HRS050-TFR03

Installation and Maintenance Manual

Thermo-chiller

HRS050/060 Series

Original Instructions

1 Read Before Using

Thank you for purchasing SMC's Thermo-chiller (hereinafter referred to as the "product"). This "Installation and Maintenance Manual" (hereinafter referred to as this "manual") briefly explains the essential safety instruction procedures to start and stop the product and reset its alarms. Read this manual before using.

2 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

⚠ **Caution**	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
⚠ **Warning**	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
⚠ **Danger**	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

⚠ Warning

- The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
- **Only trained personnel should operate machinery and equipment.**
- Assembly, handling or repair of the product should be performed by trained and experienced personnel.
- **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
  1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.
  2) Before machinery/equipment is re-started, ensure all safety measures are implemented.
- **The product can be dangerous when handled incorrectly.**
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
  1) Conditions and environments beyond the given specifications, or if the product is to be used outdoors.
  2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.
  3) An application, which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

⚠ Caution

- Do not use the product in an area of high temperature and humidity which cannot be exhausted, or where it is exposed to corrosive substances. Cooling failure can result.
- Do not handle the power supply connector and switch with wet hands. Electrical shock can result.
- This product is heavy (over 40kg). When transferring the product with casters or handles, pay attention to slopes on the route and the risk of dropping the product.
- Select piping applicable to the operating pressure range. Otherwise, it can cause fluid leakage or rupture.

3 Specifications

3.1 Product Specifications

HRS050-＊＊-20-Options

Model		HRS050-A●-20-（BJM）	HRS050-W●-20-（BJM）
Cooling method		Air-cooled refrigerated	Water-cooled refrigerated
Refrigerant		R410A (HFC) (GWP:1975)	
Control method		PID control	
Ambient temperature and humidity*1		Temperature: 5 to 40 ℃, Humidity: 30 to 70%	
Circulating fluid system	Circulating fluid*2	Tap water, Ethylene glycol aqueous solution 15%*4	
	Operating temp. range*1 (℃)	5 to 40	
	Cooling Capacity*3 (50/60Hz) (W)	4700/5100	
	Temperature stability*5 (℃)	±0.1	
	Pump capacity*6 (50/60Hz) (MPa)	0.24 (at 23L/min)/0.32 (at 28L/min)	
	Rated flow*7 (50/60Hz) (L/Min)	23/28	
	Tank capacity (L)	Approx. 5	
	Port size	Rc1/2	
	Wetted material	Stainless steel, Copper brazing (Heat exchanger) *13, Bronze *13 Brass *13, SIC, Carbon, PP, PE, POM, FKM, EPDM, PVC, NBR	
Facility water outlet filling*8	Temperature range (℃)	-	5 to 40
	Pressure range (MPa)	-	0.3 to 0.5
	Required flow*12 (L/min)	-	16
	Facility water press. differential (L/min)	-	0.3 more
	Port size	-	Rc1/2
	Wetted material	-	Stainless steel, Copper brazing (Heat exchanger), Bronze, Synthetic rubber
Automatic fluid filling*11	Feed water pressure range (MPa)	0.2 to 0.5	
	Feed water temp. range (℃)	5 to 40	
	Feed water capacity (L/min)	Approx.1	
	Automatic fluid filling port size	Rc3/8	
	Over flow port size	Rc3/4	
Electric system	Power supply	1-Phase, AC200 to 230V, 50/60Hz. Allowable voltage range ±10%	
	Breaker*14	20	
	Applicable earth leakage breaker capacity*9 (A)	20	
	Rated operating current*3 (50/60Hz) (A)	8.0/11.0	7.6/10.0
	Rated power consumption*3 (50/60Hz) (kVA)	1.68/2.20	1.55/2.00
Dimensions*9 (mm)		W377×D592×H976 (W14.8XD23.3xH38.4 [Inch])	
Accessory		Sequence I/O command signal connector 1pc., Operation manual (Installation･Operation) 2pc, Alarm code list label 1pc., Ferrite core (For communication), Cable tie (For power supple fixture)	
Weight*10 (kg)		69	67

HRS060-＊＊-20-Options

Model		HRS060-A●-20-（BJM）	HRS060-W●-20-（BJM）
Cooling method		Air-cooled refrigerated	Water-cooled refrigerated
Refrigerant		R410A (HFC) (GWP: 1975)	
Control method		PID control	
Ambient temperature and humidity*1		Temperature: 5 to 40 ℃, Humidity: 30 to 70%	
Circulating fluid system	Circulating fluid*4	Tap water, Ethylene glycol aqueous solution 15%*4	
	Operating temp. range*1 (℃)	5 to 40	
	Cooling Capacity*3 (50/60Hz) (W)	4900/5900	
	Temperature stability*5 (℃)	±0.1	
	Pump capacity*6 (50/60Hz) (MPa)	0.21 (at 23L/min)/0.29 (at 28L/min)	
	Rated flow*7 (50/60Hz) (L/Min)	23/28	
	Tank capacity (L)	Approx. 5	
	Port size	Rc1/2	
	Wetted material	Stainless steel, Copper brazing (Heat exchanger) *13, Bronze *13 Brass *13, SIC, Carbon, PP, PE, POM, FKM, EPDM, PVC, NBR	
Facility water outlet filling*8	Temperature range (℃)	-	5 to 40
	Pressure range (MPa)	-	0.3 to 0.5
	Required flow*12 (L/min)	-	17
	Facility water press. differential (L/min)	-	0.3 more
	Port size	-	Rc1/2
	Wetted material	-	Stainless steel, Copper brazing (Heat exchanger), Bronze, Synthetic rubber
Automatic fluid filling*11	Feed water pressure range (MPa)	0.2 to 0.5	
	Feed water temp. range (℃)	5 to 40	
	Feed water capacity (L/min)	Approx.1	
	Automatic fluid filling port size	Rc3/8	
	Over flow port size	Rc3/4	
Electric system	Power supply	1-Phase, AC200 to 230V, 50/60Hz. Allowable voltage range ±10%	
	Breaker*14	30	20
	Applicable earth leakage breaker capacity*9 (A)	30	20
	Rated operating current*3 (50/60Hz) (A)	8.9/11.5	7.6/10.4
	Rated power consumption*3 (50/60Hz) (kVA)	1.83/2.30	1.55/2.09
Dimensions*9 (mm)		W377×D592×H976 (W14.8XD23.3xH38.4 [Inch])	
Accessory		Sequence I/O command signal connector 1pc., Operation manual (Installation･Operation) 2pc, Alarm code list label 1pc., Ferrite core (For communication), Cable tie (For power supple fixture)	
Weight*10 (kg)		73	67

