

# Canroon

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CR2000 Intelligent Digital Induction Heating Power Source

## PRODUCT MANUAL




Shenzhen Canroon Electrical Appliances Co., Ltd




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## 1. Safety Precautions – Read Before Using

 Protect yourself and others from injury – read and follow these precautions

### 1.1 Symbol Usage


 **DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.


**NOTICE** – Indicates statements not related to personal injury. Indicates special instructions



This group of symbols means Warning! Watch Out! ELECTRIC, SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

### 1.2 Induction Heating Hazards Symbols Instructions and Precautions

 The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. Please read and follow all Safety Standards.


 Only qualified persons should install, operate, maintain and repair this unit.

 During operation, keep everybody, especially children, away.



**ELECTRIC SHOCK can kill.**  
Incorrectly installed or improperly grounded equipment is a hazard.

- (1) Do not touch live electrical parts.
- (2) Enclose any connecting bus bars and coolant fittings to prevent unintentional contact.
- (3) Wear dry, hole free insulating gloves and body protection.
- (4) Insulate yourself from work and ground using dry insulating mats or insulator big enough to prevent any physical contact with the work or ground.
- (5) Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, see ANSI Z49.1 listed in Safety Standards. And, do not work alone!
- (6) Disconnect input power before installing or servicing this equipment.
- (7) Properly install and ground this equipment according to its Owner's manual and national, state, and local codes.
- (8) Always verify the supply ground check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- (9) When making input connections attach proper grounding conductor first double check connections.
- (10) Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- (11) Frequently inspect input power cord for damage or bare wiring replace cord immediately if damaged bare wiring can kill.
- (12) Turn off all equipment when not in use.
- (13) Do not use worn, damaged, undersized, or poorly spliced cables.
- (14) Do not drape cables end your body.
- (15) Do not touch power circuit if you are in contact with the work, ground, or another power circuit from a different machine.
- (16) Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- (17) Wear a safety harness if working above floor level.
- (18) Keep all panels and outer cover securely in place.

 Significant dc voltage exists in inverter-type power sources after removal of input power. Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any internal parts.



**FUMES AND GASES can be hazardous.**

Induction Heating of certain materials, adhesives, and fluxes can produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- (1) Keep your head out of the fumes. Do not breathe the fumes.
- (2) If inside, ventilate the area and/or use local forced ventilation to remove fumes and gases.
- (3) If ventilation is poor, wear an approved air-supplied respirator.
- (4) Read and understand the Material Safety Data Sheets (MSDS) and The manufacturer's instruction for adhesives, fluxes, metals, coatings, cleaners, and degreasers.
- (5) Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch person near-by. Fumes and gases from heating can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- (6) Do not heat in locations near degreasing, cleaning, or spraying operations. The heat can react with vapors to form highly toxic and irritating gases.
- (7) Do not heat coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the heated area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if heated. See coating MSDS for temperature information.



**Fire or explosion hazard.**

- (1) Watch out overheat parts.
- (2) Watch for fire; keep extinguisher nearby.
- (3) Keep flammables away from work area.
- (4) Do not locate unit on, end, or near combustible surfaces.
- (5) Do not install unit near flammables.
- (6) Do not operate where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- (7) After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- (8) Use only correct fuses or circuit breakers. Do not oversize or bypass them.



**INDUCTION HEATING can cause burns.**

- (1) Hot parts and equipment can injure.
- (2) Don't touch the hot parts with bare hands.
- (3) Cooling for a period of time before handling parts or equipment.
- (4) Keep metal jewelry and other personal metal items away from the induction coil during operation.

### 1.3 Additional Symbols for Installation, Operation, and Maintenance



**FALLING UNIT can cause injury.**

- (1) Use handle and have person of adequate physical strength lift unit.
- (2) Move unit with hand cart or similar device.
- (3) For units without a handle, use equipment of adequate capacity to lift unit.
- (4) When using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



**FLYING METAL OR DIRT can injure eyes.**

- (1) Wear approved safety glasses with side shields or wear face shield.



**MOVING PARTS can cause injury.**

- (1) Keep away from moving parts such as fans.
- (2) Keep all doors, panels, outer cover and guards closed and securely in place.



**MAGNETIC FIELDS can affect Implanted medical devices.**

- (1) Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- (2) Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



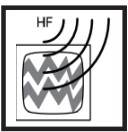
**ENDUSE can cause ENDHEATING.**

- (1) Allow cooling period.
- (2) Reduce output or reduce duty cycle before starting to heat again.
- (3) Follow rated duty cycle.



**STATIC (ESD) can damage PC boards.**

- (1) Put on grounded wrist strap BEFORE handling boards or parts.
- (2) Use proper static-proof bags and boxes to store, move, or ship PC boards.



**H.F. RADIATION can cause interference.**

- (1) High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- (2) Have only qualified person familiar with electronic equipment perform this installation.
- (3) The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- (4) If notified by the FCC about interference, stop using the equipment at once.
- (5) Have the installation regularly checked and maintained.
- (6) Keep high-frequency source doors and panels tightly shut.



**READ INSTRUCTIONS.**

- (1) Read Owner's Manual before using or servicing unit.
- (2) Use only genuine replacement parts from the manufacturer.

**1.4 Warning label Definitions**

1 	1.1 	1.2 	2 	2.1 	2.2 	2.3 
3 	3.1 	3.2 	4 	4.1 	4.2 	
5 	5.1 	5.2 	6 			

Warning! Watch Out! There are possible hazards as shown by the symbols.

- (1) Electric shock from wiring can kill.
  - a. Wear dry insulating gloves. Do not wear wet or damaged gloves.
  - b. Disconnect input plug or power before working on machine.
  
- (2) Breathing heating fumes can be hazardous to your health. Read Material Safety Data Sheets (MSDS) and manufacturer's instructions for material used.
  - a. Keep your head out of the fumes.
  - b. Use forced ventilation or local exhaust to remove the fumes.
  - c. Use ventilating fan to remove fumes.
  
- (3) Induction heating can cause injury or burns from hot items such as rings, watches, or parts.
  - a. Do not wear metal jewelry and other metal personal items such as rings and watches during operation.
  - b. Do not touch hot parts or hot head/coil.
  
- (4) Always wear safety glass or goggles during and around heating operations to prevent possible injury.
  - a. Wear either safety glasses or full goggles depending on type of operation and nearby processes.
  - b. Do not remove or paint over (cover) the label.
  
- (5) Induction heating sparks can cause fire. Do not overheat parts and adhesives.
  - a. Keep flammables away from heating operation. Do not heat near flammables.
  - b. Heating sparks can cause fires. Have a fire extinguisher nearby and have a watchperson ready to use it.
  
- (6) Become trained and read the before working on the machine or heating.

## 2. Safety Instructions and Maintenance

### 2.1 Safety Instructions

As the equipment working with 380–460V three–phase alternating voltage, the line voltage inside and outside is very high, when the equipment is running, any part of your body can not be close to the input and output terminals of the device. Though the induction heating equipment is not under work, the input and output terminals are still with dangerous voltage. Disconnecting power supply is a must if you need to check inside or maintenance. For purposes of safety, you must ensure the equipment without voltage several minutes after power off before unpacking maintenance.

### 2.2 Routine Maintenance



#### Disconnect power before maintaining

In order to ensure the induction heating power normal running and extend its life, regular maintenance is a must. Content of the maintenance is in the following table.

Item	Content
Temperature/humidity	Ensure the ambient temperature $-20^{\circ}\text{C}\sim+50^{\circ}\text{C}$ , relative humidity: 20%~90%
Oil mist and dust	Ensure no oil mist, dust and condensation in the equipment. no corrosive gas and liquid in the storage ambient
Induction heating equipment	Check it whether abnormal hot or vibrate
Fan	Ensure the fan normally running without sundries jam and so on
Input power	Ensure the input power voltage and frequency within the permit scope
Coil	Check the coil whether normal, it will show no oil mist, dust and condensation if it is not yellow

**Notice:** Ensure the power off before dedusting. Dedust with cloth and dry brush softly without water in case of damaging the components or even the complete set. While dedusting, ensuring the related plug–ins in good contact, avoid them loosing in case of affecting the equipment running.



### 3. Type and Specification

#### 3.1 Unpacking Inspection

Unpack, take out the induction heating machine, please check the below items:

- ◆ Ensure no damage after transportation(Visual inspection whether there is damage or gap)
- ◆ Ensure package with manual
- ◆ Check the nameplate and confirm your order (the nameplate is on the right side of the equipment)
- ◆ Any damage, please contact with our local dealers or our company.

#### 3.2 Specification

Type	Input	Output	Inductance Range	Dimension	Suttle	IP
CR2000-005B-12SF	Power: 5KVA Voltage: Single/ 220-240V Frequency: 50-60Hz Current: 20.8-22.7A	Power: 4.5kW (duty cycle 100%) Frequency: 5-60KHz	1-160uH	W: 262.4mm H: 304mm D: 545mm	22kg	IP23
CR2000-010B-14TF	Power: 10KVA Voltage: three-phase/ 400V(±20%) Frequency:50-60Hz Current: 12-18A	Power: 9kW (duty cycle 100%) Frequency: 3-35KHz	2.2-300uH	W: 262.4mm H: 304mm D: 545mm	22kg	IP23
CR2000-015B-14TF	Power: 15KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 18-27A	Power: 13.5kW (duty cycle 100%) Frequency: 3-15KHz	2.2-300uH	W: 262.4mm H: 304mm D: 545mm	22kg	IP23
CR2000-020B-14TF	Power: 20KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 24-36A	Power: 18kW (duty cycle 100%) Frequency: 3-15KHz	2.2-300uH	W: 262.4mm H: 304mm D: 545mm	22kg	IP23
CR2000-040B-14TF	Power: 40KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 48-72A	Power: 36kW (duty cycle 100%) Frequency: 3-35KHz	2.2-300uH	W: 548.5mm H: 747mm D: 847.5mm	95kg	IP23
CR2000-080B-14TF	Power: 80KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 96-144A	Power: 72kW (duty cycle100%) Frequency: 2.5-35KHz	3.0-500uH	W: 597mm H: 830mm D: 801mm	142kg	IP23
CR2000-120B-14TF	Power: 120KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 144-216A	Power: 108kW (duty cycle100%) Frequency: 2.5-35KHz	3.0-500uH	W: 597mm H: 830mm D: 801mm	142kg	IP23
CR2000-160B-14TF	Power: 160KVA Voltage: three-phase/ 400V(±20%) Frequency: 50-60Hz Current: 192-288A	Power: 145kW (duty cycle100%) Frequency:2.5-35KHz	3.0-500uH	W: 596mm H: 1252mm D: 805mm	234kg	IP23

#### 3.3 Commissioning before Starting

(1) Check the input terminals L、N、PE (single 220-240V) or R、S、T、PE (three-phase 400V (±20%)) and output terminals L1&L2 whether the connections are correct and screws are tight before power on.

- (2) Ensure the equipment reliable grounding.
- (3) Power on, LCD will display set screen.
- (4) Check whether there is abnormal sound or other equipment failures, if so, immediately cut off the input power supply.
- (5) Turn power switch on, system set screen start command as keyboard start command, then set output current as minimum value (such as 10A), no load running (press RUN to run), observe it whether normal.
- (6) After normally no-load running, stop it and cut off the power, then restart running with load.

## 4. Installation and Wiring

### 4.1 Installation Condition and Dismantle Cautions

For fans effective operation and radiating, keep enough space near the wind inlet and outlet, locate the equipment where ventilate and waterproof.

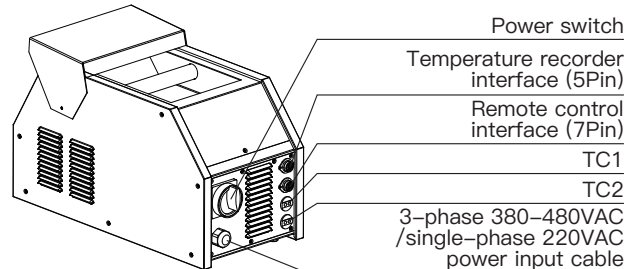
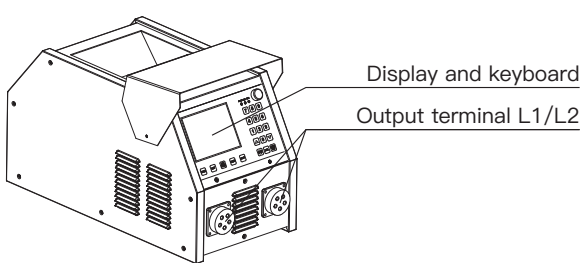
**!** Induction heating machine should run with anti-flaming material, away from heat source and flammable objects in case of fire disaster.

### 4.2 Equipment Wiring Notices

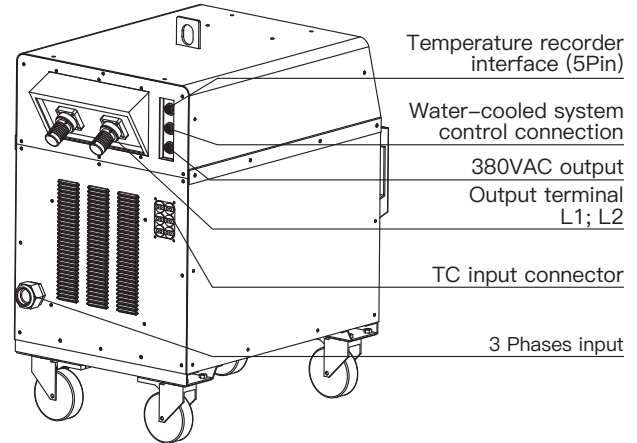
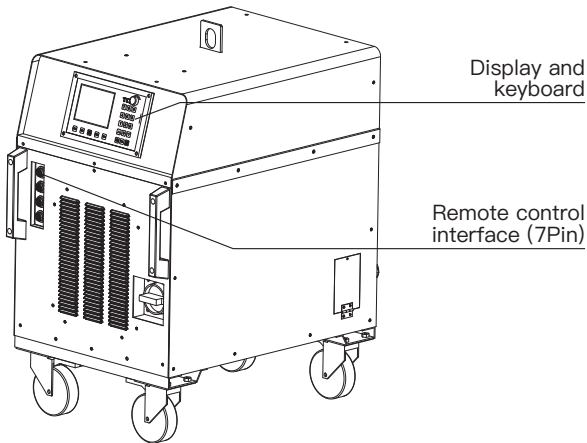
- (1) Ensure input power switch off before wiring.
- (2) Input power line must be permanently connected, equipment reliable grounding.
- (3) The ground terminal of the equipment must be reliable grounding or it could cause a electric shock and fire hazard.
- (4) Do not connect the input power line to the output terminals L1, L2 or it could damage the induction heating equipment.
- (5) Do not touch the power input terminals L、N、PE (single 220–240V) or R、S、T、PE (three-phase 400V(±20%)); output terminals L1, L2, meanwhile do not connect L1, L2 to the shell or short connect with line.

