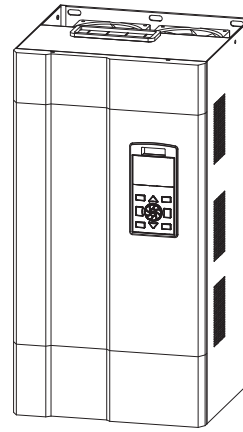
Canroon

CR1300/CR1400 Series

Intelligent Digital Induction Heating Power Supply Instruction



Product Manual

Please read the manual carefully before using the machine and keep it for refernce!

Contents

Caution:
Read this manual carefully before installation, transportation, maintenance and inspection.

Only trained professional persons can design, install and operate. During operation, all rules of the installation and examination must be followed, or will cause body damages and serious property loss.

1. Precautions

① Ensure power exactly off before installation.
② No installation on inflammable material, or will cause fire disaster.
③ Connect main return circuit, deal insulation process with bared connection terminal, or will cause electric shock hazard.
④ Power on, no operating with wet hands, or will cause electric shock hazard.
⑤ While machine running with electricity, no opening its top cover and wiring layout work. Just implement wiring layout or check only after 10 minutes power off.
⑥ Only person with professional qualification can layout wire, never left any conductor in the equipment, or will cause electric shock and equipment damage hazard.
⑦ As for the equipment in store over 2 years, use voltage regulator to gradually increase its voltage when power on.
⑧ No connecting any terminal but R, S, T with 380V, or may cause property loss hazard.
⑨ If the equipment with damage or component loss, no installation and operation, or may cause fire disaster and body damage hazard.
⑩ When installation, install where can bear the machine weight, or it will drop out and cause body damage or property loss hazard.

2. Safety Precaution and Maintenance

2.1 Precaution

As the machine is working with 380V voltage, the line voltage inner and out of the machine is so high, any part of your body can not get close to its input and output terminals. Though the induction heating machine is not under work, input and output terminal can be still with threaten voltage. If need to check inner or examine, power must be off, as for safety, must ensure equipment without current before unpack examination.

2.2 Maintenance

In order to ensure the normal operation of the induction heating power supply and extend the operating life of the equipment, it is necessary to carry out regular maintenance on the equipment. The maintenance contents are shown in the table below:

Item	Content
Temperature/Humidity	Ensure the ambient temperature –20℃～+40℃, relative humidity 20%～90%.
Oil mist and dust	Ensure no oil mist, dust and condensation in the equipment. Storage environment non–corrosive gas, liquid.
Induction heating equipment	Check whether the equipment has abnormal heat and abnormal vibration.
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 whether the coil is normal, whether there is aging, short circuit or open circuit, etc.

Notice

In consideration of the running equipment easily to absorb dust, especial for the fan module, users should try to avoid the dust overstock which will affect the heat sink leading to anybad effects result from too high inside temperature. In order to extend the life of equipment,we suggest regular dedusting for the fan and radiator, at least one time within wo months; regular dedusting for the equipment inside, at least one time within a year.

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

After unpacking 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 of the equipment and confirm that it is the product you ordered.
- ◆ Any damage, please contact with our local dealers or our company.

3.2 Specification Instructions

Type	Input			Output		Load Inductance Range (uH)
	Voltage Range and Frequency	Power (KW)	Current (A)	Min Output Line Diameter (mm^2)	Frequency (KHz)	
CR1300-005A-24TF	3-phase 380V～480V 50Hz/60Hz	5	8	6	8～35	60-200
CR1300-008A-24TF		8	12	10	8～35	60-200
CR1300-010A-24TF		10	15	10	8～35	60-200
CR1300-015A-14TF		15	23	10	8～25	80-135
CR1300-020A-14TF		20	30	16	8～25	80-135
CR1300-025A-14TF		25	38	16	8～25	80-160
CR1300-030A-14TF		30	46	16	8～25	80-160
CR1300-035A-14TF		35	53	25	8～25	60-160
CR1300-040A-14TF		40	61	25	8～25	60-160
CR1300-050A-14TF		50	76	35	8～25	60-135
CR1300-060A-14TF		60	91	35	8～25	60-135
CR1300-080A-14TF		80	121	50	8～16	60-135
CR1300-100A-14TF		100	152	75	8～16	60-135
CR1300-120A-14TF		120	182	95	8～16	60-135
CR1300-160A-14TF		160	243	120	8～16	60-135
CR1400-012A-24TF		12	18	12	3～20	150-450
CR1400-015A-24TF		15	23	14	3～20	150-450
CR1400-012C-24TF		12	18	12	3～20	150-450
CR1400-015C-24TF		15	23	14	3～20	150-450

Notice

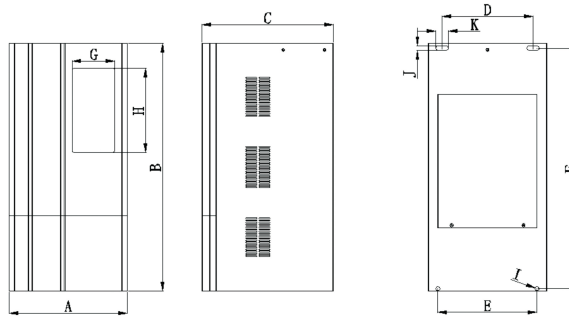
◆ The load inductance is the test value under the load, 10KHz, and series resonance conditions. It is recommended to use a digital bridge. When measuring with other equipment, please perform error compensation according to the actual situation.

◆ For the application of plastic machinery and pipe heating equipment, the best working frequency of 14TF type equipment is 12～25kHz (5～60kW)、8～16kHz (80～160kW), and the best working frequency of 24TF type equipment is 12～30kHz.

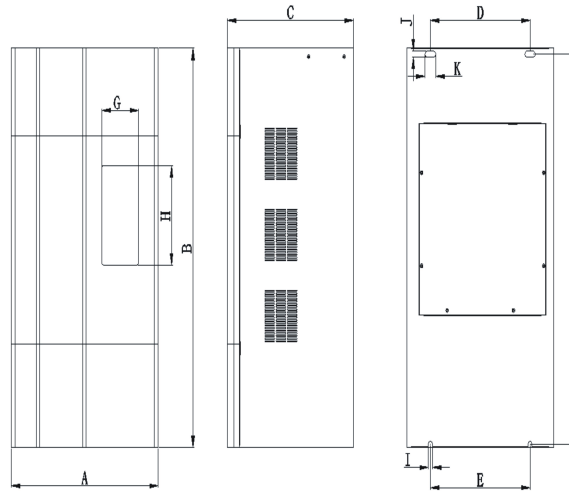
◆ When applied to mold heating equipment, the inductance is adjusted to 350μH～400μH, so that the working frequency of induction heating equipment is in the best state of 5～16 kHz.

