Operation Manual

BCLT-203

Low Temperature Circulator

Thank you for Choosing Biolab products. Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation.

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Warning: The instrument can not provide the designed protection for operators who do not follow the right procedures and requirements given by the manufacturer.

Warning: All solutions must be handled with care according to the lab's safety regulation. Please make a reference to the related material safety data sheet. Wear the lab-gown, goggle and rubber gloves all the time. Be care of hot reagents.

Warning: Be aware of the risk of electric shock. Only the trained professionals are permitted to open the face panel or back cover.

01 Applications

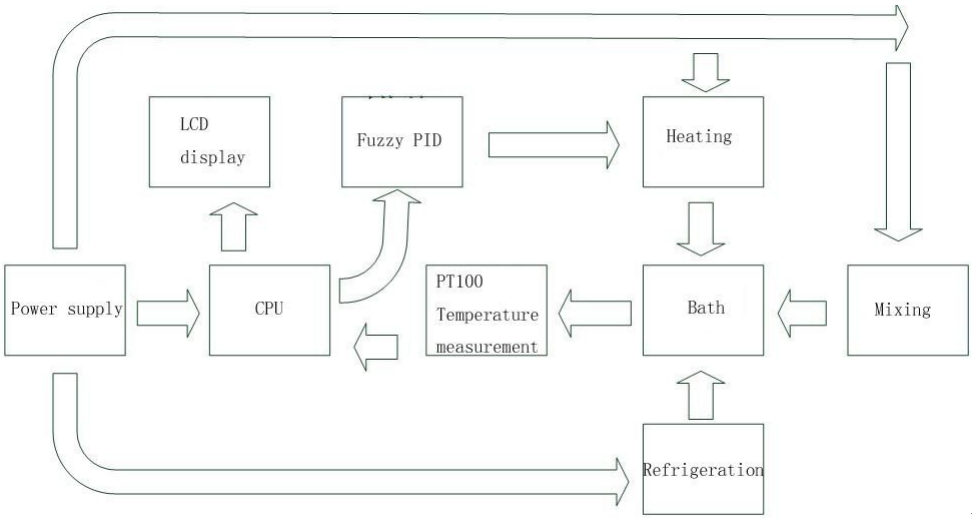
BCLT 200 series Low Temperature Circulator, thanks to its features such as highly precise and stable temperature control and fast heating and cooling, has been widely used in precise and thermostatic control equipment in sectors such as petroleum, physics, chemical industry, pharmacy, and environmental protection. You may set its working temperature depending on your needs. In addition, the circulator features various safety protection designs, reliable performance and durability.

02 Specifications

Model	BCLT-203
Control temperature range	-20～200℃
Temperature stability	±0.03℃
Temperature display resolution	0.1℃
Temperature control algorithm	Fuzzy
PID	
Type of temperature sensor:	PT100
Heating power	2000W
Refrigeration power	250W
Refrigerant	R134a
Water pump capacity	10L/min
Water pump pressure	0.35bar
Bath volume	6L
Instrument volume	400cm×240cm×650cm
Power supply	220 VAC ±10% 50Hz
Output interface	RS232/RS485 (optional)
Ambient temperature	-20℃-70℃
Instrument weight	40kg

03 Working Principle

1. Principle block diagram

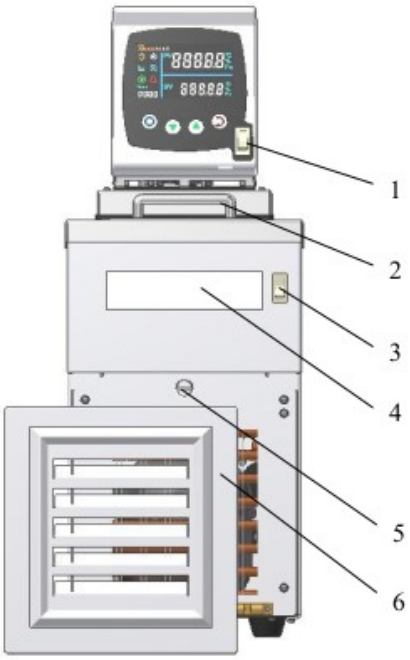


2. Principle

The circulator displays with a high-brightness LCD screen and measures temperature with a high-precision sensor. It feedbacks the measured temperature to CPU in a real-time manner, and then the fuzzy PID calculates a set of appropriate duty ratio to control heating equipment, while the mixing device is constantly circulating water in the bath so that water temperature in the bath becomes more even. All of these, along with the powerful refrigeration system, accelerate realization of the required thermostatic status. With the imported compressor and environment-friendly refrigerant R134a, the refrigeration system reduces temperature to -20℃. This closed loop system maintains the bath temperature by ±0.03℃ promptly and effectively.

