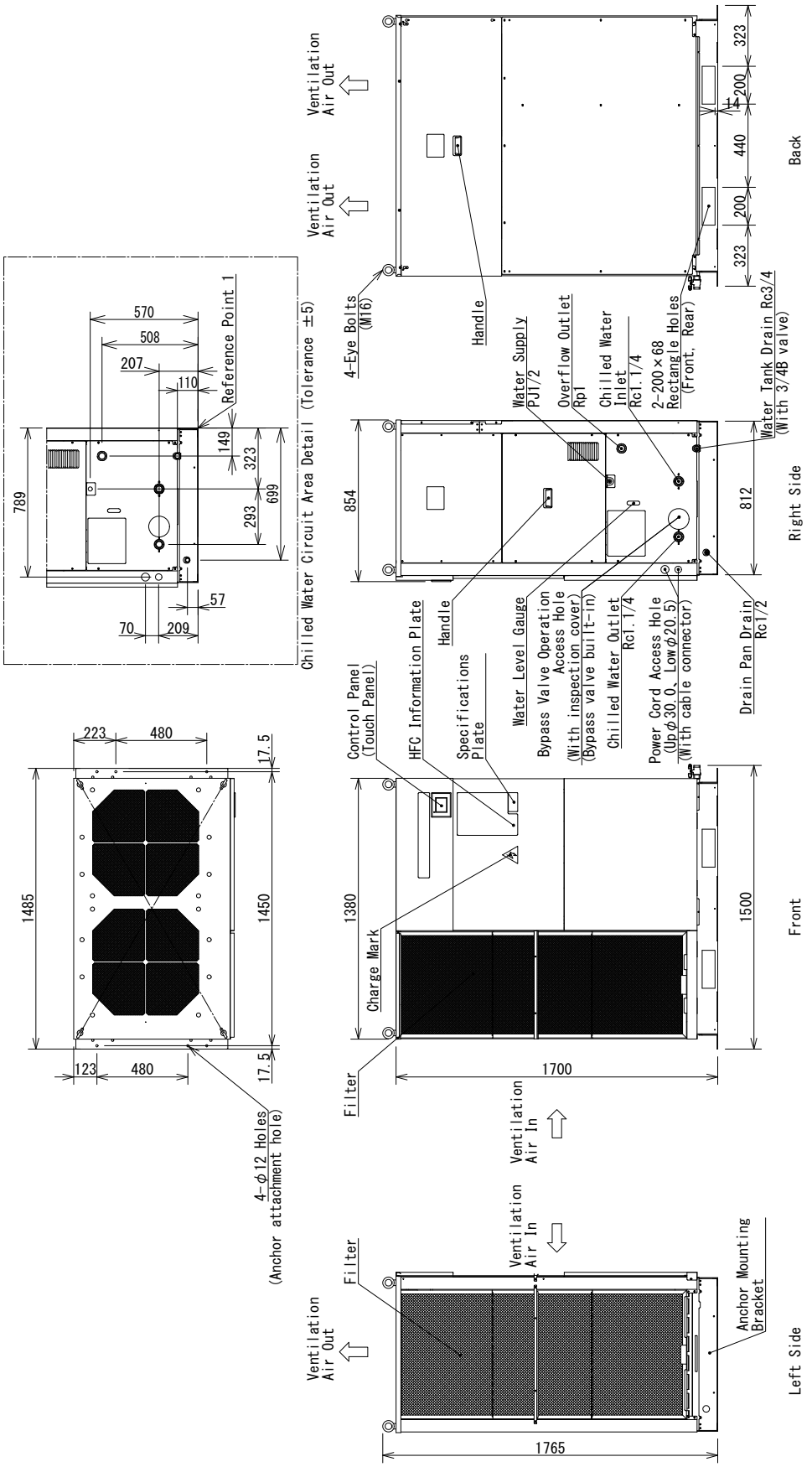
Specifications

RKE15000B-V

Model				RKE15000B-V		
Cooling capacity *1			kW	48.0		
External paint color				Grey (Munsell No. N8.0) Grey (Munsell No. N5.5)		
External dimensions (H x D x W)			mm	1800×854×1610		
Mass (When water tank is empty)			kg	460		
Ambient temperature range *9			°C	-20 to 45		
				-20 to 50 (when using an option *6)		
Chilled Water	Control Precision *4			±0.1 °C *5 During energy saving mode: ±2.0 °C		
	Temperature Setting Range		°C	3 to 35		
				0 to 35 (When using antifreeze *7)		
	Operable Pressure Range		MPa	0.08 to 0.80		
	Operable Flow Rate Range		L/min	100 to 230		
	Water Inlet and Outlet Connection Dia.			Rc1.1/4		
Electrical Ratings	Power Source *2		Phase	3		
			Hz		50	60
			V	Rating	200 to 220	200 to 220
			%	Tolerance	±10	±10
	Power Consumption *1		kW	18.1		
	Current *1		A	56.3		
	Power Supply Capacity *3		kVA	22.0		
Operation control method				Compressor rotational speed control		
Product Specifications	Compressor	Structure		Fully hermetic, scroll type		
		Output	kW	11.19 (Inverter drive)		
	Condenser			Fin and tube type, forced air cooling		
	Evaporator	Structure		Plate type		
		Material		SUS316 (with copper brazing)		
	Discharge pump	Structure		Multistage centrifugal immersion type		
		Output *1	kW	4.0 (Inverter drive)		
	Fan Motor Output		kW	0.4×2 (Inverter drive)		
	Water Tank Capacity *8		L	Approx. 100		
	Water Supply Method			Ball tap (water supply pressure: 0.50 MPa or less.)		
	Refrigeration Control Method			Electronic expansion valve (Direct stepping motor control type)		
	Refrigerant			R410A		
	Thermostat			Touch panel type electronic temperature control (with alarm monitor)		
Communication	Communications Standard			EIA Standard RS-422A/RS-485		
				USB2.0		