3.3 Equipment Appearance and Components Instruction

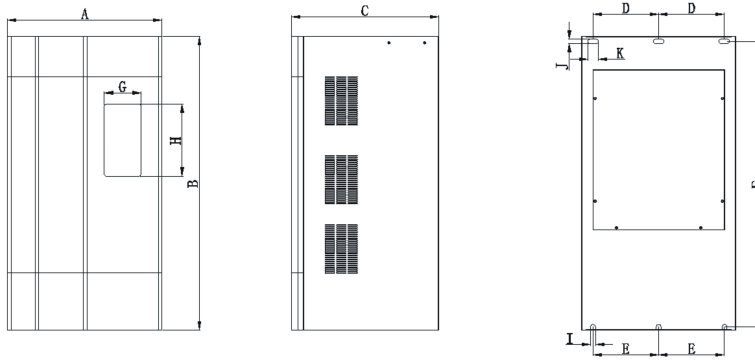
Overall dimensions:



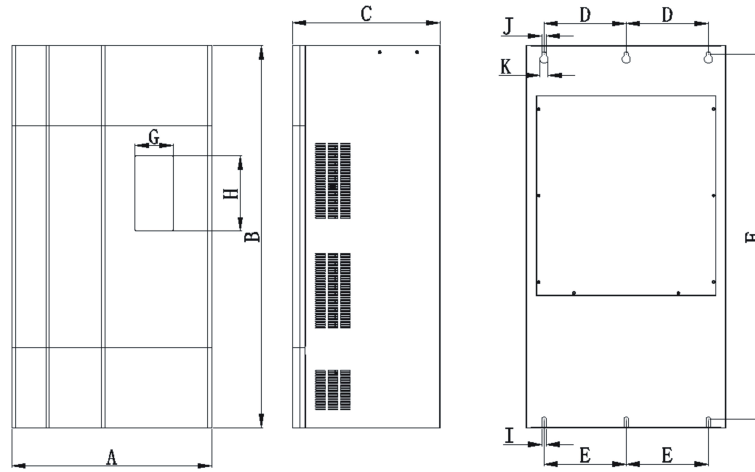
Model No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
CR1300-015A-14TF	215	445	238.5	165	180	432	76.9	150.4	Φ7.5	8	23
CR1300-020A-14TF	215	445	238.5	165	180	432	76.9	150.4	Φ7.5	8	23
CR1300-025A-14TF	255	499	249	178	180	484	76.9	150.4	Φ8	8	23
CR1300-030A-14TF	255	499	249	178	180	484	76.9	150.4	Φ8	8	23



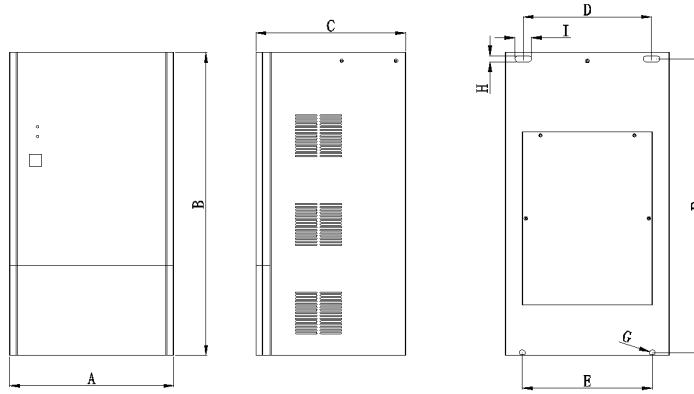
Model No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
CR1300-005A-24TF	175	353	224.5	102	102	340.5	76.9	150.4	Φ7	8	23
CR1300-008A-24TF	175	353	224.5	102	102	340.5	76.9	150.4	Φ7	8	23
CR1300-010A-24TF	175	353	224.5	102	102	340.5	76.9	150.4	Φ7	8	23
CR1300-035A-14TF	310	601	265.7	210	210	587	76.9	150.4	Φ9	8.5	23
CR1300-040A-14TF	310	601	265.7	210	210	587	76.9	150.4	Φ9	8.5	23



Model No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
CR1300-050A-14TF	325	615	310	138	138	597.5	76.9	150.4	Φ10	9	22
CR1300-060A-14TF	325	615	310	138	138	597.5	76.9	150.4	Φ10	9	22



Model No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)	J (mm)	K (mm)
CR1300-080A-14TF	401	764	311	165	165	731	76.9	150.4	Φ9	Φ9	Φ16.5
CR1300-100A-14TF	401	764	311	165	165	731	76.9	150.4	Φ9	Φ9	Φ16.5
CR1300-120A-14TF	560	1000	342	210	210	967	76.9	150.4	Φ9	Φ9	Φ16.5
CR1300-160A-14TF	560	1000	342	210	210	967	76.9	150.4	Φ9	Φ9	Φ16.5



Model No.	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	I (mm)
CR1400–012A–24TF	228	419.5	208	178	180	406.5	Φ8	8	23
CR1400–015A–24TF	228	419.5	208	178	180	406.5	Φ8	8	23
CR1400–012C–24TF	228	419.5	208	178	180	406.5	Φ8	8	23
CR1400–015C–24TF	228	419.5	208	178	180	406.5	Φ8	8	23

3.4 Functional Characteristics

Start time	< 0.2s
Power factor	> 95%
Electric heat conversion efficienc	> 85%
Service life	> 50000Hrs
Protect detection	< 10μS
Others	This product should not be used to endanger personal safety or other occasions with special safety requirements

3.5 Pre–commissioning

① Before power on, check whether the input terminal R, S, T and output terminal L1&L2 are properly wired and whether the wiring screw is tightened.
② Make sure equipment is reliably grounded.
③ After power on, if no operation, the user panel will display the output power interface as 0.00.
④ Check whether the equipment has abnormal sound and other faults, if abnormal, immediately cut off the input source.
⑤ After power on, first set F007 to 1 (keyboard startup command), then set the current to a small value (such as 20A, 30A), no load to RUN (press RUN key operation) to see if the device is normal.
⑥ After the equipment is in normal no–load running state, stop running and cut off the input power supply, and then connect the power on the load line to restart operation, and observe whether the equipment is in normal operation. Finally, check whether D–05 (output current) and D–06 (output frequency) are normal through the keyboard display, and set F006 as 1 to restore the factory value after confirmation that the equipment is in normal condition.

4. Installation and Wiring

All wire connection operation shall be carried out under the condition of power off. Do not install or operate any damage or has faulty parts induction heating equipment, otherwise there is a risk of injury.

4.1 Installation Environment Requirements

Working temperature	–20℃～+40℃
Relative humidity	Less than 90%RH, no condensation
Altitude	Less than 1000m (when higher than 1000m, the power shall be reduced by 15% for each 1000m rise)
Storage temperature	–30℃～+60℃
Others	◆ Install where no intense vibrate and strike. ◆ Install away from electromagnetic radiant source. ◆ Install where no dust pollution and explosion hazard. ◆ Install where no direct sunlight, oil mist, salinity.