04 Guidelines for use and operation

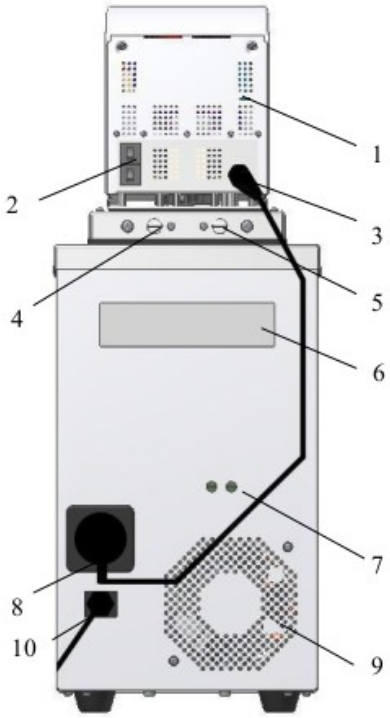
1. Component parts



Front view

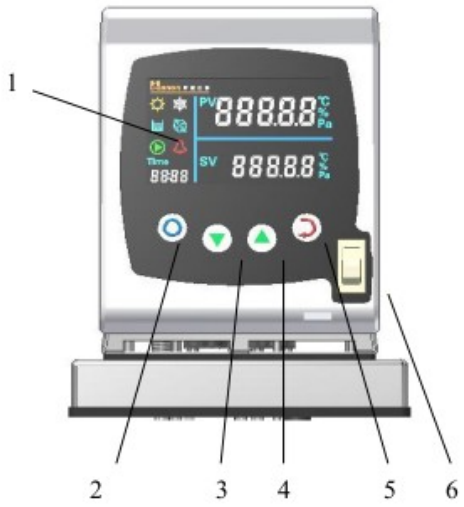
1. Heating circulation control 2. Bath cover 3. Refrigeration switch

4. Handle 5. Drain valve 6. Radiator grid



Rear view

1. Data output
2. Overcurrent breaker
3. Heating circulation control power supply
4. Water outlet
5. Water inlet
6. Handle
7. Fuse
8. Power outlet
9. Radiation window
10. Power outlet



1. Display area
2. Function button 3. Decrease button 4. Increase button 5. Return button
6. Power switch

2. Instructions for use

(1) Wire the power cord as in the rear view.

(2) When the external circulation is used for achieving constant temperature, use a water tube to connect the instrument and the equipment requiring constant temperature. Closing of internal circulation device of annular turbine is shown in Fig. x.

(3) Prior to power-on, detect that fluid level is not lower than the turbine, otherwise an alarm will give off. After the power cord is wired, turn on the power switch and the instrument displays in the full screen. Automatically detect if the LCD is normal, and after 3 seconds, automatically change over to the normal display mode. **PV:** current detection temperature: **SV:** set temperature. **Time:** time for startup and operation of the instrument.

(4) Refrigeration: refrigeration is controlled manually in order to achieve more stable thermostatic effects, and refrigeration must be turn on if the set temperature is
10℃ lower than the ambient temperature.

(5) Meaning of icons within the display screen:

: heating; : pump operating; : refrigerating; : overtemperature alarm;
: low water level; : operation

3. Brief introductions to control operation

(1) Press the function button  to display parameter SP, and press the button again to store the current value and display the next parameter. To return to the normal display interface, just press the return button  .

(2) Press the increase button  and the decrease button  to change parameter values, and press and hold for more than 3s to quickly increase or decrease.

(3) After the parameters are set, start the instrument, and press and hold the function button  for more than 3s so that the instrument is in the startup output. Now,

the instrument automatically adjusts output based on the settings so that the

instrument is thermostatic balanced. To stop output, press and hold the function button  for more than 3s to stop the instrument.

All parameters:

Parameter	Function	Setting range	Default
	Setting temperature	-20.0～200.0℃	20.0℃
	Changing parameters and password. Changing subsequent parameter is allowed only when the value is 8, otherwise it returns to the normal display interface.	0～100.0	0
	Superlow temperature alarm. When the actual temperature is lower than AL, buzzer alarms and the instrument stops.	-20.0～50.0℃	-10.0℃
	Superhigh temperature alarm. When the actual temperature is higher than AL, buzzer alarms and the instrument stops. The instrument becomes normal once the actual temperature is lower than AL.	20.0～200.0℃	80.0℃
	No applications presently.		

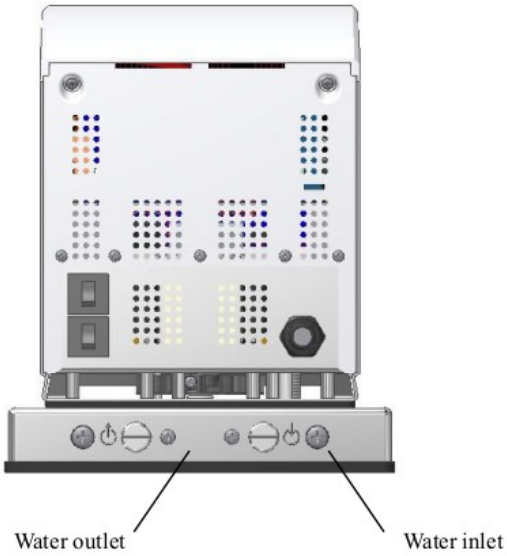
P6	Correcting temperature. When the detected temperature deviates from the standard temperature, it allows you to increase or decrease the error value on this basis.	-10.0～10.0℃	0.0℃
Htd	Water level alarm and delay. When the water level is lower than a certain value, the buzzer alarms and timing starts. The instrument stops heating output once the timing reaches ATD value.	0～59min	0min
dP	Decimal point 0.1 to 0.01 switching	0～1	0