### 4.3 Equipment Layout and Wiring

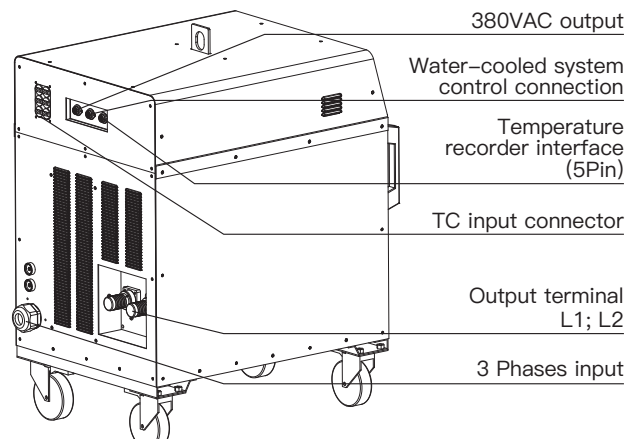
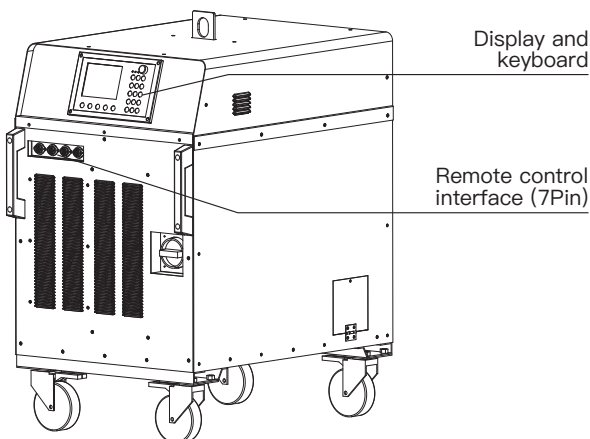
(1) CR2000-005B-12SF / CR2000-010B/015B/020B-14TF



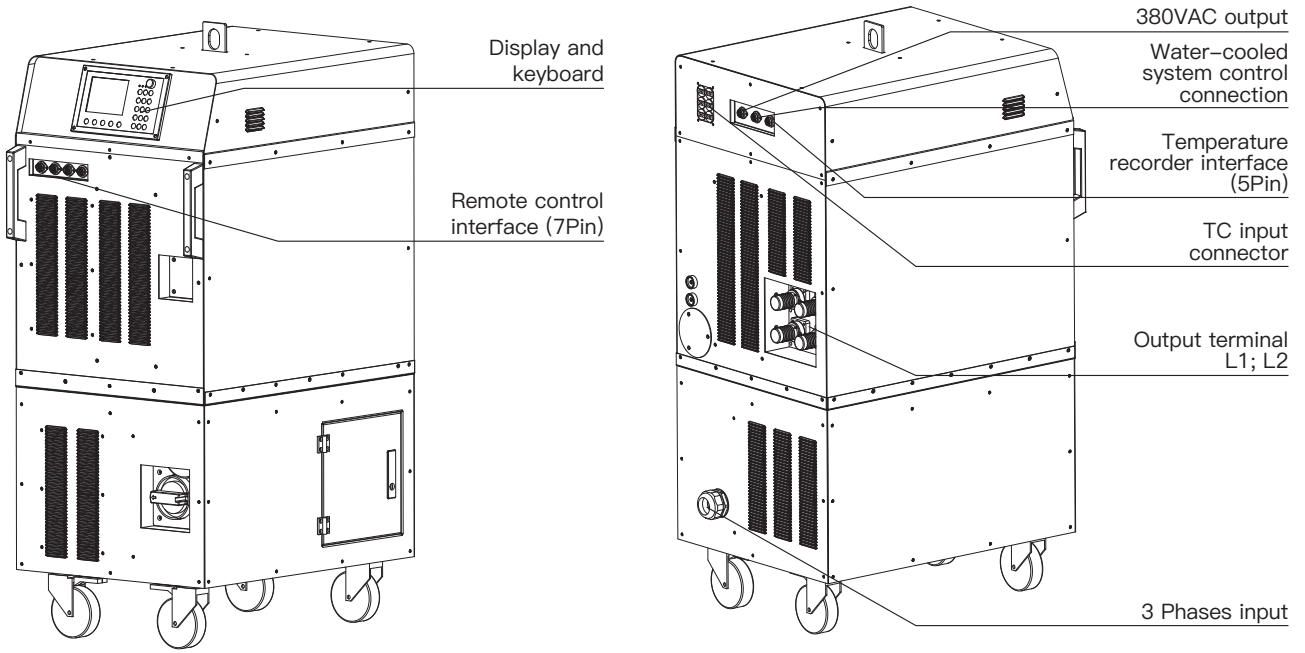
(2) CR2000-040B-14TF



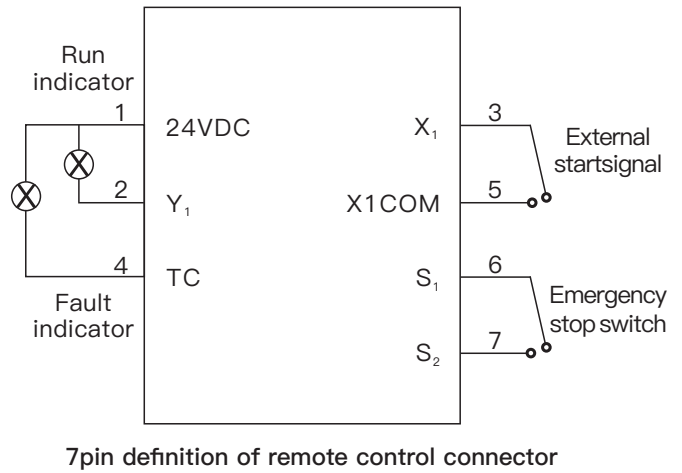
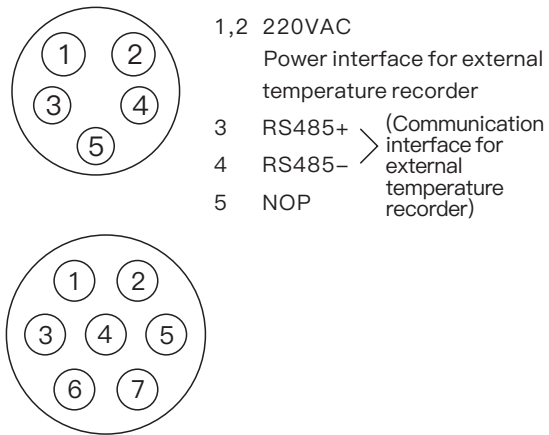
(3) CR2000-080B/120B-14TF



(4) CR2000-160B-14TF

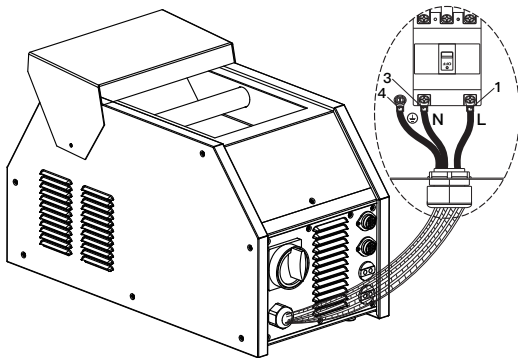


(5) 5pin/7pin Exterior Interface and Wiring

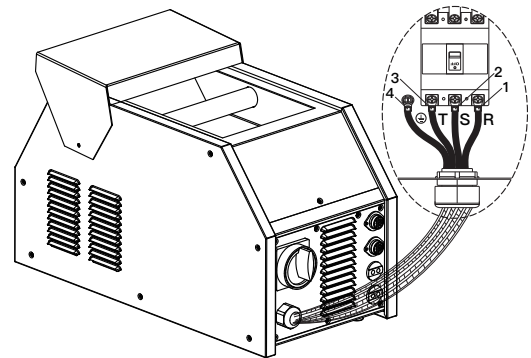


4.4 Power Source Input Connection

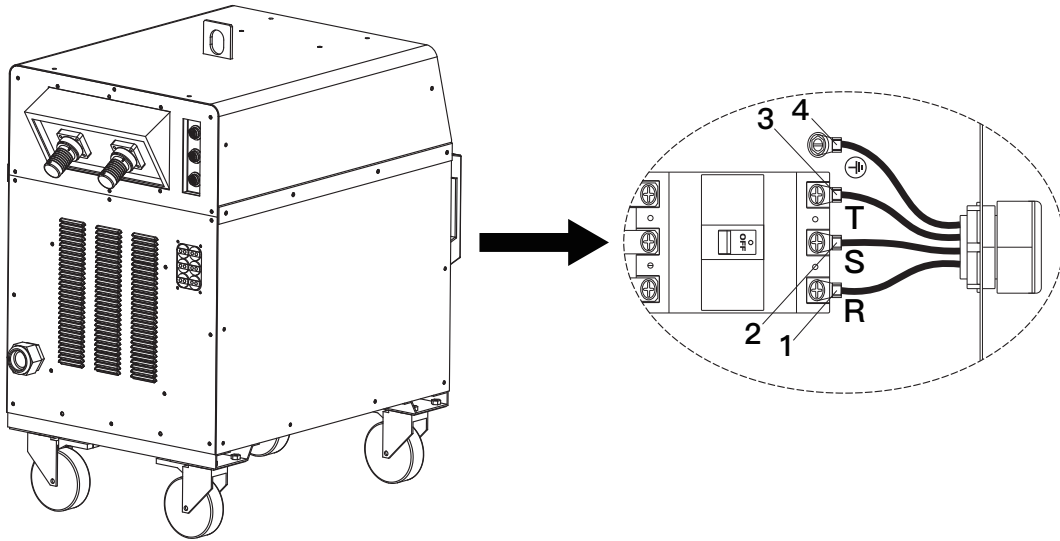
(1) CR2000-005B-12SF






(2) CR2000-010B/015B/020B-14TF



(3) CR2000-040B/080B/120B/160B-14TF



-  Installation must be in comply with all state and local regulations——only qualified persons can install it.
-  Disconnect or turn off input power source before input wire with connection unit.
-  Check voltage whether available. The device can connect with 380–460VAC、three-phase、50–60Hz input power source. check the rated label on the device and check the voltage whether available.

**Input power source connection labels:**

- (1) Red lead connection L terminal (single 220V) /R terminal (three-phase 400V(±20%)).
- (2) Black lead connection S terminal.
- (3) Blue lead connection N terminal (single 220V) /T terminal (three-phase 400V(±20%))
- (4) Yellow/green grounding lead connection PE terminal.

Wire through the Cable Glands and buckle.

**Input power source disconnection label:**

- OFF site: disconnection device
- ON site: connection device

**4.5 Thermocouple**

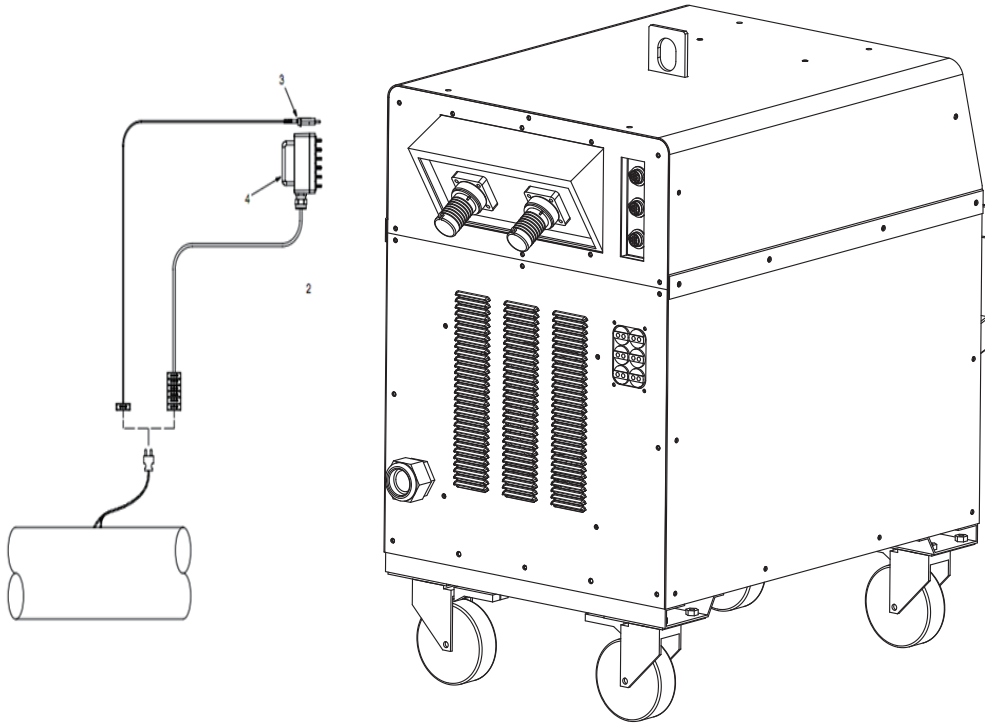
**4.5.1 Locating Thermocouple**



Thermocouple location is one of the most critical steps in the Heat Treatment Operation. Thermocouples shall be located as follows to provide a survey of heating uniformly and enable time and temperature control:

- (1) Locate thermocouples to ensure that the full area of the heat wave band is monitored.
  - a. The standard normally specifies the number of thermocouples to be used based on the pipe diameter.
  - b. The control thermocouple is placed in the plane of the weld (center of the heat zone).
  - c. The control thermocouple is placed at the top of the pipe in a standard pipe joint configuration. In other applications, the thermocouple should be located in the hottest portion of the weldment to be stress relieved.
- (2) Consider all nozzles and other welding attachments that can cause potential heat sinks through metal mass or cold spots due to heat convection or conduction, so need additional thermocouples applied.
- (3) Attach a spare thermocouple beside controlling thermocouples.
- (4) Attach thermocouples to ensure uniformity of temperature in both thin and thick workpieces.
- (5) Physically inspect all thermocouples for continuity and mark them by an identification number corresponding to the recorder channel.
- (6) Match the drawings of the workpiece indicating the numerous thermocouple locations, controlling thermocouple locations, etc. to weld identification information.
- (7) The system is equipped with 2-pin thermocouple connectors at the front of the unit. Six thermocouples can be attached to the power source.