4.2 Equipment Installation Conditions

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

4.3 Equipment Installation and Dismantle Cautions

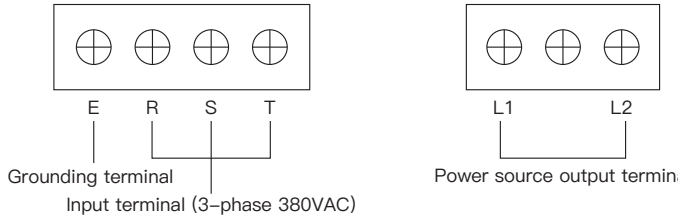
When moving the induction heating equipment, lift the cabinet with the base and do not hold the keyboard, otherwise the main unit may fall down and cause personal injury.
The induction heating equipment should be installed on flame retardant materials, away from heat sources and flammable and explosive objects, so as not to cause fire.
When more than two induction heating devices are installed in one cabinet, a cooling fan shall be installed to control the air temperature below 40℃, otherwise overheating will cause fire or damage the device.

4.4 Equipment Wiring Notices

① Before wiring, please confirm that the input power supply is cut off.
② The input power cord must be permanently fixed and the equipment must be reliably grounding.
③ The grounding terminal of the induction heating equipment must be reliably grounded with the grounding resistance less than 10 ohm, otherwise there will be the risk of electric shock and fire.
④ The minimum cross–sectional area of the grounding conductor should be bigger than 10mm^2.
⑤ Do not connect the input power cord to the output terminals L1 and L2, otherwise the induction heating equipment will be damaged.
⑥ Do not directly touch the power input terminals R, S, T and power output terminals L1, L2, and L1, L2 output terminals do not connect to the shell or with short straight line connect.
⑦ Please be sure the terminal outer cover is install well when the power is on, and be sure to cut off the power supply when removing the cover.

4.5 Input and Output Wiring

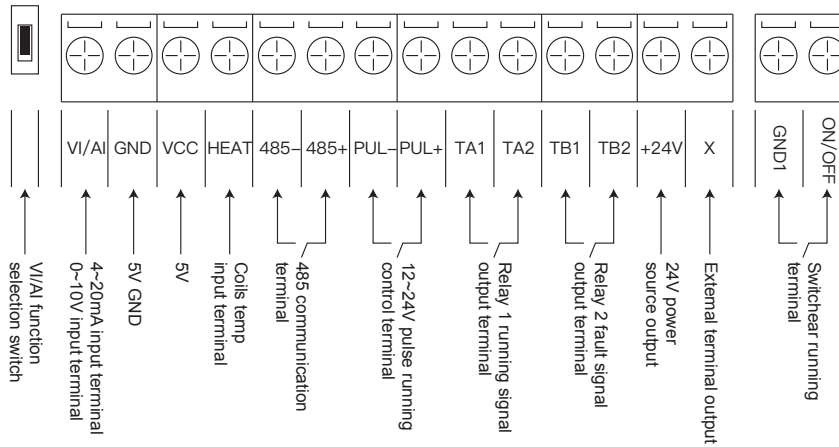
① Connect 3 phases 380VAC with input terminals R、S、T, grounding line with E terminal.
② Connect coils with output terminals L1，L2, coils must be with load.
③ Connect temperature controlling output switching signal (relay usual open terminal) with switch–gear running terminal interface.
Input and output interface as the following:



Picture 4–1 Input and output terminal wiring layout diagram

4.6 Controlling Signal Connection Terminal Instructions

(1) Planform as the following:



Picture 4–2 Terminal wiring layout

(2) **Ground wire instruction:**
In the control signal terminal wiring, there are 5V (VCC in the figure above) ground and 24V ground, where GND is 5V ground and GND1 is 24V ground.

(3) **Control signal terminal wiring instructions:**
① Connection mode of switching quantity control operation: both ends of the switch line are connected to the ON/OFF port and GND1 port in the figure respectively, regardless of positive and negative.
② Wiring mode of 12～24V pulse voltage control operation: connect the positive and negative poles of the pulse voltage to PUL+ and PUL– ports in the figure respectively, and divide the positive and negative poles.
③ Wiring mode of 0～10V voltage control operation: connect the positive terminal of the analog quantity to the VI/AI port in the figure, the negative terminal to the GND port, and set the F008 parameter to 3.
④ 4～20mA current control operation wiring mode: the current input signal is connected to the VI/AI port, the output signal is connected to the GND port, and the parameter F008 is set to 4.
⑤ Modbus power adjustment mode: data range 0–1000 corresponds to 0%–100.0%, F008 set to 5.

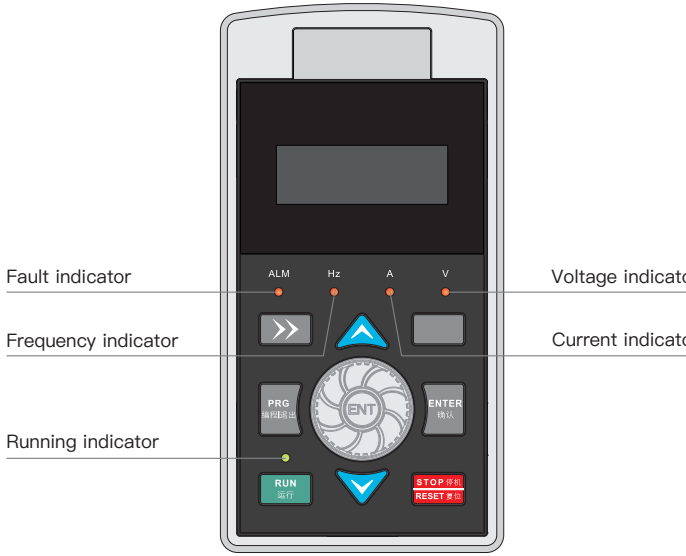
(4) **External fault signal wiring instructions:**
Connect the external fault signal input line to port X in the figure, and the signal output line to port GND1.

(5) **Coil temperature input signal wiring instructions:**
Connect the thermistor provided by the manufacturer to the VCC port and HEAT port in the figure above.

