# Operation Manual


**BSBT-201/202/203**

# Benchtop Shaking Incubator

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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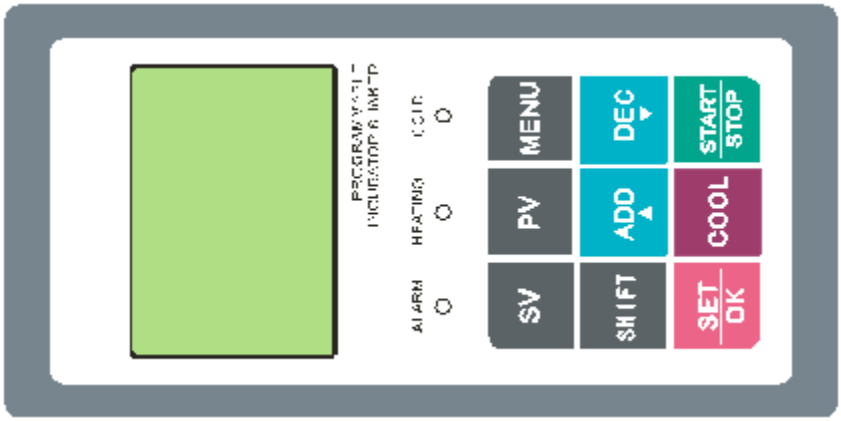
# 01 Keyboard




Description:
PV Measured data key;
SV Data setting key;
MENU Menu/back key;
SHIFT Shift key;
ADD Add key;
DEC Decrease key;
SET Confirm/enter key;
COOL Cooling setting key;
START/STOP Start/stop key.

# 02 Operating Instructions

2.1 Real-time data monitoring page
2.1.1 Real-time monitoring data main page

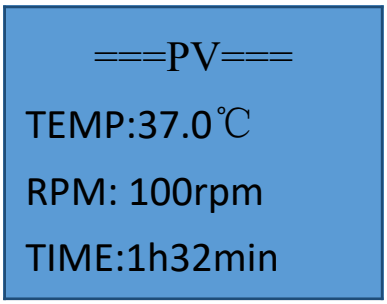



Figure 2.1.a Function page without humidity and without multi-step speed

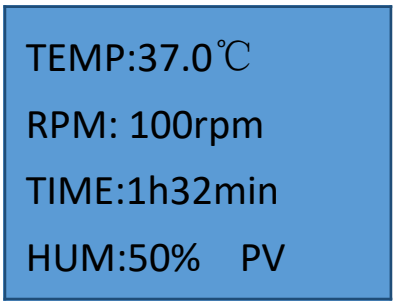



Figure 2.1.b Function interface with humidity and multi-step speed

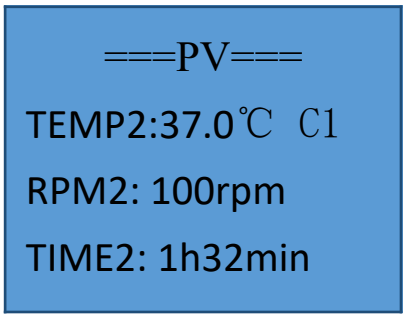



Figure 2.1.c Function interface without humidity and multi-step speed

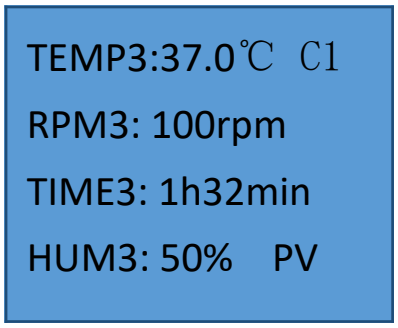



Figure 2.1.d Function interface with humidity and with multi-step speed

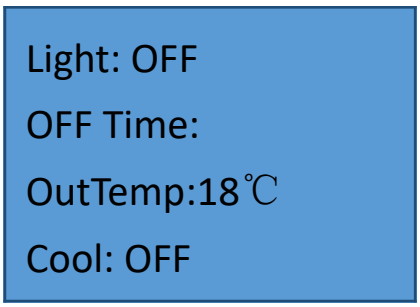
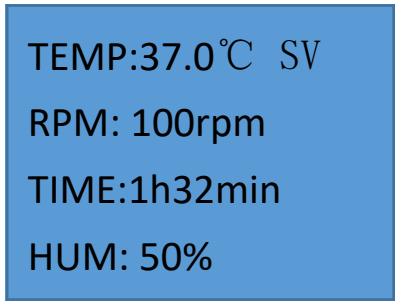


