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## OUR COMPANY

### Company Profile

Fanbolun is an innovative and developing company, as a leading manufacturer of laboratory equipment, we support industries widely, such as Pharmaceutical, chemical, catering, cosmetics and academic, contributing to improving the quality of people's lives all over the world.

### Company location

Our organization is located in Guangzhou, an international city. It is here that the development and production of our equipment as well as the coordination of our domestic and international sales, marketing and customer support activities take place.

### Main Products

The main products are complete equipment such as rotary evaporator, jacketed glass reactor and other equipment, as well as molecular distillation, centrifuge, low temperature refrigerator, lenticular filter, etc. Our company has first-hand supply and factory direct sales.

### Professional Team

The quality of our products is based on continuous product development, production technology and skilled workers. Quality is everything for us: we manufacture for our customers good quality, and reliable products. Respect for the personal and professional development of our employees, the FANBOLUN team is continuously striving to achieve industry-leading product quality and customer service, and devoting to the development of global laboratories.



## WARRANTY TERMS

- **The company promises to provide after-sales services to the products sold.**



### Warranty Period

The warranty period is one year from the date of purchase by the customer.



### After-sales Services

Free maintenance services are offered during the warranty period and paid maintenance services are available out of the warranty period.



### Service Content

Service contents include online provision of technical support and new parts for replacement.



### Contact information

If there is product failure during use, please contact your sales staff or send an email to [customerservice@gzfanbolun.com](mailto:customerservice@gzfanbolun.com), and we promise to reply within one working day.



### Exemption from warranty terms



Please note that glass parts are not covered under warranty due to the product characteristics of laboratory equipment.

### **Our company will not provide free warranty service for product failure, abnormal operation or damage caused by the following reasons:**

- Damage caused by transportation (please contact the carrier).
- Any unauthorized disassembly and modification, as well as the use of parts that are not provided or approved by our company.
- Product failure or damage caused by installation, operation and maintenance out of accordance with the instructions.
- Product failure or damage caused by fire, flood, lightning, earthquake, war and other force majeure.
- For the parts that have been repaired during the warranty period, there is a half-year warranty period for the new parts.

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Product Display

**ZNCL Heating Mantle Magnetic Stirrer**



→ Welcome to use the Heating Mantle Magnetic Stirrer produced by Our Machinery and Instrument Equipment. Our company interprets the service tenet of "Quality First, Customer Supreme" with excellent product performance and timely and thoughtful after-sales service. In order to ensure the performance of the product and enable you to use this product safely and efficiently, please read this instruction manual carefully before use.



## 02

## Product Characteristics

### ➤ Characteristic

- 1. Adopt heating mantle to heat, square heating area, uniform heating fast etc advantages. Max 380 degree C.
- 2. Fuzzy PID temperature control, double digital display, self-tuning function, measuring temperature high accuracy, small temperature fluctuation, one-button touch operation, internal and external thermocouple, SCR output, 160 - 240V wide voltage power supply, and self-protection function.
- 3. It can heat and stir in standard or nonstandard, nonmagnetic metal or non-metallic 50-20000 ml containers.
- 4. One-time molded aluminum housing, Beautiful looks; Anti-corrosive, Fine insulation.
- 5. Equipped with over-temperature protection function inside.
- 6. 30° working plate suits your seat and perspective.
- 7. Low speed steady, high speed strong.

