

# Operation Manual



BCLT-2201

# Low Temperature Circulator

Security tips

The matters contained here are extremely important and must be adhered to

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# 01 Safety warning

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**! Dangerous (may result in serious loss of property or casualties)**

1. The instrument must be grounded and away from sources of electromagnetic interference (must not be zero line or middle line for the ground).
2. Before use, please confirm the voltage and frequency of the power supply match the product requirements.
3. The product should use a separate power outlet, and confirm the plug, socket, good grounding.
4. Do not allow products in operation without turning off the power switch and unplug the power plug.
5. Do not allow free access or cut short product power line.
6. Do not repair without authorization, the company commissioned by the professionals must be repaired.

**! Warning (may cause property damage or personal injury)**

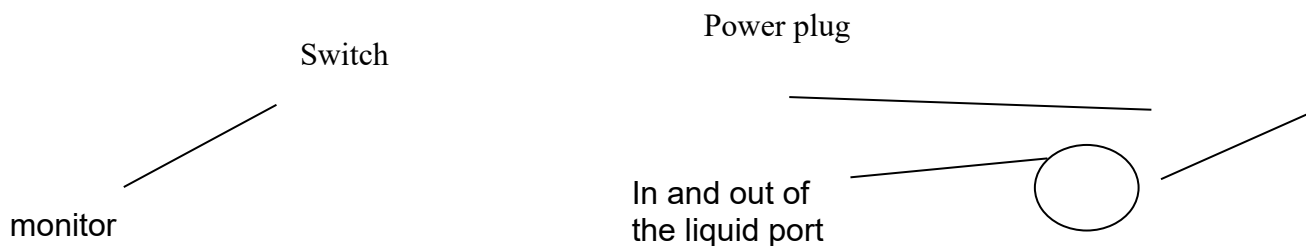
1. Must fully read and understand this product manual before operation.
2. When unplugging the power plug, do not drag the power cord directly.
3. One of the following conditions, you must unplug the product power plug:
  - 3.1 When replacing the fuse tube;
  - 3.2 Product failure to be checked repair;
  - 3.3 Long time to stop using the product;
  - 3.4 When moving the product.

**! Note (may affect the service life of the product cause it could not work normally)**

1. The product should be placed on a hard and firm surface to keep it level.
2. The product should be left some space around.
3. The product must be used under certain conditions of use. (See Chapter III 1.1 ~ 1.4)
4. The product must be used under the correct settings. (See Chapter III for details)

# 02 Product introduction

## 1. Outline



## 2. Structure Functional Overview

Circulation tank by the cycle controller, box and refrigeration system composed of three parts. Circulation controller is composed of the temperature controller, temperature sensors, and circulation pump. The box is made of high quality thin steel plate, the surface is sprayed and treated, the liner is made of stainless steel. Refrigeration system is composed of the compressor, condenser, evaporator and other components.

The device relies on the cooling system to rapidly cool down to the desired temperature and the magnetic stirrer system provides good temperature uniformity in the bath. Circulation pump is in addition to meet their own needs of constant temperature control, at the same time for the transfer of heated bath.

Behind the low temperature circulation sink there are inlet and outlet connections.

Temperature controller is a CPU processor and peripheral circuits consisting of double-row four-digit display digital controller, with Pt100 platinum resistance as a temperature sensing element, with high control accuracy, good stability advantages, meanwhile with timing, over-temperature alarm protection and other alarm functions.

## 03 Product use

### 1. Preparation before use

1.1 The product should work under the following conditions of use.

- Ambient temperature: 5 °C ~ 35 °C; air relative humidity: ≤ 85%
- Atmospheric pressure: (86 ~ 106) KPa
- Altitude not higher than 2000 meters
- Power: AC220V±10%/50HZ
- Keep away from heat source, no corrosive gas around, no strong vibration source and strong electromagnetic field.

1.2 The base that place the equipment should be flat and of non-combustible material.

1.3 Keep the equipment around (front and rear ventilation grid) at least 300mm of space, well-ventilated.

1.4 This equipment is equipped with a compressor. After the equipment is transported, do not operate it right away. After standing in the correct position, wait for (1 ~ 2) days to restart to ensure the normal operation of the compressor.

1.5 When pouring into the bath, please be careful not to pour the liquid into the instrument. It is recommended to open the insulation cover to add water or other medium from the sink port, the liquid must cover the evaporator.