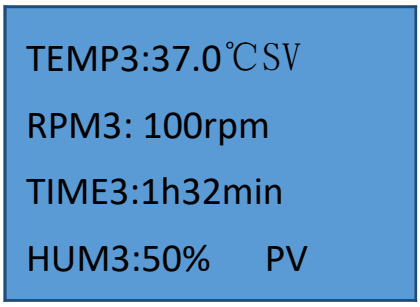

Figure 2.1.e Real-time monitoring data sub-interface

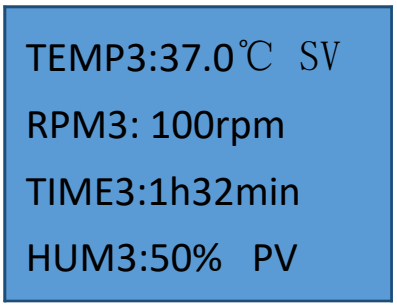
Description:
Figure 2.1.a - Figure 2.1.d correspond to the real-time monitoring data display main pages of the four combinations of no humidity + no multi-speed function, humidity + no multi-step speed function, no humidity + multi-step speed function and humidity + multi-step speed function. Figure 2.1.e shows the real-time monitoring data display sub-page, mainly displaying the lighting (with the function) state, ambient temperature, cooling state, etc.

Operation:
1. Press the SHIFT key to switch between the real-time monitoring main page and the sub-page;
2. Press the SV key to enter the temperature, speed, running time, humidity (humidity function enabled), multi-step speed (multi-step speed function enabled) and other running data pages; see 2.2 running data setting for details;
3. Press the COOL key to enter the cooling data setting page; see 2.3 cooling parameters setting for details;
4. Press the MENU key to enter the function menu, de-bugging data and other setting pages; see 2.4 function menu and de-bugging data setting for details;
5. In any page, press the PV key to return to the real-time data monitoring page.
6. Press the START/STOP key to start and stop the motor, press and hold the START/STOP key for more than 4 seconds to clear the current running data (clear the running time, and clear the current running step number and number of cycles when the multi-step speed is enabled).

2.2 Running data setting
2.2.1 Settings page



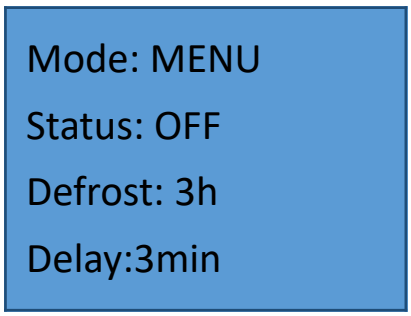



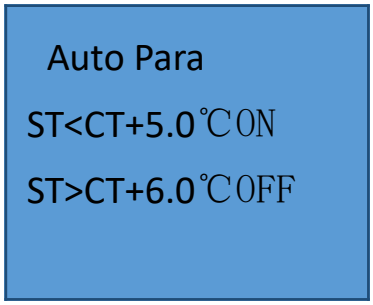

**Description:**
Figure 2.2.a shows the running data setting page when the multi-step speed function is enabled. Figure 2.2.b and Figure 2.2.c will not appear. Figure 2.2.b shows the running data setting page when the multi-step speed function is enabled; the humidity settings (HUM) of two pages will be displayed or not displayed when the humidity detection function is enabled and closed. Figure 2.2.c shows the multi-step cycle parameters setting. Step is used to set the start and stop step numbers, Cycles is used to set the number of cycles, and Clear is used to clear the setting parameters of each step to restore the factory value. Reset is used to clear the current running step value, cycle value to reset and wait for a new running command.

