

# Operation Manual



BICL 300 & 400 series

## Cooled 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 Prompt for safety



Prompt for safety:

**! Dangerous** (It might cause serious loss of property or personnel casualty)

1. The product must be earthed reliably and keep far from the interruption of electromagnetism (be sure not taking the zero line and neutral line as earthing line).
2. Before putting into use, confirm that the voltage of power supply is in conformity with the specification of the product.
3. An individual power socket shall be provided for this product, and ensure the earthing for plug and socket is all right.
4. It is not allowed to pull out or plug in the power plug without turning off the power switch during the operation of the product.
5. It is forbidden to extend or cut short the power cable at will.
6. It is not allowed to make bold to repair the product. In case of entrusting repair by our company, the work must be done by professional staff.

**! Warning (It might cause heavy loss of property or personnel casualty)**

1. It can be operated only after the instruction manual is fully read and understand.
2. Please do not draw the power cable when pulling out the plug.
3. The power plug of this product must be pulled out in case of one the following cases:

3.1 Replacing fuse tube;

3.2 The product goes wrong and standing by for inspection and repairing;

3.3 The product will not be used for long time;

3.4 When moving the product;

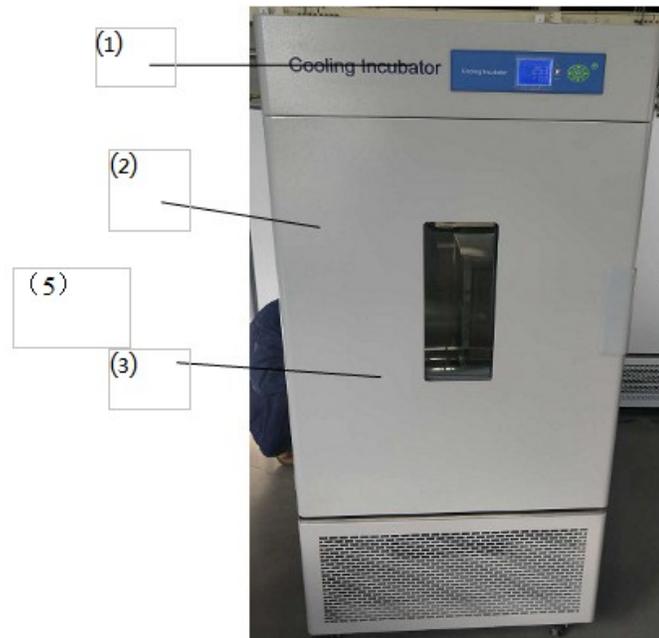
**! Notice It might affect the service life and lead to malfunction of the product)**

1. In case of handling the product, the obliquity should not be large than 45°, so as not to damage the refrigeration system.
2. When the product is transferred to the position, it shall be shelved for one to two days before operation, so as to allow the refrigeration system working in normal condition and extend its service life.
3. The product shall be set on rigid and firm plane to keep it at level status.
4. Enough space shall be remained around the product.
5. The product must be used under a certain condition.
6. Don't open/close the door rudely, or it will result in fall off of the door, damage of the product and injury accident.
7. In case the product is shelved for a long time, the humidity elimination shall be done regularly to prevent relevant parts from damaging.

# 02 Brief Introduction

## 1. Outside View

Back Side



### BICL 300 series

- (1) Control Panel
- (2) Door
- (3) OBW
- (4) Name Plate
- (5) Power Cable

## 2. Outline of Structure and Functions BICL 300 Series Incubators consist of:

▲Case—the housing is made of steel sheet by punching, with the surface sprayed with plastics; the inner chamber is made of mirror stainless steel, with four semi-circle corners extremely easy for cleaning; the spacing of shelf panels inside the case can be adjusted.

▲Illumination—the case is provided with the lighting lamp inside; the user can replace the 8W fluorescent lamp with the 8W ultraviolet lamp for the sake of sterilizing the case inside before and after the experiment.

▲Circulation-- the case is provided with cool and hot air ducts inside for the air blower to enhance the smooth air circulation so as to improve the uniformity of temperature inside the working chamber.

