

LABORATORY OVEN



(40L)



(70L 以上)

INSTRUCTION MANUAL

(GENERAL)

SAFETY INSTRUCTIONS

Due to the potential hazards associated with any electrical instrument it is important that the user is familiar with the instructions covering the capabilities, and the operation of the instrument. The user should ensure that all reasonable safety precautions are followed and if any doubt should seek professional advice before proceeding.

The instrument is designed for use by suitably trained, competent personnel in a controlled working environment and is intended for use as a LAB OVEN only.

The instrument is intended to be used in a residential, commercial and light industrial environment as laid down in EN 50081-1.

TESTEX cannot be held responsible for any unauthorised modifications to this unit.

WARNING

This unit contains hazardous live voltages. Under no circumstance should the user try to prevent or restrict the movement of parts or gain access to the internal circuitry, either personally or with the aid of foreign bodies.

All ventilation slots must be kept clear.

PROVISION FOR LIFTING AND CARRYING

When unpacking or moving this unit extreme care is required, owing to its physical construction and weight.

It is recommended that accepted lifting and carrying procedures are employed and that personnel wear the appropriate protective equipment e.g. safety shoes.

If the unit is to be move an appreciable distance/height it is recommended that it is moved via a suitable vehicle e.g. a fork lift truck.

OPERATING ENVIRONMENT

This unit is intended to be used in a residential, commercial and light industrial environment as laid down in BSEN 50081-1 and BSEN 50082-1.

The following list gives examples of locations in which the instrument might be located; workshops, laboratories and service centres. Locations which are considered to be commercial or light industrial.

CLIMATIC ENVIRONMENT

The unit is intended to operate within the following conditions

- i) Temp 5-55 deg Celsius
- ii) Humidity 30-95% RH
- iii) Altitude <2000m above sea level.

And it is intended to be stored in a temp range of -25 - +25 deg Celsius.

ELECTRICAL INFORMATION

This unit complies with BSEN 61010-1 1993 safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.

INSTALLATION CATEGORY AND POLLUTION DEGREE

Installation category III

Pollution Degree 2

ELECTRICAL SUPPLY

Voltage: 110V; 127V; 220V; 230V; 240V; 380V; 415V; _____ V

Frequency: 50Hz; 60Hz

Phase sequence: 1 Phase; 3 Phase;

WARNING LABELS

Number	Symbole	Publication	Description
1		IEC 417, No. 5031	Direct current
2		IEC 417, No. 5032	Alternating current
3		IEC 417, No. 5033	Both direct and alternating current
4		IEC 617-2, No. 02-02-06	Three-phase alternating current
5		IEC 417, No. 5017	Earth (ground) TERMINAL
6		IEC 417, No. 5019	PROTECTIVE CONDUCTOR TERMINAL
7		IEC 417, No. 5020	Frame or chassis TERMINAL
8		IEC 417, No. 5021	Equipotentiality
9		IEC 417, No. 5007	On (Supply)
10		IEC 417, No. 5008	Off (Supply)
11		IEC 417, No. 5172	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION (equivalent to Class II of IEC 536 -see annex H)
12 (see note)	 Background colour - yellow; symbol and outline - black	ISO 3864, No. B.3.6	Caution, risk of electric shock
13	 Symbol under consideration		Easily-touched higher temperature parts
14 (see note)	 Background colour - yellow; symbol and outline - black	ISO 3864, No. B.3.1	Caution (refer to accompanying documents)



Instructions for Safety

Contents hereinafter are extremely critical to be practically followed.

I. Instructions for Safety:

! Dangerous (possible to cause serious loss to properties or injuries to personages)

1. The Product must be safely grounded (make sure not to use the ZL or neutral line as the earth wire).
2. Before, make sure that the power supply has the voltage in compliance with the requirement of the Product.
3. For the Product, a separate power socket should be used and make sure the plug and socket is properly grounded.
4. With the production running, it is not allowed to pull out and plug in the power plug at random without turning off the power switch.
5. Random extension or cutting of the product's power cable is prohibited.
6. No inflammable, explosive, evaporative and corrosive articles will be placed in for drying.
7. With the product running at a high temperature of above 80 °C , don't touch the box door, vision-light door and surrounding surface to avoid any scald.
8. Don't place hands or articles into the air inlet or outlet (trough).
9. Unauthorized repair is not allowed and such authorized repair should be carried out by the special personage.

