HRX-OM-J022 1<sup>st</sup> edition : Jul. 2005 Rev. B : Nov.2008



# **Operation Manual**

#### Water-refrigerated Thermo cooler

HRG001-W HRG002-W HRG005-W





Save This Manual Carefully for Use at Any Time

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#### To the Customers

Thank you for purchasing our THERMO COOLER (hereinafter called "This unit").

For efficient and long use of the unit, be sure to read and understand this operation manual (hereinafter referred to as "this manual") and ensure well understanding of the contents.

- All warnings and precautions defined in this manual shall be observed.
- This manual provides instructions for the installation and operation of the unit. Only personnel who understand basic operation described in this manual are qualified to perform the installation and operation of the unit.
- This manual attached to the unit and its contents will not be a part of contract and accompany modification or change of existing agreement, commitment or relation.
- All SMC's obligation is covered by Sales Agreement, which is only document to guarantee the content described on the agreement.
- Any description of this manual will not be additional guaranteed item and modify existing document for warranty.
- Copying, duplicating or transferring any part of or whole contents of this manual without SMC Corporation's permission is strictly prohibited.

Note: The contents of this manual are subject to change without notice.

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# **1. Safety Instructions**



Be sure to read and understand all the important precautions in this manual before operating the unit.

# 1.1 Before using this unit

- This chapter describes the safety-related items that users should be aware of upon handling this unit.
- The unit is a circulating water chiller. SMC's liability under this warranty shall not be available for troubles caused by mishandling.
- The unit operates under high voltage and contains components that cause a rise in temperature and rotate. If a component needs to be replaced or repaired, contact to a specific vendor.
- All personnel who work on or around this unit are required to read and understand the safety-related items in this manual before working with this unit.
- This manual is not for comprehensive safety and hygiene education. Such a manual should be provided by a safety training manager.
- All personnel who work on or around this unit are to have proper training and education on dangers specific to this unit and safety measures against potential hazards.
- A safety manager is responsible to strictly observe safety standards. Operators and service technicians have individual responsibilies for their safety during operation of this unit in his/her daily work.
- Operators must individually take account of safety and assure a proper working area and working environment.
- Save this manual at a designated place for reference when necessary.

# 1.2 Danger, Warning and Caution

#### 1.2.1 Level of risk

This unit is designed with the safety of workers and the prevention of system damage. This manual classifies the risks into the following three categories according to the level of the hazard: Danger, Warning, and Caution. Read the statements carefully and thoroughly understand them before operating this unit.

DANGER, WARNING and CAUTION signs are in order according to severity (DANGER > WARNING > CAUTION). See below for the details.

# A DANGER

"DANGER" means that there is an immimence hazard that will cause serious personal injury or death during operation.

### WARNING

"WARNING" means that there is a hazard that may cause serious personal injury or death during operation.

# **ACAUTION**

"CAUTION" means that there is a hazard that may cause minor personal injury during operation.

# CAUTION

"CAUTION" without an exclamation symbol means that there is a hazard that may cause damage or failure of this unit, facility, or devices.

#### **1.2.2** Definitions of "serious injury" and "minor injury"

#### "Serious injury"

This term describes injuries such as loss of eyesight, wound, burns, electrical shock, fracture, toxication that leaves aftereffects which may require prolonged treatment and hospitalization.

#### "Minor injury"

This term describes injuries that do not require prolonged treatment or hospitalization. (injuries other than "serious injuries" described above)

#### 1.2.3 Symbols

This manual provides the following symbols in addition to "DANGER", "WARNING", "CAUTION" and "IMPORTANT" to present the warning details in easy-to-understand manner.

Symbol of electrical hazard



Symbol of heat hazard



Symbol of rotating shaft hazard



This symbol warns you of possible risk caused by a rotary object.

Symbol of "Don'ts"



This symbol denotes the items that must not be implemented.

Symbol of "Dos"



This symbol denotes the "obligation" items which you must follow in operation of this unit.

# 1.3 Hazard Warning Label

The hazard warning labels indicate where potential hazards are present during unit operation and maintenance. Be sure to read the labels and recognize the locations of the labels before starting work.

#### 1.3.1 Classification of risks

#### High voltage hazards

The unit is operated at high voltage and may cause an electrical shock. The







Do not operate the unit without the cover panel mounted. The unit contains the power supply carrying high voltage inside that is isolated with the cover panel. Unit operation without the cover panel allows the high votage to apply outside and cause injuries.