1.6 Should be based on different temperature range, filling different bath (non-over-temperature use).

When the operating temperature is below 5 °C, please pay attention to the danger of icing!  
Bath recommended: ethanol or ethylene glycol.

### 2. Power on

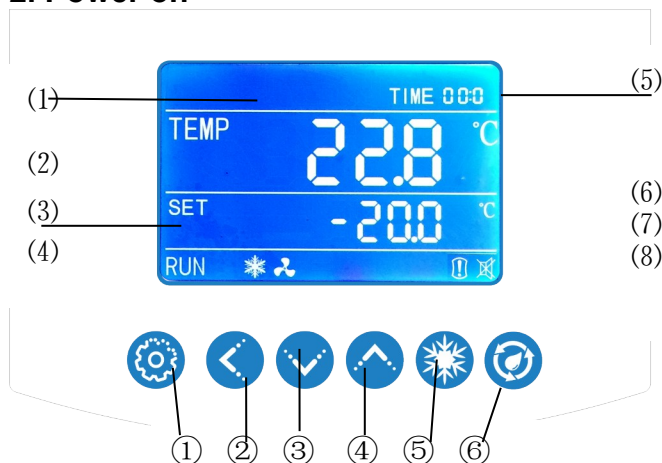








Figure 2: Controller panel

#### 2.1.1 Indicator light description



- TEMP: Display the measured temperature;
- SET: Display the setting temperature;
- RUN: When working bright, when downtime off;
- Cooling light: Light when the cooling output;
- TIME area: Display the running time or parameter value
- Silencer light: There is an alarm, light when the buzzer has silenced;
- Alarm light: Light when alarm;



8) Pump running light: Bright when pump running;


### 2.1.2 Key Description

- ①  Function key: Used for setting value modification; parameter recall and parameter modification confirmation;
- ②  Shift key: used to set value, shift of internal parameters and view of ambient temperature ;
- ③  Decrease key: In the setting state, click once to decrease 1 digit unit, long press the button, will jump to decrease more digits;
- ④  Add key: In the setting state, click once to increase 1 digit unit, long press the button, will jump to add more digits
- ⑤  Start/stop key: Press and hold this button for more than 4 seconds to control cooling operation / stop;
- ⑥  Circulation pump start / stop key: Click this button, circulation pump start / stop.

## 3. Operating steps

1) Timing function: Presskey  once, When the time is set as 0, there is no timing function; when the time setting is not 0, the controller has the timing function. Press key  once, the TIME value flashes, indicating that the time can be set as needed, by add, decrease and shift key, set the desired time value. Timing time to, Time window shows "END", buzzer sound, press any key to silence.

2) Temperature setting : Press  key again, "TEMP SET" window flashes, indicating that the temperature can be set as desired. Set the desired temperature by add, decrease and shift key. Then press key  again, return to standard display mode.

Note : ① Every time modify a parameter,, need to press" key to confirm the modification is valid.

②After all the parameters are set, long press" key for about 4 seconds to start running.

## 4. Upper deviation alarm setting

The setting of the upper deviation is reasonable, can play the role of system temperature control or out of control protection, the product must be used when working.

Example: If the product is shipped with AL = 3.0, the alarm temperature is: (set temperature + AL value) °C

## 5. Check the temperature control accuracy

5.1 With 0.1 °C index mercury thermometer (or resolution 0.1 °C digital thermometer) into the bath, the mercury end should be immersed in the bath and placed in the geometric center of the bath

5.2 Choose a point within the range of product control, when the temperature measurement value is equal to the set value, then keep the temperature for about 1 hour. Observe that the difference between the actual measured value of the mercury thermometer and the measured value of the thermometer should be  $\leq \pm 0.5$  °C.

### 6. Methods to improve temperature control accuracy

6.1 When the product is used for a period of time, check the temperature control accuracy according to 5.2 method. If it exceeds  $\pm 0.5$  °C, it can be amended as follows:

6.2 Enter the parameter setting, find “ $P_E$ ” symbol,

$$\text{按 } PK = 4000 \times \frac{(\text{Meter Measurement} - \text{Mercury Table Value})}{\text{Mercury Table Value}}$$

After the formula is calculated, the value of PK is changed on the basis of the original factory (Note: a correction is not allowed, can be repeatedly modified until it meets).

### 7. Using the Overtemperature Limit Controller

The independent temperature limit controller is an added protection system. When the temperature of the controller is out of control due to a damaged relay, the over temperature protector will automatically cut off the heating.