## 03

## Usage

### ➤ Use of the product

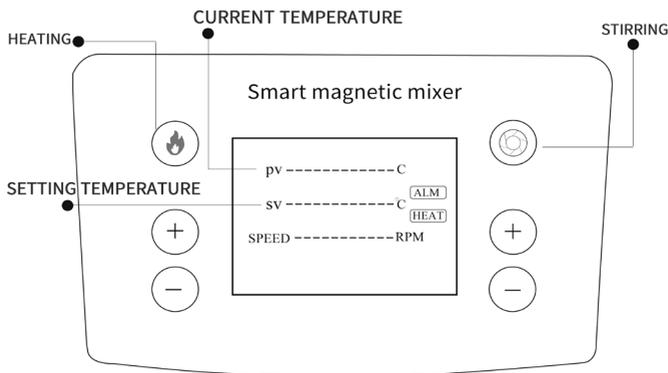
- 1. Inserted the sensor plug or external sensor probe, Inserted ~ 220V/110V power supply , turn the power switch.
- 2. Self-tuning function: starting the function can make different heating section, heating power or solution capacity irregular, heating time the shortest, temperature fluctuation minimum, balance the best, but change the heating medium or heating conditions should be auto-tuning set.
- 3. On the rear of heating plate has a rubber plug, which is used to protect the topical thermocouple socket corrosion rust and conduction inside use, unplug the probe disconnect, machine stop working. Such as when using a topical thermocouple should pull out the plug, insert the plug of topical thermocouple socket and lock nut, and then lowered the stainless steel rods in the solution for temperature control of heating.
- 4. The appliance did not break accidentally protection function, when electric accidentally bad contact, displaying window "OFF" blue, appliances or stop heating, reoccupy after checked.



## 04 Technical Parameters

Model	ZNCL-T-2L	ZNCL-T-5L	ZNCL-T-20L
Voltage	110V60Hz 220V 50/60Hz	110V60Hz 220V 50/60Hz	110V60Hz 220V 50/60Hz
Mixing capacity	2000ml	5000ml	20000ml
Heating power	450W	900W	1800W
Working time	continuously work >8 hours	continuously work >8 hours	continuously work >8 hours
Temperature accuracy	±1℃	±1℃	±1℃
Temperature control	Intelligence control. Inside, outside probe.	Intelligence control. Inside, outside probe.	Intelligence control. Inside, outside probe.
Temperature range	RT~380℃	RT~380℃	RT~380℃
Boiling	Water 10-25 mins	Water 10-25 mins	Water 10-25 mins
Furnace wire	Cr20Ni80	Cr20Ni80	Cr20Ni80
Insulation	E-glass fibers, can be temperature 450 °C	E-glass fibers, can be temperature 450 °C	E-glass fibers, can be temperature 450 °C
Insulation factor	Relative humidity ≤35% ≥500 trillion	Relative humidity ≤35% ≥500 trillion	Relative humidity ≤35% ≥500 trillion
Insulation	Environmental vacuum forming silicate cotton insulation body	Environmental vacuum forming silicate cotton insulation body	Environmental vacuum forming silicate cotton insulation body
Fuse	ø5×20 15A	ø5×20 15A	ø5×20 15A

## 05 Control Panel



### > Description

- Temperature speed controller adopts pen-type LCD display, which is especially suitable for laboratory or analytical instruments. And also it is characterized with complete function and easily operation. Temperature uses “fuzzy PID” control which has the advantages of smaller temperature overshoot, quicker stable time and better temperature control accuracy than traditional PID control mode. It is suitable for DC motor with brush speed regulation and temperature control instrument.

### > Main technical parameters and requirement

- Power supply voltage: 220VAC/110VAC  $\pm$  10% ;  
(only one voltage can be selected, please specify clearly in the order )
- Environment temperature: 0~50  $^{\circ}$ C ; RH: < 85%RH ;
- Temperature sensor: K type thermocouple ;
- Temperature setting range: 0.0~400.0  $^{\circ}$ C ;
- Temperature measuring range: -30.0~410.0  $^{\circ}$ C ;
- Basic accuracy: <0.5% ;
- Output load capacity: motor $\leq$ 30W; Heating output  $\leq$ 1000W .



## 06 Operation Method

### > Department of operation

- When the controller is powered on, the temperature display window displays “K3-C”, Speed display window displays “BYv1” for 1 second and then enters normal display status.

#### **i** Start and Stop

Click or press “heating” button (see “ruT1” parameters for details: parameters table-2) for long time to allow temperature control; click again to close temperature control function

Click or press “stirring” button (see “ruT2” parameters for details: parameters table-2) for long time to allow speed control; click again to close speed control function

#### **i** Power-down memory function

User can select whether need the power-down memory function by modifying power-down memory parameters (See “Pon” parameters: internal parameters table-2)



**When the no-power-down memory function is selected, the controller directly enters the stop state when it is powered on.**

- When the power-down memory function is selected, the controller automatically saves the running and stopping states, the running time, and the motor rotation direction when the power is turned off. When the power is turned on, the controller continues to operate when the power is off.