! Warning (Unauthorized repair may cause losses to properties or injuries to personages at one's responsibility)

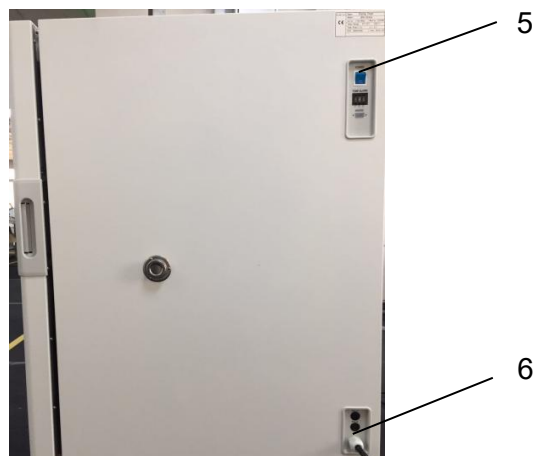
1. Make sure to read and understand thoroughly the Product's Operating Instructions before the operation may be carried out.
2. To take out the power plug, make sure not to pull directly the power cable.
3. In case of any one of the following circumstances, make sure to take out the product's power cable:
 - 3.1 To change the fuse tube;
 - 3.2 Pending for checking and repair in case of any breakdown with the product;
 - 3.3 The product will not be used for a long period of time;
 - 3.4 To shift the product;
4. With the product switched on, make sure to turn on the fan and use the up difference alarm.

! Attention (Without doing so, it may influence the lifetime and cause the normal operation of the product)

1. The product should be located on the solid and hard surface to keep it in a horizontal mode.
2. Keep certain space around the product.
3. The product must be used in certain conditions.
4. Avoid opening or closing the box door heavily; otherwise doing so will cause the falling of the box door, damage to the product and injury accident.

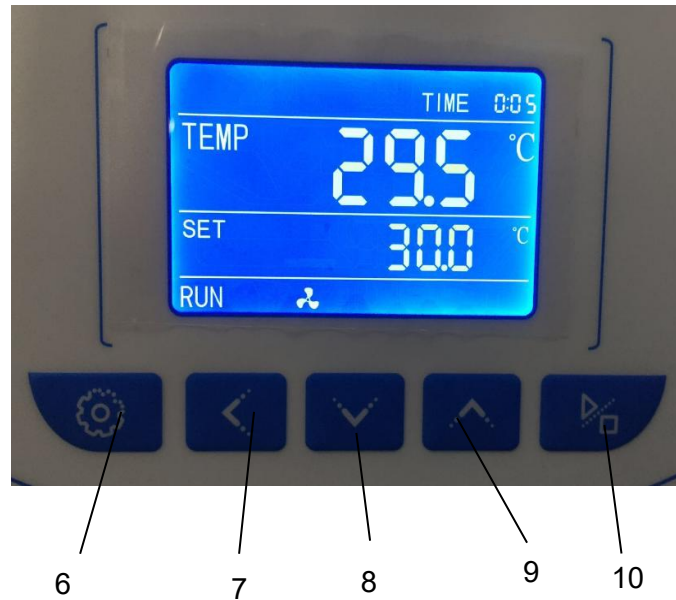
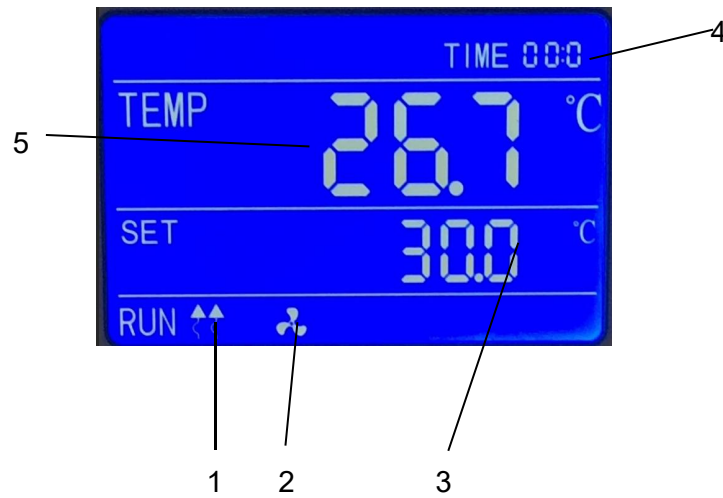
II. Product Profile

