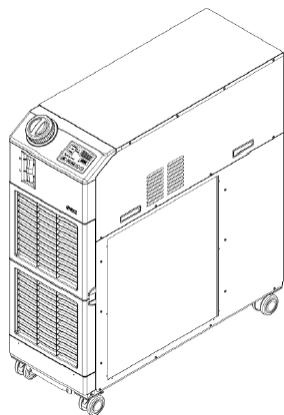




ORIGINAL INSTRUCTIONS

Instruction Manual
Thermo-chiller
HRSH090 Series



1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)¹⁾, and other safety regulations.

- ¹⁾ ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety, etc.

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.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

	Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Danger	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.**
- Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

- Only personnel with appropriate training should operate machinery and equipment.**
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

- Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**

1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2) When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3) Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

- Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

1 Safety Instructions (continue)

2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.

3) An application which could have negative effects on people, property, or animals requiring special safety analysis.

4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

- Always ensure compliance with relevant safety laws and standards.** All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

Caution

- The product is provided for use in manufacturing industries.** The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch

2 Specifications

2.1 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.

2.2 Product specifications

HRSH090- * - * - * -Options

Model	HRSH090-A * -20- *	HRSH090-W * -20- *	HRSH090-A * -40- *	HRSH090-W * -40- *
Cooling method	Air-cooled refrigerated	Water-cooled refrigerated	Air-cooled refrigerated	Water-cooled refrigerated
Refrigerant	R410A(HFC) (GWP:2088)			
Quantity of refrigerant	kg	1.32	1.4	1.32
Control method	PID control			
Ambient temperature ¹⁾	5 to 45			
Circulating fluid ²⁾	Tap water, Ethylene glycol aqueous solution 15%, Deionized water			
Operating temp. range ¹⁾	°C	5 to 40		
Cooling capacity ²⁾	kW	9.5	11	9.5
Heating capacity ²⁾	kW	2.5		
Temperature stability ³⁾	°C	±0.1		
Pump capacity	Rated flow rate (outlet)	45 (0.5MPa)		
	Max. flow rate	60		
	Max. lifting height	50		
Settable pressure range ³⁾	MPa	0.1 to 0.5		
Min. operating flow rate ³⁾	L/min	20		
Tank capacity	L	18		
Circulating fluid Outlet and inlet port size	Rc1/4 (Symbol F: G1, Symbol N: NPT1)			
Tank drain port	Rc1/4 (Symbol F: G1/4, Symbol N: NPT1/4)			
Wetted material ³⁾	Stainless steel, Copper (Heat exchanger brazing), Brass, Bronze, Carbon, Ceramic PE, PVC, POM, PTFE, NBR, EPDM, FKM, PP			
Temperature range	°C	5 to 40		
Pressure range	MPa	0.3 to 0.5		
Required flow rate	L/min	25		
Facility water pressure differential	MPa	more than 0.3		
Facility water inlet, outlet port	Rc1/2			
Wetted material	Stainless steel, Copper (Heat exchanger brazing), Bronze, Brass, PTFE, NBR, EPDM			
Power supply	AC200V/200-230V/50/60Hz 3-phase Allowable voltage fluctuation ±10%		AC380-415V/50/60Hz 3-phase Allowable voltage fluctuation ±10%	
Recommended earth leakage breaker ¹⁾	Rated current	A	30	20
Sensitivity	mA	30		
Rated operating current ²⁾	A	15	12	8
Rated power consumption ³⁾	kW	4.6 (5.2 kVA)	3.8 (4.0 kVA)	5.0 (5.6 kVA)
Sound level (Front 1m / Height 1m) ³⁾	dB(A)	66	65	65
Accessory	Alarm cord list label 2pc. (English 1pc./Japanese 1pc.), Operation manual 2pc. (English 1pc./Japanese 1pc.), Y strainer (40 meshes) 25A, Barrel nipple 25A Anchor brackets 2pcs. (including M10 bolts 4pcs.) ³⁾			
Weight (dry condition)	kg	130	130	121

Notes:

* 1 Use 15% ethylene glycol aqueous solution if operating in a place where the circulating fluid temp. or ambient temperature is lower than 10°C. Please discharge the facility water from the facility water circuit when there is a risk of freezing.

2 Specifications (continue)

* 2 Use fluid in condition below as the circulating fluid. Tap water: Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994).

15% ethylene glycol aqueous solution: diluted by tap water in condition above without any additives such as antiseptics.

Deionized water: Electrical conductivity 1µS/cm and higher (electrical resistivity 1MΩ · cm or lower).