## 🛕 WARNING



Only trained personnel are allowed to work around the power supply.

#### High temperature hazards

The unit reaches high temperature during operation and may cause burns when an operator comes in contact. The attached label contains the symbol



#### WARNING



This symbol indicates the presence of a section where temperature reaches high and the operator sustains burns when coming in contact. Even after the power is turned off, residual heat may still cause burns. The work must not be started until the section drops to sufficiently low temperature.

#### Rotating object hazards

The unit includes several parts that rotate during operation and may cause the operator to get the finger caught in these parts. The attached label

contains the symbol





The unit includes several parts which rotate during operation, and the operator who comes in contact may get injured. Even if that part seems to stop rotating, avoid touching it because the condition may be temporary and the rotation may restart.

#### 1.3.2 Type of hazard warning labels



#### Warning label on the front panel





#### Warning label for high voltage



Fig. 1-2 Warning label for high voltage

#### 1.3.3 Location of hazard warning label



- Recognize where the hazard warning labels are attached.
- The user is not allowed to reposition the labels. If the label is replaced due to being peeled off or worn out, keep the previous position.



Fig. 1-3 Location of hazard warning label

# 1.4 Model label

Check the model no. described on the label.



# 1.5 Disposition of waste

#### 1.5.1 Recovery of refrigerant and compressor oil

The unit belongs to Class 1 in the "Fluorocarbon Recovery and Destruction Law" and uses freon type refrigerant (HFC) and compressor oil. When these fluids need to be recovered, read the instructions below and ensure thorough understanding of them. If you have any questions, contact the local distributor or SMC's sales branch.



#### The type and amount of used freon can be found on the label.

#### 1.5.2 Disposal of unit

If the unit needs to be discarded, consign a specialized industrial waste disposal agency in accordance with local laws and regulations.

<sup>1.5</sup> Disposition of waste

# 2. Descriptions of Components

# 2.1 Appearance of unit

2.1.1 HRG001-W / HRG002-W





#### 2.1.2 HRG005-W





### 2.2 Descriptions and functions of components 2.2.1 HRG001-W / HRG002-W



Fig. 2-3 Piping connection port (HRG001-W/ HRG002-W)

#### 2.2.2 HRG005-W



Fig. 2-4 Piping connection port (HRG005-W)

#### 2.2.3 Control panel

2 3 4 **∕**SMC IERI ER 5 6 POWER PUMP RUN ALARM 7  $\bigcirc$  $\bigcirc$  $\bigcirc$ ON OFF Ħ PV 1 8.8.8 8. sv MODE DOWN FUNC UP 8 10 9

The control panel is common to all models.

Fig. 2-5 Control panel

Table 2-1 Control panel

No.	Name	Function		
1	Digital display, BV / SV	PV Indicates actual temperature of a circulating fluid		
I	Digital display, FV / SV	SV Indicates set temperature of a circulating fluid		
2	[POWER] LED	Lights up when the power is supplied.		
3	[RUN] LED	Lights up when the [ON] switch is proceed		
4	[PUMP] LED	- Lights up when the [ON] switch is pressed.		
5	[ALARM] LED	Lights up when an alarm arises.		
6	[ON] switch	This is used to run the unit.		
7	[OFF] switch	This is used to stop the unit.		
8	[MODE] key	This is used to switch the screens between PV and SV.		
9	[DOWN] key	This is used to decrease set temperature.		
10	[UP] key	This is used to increase set temperature.		

# 3. Transport and Installation

WARNING

The unit must be handled in correct manner. Exercise caution to assure personnel safety during the installation, operation, maintenance, and inspection of the unit.

# WARNING



# 3.1 Transport

The unit is heavy and poses potential danger at transportation. To prevent damage to the unit, be sure to follow the instructions below when transporting the unit.

#### 🛕 WARNING

If the forklift is used for transporting, ensure that the fork is inserted in a place as specified in Fig. 3-1 "Fork insertion position and unit lifting ".

# WARNING

- If eyebolts are used for lifting, ensure the unit is held at four points.
  Keep each eyebolt at an angle from 45 to 60 degrees with repect to
- the postion of the center of gravity when lifting the unit.

# CAUTION



Never set the unit on its side. The refrigerant oil will drain into refrigerant piping from the

compressor, reducing its amount in the compressor. It results in a compressor failure.