5. Display and Operation Function Instructions

5.1 Panel Keyboard Introduction

Display and keyboard operations are mainly embodied in the keyboard board. The diagram of the keyboard and the display interface of the device are shown below:



Picture 5–1 Control Panel Diagram

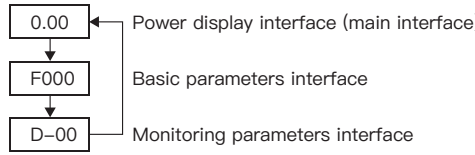
Button function instructions:

Button	Name	Instruction
PRG	Switch button	Primary menu switch
ENTER	Confirmation button	Enter the menu or set the parameters to confirm
RUN	Run button	In keyboard operation mode, press this button to start running
STOP RESET	Stop/Reset button	In keyboard operation mode, press this button to stop operation/ non–short circuit fault reset
▲	Increase button	Data or parameter code add
▼	Decrease button	Data or parameter code reduce
>>	Shift button	Shift to modify a parameter or data

Detail explanation of button functions:

PRG 编程退出

Switch button: It can be switched between power display, basic parameters and monitoring parameters in the first-level menu, as shown in the figure below:

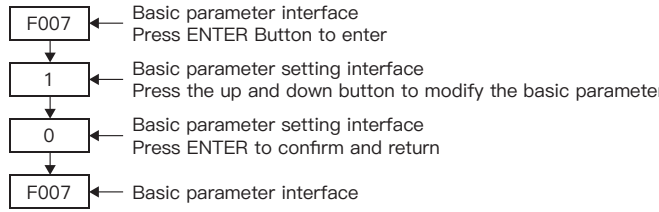


Note: The default is the main interface. When there is no button operation in the non-main interface for half a minute, it will automatically jump back to the main interface and display the current power.

ENTER 确认

Enter button: The menu enters the basic parameter setting interface or completes the parameter modification confirmation operation.

(1) Basic parameter operation
Enter the basic parameter setting interface, as shown in the figure below:



The value of F007 is 1 before modification, and the value of F007 is 0 after modification.
(2) Monitoring parameter operation
Monitoring parameter operation and basic parameter operation are basically the same, the only difference is that the specific parameter value of monitoring parameter can only be viewed but not modified.

RUN 运行

RUN button: Start the running device in keyboard running mode. However, in a state of failure, the device cannot be run until the fault is cleared.

STOP 停机
RESET 复位

Stop/Reset button: In the keyboard running mode, it is the stop button when the device is in the running state, and the reset button when it is in the error state (clear the error key, but it cannot be cleared when there are over-current, over-voltage, over-temperature of the radiator, and lack of equal input errors).

Shift button: Press this button to modify the parameter code (basic parameter, monitoring parameter) or specific parameter value from right to left one by one. The cursor is positioned at the rightmost nixie tube position when you press this button for the first time, and so on from right to left, the cursor disappears when you press this key for the fifth time, and it repositions to the rightmost nixie tube position when you press this key for the sixth time. Repeat in this way.
The shift modification is shown below:

Increase/Decrease button: When you press this button, the parameter code (basic parameter, monitoring parameter) or the specific value of the basic parameter can be added or subtracted by 1; when the key is continuously pressed and held, the data will start at 0.3S plus or minus 1, and after about 3S, it will plus or minus 10 every 0.3S. Plus or minus 100 every 0.3S after 6S, and plus or minus 1000 every 0.3S after about 9S.
Note: The modified value takes its maximum and minimum values as the upper and lower limits.

5.2 Status Indicator and Menu Mode Display

(1) Status indicator description

Type			Function Instruction
Display Function	LED Digital Display		Displays the current operating parameters of the device.
	Status Indicator	RUN	Running indicator, the green light indicates that the device is running, and the red light indicates that the device is stopped.
		ALM	Fault indicator, indicating the equipment has a fault or warning.
		Hz	Frequency indicator, the unit is KHz.
		A	Current indicator, the unit is A.
		V	Voltage indicator, the unit is V.
		Hz、V	Temperature indicator, the unit is ℃.
		Hz、A、V	Power indicator, the unit is KW.

Note: Besides the above parameter indicators display, other parameter indicators do not display.

(2) Menu mode display

Mode	Primary Menu	Secondary Menu
Basic parameter mode	Basic parameter code (format: FXXX)	Basic parameter specified value
Monitoring parameter mode	Monitoring parameter code (format: D–XX)	Monitoring parameter specified value

Press PRG button can switch between basic parameter mode, monitoring parameter mode and main menu (power display), press ENTER button, enter corresponding secondary menu. With secondary menu, press PRG or ENTER key to exit the secondary menu.

(3) Faults and alarm display mode

Faults Display	Alarm Display
Fault code display format: E–XX	Alarm code display format: A–XX

Latest fault code and then power, current and other values saved in the monitoring parameter table, Check the monitoring parameter table to acquire the latest, second, third fault codes.
Check the basic parameter FXXX specification refer to 7.1 basic parameter.
Check the monitoring parameter D.XX specification refer to 7.3 monitoring parameter table.
Check the fault code E.XX and alarm code A–XX specification refer to 9.1 fault and fault parameter.

5.3 Parameter Setting

Enter basic parameter interface (example: F013), if set specified parameter value, press 

to enter basic parameter value set interface, then press  to set specified parameter, then press 

to confirm parameter set then save.

Notes: Some parameters modifying have limitation conditions, for example, curve heating power and time can not be modified during the system running. Just can modify after stop.
Detailed instructions refer to the label instructions on the end of basic parameter table.

(1) Password set and clear

Password setting:

Password set from password parameter（F005、F028、F032）to parameter set interface, press  set password, press  to confirm password set and save it.

① **User password (F005) functions**
After user password set, any adjustable parameter can not be modified without password.

② **Running limitation password (F028)**
After running limitation password set, set running limitation (F029) and running time limitation set (F030), the two parameters can not be modified.

③ **Factory password (F032)**
After factory password set, any adjustable parameter can not be modified without password.

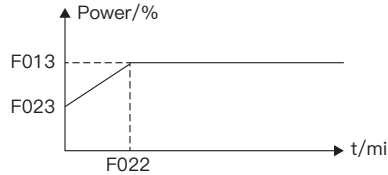
Password clear:

From password parameter (F005、F028、F032) to enter basic parameter set interface, press   to input known password value, press  to confirm password input check. If input password is correct, then follow-up adjustable parameter can be modified, or can not be modified.

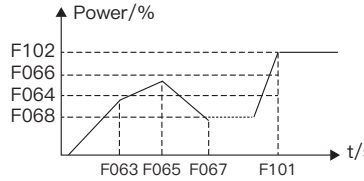
Note: If forget the password, please contact with the manufacture.

(2) Curve and 20 segments heating mode

Curve heating mode, can set curve heating time and initial power, curve heating time is the time from initial power to rated power. Slope power is rated power/initial power multiple increase, when reach rated power, heat with rated power.
Curve heating mode as the following:



20-segment heating mode, can set each segment heating time and power, segment N power running time as segment N heating time. When 20-segment running over, heat with the last segment power.
20-segment curve heating mode as the following:



6. Operation Control

6.1 Three Running Order Modes

The equipment with two starting and stopping controlling order modes:

① External terminal starting:

Set running order channel (F007) as 0, that is external terminal starting order. Choose the mode when use terminal interface ON/OFF and GND1 constituting 2-line to control start/stop.

② Keyboard start:

Set running order channel (F007) as 1, that is keyboard start order. Choose the mode when use 

key to control start/stop.

③ Modbus communication start order:

Set running order channel (F007) as 2, that is modbus communication start order.