▲Control—Digital display MC temperature controller, with the sensor using Pt100 resistance, for accurate, stable and reliable temperature control.

▲Protection—with the delay start (3min) and overheating protection functions for the compressor;

With multistage independent overheating alarm protection system:

[Stage-I overheating protection] the temperature controller is equipped with the deviation alarming function, with which the user can adjust the deviation as per needs, with AL1 parameter set automatically.

[Stage-II overheating protection] When the actual temperature exceeds the protection value set for high temperature limit, the device will automatically cut off the power for the heating part and send the light and sound alarm. Since the circulating fan is still running during alarming, when the temperature is below the temperature limit, the alarm will be automatically canceled. (Optional)

[Stage-III overheating protection] Since the electric heating tube circuit is in series with an overheating protector, when the temperature inside the case is up to about 70°C, the temperature relay will be automatically off to avoid any incidence of damage; when it is below 70°C, it will resume to normal.

▲Convenience—The biochemical incubator is provided a large-area double-glass OBW (observation window) for observing the incubated materials inside directly with opening the door.

▲Extension of functions-- a. optional with the pin printer, for real-time printing and long-term storage of data;

b. Optional with RS 232/RS 485 interface, for remote control;

c. Optional with LC temperature controller;

## 03 Application

### 1. Preparation of application

The product shall be used in the following conditions:

1.1 Ambient temperature: + 5°C~35°C,

Relative humidity: <85%;

1.2 Power Supply: (220) V (50) Hz;

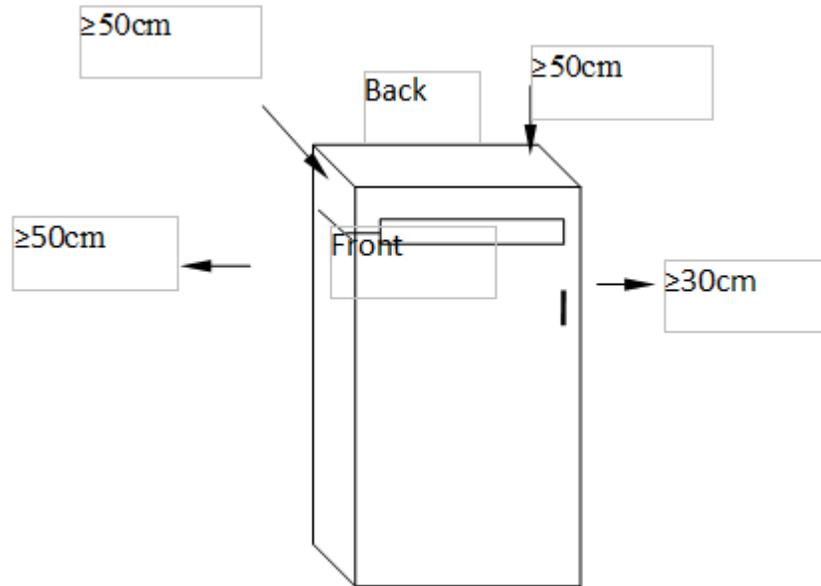
1.3 Air pressure: (86~106) kPa;