(8) Type K thermocouple wire has a positive and negative wire. The positive wire is marked as solid yellow or striped yellow. The connector screw terminals are marked positive and negative.




Temperature control mode, power source must be connected to socket TC1 with a thermocouple. Figure labels as the followings:

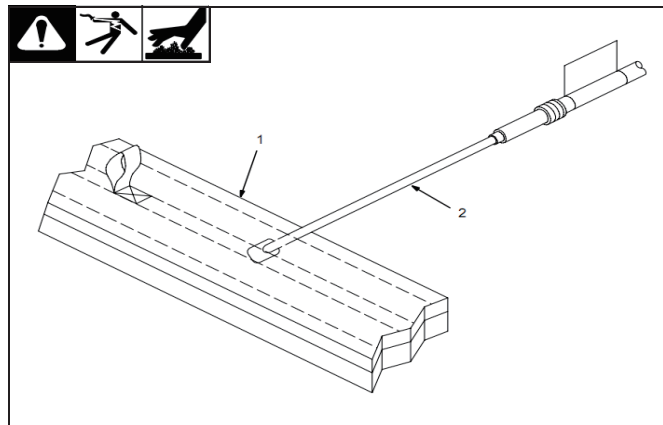
 Never weld thermocouple to workpieces when connected with power source.

**4.5.2 Using Contact Thermocouples**

The welded thermocouples discussed previously can be used for preheating or stress relieving. As an alternative, in preheating applications, a contact temperature sensor can be used. This eliminates the need to weld thermocouples and the sensor can be moved during the preheat process to check temperatures at other locations on the joint.

 **Removing the contact probe will display a short duration of heat drop on the temperature Recorder.**  
 In preheating applications, the thermocouple must be placed under the induction coil. Temperatures at the weld joint can be checked with temperature sensitive crayons to verify the preheat temperature. Welded thermocouples are normally used in stress relieving applications due to their accuracy.

**4.5.3 Placing Temperature Probe**

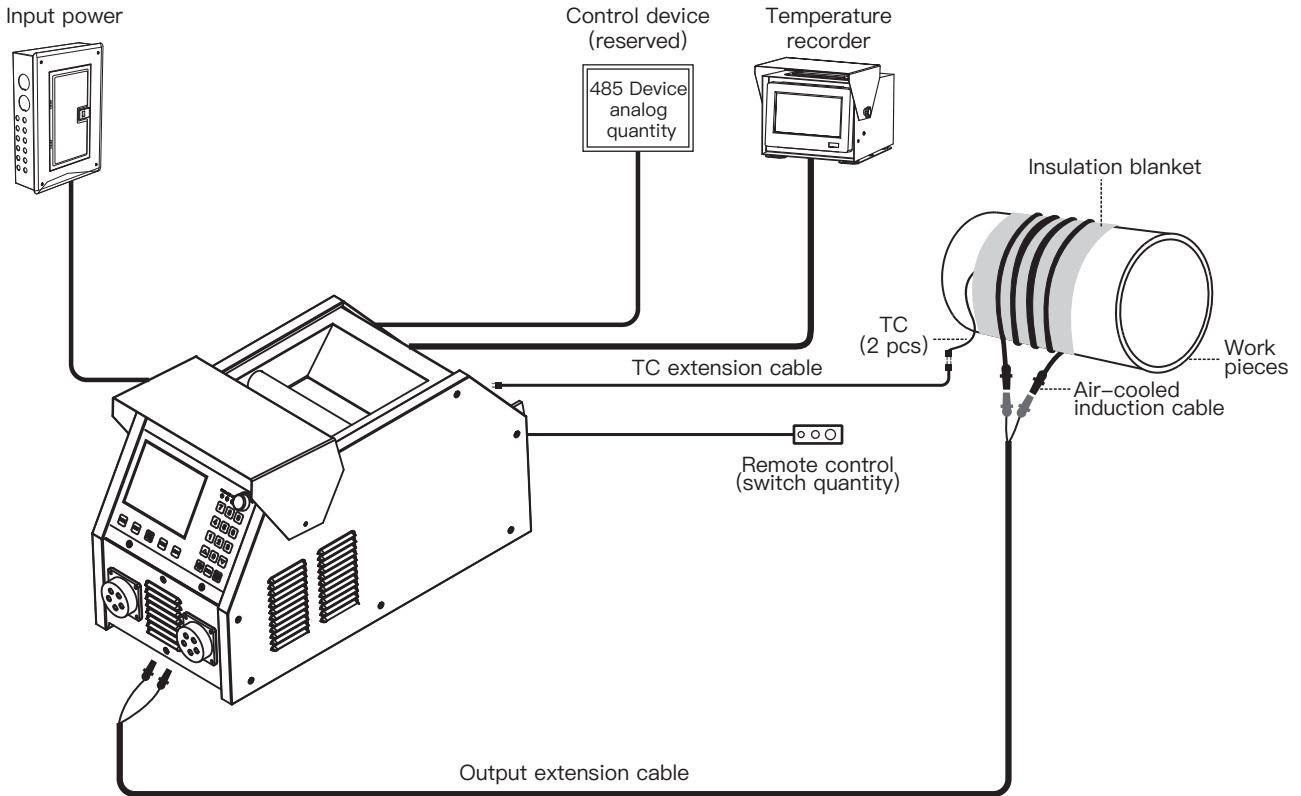


Temperature probe placed diagram

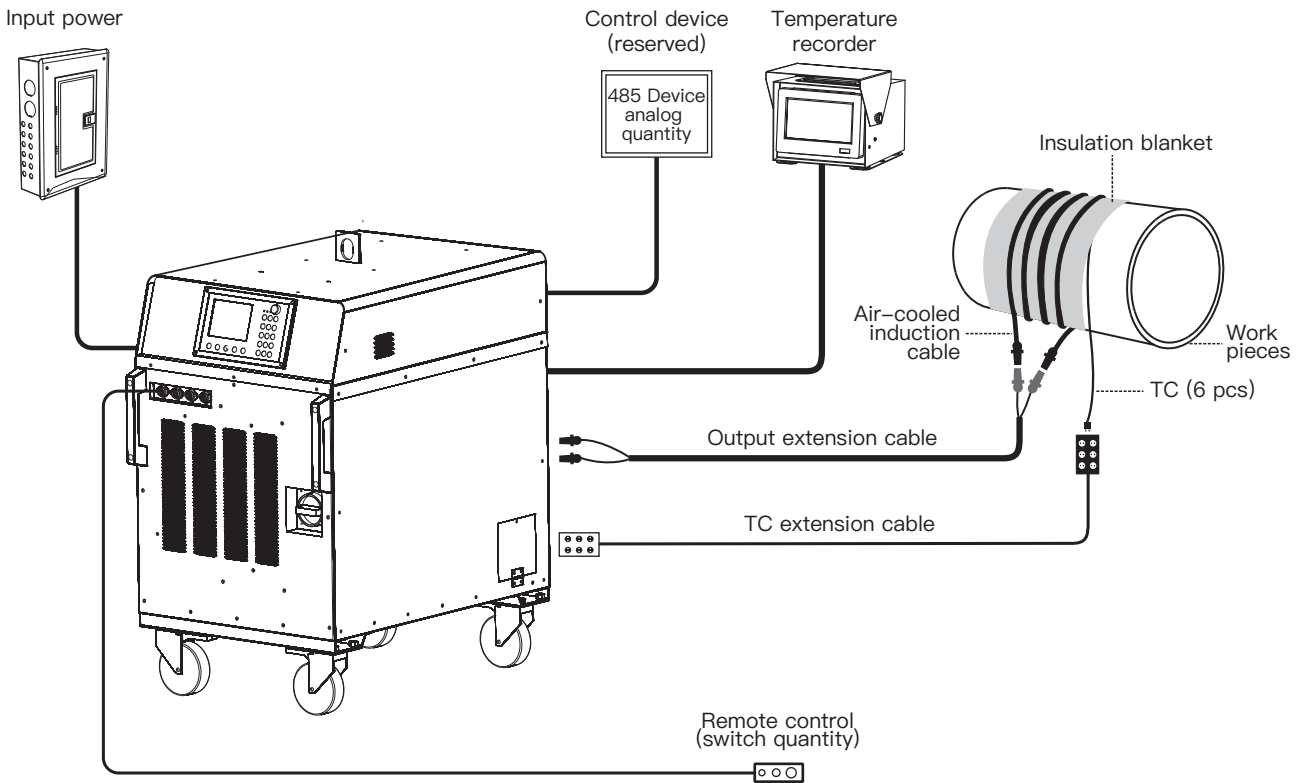
- (1) Blanket
- (2) Temperature Probe Place temperature probe between blanket and metal material. The probe must be in contact with the material being heated.

**4.6 Air-cooled Induction Cable Heating Application Illustration**

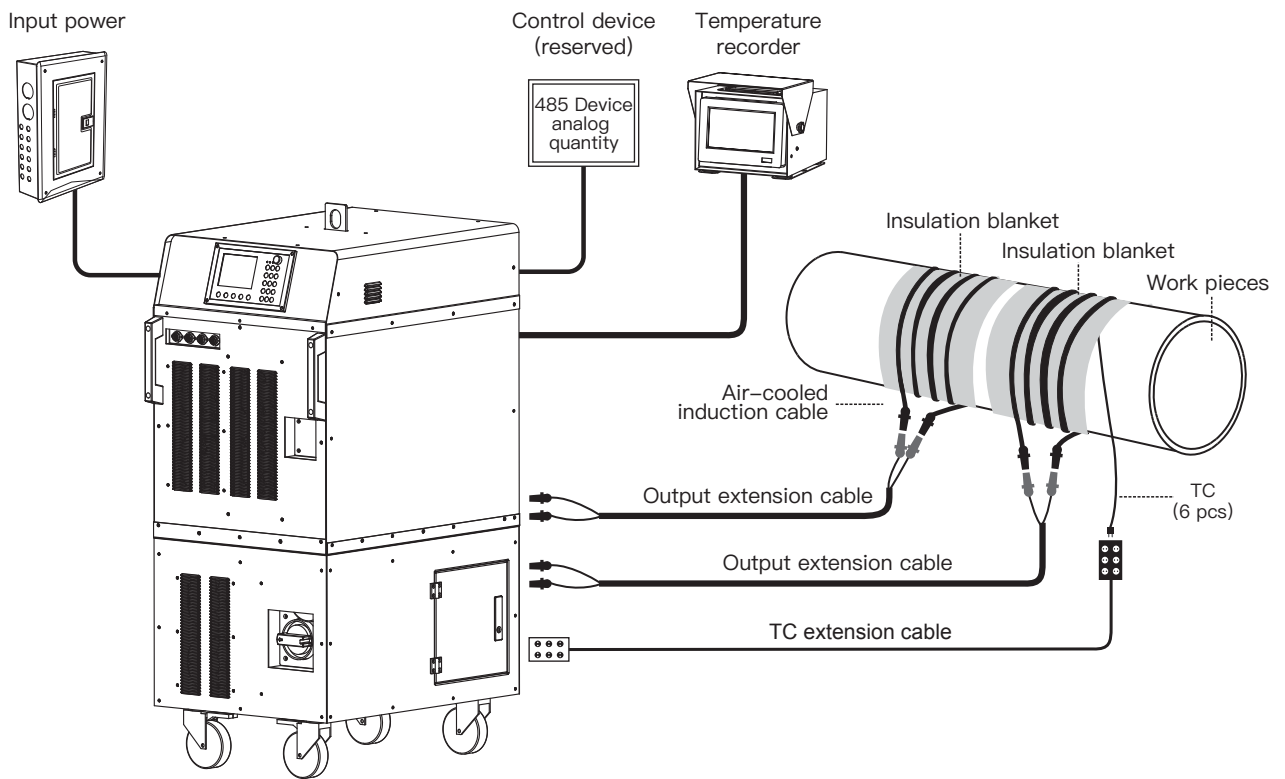
(1) CR2000-005B-12SF / CR2000-010B/015B/020B-14TF



(2) CR2000-040B/080B/120B-14TF



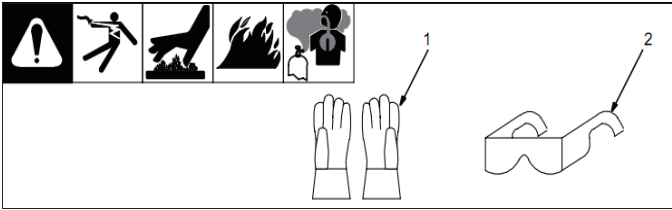
(3) CR2000-160B-14TF





## 5. Display and Operation Control

### 5.1 Safety Equipment



Wearing the following during operation:

1: Dry, insulating gloves

2: Safety glasses with side shields

Do not wear rings or watches during operations.