**Operations:**
1. In case of enabling multi-step (See 2.4 function menu page), press "SHIFT" to switch the running parameters setting page of each step as shown in Figure 2.2.b (8 sections) and the cycle parameters setting page as shown in Figure 2.2.c;
2. Press the SET key to enter the parameters setting; the currently set parameters are displayed in bold;

3. In the parameters setting page, press SHIFT to move each setting parameters; press the SET key to confirm and set the value; press MENU to return to the previous menu; press the ADD key to set the parameters increase; press the DEC key to set the parameters decrease;
4. In the parameters setting page as shown in Figure 2.2.c, move the bold to Clear, and press the SET key to clear the parameters of each step (restore the factory value); move the bold to "Re-set", press the SET key, stop and clear the current running step value and cycle value and wait for a new running command.

2.3 Cooling parameters setting
2.3.1 Setting page



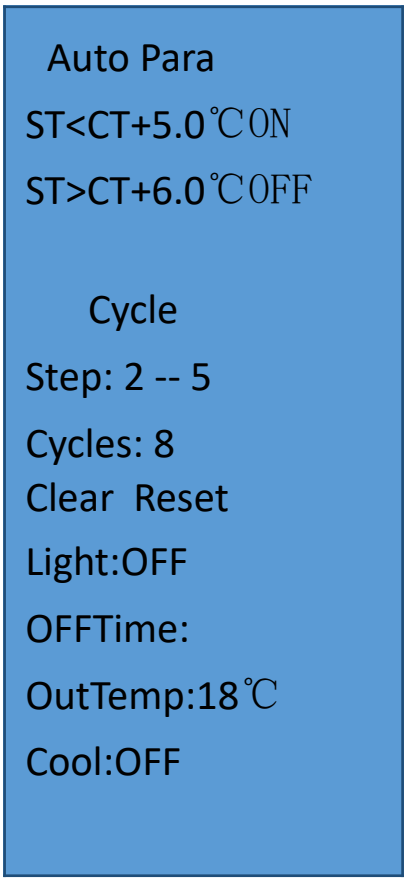




Figure 2.3.a Cooling setting page  Figure 2.3.b Automatic cooling parameter

**Description:**
Figure 2.3.a shows the cooling parameters setting page, where Mode indicates the cooling running mode: MENU – manual, AUTO – automatic. Status: When the cooling mode is manual, this position is the cooling switch: ON: turned on, OFF: turned off; when the cooling mode is automatic, this position shows the current cooling state, which cannot be modified manually: ON: cooling is running; OFF: cooling is turned off. Defrost is used to set the defrost interval, in hours; Delay is used to set the defrost delay time, in minutes.
Figure 2.3.b shows the automatic cooling parameters setting page, where when the Mode is set to AUTO, pressing the secondary shift key to enter: ST<CT+X.X℃ON indicates that when

the set temperature is less than the ambient temperature above + XX ℃, cooling runs automatically; ST>CT+X.X℃OFF indicates that when the set temperature is greater than the ambient temperature above + XX ℃, the cooling is turned off automatically.

Note: After it is powered on, the cooling compressor will delay 3 minutes before running!

**Operation:**

1. Press the SET key to enter the parameters setting layer, where the setting parameters are displayed in bold, and press the SHIFT key to switch the page (e.g. the mode is AUTO).
2. In the parameters setting layer, press the SHIFT key to move the selected setting parameters, press the ADD/DEC key to switch or increase and decrease parameters, press the SET key to save and execute the setting parameters, and press the MENU key to return to the previous menu;

2.4.1 FUN.SET function setting

Enter the FUN.SET setting menu, which includes the three function setting pages as follows:

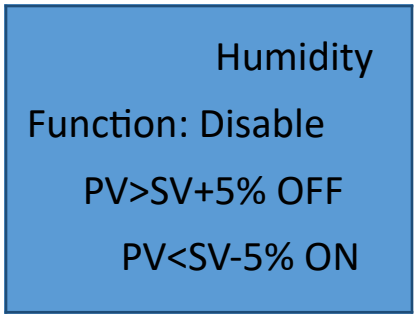




Figure 2.4.1.a Lighting parameters setting Figure 2.4.1.b Humidity parameters setting