* 3 (1) Ambient temp./Facility water temp. : 32°C, (2) Circulating fluid: Tap water, (3) Circulating fluid temp.: 20°C, (4) Circulating fluid flow rate : Rated flow rate, (5) Power supply: HRSH090- * -20: AC200V; HRSH090- * -40: AC400V.

* 4 (1) Ambient temp./Facility water temp. : 32°C, (2) Circulating fluid : Tap water, (3) Circulating fluid flow rate : Rated flow rate, (4) Power supply : HRSH090- * -20: AC200V; HRSH090- * -40: AC400V.

* 5 (1) Ambient temp./Facility water temp. : 32°C, (2) Circulating fluid : Tap water, (3) Circulating fluid temp.: 20°C, (4) Heat load : Same as the cooling capacity, (5) Circulating fluid flow rate: Rated flow rate, (6) Power supply : HRSH090- * -20: AC200V; HRSH090- * -40: AC400V, (7) External piping length: Minimum

* 6 With the pressure control mode by inverter. When the pressure control mode is not used, the pump power frequency set mode can be used.

* 7 Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, please install a bypass piping.

* 8 To be prepared by user. A specified earth leakage breaker is installed for option B, option S and 400V type.

* 9 The anchor brackets (including M10 bolts) are used for fixation with the skid when this product is packed. The anchor bolts are not attached.

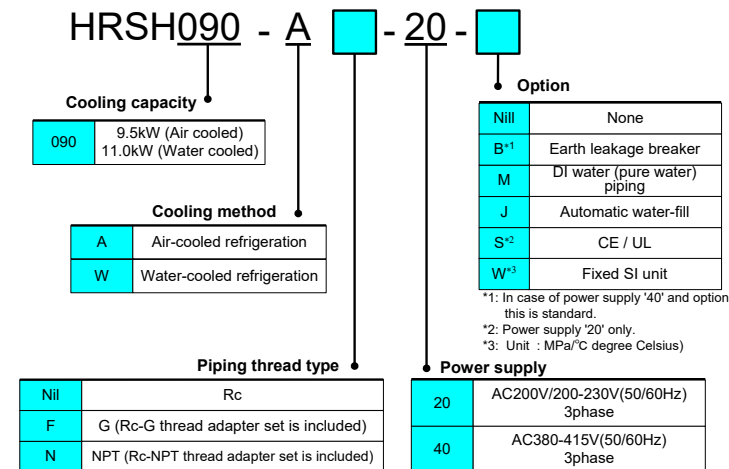
* 10 Copper, bronze and brass is not included when option M [DI water (pure water) piping] is selected.

2.3 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	2018	2019	2020	...	2022	2023	2024	...
Month	W	X	y	...	A	B	C	...
Jan	o	Wo	Xo	yo	...	Ao	Bo	Co
Feb	P	WP	XP	yP	...	AP	BP	CP
Mar	Q	WQ	XQ	yQ	...	AQ	BQ	CQ
Apr	R	WR	XR	yR	...	AR	BR	CR
May	S	WS	XS	yS	...	AS	BS	CS
Jun	T	WT	XT	yT	...	AT	BT	CT
Jul	U	WU	XU	yU	...	AU	BU	CU
Aug	V	WV	XV	yV	...	AV	BV	CV
Sep	W	WW	XW	yW	...	AW	BW	CW
Oct	X	WX	XX	yX	...	AX	BX	CX
Nov	y	Wy	Xy	yy	...	Ay	By	Cy
Dec	Z	WZ	XZ	yZ	...	AZ	BZ	CZ