3 Specifications (continue)

Notes:

＊1 Use the product in conditions where freezing will not occur. Consult with SMC if using in a season or region where the ambient temperature will fall below zero.

＊2 If tap water is used, use water which satisfies the standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994/Cooling water system - circulation type - make-up water)

＊3 (1)Operating ambient temp.: 25 ℃ , (2)Circulating fluid temp.: 20 ℃ , (3)Circulating fluid rated flow, (4) Circulating fluid : Tap water, (5) Facility water temp.: 25 ℃(＊15).

＊4 Use a 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temp. is lower than 10 ℃.

＊5 Outlet temp. when the circulating fluid flow is rated flow, and the circulating fluid outlet and the return are directly connected. Installation environment and power supply are within specification range and stable.

＊6 The capacity at the thermo-chiller outlet when the circulating fluid temp. is 20 ℃.

＊7 Fluid flow to maintain the cooling capacity and the temperature stability. The specification of the cooling capacity and the temperature stability may not be satisfied if the flow rate is lower than the rated flow.

＊8 To be prepared by the customer. Use an earth leakage breaker with sensitivity of 30mA/200V in power supply specification.

＊9 Dimension between panels. Projection is not included.

＊10 Weight when the circulating fluid and facility water (for water-cooled type) is not included. The weight will increase by 1kg when option J [Automatic fluid filling] is selected.

＊11 For option J [Automatic fluid filling port].

＊12 There is required flow when adding load described on cooling capacity in case of note 3 conditions.

＊13 Copper, bronze and brass are not included when option M [DI water piping] is selected.

＊14 In case of option B [Earth leakage breaker], the breaker is changed to an earth leakage breaker.

＊15 For water -cooled type.

3.2 General Description and Intended Use

This product used a built-in pump to circulate a liquid such as water, adjusted to a constant temperature by the refrigeration circuit. This circulating liquid cools parts of customer's machine that generate heat.

3.3 Production Serial Number Code

The production serial number code printed on the label indicates the month and year of production as per the following table:

Year / Month		2012	2013	2014	….	2021	2022	2023	….
		Q	R	S	….	Z	A	B	….
Jan	o	Qo	Ro	So	….	Zo	Ao	Bo	….
Feb	P	QP	RP	SP	….	ZP	AP	BP	….
Mar	Q	QQ	RQ	SQ	….	ZQ	AQ	BQ	….
Apr	R	QR	RR	SR	….	ZR	AR	BR	….
May	S	QS	RS	SS	….	ZS	AS	BS	….
Jun	T	QT	RT	ST	….	ZT	AT	BT	….
Jul	U	QU	RU	SU	….	ZU	AU	BU	….
Aug	V	QV	RV	SV	….	ZV	AV	BV	….
Sep	W	QW	RW	SW	….	ZW	AW	BW	….
Oct	X	QX	RX	SX	….	ZX	AX	BX	….
Nov	y	Qy	Ry	Sy	….	Zy	Ay	By	….
Dec	Z	QZ	RZ	SZ	….	ZZ	AZ	BZ	….

4 How to Order

HRS 060 - A ☐ - 20 - ☐

① Cooling capacity

050	4700W/5100W (50/60Hz)
060	4900W/5900W (50/60Hz)

② Cooling method

A	Air-cooled refrigerator type
W	Water-cooled refrigerator type

③ Piping thread type

Null	Rc
F	G (PT-G conversion fitting is included)
N	NPT (PT-NPT conversion fitting is included)

④ Power supply

20	1-phase AC200 to 230V (50/60Hz)

⑤ Option

Null	None
B	Earth leakage breaker
J	Automatic water -supply
M	Pure water piping

5 Name of Parts and Accessories

5.1 Accessories

- Check the enclosed accessories with the delivered thermo-chiller.

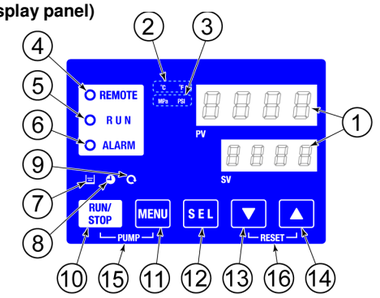
1	Alarm code list label		1
2	Operation Manual		2 (JPN: 1pc , ENG: 1pc)
3	Sequence I/O command signal connector*		1
4	Ferrite core* (For communication)		1
5	Cable tie* (For power supply cable fixture)		1

*These accessories are not explained in this manual. For details, read the Operation Manual attached.