1.4 Altitude: < 2000m;

1.5 Without high vibration source and high electromagnetic interference around;

1.6 The product shall be placed steadily and horizontally indoors without heavy dust, direct sunlight and corrosive gas;

1.7 Adequate spacing shall be kept around the product (as shown in the figure above) for the sake of heat radiation.



## 2. Power-on for Starting

### 2.1 Operating Panel

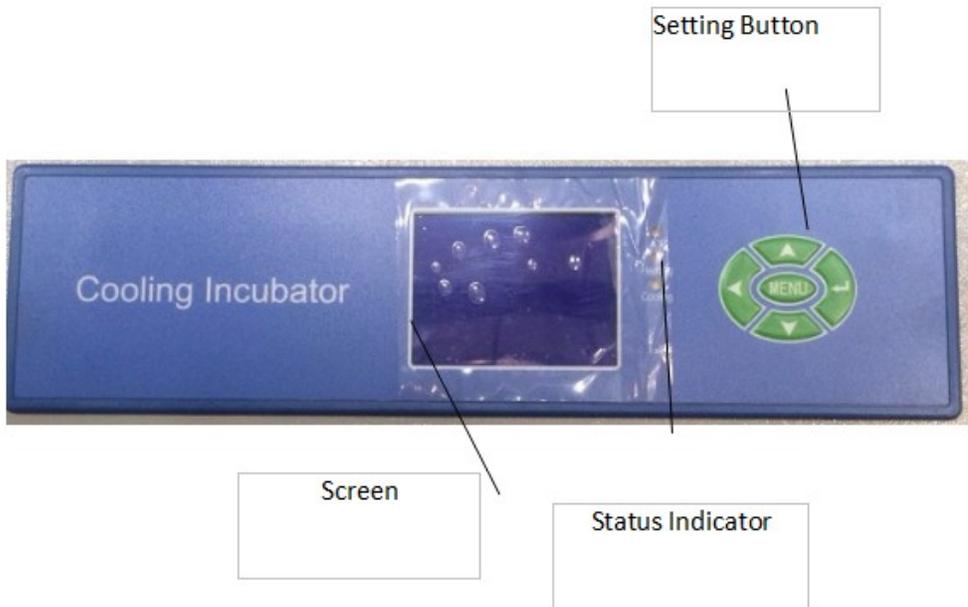


Figure 1

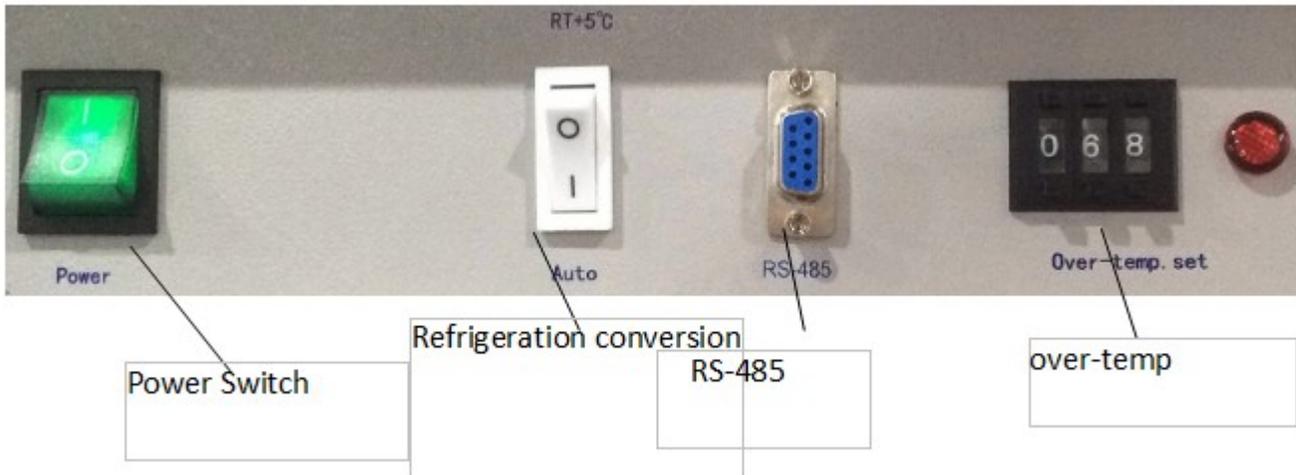
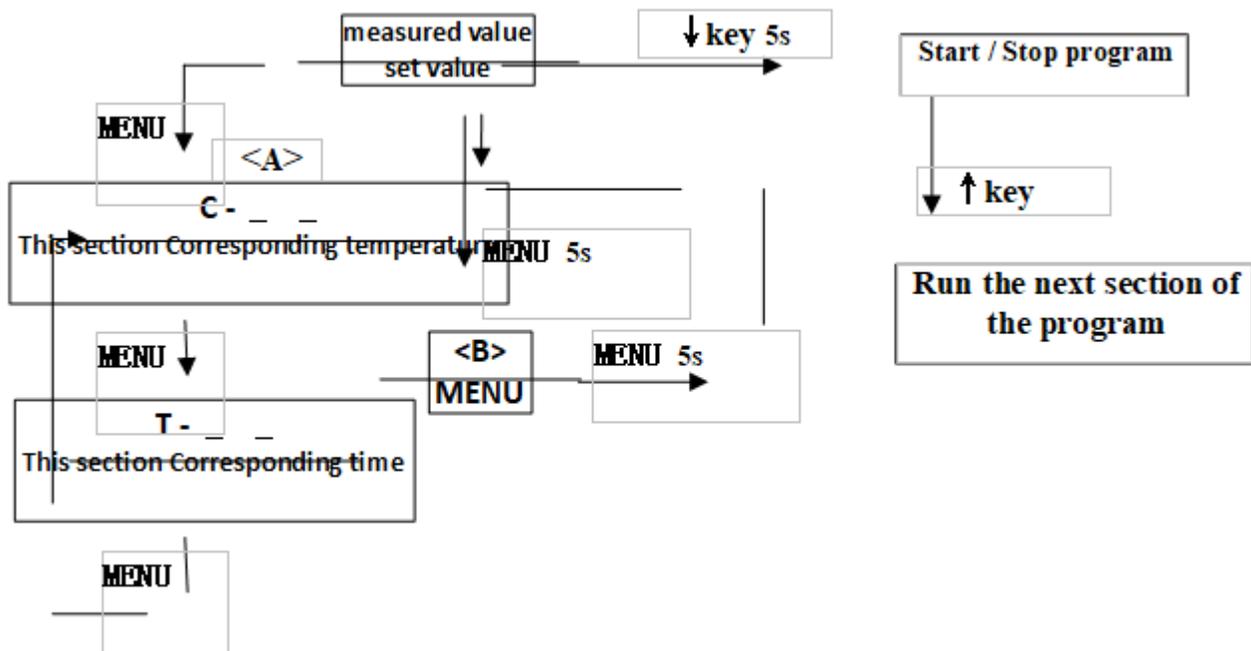