### 5.2 LCD Keyboard Instructions

Equipment display and operation mainly on the LCD and keyboard. Following is the diagram and equipment display screen.

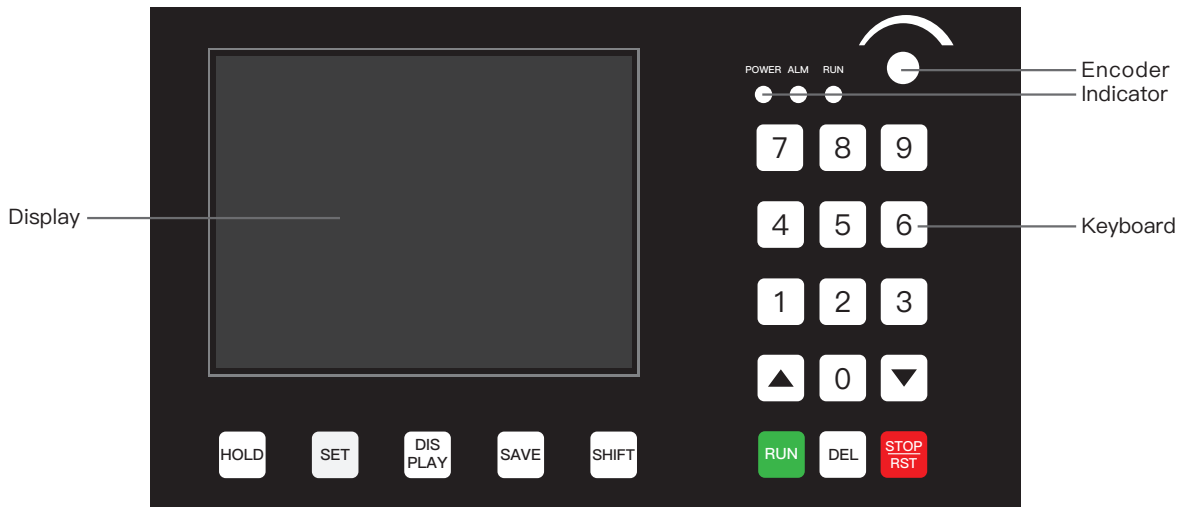


Chart 5-1 Keyboard and LCD display diagram

Button function instructions:

Signal	Function	Instruction
	Shift Button	<b>System set</b> screen and <b>control mode set</b> screen cursor location; <b>Basic parameters set</b> screen and <b>fault message</b> screen backtrack, go back to the previous menu.
	Hold Button	Other interface besides <b>faults alarm</b> interface and <b>code check</b> interface, Hold function when running, skip to <b>hold mode</b> . Then RUN indicator, Green (blue) light flashing.
	Run	On the keyboard operation mode, press the button to start running. RUN indicator green (blue) light on.
	Stop/Reset	On the keyboard operation mode, press the button to stop running; After downtime, reset in case of fault RUN indicator light off.
	Increase/Up	Data or parameter code add-
	Decrease/Down	Data or parameter code reduce-
	Encoder	Add or reduce output power values when operation.
	Control Mode Parameter Set Button	Skip to <b>control mode set</b> screen, set relevant parameters.
	Control Mode running Status Display Button	Skip to running status screen, monitor running mode status.
	Parameters Save Button	Save parameters, all set parameters must be saved before effective.

Button function instructions:















Signal	Function	Instruction
	System Set Screen Shortcut Button	SAVE+SET press both buttons simultaneously to skip to <b>System set</b> screen, Set temperature unit, control mode, start order, output current
	Monitor Parameter Screen Shortcut Button	SAVE+DISPLAY press both buttons simultaneously to skip to <b>monitor parameter</b> screen, check output power, current, frequency, transmitt temperature.
	Basic Parameter Screen Shortcut Button	SAVE+SHIFT press both buttons simultaneously to skip to basic parameter screen, set parameter initialization, frequency range, running limitation time and so on.
	Digit 0	Digit code input
	Digit 1	Digit code input
	Digit 2	Digit code input
	Digit 3	Digit code input
	Digit 4	Digit code input
	Digit 5	Digit code input
	Digit 6	Digit code input
	Digit 7	Digit code input
	Digit 8	Digit code input
	Digit 9	Digit code input
	Delete	Delete digit values

Chart 5-1 Button Function

### 5.3 Indicator and Display Mode

(1) Indicator instructions:

Pattern	Function instruction
Status Indicator	POWER Power indicator, light red when power on.
	RUN Light green (blue) when running, running indicate; Green (blue) light flashing when device with hold status, hold status indicate.
	Alarm Alarm indicator, light yellow when equipment with fault or alarm.

(2) Display mode:

Basic parameter	Basic parameter code display: PX.XX
Monitoring Parameter	Monitoring parameter code display: D-XX
Fault Display	Fault code display: E-XX
Alarm Display	Alarm code display: A-XX

Latest fault code and then power, current and other values saved in the monitoring parameter D-22~D-31, check the monitoring parameter D-22~D-31 with the latest, second, third.....fault code and some other fault information. Check the basic parameter PX.XX specification refer to 7.1 basic parameter  
 Check the basic parameter D.XX specification refer to 7.2 monitoring parameter  
 Check the basic parameter E.XX and A-XX specification refer to 8.1 fault and fault Parameter.

**5.4 Parameter Screen Display and Set**

**5.4.1 System Set Screen**

Press set button **SET** and save button **SAVE** and popup system set screen, as on the right:

System Set Screen	
Degree Units .....	°C
Range .....	±10°C
Language:	English
Curve Number .....	1
Control Mode .....	Temperature
Start Command ...	Keyboard
Input Power .....	40.0KW
Output Current .....	233.0A


Alter Set:

- (1) Press shift button **SHIFT**, move the cursor to the parameters to be altered;
- (2) Press increase button **▲** or decrease button **▼** to choose the value to be set (except the time value, only digit can be input in the time value);
- (3) Value parameters such as power, current, temperature difference value can be input with numeric button (0~9), use delete button **DEL** to delete;
- (4) Press save button **SAVE**, values will be saved.

**Optional Items:**

Degree Unit: °C/°F  
 Range: ±1~55°C (±2~99°F)  
 Language: English  
 Curve Number: 1/2/3  
 Control Mode: temperature/power  
 Start Command: remote/keyboard  
 Input Power: 0.0~Rated Input Power  
 Output Current: 1.0~Rated Output Current

**[Factory Set °C]**  
**[Factory Set 10°C]**  
**[Factory Set English]**  
**[Factory Set 1]**  
**[Factory Set temperature]**  
**[Factory Set keyboard]**  
**[Factory Set Rated Input Power]**  
**[Factory Set Rated Output Current]**

 Temperature difference range is to adjust temperature when set temperature and feedback temperature difference value deviate between positive and negative.  
 All of the system parameters are global parameter, any system parameter to be altered will apply to all the programme.

when set input power, **[input power]** input value less than the set **[power]** value in the constant power set screen or power VS time set screen, then press save **SAVE** button, it display as the below:

Never set system set screen **[input power]** value Less than the set **[power]** value in the constant power set screen or power VS time set screen.

**5.4.2 Control Mode Set Screen**

Allow users to set control procedure for specific heating procedure. Optional control procedure include temperature and power.

**5.4.2.1 Temperature Control**

Temperature control heating procedure is based on the thermocouple feedback temperature. Temperature control mode include four different procedures as the following: preheating, back-out, post welding heat treatment and user-defined mode.

Press **SET** and **SAVE** button to popup the system set screen. Set **[control mode]** as **[temperature]**, press save button **SAVE** to save, then press set **SET** button to skip to temperature control set screen. When skip to temperature control set screen, LCD will display as on the right:

Temperature Control Mode Set Interface	
>	Preheat
	Bake-Out
	PWHT
	Custom

Press shift button **SHIFT** to move the cursor to choose mode; Use **SAVE** button to save chosen mode and skip to the set interface corresponding to the chosen temperature control mode.






**5.4.2.1.1 Preheat**

**Preheat** procedure is a simply method of heating the material to some temperature and keep constant for a time.

When the chosen temperature control mode in the temperature control mode set interface is preheating, LCD will display as on the right:

Preheat Set Screen	
Mode .....	> Preheat
Control TC .....	1
Temperature .....	150°C
Soak Time .....	01:00:00

Alter Set:

- (1) Press shift button  to move the cursor to the parameters to be altered;
- (2) Press increase button  or decrease button  to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button  to delete;
- (4) Press save button  , values will be saved.

**Optional Items:**

Mode: **Preheat**

Control TC: 1, 1,2, 1,2,3, 1,2,3,4, 1,2,3,4,5, 1,2,3,4,5,6

Temperature: 0~1300°C (32~2372°F)

Soak time: 00:00:00~99:59:59

**【Factory Set 1】**

**【Factory Set 150°C】**

**【Factory Set 00:00:00】**



TC1 must be controlling thermocouples and masterly controlling temperature. CR2000-005B/010B/015B/020B-14TF support two thermocouple input.






**5.4.2.1.2 Bake-Out**

**Bake-out mode** is heating workpieces at a quick increase rate to a temperature and hold it for a while, then cool down to the specified temperature.

When the chosen temperature control mode in the temperature control mode set interface is bake-out, LCD will display as on the right:

Bake-out Set Screen	
Mode.....	> bake-out
Control TC .....	1
Soak Temperature:	600°C
Soak Time.....	02:00:00
Cool Temperature..	200°C
Cool Rate.....	80°C/hr

Alter Set:

- (1) Press shift button  to move the cursor to the parameters to be altered;
- (2) Press increase button  or decrease button  to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button  to delete;
- (4) Press save button  , values will be saved.

**Optional Items:**

Mode: **bake-out**

Control TC: 1, 1,2, 1,2,3, 1,2,3,4, 1,2,3,4,5, 1,2,3,4,5,6

Soak temperature: 0~1300°C (32~2372°F)

Soak time: 00:00:00~99:59:59

Cool temperature: 0~1300°C (32~2372°F)

Cool rate: 1~6000°C/hr (34 -10832°F/hr)

**【Factory Set 1】**

**【Factory Set 600°C】**

**【Factory Set 02:00:00】**

**【Factory Set 200°C】**

**【Factory Set 8°C/hr】**

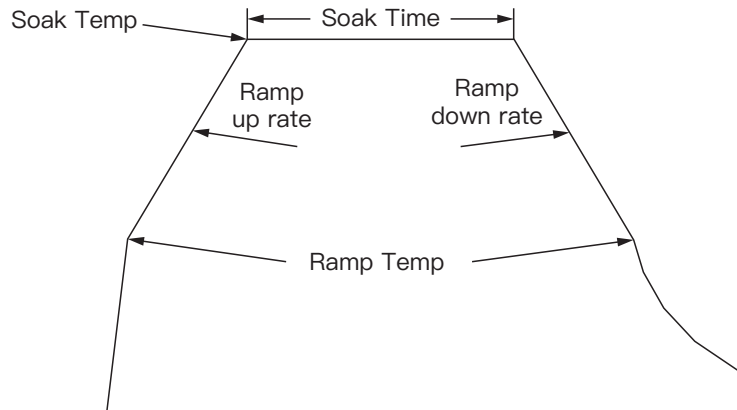


TC1 must be controlling thermocouples and masterly controlling temperature. CR2000-005B/010B/015B/020B-14TF support two thermocouple input.

**5.4.2.1.3 PWHT**

PWHT process:

- (1) Heat workpiece from ramp temperature to soak temperature at ramp up rate.
- (2) Hold workpiece temperature at soak temperature point for a while (soak time).
- (3) Cool down workpiece from hold temperature to ramp temperature at ramp down rate.



PWHT Process Diagram

When the chosen temperature control mode in the temperature control mode set interface is PWHT, LCD will display as on the right:

Mode.....	> PWHT
Control TC .....	1
Ramp Temp .....	200°C
Ramp Rate.....	80°C/hr
Soak Temp.....	600°C
Soak Time.....	02:00:00

Alter Set:

- (1) Press shift button **SHIFT** to move the cursor to the parameters to be altered;
- (2) Press increase button **▲** or decrease button **▼** to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button **DEL** to delete;
- (4) Press save button **SAVE**, values will be saved.

**Optional Items:**

Mode: PWHT	
Control TC: 1, 1,2, 1,2,3, 1,2,3,4, 1,2,3,4,5, 1,2,3,4,5,6	<b>【Factory Set 1】</b>
Ramp temperature: 0~1300°C (32-2372°F)	<b>【Factory Set 200°C】</b>
Ramp rate: 1~6000°C/hr (34 -10832°F/hr)	<b>【Factory Set 80°C/hr】</b>
Soak temperature: 0~1300°C (32-2372°F)	<b>【Factory Set 600°C】</b>
Soak time: 00:00:00~99:59:59	<b>【Factory Set 02:00:00】</b>

TC1 must be controlling thermocouples and masterly controlling temperature. CR2000-005B/010B/015B/020B-14TF support two thermocouple input.

**5.4.2.1.4 Custom**

Users can define procedure or dissymmetry heat treatment procedure, with which the heating rate, cooling rate and temperature can be different.

When the chosen temperature control mode in the temperature control mode set interface is custom, LCD will display as on the right:

Mode.....	> Custom
Curve Num.....	1
Segment.....	1
Type.....	END
Control TC .....	1

Alter Set:

- (1) Press shift button **SHIFT** to move the cursor to the parameters to be altered;
- (2) Press increase button **▲** or decrease button **▼** to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button **DEL** to delete;
- (4) Press save button **SAVE**, values will be saved.