5.2 Main Parts

- The names of parts used in this manual are as follows:

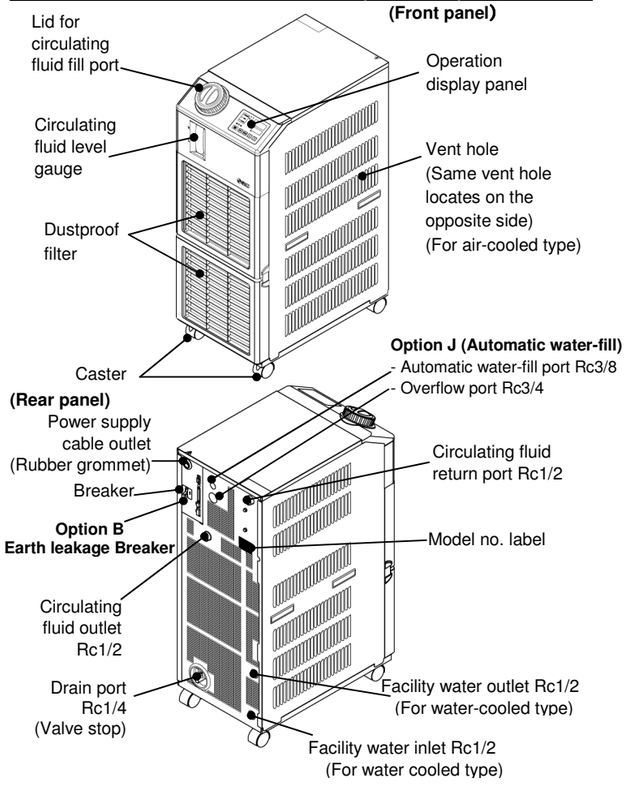
(Operation display panel)



No	Description	Function	
1	Digital display (7-segment, 4 digits)	PV	Displays the temperature and pressure of the circulating fluid and alarm codes.
		SV	Displays the discharge temperature of the circulating fluid and the set values of other menus.
2	[℃] [℉] lamp	Equipped with a unit conversion function. Displays the unit of display temperature (default setting ℃).	
3	[MPa] [PSI] lamp	Equipped with a unit conversion function. Displays the unit of display pressure (default setting MPa).	
4	[REMOTE] lamp*	Enables the remote operation (start and stop) by communication. Lights up during remote operation.	
5	[RUN] lamp	Lights up when the product is started and in operation. Goes off when the product is stopped. Flashes during stand-by for stop or anti-freezing function, or independent operation of the pump.	
6	[ALARM] lamp	Flashes with buzzer when alarm occurs.	
7	[ ] lamp	Lights up when the surface of the level indicator falls below the LOW level.	
8	[ ] lamp*	Lights up while the run timer or stop timer function is working.	
9	[ ] lamp*	Lights up when the product is in automatic operation.	
10	[RUN/STOP] key	Makes the product start or stop.	
11	[MENU] key*	Shifts the main menu (display screen of temperature) and secret menu (entry of set values and monitor screen).	
12	[SEL] key*	Changes the item in menu and enters the set value.	
13	[▼] key	Decreases the set value.	
14	[▲] key	Increases the set value.	
15	[PUMP] key	Keep the [MENU] and [RUN/STOP] keys pressed down simultaneously. The pump starts running independently to make the product ready for start-up (release the air).	
16	[RESET] key	Keep the [▼] and [▲] keys pressed down simultaneously. This will stop the alarm buzzer and reset the [ALARM] lamp.	

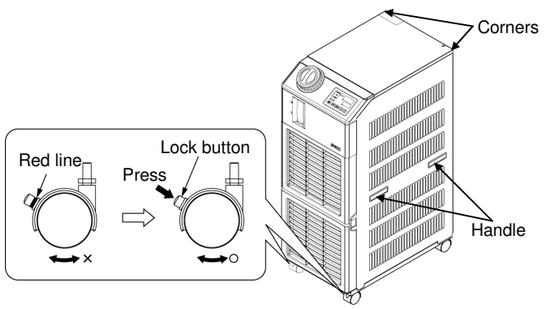
*These lamps and keys are not explained in this manual. For details, read the Operation Manual attached.

5 Name of Parts and Accessories (continue)



6 Transportation, Transfer and Moving

1) Be sure to unlock the caster (only at the front wheel). There is no lock function with the rear casters.
2) Push the left and right panels with the handle and move.
3) Use corners when pushing the front or rear panel. Pushing at the centre can deform the panel.



7 Installation

7.1 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.

7.2 Types of Hazard Labels

⚠ Warning

- The product has various potential hazards and they are marked with warning labels.

Warning related to Electricity

⚠	This symbol stands for a possible risk of electric shock.

Warning related to High Temperatures

⚠	This symbol stands for a possible risk of hot surface and burns.

Warning related to Rotating Objects

⚠	This symbol stands for a possible risk of cutting fingers or hand, or entanglement by rotating fan (For air-cooled type).

Warning related to other General Dangers

⚠	This symbol stands for general danger.