	Maximum Number of Connected Units			RS-422A/RS-485	32 units	
				USB (TYPE B)	1 unit	
Safety Devices	Compressor			Electronic thermostat for inverter		
	Discharge Pump			Electronic thermostat for inverter		
	Fan Motor			Electronic thermostat for inverter		
	Inverter			Overload cutoff		
	Electric Circuit			Earth leakage breaker, Overload cutoff		
	Refrigeration Cycle			High-pressure pressure switch		
	Water Circuit			Float switch (for low water level alarm)		
Accessories	1. Y-shape strainer 1.1/4B (40 mesh or equiv.): 1piece 2. Nipple 1.1/4B×100L (to mount Y-strainer): 1 piece					
Remarks	*1 Operating conditions: Chilled water temp.: 20 °C. Ambient temp.: 32 °C. Chilled water flow rate: 200 L/min. Cooling capacity is at least 95 % of listed figures. *2 Source voltage phase unbalance should be within ±3 %. *3 At maximum driving current within specifications. *4 The setting can be changed by changing parameter F015. *5 When the continuous current load fluctuation is within ±10 %, the ambient temperature and power source, etc. are stable, and the chilled water flow is at least 140 L/min. However, note that the following cases are excluded: ① The first 4 minutes (approx.) after the compressor starts. (Temperature control will start approx. 4 minutes after the compressor starts.) ② When the refrigeration load is small, and the compressor is switching on and off, or when the heating-side electronic expansion valve is switching between fully closed to open or open to fully closed. ③ When the current load varies more than ± 10 %. At such times, the temperature will be within ± 2.0 °C. ④ When the water temperature setting is changed. *6 Distribution Panel High-Temperature Set installed. (Optional part) *7 Antifreeze is a 30 to 40 % ethylene glycol solution. *8 Level gauge at F position. *9 Not frozen.					