6.2 Six Heating Modes

① 20-segment heating mode:

Set heating mode (F008) as 0, that is 20-segment heating mode, can set each segment heating power and heating time (F063～F102), it will heat with preset heating mode, during running process, skip 0 power segment and set power increase and decrease rate, improve running efficiency.

② Curve heating mode:

Set heating mode (F008) as 1, that is curve heating mode,can set curve initial power (F023) and heating time (F022), it will heat with preset curve heating mode.

③ Maximum power heating mode:

Set heating mode (F008) as 2, that is maximum power heating mode, then it will heat with maximum power, adjust (F013) to set maximum power output value.

④ 0～10V control mode:

Set heating mode (F008) as 3, that is 0～10V control mode, then can adjust analog input voltage value to adjust output power.

⑤ 4～20mA control mode:

Set heating mode (F008) as 4, that is set 4～20mA mode, then can adjust analog input current value to adjust output power.

⑥ Modbus control mode:

Set the heating mode (F008) to 5, that is, Modbus mode. At this time can through the 485 communication interface given 0-1000 data to adjust the output power.

6.3 Power on Start Functions Choice

Set power on start (F009) as 0, that is non-running with power on terminal short circuit, then, when equipment power on and running terminal in valid status, it will not start running. Release running terminal and it can not run until make running terminal in valid again. Set power on start (F009) as1, that is running with power on terminal short circuit, then, equipment will run when it power on and running terminal in valid. With the mode, after power on it will automatic inspect equipment status and running in accident power off situation, ensure automatic recover work after accident power off.

Notice: The function just be in valid when running order channel chosen as external terminal order start.

6.4 Parameter Initialization Function

Set parameter initialization (F006) as 0, that is non-action, then, parameter can not be initialized.

Set parameter initialization (F006) as 1, that is parameter initialization, then initialize the parameter, restore parameter to factory value.

When parameter set with errors and other status abnormal, appropriately start the function.

6.5 Specific Parameter Storage Function Choice

Set parameter (F012) as 0, that is non-storage, then accumulated running time, electricity consumption, start times and other data can not be stored.
Set parameter (F012) as 1, that is storage, then accumulated running time, electricity consumption, start times and other data can be stored, acquire the data through checking monitoring parameters.

6.6 Equipment Protection and Alarm Function

Low voltage alarm
Busbar current overcurrent hardware protection
Output current over current hardware protection
VCE circuit protection
High voltage alarm
Default phase protection input undervoltage protection
Coil load mismatch protection
Coils overheat protection
Current limitation alarm
Input over current software protection
Running set time up protection
Output current abnormal protection
Power derating operation alarm
Overload over one minute protection
Phase-locked anomaly detection protection
Radiator overheat protection
Non-load or inspect no load alarm
Temperature sensor abnormal protection
Input current abnormal inspection protection
Running limitation protection
Display panel communication error protection
Output over current software protection
Load inductance over/under protection
Input overvoltage protection

7. Parameter Table

7.1 Basic Parameter Table

Label instructions:
"×"—— Indicate parameter set value can not be modified in running status.
"◆"—— Indicate the parameter value is actually inspected value, can not be modified.
"○"—— Indicate the parameter set value can be modified in running status.
"–"—— Indicate the parameter is a reservation, can not be modified.

Function	Instruction	Set Scope	Unit	Factory-set Value	Modify	Modbus Address	Attri-bute
F000	Rated power	1.00～99.99KW	0.01KW	Machine type set	◆	1099	R
F001	Rated input power	220～380V	1V	Machine type set	◆	1100	R
F002	Rated input current	0.1～999.9A	0.1A	Machine type set	◆	1101	R
F003	Reservation				–	1102	R
F004	Test	0～2 (only for factory test)	1	0	×	1103	R/W
F005	Primary password	0～9999	1	****	×	1104	R/W
F006	Parameter initialization	0: Non-action 1: Parameter initialization	1	0	×	1105	R/W
F007	Start order choice	0: External terminal start order 1: Keyboard start order 2: Modbus communication start	1	0	×	1106	R/W
F008	Heating mode	0: 20-segment heating mode 1: Curve heating mode 2: Maximum power heating mode 3: 0～10V control 4: 4～20mA control 5: Modbus power control	1	2	×	1107	R/W
F009	Power on start	0: Non-running with power on terminal short circuit 1: Running with power on terminal short circuit	1	0	×	1108	R/W
F010	Input power correction factor	50.0～120.0%	1%	100.0%	×	1109	R/W
F011	Output current correction factor	50.0～120.0%	1%	100.0%	×	1110	R/W
F012	Parameter storage	0: Non-storage 1: Storage (store accumulated time, fault information, electricity consumption, start running times and other data)	1	0	×	1111	R/W
F013	Maximum power limitation value	0～100%*Pe (rated power)	1%	100%	×	1112	R/W
F014	Modbus communication enable	0: Disable 1: Valid	1	0	○	1113	R/W
F015	Modbus baud rate	0: 4800BPS 1: 9600BPS 2: 19200BPS 3: 38400BPS	1	1	○	1114	R/W

Function	Instruction	Set Scope	Unit	Factory-set Value	Modify	Modbus Address	Attri-bute
F016	Reservation				—	1115	R
F017	Modbus device address	1～127	1	1	○	1116	R/W
F018	Modbus communication delay time	0～50	1	0	○	1117	R/W
F019	Reservation				—	1118	R
F020	Reservation				—	1119	R
F021	Reservation				—	1120	R
F022	Curve heating time	1～20	1min	8	×	1121	R/W
F023	Curve heating initial power	10%～99%*【F000】*【F013】	1%	60%	×	1122	R/W
F024	Reservation				—	1123	R
F025	Reservation				—	1124	R
F026	Reservation				—	1125	R
F027	Output current lock	5.0A～rated output current	0.1A	Machine type set	×	1126	R/W
F028	Running limitation password	0～255	1	****	×	1127	R/W
F029	Running limitation set	0: Invalid 1: Valid (F012–parameter storage must start)	1	0	×	1128	R/W
F030	Running limitation time set	0～9999 hours	1	0	×	1129	R/W
F031	Reservation				—	1130	—
F032	Factory password	0～9999	1	****	×	1131	R/W
F033	Reservation				—	1132	R
F034	Reservation				—	1133	R
F035	Output frequence lower limit	8.0KHz～F036	0.1KHz	8.0	—	1134	R
F036	Output frequence upper limit	F035～40.0KHz	0.1KHz	8.0	—	1135	R
F037	E–24 Shield selection	0: Prohibit 1: Valid	1	0	○	1136	R/W
F038	Reservation				—	1137	R
F039	Reservation				—	1138	R
F040	Reservation				—	1139	R
F041	Output current lock tolerance scope	0.5～10.0	0.1	2.0	—	1140	R
F042	E–23 shield selection	0: Prohibit 1: Valid	1	1	○	1141	R/W
F043	Reservation				—	1142	R
F044	Reservation				—	1143	R