7.3 Environment

⚠ Warning

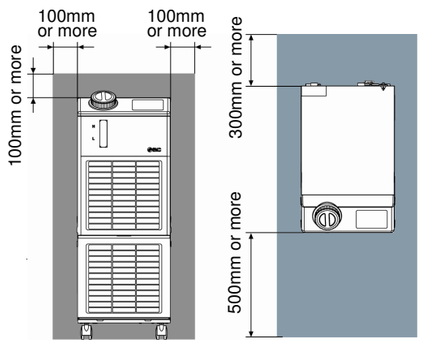
- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use the product in an area of high temperature and humidity which cannot be exhausted, or where it is exposed to corrosive substances. Cooling failure can result.
- Do not use the product outdoors. If the product is subjected to rain or water splash it may cause electrical shock, fire or failure.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not mount in a location exposed to radiant heat.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not use in locations at altitudes of 3000m or higher (except for product storage and transport), refer to the Operation Manual.

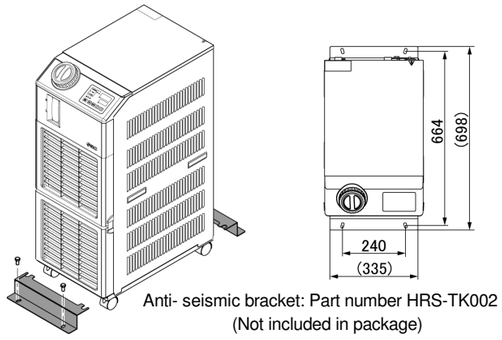
7.4 Mounting

⚠ Warning

- The Installer / End User is responsible for carrying out a noise risk assessment on the equipment after installation and taking appropriate measures as required.

1) Select a hard flat and level surface suitable to support the weight of the product and which will reduce the effect of vibration.
2) Install the product so the operation panel is easily visible and accessible, electrical and fluid connections can be easily made at the rear of the product and the air inlet and outlet vents are clear of obstructions. After moving into position, lock the front caster wheels again.
3) Fix the product to the floor or base using the anti-seismic bracket (prepared separately).





Anti- seismic bracket: Part number HRS-TK002
(Not included in package)

7.5 Piping

⚠ Caution

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

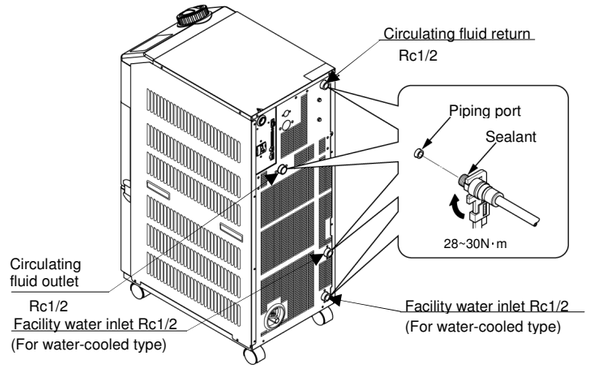
Thread	Tightening torque (N·m)
Rc 1/2	28 to 30

1) Connect the circulating fluid return port with the user's machine outlet.

2) Connect the circulating fluid discharge port with the user's machine inlet.

<Water-cooled refrigeration type HRS*-W>**

1) Connect the facility water inlet with the user's water source outlet.
2) Connect the facility water outlet with the user's water source inlet.



7.6 Filling of Circulating Fluid

⚠ Caution

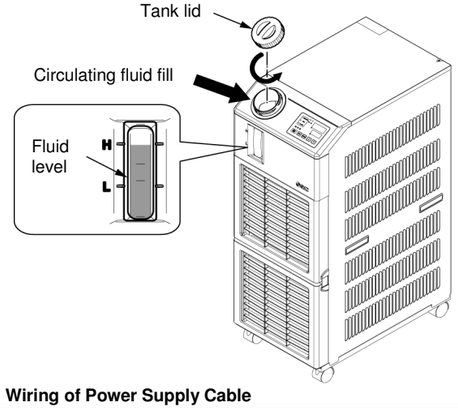
- When the temperature of the circulating fluid is set to lower than 10°C, use 15% aqueous solution of Ethylene Glycol. Tap water may freeze in the Thermo-chiller, leading to malfunction.

- If using Ethylene Glycol, refer to the supplier's Material Safety Data Sheet (MSDS) and wear Personal Protective Equipment (PPE) as appropriate.

1) Check the drain port is plugged or closed by the valve to prevent the supplied circulating fluid from draining out.

2) Turn the lid for the circulating fluid fill port counter clockwise to open, and fill the circulating fluid up to "H" of the level indicator scale.

3) After filling to the specified level, turn the lid clockwise to close.



7.7 Wiring of Power Supply Cable

⚠ Warning

- The electrical facilities should be installed and wired in accordance with local laws and regulations of each country and by the person who has knowledge and experience.
- Check the power supply. Operation with voltages, capacities, frequencies and cable sizes other than those specified can cause heat, fire and electrical shock.
- Wire with an applicable cable size and terminal.
- Be sure to shut off the user's power supply. Wiring with the product energized is strictly prohibited.

⚠ Caution

- Use an individual socket or earth leakage breaker.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.

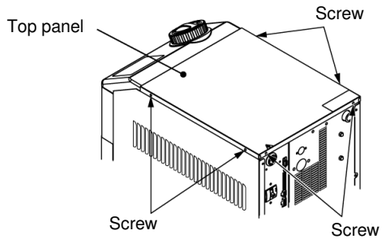
7.7.1 Preliminary Preparation for Wiring

Prepare the power supply shown in the following table. For the connection between the product and power supply, use the power supply cable and earth leakage breaker shown below:

Model	Power supply voltage	Terminal block screw diameter	Recommend crimp terminal	Cable qty. x size	Recommended earth leakage breaker		
					Rated voltage [V]	Rated current [A]	Sensitivity of leak current [mA]
HRS050-A*-20 HRS050-W*-20 HRS060-W*-20	1-phase 200-300V AC (50/60 Hz)	M4	5.5-4	3 cores x12AWG (3 cores x3.5mm²) (including ground)	200, 230	20	30
HRS060-A*-20				3 cores x10AWG (3 cores x5.5mm²) (including ground)		30	

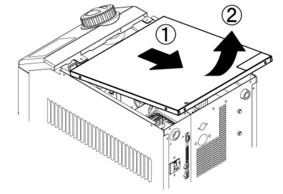
7.7.2 Wiring of Power Supply

1) Remove six screws to remove the upper panel.