External Dimensions

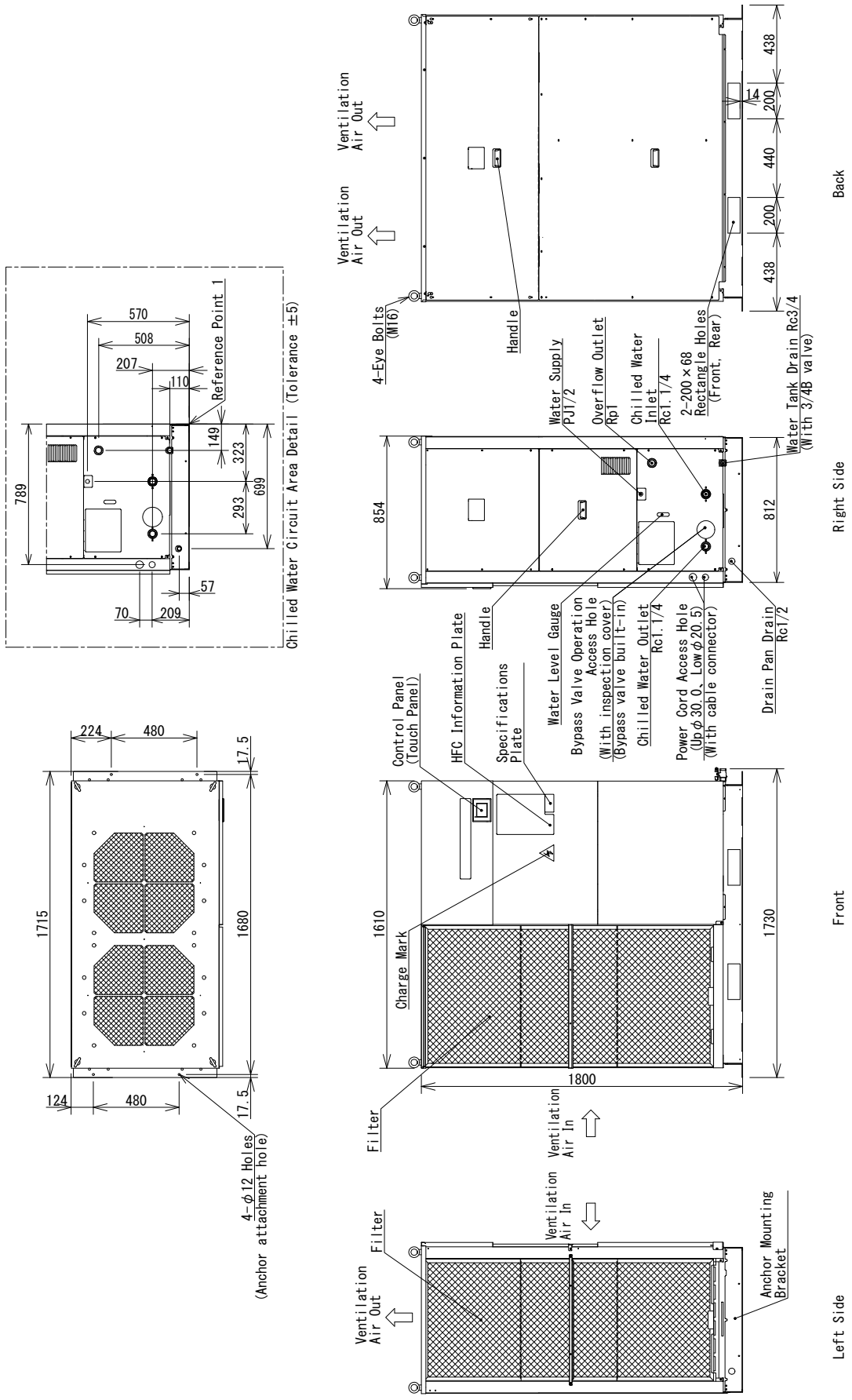
RKE11000B-V



1. Route signal and communication cables through holes separate from the power cord hole.
2. Compatible cable connector outside diameter is Up φ27.0 t30.0, Low φ18.5 to 20.5.
3. Normal Tolerance JIS B0405(1991)-v