Function	Instruction	Set Scope	Unit	Factory-set Value	Modify	Modbus Address	Attri-bute
F045	Zero drift current accumulates	0.0～1.0	0.1	0.3	—	1144	R
F046	Reservation				—	1145	R
F047	Reservation				—	1146	R
F048	Reservation				—	1147	R
F049	Reservation				—	1148	R
F050	Reservation				—	1149	—
F051	Reservation				—	1150	—
F052	Reservation				—	1151	—
F053	Reservation				—	1152	R
F054	Reservation				—	1153	R
F055	Reservation				—	1154	R
F056	Reservation				—	1155	R
F057	Reservation				—	1156	R
F058	Reservation				—	1157	R
F059	Reservation				—	1158	R
F060	Reservation				—	1159	R
F061	Reservation				—	1160	R
F062	Fan delay stop time	0～3000	1	30	×	1161	R/W
F063	20-segment heating mode, segment 1 heating time	1～300	1sec	10	×	1162	R/W
F064	20-segment heating mode, segment 1 heating power	10%～100% *【F000】*【F013】	1%	10%	×	1163	R/W
F065	20-segment heating mode, segment 2 heating time	1～300	1sec	10	×	1164	R/W
F066	20-segment heating mode, segment 2 heating power	10%～100% *【F000】*【F013】	1%	15%	×	1165	R/W
F067	20-segment heating mode, segment 3 heating time	1～300	1sec	10	×	1166	R/W
F068	20-segment heating mode, segment 3 heating power	10%～100% *【F000】*【F013】	1%	20%	×	1167	R/W
F069	20-segment heating mode, segment 4 heating time	1～300	1sec	10	×	1168	R/W
F070	20-segment heating mode, segment 4 heating power	10%～100% *【F000】*【F013】	1%	25%	×	1169	R/W

Function	Instruction	Set Scope	Unit	Factory-set Value	Modify	Modbus Address	Attri-bute
F071	20-segment heating mode, segment 5 heating time	1～300	1sec	10	×	1170	R/W
F072	20-segment heating mode, segment 5 heating power	10%～100%*【F000】*【F013】	1%	30%	×	1171	R/W
F073	20-segment heating mode, segment 6 heating time	1～300	1sec	10	×	1172	R/W
F074	20-segment heating mode, segment 6 heating power	10%～100%*【F000】*【F013】	1%	35%	×	1173	R/W
F075	20-segment heating mode, segment 7 heating time	1～300	1sec	10	×	1174	R/W
F076	20-segment heating mode, segment 7 heating power	10%～100%*【F000】*【F013】	1%	40%	×	1175	R/W
F077	20-segment heating mode, segment 8 heating time	1～300	1sec	10	×	1176	R/W
F078	20-segment heating mode, segment 8 heating power	10%～100%*【F000】*【F013】	1%	45%	×	1177	R/W
F079	20-segment heating mode, segment 9 heating time	1～300	1sec	10	×	1178	R/W
F080	20-segment heating mode, segment 9 heating power	10%～100%*【F000】*【F013】	1%	50%	×	1179	R/W
F081	20-segment heating mode, segment 10 heating time	1～300	1sec	10	×	1180	R/W
F082	20-segment heating mode, segment 10 heating power	10%～100%*【F000】*【F013】	1%	55%	×	1181	R/W
F083	20-segment heating mode, segment 11 heating time	1～300	1sec	10	×	1182	R/W
F084	20-segment heating mode, segment 11 heating power	10%～100%*【F000】*【F013】	1%	60%	×	1183	R/W
F085	20-segment heating mode, segment 12 heating time	1～300	1sec	10	×	1184	R/W
F086	20-segment heating mode, segment 12 heating power	10%～100%*【F000】*【F013】	1%	65%	×	1185	R/W

Function	Instruction	Set Scope	Unit	Factory-set Value	Modify	Modbus Address	Attri-bute
F087	20-segment heating mode, segment 13 heating time	1～300	1sec	10	×	1186	R/W
F088	20-segment heating mode, segment 13 heating power	10%～100%*【F000】*【F013】	1%	70%	×	1187	R/W
F089	20-segment heating mode, segment 14 heating time	1～300	1sec	10	×	1188	R/W
F090	20-segment heating mode, segment 14 heating power	10%～100%*【F000】*【F013】	1%	75%	×	1189	R/W
F091	20-segment heating mode, segment 15 heating time	1～300	1sec	10	×	1190	R/W
F092	20-segment heating mode, segment 15 heating power	10%～100%*【F000】*【F013】	1%	80%	×	1191	R/W
F093	20-segment heating mode, segment 16 heating time	1～300	1sec	10	×	1192	R/W
F094	20-segment heating mode, segment 16 heating power	10%～100%*【F000】*【F013】	1%	84%	×	1193	R/W
F095	20-segment heating mode, segment 17 heating time	1～300	1sec	10	×	1194	R/W
F096	20-segment heating mode, segment 17 heating power	10%～100%*【F000】*【F013】	1%	87%	×	1195	R/W
F097	20-segment heating mode, segment 18 heating time	1～300	1sec	10	×	1196	R/W
F098	20-segment heating mode, segment 18 heating power	10%～100%*【F000】*【F013】	1%	90%	×	1197	R/W
F099	20-segment heating mode, segment 19 heating time	1～300	1sec	10	×	1198	R/W
F100	20-segment heating mode, segment 19 heating power	10%～100%*【F000】*【F013】	1%	93%	×	1199	R/W
F101	20-segment heating mode, segment 20 heating time	1～300	1sec	10	×	1200	R/W
F102	20-segment heating mode, segment 20 heating power	10%～100%*【F000】*【F013】	1%	96%	×	1201	R/W

7.2 Basic Parameter Instruction

Function	Instruction	Setting Scope
F000	Rated power	1.00～99.99KW

* Check equipment rated power with the parameter table.

Function	Instruction	Setting Scope
F001	Rated input voltage	220～380V

* Check equipment rated input voltage with the parameter table.

Function	Instruction	Setting Scope
F002	Rated input current	0.1～999.9A

* Check equipment rated input current with the parameter table.

Function	Instruction	Setting Scope
F005	Primary password	0～9999

* Set equipment parameter password to limit entrance to next menu.

Function	Instruction	Setting Scope
F006	Parameter initialization	0: Non-action 1: Parameter initialization

* Set the parameter as1 to reset equipment parameter to factory value.

Function	Instruction	Setting Scope
F007	Start order choice	0: External terminal start order 1: Keyboard start order 2: Modbus communication start order

* Set F007 parameter to set induction equipment running start channel:
0: External terminal start order.
1: Keyboard start order.
2: Modbus communication start order.