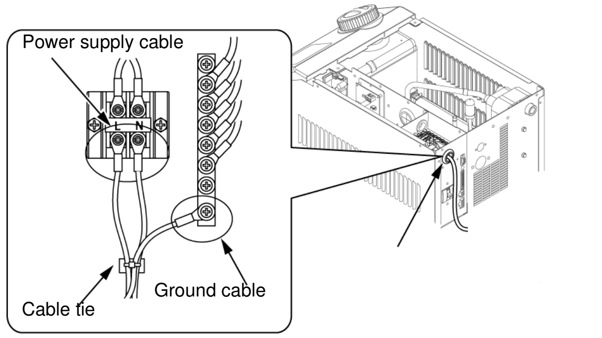


7 Installation (continue)

2) Pull the upper panel towards the back of the product and lift it to remove.



3) Connect the power supply cable and ground cable as shown in the figure below.



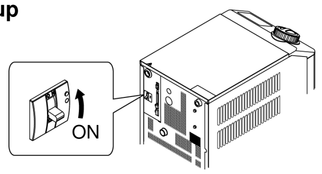
∗ Connect over current protection to the power cable connected to the equipment in order to avoid hazard.

8 Start, Stop and Temperature Settings

8.1 Preliminary Preparation for Start-up

8.1.1 Supply of Power

1) Turn on the power switch.



→The initial screen (HELLO) will be displayed for approx. 8 seconds on the operation panel. Then the display changes to the main screen which displays the circulating fluid outlet temperature.

8.1.2 Air Release

1) Press the [PUMP] key ([RUN/STOP] key and [MENU] key simultaneously). The [RUN] lamp flashes and only the pump continues the operation. This operation allows the discharge of the circulating fluid, and enables checking leakage from the piping and air release.

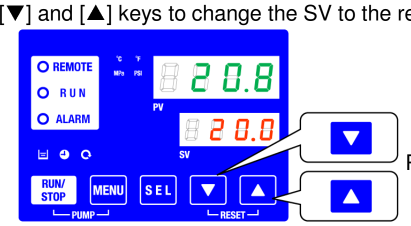
2) At this time, the fluid level can lower and cause the alarm "AL01; Low tank level", which will lead to the stop of the product.

3) In that case, check that there is no leakage from the user's piping, fill the circulating fluid as specified in "7.6 Filling of Circulating Fluid" and take necessary actions in "9. Reset Alarms".

4) Repeat steps 1) to 3) until the alarm ("AL01; Low tank level") is no longer generated.

8.1.3 Temperature Setting

1) Press the [▼] and [▲] keys to change the SV to the required value.

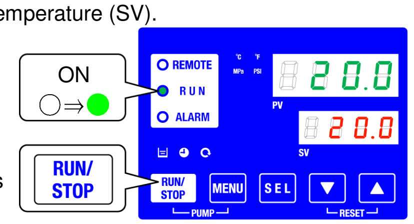


8.2 Start of the Product

1) Keep the [RUN/STOP] key pressed for approx. 2 seconds.

⇒The [RUN] lamp lights up (in green) and the product starts running.

The circulating fluid discharge temperature (PV) is controlled to the set temperature (SV).

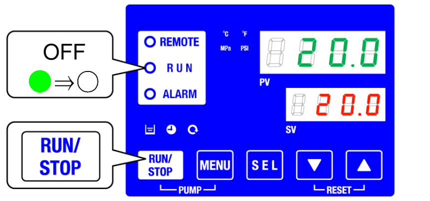


8 Start, Stop and Temperature Settings (continue)

8.3 Stop of the Product

1) Keep the [RUN/STOP] key pressed for approx. 2 seconds.

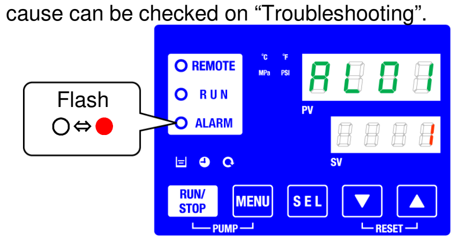
⇒The [RUN] lamp flashes (in green) and continues the operation until the product is ready to stop. After approx. 15 seconds, the [RUN] lamp goes off and the product stops.



9 Reset Alarms

⚠ Caution

- Should some error occur, the [ALARM] lamp flashes (in red) and the buzzer sounds to inform the user of the 'Error'.
- The alarm code will be displayed on the operation panel so that the cause can be checked on "Troubleshooting".

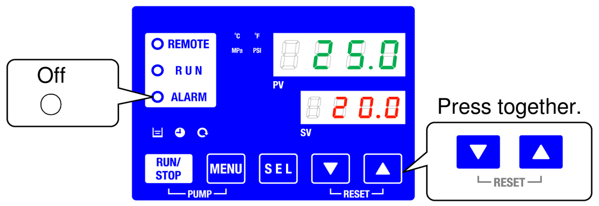


- Before resetting the alarm, read the "Causes and Remedies" of "Troubleshooting" and eliminate the cause explained there. Otherwise, the same alarm may be repeated.
- As accessories, the clear cover (for this manual) and alarm code list label are enclosed. Stick the label to the panel to check the contents of alarm codes.