**Optional Items:**

Mode: Custom

Curve Num.: 1~3

【Factory Set 1】

(Curve no can not be set in this screen but can be in the System set screen)

Segment: 1~10

【Factory Set 1】

Type: soak/ramp/step/end

【Factory Set end】

◆For soak type:

Soak temperature: 0~1300°C (32-2372°F)

【Factory Set 0°C】

Soak time: 00:00:00~99:59:59

【Factory Set 00:00:00】

◆For ramp type:

Ramp temperature: 0~1300°C (32-2372°F)

【Factory Set 0°C】

Ramp rate: 1~6000°C/hr (34 -10832°F/hr)

【Factory Set 0°C/hr】

◆For step function:

Temperature: 0~1300°C (32-2372°F)

【Factory Set 0°C】

◆For end type:

Control TC: 1, 1,2, 1,2,3, 1,2,3,4, 1,2,3,4,5, 1,2,3,4,5,6

【Factory Set 1】



TC1 must be controlling thermocouples and masterly controlling temperature.

CR2000-005B/010B/015B/020B-14TF support two thermocouple input.

Temperature controlling, ramp is calculated in °C/hr or °F/hr, programmable ramp minimum and maximum value is 1°C/hr (34°F/hr) and 6000°C/hr (10832°F/hr). Minimum and maximum programmable temperature is 0°C (32°F) and 1300°C (2372°F). Minimum and maximum soak time is 0 and 100 hours. user-defined function can set 3 curves at maximum, choose curve NO in the system set screen, each curve can set 10 segments at maximum, choose segment NO in the user-defined screen. When segment NO changed, it will display corresponding segment parameter information. End the programme indicate the completion of the cycle and the end of the output power.

User-defined segment controlling heating procedure:

Type as step function:

Custom Set Screen	
Mode.....:	> Custom
Curve Num.....:	1
Segment.....:	1
Type.....:	Step
Temperature.....:	200°C

Full power heating to 200°C

Type as ramp:

Custom Set Screen	
Mode.....:	> Custom
Curve Num.....:	1
Segment.....:	2
Type.....:	Ramp
Target Temperature:	600°C
Ramp Rate.....:	600°C/hr

At 600°C/hr rate, controlling heating to 600°C

Type as soak:

Custom Set Screen	
Mode.....:	> Custom
Curve Num.....:	1
Segment.....:	3
Type.....:	Soak
Soak Temperature...:	600°C
Soak Time.....:	01:00:00

600°C soak one hour

Type as ramp:

Custom Set Screen	
Mode.....:	> Custom
Curve Num.....:	1
Segment.....:	4
Type.....:	Ramp
Ramp Temperature.:	400°C
Ramp Rate.....:	600°C/hr

At 600°C/hr rate, controlling cooling to 400°C

Type as end:

Custom Set Screen	
Mode.....:	> Custom
Curve Num.....:	1
Segment.....:	5
Type.....:	END
Cotrol TC.....:	1

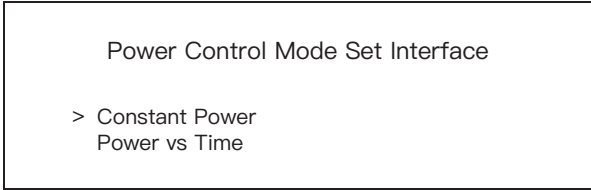
End segment end heating circle

**5.4.2.2 Power Control**

Power control mode is a method with output power. Power control mode include the following two different processes: constant power mode, power VS time mode.

Press set button **SET** and save button **SAVE**, popup system set screen, set **Control Mode** as **Power**, press save button **SAVE** to save, then press set **SET** button, skip to power control mode set interface.

When skip to power control mode set interface, LCD will display as on the right:



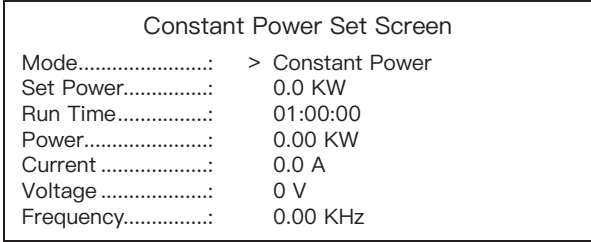
Press **SHIFT** to move the cursor to choose mode;

Press **SAVE** to save chosen mode and skip to the set interface corresponding to the chosen power control mode.

**5.4.2.2.1 Constant Power**

Constant power mode is running a certain time at a constant power (when running time is 00: 00:00 as infinite running mode).

When the chosen power control mode in the power control mode set interface is constant power, LCD will display as on the right:



Alter Set:

- (1) Press shift button **SHIFT** to move the cursor to the parameters to be altered;
- (2) Press increase button **▲** or decrease button **▼** to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button **DEL** to delete;
- (4) Press save button **SAVE**, values will be saved.

**Optional Items:**

Mode: **constant power**

Set Power: 0~output power set value in **System set screen** **[factory set as 0 kW]**

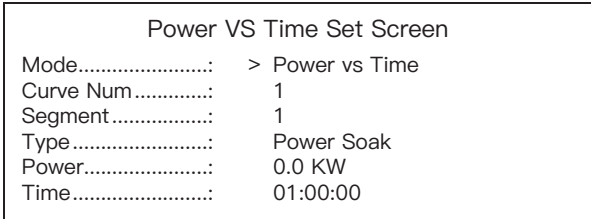
Run Time: 00:00:00~99:59:59 **[factory set as 00:00:00]**

Last 4 parameters, power, current, voltage, frequency as device running monitoring parameters.

**5.4.2.2.2 Power vs Time**

Power VS Time mode is based on the relationship ratio between time and power.

When the chosen power control mode in the power control mode set interface is power VS time, LCD will display as on the right:



Alter Set:

- (1) Press shift button **SET** to move the cursor to the parameters to be altered;
- (2) Press increase button **▲** or decrease button **▼** to choose designated value (except time value, only input digit with time value);
- (3) Numerical parameters, such as temperature, power, time, input the values with digit button (0~9), use delete button **DEL** to delete;
- (4) Press save button **SAVE**, values will be saved.

**Optional Items:**

Mode: **Power VS Time**

Curve Num.: 1~3 **[factory set as 1]**

(Curve no can not be set in this screen but can be in the **System set screen**) **[factory set as 1]**

Segment: 1~10 **[factory set as end]**

Type: **power soak/power ramp/end** **[factory set as end]**

◆For type as power soak/power ramp, only power and time can be set:

Power: 0~Set output power set value in system set screen

Time: 00:00:00~99:59:59

【factory set as 0 kW】

【factory set as 00:00:00】

power control mode can be set up to 3 curves, curve number in the system set screen selection, each curve can set 10 segments. When segment number changed, it will display corresponding segment parameter information.


For type as end, Indicates that the termination of the cycle of completion and output power.

### 5.4.3 Running Status Screen

With running status, users can monitor device running status during heating process. According to control mode (temperature or power), temperature mode (preheating, bake-out, PWHT or user-define) and power mode (constant power or power time), the display will show different screen.

With running status screen, just for monitoring but no optional or alterable parameters.

#### 5.4.3.1 Temperature Control Status Screen

Press running status display button , popup control mode running status screen, display as on the right:

(1) Preheating, bake-out and PWHT running status screen

Run Status Screen	
Mode.....:	Preheat TC1: 30.0
Target Temp:	150°C TC2: OPEN
Countdown...:	01:00:00 TC3: OPEN
Status .....	Stopped TC4: OPEN
	TC5: OPEN
	TC6: OPEN

Mode display the programme mode (Preheat, Bake-out, PWHT, or Custom). During operation, Target Temp display present operation target temperature, Countdown display remaining time, present status (Running, Hold, Stopped). TC1~TC6 display thermocouple 1~6 temperature. The screen is hold for monitoring or present type (Soak, Step, ramp, end) TC1~TC6 display thermocouple 1~6 temperature. The screen is just for monitoring.

(2) User-defined running status screen:

First Segment: Step

Run Status Screen	
Mode.....:	Custom TC1: 200.0
Target Temp:	200°C TC2: OPEN
Countdown...:	00:00:00 TC3: OPEN
Type.....:	Step TC4: OPEN
Curve Num...:	1 TC5: OPEN
Segment.....:	1 TC6: OPEN

Second Segment: Ramp Up Temperature

Run Status Screen	
Mode.....:	Custom TC1: 200.0
Target Temp:	400°C TC2: OPEN
Countdown...:	00:03:20 TC3: OPEN
Type.....:	Ramp TC4: OPEN
Curve Num...:	1 TC5: OPEN
Segment.....:	2 TC6: OPEN

Third Segment: Soak

Run Status Screen	
Mode.....:	Custom TC1: 400.0
Target Temp:	400°C TC2: OPEN
Countdown...:	00:05:00 TC3: OPEN
Type.....:	Soak TC4: OPEN
Curve Num...:	1 TC5: OPEN
Segment.....:	3 TC6: OPEN

Fourth Segment: Ramp Down Temperature

Run Status Screen	
Mode.....:	Custom TC1: 200.0
Target Temp:	200°C TC2: OPEN
Countdown...:	00:03:20 TC3: OPEN
Type.....:	Ramp TC4: OPEN
Curve Num...:	1 TC5: OPEN
Segment.....:	4 TC6: OPEN

Fifth Segment: End Segment, device stop running, none screen display

#### 5.4.3.2 Power Control Status Screen

Press running status display button , popup control mode running status screen, it displays as the followings:

(1) Constant power running status screen:

Run Status Screen	
Mode.....:	Constant Power TC1: 30.0
Power.....:	0.00 KW TC2: OPEN
Countdown...:	01:00:00 TC3: OPEN
Status.....:	Stopped TC4: OPEN
	TC5: OPEN
	TC6: OPEN

(2) Power vs Time running status screen:

Run Status Screen	
Mode.....:	Power vs Time TC1: 30.0
Curve Num..:	1 TC2: OPEN
Segment.....:	1 TC3: OPEN
Type.....:	End TC4: OPEN
Power.....:	0.00 KW TC5: OPEN
Countdown :	00:30:00 TC6: OPEN

Power display present actual output power, Countdown display thermal cyclereaming time, Status indicate present work status running or stop. TC1~TC6

Mode display present working mode, curve Num indicate curve NO, segment indicate present working segment NO, Power display present actual output power,

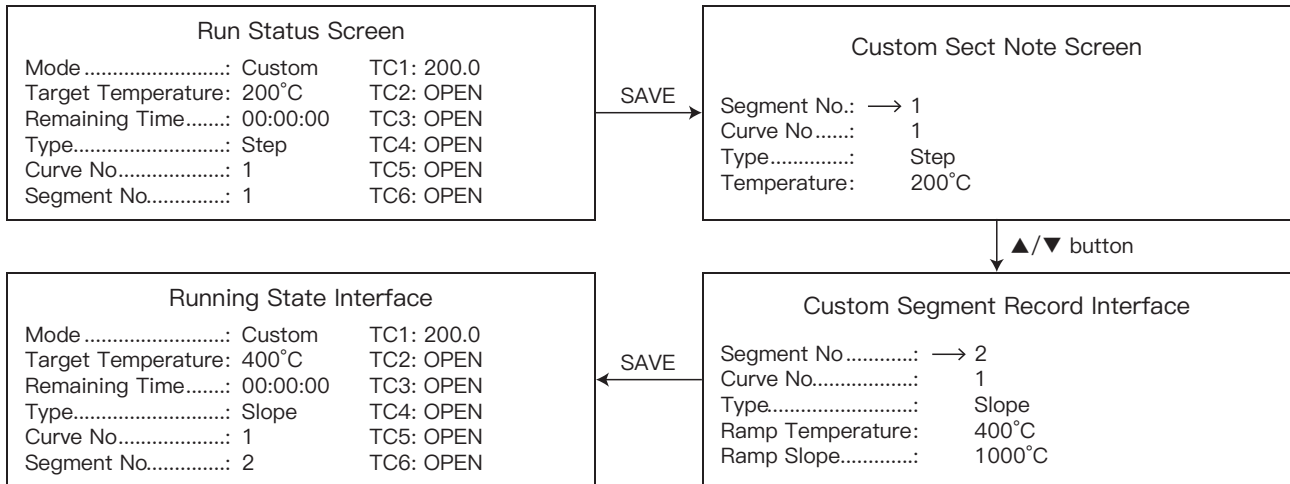


display thermocouple 1~6 temperature, the screen is just for monitoring.

countdowndisplay remaining time, type display present segment type (Power\_Soak, Power\_ramp, End). TC1~TC6 display thermocouple 1~6 temperature. The screen is just for monitoring.

**5.4.4 Custom Segment Record Interface**

In Custom Segment Record Interface, it is available for users to check Custom Mode set values in shutdown state or hold state and can choose needed segments to start running from chosen segment. This interface can be just entered from running state interface of Custom Mode in shutdown or hold state. In Running State Interface of Custom Mode, press **SAVE** to skip to Custom Segment Record Interface in shutdown or hold state, display as the below:



In Custom Segment Record Interface, each segment value can be checked by up and down button, press hold button to choose run initial segment and return to custom run interface. In this interface, segment value can just be checked but modified.