# CAUTION



Drain the residual fluid from the piping as much as possible to prevent spill.

### CAUTION



If the forklift is used for transporting the unit, be sure to prevent the fork from contacting the cover panel or pipe connection ports.





### 3.2 Installation



#### 3.2.1 Installation conditions

Do not use or store the unit in the following environments. Potential unit malfunction and damage may occur if disregarded.

- Environment that is exposed to water vapor, salt water or oil mist
- Environment that is exposed to dust or powdery materials
- Environment that is exposed to corrosive gas, flammable gas or solvent
- Environment that is exposed to direct sun light or radiant heat
- Environment where ambient temperature is out of the specified range
- Environment that is subjected to abrupt changes in temprature
- Environment that is subjected to strong electromagnetic noise (incl. strong electrical field, strong magnetic field, or surge voltage)
- Environment that generates static electricity, or condition in which static electricity discharges to the unit
- Environment that generates strong high frequencies
- Environment at high altitudes of over 1000m
- Condition which allows strong vibrations and impacts to transmit to the unit
- Condition with external force or load to deform the unit
- Condition with an insufficient maintenance space as required
- Condition with an insufficient maintenance space as required

#### 3.2.2 Installation

- Keep the unit away from vibration. Install the unit on a flat and stable surface.
- Refer to "7.2 Outline dimensions" for the dimensions of the unit.

#### 3.2.3 Electrical wiring

	A WARNING				
<ul> <li>Do not modify the electrical wiring. Incorrect wiring can cause an electrical shock and fire. Failure to do so will void any warranty.</li> <li>The set value of the safety device must not be changed. Changing the set value can cause system failure and fire.</li> </ul>					
	A WARNING				
	<ul> <li>Only qualified personnel are allowed for wiring.</li> <li>Be sure to cut off the power supply for safety. Wiring installation with the unit energized is strictly prohibitted.</li> <li>Use the specified cables. Properly apply strain relief to prevent an external force from being exerted on the terminals. Poor or loose connection can cause electrical shock, heat spots, or fire.</li> <li>Supply the power to the unit from a reliable power source (without surge voltage).</li> <li>Be sure to use a GFCI breaker to prevent an electrical shock and burnt compressor motor. The breaker with adequate capacity of current leakage and load should be selected in accordance with "7.1 Specification list".</li> <li>Ensure that the power supply meets the specification of the unit.</li> <li>Always establish a ground for safety.</li> <li>Do not connect the ground to a water line, gas pipe and lightening conductor.</li> <li>Do not branch off the wiring to multiple. Potential hot spots or fire may occur if disregarded.</li> </ul>				

#### Power supply cable and GFCI breaker

Select a cable for power supply and GFCI breaker corresponding to the model no. provided in the following table.

	ltem	HRG001-W	HRG002-W	HRG005-W
Power	Power Size		3.5mm <sup>2</sup>	4-core 5.5mm <sup>2</sup>
supply cable	Round compressive terminal size	3.5-4S		5.5-4S
Signal	Size	6-core 0.75 mm <sup>2</sup>		
cable	Y-shaped compressive terminal size		1.25Y-3	
Capacity of GFCI breaker*		5A	10A	20A

 Table 3-1
 Cable for power supply and current leakage

\* Use the breaker with current sensitivity of 30mA at minimum.

#### How to conduct wiring

**1.** Undo the screws (6 pcs.) and take off the front panel.



Fig. 3-2 Removal of front panel

2. Connect the power supply cable and signal cable as shown in the figure.







Fig. 3-4 Electrical wiring (HRG005-W)



Fig. 3-5 Installation (electrical wiring)

HRG005-W





#### 3.2.4 Piping

	CAUTION
0	<ul> <li>Install piping properly. Improper installation may cause leaks.</li> <li>Keep supply water pressure below 0.5MPa.</li> <li>Make sure the locations of IN and OUT ports for circulating fluid supply. The reverse connection inhibits proper operation of the unit.</li> <li>Make sure no entry of dust and foreign materials into the water circuit during piping installation.</li> <li>Hold the piping connected port with a specific wrench for tightening.</li> </ul>

#### Pipe diameter

The pipe diameters are common to all models. Table 3-2 Pipe diameter

ipe diameter
Diameter
Rc1/2

#### How to install piping

**1.** Hold the piping connected port with a specific wrench and tighten the pipe.



Fig. 3-7 Tightening of pipe

#### Remarks

Install a valve at the drain port to facilitate the draining of the circulating fluid from the tank. (The vavle needs to be preapred separately.)