External Dimensions

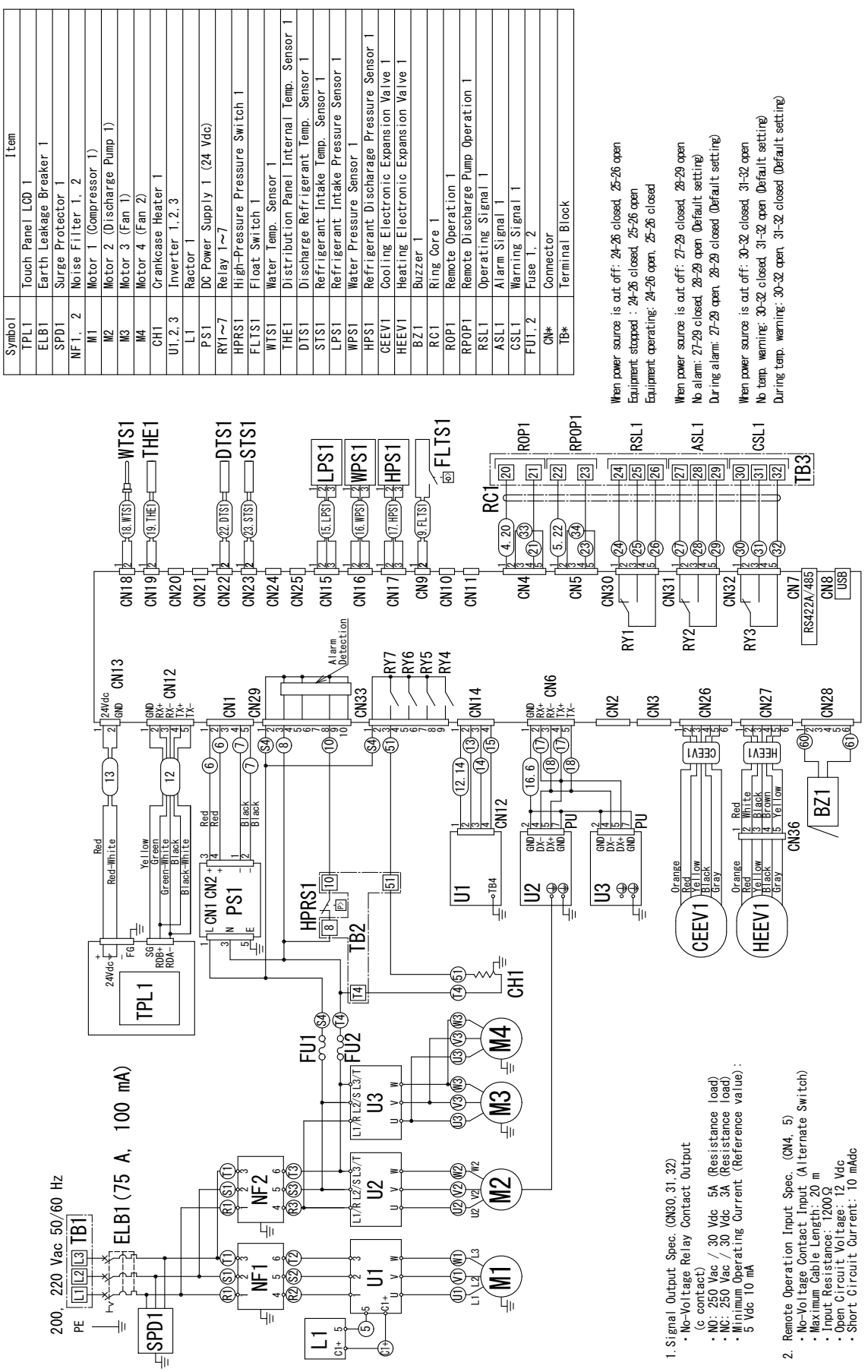
RKE15000B-V



1. Route signal and communication cables through holes separate from the power cord hole.
2. Compatible cable connector outside diameter is Up φ27.0 t30.0, Low φ18.5 to 20.5.
3. Normal Tolerance JIS B0405(1991)-v