Reset of alarm

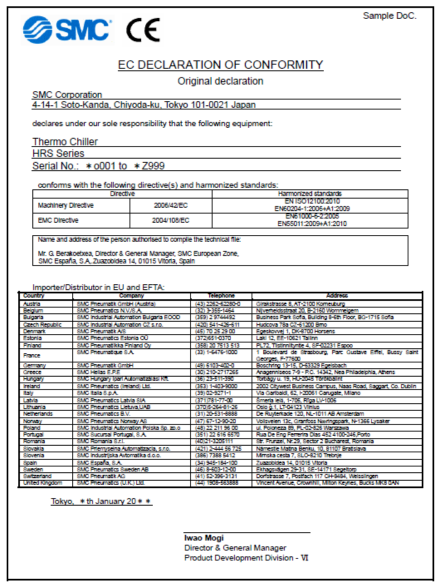
1) Press the [RESET] key ([▼] and [▲] keys simultaneously).

⇒The buzzer and then [ALARM] lamp (red) go off.



10 Declaration of Conformity

Below is a sample Declaration of Conformity (DoC) used for this product.



Sample DoC.

EC DECLARATION OF CONFORMITY

Original declaration

SMC Corporation
4-14-1 Soto-Kanda, Chiyoda-ku, Tokyo 101-0021 Japan

declares under our sole responsibility that the following equipment:

Thermo Chiller
HRS Series
Serial No.: ∗o001 to ∗Z999

conforms with the following directive(s) and harmonized standards:

Directive		Harmonized standards
Machinery Directive	2006/42/EC	EN ISO12100:2010 EN60204-1:2006+A1:2009
EMC Directive	2004/108/EC	EN61000-6-2:2005 EN55011:2009+A1:2010

Name and address of the person authorised to compile the technical file:

Mr. G. Berakoetxea, Director & General Manager, SMC European Zone,
SMC España, S.A.,Zuazobidea 14, 01015 Vitoria, Spain

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United Kingdom	SMC Pneumatics (U.K.) Ltd.	(44) 1908-563888	Vincent Avenue, Crownhill, Milton Keynes, Bucks MK8 0AN

Tokyo, ∗th January 20∗∗

Iwao Mogi
Director & General Manager
Product Development Division - Ⅵ

11 Troubleshooting

11.1 Troubleshooting

The troubleshooting method depends on which alarm has been generated. Refer to the "Alarm code list and Troubleshooting".

⚠ Warning

In the event of an unexpected problem or malfunction, switch off the product and investigate the cause. If the cause of the problem cannot be determined, do not use the product, but contact SMC for assistance.

Alarm code list and Troubleshooting

Code	Description	Operation	Cause/Remedy (Press the reset key after eliminating the cause.)
AL01	Low level in tank	Stop*1	The fluid level has fallen below the level indicator. Fill the circulating fluid.
AL02	High circulating fluid discharge temp.	Stop	･Ensure that the circulating fluid flow is 20 L/min. or more. ･Reduce the ambient temperature or heat load. ･Wait until the temperature decreases.
AL03	Circulating fluid discharge temp. rise	Continued*1	
AL04	Circulating fluid discharge temp.	Continued*1	Check the ambient temperature condition and the temperature of supplied circulating fluid.
AL05	High circulating fluid return temp.	Stop	･Ensure that the circulating fluid flow is 20 L/min. or more. ･Check the heat load is within the specified range.
AL06	High circulating fluid discharge pressure	Stop	Check the user's piping for bends, squash and foreign matters.
AL07	Abnormal pump operation	Stop	Restart and check the pump is operating.
AL08	Circulating fluid discharge pressure rise	Continued*1	Check the user's piping for bends, pinching or blockage by foreign matters.
AL09	Circulating fluid discharge pressure drop	Continued*1	･Restart and check the pump is operating. ･Ensure that the tank level is within the appropriate range.
AL10	High compressor intake temp.	Stop	Check the temperature of the circulating fluid returning to the product.
AL11	Low compressor intake temp.	Stop	･Check the circulating fluid flows. ･Check the circulating fluid in the evaporator is not frozen. ･Use a 15% ethylene glycol aqueous solution if operating with a set temperature lower than 10°C.
AL12	Low super heat temperature	Stop	
AL13	High compressor discharge pressure	Stop	Reduce the ambient temperature or heat load.
AL15	Refrigerant circuit pressure (high pressure side) drop	Stop	･Check the ambient temperature is within the specified range. ･It is possible that refrigerant is leaking. Ask for the service.
AL16	Refrigerant circuit pressure (low pressure side) rise	Stop	Reduce the ambient temperature or heat load.
AL17	Refrigerant circuit pressure (low pressure side) drop	Stop	Check the circulating fluid flows.
AL18	Compressor overload	Stop	Leave for 10 minutes and restart, and check the compressor is operating.
AL19*2	Communication error *2	Continued *1	The request message from the host computer has not arrived. Send it again.
AL20	Memory error	Stop	Written data is different from read data. Ask for the service of RAM.
AL21	DC line fuse cut	Stop *1	DC circuit fuse of the communication connector for the contact input/output is short circuited. Ask for the service of the fuse of the DC circuit. Confirm there is no incorrect wiring or load of 500mA or larger.
AL22	Circulating fluid discharge temp. sensor failure	Stop	The temperature sensor is short-circuited or opened. Ask for the service of the temperature sensor.
AL23	Circulating fluid return temp. sensor failure	Stop	
AL24	Compressor intake temp. sensor failure	Stop	
AL25	Circulating fluid discharge pressure sensor failure	Stop	The pressure sensor is short-circuited or opened. Ask for the service of the pressure sensor.
AL26	Compressor discharge pressure sensor failure	Stop	
AL27	Compressor intake pressure sensor failure	Stop	