4. Preparations prior to use

(1) Care shall be taken so that no fluid overflows when it is injected into the bath. 20mm lower than the water tank edge is recommended as the maximum fluid level. After the bath is filled with fluid, replace the bath cover before starting and operating the instrument. During operation, check fluid level from time to time to ensure the heating tube and pump are always immersed in the fluid. (In case of high temperature experiment, insulated gloves must be worn for fear of scald). After the experiment is completed, turn off the upper and lower power switches.

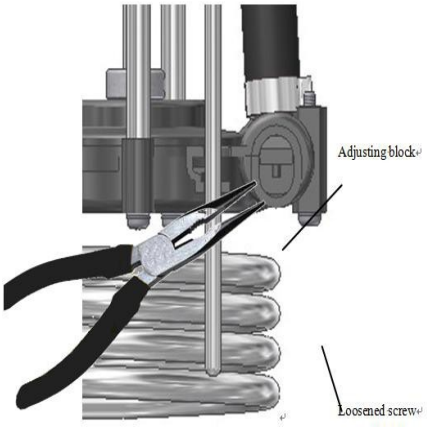
2. If to change the fluid, hold the bottom of grid with your hands to remove the grid; and fluid can be drained by unscrewing the drain plug with a straight screwdriver. After the fluid is drained, tighten the plug.

3. The circulator is used for both external circulation and internal circulation. If it is used for internal circulation, plugs of water inlet and outlet must be tightened. If it is used for external circulation, remove the plugs, connect the water inlet and outlet with a tube, and fix a fastening throat hoop to ensure the tube ends are connected securely. Ensure fluid flows in the tube smoothly during working, and the tube must be free from any bending. To improve effects of experiment, an insulation bushing may be installed on surface of the tube. Regularly check and promptly change the tube as it will age during its service.



5. Pump flow may be adjusted as required by the user. Firstly, loosen the screw with a Phillips screwdriver, secondly clamp the adjusting block a flat-nose pliers and rotate the block to the desired position, and finally, tighten the screw.

The diagram below shows functions of the block when it is in different positions: A —100% internal circulation
B—100% internal circulation
C—60% internal circulation and 40% external circulation D—20% internal circulation and 80% external circulation



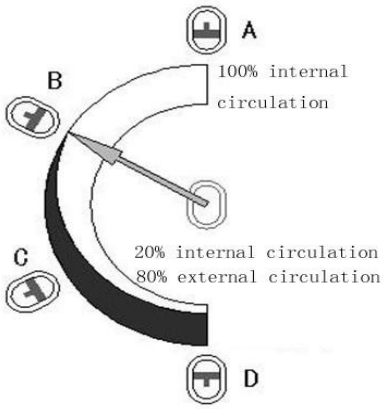


Fig. X

5. Precautions

(1) The power outlet must be provided with earthing conductor so that the instrument
housing is earthed for fear of accident.
(2) Ingress of any solution into the circulation control is prohibited to prevent any damage to the instrument.
(3) It is prohibited from heating the bath without water to prevent the heating tube
from being burned.
(4) If the external circulation is not used, remove the water tube, and tighten the external circulation water outlet screw for fear of ejection of fluid.

6. Troubleshooting

Commonly-occurring trouble	Possible cause	Solutions
No temperature rise	No power in the external power outlet	Connect with an external power supply.
	Overcurrent protection short circuit	Check the circuit, and replace the overcurrent protector
	Power switch short circuit	Change the power switch.
	Electric heating tube short circuit	Change the electric heating tube.
	Sensor fault	Check and replace the sensor.
Continuous temperature rise beyond control	Sensor fault	
	Silicon controlled rectifier short circuit in the temperature	Check and replace the silicon controlled rectifier.
No temperature lowering	Refrigeration switch and fuse open circuit, and sensor fault.	Check and replace the sensor, refrigeration switch and fuse.
Error appearing in the display and buzzer alarm.	Sensor circuit break	

05 Maintenance

This instrument is a precision measurement instrument. In order to ensure its accuracy and prevent possible damage during use, we recommend you maintenance of the instrument as follows:

(1) Water tank should be placed on a fixed platform, and the power supply connected with the instrument should be 220V. The power outlet must be a three-hole receptacle, and earthing conductor is required.

(2) Water must be injected only before the instrument is not powered on, and when the instrument is being used, the water level must be higher than the stainless steel heater. Never heat when no water exists or water level is lower than the heater. Otherwise heating tube will be damaged.

(3) If the thermostatic control does not work properly, the control can work simply by cleaning silver contacts on the control with a fine emery cloth.

(4) To inject water, water shall not flow into the control cabinet for fear of electric shock, and after the instrument is used, drain water in the tank, and clean the tank to keep a clean tank, thus improving service life.

(5) Purified water is preferable for fear of scale.

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