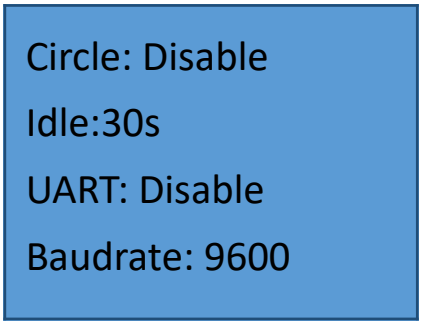



Figure 2.4.1.c Multi-step speed, backlight and communication port parameters settings

Description:

A. Lighting control, as shown in Figure 2.4.1.a

1 · Function - Lighting control function switch (press the ADD (add) key or the DEC (decrease) key); ENABLE - enable the lighting control function; DISABLE- turn off the lighting

control function;

2 · ON Time – Lighting on time;

3 · OFF Time – Lighting off time; press SET key for confirmation after the setting is completed.

B. Humidity control (press the SHIFT key again to enter the humidity setting page), as shown in Figure 2.4.1.b.

1. Function - Humidity monitoring function switch, which is operated in the same way as lighting;

2. PV> SV + X% OFF, indicating the actual humidity > the set humidity + X% humidification off;

3. PV <SV-X% ON, indicating the actual humidity < the set humidity - X% humidification on; press the SET key for confirmation after the setting is completed.

C. Other functions, as shown in Figure 2.4.1.c (press the SHIFT key again to enter the page)

1. Circle - multi-section function switch; ENABLE - enable multi-section; Disable - off multi-section;

2. Idle - Backlight timing off function: Press the ADD key or the DEC key to change the backlight display time.

15S: no operation, 15S backlight off; 30S: no operation, 30S backlight off; 1M: no operation, 1M backlight off; 5M: no operation, 5M backlight off; OFF: backlight control function is turned off, and the backlight is always turned on.

3. UART-serial function; (pause)

4. Baudrate - baud rate.

Operations:

1. Press the SHIFT key to switch among the three browsing pages or switch the setting parameters in order;

2. Press the SET key to enter the parameters setting layer page from the parameters browsing page, where the currently modified parameters are displayed in bold; in the parameters setting page, then confirm to save the modified function parameters;

3. In the parameters setting page, press the ADD or DEC key to increase or decrease or switch the relevant parameters;

4. Press the MENU key to return to the previous menu.

### 2.4.2 DEBUG de-bugging function

In the Debug menu, first enter the password input page, as shown in Figure 2.4.2.a, press the SHIFT key to select the password digit, press the ADD and DEC keys to increase or decrease the number, and press the SET key for confirmation. The factory password is: 0123, and the de-bugging value entered with the factory value will also be saved as the application value and the factory value, where the factory value is for the following recovery. The user password is: 4567, and the de-bugging value entered with the user password is saved only as the application value without effect on the factory value.

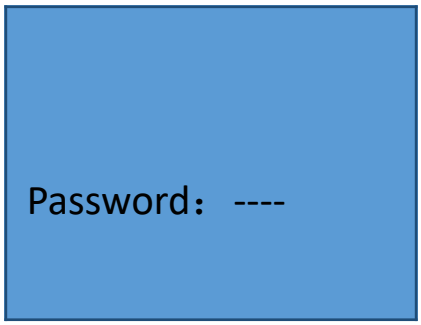



Figure 2.4.2.a Password input page

If the password input is entered correctly, press the SET key for confirmation to enter the function menu as shown in Figure 2.4.2.b.