3 How to Order



4 Name of Parts and Accessories

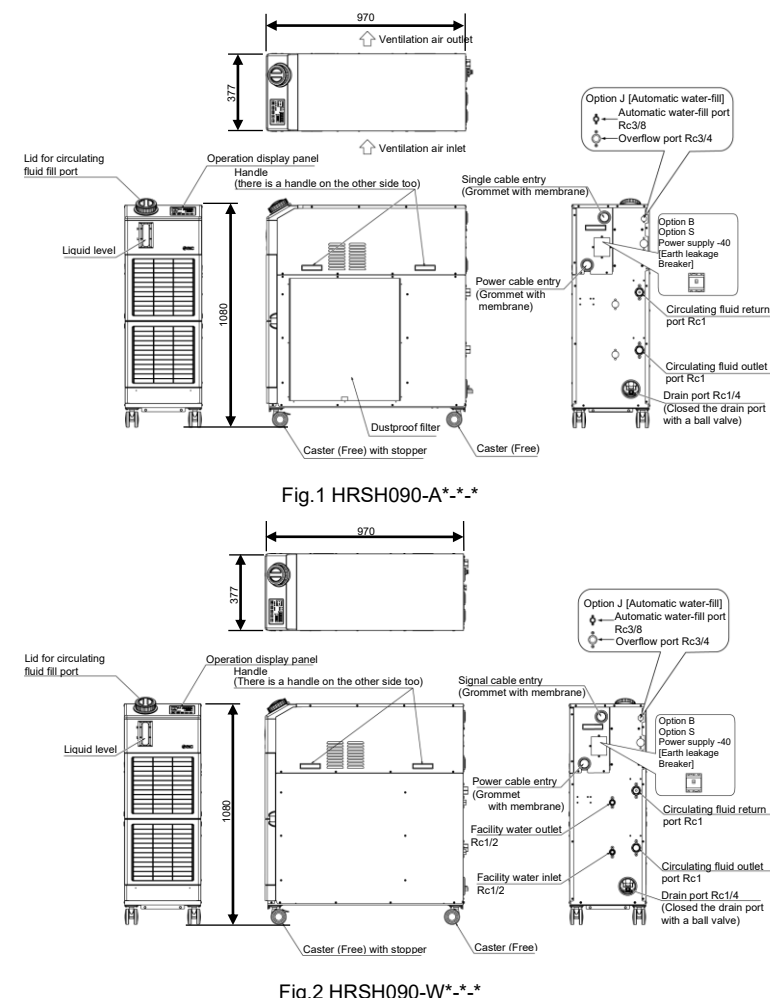
4.1 Accessories

Check the enclosed accessories with the delivered thermo-chiller.

1	Operation Manual	1pc	
2	Alarm code list label	1pc	
3	Y strainer (40 mesh) 25A	1pc	
4	Barrel nipple 25A	1pc	
5	Anchor bracket : (HRS-TK004) (The anchor bolts are not attach)	2pc	
6	For G thread adapter set : - HRSH090-AF- * - * : (HRS-EP019) HRSH090-WF- * - * : (HRS-EP023)	1 set	
	For NPT thread adapter set : - HRSH090-AN- * - * : (HRS-EP018) HRSH090-WF- * - * : (HRS-EP022)	1 set	
	For G thread adapter set : - HRSH090-AF- * - J : (HRS-EP021) HRSH090-WF- * - J : (HRS-EP025)	1 set	
	For NPT thread adapter set : HRSH090-AN- * - J : (HRS-EP020) HRSH090-WN- * - J : (HRS-EP024)	1 set	

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

4.2 Outline Dimensions



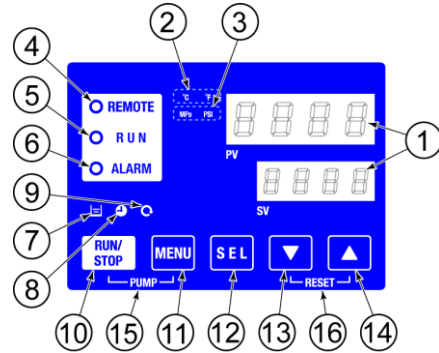
4 Name of Parts and Accessories (continue)

4.3 Function of parts

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

Name	Function
Operation display panel	Runs and stops the product and performs settings such as the circulating fluid temperature.
Power supply cable	Power supply of voltage specifications; connect the plug to the breaker of the user's equipment.
Model Label	Shows the part number of the product.
Circulating fluid outlet port	The circulating fluid flows out from the outlet port.
Circulating fluid return port	The circulating fluid returns to the return port.
Drain port	This drain port to drain the circulating fluid out of the tank.

4.4 Operation display panel



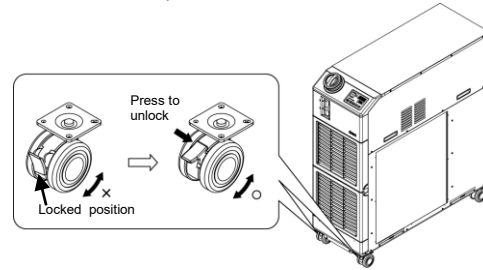
No	Description	Function	
1	Digital display (7-segment, 4 digits)	PV	Displays the temperature and pressure of the circulating fluid and alarm codes.
		SV	Displays the discharge temperature of the circulating fluid and the set values of other menus.

No	Description	Function
2	[°C] [°F] lamp	Equipped with a unit conversion function. Displays the unit of display temperature (default setting °C).
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 used in this manual. For details, read the Operation Manual attached.

5 Transportation, Transfer and Moving

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



6 Installation

6.1 Installation

Warning

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

6.2 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.
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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).
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Warning related to other General Dangers

	This symbol stands for general danger.
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6.3 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.