**5.4.5 Monitoring Parameters, Fault Code Record Display**

Simultaneously press save **SAVE** button + running status display button **DIS PLAY**, popup monitoring parameter screen, as on the right:

Monitoring screen

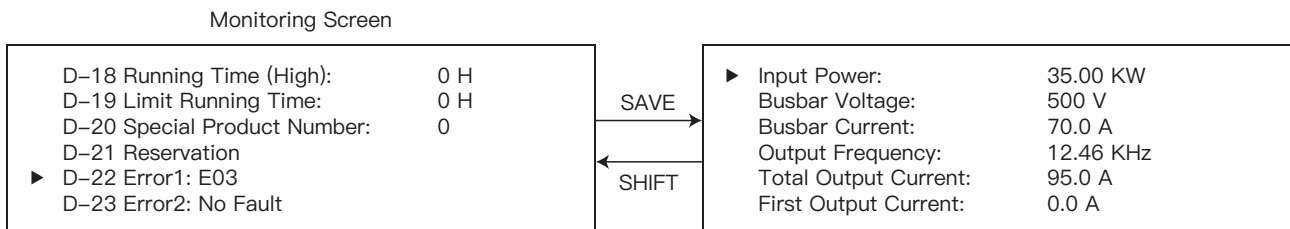
▶ D-00 Input Power:	0.00 KW
D-01 Input Voltage:	0 V
D-02 Input Current:	0.0 A
D-03 Output Frequency:	0.00 KHz
D-04 Total Output Current:	0.0 A
D-05 First Output Current:	0.0 A

**Monitoring parameter display screen:**

On the monitoring parameter screen, use UP **▲** and DOWN **▼** button to move the cursor up and down, 32 monitoring Parameters in total, for more monitoring parameters, refer to 7.3 monitoring Parameter. The specific values cant be modified but check.

**Fault code display screen:**

Skip to monitoring parameter screen, when cursor ▶ location to D-22~D-31 (fault code parameter), if the parameter display with fault (fault as: E03) press **SAVE** button to **fault message screen**, none faults, then can not skip to **fault message screen** (no fault display: No Fault), as the diagram below:

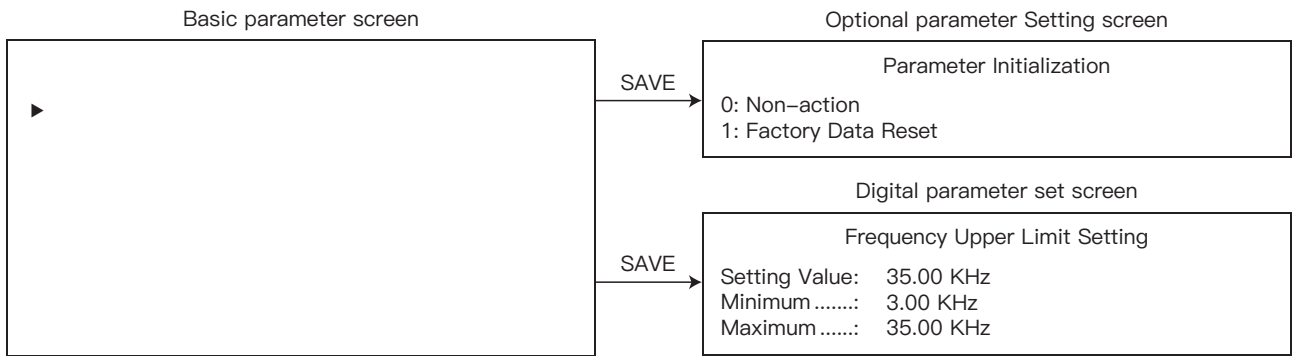


**5.4.6 Basic Parameters Display**

**Basic parameter display screen:**

Simultaneously press save button **SAVE** + shift button **SHIFT**, popup code check interface, code check correction then

skip to basic parameter screen, in basic parameter screen can use / move cursor up and down, for more basic parameters, please check 7.1 basic parameter table as the following diagram:

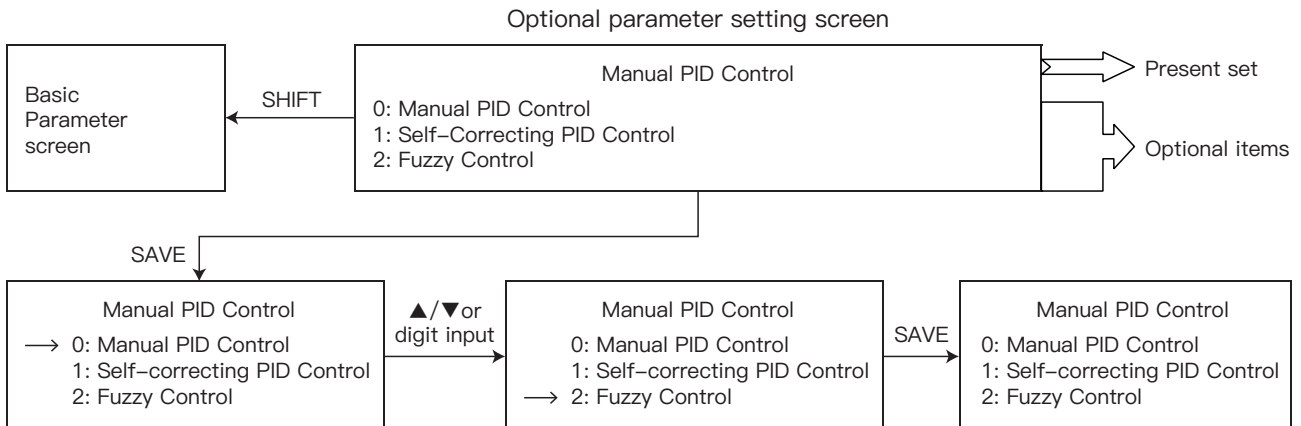


**Basic parameter set screen:**

**(1) Optional parameter set screen:**

Go to optional parameter set screen, press button, → optional cursor occurs before the below optional item, indicate can use / button to move cursor, choose needed item (as the below: Manual PID Control), Press to confirm, optional cursor→disappear and the present set item site display as a latest set item (as the below: Fuzzy Control), set is finished.

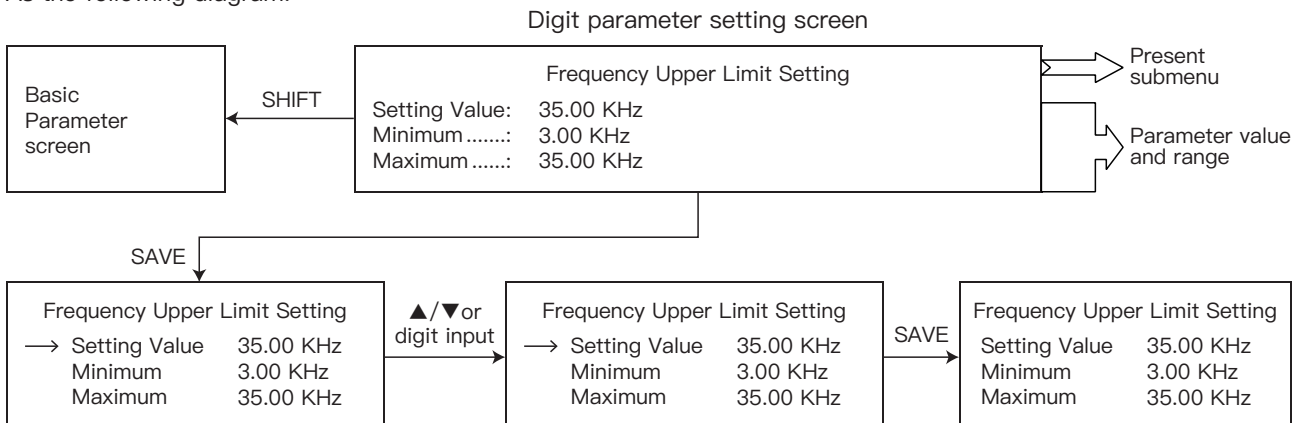
As the following diagram:



**(2) Digit parameter set screen:**

Go to digit parameter set screen, press , → optional cursor Occurs in front of the below optional item, indicate can use / button or fast input needed set value (as the below: 35.00KHz), Press to confirm, optional cursor → disappear, then set is inished, the maximum value and minimum value in the Chart 5-7 as input value range, they can not be modified. Use to go back to basic parameter sub menu screen.

As the following diagram:

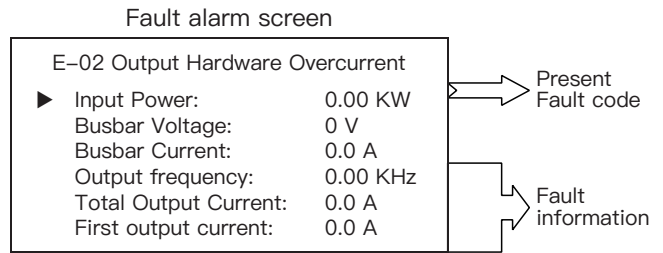


**Note:** Some parameter modify with limitation, such as curve heat power and time, can not be modified under running but stop. More detailed information, refer to the sign instruction in the end of the basic parameter table.

**5.4.7 Fault Alarm Screen Display**

Fault alarm screen:

Fault alarm screen, display present fault code and the fault information, as on the right diagram:



**5.5 Hold Button (Constant Temperature/Constant Power) Function**

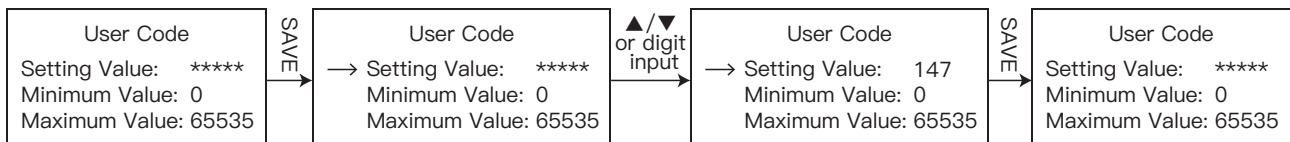
Other interface besides faults alarm interface and code check interface, can hold the present status during running. With running status, press hold button **HOLD**, it will start hold function, then RUN indicator green (blue) light flashing. On hold mode, programme parameters can be altered. Press hold button **HOLD** it will cancel hold function, RUN indicator green (blue) flashing disappears. On the hold mode, if some relevant parameters be altered, the the programme will continue heating with the latest altered parameters.

**5.6 Code Set and Check**

Code set:

From code parameter (P0.00, P3.02) to parameter set screen, press **▲**, **▼** or fast digit input code, press **SAVE** then finish the code set and save it. As the following diagram:

Code set screen:



(1) User code (P0.00) function

User code factory value: 2014. After set user code, any tunable parameter can not be checked and modified.

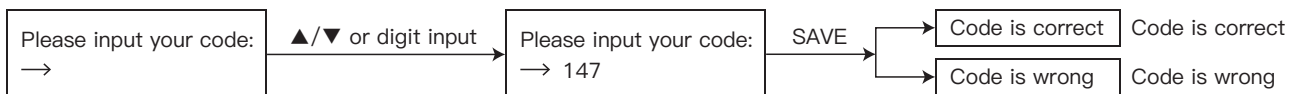
(2) Running limitation code (P3.02)

After set running limitation code, running limitation set (P3.03) parameter and running limitation time set (P3.04) parameter can not be modified.

Code check:

From other screens to basic parameter series screens, a code check screen will pop out if it has user code, press **▲** / **▼** or input the code value digit, press **SAVE** to confirm code input check. It will display “code is correct” if input correctly or it will display “code is wrong” then back to the code check screen as the following diagram:

Check code parameter screen:



Note: If you forget the code, please contact with the manufacturer.

## 6. Function Instruction

### 6.1 Parameters Initialization Function (P0.03)

Set parameters initialization (P0.03) as non action, then parameters can not be initialized.

Set parameters initialization (P0.03) as parameters P initialization, then parameters P can be initialized, parameters reset to Factory Defaults.

### 6.2 Temperature Control Option Parameters (P2.03/P2.04)

(1) System parameters self-test choice (parameter P2.04)

**None-action:**

Set system parameters self-test choice (P2.04) as non-action, then system parameters do not self-test.

**System parameters test:**

Set system parameters self-test choice (P2.04) as system parameters test, then the system will automatic test system parameters according to the load condition, make temperature control with optimal state.

(2) Temperature adjustment method choice (parameter P2.03)

**Manually set PID control:**

Set temperature adjustment method choice (P2.03) as manually set PID control, then set the PID parameters according to the actual conditions (proportion gain high and low digit number (F2.07~F2.08)、integral time (F2.09)、differential time (F2.10)) value.

**Self-Correcting PID control:**

Set temperature control mode choice (P2.03) as self-correcting PID control, then machine will automatically self-correct parameters, on condition that PID actual parameters must pass system parameter self-inspect choice (P2.04) set as system parameters inspect acquire.

**vague control:**

Set temperature control mode choice (P2.03) as vague control, then machine inner regulation control load temperature. When temperature overshoot value do not meet the need, appropriately increase parameter (P2.05) value, but may affect the temperature rise speed. When stable deviation temperature do not meet the need, appropriately decrease parameter (P2.06) value.

### 6.3 Language Choice (P3.05)

Set language choice (P3.05) as English, then all screens display in English.

Set language choice (P3.05) as Chinese, then all screen display in Chinese.

### 6.4 TC Type Selection (P3.06)

Set the TC type selection (P3.06) as K type, and the input type selection of TC1~TC6 thermocouples to K type thermocouple detection.

Set the TC type selection (P3.06) as infrared thermocouple, and select the input type of TC1~TC6 thermocouple as infrared thermocouple detection.

