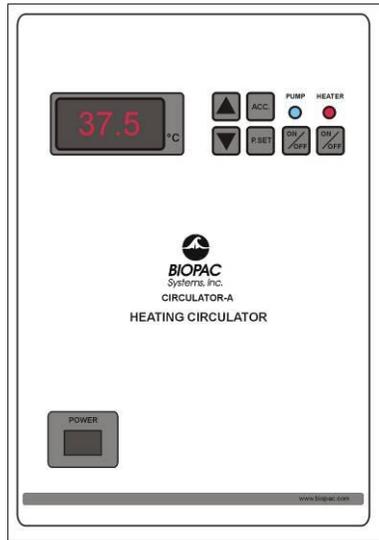


CIRCULATOR A/B HEATING CIRCULATORS

Heating circulators are used with Tissue Bath Stations and include a digital temperature display and the following controls:

- Preset**
- Temperature**
- Power**
- Heater**
- Circulation**

Inlet and **Outlet** ports are on the back, along with the power cord.



Circulator A:
110 V, 60 Hz

Circulator B:
220 V, 50 Hz

CIRCULATOR SETUP AND USAGE GUIDE

BIOPAC Heating Circulators will maintain water temperature at a preset value in the range 30° C to 45° C and circulate the water through tissue baths.

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- Preset**
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CALIBRATION

Although the offset value for the temperature sensor is factory-calibrated, the user can calibrate the controller's internal temperature sensor. To calibrate the sensor:

1. Install a calibrated reference thermometer in the bath.
2. Adjust the offset value to zero.
3. Adjust the preset value to an appropriate temperature.
4. Once the bath reaches the preset value and stabilizes, calculate the offset value by noting the difference between the reference thermometer value and the preset value.
5. Enter this value as an offset.

ERROR CODES

<u>Display</u>	<u>Indication</u>
Lo	Water in the bath is not enough or the bath is empty.
Sen	Microprocessor cannot communicate with the temperature sensor.

CIRCULATOR SETUP & USAGE GUIDELINES

1. Connect a hose from the INLET on the back of the circulator to the tissue bath OUTPUT.
 - For more than one tissue bath, connect the tissue baths serially.
2. Connect a hose from the OUTLET on the back of the circulator to the tissue bath INPUT.
3. Fill the stainless steel water bath with 4.5 liters of water.
 - A buzzer sound warning will be emitted if there is not enough water in the bath when the Circulator is powered on. See *Error Codes* above.
4. Place the glass lid on the bath to close.
5. Plug the power cord from the back of the Circulator to a power source.
6. Press the **POWER** key to turn on the circulator.
7. To see the preset temperature value, press the **P.SET** key.
 - To change the preset temperature value, hold down the P.SET key and, at the same time, repeatedly press the UP or DOWN arrow keys to increase or decrease the preset value.
8. To see the acceleration value of the Circulator, press the **ACC** key.
 - To change the preset acceleration value, hold down the ACC key and, at the same time, repeatedly press the UP or DOWN arrow keys to increase or decrease the preset value. The higher values for acceleration indicate more rapid heating.
9. To see the offset temperature value, press the ACC and P.SET keys at the same time.
 - This is a factory-calibrated value. To calibrate the temperature sensor, see *Calibration* above.
 - All preset values are written to non-volatile memory.
10. Press the **PUMP ON/OFF** key to start the circulation pump.
 - Check that the **blue** Pump Status LED is ON. The pump should begin circulating water.
11. Check that the water goes out of the circulator and flows through the waterway of the tissue bath(s).
 - With initial setup, some air may remain in the circulator pump. See *Troubleshooting* below.
12. Press the **P.SET** button and confirm the set value of the desired temperature.
13. Press the **HEATER ON/OFF** key to turn on the heater.
 - Check that the **red** Heater Status LED is ON.
 - Check that the Heater Display LED is on to confirm that the heater inside the bath is working.
 - Circulator will maintain the preset temperature of water in the bath; variations of $\pm 0.2^{\circ}\text{C}$ are acceptable.
14. Check the water level periodically and add water to the bath if the level drops below 4 liters.
 - **Caution:** Over time, the water level inside the bath may decrease. Do not operate the circulator with less than 4 liters of water in the bath.
15. To turn the PUMP and HEATER on and off individually, press their respective ON/OFF keys.
16. To stop operation, press ON/OFF keys.
 - Power down equipment in the following order: PUMP, HEATER, POWER.

TROUBLESHOOTING

- **There is no water circulation or very little.**

1. Check the hose connections and be sure they are connected to the correct positions.
2. Check that the hoses are not bent or twisted (which might impede the flow of water).
3. Confirm that there is at least 4 liters of water in the bath.

- **There is some air in the waterway.**

To remove the air:

1. Press the PUMP ON/OFF key to **OFF** stop the circulator pump.
2. Disconnect the hose from the INPUT of tissue bath. (Leave other end connected to the Circulator OUTLET.)
3. Put the end of the hose in a bucket to catch the water flow.
4. Press the PUMP ON/OFF to **ON** to start the circulator pump.
5. Operate the circulator pump for a few 1-2 second cycles.
6. Press the PUMP ON/OFF key to **OFF** stop the circulator pump.
7. Reconnect the hose to the INPUT of the tissue bath.
8. Press the PUMP ON/OFF to **ON** to start the circulator pump and continue with normal operation.

TECHNICAL SPECIFICATIONS

Dimensions:	40 cm (L) x 20 cm (W) x 29 cm (H)
Temperature Range:	30° C to 44° C
Reading Sensitivity:	0.1° C
Display:	3 digit (LED Display)
Water Bath Volume:	4.5 liters (Stainless Steel)
Circulation Flow:	2 liter/min.
Heater Resistance:	1000 Watt
Circulation Pump:	110 V 100 W Plastic Head
Supply Voltage:	
CIRCULATA:	110 Volt 60 Hz (1000 Watt)
CIRCULATB:	220 V 50 Hz (1100 Watt)
Inlet/Outlet	OD 8.5 mm, ID 6.3 mm Tubing
Temperature Offset Range:	0° C to 1.2° C
Acceleration Levels:	0 to 5

NOTE: Heating Circulators are not available for EU purchase or delivery.