#### Recommended piping installation



No.	Name	Size
1	Valve	Rc1/2
2	Y-shaped strainer	Rc1/2
3	Relieving valve	Rc1/2, set from 0 to 0.5 MPa
4	Pressure gauge	0 to 1.0 MPa
5	Flow meter	0 to 50 L/min

#### 3.2.5 Supply of circulating fluid

**7**. Open the tank lid and supply the circulating fluid until the fluid reaches the range specified on the level indicator.



Fig. 3-9 Level indicator

#### 3.2.6 Reinstallation of unit





When the unit is transferred to and installed in a different place after operation at the original place (including trial run), perform transporting and installation of the unit according to the procedures described below and in Chapter 3.

#### ■ Disconnection of power supply cable

Be sure to cut off the power supply when disconnecting the power supply cable.



- A WARNING
- Only qualified personnel are allowed to install wiring.
  Be sure to cut off the power supply for safety. Wiring with the unit energized is strictly prohibited.

# 4. Startup and Shutdown



Personnel with adequate knowledge and experiences of this product and peripheral devices shall be in charge of starting up and shutting down the unit.

## 4.1 Pre-check

Check the following items before starting up the unit.

#### 4.1.1 Installation condition

- Make sure the unit is installed horizontally.
- Do not put any heavy object on the unit or apply excess force by piping.

#### 4.1.2 Connection of cable

Check that the power cable, ground and I/O signal cables are correctly connected.

4.1.3 Piping for cooling water

Check that piping for cooling water IN and OUT are correctly connected.

#### 4.1.4 Piping for circulating fluid

Check the I/O piping of the circulating fluid is installed correctly.

4.1.5 Level indicator (for level in the tank)

Check the fluid level is within the specified range.

# 4.2 Preparation of startup

#### 4.2.1 Power supply

Supply the power.

The following conditions are observed on the control panel upon power-ON.

• The [POWER] LED lights up.



Fig. 4-1 Power supply

#### 4.2.2 Setting of circulating recirculating fluid temperature

Press the [UP] and [DOWN] keys to set a desired temperature in the digital display SV.



#### 4.2.3 Additional water supply

#### ■ [TS] switch (pump manual operation switch): HRG005-W only

HRG005-W has the [TS] switch (pump manual operation switch) to purge air from the circulating fluid circuit at initial startup. Remove the front panel, and purge air according to the procedures given below.



**1.** Press the [TS] switch for a several seconds, monitoring the fluid level gauge.

Air is purged from the pipe, and the fluid level is lowered.

**2.** Supply the circulating fluid again according to section 3.2.5.

### CAUTION

If leakage occurs due to faulty piping including an opened fitting of eternal piping, stop manual operation of the pump and fix the leak.

# 4.3 Unit Startup and Shutdown

#### 4.3.1 Starting the unit

**1.** Press the [ON] switch on the control panel.

The unit starts operating and regulates the circulating fluid temperature.

The [RUN] LED and [PUMP] LED on the control panel come on.



Fig. 4-4 Starting the Unit

#### 4.3.2 Stopping the unit

**1.** Press the [OFF] switch on the control panel.

The unit stops.

The [RUN] LED and [PUMP] LED on the control panel go out.



Fig. 4-5 Stopping the unit

# 4.4 Check at startup

Check the following items at startup of the unit.

**WARNING** 

When any abnormality is found, press the [OFF] switch immediately to stop the unit and turn the power supply breaker off.

- No leak from circulating fluid piping
- No circulating fluid flowing out of the tank drain port
- Circulating fluid pressure within the specified range

#### Bypass valve

Normally, the bypass valve is fully opened. If the unit is started up with the valve fully closed, water supply may reach abnormal high pressure depending on external piping conditions. Be sure to keep the bypass valve fully opened for initial startup of the unit installed.

Adjust the bypass valve to obtain required pressure and flow rate by checking on the external pressure gauge and flow meter that can be prepared by customer or mounted on external piping.



Fig. 4-5 Bypass valve (HRG001-W / HRG002-W)

Fig. 4-6 Bypass valve (HRG005-W)

<sup>4.4</sup> Check at startup

# 5. Error Message and Troubleshooting

# 5.1 Error Message

This product is stopped when an error is detected.

Table 5-1 shows the LED conditions (ON/OFF) and signal output in the event of the error.