11 Troubleshooting (continue)

Code	Description	Operation	Cause/Remedy (Press the reset key after eliminating the cause.)
AL28	Maintenance of pump	Continued	The timing of a periodical check is informed. Recommended to ask for the check and service of the pump, fan motor and compressor.
AL29 *3	Maintenance of fan motor*3	Continued	
AL30	Maintenance of compressor	Continued	
AL31 *2	Contact input 1 signal detection *2	Stop *1	Contact input is detected.
AL32 *2	Contact input 2 signal detection *2	Stop *1	
AL33	Water leakage	Stop *1	･Check if the leakage sensor is connected. ･Leakage occurred. Check the leakage point.
AL34	Electric resistivity rise	Continued	Electrical resistivity is larger than the set value.
AL35	Electric resistivity drop	Continued	Electrical resistivity is smaller than the set value. Replace the DI filter.
AL36	DI sensor error	Continued	･Check if the resistivity sensor is connected. ･There may be short circuit or open wire of the resistivity sensor. Replace the sensor.

∗ 1"Stop" or "Continued" are default setting. The user can change them to "Continued" / "Stop". For details, read the Operation Manual attached.

∗2 "AL19, AL31, AL32" are disabled in the default setting. When those functions need to be enabled, refer to the Operation Manual attached.

∗3 HRS∗∗∗-A∗-∗∗(Air-cooled refrigeration type).

∗4 Refer to the "Operation Manual" separate sheet for other alarms.

11.2 Other Errors

The causes and remedies for failures that are not indicated by alarm numbers are shown in 'Alarm code list and Troubleshooting' table.

Causes and remedies for failures without alarm number

Content of Failure	Cause	Remedy
The operation panel displays nothing	The breaker is not turned on.	Turn on the breaker.
	Failure of the breaker.	Replace the breaker.
The operation panel displays nothing	No power supply (The breaker for the power supply is not turned on.)	Supply the power.
	Trip of breaker due to short-circuit or current leakage	Repair the short-circuit or current leaking part.
The [RUN] LED does not light up even when the [RUN/STOP] switch is pressed.	Communication is not set in the local mode.	Set the communication in the local mode.
	Failure of the [RUN] LED	Replace the controller.
	Failure of the [RUN/STOP] switch	Replace the controller.

12 Maintenance

12.1 General Maintenance

⚠ Warning

- Do not operate switches, etc. with wet hands and do not touch the electrical parts such as the power supply plug. It might cause electric shock.
- Do not splash water directly on the product and do not wash with water. It might cause electric shock and fire, etc.
- Do not touch the fins directly when cleaning the dustproof filter. It might cause injury.
  Remount all panels removed for inspection or cleaning. As this might cause injury or electric shock if the prodcut is operated without the panels.

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- Before performing maintenance, turn off the power supply. After installation and maintenance, turn on power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.

12 Maintenance (continue)

- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

12.2 Control of Circulating Fluid Quality

⚠ Warning

- Use specified circulating fluids only. If other fluids are used, they may damage the product or result in dangerous hazards.
- When using fresh tap water ensure that it satisfies the water standard shown in the Operation Manual.

⚠ Caution

Clean the tank, circulating fluid circuit, and change the circulating fluid in the tank if any problems are found during the regular check. Even if no problems are found, it is recommended to change the fluid once every 3 months in case evaporation of the fluid causes concentration of impurities.

12.3 Daily Check

⚠ Caution

Check each item of “Daily checklist”, and if any error is seen, stop the operation of the product and turn off the user's power supply, and service the product.

Daily checklist

Item	Description of checking	
Installation condition	Check the installation conditions of the product.	There is no heavy object on the product or excessive force on the piping.
		Temperature and humidity are within the specified range of the product.
Fluid leakage	Check the connected part of piping	There is no circulating fluid leakage from the connected part of piping.
Fluid amount	Check the liquid level indicator.	The circulating fluid level must enter between the scales of ‘‘H’’ and ‘‘L’’.
Operation panel	Check the display.	The numbers on the display are clear.
	Check the function.	The [RUN/STOP] and [MENU], [SEL], [▼], [▲] buttons operate properly.
Circulating fluid temperature	Check on the operation panel.	There is no problem for use.
Operating conditions	Check the operation condition.	There is no abnormal noise, vibration, smell or smoke.
Facility water*	Facility water condition	Temperature, flow rate and pressure are within the specified range.

*For water-cooled type

12.4 Monthly Check

Cleaning of air vent (For air-cooled type)

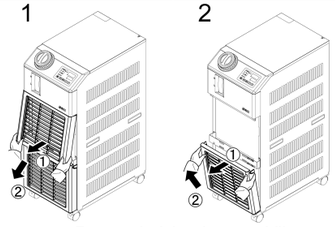
⚠ Caution

- If the fins of the air-condenser become clogged with dust or debris, heat radiation performance reduces. This results in the reduction of cooling performance, and may stop the operation because the safety device is trigger. Shut off the power supply of the product when performing cleaning, maintenance or inspection. Otherwise, it might cause electric shock, injury or burn, etc.
- Replace all panels removed for inspection or cleaning. It might cause injury or electric shock if it is operated with the panel removed or opened.