Figure 2

2.2 Turn on the power switch so that the motor runs; the temperature controller's PV screen displays the measured temperature and SV screen displays the set temperature. Then the incubator will be in a state of running.

3. Call-out Sequence of Functions

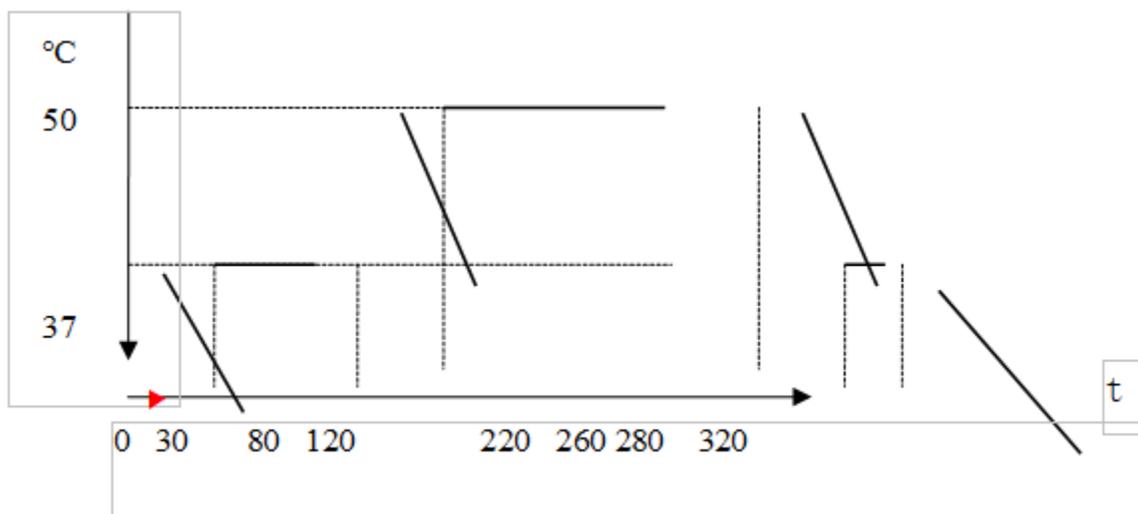


Tap the MENU button to enter the user menu (A menu)

Parameter name	Function	Set range
C-xx	temperature setting	100%FS
Specified XX <b>Corresponding temperature</b> , XX range 01~30, is 1~30 segment.		
t-xx	Time setting	0~999 minute
Specified XX <b>Corresponding time</b> , XX range 01~30, is 1~30 segment.		