6 Installation (continue)

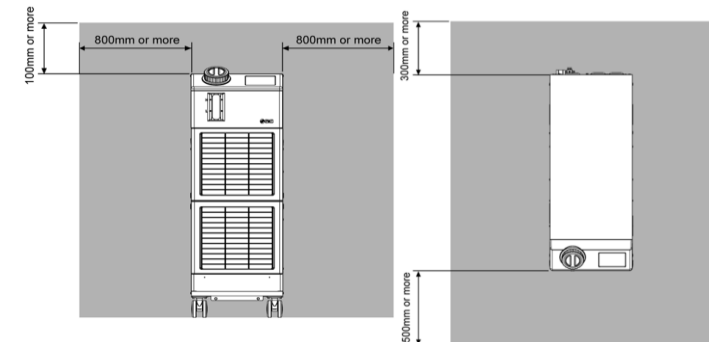
6.4 Mounting

Warning

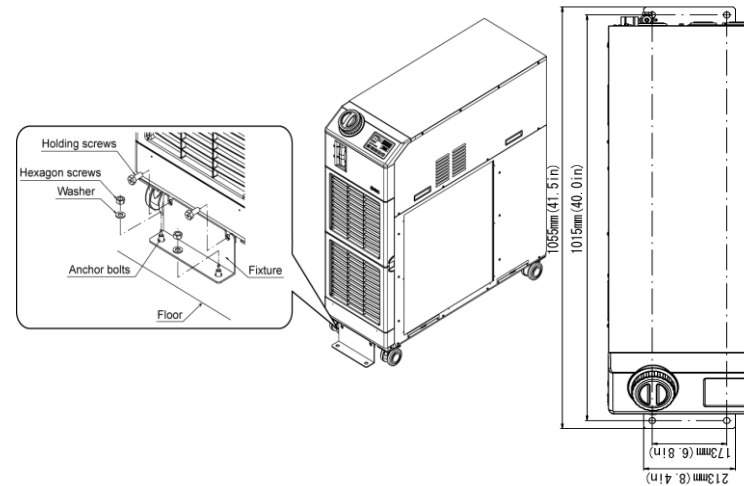
- The Installer / End User is responsible for carrying out a noise risk assessment on the equipment after installation and taking appropriate measures as required.

- 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 anchor bracket (The anchor bolts are not attached).

6.4.1 Installation Space



6.4.2 Anchor brackets



6.5 Piping

Caution

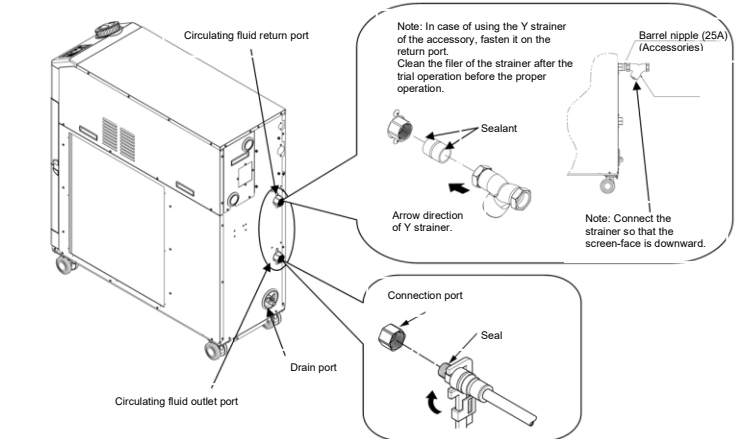
- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Name	Port size*1	Recommended tightening torque	Recommended piping specification
Circulating fluid supply	Rc1	36 to 38 N·m	1.0MPa and more.
Circulating fluid return	Rc1		
Drain port	Rc1/4	8 to 12 N·m	-
Overflow port*2	Rc3/4	28 to 30 N·m	Inside diameter 19mm and more of piping.

6 Installation (continue)

Name	Port size*1	Recommended tightening torque	Recommended piping specification
Facility water inlet *1	Rc1/2	28 to 30N·m	1.0MPa and more. (Supply puressure : 0.3 to 0.5MPa)
Facility water outlet *1	Rc1/2		
Automatic water-fill port *2	Rc3/8	22 to 24N·m	1.0MPa and more. (Automatic water-fill pressure 0.2 to 0.5MPa)

*1: Water cooled type only, *2: For Option J [Automatic fluid filling]