When the unit cools to the set value, the protection system is eliminated and the instrument resumes work.



## 04 Product use

1. The device must be connected to a good grounding outlet! To ensure personal safety;
2. When the bath is water, please pay attention to the use of temperature, prevent freezing, resulting in temperature control is inaccurate;
3. When replenishing the bath liquid, the type of bath liquid into the bath must be the same; (Note that the liquid medium in the working chamber must be filled with different bath liquid according to different operating temperature)
4. Use of flammable bath! Such as the use of improper bath caused damage, is responsible for the user!
5. Connect the rubber tube, connecting the clamp pressure to prevent fall off;
6. Continuous operation, part of the bath cover and circulation pump junction will become very cold, therefore, in the touch of these places, we must be careful to prevent frostbite;
7. Tank filled with liquid is strictly prohibited to transfer or tilt, so as not to be immersed in liquid immersion into the device causing danger or equipment damage;
8. Please use clean water or medium, strictly prevent sediment and other foreign matter into the cooling system damage circulation pump;
9. After use, turn off the power switch, unplug the power cord plug, drain into the drain plug (note the bath temperature, be careful to avoid frostbite) and dry the cabinet.

## 05 Attachment

### 1. Main Specifications

Product Name	Cooling / Heating recirculating chiller
Model	BCLT-2201
Storage tank maximum capacity (L)	5
Temperature range	- 20°C~80°C
Temperature accuracy	±0.5°C
Cooling capacity at 10 °C (W)	530
Refrigerant	R404A
Safety features	Delay, leakage, over-current, over-voltage
Total power (W)	1100
Power requirements	AC230V/50HZ

Pump power	30
Pump flow max. (L/min)	6
Maximum head (m)	9
Inlet/Outlet pipe diameter (mm)	φ10
Weight (Kg)	32
Liquid storage	3.5
Noise level	≤45
Dimensions W*D*H (mm) (include caster)	210*410*511

## 2. Each function parameter table

1) Long press the function key, when the LCD display LK, enter the password, click the function key to enter the setting:  
A Menu Sheet 2

Value	Name	Setting range	Description	Factor y Set value
KA	Power-on mode	2 0~	① When KA = 0, the controller is in the stopped state after power on, it must start and stop by long press start / stop key; ② when KA = 1, the controller automatically run after power; ③ When KA = 2, the controller starts running from the last power-off.	

KB	Appointment of boot selection	0-1	0: No reservation; 1: Appointment to boot, automatically return to 0 each time the power is turned on, and this parameter can only be modified to 1 in the stop state, then start booking function	
SE	Revision of RT	-100-100.0	When the actual RT differs from that shown by the controller, adjust the value accordingly.	
Pb	Zero point adjust (intersection)	-100.0 ~100.0	When the zero error comparatively smaller and the full point error comparatively larger, to update this value should be needed. Ordinary for pt100, updating this value is rarely	

			needed.	
Pk	Full point adjust(intercept)	-1000 ~1000	When the controller zero error is small, large full-scale error, you can adjust the value.	

2) Long press the function key, when the LCD display LK, enter the password, click the function key to enter the setting.

B Menu Sheet 3

Value	Name	Setting range	Description	Factory Set value
AL	Alarm Settings	0 ~ 50.0	When the measured temperature exceeds the "set temperature + AL" value, over-temperature alarm indicator bright, cut off heating output	
CL	Setting of cooling control	-5.0 ~ 60.0	When temperature exceeds CL and complies with time delay in cooling by the compressor, the cooling pilot lamp will light up and cooling junction will be switched on to start the compressor.	
Ct	Delay in cooling control	0~ 300 (s)	Delay time required for start of the compressor for the two consecutive times Ct=0 function of the compressor is cancelled.	
P	Proportional band	2.0 ~ 400.0	Proportional control action. If P is larger, then the gain of system is lower. It only use on the heating side.	
I	Integration time	2~ 3600 S	Integrated time constant. I larger, then the integrated action is smaller.	
d	Differential time	0~ 3600 S	Derivative time constant. D larger, then the derivative action is also larger, and can overcome overshoot.(D = 0 PI control)	
Ar	Overshoot suppression	0~ 100	Used to suppress overshoot (Ar is determined as: 1.5 ~ 2 times the steady-state output duty cycle)	
t	Control cycle	1 ~ 100S	For the thyristor output it is about 2-3seconds.For those equipment that the superfluous power provided is comparatively larger, select larger T would decrease the stable error caused by PID control.	



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