4. Application examples

With the application curve shown below



<b>C-01</b>		<b>C-02</b>		<b>C-03</b>		<b>C-04</b>		<b>C-05</b>		<b>C-06</b>		<b>C-07</b>
37	→	37	→	50	→	50	→	37	→	37	→	Room temperature
<b>T-01</b>		<b>T-02</b>		<b>T-03</b>		<b>T-04</b>		<b>T-05</b>		<b>T-06</b>		<b>T-07</b>
30		50		40		100		40		20		0

The first paragraph of the program: The starting temperature defaults to room temperature, the target temperature is the value of C-01, the segment running time is T-O1; (Target temperature is higher than room temperature, indicating that the paragraph is the warming phase)

The second paragraph of the program: The starting temperature is the value of C-01, the target temperature is the value of C-02, the segment running time is T-O2;

(Target temperature and starting temperature of the same, indicating that the segment is the Insulation stage)

Programming and so on.

## 5. Use of Switch

5.1 (See Figure 2) When the set temperature is higher than the ambient temperature by 5°C, please select "RT+5°C";

(With the cooler in the OFF state)

5.2 When the set temperature is close to the ambient temperature or lower than the ambient temperature by 5°C, please select "AUTO";

(With the cooler in the RUN state)

## 6. Calibration of Temperature Control Accuracy

6.1 Place one 0.1°C scaled mercurial thermometer (or digital temperature tester with the resolution of 0.1°C) inside the working chamber; the mercurial sensor of the thermometer should be in the geometric center of the effective space inside the working chamber

6.2 Select any point within the temperature control range for setting SV; when the measured PV equals to SV, keep the constant temperature for about 1~2 hours (which will depend on the specification of the product) and observe the mercurial thermometer: the difference between the actual measured temperature value and the measured PV displayed in the temperature control instrument should be less than or equal to  $\pm 0.5^{\circ}\text{C}$ .

## 7. Increase of Temperature Control Accuracy

7.1 Correction of Bias between Measured Temperature and Actual Temperature inside Working Chamber

7.1.1 Press "MENU" key for more than 5s (to enter B Menu); when PV screen displays "ALI", release, then press again Press MENU key several times to find the "L C K" prompt;

7.1.2 Press "↑" key so that SV screen displays 18 (i.e., unlock) ;

7.1.3 Press again "MENU" key several time to find "SC" prompt of the control parameter to be adjusted; press the functional key so that the control parameter is displayed as the required value;

$$\text{SC} = \text{original SC value} + (\text{actual temperature} - \text{PV displayed value})$$

7.1.4 According to the above formula, calculate "SC" value for input (in case of failing to adjust correctly once, it can be repeated several times till complying with the standard) .

7.1.5 If SC is already adjusted to the maximum (out of the range) and cannot be adjusted further, set "SC" to 0;

7.1.6 Press "MENU" key several times till PV screen displays "H L"; change "H L" to 1.000 and then return to the running mode;

7.1.7 In case of selecting, within the range of temperature measurement, two testing points, such as P1, P2 points, the gradient will be:

$$\text{H L} = (\text{Glass P2} - \text{Glass P1}) / (\text{Instrument P2} - \text{Instrument P1})$$

(Make sure to keep three decimal points)

7.1.8 Where it is still incorrect after setting a new "H L" parameter, as per steps in 8.1.3, adjust

again "SC" (repeatedly till complying with the standard) .