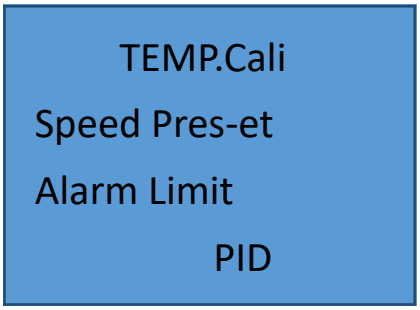



Figure 2.4.2.b De-bugging function menu

Description:

A. TEMP.Cali - Enter the temperature calibration page, and refer to 2.4.2.1;
B. Speed Preset - Enter the speed storage page, and refer to 2.4.2.2;
C. Alarm Limit - Enter the alarm values setting page, and refer to 2.4.2.3;
D. PID - Enter the temperature PID setting page, and refer to 2.4.2.4;

Operations:

1. Press the SHIFT key for selection, press the SET key for confirmation and enter the relevant menu setting page, and press the MENU key to return to the previous menu.

2.4.2.1 Temperature calibration selection page

Description:

As shown in Figure 2.4.3.c,
A. Low TEMP - Low temperature calibration: refer to 2.4.2.1.1;
B. High TEMP - High temperature calibration: refer to 2.4.2.1.2;
C. Reset - Reset the factory value;

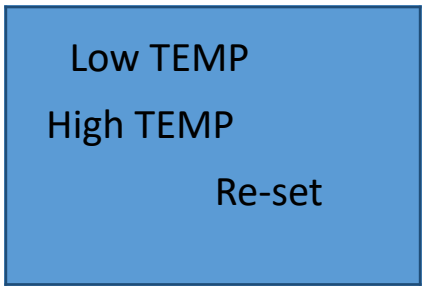



Figure 2.4.2.c Temperature calibration selection page

Operations:
1. Press the SHIFT key for selection, press the SET key for confirmation and enter the relevant menu setting page, and press the MENU key to return to the previous menu.

2.4.2.1.1 Low temperature calibration

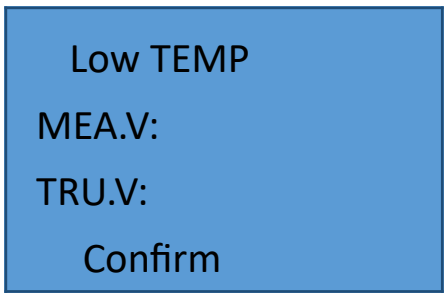



Figure 2.4.2.d Low temperature calibration page

Description:
A. MEA.V - Measured value: the temperature value measured and calculated directly from the sensor without any calibration processing, which can be viewed only, but cannot be modified;
B. TRU.V - Actual value: enter the actual temperature value; (the temperature value displayed by the thermometer in the cavity)
C. Confirm - Confirm and store.
Operation:
1. When the bold is in TRU.V, press the ADD/DEC key to modify the actual temperature value;
2. Press the SHIFT key to switch the operating parameters;
3. When Confirm is in bold, press the SET key to confirm the temperature calibration setting parameter;
4. Press the MENU key to return to the previous menu.

2.4.2.1.2 High temperature calibration

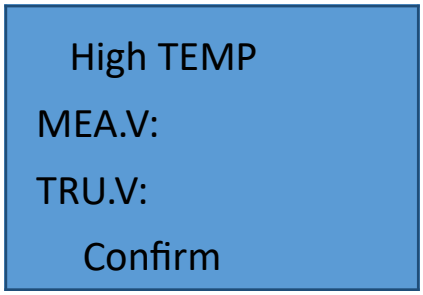



Figure 2.4.2.e High temperature calibration page
Both the description and the operation are same as the low temperature calibration.

Speed pre-store page

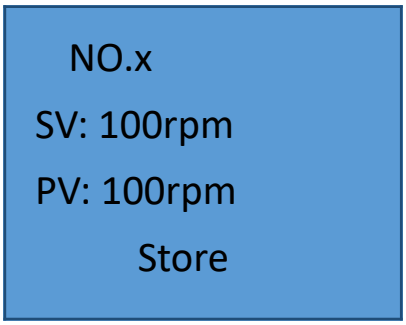



Figure 2.4.2.f Speed pre-store page

Description:

A. NO.x - 8 speed point values can be pre-stored, where x indicates the serial number of the speed store point;

B. SV - Speed setting value, where you can set the required speed value;

C. PV - Actual measured speed, where the measured speed is displayed in real time and cannot be modified;

D. Store – When the bold font is moved to the line and the SV value and PV value are equal, press the SET key to confirm and store the output voltage value at the speed point.

