



# Re-Circulating Chiller

## LMRCC-A102

### Index

| <b>Sr.no</b> | <b>Title</b>    | <b>Page no</b> |
|--------------|-----------------|----------------|
| <b>1.</b>    | Safety Measures | 2              |
| <b>2.</b>    | Introduction    | 4              |
| <b>3.</b>    | Features        | 4              |
| <b>4.</b>    | Specifications  | 5              |
| <b>5.</b>    | Applications    | 5              |
| <b>6.</b>    | Installation    | 6              |
| <b>7.</b>    | Operations      | 10             |
| <b>8.</b>    | Troubleshooting | 13             |
| <b>9.</b>    | Accessories     | 14             |

## 1. Safety Measures

### 1.1 Security Description and Marking

|                       |                                                             |
|-----------------------|-------------------------------------------------------------|
| Danger                | Immediately cause personal injury (serious injury or death) |
| Warning               | May cause personal injury (serious injury or death)         |
| Be careful            | May cause personal injury                                   |
| Important information | Tips or useful information                                  |
| Requirement           | For the safety of the instrument, follow the instructions   |

### 1.2 Use Safety Instructions

- ① Keep the instrument used in a perfect working condition.
- ② Only operate and maintenance by skilled operators.
- ③ Do not remove any safety device.
- ④ If you do not use by the instructions or improper use, resulting in losses, the manufacturer will not be responsible.
- ⑤ The equipment can only be used for devices requiring low temperature cooling or constant temperature.

### 1.3 Responsibility of the person in charge

Keep the instruction manual in a fixed position for easy access. Only specialized trained personnel can operate the instrument. Make sure the operator has read the operating instructions. Need to wear personal protective equipment.

### 1.4 Operator requirements

Operators read the operating instructions to ensure proficiency in the operation of the equipment. The minimum age of the operator cannot be less than 18 years old.

### 1.5 Operational responsibility of instruments

Make sure that the operator has read the operating instructions, paying particular attention to the safety instructions. When operating the instrument, wear personal protective equipment such as goggles, safety gloves, etc. Within the work area, the operator assumes the responsibility of a third party.

### 1.6 Work area

The so-called working area refers to the front of the instrument panel area. The work area must be decided by the operator who will connect the peripheral equipment. It is the user's responsibility to ensure a clean, safe work area during temperature control. Work area decisions should take full account of the risks and conditions of use. Must be placed in a non-explosion zone.

## 1.7 Safety device standard

This instrument is used at level III.

| Graded level of laboratory thermostatic equipment                                                                                                                                                                                                                         | Heat conduction oil | Technical requirement                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------|
| I                                                                                                                                                                                                                                                                         | Non-flammable (1)   | Over temperature cut protection (3)                                                              |
| II<br>III                                                                                                                                                                                                                                                                 | Flammable (2)       | After adjusting the temperature, cut off the adjustment temperature, and add a low level switch. |
| 1) Usually water.<br>2) Burning point $\geq 65^{\circ}\text{C}$ , which means that ethanol can be used under strict supervision.<br>3) The over-temperature protection device can consist of a thermal oil sensor and a corresponding over-temperature protection switch. |                     |                                                                                                  |

**Over temperature electronic protection:** As a device for providing low-temperature cold source, this instrument has no built-in heating device inside, and is controlled by intelligent controller during low-temperature operation. When the temperature is too low, the compressor will stop working automatically. Changing the overheating device eliminates the need for mechanical tools. The over temperature switch can be adjusted through the inside of the control panel.

## 1.8 External safety device

- ① Alarm function
- ② Instrument Description Information
- ③ Hazardous emergency procedures
- ④ Unplug the power
- ⑤ Evacuate the area to avoid injury or loss of life

## 2. Introduction

**Re-Circulating Chiller LMRCC-A102** has temperature range of -25°C to 30°C. It has digital display and user-friendly controls. Equipped with high-performance compressor and efficient cooling system. Integrated with 15L tank capacity for continuous operation.

