



Laboratory Equipment Pty Ltd

**INSTRUCTION MANUAL
FOR LABEC SHAKING WATER
BATHS**

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1、 Safety warning before operating



Prohibited items

The following items could cause serious injury or death

1. Read the product instruction manual before using this product.
2. Do not put volatile, flammable and explosive materials in the machine, otherwise could cause explosion or fire.
3. Do not place the device in a place exposed to rain, moisture, or splashing, as this may result in electrical leakage, short circuit, or electric shock.
4. Non-professional technicians must not disassemble, repair or modify the equipment, otherwise it may cause fire or electric shock to personnel due to improper operation.
5. Do not damage the power plug or the power cord. If it is damaged, the power cord must be replaced. Otherwise, it may cause fire or electric shock.



Confirm before use

The following items may cause personal injury, equipment damage and related property damage.

1. This equipment should be installed on levelled ground, otherwise could cause injury.
2. Please use the special power supply that is indicated on the nameplate. This equipment must be installed on the ground, otherwise could cause electric shock and fire because of electric leakage.
3. Do not touch the power plug with wet hands, otherwise there is a risk of electric shock
4. Before any repair or maintenance is carried out, the power must be disconnected to prevent electric shock or injury.
5. Please wear gloves when repairing and maintain the equipment in case of injury.
6. Do not damage the power cord or use the non - specified power cord, do not connect the power cord in the middle section and use long soft wire, otherwise it may lead to electric shock or fire.
7. Do not remove the power plug during the operation, do not pull the power cord by pulling the power cord.
8. If you find that the equipment is running abnormally, unplug the power plug immediately and stop the equipment.
9. If the equipment is idle for a long time in the unsupervised area, please ensure that the equipment door is completely closed.



Necessary Considerations

The following items could cause staff injury or equipment

- ❖ Adjust the feet so that the equipment is installed horizontally, and all four feet should be close to the support surface. There must be no vacant or false.
- ❖ Use a separate power outlet fitted with a grounding wire. Tight the power plug when in use.
- ❖ Put off the power plug, before removing the equipment.
- ❖ Carefully touch the inner wall of the door, which may be hot.
- ❖ Non-professional technical staff should not disassemble the machine, Professional staff should repair and replace parts.
- ❖ The internal parameters must be set by the specific management person to prevent the function of the controller program from being disturbed by don't know setting operation.
- ❖ The installation location of the equipment must be longer than 20 cm from the wall and from the object.
- ❖ Open or close the door gently. Rudely opening or closing the door can easily cause damage to the equipment.
- ❖ The surface of the equipment must not be exposed to volatile chemicals such as gasoline or thinner.
- ❖ Keep the inside and outside of the box clean, often cleaning debris and smudges

2、 Product main features

1. The large screen background light liquid crystal display displays the measured value, the set value and the machine running state at the same time. It can run regularly or continuously, showing the setting time and the remaining time.
2. High precision temperature control: intelligent PID control and high precision PT100 temperature sensor. Intelligent over temperature audible and visual alarm, operation parameters can be memorable and protected. The power is cut off by accident, and it will resume operation automatically according to the original program after calling.
- ❖ 3, high precision speed control: PID feedback control, motor speed is stable and accurate, accuracy is 1rpm. The unique slow start design, after the rotating speed is out of control,

automatically lock, the start speed can be adjusted, prevent the sudden start of the shake flask liquid spatter, effectively guarantee the accuracy of the quantitative experiment.