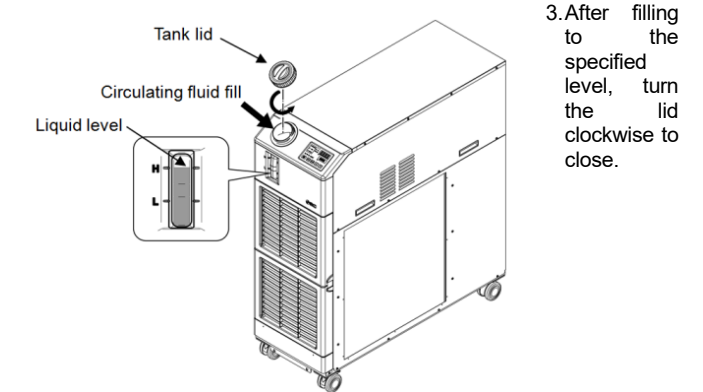


6.6 Filling of Circulating Fluid

Caution

- When the temperature of the circulating fluid is set to 10°C, use a 15% aqueous solution of Ethylene Glycol. Tap water may freeze in the Thermo-chiller, leading to malfunction.
- If using Ethylene Glycol, refer to the suppliers Material Safety Data Sheet (MSDS) and wear Personal Protective Equipment (PPE) as appropriate.
- Supply the circulating fluid up to the "H" mark on the tank. Operation will stop when the fluid level falls lower than "L".

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.



6.7 Wiring of the power supply

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 earth leakage breaker.
- Be sure to provide grounding. Incomplete grounding can cause failure and electrical shock.

6 Installation (continue)

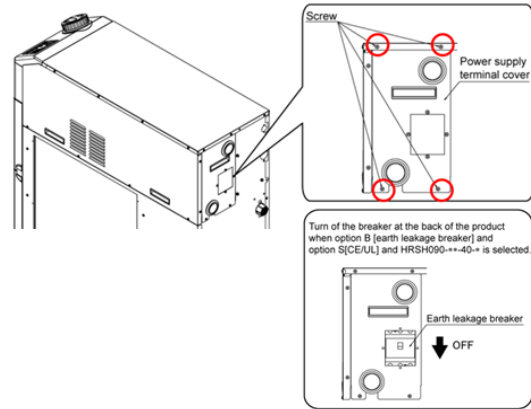
6.7.1 Preliminary preparation for wiring:

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	Recommended crimp terminal	Cable qty. x size*2	Earth leakage breaker	
					Rated current [A]	Sensitivity of leak current [mA]
HRSH090-A*-20-* HRSH090-W*-20-*	AC200/ 200-230V 50/60Hz 3phase	M5	R5.5-5	4 cores x AWG10 (4 cores x 5.5mm ²) *including ground	30	30
HRSH090-A*-40-* HRSH090-W*-40-*	AC380- 415V 50/60Hz 3phase		R5.5-5 (Power supply) R14-5 (Grounding cable)	3 x 5.5 mm ² (3 x AWG10) (Power supply) 1 x 14 mm ² (1 x AWG6) (Grounding cable)	20	

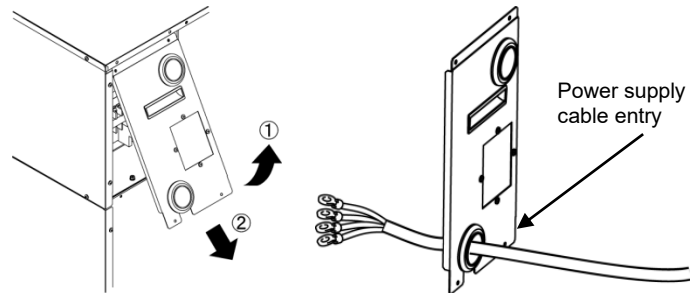
6.7.2 Wiring of Power Supply

- 1) Remove 4 screws to remove the power supply terminal cover on the back of the product.

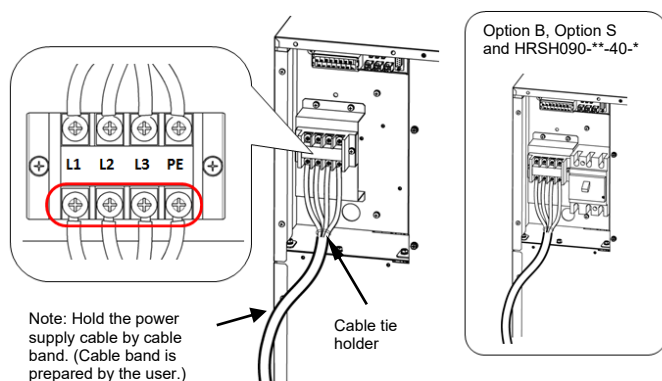


- 2) Hold the pull of the power supply terminal cover. Pull the bottom of the cover forward and remove it moving the cover downwards.

- 3) Insert the power supply cable and ground cable to the power supply cable entry of the power supply terminal cover (grommet with film).