Function	Instruction	Setting Scope
F008	Heating mode	0: 20-segment heating mode 1: Curve heating mode 2: Maximum power heating mode 3: 0～10V control 4: 4～20mA control 5: Modbus power adjustment control

* Set F008 parameter to set induction heating equipment heating mode:
0: User can set F063～F102 parameter according to heating curve.
1: User can set F022、F023 parameter to run with curve heating mode.
2: Equipment runs at maximum power.
3: 0～10V control mode.
4: 4～20mA control mode.
5: Modbus control mode.

Function	Instruction	Setting Scope
F009	Power on start	0: On-run with power on terminal short circuit 1: Run with power on terminal short circuit

* Set F009, can set induction heating equipment whether run with power on.
0: Power on, it will not run though external terminal short circuit.
1: Power on, it will run if external terminal short circuit.

Function	Instruction	Setting Scope
F012	Parameter storage	0: Non-storage 1: Storage (Store accumulated running time, faults information, electricity consumption, start running times and other data)

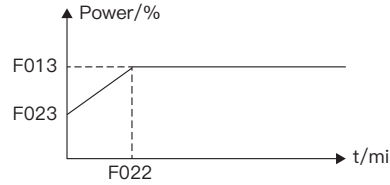
* Set F012 to store electricity consumption and other parameter:
0: Non-storage.
1: Store electricity consumption, running time and other data (store/2 hours)

Function	Instruction	Setting Scope
F013	Maximum power limitation	0～100%*Pe (rated power)

* Set F013 parameter to set equipment maximum output power.

Function	Instruction	Setting Scope
F022	Curve heating time	1～20
F023	Curve heating initial power	10%～99%*【F000】*【F013】

* Set F022、F023 parameter to set equipment heating curve (set F008 parameter as 1).
Curve graph as the following:



Function	Instruction	Setting Scope
F027	Output current lock	5.0A～machine type set

* Set F027 can set equipment maximum output current.

Function	Instruction	Setting Scope
F028	Running limitation password	0～255
F029	Running limitation set	0: Invalid 1: Valid (F012-parameter storage must turn on)
F030	Running limitation time set	0～9999 hours

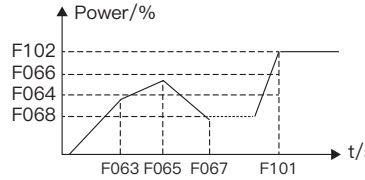
* When parameter F012、F029 value is 1, set F030 parameter to make equipment work with timing mode, if set running limitation password (F028), can not modify F029, F030 value until password authentication finished.

Function	Instruction	Setting Scope
F032	Factory password	0～9999

* Set the parameter password to limit entrance to next menu.

Function	Instruction	Setting Scope
F063 ~ F102	20-segment heating mode	

* When F008 value is 0, set F063～F102 to set heating curve:



7.3 Monitoring Parameter Table

User can observe equipment actually running parameters through keyboard.

Monitoring Parameter			
Monitoring Code	Instruction	Scope	Modbus Address
D-00	Present output power	0.00～99.99KW	999
D-01	Series equivalent resistance	0.0～999.9Ω	1000
D-02	DC busbar voltage	0～800V	1001
D-03	DC busbar current	0.1～999.9A	1002
D-04	Load inductance	80～400uH	1003
D-05	Output current	0.1～999.9A	1004
D-06	Output frequency	8.0～25.0KHz	1005
D-07	Radiator temperature	0.0～125.0℃	1006
D-08	Load coils temperature	0.0～120.0℃	1007
D-09	Reservation		1008
D-10	Reservation		1009
D-11	Phase locking angle deviation	0.1～360.0°	1010
D-12	Reservation		1011
D-13	Reservation		1012
D-14	Accumulated running time	0～9999H	1013
D-15	Accumulated electricity consumption (low-order)	0～9999KWH	1014
D-16	Accumulated electricity consumption (high-order)	0～9999KWH	1015
D-17	Main procedure software version high-order	0～9999	1016
D-18	Main procedure software version low-order	0000～FFFF	1017
D-19	Keyboard version No.	1.00～9.99	1018
D-20	Latest faults code	0～24	1019
D-21	Last second faults code	0～24	1020
D-22	Last third faults code	0～24	1021
D-23	Reservation		1022
D-24	Reservation		1022

Monitoring Code	Instruction	Scope	Modbus Address
D–25	Running limitation accumulated time	0～9999h	1024
D–26	Output phase	0～1024	1025
D–27	Reservation		1026
D–28	Reservation		1027
D–29	Busbar under voltage protection	0～1000V	1028
D–30	Busbar voltage restore restart valve value	0～1000V	1029
D–31	Busbar current limitation range value	Machine type set	1030
D–32	Busbar current protection value	Machine type set	1031
D–33	Output current limitation range value	Machine type set	1032
D–34	Output current protection	Machine type set	1033
D–35	Running downshift number	0～10	1034
D–36	Actual busbar current	0～200.0A	1035
D–37	Duty ratio	0.0～100.0	1036
D–38	Equipment busbar current	0.0～200.0A	1037
D–39	Equipment output current	0.0～200.0A	1038
D–40	Busbar voltage when faults occur	0～1000V	1039
D–41	Busbar current when faults occur	0.0～200.0A	1040
D–42	Output current when faults occur	0.0～200.0A	1041
D–43	Output phase when faults occur	0～1000	1042
D–44	Output frequency when faults occur	8.0～35.0KHz	1043
D–45	Radiator temperature when faults occur	0.0～125.0℃	1044
D–46	Special product request number high–order	0～9999	1045
D–47	Special product request number middle–order	0～9999	1046
D–48	Special product request number low–order	0～9999	1047
D–49	AV state	0～1024	1048
D–50	AI state	0～1024	1049

8. Function Features

8.1 Equipment Function

(1) Perfect electromagnetic compatibility

As electronic system processor frequency and electronic signal frequency being improved one electronic system is a complex equipment consisted of many components and subsystems. High-speed and high-density equipment will enhance system radiation, low voltage, high sensitivity will weaken system anti-interference, so the mutual interference between electromagnetic ambient and system inner will seriously threat the stability and safety of electronic equipment. CR1300 series products strictly follow electronic equipments relevant EMC standards and have passed international authorities certification.

(2) Multi-heating mode

Can freely use these six modes: 20-segment heating mode, curve heating mode, maximum power heating mode, 0～10V control heating mode, 4～20mA control heating mode, modbus control heating mode.

(3) Comprehensive protection function design

Offer overcurrent, overvoltage, default phase, short circuit and so on, more than 20 running control protection functions. It will not damage the equipment when induction coil short circuit, workpiece short circuit, power grid fluctuation and other abnormal cases.

(4) Infinite power adjustment mode

In infinite power adjustment mode, it will realize any power output within the rated range, ensuring different power requirement during use.

(5) Strong environmental adaptability

Adopt high-capacity design and advanced coating process, can be long used in high temperature, oil , dust and other scurviness ambient(current limitation power derating process based on practical situation).