7.1.9 If there is still a bias, correct repeatedly as per 8.1.3 and 8.1.4;

7.1.10 Upon completion of adjusting "H L" and "SC", press "MENU" key to find "LCK" prompt, press "↓" key so that SV screen is displayed as 0 (lock), press "MENU" key for more than 5s to return to the running mode so that the instrument executes the revised parameter.

7.2 Control of Unstable Temperature (Excessive Overshooting

7.2.1 Refer to 8.1.1 for entering B menu;

7.2.2 Increase the parameter "P" (proportional band) , by about 0.5 each time;

7.2.3 In the meanwhile, change the parameter "I", by increasing 100s each time as well as change the parameter "D",  $D = 1/4$ , and heat up again for observation till the temperature overshooting complies with the requirement;

7.2.4 When the required temperature is relatively low, to reduce the temperature overshooting, the secondary setting can be applied.

(For instance: when the required temperature is 40°C, first set it to 38°C, wait for the temperature to become basically stable before setting to 40°C, so as to reduce or even stop any temperature overshooting.)

## 8. Application of Optional "Overheating Protector"

**Overheating Protector is an independent protection system. When the temperature is out of control due to the fault of the temperature controller and the temperature inside the working chamber is up the pre-set value of temperature limit on the overheating driver panel, the overheating protector will automatically cut off heating and alarm.**

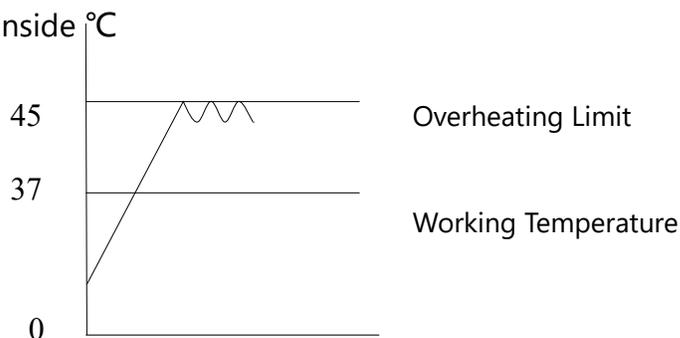
(As shown in Left Figure) when the temperature inside °C

the working chamber is lower the set

value, the

protection system is cancelled and the

instrument



Returns to running. It is repeated till the fault

is eliminated.

Particular operating is as follows:

8.1 The set value of temperature limit should be  $\geq$

$$(SV+AL) + (3\sim 5) \text{ } ^\circ\text{C}$$

8.2 Use +/- button the overheating setting driver panel to set the required temperature limit

For example: SV=37°C, AL=3

The set value of temperature limit should be set as 45°C

**Note:** as per needs of the user, the product can be provided with the optional 30-section LC /ND controller, which can be equipped with the optional RS 232c/485 communication interface, Epson desktop or panel-embedded printer, etc.



## 04 Maintenance and Instructions

### 1. Conditions for Storage

1.1 Ambient temperature: (-40~+55°C)

1.2 Relative humidity: ≤ 95% (25°C)

1.3 Air pressure: (50 ~ 106) kPa

1.4 Altitude: < 2000m;

### 2. Method for Dehumidifying

2.1 If the device stands idle for long, the power cable should be pulled out to avoid any human injury;

2.2 Regularly (generally once every quarter) run it for 5 hours as per application conditions so as to eliminate moisture on the electric parts and avoid any damage to the relevant parts.

2.3 Set the temperature at 40°C` and open the door every two hours to let out the moisture;

2.4 After handling, pull out the cable plug-in and wipe out the water from the case before storage.

### 3. Defrosting

3.1 The device runs at a low temperature (lower than the ambient temperature);

3.2 The cooling effect is not ideal (cooling slowly or causing a static error);

3.3 Every 15 days, "defrost": set at 40°C and keep the device running more than 3 hours;

3.4 After defrosting, reset the required parameter for running.

4. After use, turn off the main power supply and clean the water from inside the case.

5. Before using again or changing the technical requirement, check the temperature control accuracy. (Refer to III.3)

6. Except for such parameters as SV, SC, H L and L C K, that can be changed, other control parameters shall be adjusted subject to the consent of our Service Center or by the professional persons.