- When there is a temperature alarm, “**ALM!**” prompt is always on, controller automatically turns off heating output and the buzzer continuously rang;

When there is a speed alarm, “**ALM!**” prompt is always on, controller automatically stops motor running and the buzzer beeps. Users can press any button to silence when the buzzer sounds.

 **If controller temperature display window displays “----”, it indicates the error of temperature sensor or controller itself. Please check carefully the temperature sensor and its wiring.**

- Under the main interface display, click the left button   to modify temperature setting value; click the right button   to modify the speed setting value; press and hold to increase or reduce continuously. At this time, LCD screen “ **【set】** ” identifier is on. When modification is over, setting value would continue to flash about 2 seconds, then save the data automatically and stops flashing.

## Internal parameters setting

- Press and hold left button  for 3 seconds, the first row of LCD screen displays password prompt “Lc”, the second row displays password value. User can change it to the required password value by increasing or reducing. Click “Heating” button again, the controller would return automatically to normal display status if the password value is not correct; the controller would enter internal parameters setting status if the password value is correct. Click “Heating” Button again can modify each parameters in turn. Pressing and holding “Heating” button for 3 seconds can exit this status and the parameters value would save automatically. See following table for details:



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## Internal Parameters Table

### Internal parameter table -1

Model	Parameters name	Function description	(range) Factory value
Lc	Password	Users can check and modify parameters value when "Lc=3"	0
ALH	Upper deviation Over temperature alarm	Temperature alarm function would start when measured temperature value>temperature setting value+ALH. Refer "附录4"for details	(0.0~100.0℃) 10.0
T	Control cycle	Heating control cycle	(1~60 sec.) 5
P	Proportional band	Time proportional adjustment	(0.1~300.0) 30.0
I	Integration time	Integral action adjustment	(1~2000 sec.) 200
d	Differential time	Differential action regulation	(0~2000 sec.) 200
Pb	Temperature deviation correction	Generally used to correct errors caused by low temperature measurements. Pb=Actual temperature value — meter measurement value	(-99.9~99.9℃) 0
PL	Temperature slope correction	Generally used to correct errors caused by low temperature measurements. PL=1000* (Actual temperature value — meter measurement value) ÷ meter measurement value	(-999~999) 0
Adr	Address	reserved, invalid	(1~32) 1

### Internal parameter table -2

Model	Parameters name	Function description	(range) Factory value
Lc	Password	Users can check and modify parameters value when "Lc=9"	0
Pon	Power-down memory function	0: without power-down memory function; 1: with power-down memory function	(0~1) 0
doT	Temperature display decimal	0: temperature value don't have decimal; 1: temperature value has one decimal;	(0~1) 0
ruT1	Heating button delay	Press and hold heating button, function runs after ruT1 time	(0~10s) 0
ruT2	Stirring button delay	Press and hold stirring button, function runs after ruT2 time	(0~10s) 0
bL	Absolute value alarm	Temperature alarm on when temperature measured value> Absolute value, please refer "附录.4"for details	(0.0~400.0) 400.0℃
nP	Output power	Heating output power percentage	(0~100%) 100
SPL	Lower limit of temperature setting	Minimum value of temperature setting	(0.0~SPH) 0.0℃
SPH	Upper limit of temperature setting	Maximum value of temperature setting	(SPL~400.0) 400.0℃

### Internal parameter table -3

Model	Parameters name	Function description	(range) Factory value
Lc	Password	Users can check and modify parameters value when "Lc=67"	0
rST	Restore to factory value	0: Don't restore to factory value 1: Restore all the parameters to factory value	(0~1) 0



## Internal parameter table -4

Model	Parameters name	Function description	(range) Factory value
Lc	Password	Users can check and modify parameters value when "L=27"	0
AT	self-tuning	0: Close self-tuning; 1: Open self-tuning	(0~1) 0