Fig. 5-1 Control panel

\_ . .

••	Setting range	Unit status	LED (●: Off, 〇: On)			Operation	Error stop
Alarm			POWER	RUN	ALARM	output	signal output
Power error	_	Stopped	•	•	•	Open contact	Closed contact
Start-up failure	—	Stopped	GreenO	•	Red O	Open contact	Open contact
Reverse of pump and compressor	_	Stopped	GreenO	•	Red O	Open contact	Open contact
Tank water level drop	Lower limit of water level in the tank	Stopped	GreenO	●	Red O	Open contact	Open contact
Pump overload	_	Stopped	GreenO	•	Red O	Open contact	Open contact
Compressor overload	_	Stopped	GreenO	•	Red O	Open contact	Open contact
High temp. of supplied water	40°C and over	Stopped	GreenO	•	Red O	Open contact	Open contact

# 5.2 Troubleshooting

Table 5-2 Troubleshooting					
Alarm Unit status		Cause	Remedies	How to	
Power error				Manual	
	The [POWER]	Power is not supplied.	Supply the power.	reset	
	LED is not	A breaker is tripped.	Fix a short or ground fault.		
	turned on.	Low voltage	Supply a rated voltage.		
		Failure in the [POWER] LED	Ask for service.		
Startun failure	LED remains	interrupted. A voltage sag occurred.	Supply three-phase power.	Auto reset	
Clartap railare	the press of	Failure in the [RUN] LED	Ask for service.		
	switch.	Failure in the [ON] switch	Ask for service.		
Reverse of pump and compressor	Reverse phase relay starts.	Incorrect phase sequence of power wiring	Normal according to product spec. Rewire the power cable for two of three phases. Wiring should be performed by a qualified person.	Auto reset	
Tank water level drop	Level switch contact is opened.	Inadequate water in the tank (natural evaporation)	Normal according to product spec. Circulating water is low in amount. Supply the circulating water.	Auto reset	
Pump	Pump thermal	Power voltage sag	Normal according to product spec. Boost up the capacity of power breaker. Wiring should be performed by a gualified person.	Manual reset	
overload	switch has been tripped.	Abnormal rise in circullating fluid pressure	Adjust the opening of the manual relief valve. Ask for service.		
		Abnormal failure of pump	Change the pump. Ask for service.		
	Compressor	Power voltage sag	Normal according to product spec. Boost up the capacity of power breaker. Wiring should be performed by a gualified person.	Manual reset	
Compressor		Abnormal heat dissipation capability of condensor.	Normal according to product spec. Improve ambient conditions to provide ventilation and exhaust heat.		
overload	overload switch has been tripped.	Improper rated cooling capability	Normal according to product spec. Reduce a calorific value output from user's unit.		
		Refrigerant leak	Ask for service to get the		
		Abnormal failure in the	refrigerant gas charged and the		
		Failure in the electromagnetic switch	switch replaced.		
High temp. of recirculating fluid	The contact of temperature controller EV1	Rise in ambient temperature	Improve ambient conditions. Avoid installing it at a place exposed to direct sunlight or radiant heat.	Auto reset	
	is opened	Improper rated cooling capability	Normal according to product spec. Reduce a calorific value output from user's unit.		
		Refrigerant leak Failure in the refrigerant solenoid valve Failure in the compressor Other abnormalities in the refrigeration circuit Failure in the temperature controller	Ask for service to get the refrigerant gas charged and the compressor and electromagnetic switch replaced.		
		Over the cooling capability	Reduce a calorific value output from user's unit.		
		Abnormal failure of fan motor	Replace the fan motor. Ask for service.		

# 6. Unit Maintenance

## 6.1 Control of water quality

# **A**CAUTION

circulating fluid used in this unit is fresh water (tap water). This unit may be damaged when unpermitted fluids are used. Potential fluid leak may occur if disregarded, which results in electric shock and ground fault.

ONLY use fresh water (tap water) which satisfies water quality standards as shown in the table below.