## 3. Features

- High-efficiency heat exchanger
- 45 segments per program
- 7-inch touch screen
- Multiple interface options
- USB data storage
- Self-diagnostic function

## 4. Specifications

|                                        |                                                                                                                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Model No.</b>                       | <b>LMRCC-A102</b>                                                                                                                                                                     |
| <b>Volume</b>                          | 15L                                                                                                                                                                                   |
| <b>Temperature Range</b>               | -25°C to 30°C                                                                                                                                                                         |
| <b>Temperature Control Accuracy</b>    | ±0.5°C                                                                                                                                                                                |
| <b>Temperature Control And Display</b> | ASET multi-function control, LED                                                                                                                                                      |
| <b>Pump Type</b>                       | Ultra-high temperature shielded pump                                                                                                                                                  |
| <b>Flow Rate</b>                       | 20L/min                                                                                                                                                                               |
| <b>Pressure</b>                        | 1.2 bar                                                                                                                                                                               |
| <b>Compressor Cooling</b>              | Water-cooling                                                                                                                                                                         |
| <b>Circulation Type</b>                | Closed circulation                                                                                                                                                                    |
| <b>Temperature Controller</b>          | PID 100 adaptive controller                                                                                                                                                           |
| <b>Safety Protection</b>               | Temperature probe abnormal alarm, multi-point temperature monitoring, overheating alarm, leakage protector, high-temperature system flat pressure protection, liquid level indication |
| <b>Power Consumption</b>               | 2.4KW                                                                                                                                                                                 |
| <b>Power Supply</b>                    | 1PH AC 110V/220V/50 to 60Hz                                                                                                                                                           |
| <b>Dimension</b>                       | 430×650×875 mm                                                                                                                                                                        |
| <b>Packaging Dimension</b>             | 530×760×1060 mm                                                                                                                                                                       |
| <b>Net Weight</b>                      | 110 Kg                                                                                                                                                                                |
| <b>Gross Weight</b>                    | 130 Kg                                                                                                                                                                                |

## 5. Applications

Re-Circulating Chiller LMRCC-A102 is ideal for laboratories, industrial cooling, and chemical process temperature control. It ensures stable cooling for research, manufacturing, and medical settings.

## 6. Installation

### 6.1 Power Connection

**Warning:** Make sure the power supply voltage meets the requirements on the instrument nameplate before connecting! We do not accept any liability for damage caused by incorrect supply voltage connections!

**Safety instructions:**

**DANGER:** Connect the instrument to the protective ground wire!

**Warning:** Do not move while the instrument is running!

**DANGER:** Do not use the instrument when the main power cord is damaged!

The phase sequence and phase failure protector are installed inside the three-phase electrical equipment.

If there is no power supply on the controller after power-on, replace any two live wires until the indicator light on the phase and phase protector is green. (If the indicator light flashes or does not light, it proves that the phase continuation error, break-phase, or phase continuation and fault of break-phase protector phase failure)

### 6.2 Starting up Preparation

The type of equipment must keep the body vertically upwards when moving. A stable, fixed device is provided to ensure that the refrigeration equipment does not tilt. Ensure that there is enough fresh air at the ventilated surface and allow the discharged hot air to spread evenly.

Check the tightness of the connection between the instrument and the peripheral. See the technical parameter table for details. Make sure that the distance between the surrounding walls and the rear panel of the instrument is above 70 cm.

**Water-cooled Instruction:** Water cooling control in the cooling circulator is to reduce the consumption of cold water. Only when the refrigeration compression is started, there will be more cold water. If the instrument stops controlling temperature, the cold water will stop flowing into the circulation. The instrument uses a pressure sensitive valve to control the flow of water.

**Warning:** The cold water supply requires a certain water pressure and needs to be between 1.5 ~ 4 bar. To avoid leakage of water, it is necessary to check the water pipes and connections regularly and take corrective measures (such as replacing the water pipes). Turn off the supply of cold water after turning off the instrument. For your safety, reinforce the water pipes.

**Preparation of water cooling device (Only for compressor water cooling)**

Find the water-cooled input interface from the icon in the appendix, connect the water pipe, and open the control valve. Find the maximum and minimum values of the allowable water pressure in the data sheet.

### 6.3 Application of connecting external supporting equipment

Reactor, rotary evaporator, plate heat exchanger, shell and tube heat exchanger, etc. to ensure that the material and performance of the pipeline match the range of heat transfer oil and temperature. To ensure the correct operation of the machine, it must be ensured that no air bubbles remain in the system, ensuring that the heat transfer medium outlet is connected to the lower interface of the heat exchange device, and the heat transfer medium inlet of the device is connected to the upper interface of the heat exchange device.