1. Outlook



- | | | |
|-----------------|-----------------------------------|---|
| (1) Box Door | (2) Damper Regulator | (3) Display Panel of Thermal Controller |
| (4) Door Handle | (5) Specification and Model Plate | (6) Power Switch |

2. Operating Panel of Meter (LCD Screen)



- | | | |
|------------------------------------|---|--------------------------|
| (1) Output Model (MODE) | (2) Air output | (3) Set Temperature/Stop |
| (4) Total Time for Set Temperature | (5) Signs for Measuring Temperature/Parameter | |
| (6) Model and Confirm/Select Key | (7) Shift Key | (8) Decrease Key |
| (9) Increase Key | (10) Start/Stop Key | |

3. Overview of Structure and Function

BPG Series Electrical-heating Constant Temperature Incubator is composed of the case, thermal control system and air circulation system.

The case is made of fine-quality steel plates by punching, with the surface plasticized, while the chamber is made of fine-quality of galvanized sheet or mirror-face stainless steel sheet (optional for the customer). The thermal insulating layer is filled up with the mineral wool, while the box door is installed with thermal controller display screen and operating buttons.

The main component of the thermal control system is the thermal controller, which is a digital circuit controller with CPU (the Thermal Controller for short). The thermal controller has the LCD (70×42mm) white display screen, with such functions as screen display, PID regulation, time control, thermal control error correction, difference alarming and protection. The thermal cell of Pt100 platinum resistor, heating element of metal-pipe heater and the thermal controller form an enclosed heating control system.

The air circulation system is composed of fan and air duct. The fan is rotated to force the circulation of cool and hot air in the chamber so as to raise the evenness of temperature in the chamber.

The product has such advantages as high accuracy of thermal control, less overshoot, small fluctuation and differential over-temperature protection. According to the needs of the customer, an independent over-temperature protection system can be equipped (optional) to raise further the safety of the product.

II. Use of Product

Preparation for Operation

The product should be operated in the following conditions:

1.1 Ambient temperature: 5°C~40°C,

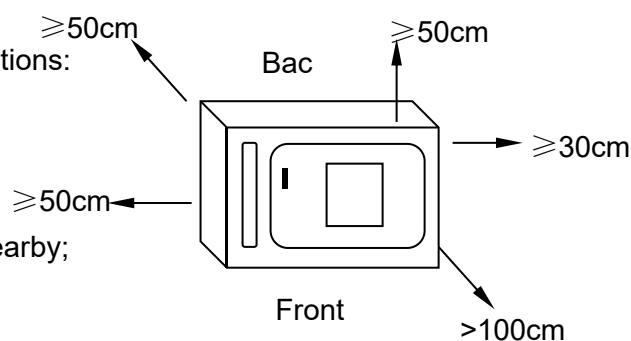
Relative humidity: < 85%;

1.2 Without any strong vibration and magnetic field nearby;

1.3 To be place horizontally and evenly, in the room without any serious dust, direct sunlight and corrosive gas;

1.4 For the power supply voltage of the product, see Technical Index;

1.5 Place rationally and adjust the shelf position and quantity, while the articles placed into the chamber must have certain space nearby. The weight should be proper to avoid bending the shelf.





2. Power On

2.1 Put in the goods for cultivation; press the button on the handle with one finger to close the door and then release the button;

2.2 In the normal cultivation of goods, close the two air doors on top of the box. The opening of air doors may influence the accuracy of thermal control.

2.3 With the power on, the meter's display screen is lit and the operating sound of the fan can be heard;

2.4 After the self-checking for about 4 seconds, the thermal controller will enter the operating mode; the TEMP in the screen is the measuring temperature, while SET is the set temperature. With $TEMP < SET$,

“MODE” screen displays the graph of , indicating the thermal controller is in the mode of heating up, while the right down screen displays the output capacity. In case of power cut, alarming, the graph of  is displayed below “ALARM” on the screen.