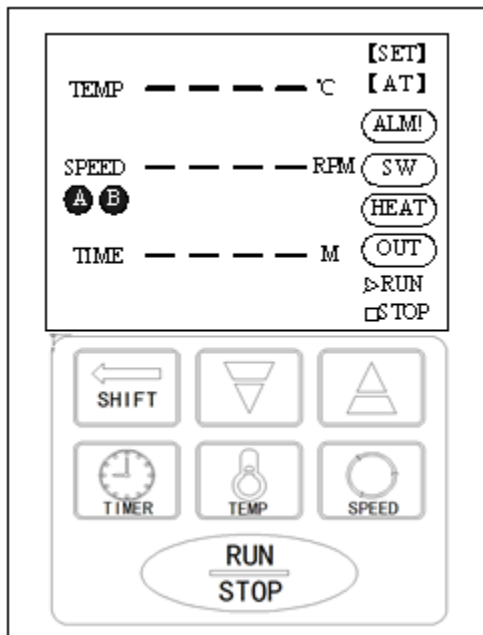
4, A variety of functional uses, standard test tube rack and water bath bottle holder, can also have the function of water bath at the same time.

3、 Technical parameter

Model		FWS-30
Mode		Reciprocating oscillation + thermostatic water bath
Function	Operating Temp Range	RT~100°C
	Temp. Resolution Ratio	0.1°C
	Temp. Motion	±0.1°C
	Temp. Uniformity	±0.2°C
	Reciprocal Oscillation Amplitude	16 or 24mm (Ex-factory is 16mm)
	Reciprocating Frequency Range	20~180 (r/min)
	Reciprocating Frequency Accuracy	±1rpm
Structure	Water Tank	Mirror stainless steel
	Outer Shell	Cold rolling steel electrostatic spraying exterior
	Upper Cover	Mirror stainless steel
	Insulating Layer	Polyurethane
	Heater	Stainless Steel Heater
	Driving Mode	Crankshaft+ double link + four wheels
	Shelf	Mirror stainless steel
	Power rating	1.5kW
Controller	Temp. Control Mode	LCD PID Intelligent control
	Reciprocating Control Mode	
	Setting Mode	Touch button setting
	Temp. Display Mode	LCD Display
	Speed Display Mode	

	Timer	0~9999 min
	Operation Function	Fixed value operation, timing function, auto stop, quickly stop start
	Temperature Sensor	Pt100
	Speed Sensor	Hoare
	Additional Function	Deviation correction, menu keys locked, power-off memory
	Safety device	over temperature alarm, menu locked, water full or shortage protection, Motor shaft lock protection;
Specification	Water Tank Size (W*L*H)(mm)	500*310*200
	Exterior Size (W*L*H)(mm)	828*360*425
	Packing Size (W*L*H)(mm)	908*440*505
	Spring Shock Basket Size (mm)	395*250
	Shock Basket Largest Single Size (ml /piece)	100ml*12/250*8/500*6
	Inside Volume	31L
	Shock Basket Bearing	5kg/layer
	Current Rating (50Hz)	AC220V/6.8A
	NW/GW (kg)	20/30
	Accessories	Water bath flask seat, tube rack

4、 Controller instructions



1. Methods of operation and use

1. the controller is powered on, the temperature display window displays "P1-Y", and the speed display window displays "PSv2" about 4 seconds after entering the normal display state.

2. prohibition of temperature and speed control

When the temperature setting value is "0", the temperature display window displays "oFF", which means that the temperature control function is forbidden.

When the speed setting value is "0", the speed display window displays "oFF", which means that the speed control function is prohibited.

3. timing function

When the total timing time is set to "0", there is no timing function, the controller runs continuously; when the setting time is not "0", the timing is stopped running (see the NDT parameter: the internal parameter table -6), the time display area shows "End", the buzzer beep is called EST (see the internal parameter table -6) and stops at the second. Call. Click the run / stop button to restart the operation.

4. start and stop

Long press the "run / stop" key RUN (see internal parameter table -2) seconds to start or stop the controller running. The run time "RUN" identifier is lit, and the "STOP" identifier is lit when it stops.

5. power off memory function

By modifying the power down memory parameter value (see "Pon" parameter: internal parameter table -2), you can choose whether there is power down memory function.

When no power down memory function is selected, the controller goes directly to the stop state when power is switched on.

When the power off memory function is selected, the controller automatically saves the

running and stopping state, running time and the direction of the motor rotation when the power is broken, and the controller continues to run at the state of power down when the power is on.