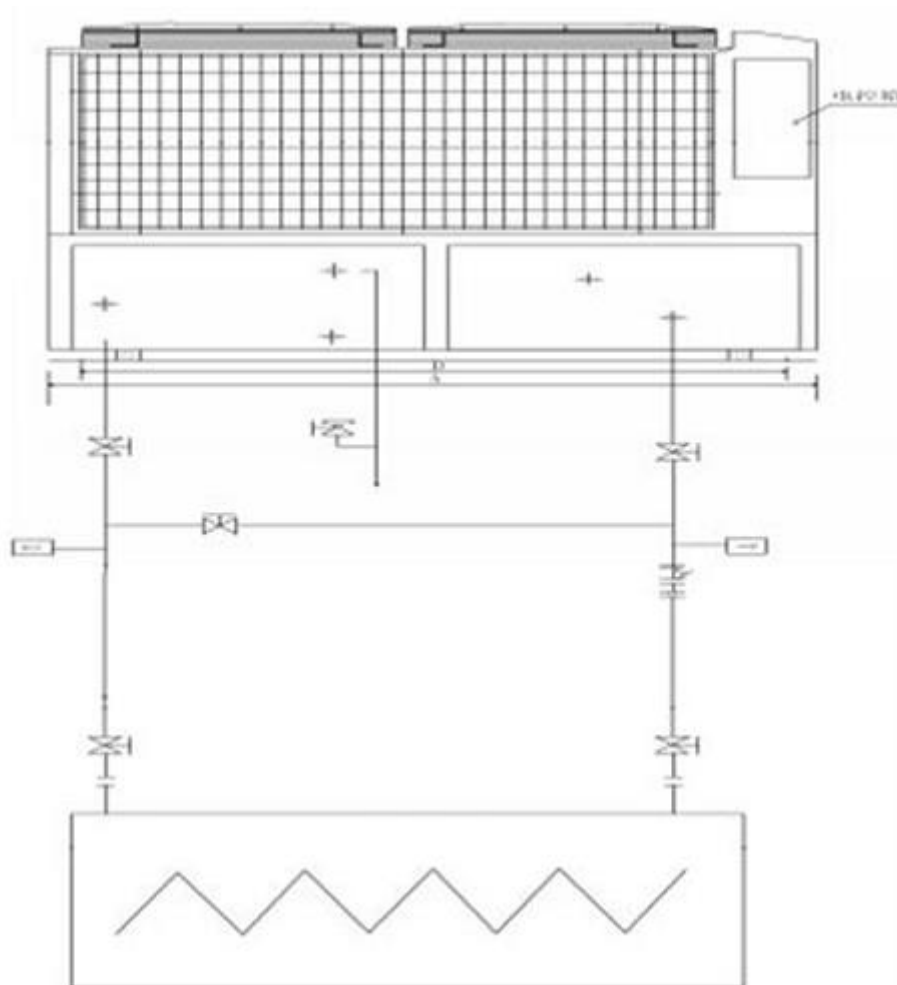


Figure-1

### 6.4 Fill the heat transfer medium

**Special Note:** When filling the heat transfer medium, be sure to prevent the heat transfer medium from overflowing to the upper cover; overflowing the liquid to the upper cover may cause the heat transfer medium to leak to the electrical parts of the equipment, which may cause the equipment to short-circuit, electrical fault, control system failure, If the heat transfer medium is flammable and explosive, may cause burning, explosion.

Fill the heat transfer medium from the filling port and turn the power on. Press the "Pump" button on the control panel to start filling, the system full filled with thermal media, run a few minutes to ensure that the air in the system is excluded (a large number of air may cause pump cavitation), set the required temperature, Press the "heating and cooling" button, can be normal operation. (Heat transfer medium is not allowed to use water)

### **Heat transfer medium or cooling medium filling**

- 1) Equipment before heat transfer medium or cooling medium filling, the heat transfer liquid inlet of the cooling circulator and (such as a reaction kettle, a rotary evaporator, a plate heat exchanger, a shell and tube heat exchanger, etc.) upper heat transfer liquid outlet are connected by stainless steel bellows; The heat transfer oil outlet of the cooling circulator is connected with (such as a reaction kettle, a rotary evaporator, a plate heat exchanger, a shell and tube heat exchanger, etc.) lower heat transfer oil inlet by stainless steel bellows.
- 2) Heat transfer medium or cooling medium fill into the liquid inlet, turn on the power, press the pump button (then the system will automatically exclude air), 30 seconds interval, turn off the pump button(The heat transfer medium or cooling medium is continuously added during the process until the heat transfer medium or cooling medium is heard in the system to return to the filling tank).
- 3) After the entire circulatory system is filled with heat transfer medium or cooling medium (including the reactor jacket, rotary evaporator, plate heat exchanger, shell and tube heat exchanger, etc.), set the required temperature and turn on the cooling button.
- 4) After that, just turn on the cooling button, pump button set the temperature. (Note: When the equipment is running, the circulating pump must be turned on firstly.)