2.5 Check Accuracy of Thermal Control

2.5.1 Put the 0.5°C graduation mercury thermometer (or resolution 0.1°C digital thermo-detector) in the chamber of the product;


The temperature probe of the thermometer should be in the geometric center of the effective space of the chamber





2.5.2 At any point within the thermal control range of the product thermal control, set SET thermal control value. When TEMP measuring value equals to the set value, keep the constant temperature for about 1~2 hours (the time of constant temperature depends on the specification of the product) and observe that the difference between the actual temperature value measured by the mercury thermometer and the measured value TEMP displayed by the thermal controller should be lower than or equivalent to the fluctuation of thermal control.


3. Temperature and time Setting

3.1 At the factory, the product is normally set: SET=80 °C;

3.2 In case of need to change the setting of operating temperature:

3.2.1 Long press down the key , when the screen appears the RUN mode.

3.2.2 Press down the key , Select the temperature or time parameters to modify; When the cursor flashes, use the key  for moving left or right, the key  for the data increasing, the key  for Data reduction.

3.2.3 After all parameters are modified, then press the key , so that the machine goes into working mode.

4. Method for Setting up Different Alarm

The rational setting of up difference can play a protecting role for the system's thermal control difference or out-of-control, which must be used with the product in operation.

4.1 At factory, the product is normally set as AL=2~3: i.e., the alarming temperature is: (SET+AL) °C

4.2 Press the key OK for about 4 seconds and release when TEMP displays the sign “ ” (indicating the thermal controller enters the parameter menu), but make sure to open the electronic lock “Lk” before correcting the relevant parameters with the keys ↓ and ↑ .

4.3 Procedure for unlocking: upon entering the parameter menu, press several times the key OK; when TEMP displays the symbol “ ”, use the key ↑ to change SET value from “0” to “18” to open the electronic lock (afterwards, with no key pressed for 1 minute, the thermal controller will automatically return to the operating mode);

4.4 Press several time the key OK; when TEMP displays the symbol “ ”, use the keys ↓ and ↑ to set the rational up differential value. With AL parameters corrected, press OK for confirmation;

4.5 Press again the key OK several times to display the symbol “ ”; use the key ↓ to change “18” for “0”, to close the electronic lock.

Note: it is also possible to turn over the electronic lock after changing all the parameters to be corrected.

5 Method for Raising Accuracy of Thermal Control

5.1 With the product used for a certain period of time, it is necessary to check the accuracy of thermal control as per method of Section 2.6. If exceeding by $\pm 1^{\circ}\text{C}$, the following method can be adopted for correction:

5.1.1 Enter the parameter menu of the thermal controller (see Section 5.2)

5.1.2 Open the electronic lock (see Section 5.3)

5.1.3 Press again the key OK several times to find the symbol of “ ”,

$$\text{As per PK} = 4000 \times \frac{(\text{SET Value} - \text{Mercury Meter Value})}{\text{Mercury Meter Value}}$$

Upon calculating with the formula, use the keys ←, ↓ and ↑ for correction based on the factory PK value

Note: if it is not accurate with one correction, the correction can be repeated up to the compliance.

5.1.4 In case of need to change other parameters, press continually the key OK and the symbol displayed by TEMP on the screen; SET value is the corresponding parameter value of the symbol.

5.1.5 With each parameter corrected, it is necessary to press the key OK for confirmation. To correct the parameter, upon completion of each correction, press the **↵** key to return.

6. Instructions for Use of Operational “Over-temperature Protector”

The over-temperature protector is an independent protection system. When the temperature is out of control due to the failure of the thermal controller and the room temperature of the chamber reaches the set value of limiting temperature in the over-temperature driving plate, the over-temperature protector will automatically cut off heating and alarms.