- 4) Connect the power supply and the ground cable as shown in the figure below

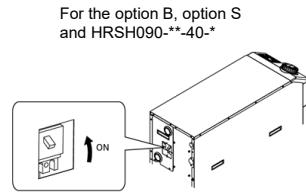


7 Start, Stop and Temperature Settings

7.1 Preliminary Preparation for Start-up

7.1.1 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.

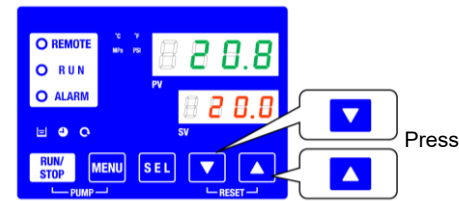


7.1.2 Air Release

- 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.
- 1) 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.
 - 2) In that case, check that there is no leakage from the user's piping, fill the circulating fluid and take necessary actions in "8. Reset Alarms".
 - 3) Repeat steps 1) to 3) until the alarm ("AL01; Low tank level") is no longer generated.

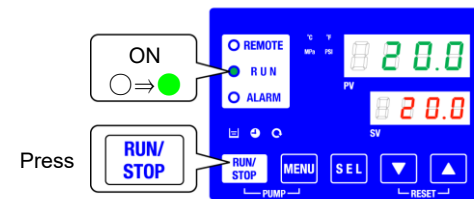
7.1.3 Temperature Setting

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



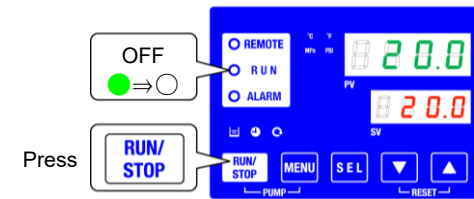
7.2 Start of the Product

- 1) Press the [RUN/STOP] key.
→The [RUN] lamp lights up (in green) and the product starts running. The circulating fluid discharge temp (PV) is controlled to the set temp (SV).



7.3 Stop of the Product

- 1) Press the [RUN/STOP] key.
→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.



8 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.

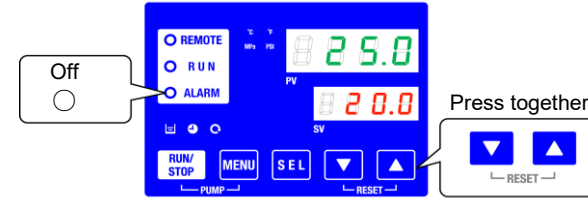


8 Reset Alarms (continue)

- Before resetting the alarm, read the "Causes and Remedies" of "Troubleshooting" and eliminate the cause explained there. Otherwise, the same alarm may be repeated.

Reset of alarm

- 1) Press the [RESET] key ([▼] and [▲] keys simultaneously).
→The buzzer and then [ALARM] lamp (red) go off.



9 Troubleshooting

9.1 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	A.RUN	The fluid level of the level indicator has fallen. Fill the circulating fluid.
AL02	High circulating fluid discharge temp.	A.STP	Check that the ambient temperature, facility water specifications and heat load are within the specified ranges.
AL03	Circulating fluid discharge temp. rise	A.RUN	Wait until the circulating fluid temperature lowers.
AL04	Circulating fluid discharge temp. drop	A.RUN	Check that the filled circulating fluid temperature is within the specified range.

Code	Description	Operation	Cause/Remedy (Press the reset key after eliminating the cause.)
AL05	High circulating fluid return temp.	A.STP	Check that the circulating fluid flows. Check that the heat load is within the specified range.
AL06	High circulating fluid discharge pressure	A.STP	Check that there is no bend, collapse and clog on/in the external piping.
AL07	Abnormal pump operation	A.STP	The pump does not operate. Check that the pump thermal operation switch is operated.
AL08	Circulating fluid discharge pressure rise	A.RUN	Check that there is no bend, collapse and clog on/in the external piping. In case of displaying EEEE on the PI display of the main display and check monitor menu, the pressure sensor of the circulating fluid circuit has a malfunction. Ask the service.
AL09	Circulating fluid discharge pressure drop	A.RUN	Restart and check if the pump runs. In case of displaying EEEE on the PI display of the main display and check monitor menu, the pressure sensor of the circulating fluid circuit has a malfunction. Ask the service.
AL10	High compressor suction temp.	P.RUN	Check the returned circulating fluid temperature. Check that the heat load is within the specified range.
AL11	Low compressor suction temp.	P.RUN	Check that the circulating fluid flows. Use 15% ethylene glycol aqueous solution with the set temperature lower than 10 deg. C.
AL12	Low super heat temperature	P.RUN	
AL13	High compressor discharge pressure	P.RUN	Check that the ambient temperature, facility water specifications and heat load are within the specified ranges.
AL15	Refrigerant circuit pressure (high pressure side) drop	P.RUN	Malfunction of the refrigeration circuit occurred. Ask for the service.
AL16	Refrigerant circuit pressure (low pressure side) rise	P.RUN	Check that the ambient temperature, facility water specifications and heat load are within the specified ranges.
AL17	Refrigerant circuit pressure (low pressure side) drop	P.RUN	Check that the circulating fluid flows higher than the minimum operating flow rate. It is possible that refrigerant is leaking. Ask for the service.
AL18	Compressor running failure	P.RUN	Restart and check if the compressor runs after leaving for 10 minutes.
AL19	Communication error	OFF	No request message is sent from the host computer. Send it again.
AL20	Memory error	A.STP	Malfunction of the controller occurred. Ask for the service.