### **6.5 Environmental Conditions**

- 1) Whether the heating circulator is air-cooled or water-cooled, the temperature control device needs to be located in an operating environment with sufficient fresh air; the space is larger than 30cm.
- 2) When selecting a heat-conducting medium, pay attention to its upper and lower temperature limits, whether the ignition point, viscosity, freezing point, etc. meet the requirements, and whether it is suitable for the internal pipeline of the instrument.
- 3) Select the heat transfer medium tube, the length should be as short as possible, the diameter as large as possible, if the diameter is too small, it may cause the current limit.
- 4) Do not use water as a heat transfer medium. Inappropriate thermal media will have a negative impact on the instrumentation and may cause damage to the device. It is therefore only possible to use the heat-conducting medium specified and to use it within the specified pressure range.
- 5) The temperature can only be controlled below the boiling point of the heat transfer medium and the viscosity must not exceed 50 mm<sup>2</sup>/s when the heat transfer medium is operated at low temperatures. Fill the heat transfer medium at room temperature. Slowly and carefully pour in the filling. Also make sure that no thermal media is spilled. Protective equipment such as goggles, anti-corrosion chemical gloves, etc. must be worn during filling.

- 6) Equipment must be reset after filling equipment adjustment parameters, which is the correct operation and use of equipment requirements.
- 7) Do not knot the heat transfer medium pipe.
- 8) Regularly check the heat transfer medium tube to avoid material strain (such as: fission).
- 9) In order to avoid damage to the instrument's pipeline, when using high-mineral water, regularly use water treatment chemicals to clean the pipeline dirt. (water-cooled equipment).

### 6.6 Location

#### Warning

- ① When carrying the instrument to ensure that is vertical upward.
- ② The instrument needs to be located on a level surface and fixed.
- ③ Put on a fire-retardant surface.
- ④ Keep the environment around the instrument clean and avoid slipping.
- ⑤ If the instrument is located on, install the brake device for the small wheel.
- ⑥ Put some can absorb the thermal conductivity of the material below the instrument to prevent the thermal medium overflow or leakage.
- ⑦ Any heat transfer medium overflow must be cleaned up.
- ⑧ For large instruments, determine the carrying capacity of the ground.

### 6.7 Thermal Media

We recommend using the HTF we listed in the table. The name of the HTF comes from its ability to work and its viscosity at 25 °C.

The viscosity of HTF cannot be more than 50 mm<sup>2</sup>s at the lowest temperature.

The maximum density of HTF cannot be greater than 1kg/dm<sup>3</sup>s23.

**Note:** We recommend covering the outside of the instrument with inert gas. When using water-absorbent coolant, be sure to observe the flow.

## 7. Operations

### 7.1 Control Panel

- ① **"Set" button:** In the normal display state, click this button to enter the temperature setting state, long press this button to enter the internal parameter setting state.
- ② **"Pump" button:** Pump output key.
- ③ **"Cooling" button:** Refrigeration allowable on-off key.
- ④ **"Power" button:** Press this button to turn on or off the display and all outputs of the controller itself.

**Note:** When the controller is turned off by this button, the power of the device is not being cut off. Therefore, if the device is not used for a long time, it is strongly recommended to unplug the external power supply of the device.

- ⑤ **"▲" increase button:** Click this button in the setting state to increase the set value. Press and hold this button to increase the set value continuously.
- ⑥ **"▼" decrease button:** Click this button in the setting state to decrement the set value. Press and hold this button to decrease the set value continuously.
- ⑦ **"◀" Shift button:** Click this button in the setting state to make the set value shift and change. In the normal display state, press and hold this button for 5 seconds to enter the temperature auto-tuning selection state.