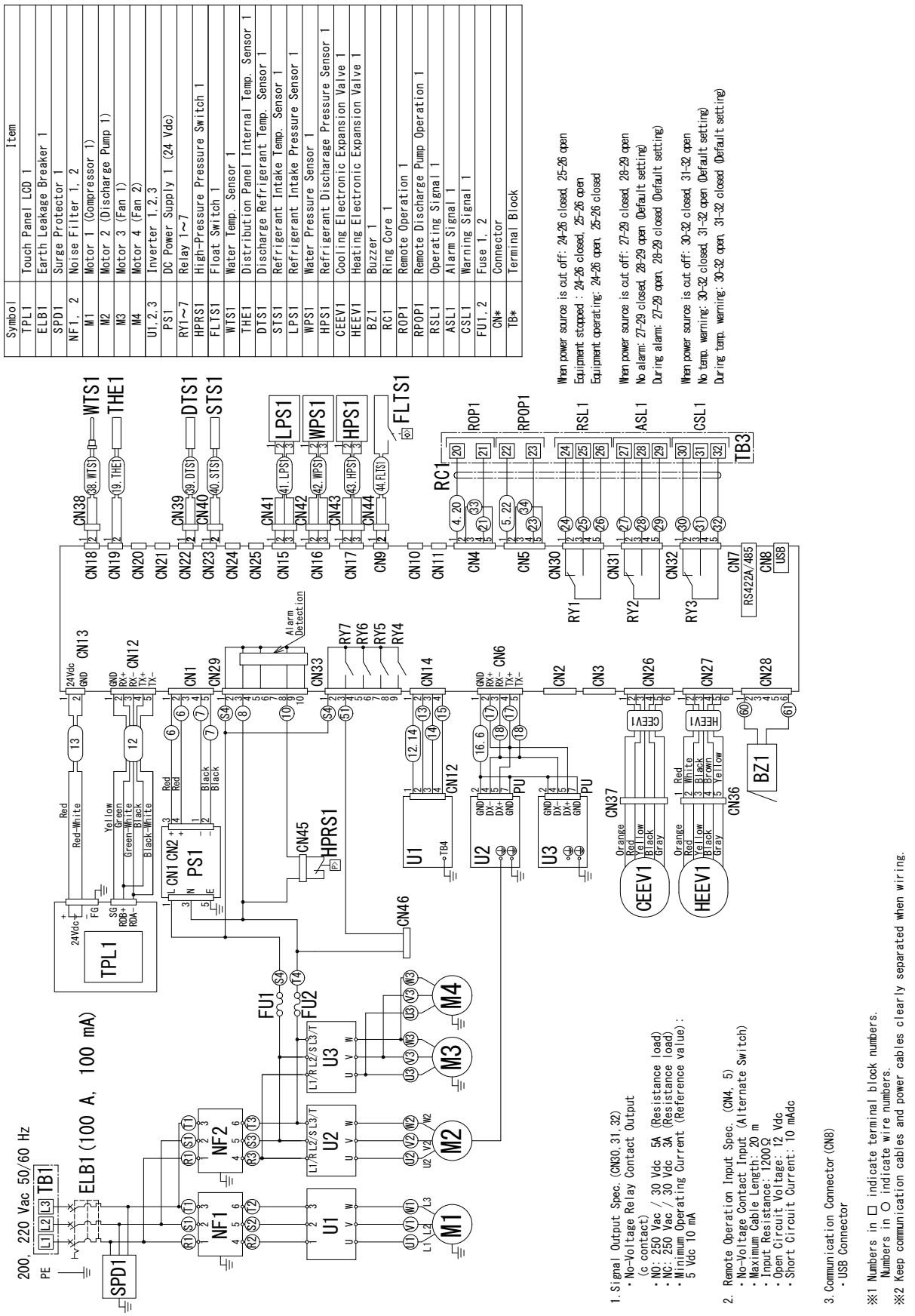
Wiring Diagram

RKE11000B-V



Wiring Diagram

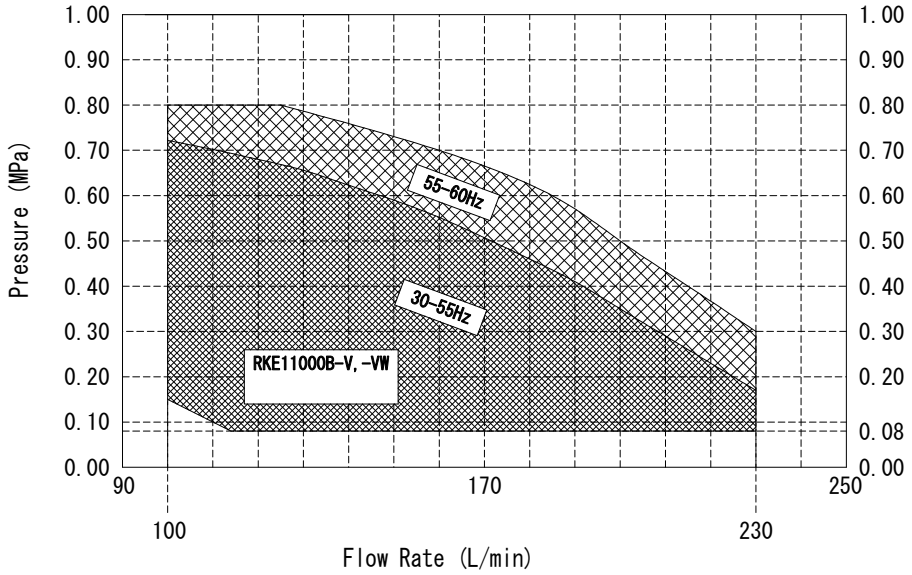
RKE15000B-V



Chilled Water Flow Chart

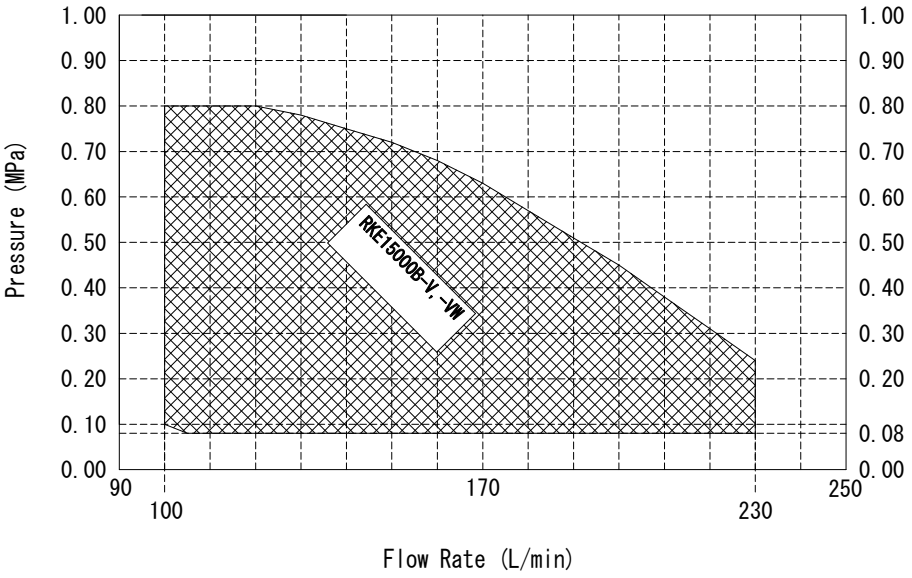
RKE11000B-V, RKE15000B-V

■ RKE11000B-V



●If the ambient temperature goes above 40 °C then the alarm may stop, therefore set the frequency to 55 Hz or lower using "constant frequency control". If operating under "constant flow control" and "constant pressure control", set the flow rate or pressure so that the operating frequency is below 55 Hz.