6. in setting state (Non internal parameter setting), if no key is pressed in 1 minutes, the controller will automatically return to the normal display state.

7. when there are temperature and speed alarm, the "ALM!" identifier is lit and the buzzer calls. When the buzzer calls, it can press any key.

8. when the controller has blocked (Er-2), Holzer error (Er-3), busbar under voltage (Er-4), busbar over voltage (Er-5), and communication failure (Er-6), the speed bar shows the fault code, and the controller automatically stops the motor operation.

9. if the controller temperature display window displays "-", indicating the fault of the temperature sensor or the controller itself, please check the temperature sensor and its wiring carefully.

2. System self-tuning

When the temperature control effect is not ideal, system self tuning can be carried out. In the process of self tuning, the temperature will have a large overshoot. Users should take full account of this factor before the system self tuning.

In the run and non set state, after 6 seconds of "shift" key, enter the system self setting selection state, temperature display window display self setting prompt "AT", speed display window display "OFF", click "increase" or "decrease" key select display "on" or "OFF", when displaying "on", click "temperature" set Setting the key, the instrument enters the system self-tuning state, the AT identifier flashes, after the completion, the AT identifier stops flashing, the controller will get a better set of PID parameters, parameter values automatically save. In the process of system self tuning, the self setting process can be aborted by pressing the shift key for 6 seconds or closing the controller.

In the process of system self tuning, if there is an upper deviation and over temperature alarm, the alarm identifier is not bright, the buzzer does not call, but the heating alarm relay will automatically disconnect. All setting keys are invalid during system self tuning.

3. Setting of temperature and its parameters

1. click "temperature" key, enter the temperature setting state, temperature display window display "T-SP", temperature setting value flicker, can be modified to the required set value by increasing, decreasing and shifting key; then click "temperature" key, exit temperature setting state, temperature setting value automatically save.

2. Long press "temperature" key 3 seconds, the temperature display window displays the password prompt "Lc", the speed display window displays the password value, and modifies the required password value by increasing, decreasing and shifting key. Then click "temperature" key, if the password value is not correct, the controller automatically returns to the normal display state, if the password value is correct, then enter the temperature internal parameter setting state, and then click "temperature" key to modify each parameter in turn. If you press the "temperature" button for 3 seconds, you can exit the state and automatically save the parameter value. See the following table in detail:

Internal parameter table -1

Parameter indication	Parameter name	Parameter function description	(Range) Value	Factory
Lc	Password	The parameter value can be viewed and modified when	0	
ALH	Upper deviation Over temperature alarm	When the "temperature measurement > temperature setting value +AL", the alarm light is turned on, the buzzer calls, and the heating output is disconnected.	(0~20.0°C) 5.0	
T	Control cycle	Heating control cycle.	(1~60 sec)	5
P	Proportional	Time proportional adjustment.	(0.1~100.0)	20.0
I	Integration	The integral function is adjusted.	(1~2000 sec)	200
d	Differential time	Differential action regulation.	(0~2000 sec)	200
LT	Floodlight off-delay	The light is opened and the time delay LT time is automatically closed. When "LT=0", the light must be closed manually.	(0~9999min) 0	
Pb	Temperature correction	Correction of the error produced when the sensor is measured. Pb= actual temperature value - instrument measured value	(-99.9~99.9°C) 0	
PL	Slope correction	Correction of sensor measured errors (high temperature) . PL=1000* (actual temperature value instrument- measured value)/ measured value)	(-999~999) 0	

Internal parameter table -2

Parameter indication	Parameter name	Parameter function description	(Range) Value	Factory
Lc	Password	The parameter value can be viewed and modified when "Lc=9"	0	
Pon	Power off memory	0: without power off memory function 1: with power off memory function	(0~1) 0	
ruT	Run / stop Key delay	The button function is effective after the long run / stop key ruT	(0~10 sec) 0	
nP	Maximum power output	The maximum power percentage of the heating output.	(0 ~ 100%) 100	