When the temperature control effect is not ideal, the user can perform system self-tuning. During the self-tuning process, the temperature will have a large overshoot. Fully consider this factor before the user performs the system self-tuning.

In the running and normal display state, long press the shift button for 5 seconds, the upper row displays the auto-tuning prompt "AT", the lower row displays "OFF", you can click the increase or decrease button to select the display ON or OFF.

When it's displayed on, click the "set" button, the auto-tuning prompt "AT NOW" flashes. After the auto-tuning is completed, the "AT NOW" prompt stops flashing, the controller will get a set of more system PID parameters, and the parameter values are automatically saved.

In the self-tuning process, repeat the above operation. When it displays "OFF", click the "set" button to terminate the self-tuning program.

### 7.2 Operation and usage of Control Panel

- ① When the equipment is powered on, the display and all outputs of the controller are off. Click the power button to enter the normal working state.
- ② **Temperature setting:** In the normal display state, click the set button to enter the temperature setting state. The display window the upper row displays the prompt SP, the lower row displays the temperature setting value, and after modifying to the desired setting value, then click the set button to exit this setting state, and the modified setting value is automatically saved.
- ③ **Internal parameter setting:** In the normal display state, long press the set button for 3 seconds, the display window the upper row displays the password prompt PA, the lower row displays the password value, after modifying the required password value, and then click the set button, if the password value is incorrect, the controller automatically returns to the normal display state.

If the password value is correct, it will enter the internal parameter setting state, and then click the set button to modify each parameter in turn (see the internal parameter table for details); then press and hold the set button for 3 seconds. User can exit this state and the parameter values are automatically saved.

### Pb Internal parameter table

| Parameter indication | Parameter name         | Parameter function description                                                                  | Factory value (Range) |
|----------------------|------------------------|-------------------------------------------------------------------------------------------------|-----------------------|
| PA                   | Password               | View and modify parameter values when "PA=3"                                                    | 0                     |
| Pb                   | Temperature correction | Correct error generated during temperature measurement.<br>Pb=Pb+ (actual temperature value-PV) | (-50.00~50.00°C) 0    |

**Note 1:** Pb is used to correct the error at normal temperature (preferably 0°C).

④**Abnormal temperature alarm:** If "---" is displayed on the upper display window, it indicates that the temperature sensor is faulty or the temperature exceeds the measurement range or the meter itself is faulty. The buzzer sounds continuously and the "ALM!" character lights up. Please check the temperature sensor and its wiring.

⑤When the upper limit is over temperature alarm, the buzzer will beep intermittently, the "ALM!" character is always on, and the over temperature alarm relay output is off. Note: If the over temperature alarm is generated due to changing the temperature setting value, the "ALM!" character is always on, but the buzzer does not sound.

⑥**Error alarm:** When the signals "SIN1" and "SIN2" are short-circuited, error codes "E-01" and "E-02" are displayed, respectively.

When the cumulative usage time is allowed, the error code "E-05" is displayed. If an error code is displayed, the controller automatically stops running, disconnects all outputs, and the buzzer sounds continuously. The error code display cannot be cleared. If the fault is removed, you must click the "Power" button to restart the operation.

⑦When the buzzer sounds, you can press any key to silence.

## 7.3 Temperature control

**Start temperature control:** After filling the heat transfer medium or cooling medium, it starts to control the temperature. Set the temperature, press the pump and cooling buttons (you must keep the pump working while the equipment is run, otherwise it will cause system failure). When the temperature reaches the set value, the refrigeration will be automatically turned off, the refrigeration compressor will be opened when the temperature rises.

**Finish temperature control:** The Cooling circulator can be stopped immediately by turning off the power at any time. If it takes a long time not to work, be sure to discharge the heat transfer medium.

### 7.4 Heat transfer medium exclusion

**Instructions:** Connect a suitable drain-pipe to the drain outlet and let it flow into a suitable vessel (make sure the pipe and vessel match the heat transfer media). Open the drain valve, heat transfer medium from the external application to the pump chamber, and then from the drain outlet to the vessel. After low-temperature operation, remove the heat transfer medium, and must do a good job of protection, to prevent low-temperature frostbite. Open the heat transfer medium outlet of the cooling circulator and carefully blow nitrogen into the heat transfer medium outlet (pressure below 3 Bar), more heat transfer medium in the system will be excluded.