■ RKE15000B-V



IMPORTANT

- **The graph shows the actual measured flow rate when the bypass balve is closed.**
- **The inverter adjusts the frequency, and the flow rate will change accordingly.**
- **The hatched area indicates the possible range of adjustment based on the changed frequency.**
- **If additives are used, the flow rate characteristics will change due to the type of additive used, the concentration, fluid temp., etc.**

Inspection Chart

■ Inspection Chart

No	Part Name	Date (YY-MM-DD)	Accumulated running time (products:×100 hours)	Comments
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Product Warranty

This product shall be warranted as follows. For warranty repairs, please contact the dealer where the product was sold after confirming the product model and serial number.

1. Warranty Period

(1) Refrigerant circuits：Two years from the date of purchase, or 10,000 operating hours, whichever comes first.
(2) Others ：One year from the date of purchase.

2. What Is Covered by this Warranty

(1) If breakdown occurs within the above warranty period and the cause of the breakdown lies with ORION, then the damaged part(s) will be replaced or repaired by ORION free of charge. Note that depending on the country/region where the product is being used, repairs may take more time or be impossible. Please consult with your dealer in advance regarding service and repair options for products to be operated outside of Japan.
(2) In principal, the owner of the product will confirm diagnosis of the breakdown according to the operating manual. However, there might be cases where this work may be carried out instead by a member of ORION's service network. In such cases, there will be no charge where the cause of the breakdown lies with ORION.
(3) Note that even during the warranty period, there will be costs incurred by the user (outside the warranty) in the following cases:
① Breakdown resulting from operating under unsuitable operating conditions, environment, handling, use, or method of operation outside those written in the specifications or operating manual of the product, or as a result of carelessness or negligence on the part of the user.
② Breakdown resulting from non-ORION equipment (user's own equipment or software design, etc.).
③ Breakdown resulting from repairs or modifications conducted by non-ORION designated contractors.
④ Breakdown which could be recognized as being avoidable in cases where an ORION product is used in conjunction with the user's equipment where the user's equipment is legally regulated to have a safety device whereby inclusion of the safety device could have averted the breakdown, or in cases where the addition of function, structure, etc., could have, according to common knowledge of the industry, averted the breakdown.
⑤ Any breakdown which is recognized as being avoidable had normal fixed term inspections, and/or normal maintenance and replacement of consumables, been performed as indicated in the operating manual, etc.
⑥ Replacement of consumables (parts to be replaced at fixed terms or based on inspection).
⑦ Breakdown due to external factors beyond human control such as fire etc., or breakdown resulting from natural disaster such as earthquake, lightning, storm and flood damage, etc.
⑧ Breakdown due to reasons unforeseeable due to the technological standard at the time the product was shipped from ORION.
⑨ Any breakdown resulting from corrosion caused by operating the product in an atmosphere that contains corrosive gases, organic solvents, chemical solutions, etc., or in an environment where such substances could come into contact with the product.
(4) In cases where a separate contract, etc. has been established, that contract will take priority.

3. Warranty Obligation Exclusions

Regardless of the warranty period, compensation for any of the following will not fall under the obligations of this warranty: any hindrance or accident compensation resulting from reasons not under ORION's obligations; any lost opportproducties, lost profit, secondary losses, damages to non-ORION equipment incurred by users resulting from the breakdown of ORION products; and any replacement work, readjustment of on-site machinery and equipment, and operating work by users.

4.Product Use Limitations

(1) When using ORION products in connection with important facilities, be sure to establish backup and/or failsafe measures so that even in the event of breakdown of such products, such breakdown will not lead to serious accidents or losses.
(2) ORION products are designed and produced as general purpose equipment to be used in general industrial applications. Therefore, this warranty will not apply when used in the following applications: However, in cases where the customer/user takes full responsibility and confirms the performance of the product in advance, and takes necessary safety precautions, please consult with ORION and we will consider if use of the product in the desired application is appropriate.
① Atomic energy, aviation, aerospace, railway works, shipping, vehicles (cars and trucks), medical applications, transportation applications, and/or any applications where it might have a great effect on human life or property.
② Electricity, gas, or water supply systems, etc. where high levels of reliability and safety are demanded.

ORION MACHINERY CO., LTD.

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