9 Troubleshooting (continue)

Code	Description	Operation	Cause/Remedy (Press the reset key after eliminating the cause.)
AL21	DC line fuse cut	A.STP	Fuse for the power supply output of the contact input/output connector has blown. Ask for the service. Check that there is no incorrect wiring and the current load is within the specified range.
AL22	Circulating fluid discharge temp. sensor failure	A.STP	
AL23	Circulating fluid return temp. sensor failure	A.STP	Malfunction of the temperature sensor occurred. Ask for the service.
AL24	Compressor suction temp. sensor failure	P.RUN	
AL25	Circulating fluid discharge pressure sensor failure	A.STP	Malfunction of the pressure sensor for the circulating fluid circuit occurred. EEEE is displayed on the PI display of the main display and check monitor display. Ask for the service.
AL26	Compressor discharge pressure sensor failure	P.RUN	Malfunction of the pressure sensor for the refrigeration circuit occurred. Ask for the service.
AL27	Compressor suction pressure sensor failure	P.RUN	
AL28	Pump maintenance	OFF	Notices of the periodical maintenances. Ask for the services of the pump, fan and/or compressor. Every 8,000h ^{*5}
AL29 ^{*2}	Fan maintenance	OFF	Every 30,000h
AL30	Compressor maintenance	OFF	Every 30,000h
AL31	Contact input 1 signal detection	A.STP	Contact input is detected.
AL32	Contact input 2 signal detection	A.STP	
AL37	Compressor discharge temp. sensor failure	P.RUN	Malfunction of the temperature sensor occurred. Ask for the service.
AL38	Compressor discharge temp. rise	P.RUN	Check that the ambient temperature, facility water specifications and heat load are within the specified ranges.
AL39	Internal unit fan stoppage	A.RUN	Malfunction of the internal unit fan occurred. Ask for the service.

Code	Description	Operation	Cause/Remedy (Press the reset key after eliminating the cause.)
AL40	Dust-proof filter maintenance	OFF	Notice of periodical maintenance. Ask for the service of the dust-proof filter. Every 500h ^{*3}
AL41	Power stoppage	A.STP	The power was shut off during running. Restart after checking the power supply.
AL42	Compressor waiting	A.RUN	The system is waiting for the compressor to be ready to run. Wait for a while. Will be automatically released after running.
AL43 ^{*2}	Fan breaker trip	P.RUN	Release the fan breaker trip refer to Operation Manual [6.3.2 How to release the fan breaker trip].
AL44 ^{*2}	Fan inverter error	P.RUN	
AL45 ^{*1}	Compressor breaker trip	P.RUN	Check that there is no power failure such as ground fault, short circuit, voltage fluctuation, abnormal interphase voltage, open phase, surge
AL46	Compressor inverter error	P.RUN	
AL47 ^{*1}	Pump breaker trip	A.STP	Keep the [▼] and [▲] keys of the operation display panel pressed down simultaneously for 10 seconds to reset. After resetting AL48, WAIT (WAIT) will be displayed and the product cannot run for 40 seconds. Restart 40 seconds later after resetting.
AL48	Pump inverter error	A.STP	
AL47 ^{*4}	Internal unit fan stoppage	A.RUN	Internal unit fan failure. Ask for service for the internal unit fan.

*1: This alarm does not occur on the product of power specification '-20'. (Except option S.)

*2: This alarm does not occur on the product of water cooled type.

*3: Change the setting within the range of 1 to 9999.

*4: This alarm does not occur on the product of air cooled type.

*5: Notice on mechanical seal replacement. Mechanical seal replacement is limited to 2 times. If the cumulative operation time of the pump exceeds 20,000 hours, please consider requesting pump inspection service.

9 Troubleshooting (continue)

9.2 Other Errors

The causes and remedies for failures that are not indicated by alarm numbers are shown in below table.