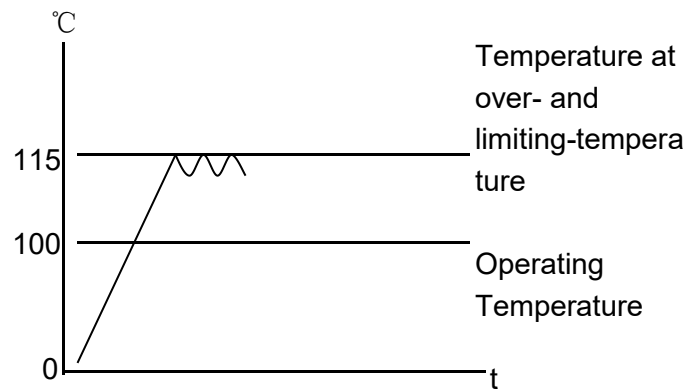
(As shown in the left diagram) when the room temperature of the chamber is lower the limiting temperature value, the protecting system will be off and the meter resumes to normal.

The particular operation is as follows:

6.1 The set value of limiting-temperature should be greater than or equivalent to $(SET+AL)+ (2\sim5)^{\circ}C$

6.2 See Figure 1: Set the required limiting temperature as per need by using the “+” “-” buttons on the over-temperature setting plate of the panel.

For example: SET=37°C,AL=5, then set 42°C (i.e., the setting plate is set with 042).



7. Maintenance and Instructions

1. Upon completion of each operation, first switch off the power. Open the box door and wait till the temperature is cooled down in the box before taking out the cultivated goods.
2. In case of keeping the product idle for a long period of time, it is necessary to clean the product in and out. Pull out the power plug and cover it with the plastic anti-dust cap.

3. If the environment for storage has a high humidity, it is necessary to regularly (about 1 month) power on for heating to dehumidify.

4. Before using it again or in case of any change in technical requirement, it is necessary to check the accuracy of thermal control (see the relevant sections).

5. Except for change of such parameters as **SET, AL, Pk, Lk**, to change other control parameters, it is necessary to obtain consent from our Service Center or such parameters can be adjusted by the special personages.

8. Appendix

1. Table of Parameters

Prompts	Names	Setting range	Description	Factory set value
/AL	Up difference alarm setting	0~ full range 0.0~ full range	When the temperature exceeds (SET+AL) value, ALM indicator is lit and the buzzer sounds: cutting off the heating output	
/CL	Cooling Control Setting	0~ full range 0.0~ full range	When the temperature exceeds (SET+CL) value, COLD lamp is lit: cooling is connected and the compressor starts.	Not available
/P	Proportional Band	1~ full range 1.0~ full range	Only for the heating side. The bigger P, the lower the system increase; reduction of P can raise the controlling accuracy of the system and eliminate the steady-state error	
/I	Integral Time (Readjust Time)	(0~3600) seconds	The bigger I, the integral time constant, the weaker the integral function; the system is stable.	
/d	Rate Time (Pre-regulated Time)	(0~3600) seconds	The bigger d, the rate time constant, D, the stronger the rate function so as to overcome the over-adjustment; I=0, d=0 is semi-proportional control; normally, d takes twice of I or equals to I.	
/Ar	Overshoot Control (proportional re-setting)	(0~100)%	Changing output capacity and increasing Ar can raise the heating rate and benefits eliminating the steady-state error; reducing can avoid overshoot.	
/T	Heating period	(1~300) seconds	The output of silicon control is normally (2~3) seconds; as for the equipment with comparatively large surplus capacity, increasing T can reduce the steady-state error of PID control.	
/Pb	Zero Setting (Intercept)	-100~100 -100.0~100.0	When the meter's zero error is comparatively big and full-range error is comparatively small, adjust the value; normally Pt100 seldom adjusts the value	
/PK	Full Setting (Slope)	-(1000~1000) seconds	When the meter's zero error is comparatively small and full-range error is comparatively big, adjust the	

			value; PK=4000×(specific value – actually displayed value)/actually displayed value; normally Pt100 adjusts the value first	
/CT	Cooling Control Delay	(0~3600) seconds	When the measuring value reaches the alarming value, the alarming relay will output only after CT time	Not available
/dp	Decimal Setting	0 or 1	dp=0, display resolution is 1℃ dp=1, display resolution is 0.1℃	
/Ft	Filtering Coefficient	0~255	The smaller the filtering coefficient, the more sensible the display reaction, but it may cause fluctuation; otherwise, the display is comparatively stable.	
/LK	Password Lock	0~255	With LK=18, the above parameters can be changed (with the meter in operation, AT lamp is not lit)	