Operations:

1. The SHIFT key is used to switch SV: Store setting bar and the pages of 8 pre-stored speed points;
2. When the bold moves to Store, press the SET key to store the output value corresponding to the PV speed;
3. When the bold is in SV, press the ADD/DEC key to increase or decrease the set value;
4. Press the MENU key to return to the previous menu;

Running alarm limit setting page

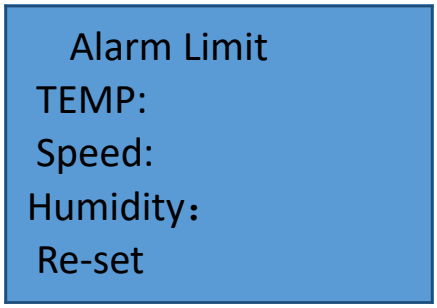



Figure 2.4.2.g Alarm limit setting page

Description:

A. TEMP: - Temperature alarm limit setting: after the temperature is stabilized, if the temperature changes to beyond the upper and lower limits of the set temperature, the buzzer alarms, and you can press the SHIFT key to cancel the alarm sound;

B. Speed - Speed alarm limit setting, described as above;

C. Humidity - Humidity alarm limit setting, described as above;

Operation:

1. In the browsing page, press the SET key to enter the parameters setting page, where the current setting parameters are displayed in bold; in the parameters setting page, the SET key for confirmation and store the set parameters;

2. Press the SHIFT key to move the bold display, and select the setting parameters;

3. Press the ADD/DEC key to increase/decrease the current setting parameter;

4. Press the MENU key to return to the previous menu;

2.4.2.4. PID setting

PID setting is divided into three setting pages: 1. Cooling off mode; 2. Cooling on mode; 3. Speed PID setting; the PID setting values are within the range of 0-255;

1. Cooling off mode:

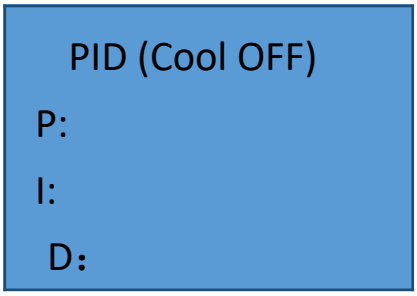



Figure 2.4.2.h Cooling off PID setting

Cooling on mode

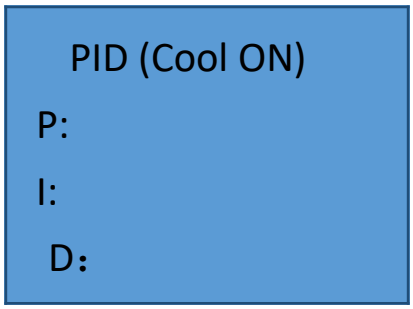



Figure 2.4.2.i Cooling on PID setting

Speed PID setting

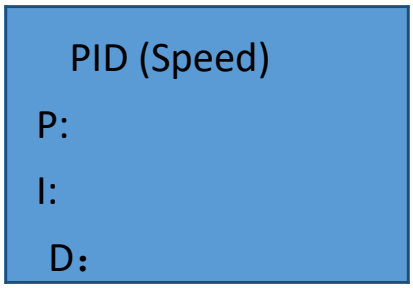



Figure 2.4.2.j Speed PID setting

Operation:

1. In the parameters browsing page, press the SHIFT key to switch three PID setting pages, and press the SET key to enter the current setting page;
2. In the parameters setting page, press the SHIFT key to switch P, I and D setting parameters, and switch setting pages; press the SET key to confirm and save the set parameters;
3. Press the ADD/DEC key to increase/decrease the current setting parameters;
4. Press the MENU key to return to the previous menu.

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