Content of Failure	Cause	Remedy
The operation panel displays nothing	The breaker of the customer's power supply or/and the optional breaker is/are not turned on.	Turn on the breaker.
	Failure of the breaker of the customer's power supply or/and optional power supply.	Replace the breaker.
	Breaker trip of the customer's power supply or/and the optional breaker due to short-circuit and 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 set.	Check communication setting.
	Failure of the [RUN] LED	Replace the controller.
	Failure of the [RUN/STOP] switch	Replace the controller.

10 Maintenance

10.1 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 product 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.

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

10.2 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.

10.3 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 be between the scales of "H" and "L".

10 Maintenance (continue)

Item	Description of checking	
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.
Ventilating condition (Air-cooled type)	Check the condition of the ventilation grill.	Make sure the ventilation grill is not obstructed.
Facility water (Water-cooled type)	Facility water condition	Temperature, flow rate and pressure are within the specified range.

10.4 Monthly Check

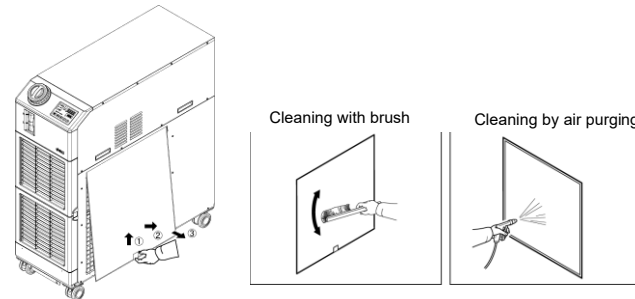
Cleaning of air vent (For Air-cooled type)

Caution

- If the air ventilation of the product have clogged with dust or debris, heat radiation performance reduces. This results in the reduction of cooling performance, and may stop the operation.
- Shut off the power supply of the product when performing cleaning, maintenance or inspection. Otherwise, it might cause electric shock, injury or burn, etc.

10.4.1 Removal and Cleaning of the Dustproof Filter

- Dustproof filter is installed on the right side of the chiller.
- Hold the pull at the bottom of the dustproof filter and lift the filter. Pull the filter forward, and lift it, then pull it downward. Care should be taken not to deform or scratch the air cooled condenser (fin) while the removal.
- Use a long bristle brush or air gun to clean the condenser.
- Mount the dustproof filter in reverse order of removal.



10.5 Inspection Every 3 Months

10.5.1 Replacement of Circulating Fluid

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

10.5.2 Replacement of Facility Water (For water cooled type)

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

10.6 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.
 - 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.

10.7 Discharge of the Circulating Fluid and Facility Water

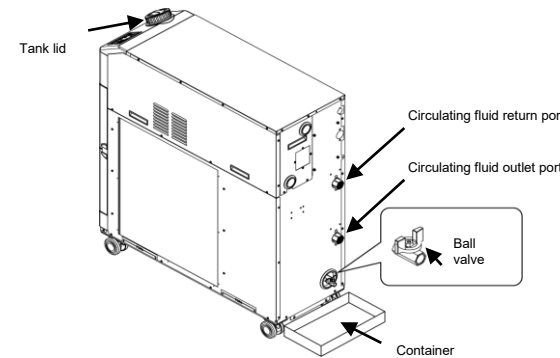
Warning

- Shut off the the breaker of the customer's power supply.
- 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.

10 Maintenance (continue)

10.7.1 Drain of the Circulating Fluid

- Place a container underneath the drain outlet.
- Remove the tank lid.
- Open the ball valve at the drain port and drain the fluid.
- Confirm that all the circulating fluid has been drained from the product and piping, and apply air purge from the circulating fluid return port.
- After the circulating fluid has drained from the tank, close the ball valve at the drain port and put the tank lid back on.



10.7.2 Drain of the Facility Water Fluid

- Remove facility water piping from the product.
- Open the left side panel then, open the air vent valve. The facility water in the product will be drained from the facility water inlet port.
- After draining, shut the air vent valve and close left side panel.

10.8 Consumable Parts

Qty.	Description	Part No.	Remark
1	Dust-proof filter	HRS-S0306	1pc is used per unit
1	Mechanical seal set	HRS-S0307	1 set is used per unit
1	Mechanical seal set	HRS-S0350	1 set is used per unit (Option M)

11 Declaration of Conformity

11.1 Below is a sample Declaration of Conformity (DoC) used for this product. An actual DoC will be supplied with each product.



12 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

- The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

12 Limitations of Use (continue)

- Limited warranty and Disclaimer**
 - The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first ⁽¹⁾. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
 - For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
 - Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

⁽¹⁾ Vacuum pads are excluded from this 1 year warranty. A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

- The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
- The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

- SMC products are not intended for use as instruments for legal metrology.** Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

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