Co	Turn off heating Output deviation	When the "temperature measurement value \geq temperature setting value +Co", turn off the heating output.	(0.0~20.0°C) 5.0
SPH	Upper limit of temperature	Upper limit of temperature set value	(0.0~200.0°C) 100.0
Adr	Communication address	Reserved, invalid	(1~32) 1

Internal parameter table -3

Parameter indication	Parameter name	Parameter function description	(Range) Factory Value
Lc	Password	The parameter value can be viewed and modified when "Lc=567"	0
rST	Factory reset	0: do not restore the factory value 1: restore factory value (including: internal parameters table 1, table 2, table 6 and table 5, Fr, DB, dF three parameters)	(0~1) 0

4. Speed and its parameter setting

1. click "speed" key, enter the speed setting state, the temperature display window displays the prompt "S-SP", the speed setting value flashes, can be modified to the required set value by increasing, decreasing and shifting key; then clicking the "speed" key, exit speed setting state, speed setting value automatically save.

2. Long press "speed" key 3 seconds, the temperature display area displays the password prompt "Lc", the speed display area displays the password value, and modifies the required password value by adding, decreasing and shifting keys. Then click "speed" key, if the password value is not correct, the controller automatically returns to the normal display state, if the password value is correct, then enter the speed internal parameter setting state, and then click the "speed" key to modify each parameter in turn. Press the "Speed" button for 3 seconds longer to exit the state and save the parameter values automatically. See the following table in detail:

Note: Speed parameter is forbidden to be modified during the operation of the controller. If it needs to be modified, please stop the controller and modify it again.

Internal parameter table -4

Parameter indication	Parameter name	Parameter function description	(Range) Factory Value
Lc	Password	The parameter value can be viewed and modified when "Lc=3"	0
Pd	Proportional gain	Speed proportional gain	(1~100) 10
Id	Integral coefficient	Velocity integral coefficient.	(1~100) 5
InT	Acceleration time	The time required for the motor to speed up to the set value.	(1~60) 10
dET	Deceleration time	The time required for the motor to decelerate to the set value.	(1~60) 10
SdL	Speed setting lower limit	The minimum value of the set value	(20~500) 20
SdH	Speed setting upper limit	The maximum value of the set speed	(SdL~500) 300

Internal parameter table -5

Parameter indication	Parameter name	Parameter function description	(Range) Factory Value
Lc	Password	The parameter value can be viewed and modified when "Lc=9"	0
EAr	Gear ratio	Large gear diameter / small gear diameter.	(1.0~10.0) 1.0
PoL	Pole logarithm of motor	The DC brushless motor is extremely logarithmic.	(1~32) 4
dIF	Motor rotation Datum direction	DIF=0: the direction of clockwise rotation is positive DIF=1: the counter clockwise rotation direction is positive	(0~1) 0
FdS	Velocity feedback value	Velocity feedback system value	(0.1~10.0) 1.0
FdC	Current feedback value	Current feedback system value	(0.1~10.0) 1.0

FrE	carrier frequency	Frequency modulation frequency of brushless motor carrier Note: restart the controller after changing carrier frequency.	(5~15) 15
Po	Motor power	Brushless motor power Note: users adjust this parameter according to the actual power of the motor.	(1~100) 60
CL	Overflow multiple	Allowable current multiplier for overcurrent protection of motor	(1.0~10.0) 5.0
Fr	Rotation direction selection of motor	0: the motor is only running in positive rotation. 1: the motor runs only by reversing; 2: the motor can be operated in a positive and reverse direction.	(0~2) 0
db	display Insensitive area	Speed display insensitive area	(0~100) 2
dF		(reservation is invalid)	

5. Time Setting

1. When "Fr=0" or "Fr=1": The motor only runs in forward or reverse only:

Click the "Time" button to enter the total time setting state. The temperature display window prompts "AT", and the increase, decrease and shift keys can be modified to the desired set value; then click the "Time" button to exit the total. The time is set and the set value is automatically saved.