## 05 Appendixes

### 1. Technical Specifications

The product is manufactured as per enterprise standard Q/TIWY 11.

#### 1.1 Biochemical Incubator

Index	Model			
	BICL-301	BICL-302	BICL-303	
	BICL-401	BICL-402	BICL-403	
Power supply	220V 50Hz			
Rang of controlled temperatures	300 Series:-20°C~65°C		400 Series:-40°C~65°C	
Temperature resolution	0.1°C			
temperature stability	±1°C			
Size of operating room ( mm)	400×300×42 0	500×405×60 0	550×405×67 0	680×505×73 0
Overall dimensions ( mm)	660×720×93 0	685×850×14 10	785×810×14 40	865×910×15 40
Refrigeration agent	300 Series: R404A			
Input power ( W)	1100/1500/2 800	1100/1450/4 100	1300/1700/5 100	1500/1900/6 100

Table 1

2.

Tables  
of

## Functional Parameters

B Menu: press hold MENU key for 5s to enter

Table 2

Prompt	Name	Setting Range	Ex-factory Setting	Ex-factory value
$\overline{AL1}$ / AL1	Upper allowance alarm setting	(-99.9~999.9) °C	When temperature > SV+AL value, buzzer sounds, cut off heating output, SV screen synchronically displays "set value / ———", press any key for silence;	
$\overline{COLD}$ / COLD	Cooling control setting	(-99.9~999.9) °C	When temperature > SV+CL value, COLD lit, cooling contact connected to start compressor	
$\overline{SEC}$ / SEC	Cooling start delay	(1~180) s	When actual temperature > (SV+CL), temperature controller, vide SEC delay, triggers cooling signal, cooling delays, COLD lamp flickers;	
$\overline{SC}$ / SC	Display value Error correction	(-20~20) °C	Measure actual temperature inside for comparison with PV displayed temperature to correct display error	
$\overline{ATU}$ / ATU	Auto-tuning command	0, 1	0: OFF, 1: ON. Auto-tuning of one group of PID parameters.	Not recommended
$\overline{P}$ / P	Proportional band	(0~100) °C	Heating proportion control, the higher P, the lower the system gains; reduction of P can increase system control accuracy and eliminate static error.	
$\overline{I}$ / I	Integration time (re-adjusting time)	(1~4320) s	Constant of integration time; the bigger I, the weaker the integration and the system is stable.	
$\overline{d}$ / d	Differential time (pre-adjusting time overshooting)	(0~1200) s	Constant of differential time; the bigger d, the stronger the differential is, and able to overcome over-tuning; generally d takes (1/4) times of I.	
$\overline{T}$ / T	Heating period	(1~60) s	SCR output is generally (2~3)s; for the device with higher residual power, T is tuned higher to reduce the static error of PID.	
HL/HL	Gradient	0.500~1.500	Ensure consistent accuracy of temperature control in entire range	
ADDr	Mailing address			
$\overline{LCK}$ / LCK	Password lock	0, 18	18: unlock, 0: lockup,	

All have been strictly tested before dispatching from the factory and shall not be corrected when the technical indexes meet the requirement and the running is normal.