	Substances	Cooling water system/ Circulating fluid
	pH (25°C)	6.8 to 8.0
	Electrical conductivity (25°C) (µs/cm)	1 to 400
	Chloride ion (mgCI-/L)	50 and below
Standard	Sulfuric acid ion (mgSO <sub>4</sub> <sup>2-</sup> /L)	50 and below
Stanuaru	Acid consumption (pH4.8) (mgCaCO <sub>3</sub> /L)	50 and below
	Total hardness (mgCaCO <sub>3</sub> /L)	70 and below
	Calcium hardness (mgCaCO <sub>3</sub> /L)	50 and below
	Ion silica (mgSiO <sub>2</sub> /L)	30 and below
	Iron (mgFe/L)	1.0 and below
	Copper (mgCu/L)	1.0 and below
Poforonco	Sulfide ion (mgS <sup>2-</sup> /L)	Don't be detected
Kelelelice	Ammonium ion (mgNH <sub>4</sub> <sup>+</sup> /L)	1.0 and below
	Residual chlorine (mgCl/L)	0.3 and below
	Free carbon dioxide (mgCO <sub>2</sub> /L)	4.0 and below

 Table 6-1
 Water quality standards for fresh water (tap water)

\*Excerpt from the Refrigeration and Air Conditioning Equipment Water Quality Guideline JRA-GL-02-1994

### CAUTION

If the periodic inspection finds a nonconforming substance in the facility water, wash the tank and the cirulating circuit, and replace the water in the tank. Water will evaporate, and impurities will build up. Even if no abnormal event occurs, it is recommended to replace the water in the tank once every three months. Refer to section "6.2 Inspection and Cleaning" for the periodic inspection.

# 6.2 Inspection and cleaning

# WARNING



Do not operate the switches, etc. with wet hands and do not touch any electrical components such as a power supply plug. It may cause an electric shock if disregarded.

# WARNING



Keep this unit from water. Do not wash the unit with water. It may cause an electric shock and fire if disregarded.

# WARNING



Do not touch the fin directly during cleaning of the condenser. It may cause personal injury if disregarded.

# WARNING



Cut off the power supply of the unit before performing cleaning, maintenance and inspection. It may cause an electric shock, injury or burn if disregarded.

# WARNING



Always mount the panel back onto the unit after removing the panel for inspection or cleaning. Failure to close or re-attach the panel may cause personal injury or electric shock during unit operation.

#### 6.2.1 Daily inspection

Check the items listed below before, during, and after operation of this unit. If any abnormal event is detected, stop operation and turn off the main breaker. Be sure to lock out and tag out before asking for service.

- The circulating fluid should fall within the specified level. When it is out of the range, replenish or drain excess circulating fluid to maintain a proper level. (Be sure to stop the unit before replenishing the circulating fluid.)
- The characters and numbers on the liquid crystal display of the control display panel should be clear.
- There should be no leak from the circulating fluid piping.
- Water supply pressure of the circulating fluid should be within the specified range.
   (Discharge pressure of the circulating fluid should be lower than the prood pressure of user's unit.)
- There should be no abnormal sound or abnormal vibration from this unit.
- There should be no nasty smell or smoke from this unit.

#### 6.2.2 Monthly inspection

#### Inspection of the tank

Check the following items. Replenish or replace fresh water (tap water), or clean it when an abnormal event is found.

- Foreign materials adhere to the inner wall ot the tank.
- Slime is found on the inner wall of the tank.
- Foreign materials float on the surface of fulid in the tank.
- There is scale deposited in the tank.
- It has a foul odor.
- The water has been discolored.

#### 6.2.3 Biannual inspection

#### Check for leak from the pump mechanical sealing

Remove the panel and check for leak from the pump mechanical sealing. When a leak is found, it is necessary to replace the mechanical sealing. Contact the local distributor or SMC's sales branch.

#### l m p o r t a n t

 Leak from the mechanical sealing Leakage from the mechanical sealing occurs in structure. Although JIS defines leakage for 3cc/hr or less (reference value), 0.3cc/hr or more is our leakage standard suggested for the replacement of the mechanical sealing.
 A recommended replacement cycle of the mechanical sealing is 6000 to 8000 hours a year (usually).

## 6.3 Storage

Take the following procedures for long-term storage of the unit.

- **1.** Turn off the former power breaker.
- **2.** Fully open the drain valve and drain the water from the tank.
- **3.** Remove the drain plug of the circulating pump and drain the water from the pump.
- **4.** Cover the unit with a plastic sheet for storage after draining is completed.

# 6.4 Consumables

Replace parts in response to the level of wearing out at inspection.

Table 6-2 Biannual inspection					
Part number Part Qty. Remarks					
HRG-S0003	Pump mechanical seal	1 set	For HRG005		

\* It is not required for HRG001 and HRG002.