2. When "Fr=2": The motor can run in reverse direction:

Click the "Time" button to enter the total timing setting state, and the increase, decrease and shift keys can be modified to the desired setting values; then click the "Time" button to enter the positive turn time setting and stop. Time setting, reverse time setting status, click the "Time" button to exit the time setting status, and the setting value is automatically saved.

When entering the positive turn time setting state, the temperature display window displays the prompt "Fd-" and the positive turn identifier lights on.

When entering the stop time setting state, the temperature display window displays the prompt "P-" and the positive and negative turn identifier is extinguished.

When entering the reverse time setting state, the temperature display window displays the prompt "rd-" and the inversion identifier lights on.

Note: the total timing can be selected by minute and hour timing; positive turn, stop, reverse timing time is fixed to minute time.

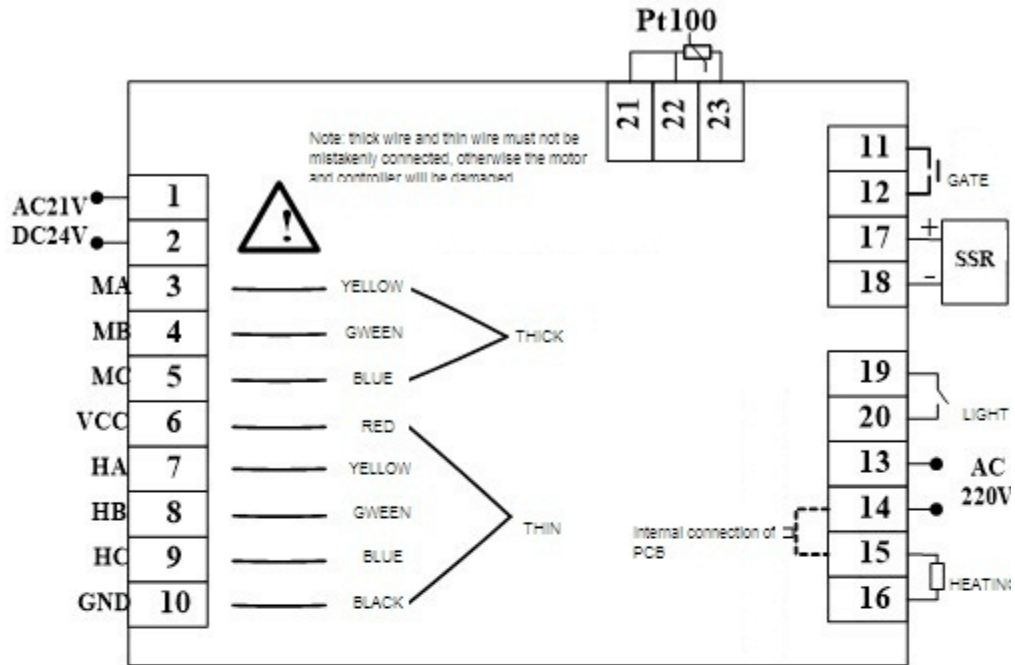
3. Long press "time" key about 3 seconds, the temperature display area display the password prompt "Lc", the speed display area password value, through the increase, decrease and shift

key to modify the required password value. Then click the "time" key, if the password value is not correct, the controller automatically returns to the normal display state, if the password value is correct, then enter the time internal parameter setting state, and then click the "time" key to modify each parameter in turn. If you press the "time" key 3 seconds, you can exit this state, and the parameter value is automatically saved. See the following table in detail:

Internal parameter table -6

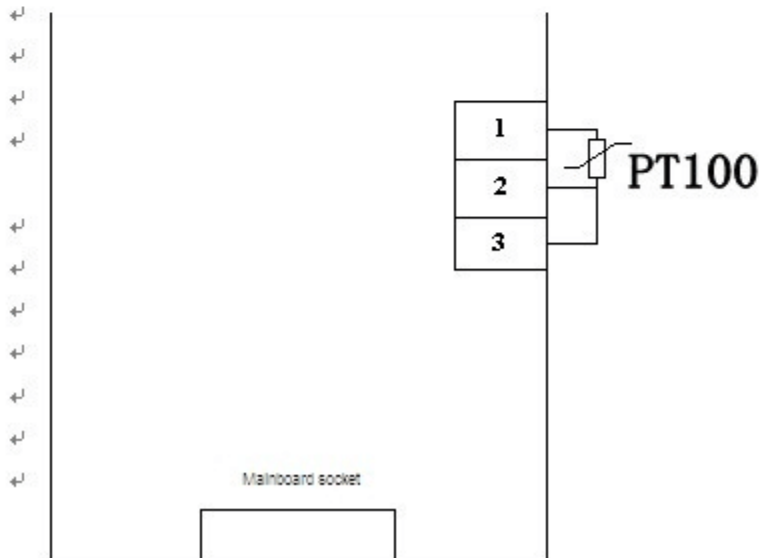
Parameter indication	Parameter name	Parameter function description	(Range) Factory Value
Lc	Password	The parameter value can be viewed and modified when "Lc=3".	0
ndT	Timing Pattern selection	0: start time after running, run time, stop speed, keep the temperature. 1: start time after running, run time, stop speed and temperature at the same time. 2: when the temperature reaches the set value, the timer starts, and the running time stops. 3: when the temperature reaches the set value, the timer starts, the running time goes to the same time, and the speed and temperature are stopped. When the timer starts, the "TIME" identifier begins to blink, and the time display area displays "End" after the timer is finished.	(0~3) 1
Hn	Total timing Timer Mode	0: timed with minutes, the "M" identifier is lit 1: timing by hour, the "M" identifier is extinguished Note: no modification in the operation of this parameter	(0~1) 0
SPd	Constant temperature deviation	When the "temperature measurement value \geq set temperature - SPd", it enters the constant temperature state.	(0.1~100.0°C) 0.5
EST	Time end Prompting time	When the timing is over, the buzzer prompts the time. Note: when "EST=9999", it represents a permanent prompt	(0~9999 sec) 60
rT	Total timing Time correction	Correction of the total timing error, Correction value = running time (seconds) - actual time (seconds) *10 / actual time (points)	(-999~999) 0

5、Wiring Diagram



MASTER DRIVE BOARD WIRING LAYOUT

- 1) Power out by AC24V Transformer, no matter of plus-minus when connection
- 2) MTZS/H/E-C1006 Series without Lighting function (without 19,20 terminal)
- 3) With MTZB Type meter, the PT100 Sensor can be connected to the 21/22/23 terminal, MTZS/H Type meter without 21/22/23 terminal, the PT100 sensor need to be connected behind the display panel



6、 General troubleshooting

Failure phenomenon	Fault analysis	Troubleshooting
Open machine without display	Power supply is not connected	Check if the power outlet with voltage
	The power plug is not plugged in	Check the reliability of the contact between the power plug and the socket
	The power switch is not open	Turn on the power switch on the right side of the instrument
	The damage of the fuse on the box	Replacement of a power fuse with the same specification
The measured temperature is higher than the set temperature and enters the state of high temperature alarm.	The instrument has not yet entered the state of constant temperature	Wait for a moment to deal with it
	The water level in the sink is too low	Increase the water level so that the water level is higher than the heating tube and sensor.
	There is a temporary high temperature phenomenon in the cavity	Correction of temperature setting
	Heater anomaly	Notify the factory to repair
The measured temperature is lower than the set temperature and enters the low temperature alarm state.	The instrument has not yet entered the state of constant temperature	Wait for a moment to deal with it
	The lid of the box is not covered well, and the heat is more exudes	Cover the lid well and do not open it frequently
	Heater anomaly	Notify the factory to repair
Instability of shaking plate	The instrument is not placed smoothly	Adjust the foot of the instrument to make the instrument smooth
	Foreign body barrier at the bottom of the plate	Removal of foreign body
	Control circuit fault	Notify the factory to repair
A sharp drop in the water level in the sink	Continuous high temperature operation and rapid evaporation	Replenish water in time
	Drain valve leaking	Repair or replace a drain valve
	Water tank seepage	Notify the factory to repair