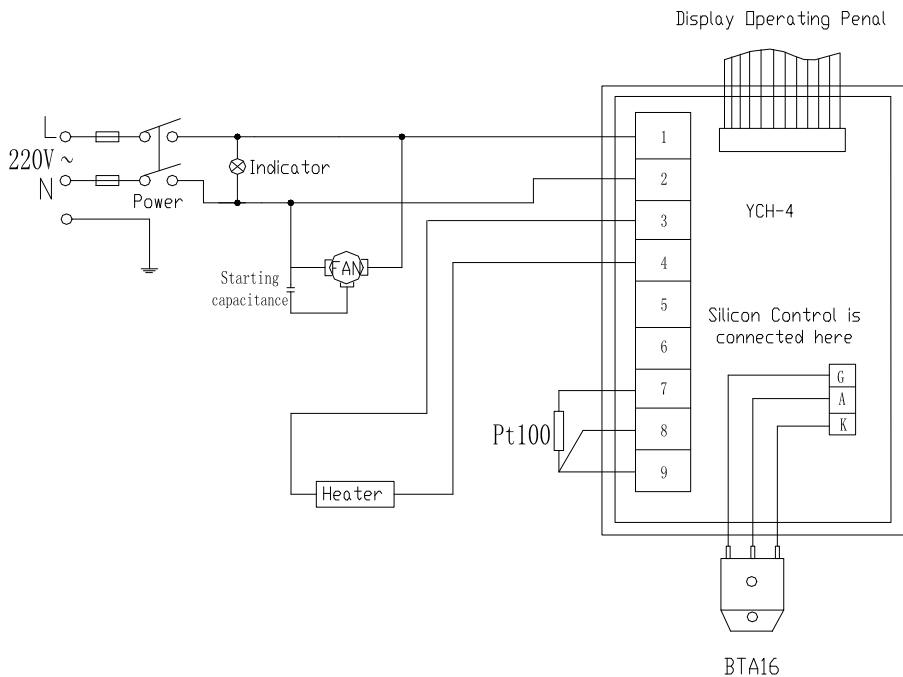
2. Reasons and Handling of Breakdowns

Description of Breakdown	Assumption of reasons for breakdown	Method for troubleshooting
No power supply upon start-off (the indicator is lit)	There is no electricity at the power socket or the plug cable is not well connected	Repair
	The box's power cable is broken or the plug is not properly connected	Repair or re-plug
	Power switch is out of order (or not on)	Replace or turn on the power switch
	Fuse is burnt out	If it burns out again after replacement, it is necessary to check if the switch, motor, heater, thermal controller and parts any short-cut or leakage (with insulation resistance being 0) and repair before re-start
Meter displays "□□□□"	Sensor is out of order or cable is cut (off)	Repair or replace Pt100
No heating	Error in time setting	ST≠0 or "ST≠ (heating + constant temperature + cultivation) minute
	Thermal controller is out of order (without output)	Replace
	The dual-way silicon control is not connected	Replace (Model: BTA16 or BTA26)
	The heating tube's connection is off or short-cut	Repair or replace
Inaccurate thermal control (big	Heating graph is not lit and the temperature rises	Replace the silicon control out of order

steady-state error) or heating up out of control (buzzer beeps)	Fan is out of order (not running)	Turn on or replace the fan
	The ambient temperature has excessively small temperature difference with the set temperature	Minimum thermal control temperature: RT+10°C
	Pt100 is not properly connected and the resistance value becomes bigger	Reconnect
	Ar, P and other parameters are not properly set	Re-set
	Pb and Pk are not accurately adjusted	Regulate the set Pb, Pk
Abnormal or big noises	The fan's bearing is out of order and lacks lubricant oil	Add lubricant oil or change the fan
	In friction with the rear air-duct penal	Repair (or place the washer)

3. Illustrative Diagram for Connection

Changes will not be notified (if any)



(The element is fixed on the inner wall of case along with the radiator)