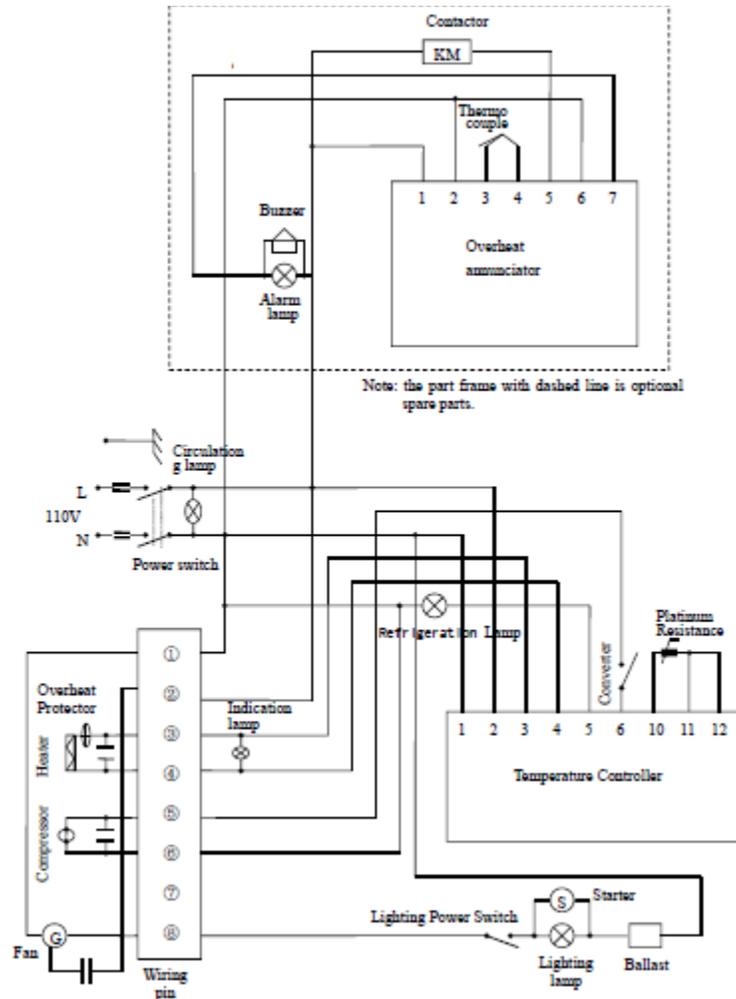
## 06 Troubleshooting

Faults	Possible causes	Action
Without power upon switching on (Indicator not lit)	Power socket is inactive or in poor contact	Repair
	Power cable is broken or not properly plugged-in	Repair, re-plug-in
	Power switch is damaged (or not on)	Replace, turn on the power switch
	Fuse burnt out	If burning out again upon connection after change, check if motor and other parts are in short-circuit (damaged motor will smell, wire coil turns black) or case connected (insulation resistance as 0), repair before starting
Instrument no display	Wire off or instrument burnt out	Connect again or change instrument
Instrument displays“- - - -”	Sensor damaged or wire broken (off)	Repair or change Pt100 (100Ω, 0.3Ω/°C at 0°C)
	Temperature out of control range	Use proper temperature value as specified
No cooling	Switch not in proper position	Set to proper position
	Compressor damaged or pipe blocked or coolant leakage	Change, clear, add coolant
	Compressor overheating protector actuated	Restore naturally when compressor temperature drops
	Compressor protector burnt out (with burning smell)	Change protector
Temperature out of control AL1 indicator lit	AL1 set as 0 or incorrectly	Re-set
	Two-way SCR breakdown	Change (Model: BTA16)
	Temperature controller damaged	Change temperature controller

Temperature fails to rise	Temperature controller damaged(inactive, HEAT lamp not lit)	Change temperature controller
	HEAT lamp lit	Change 3041/3061 trigger or BTA16 SCR
	HEAT lamp lit, two-way SCR not connected	Change two-way SCR (Model: BTA16)
	Timing used, temperature rises and falls	Keep T1 ≠ 0
Big error in temperature control or static error	Fan damaged (without running)	Change fan
	Pt100 in poor contact, resistance increasing	Connect again
	Parameter (HL, SC) incorrectly set	Re-set
	PID and other parameters not properly set	Re-adjust the parameter
	Condenser frosts excessively, low cooling power	Heat up for defrosting (set 40°C, run for more than 3 hours)
Fan sound abnormally or has a big noise (>70dB(A))	Fan damaged or compressor fan damaged	Change the fan
	Rubbed rear duct board or blade damaged	Repair (washer), adjust spacing

# 07

## Wiring Principle Diagram



## Parking List

Sr. No.	Type	Description	Unit	Qty	Remarks
1	Document	User's Book	Copy	1	
2	Document	Packing List	Copy	1	
3	Accessory	Shelf panel	Pc	3	
4	Accessory	Water pan	Pc	1	



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