<sup>6.4</sup> Consumables

# 7. Documents7.1 Specifications list

			Table 7-1	Specifications list		
Item		HRG001-W	HRG002-W	HRG005-W		
Installation/ Rated ambient Op. Environment humid. range		32°C				
		45~75%RH (No condensation)				
Operating fluid			Circulating fluid/fresh water (tap water)			
R	Rated capacity of tank		10L 20L			
Input	Power sup. voltage		3-phase AC200/200-220V (50/60 Hz)			
	Recommended leak breaker capacity		5A	10A	20A	
	Breaker sensitivity current		30mA			
	Start/stop instruction signal (Remote op. signal)		Remote operation starts at DC24V and 8 mA are applied, and stops at DC0V.			
	Rated temp. & accuracy of circulating fluid		20±1.0°C and 0.5°C (Temp. setting range 5∼35°C)			
	Rated cooling capacity		0.9/1.1 kW(50/60 Hz)	1.9/2.3 kW (50/60 Hz)	4.5/4.8 kW(50/60 Hz)	
Dutp	Pumping capacity		29/37 L/min(He	ead 10 m)	33/42 L/min(Head 10 m)	
Lŧ	Signal output	Op. signal	Relay contact (Contact cap. AC250V, 1A, resistance load. Contact closes during operation, and contact opens during stop and during power shutdown.)			
		Emergency. Stop signal	Relay contact (Contact cap. AC250V, 1A, resistance load. Contact closes while alarm light remains OFF and during power shutdown, and contact opens while alarm light remains ON.)			
Prc (f	Emergency stop		Unit stop function for low tank level (with tank level switch)			
			Pump reverse rotation detec	ction (with phase relay)	Pump/compressor reverse rotation detection (with phase relay)	
or ec			Unit stop function for pump/compressor overload (with over current relay)			
ive function quipment)			Unit stop function for abnormal fan motor temperature rise (Temp. fuse is built into fan motor)		Unit stop function for abnormal fan motor temperature rise (Thermostat is built in fan motor.)	
			Unit stop function for abnormal circulating fluid temperature rise (Set temp. of the temp. controller: 40°C)			
	Others		Protection against excessive temp. increase of compressor (OLP), Protection against pressure increase of feeding water (With manual valve, Leak protection (With drain pan)			
Material/Substance	Outside panel		SGCC (Munsell 10Y8/0.5 Urban white)			
	Operation panel		SGCC (DIC183 Blue)			
	Base		SECC (Paint Munsell 10Y6/0.5 Urban gray)			
	Wetted part		SUS type (tank, connections such as inlet and outlet), BC (hose fitting, tube fitting), PVC (piping hose for internal water feeding), PPE (pump casing, Impeller), Polyurethane (Limnimeter)		SUS (pump impeller, tank, connections such as Inlet and outlet), BC (pump casing, hose fitting), PVC (piping hose for internal water feeding), Polyurethane (Limnimeter)	
	Internal piping for refrigerant		C1220T			
	Operating refrigerant		R407C(HFC)	R407C(HFC)	R407C(HFC)	
Accessories			No accessories Eye b		Eye bolt M12×4 pcs	
7000300103			(Please prepare a powe	r supply, signal cable an	d connection terminal under your responsibility.)	
Weight			Approx. 65kg	Approx. 70kg	Approx. 117kg	

# 7.2 Outline dimensions











Fig. 7-2 Outline dimensions (HRG005-WW)



#### 7.3.2 HRG005-W





Fig. 7-5 Flow chart (HRG001-W and HRG002-W)

#### 7.4.2 HRG005-W



	Sym bol	Name		
Coc water	PV	Pressure water regulating valve		
ling	S	Strainer		
	CM	Compressor		
	CD	Air-cooled condenser		
	пре	Pressure switch for		
Re	TIF 3	high pressure		
fric	D	Refrigerant dryer		
Jera	EV	Evaporator (Cooler)		
atic	Α	Accumulator		
ň	SV	Solenoid valve		
Ĭro	R	Capillary tube		
üit	CRV	Capacity regulating valve		
	060	Pressure switch for low		
	F JZ	pressure		
	Т	Tank		
_ ≦	LS	Level switch		
circ	LI	Limnimeter		
r fe	PM	Pump		
ëd	TI	Temperature sensor		
	RV	Hand valve		

Fig. 7-6 Flow chart (HRG005-W)