## Internal parameter table -5

Model	Parameters name	Function description	(range) Factory value
Lc	Password	Users can check and modify parameters value when "Lc=103"	0
Pd	Proportional gain	Speed proportional gain	(1~99) 40
Id	Integral coefficient	Speed integral coefficient	(1~99) 2
InT	Acceleration time	Required time from minimum to maximum speed	(5~60) 10
dET	Deceleration time	Required time from maximum to minimum speed	(5~60) 10
SdL	Lower limit of speed setting	Minimum value of temperature setting	(60~SdH) 200
SdH	Upper limit of speed setting	Maximum value of temperature setting	(SdL~6000) 2000
PoL	Steps number	The number of steps in the Hall speed measurement	(1~32) 1
db	Display insensitive area	Speed display insensitive area	(0~99) 5

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## System Self-tuning

### ➤ System self-tuning

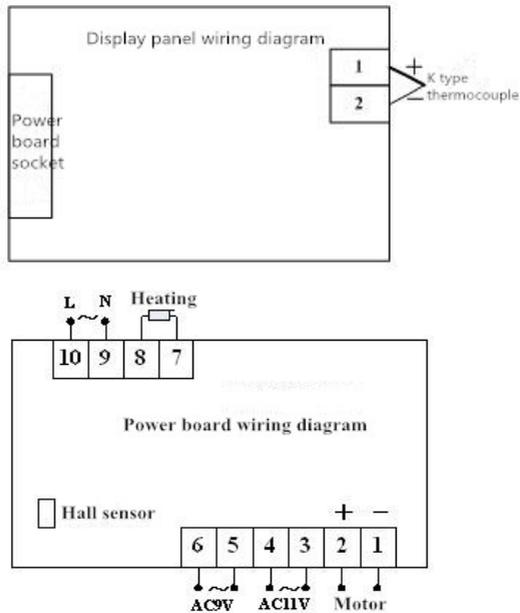
- System self-tuning can be used if the temperature control effect is not so good. The temperature will have a large overshoot during self-tuning process. So please fully consider this factor before the user performs the system self-tuning.
- Click “heating” button to start temperature control, and then modify “AT” parameters value in parameters table-4 to enter selection status of system self-tuning. When the first row of LCD screen displays system self-tuning prompt “AT”, users can click “increase” or “decrease” button to modify “AT” parameters. If modify the parameter value to 1, and then click setting button to exit, the instrument enters system self-tuning status, “AT” prompt flickers. After self-tuning process finished, “AT” prompt stops flicker. The controller will get a better set of PID parameters and the parameter values will be saved automatically. During the system auto-tuning process, turning off the controller operation can abort the auto-tuning process.
- If there is an upper deviation over-temperature alarm during the system self-tuning process, the alarm identifier will not light, but the heating alarm relay will be automatically disconnected. All parameters cannot be modified during system auto-tuning.



## 09 Wiring Diagram

### ➤ Wiring diagram

- **Attention: 1** To reduce the interference to the instrument during wiring, please separate the strong electric lines(such as power lines and load lines, etc) and weak electric lines(such as sensor, signal lines, etc)
- **2** The power supply voltage is 220VAC or 110VAC (only one voltage can be selected, please specify in order).  
L and N only represent the controller power supply, and the actual wiring does not need to distinguish between the fire wire and the neutral wire.



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## Notice

### Customer Notice

- ⚠ Heating board's temperature is very high, so you should beware burning in operation.
- ⚠ Instrument should have a good grounding.
- ⚠ First use, it is the normal phenomenon that white smoke and odor emitted. For the internal insulating materials in the process of production containing oil and other compounds, it should be put in ventilated place, then disappear several minutes later and can use normally.
- ⚠ Wet hand, liquid spill or long-term in humidity, may have induction electricity through the thermal insulation layer to shell, please have a good grounding and pay attention to the ventilation. Such as leakage serious, please don't use. In order to avoid danger, it needs to be in the sun or drying in oven before use.
- ⚠ Once finding no electricity, please first check whether the right rear insurance needs to be changed.
- ⚠ A long time no using, please keeps the instrument clean, and kept in dry and non-corrosive gases environment.
- ⚠ If owing to products or the specifications for the product involved improvement to the content of the manual has synchronize, we will inform you prior.