**Special Note:** When filling the heat transfer medium, be sure to prevent the heat transfer medium from overflowing to the upper cover; overflowing the liquid to the upper cover may cause the heat transfer medium to leak to the electrical parts of the equipment, which may cause the equipment to short-circuit, electrical fault, control system failure; If the heat transfer medium is flammable and explosive, may cause burning, explosion.

### 7.5 Replace heat transfer medium / internal cleaning

**Warning:** Be careful not to use acetone as a cleaning solvent. Otherwise, it will undermine the instrument's sealing. After the discharge, depending on the heat transfer medium, there will still be a lot of heat transfer medium left in the pump chamber and the inner container.

Fill a suitable solvent, for example using a silicone oil cycle to clean the internal components, including the pump chamber, the internal container, the catheter, etc. Depending on the contamination, it may be necessary to repeat several times in this way. Then have the instrument open all the drain valves and connections.

Note that before using ultra-low temperature operation to control the temperature with a new heat transfer medium, be sure to remove the moisture in the system. Otherwise, the viscosity of the heat transfer medium will increase when the temperature is low, and the heat transfer capacity will be reduced.

## 8. Troubleshooting

| Malfunction                                  | Reason                                                     | Handling                                                                   |
|----------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------|
| Faults of the controller                     | Sensor open or shorted.                                    | Change.                                                                    |
|                                              | Controller failed.                                         | Change.                                                                    |
|                                              | Temperature alarm value appears.                           | Professional maintenance.                                                  |
| The whole machine unit is not working        | Error in phase sequence.                                   | Adjust the power phase sequence, replace the phase protection.             |
|                                              | Leakage.                                                   | Check the leakage parts.                                                   |
|                                              | Default Phase.                                             | Check the line.                                                            |
| Circulating pump does not work               | Control AC contactor does not pull.                        | Check whether there is a control signal output.                            |
|                                              | Failure of circulating pump.                               | Overhaul or replace.                                                       |
| Refrigeration unit does not work             | Controller no signal output.                               | Check controller.                                                          |
|                                              | Refrigeration AC contactor failure.                        | Change.                                                                    |
|                                              | Chiller failure.                                           | Careful inspection.                                                        |
| Refrigeration unit is working unrefrigerated | Refrigerant leak.                                          | Check the leak point, add new refrigerant.                                 |
|                                              | Refrigeration low temperature control valve, not open.     | Check refrigeration low temperature control valve.                         |
|                                              | Circulating pump does not work.                            | Check the cause of the circulation pump failure.                           |
|                                              | The cooling fan does not operate.                          | Whether the capacitor is faulty or not, fan failure, with fan replacement. |
|                                              | Insufficient cooling water pressure and insufficient flow. | Need to guarantee the amount of flow and pressure.                         |

If the upper line of the controller shows the following fault code, the controller turns off all outputs.

| Code name   | Fault code description                                                           |
|-------------|----------------------------------------------------------------------------------|
| <b>Sn-1</b> | The first temperature sensor or the controller itself fails.                     |
| <b>Sn-2</b> | The first temperature sensor or the controller itself fails.                     |
| <b>Sn-3</b> | 4-20mA current input exceeds the upper limit (this alarm only occurs when nod=1) |
| <b>LP-1</b> | Low level alarm 1 Alarm (alarm when closed)                                      |
| <b>LP-2</b> |                                                                                  |
| <b>HP-1</b> | High pressure alarm 1 Alarm (alarm when closed)                                  |
| <b>HP-2</b> | High pressure alarm 2 Alarm (alarm when closed)                                  |
| <b>Stop</b> | Pre-authorization time expires                                                   |

## 9. Accessories

### Standard Accessories

| Accessory               | Quantity | Unit  |
|-------------------------|----------|-------|
| Stainless steel chassis | 1        | Piece |
| Compressor              | 1        | Piece |
| Plate heat exchanger    | 1        | Piece |
| Pump                    | 1        | Piece |
| Power Cord              | 1        | Piece |

### Optional Accessories

| Model No.     | Accessory                      | Unit | Quantity |
|---------------|--------------------------------|------|----------|
| LMRCC-A102-H1 | Heat-conducting oil metal hose | Each | 1        |
| LMRCC-A102-S1 | Shell material                 | Each | 1        |



Labmate Scientific Inc

Email: [info@labmate.com](mailto:info@labmate.com) | Website: [www.labmate.com](http://www.labmate.com)