## 7. Parameter Table

### 7.1 Basic Parameter Table

CR2000 Basic Parameter Table						
Label Instructions: “×” indicate the parameter can not be modified under running; “◆” indicate the parameter value is actual value, can not be modified; “○” indicate the parameter set value can be modified under running; “—” indicate the parameter can not be modified as a reservation; “◇” manufacturer parameter, only manufacturers modify, users are not permitted.						
P0: System Parameter						
Function	Instruction	Set Scope	Unit	Factory Set Value	Modbus Address	Modify
P0.00	User code	0~65535	1	****	41100	×
P0.01	Software version (high)	0000~FFFF	1	Machine type set	41101	◆
P0.02	Software version (low)	0000~FFFF	1	Machine type set	41102	◆
P0.03	Parameter initialization	0: Non-action 1: Factory data reset	1	0	41103	×
P1: Basic Running Parameter						
P1.00	Frequency lower limit setting	3.00KHz~ 【P1.01】	0.01KHz	Machine type set	41104	×
P1.01	Frequency upper limit setting	【P1.00】 ~35.00KHz	0.01KHz	Machine type set	41105	×
P1.02	Encoder power control speed	1~300	1	30	41106	○
P2: Temperature Control Parameter						
P2.00	Feedback channel filtering time	0.00s~10.00s	0.01s	0.20s	41107	○
P2.01	Feedback channel lower limit value	0~2000℃	1℃	0℃	41108	○
P2.02	Feedback channel upper limit value	0~2000℃	1℃	1300℃	41109	○
P2.03	Temperature control mode	0: Manual PID control 1: Self-correcting PID control 2: Fuzzy control	1	0	41110	×
P2.04	System parameter self-adjusting	0: Non-action 1: System parameter self-adjusting	1	0	41111	×
P2.05	Input quantization factor	0.1~10.0	0.1	5.0	41112	×
P2.06	Output proportion factor	0.0~6553.5	0.1	6.0	41113	○
P2.07	Proportion gain (high)	0~9999	1	0	41114	○
P2.08	Proportion gain (low)	0~99.99	0.01	50.00	41115	○
P2.09	Integral time	0.00s~655.35s	0.01s	0.00s	41116	○
P2.10	Differential time	0.00s~655.35s	0.01s	0.00s	41117	○
P2.11	Sampling cycle	0.01~655.35S	0.01s	2.00s	41118	×
P2.12	Reservation	—	—	—	41119	—
P2.13	Maximum permitted temperature	0.0~2000.0℃	0.1℃	2000.0℃	41120	×
P2.14	Integral mode	0: Normal mode 1: Integral separation mode	1	0	41121	×
P2.15	I separation minimum value	0.1℃~ 【P2.16】	0.1℃	0.1℃	41122	×
P2.16	I separation maximum value	【P2.15】 ~2000.0℃	0.1℃	2000.0℃	41123	×
P3: Advanced Function Parameter						
P3.00	Default phase protect choice	0: Forbid 1: Valid	1	1	41124	×
P3.01	Test mode	0~2	1	1	41125	×

Function	Instruction	Set Scope	Unit	Factory Set Value	Modbus Address	Modify
P3.02	Running limit code	0~65535	1	****	41126	×
P3.03	Running limit setting	0: Invalid 1: Valid	1	0	41127	×
P3.04	Limit running time setting	0~65535H (hour)	1H	0H	41128	×
P3.05	Language choice	0: English 1: Chinese	1	0	41129	×
P3.06	TC type selection	0: K type 1: Infrared	1	0	41130	×
P3.07	Voltage correction coefficient	80.00%~120.00%	0.01%	100.00%	41131	×
P3.08	Input current correction coefficient	80.00%~120.00%	0.01%	100.00%	41132	×
P3.09	Keyboard version	1.00~9.99	0.01	Keyboard set	41133	◆
P3.10	RS485	0: RS485 OFF 1: RS485 ON	1	0	41134	○
P3.11	Adjust signal	0: TC 1: 4~20mA 2: 0~10V	1	0	41135	○
P3.12	The switch of A-07	0: Forbid 1: Valid	1	1	41136	○
P3.13	E-15 mode	0: Restart 1: Continue	1	0	41137	○
P3.14	Infrared min-temperature	0~2000℃	1℃	0℃	41138	○
P3.15	Infrared max-temperature	0~2000℃	1℃	1300℃	41139	○
P3.16	Infrared temperature correction	0.500~1.500	0.001	1.000	41140	○
P3.17	Max sink temperature	60.0~85.0℃	0.1℃	70.0℃	41141	○
<b>P4: Transmitter Function Parameter</b>						
P4.00	Transmitter address	1	1	255	41142	○
P4.01	Transmitter TC1 calib. coeff.	10000	1	20000	41143	○
P4.02	Transmitter TC1 constant	1	-1300	1300	41144	○
P4.03	Transmitter TC2 calib. coeff.	10000	1	20000	41145	○
P4.04	Transmitter TC2 constant	1	-1300	1300	41146	○
P4.05	Reservation	—	—	—	41147	○
P4.06	Reservation	—	—	—	41148	○
P4.07	Reservation	—	—	—	41149	○
P4.08	Reservation	—	—	—	41150	○
P4.09	Reservation	—	—	—	41151	○
P4.10	Reservation	—	—	—	41152	○
P4.11	Reservation	—	—	—	41153	○
P4.12	Reservation	—	—	—	41154	○

## 7.2 Monitoring Parameter Table

Users can observe induction heating equipment running parameters through the keyboard.

Monitoring Parameter		
Monitoring Code	Instructions	Range
D-00	Input power	0.00~655.35KW
D-01	Input voltage	0~1000V
D-02	Input current	0.1~999.9A
D-03	Output frequency	3.00~35.00KHz

Monitoring Code	Instructions	Range
D-05	Output current 1	0.1~999.9A
D-06	Output current 2	0.1~999.9A
D-07	Resonant CAP volt	0~6000V
D-08	Equal resistance (ESR)	0.0~100.0Ω
D-09	Inductance	1~1000uH
D-10	Output duty cycle	0.01%~100.00%
D-11	Power factor angle	0.0~180.0°
D-12	Quality factor Q	0.1~10.000
D-13	Heat sink temperature	0.0~165.0°C
D-14	AI state	0~4096
D-15	Transformer TEMP	0.0~165.0°C
D-16	Reservation	——
D-17	Run time (low)	0~9999H
D-18	Run time (high)	0~9999*10000H
D-19	Limit run time	0~9999H
D-20	Special product num	1~65535
D-21	Reservation	——
D-22	Error1	No fault
D-23	Error2	No fault
D-24	Error3	No fault
D-25	Error4	No fault
D-26	Error5	No fault
D-27	Error6	No fault
D-28	Error7	No fault
D-29	Error8	No fault
D-30	Error9	No fault
D-31	Error10	No fault

## 8. Protection、Alarm Code and Fault Check

### 8.1 Protection and Alarm Code Table

Fault Code			
Fault Code	Fault Instruction	Reason	Fault Inspection
E-00	No Protection Action	—	—
E-01	Busbar overcurrent protection	Busbar overcurrent circuit protect action	1. Stop or single machine running with error code E-01, try to replace control board. 2. Multi heating machine with one load, try to increase the distance between coils.
E-02	Output overcurrent protection	Output overcurrent circuit protect	1. Inspect the output terminal and coil whether short or not. 2. Inspect output terminal, coil and machine inwall whether there are signs of ignition, or should strengthen the insulativity between output coil and connection point. 3. Multi heating machine with one load, try to increase the distance between coils.
E-03	VCE inspection protection	Drive circuit protection action	1. Inspect output terminal and coil whether short circuit or not. 2. Inspect output terminal, coil and machine inwall whether there are signs of ignition, or should strengthen the insulativity between output coil and connection point. 3. Inspect output terminal, coil and machine inwall whether there are signs of ignition, or should strengthen the insulativity between output coil and connection point. 4. Power on with error code E-03, contact with the manufacture.
E-04	Output software overcurrent	Output current overload protection software action	1. Inspect the output terminal and coil whether short or not. 2. Inspect output terminal, coil and machine inwall whether there are signs of ignition, or should strengthen the insulativity between output coil and connection point.
E-05	Input busbar overvoltage protection	Output overvoltage protection software action	1. After stop, use multimeter to measure input cable voltage, ensure it in the range of $V_e^* (1 \pm 20\%)$ . 2. After stop, use multimeter to measure input cable voltage, ensure it in the range of $\{V_e^* (1 \pm 20\%)\}$ , then adjust P3.06 value to ensure D-02value=cable voltage. 3. Multi heating machine with one load, error code with E-05, try to increase the distance between coils.
E-06	Input busbar undervoltage protection	Output undervoltage protection software action	1. After stop, use multimeter to measure input cable voltage, ensure it in the range of $V_e^* (1 \pm 20\%)$ . 2. After stop, use multimeter to measure input cable voltage, ensure it in the range of $\{V_e^* (1 \pm 20\%)\}$ , then adjust P3.06 value to ensure D-02value=cable voltage.
E-07	Reservation	—	—
E-08	Reservation	—	—
E-09	Default Phase protection (only for 3 phases input power)	3 Phases AC default phase protection action	1. Tighten the screws on the input terminal of the heating power machine, ensure contact between input line and input terminal well. 2. Check 3-phase input power line whether broken, or replace the lines. 3. Check creepage.
E-10	Radiator temperature overhigh	① Air flue jam ② Inverter fan fault ③ Ambient temperature overhigh	1. Clean cooling fan. 2. Improve radiating ambient. 3. Check fan power line whether contact well. 4. Replace fans if broken
E-11	Overload Protection	Load power overhigh	Input power set value $\leq$ rated power
E-12	Load temperature overhigh protection	Temperature adjustment not stable or temperature sensor broken	Inspect load temperature sampling channel.



Fault Code	Fault Instruction	Reason	Fault Inspection
E-13	Reservation	——	——
E-14	Busbar current overload during running (software protection point) protection	Busbar end current protection software action	Inspect input voltage whether abnormal or not.
E-15	External equipment fault	External fault signal input	Inspect external equipment fault.
E-16	No-load running protection	No-load running	1. No-connect with heating coil. 2. Output coil and output terminal with poor contact.
E-17	Reservation	——	——
E-18	Reservation	——	——
E-19	Reservation	——	——
E-20	Reservation	——	——
E-21	Running time limitation protection	Limit running function in effect and set time up	Input running limit code (P3.02) to check and set P3.03 to 0.
E-22	Display panel communication fault	Display panel line connected bad, control board broken	1. Reinsert keyboard board and control board communication line. 2. Take keyboard board out from the slot and reinstall it. 3. Replace keyboard board and control board communication line. 4. Try to replace a new control board.
E-23	Load inductance overhigh protection	Load inductance overhigh	Reduce output coil inductance.
E-24	Load inductance End-Low protection	Load inductance end-low	Increase output coil inductance.
E-25	Creepage protection	Induction heating power creepage	1. Check whether the coil is creepage. 2. Check whether coil directly contact with iron material. 3. Check whether machine with signs of lighter.
E-26	Transformer TEMP overhigh protection	Hydraulic pressure low or temperature sensor broken	
E-27	Cooling pipe without water or hydraulic pressure low protection	Cooling pipe not connected well or with much dirt	
E-28	Resonant CAP TEMP overhigh protection	CAP not matched or fan power End-Low	
E-29	Resonant CAP temperature measuring fault protection	Resonant capacitance temperature measuring line not connected well	
E-30	Load coil temperature measuring fault protection	Load coil temperature measuring line not connected well	
E-31	Transformer temperature measuring fault protection	Transformer temperature measuring line not connected well	
E-32	PID feedback fault	Temperature PID feedback line not connected well or disconnected	
E-33	Slave machine synchronization running fault protection	Slave machine under protection or without synchronous running mode	

Fault Code	Fault Instruction	Reason	Fault Inspection
P.oFF	Low voltage	Busbar voltage too low, raise supply power voltage	1. After stop, use multimeter to measure input cable voltage, ensure it in the range of $V_e^* (1\pm 20\%)$ . 2. After stop, use multimeter to measure input cable voltage, ensure it in the range of $\{V_e^* (1\pm 20\%)\}$ , then adjust P3.06 value to ensure D-02 value=cable voltage.

NOTE:  $V_e$  as rated input voltage.

Alarm Code			
Alarm Code	Instruction	Reason	Fault Inspection
A1	No load or can not detect load	—	—
A2	Current limit	Input (output) current Higher than rated input (output) current protection	—
A3	Derating power running	① Voltage low, in the scope of $\pm(20\sim 30\%)$ ② Radiator temperature overhigh lead to forced derating power running	If machine temperature overhigh, increase power ambient ventilation and clean radiating fan
A4	Voltage high alarm	Input voltage higher than input voltage protection value	Ensure D-01 value=cable voltage
A5	Voltage low alarm	Input voltage lower than input voltage protection value	Adjust P3.07, ensure D-01 value=cable voltage
A6	Transformer and master control panel communication fault alarm	Transformer and master control panel communication fault	1. Check transformer and master control panel connection well or not 2. Check transformer indicator whether normal
A7	PID feedback offline	—	—
A8	Load coil temperature measuring offline	—	—
A9	Transformer temperature measuring offline	—	—
A10	Resonant CAP temperature measuring offline	—	—
A11	Synchronous running mode communication fault alarm	Synchronous running mode communication line connected bad	Check synchronous running mode communication line

## 9. RS485 Communication Protocol

(1) Machine address: Set by P3.18, the default is 1

(2) Serial interface parameter:

Baud rate: 9600

Data bit: 8

Check bit: None

Shut down bit: 1

(3) Register address:

41000~41031—Monitoring parameter (D) address

41100~41141—Basic parameter (P) address

41300—Error address

41301—Warning address

41400—Shutdown running address

41401~41406—6 routes display temperature address

41407~41410—Machine status indicator parameter address

41500~41505—System interface parameter address

41600~41604—Preheat setting interface parameter address

41700~41706—Annealing setting interface parameter address

41800~41806—PWHT setting interface parameter address

41900~41904—Constant Power mode interface parameter address

42000~42059—Power vs time mode interface parameter address

42060~42064—Constant current mode interface parameter address

42065~42089—Current vs time mode interface parameter address

43001—RS485 Power given address

(4) Address table:

Monitoring Parameter (D)			
Address	Parameter	Range	Description
41000	Input power	0.00~655.35KW	
41001	Input voltage	0~1000V	
41002	Input current	0.1~6553.5A	
41003	Output frequency	0.50~40.00KHz	
41004	Total output current	0.1~6553.5A	
41005	Output current 1	0.1~6553.5A	
41006	Output current 2	0.1~6553.5A	
41007	Resonant CAP volt	0~6000V	
41008	Equal resistance (ESR)	0.0~100.0Ω	
41009	Inductance	1~1000uH	
41010	Output duty cycle	0.01%~100.00%	
41011	Power factor angle	0.0~180.0°	
41012	Quality factor Q	0.1~10.000	
41013	Heat sink temperature	0.0~165.0°C	
41014	AI state	0~4096	
41015	Transformer TEMP	0.0~165.0°C	
41016	Reservation		
41017	Run time (low)	0~9999H	
41018	Run time (high)	0~9999*10000H	
41019	Limit run time	0~9999H	
41020	Special product num	1~65535	
41021	Reservation		
41022	Error 1	0~33	0: No fault Other: Fault code

Address	Parameter	Range	Description
41023	Error 2	0~33	0: No fault Other: Fault code
41024	Error 3	0~33	0: No fault Other: Fault code
41025	Error 4	0~33	0: No fault Other: Fault code
41026	Error 5	0~33	0: No fault Other: Fault code
41027	Error 6	0~33	0: No fault Other: Fault code
41028	Error 7	0~33	0: No fault Other: Fault code
41029	Error 8	0~33	0: No fault Other: Fault code
41030	Error 9	0~33	0: No fault Other: Fault code
41031	Error 10	0~33	0: No fault Other: Fault code
<b>Machine Status Indicator</b>			
41407	Machine status indicator	bit0~bit7	bit0: Normal voltage indicator 0: Abnormal voltage 1: Normal voltage bit1: Running status indicator 0: No operation 1: Running bit2: Reserved bit3: Fault status 0: No fault 1: Faulty bit4: Warning status 0: No warning 1: Warning bit5: Reserved bit6: Reserved bit7: Reserved
41408	Heating indicator	0~1	0: No heating 1: Heating
41409	Fault indicator	0~1	0: No fault 1: Faulty
41410	Machine ready indicator	0~1	0: Not ready 1: Ready
<b>System Interface</b>			
41500	Maximum power	0.5~rated power	
41501	Maximum output current	5.0~maximum output current	
41502	Temperature control accuracy	0~255	The larger the value, the higher the accuracy and the slower the response, generally take 3~20
41503	Control mode	0~1	0: Temperature control 1: Power control
41504	Start mode	0~1	0: 485 start 1: Keyboard start
41505	Curve number selection	0~1	Temperature mode: 0~2 Power mode: 0~19
<b>Constant Temperature Setting Interface</b>			
41600	Control TC number	0~5	

Address	Parameter	Range	Description
41601	Preheat temperature	0~1300℃	
41602	Holding time (hour)	0~99	
41603	Holding time (minute)	0~59	
41604	Holding time (second)	1~59	
<b>Annealing Setting Interface</b>			
41700	Control TC number	0~5	
41701	Holding temperature	Cooling temperature~1300℃	
41702	cooling temperature	0~holding temperature	
41703	Cooling rate	1~6000℃/h	
41704	Holding time (hour)	0~99	
41705	Holding time (minute)	0~59	
41706	Holding time (second)	1~59	
<b>PWHT Setting Interface</b>			
41800	Control TC number	0~5	
41801	Ramp temperature	0~holding temperature	
41802	Ramp rate	1~6000℃/h	
41803	Holding temperature	Ramp temperature~1300℃	
41804	Holding time (hour)	0~99	
41805	Holding time (minute)	0~59	
41806	Holding time (second)	1~59	
<b>Constant Power Mode Interface</b>			
41900	Setting power	0.5~rated power	
41901	Running time (hour)	0~99	
41902	Running time (minute)	0~59	
41903	Running time (second)	0~59	
41904	Running time (0.1 second)	0~9	
41905	Remaining run time (hour)	0~99	
41906	Remaining run time (minute)	0~59	
41907	Remaining run time (second)	0~59	
41908	Remaining run time (0.1 second)	0~9	
<b>Power VS Time Mode Interface</b>			
42000	The first segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42001	The first segment setting power	0.5~rated power	
42002	The first segment running time (hour)	0~99	
42003	The first segment running time (minute)	0~59	
42004	The first segment running time (second)	0~59	
42005	The first segment running time (0.1 second)	0~9	
42006	The second segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42007	The second segment setting power	0.5~rated power	
42008	The second segment running time (hour)	0~99	
42009	The second segment running time (minute)	0~59	
42010	The second segment running time (second)	0~59	

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Address	Parameter	Range	Description
42011	The second segment running time (0.1 second)	0~9	
42012	The third segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42013	The third segment setting power	0.5~rated power	
42014	The third segment running time (hour)	0~99	
42015	The third segment running time (minute)	0~59	
42016	The third segment running time (second)	0~59	
42017	The third segment running time (0.1 second)	0~9	
42018	The forth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42019	The forth segment setting power	0.5~rated power	
42020	The forth segment running time (hour)	0~99	
42021	The forth segment running time (minute)	0~59	
42022	The forth segment running time (second)	0~59	
42023	The forth segment running time (0.1 second)	0~9	
42024	The fifth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42025	The fifth segment setting power	0.5~rated power	
42026	The fifth segment running time (hour)	0~99	
42027	The fifth segment running time (minute)	0~59	
42028	The fifth segment running time (second)	0~59	
42029	The fifth segment running time (0.1 second)	0~9	
42030	The sixth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42031	The sixth segment setting power	0.5~rated power	
42032	The sixth segment running time (hour)	0~99	
42033	The sixth segment running time (minute)	0~59	
42034	The sixth segment running time (second)	0~59	
42035	The sixth segment running time (0.1 second)	0~9	
42036	The seventh segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42037	The seventh segment setting power	0.5~rated power	
42038	The seventh segment running time (hour)	0~99	
42039	The seventh segment running time (minute)	0~59	
42040	The seventh segment running time (second)	0~59	
42041	The seventh segment running time (0.1 second)	0~9	
42042	The eighth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42043	The eighth segment setting power	0.5~rated power	
42044	The eighth segment running time (hour)	0~99	
42045	The eighth segment running time (minute)	0~59	
42046	The eighth segment running time (second)	0~59	
42047	The eighth segment running time (0.1 second)	0~9	

Address	Parameter	Range	Description
42048	The ninth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42049	The ninth segment setting power	0.5~rated power	
42050	The ninth segment running time (hour)	0~99	
42051	The ninth segment running time (minute)	0~59	
42052	The ninth segment running time (second)	0~59	
42053	The ninth segment running time (0.1 second)	0~9	
42054	The tenth segment type	0~1	0: Hold 1: Ramp rate 3: End 20
42055	The tenth segment setting power	0.5~rated power	
42056	The tenth segment running time (hour)	0~99	
42057	The tenth segment running time (minute)	0~59	
42058	The tenth segment running time (second)	0~59	
42059	The tenth segment running time (0.1 second)	0~9	
<b>Constant Current Mode Interface</b>			
42060	Constant current value	0~rated current	
42061	Constant current setting time (hour)	0~99	
42062	Constant current setting time (minute)	0~59	
42063	Constant current setting time (second)	0~59	
42064	Constant current setting time (0.1 second)	0~9	
42065	Constant current remaining run time (hour)	0~99	
42066	Constant current remaining run time (minute)	0~59	
42067	Constant current remaining run time (second)	0~59	
42068	Constant current remaining run time (0.1 second)	0~9	
<b>Current VS Time Mode Interface</b>			
42069	The first segment current value	0~rated current	
42070	The first segment running time (hour)	0~99	
42071	The first segment running time (minute)	0~59	
42072	The first segment running time (second)	0~59	
42073	The first segment running time (0.1 second)	0~9	
42074	The second segment current value	0~rated current	
42075	The second segment running time (hour)	0~99	
42076	The second segment running time (minute)	0~59	
42077	The second segment running time (second)	0~59	
42078	The second segment running time (0.1 second)	0~9	
42079	The third segment current value	0~rated current	
42080	The third segment running time (hour)	0~99	
42081	The third segment running time (minute)	0~59	
42082	The third segment running time (second)	0~59	
42083	The third segment running time (0.1 second)	0~9	
42084	The fourth segment current value	0~rated current	
42085	The fourth segment running time (hour)	0~99	
42086	The fourth segment running time (minute)	0~59	
42087	The fourth segment running time (second)	0~59	

Address	Parameter	Range	Description
42088	The fourth segment running time (0.1 second)	0~9	
42089	The fifth segment current value	0~rated current	
42090	The fifth segment running time (hour)	0~99	
42091	The fifth segment running time (minute)	0~59	
42092	The fifth segment running time (second)	0~59	
42093	The fifth segment running time (0.1 second)	0~9	
<b>RS485 Power Given</b>			
43001	Percentage power/current adjustment	0~1000	

Note: 42000~42059 are the parameter addresses of the currently selected curve. When you need to set other curves, you need to set 41505 first, select the curve you want to set as the current curve, and then set the parameters of 42000~42059 to set the set parameters to the corresponding curve.

For example, curve 1 has been set by setting addresses 42000~42059. If you want to set curve 2, you should first set the value of 41505 to 1 (that is, select curve 2), then set the address 42000~42059 to realize setting the parameters of curve 2.

(5) Case (The following data are displayed in hexadecimal):

Write the preheat temperature value:

Send: 01 06 06 40 02 58 88 0C——Set P1.06 parameter value

Read error parameter:

Send: 01 03 05 13 00 01 75 03——read current error

Read warning parameter:

Send: 01 03 05 14 00 01 C4 C2——read current warning

Read output power parameter:

Send: 01 03 03 e7 00 01 34 79——read current output power

Read output current parameter:

Send: 01 03 03 eb 00 01 F4 7A——read current output current

Read output frequency parameter:

Send: 01 03 03 ea 00 01 A5 BA——read current output frequency

Running command (The running command cannot be written in 10):

Send: 01 06 05 77 00 01 F8 DC——run

Send: 01 06 05 77 00 02 B8 DD——stop

Write control board 6 routes temperature:

Send: 01 10 05 78 00 06 00 01 00 02 00 03 00 04 00 05 00 06 D0 35

——Set the 1~6 route temperature values respectively to 0.1、0.2、0.3、0.4、0.5、0.6

Read the 1 and 2 route temperature (Temperature data is signed 16-bit data):

Send: 02 03 05 78 00 02 44 ED

Read the 3 and 4 route temperature:

Send: 03 03 05 78 00 02 45 3C

Read the 3 and 4 route temperature:

Send: 04 03 05 78 00 02 44 8B

(6) Communication format

① 03: read multiple registers

Send data format:

Machine address 03 start address (16 bits) number of registers (16 bits) CRC check code (16 bits)

Receive data format:

Machine address 03 data length (8 bits) data (16 bits\*number) CRC check code

② 13: read single register attributes

Send data format:

Machine address 13 register address (16 bits) number of data (16 bits) CRC check code

Receive data format:

Machine address 13 data length (8 bits) main parameter (16 bits) attribute (16 bits)

Minimum value (16 bits) Maximum value (16 bits) CRC check code

③ 06: Write one menu register

Send data format:

Machine address 06 register address (16 bits) data (16 bits) CRC check code

Receive data format:

Machine address 06 register address (16 bits) data (16 bits) CRC check code

④ 10: Write multiple menu registers

Send data format:

Machine address 10 start address (16 bits) number of registers (16 bits) data (16 bits) CRC check code

Receive data format:

Machine address 10 start address (16 bits) number of registers (16 bits)



(7) MDBUS communication error code:

Format:

Machine address 80+function code error code CRC check code

Code No.	Description	Reason
01	Illegal function	Command number error
02	Illegal address	Register address is incorrect
03	Illegal data	Data out of parameter data range
04	Illegal register length	The number of read/write registers is incorrect
05	CRC error	Send/receive data error
06	Parameters cannot be modified during operation	
07	Parameters cannot be modified	
08	The upper computer control command is invalid	
09	Parameters are password protected	
0A	Wrong password	

(8) Parameter attribute:

Bit	Meaning
Bit7~Bit5 (Read-write attribute)	00: Reserve or monitor parameters 01: Only read 10: Read-only when running 11: Can read and write in any state 101: Password parameters
Bit4~Bit2 (unit)	000: None 001: Hz 010: A 011: % 100: V 101: °C 110: TIME 111: KW
Bit1~Bit0 (number of point)	00: None 01: One point 10: Two points 11: Three points



## Warranty Card

### Product Information:

Product Name: \_\_\_\_\_

Customer Name: \_\_\_\_\_

Model Type: \_\_\_\_\_

Customer Address: \_\_\_\_\_

Purchase Date: \_\_\_\_\_

Contact Number: \_\_\_\_\_

### Warranty Terms:

1. From the date of original shipment, we guarantee warranty of 12 months for free, and paid service for a lifetime;
2. Product failure caused by the following reasons are not included in 12 months warranty guarantee:
  - (1) Users didn't conduct right operation according to user's manual;
  - (2) Equipment has been repaired or modified by user's without consent of manufacturer;
  - (3) Fault caused by operation outside standard scope of application;
  - (4) Abnormal aging or fault result from bad operating environment;
  - (5) Damage caused by force majeure like earthquake, fire, flood, thunderstrike, abnormal voltage, or other natural disasters;
  - (6) Damage caused by improper delivery or external force.
3. Manufacturer preserves the right to refuse warranty service for the following condition:
  - (1) Damage of beyond recognition of brand, trade mark, serial number, nameplate, and other manufacturer marks;
  - (2) Payment is not finished according to contract;
  - (3) Intentional concealment to our after-sale service provider of wrong operation during setting, wiring, operation, maintenance or other process.
4. For failing products, Canroon preserve the right to entrust others for warranty issues.

## Certificate

Inspector: \_\_\_\_\_ QC 001

The product is inspected according to the standard.









# Canroon

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REV: V2.7