12.4.1 Removal of the Dustproof Filter

1) The dustproof filter is installed at the lower part of the front face of the thermo-chiller. It is mounted with a magnet. The dustproof filter is divided into two identical sections.
2) The dustproof filters can be removed as shown in the below drawing . Care should be taken not to deform or scratch the air-cooled condenser.

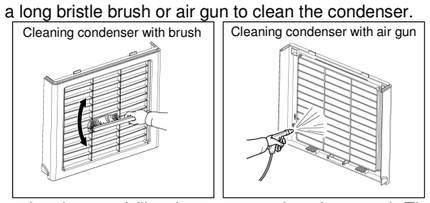
12 Maintenance (continue)



Removal of the dustproof filters

12.4.2 Cleaning of Filter

1) Use a long bristle brush or air gun to clean the condenser.



2) Mount the dustproof filter in reverse order of removal. The magnet clicks when mounted.

12.5 Inspection Every 3 Months

12.5.1 Replacement of Circulating Fluid

- Clean the tank and replace the circulating fluid (clean water).

12.5.2 Replacement of Facility Water (For water cooled type)

- Clean the facility water source and replace the facility water.

12.6 Inspection Every 6 Months

⚠ Caution

- It is impossible to prevent the leakage from the mechanical seal completely because of its structure. Although the leakage is described as 3cc/hr or less (reference value) based on the JIS.
- The recommend lifetime of the mechanical seal before needing replacement is 6000 to 8000 hours (usually 1 year).
- Check for water leakage from pump.

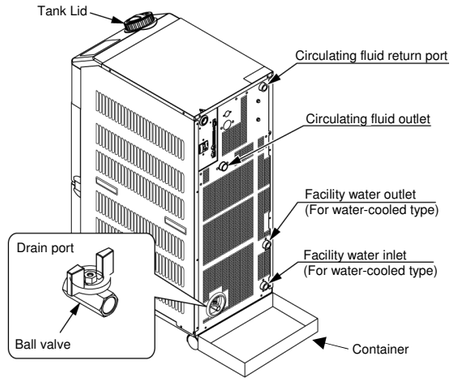
  Remove the panel and check the mechanical seal of the pump for excessive leakage. If the leakage is found, replace the mechanical seal. Order the mechanical seal described in Operation Manual.

12.7 Discharge of the Circulating Fluid and Facility Water

⚠ Warning

- Stop the customer device and release the residual pressure before discharging the circulating fluid.
- Before discharging the facility water, in case of water-cooled refrigerated type, stop the equipment for the facility water, or stop the facility water circuit to release the residual pressure.

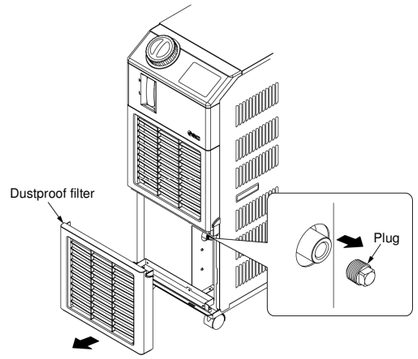
1) Place a container with a capacity of approx. 10L underneath the drain outlet.



12 Maintenance (continue)

2) Remove the tank lid.
3) Open the ball valve at the drain port and drain the fluid.
4) Confirm that a sufficient amount of the circulating fluid has been drained from the user’s machine and piping, and apply air purge from the circulating fluid return port.
5) After the circulating fluid finishes has drained from the tank, close the ball valve at the drain port and put the tank lid back.

- **For the water-cooled refrigeration chiller, drain the facility water according to the procedures from 6 to 8.**

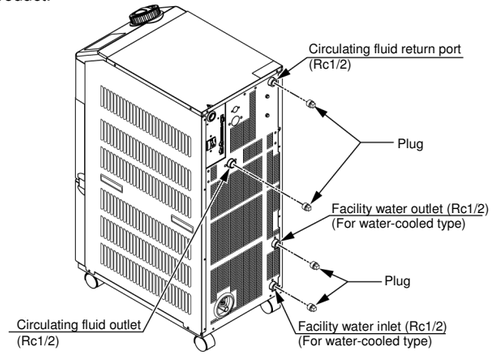


6) Remove the piping of the outlet of the facility water.
7) Remove the dustproof filter to remove the plug.

⚠ Caution

- **Just removing the facility water piping does not discharge the facility water completely. Remove the plug to discharge the facility water.**

8) After ensuring that the facility water is completely discharged, apply the sealant tape to the plugs which are removed during step 7 for mounting.
9) Refer to the below diagram to mount the plug to the piping of the product.



Plug to the piping of the product

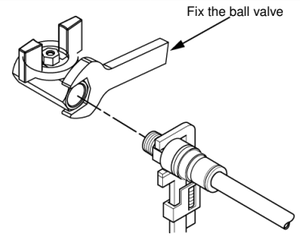
12.8 Connection to the Drain (Ball Valve)

- When connecting piping to the drain (ball valve), fix the ball valve with a spanner.

⚠ Caution

If you do not fix the ball valve during piping, the ball valve will rotate, causing fluid leakage or malfunction. Fix the ball valve during piping.

12 Maintenance (continue)



Connection to the drain

12.9 Consumable Parts

Description	Part No.	Remark
Dustproof filter	HRS-S0001	For spare
Mechanical seal set	HRG-S0211	---

13 Contacts

Country	Company	Address
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