8.2 Main Function Features

(1) Dephase PWM control

CR1300 series adopt dephase PWM control mode, can improve equipment control precision and power factor, decrease module switchgear dissipation.

(2) IGBT invert

Adopt IGBT invert technology, realize high efficiency soft start, compared with traditional valve type, thyristor type, it has absolute advantage in comprehensive function aspect.

(3) PID adjust technology

Internal PID adjust technology, can realize power increase and decrease rate controllable and high-precision output power stability controllable perfect balance.

(4) Comprehensive protection function choice

It has protection function with over current, overvoltage, under voltage, overheat, short circuit, no-load, it has software and hardware double protection with over current and overvoltage in case of damaging equipment under abnormal circumstances.

(5) Convenient heating mode

- Maximum power heating
- Curve heating: set initial power, initial time on line, run in preset heating curve mode
- 20-segment heating: set each segment heating power and heating time on line, run in preset heating curve mode, during running, skip segment with 0 power, improve running efficiency.
- 0～10V control heating
- 4～20mA control heating
- Modbus control heating

(6) Accidental power outages, recover running after power on

When accidental power outages occur, it will automatic inspect equipment status after power on and automatic run, ensure automatic recovery after accidental power outages, reduce loss maximatily.

(7) Running order start mode diversification

– External terminal start
– Keyboard start
– Modbus communication start order

(8) Output power adjustable

Heating maximum power can realize 0%～100% adjustment, any power output can be available as required to meet customer use.

(9) Parameter set and save

Set parameter any time and save.

(10) Faults information save

During running with faults, it can save any time so as to check faults information from keyboard for maintenance and debugging.

(11) Point to point communication interface

– Keyboard input, output interface
– Analog input interface
– Faults alarm relay output interface
– External faults and coil temperature signal input interface

(12) High definition digital tube display

The display interface of the equipment adopts digital tube display, the advantages of the display interface are high definition, simple structure, no matter day or night, the data can be clearly visible.

(13) Modular design

Compared with traditional induction heating power source, new modular design has obvious advan–tage in property, function, reliability, maintainability, workability and product image aspects.

9. Protection, Alarm Code and Faults Screening

9.1 Protection and Alarm Code Table

Fault Code			
Fault Code	**Fault Instruction**	**Reason**	**Fault Inspection**
E–00	No protection action		
E–01	Busbar over current protect	Busbar over current circuit protect action	Seek service from the manufacturer
E–02	Output over current protect	Output current overcurrent protection circuit action	1. Test whether the output terminal and coil are short circuit. 2. Check whether there are any signs of leakage or ignition in the output cable, induction coil and inside the machine.
E–03	VCE inspection protection	Drive circuit protection action	1. Test whether the output terminal and coil are short circuit. 2. Check whether there are any signs of leakage or ignition in the output cable, induction coil and inside the machine. 3. Set the F004 parameter to 1, and then run, if it still reports E–03, you should consult the manufacturer (Note: When F004 is set to 1, the power must be cut off to stop the machine). 4. Consult the manufacturer when reporting E–03 after power–on.
E–04	Output current overload under running (Software protection point) protection	Busbar overcurrent protection software action	1. Test whether the output terminal and coil are short circuit. 2. Check whether there are any signs of leakage or ignition in the output cable, induction coil and inside the machine. 3. Check whether the coil inductance is too low. 4. When power on if report E–04 error, you can try to replace the control board.
E–05	Busbar overvoltage protection	Output overvoltage protection software action	1. After stop, use multimeter to measure 3phase input voltage, if the value is higher than 550V, never run until lower than 550V. 2. After stop, use multimeter to measure 3phase input voltage, if the value is lower than 550V, just Adjust the regulator potentiometer on the control board, make D–02 value correspond to the test value. (D–02 value = test value * 1.414) 3. Multi heating machine with one load, error code with E–05, try to increase the distance between coils.
E–06	Busbar under voltage protection	Output undervoltage protection software action	1. After stop, use multimeter to measure 3phase input voltage, if the value is lower than 300V, never run until higher than 300V. 2. After stop, use multimeter to measure 3phase input voltage, if the value is higher than 300V, just adjust the regulator potentiometer on the control board, ensure D–02 value correspond to the test value. (D–02 value = test value * 1.414)

Fault Code	Fault Instruction	Reason	Fault Inspection
E–07	Reservation		
E–08	Reservation		
E–09	Default phase protection	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.
E–10	Radiator overheat protection	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 replace fans if broken. 4. Replace fans when it is broken.
E–11	Coil overheat protection	Coil fan fault or coil specification mismatch heating machine	1. Improve heating coil. 2. Strengthen coil radiating.
E–12	Reservation		
E–13	Running time up and protection	Limit running function in effect and set time up	Input running limitation code (F028) to check, then set F012 and F029 as 0.
E–14	Busbar current overload (software protection point) protection under running	Busbar overcurrent software protection action	Seek service from the manufacturer.
E–15	External equipment fault protection	External fault signal input	Inspect external equipment fault.
E–16	No–load running (more than 1 minute) protection	No–load running	1. No–connect with heating coil. 2. Output coil and output terminal with poor contact.
E–17	Phase locking abnormal inspection	Mutual inductor faults or phase locking circuit fault	Seek service from the manufacturer.
E–18	Output current abnormal protection	Output line connectio bad and output current adopt circuit abnormal	1. Check whether the 34PIN cable is tightly inserted. 2. Check whether the signal line of the output current sensor is connected properly. 3. In the exclusion of the first two cases can be considered to replace the control board and 34PIN cable.
E–19	Temperature sensor faults protection	Temperature sensor plug loose or temperature sensor invalid	1. Plug tightly heating power source inner temperature sensor signal line. 2. Consult the manufacturer and replace inner temperature sensor.

Fault Code	Fault Instruction	Reason	Fault Inspection
E–20	Input current faults protection	Input current sensor invalid or input current adopt circuit abnormal	1. Check whether the 34PIN cable is tightly inserted. 2. If 34PIN row line slot with sundries, firstly clean slot sundries, then tightly stuck 34PIN cable. 3. Replace the 34PIN cable. 4. In the case of multiple heating power sources dragging the same load, try to increase the distance between coil groups. 5. In the exclusion of the first four cases can be considered to replace the control board and 34PIN cable.
E–21	External temperature sensor fault protection	External temperature sensor broken	Replace external temperature sensor.
E–22	Display board communication error	Display board 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 value overhigh protection	Load inductance value overhigh	Reduce output coil inductance.
E–24	Load inductance too low protection	Load inductance too low	Increase output coil inductance.
P.oFF	Low voltage	Busbar voltage two low, raise supply power voltage	1. After stop, use multimeter to measure 3–phase input voltage, if value lower than 270V, check power supply. 2. After stop, use multimeter to measure 3–phase input voltage, if value higher than 300V, adjust the regulator potentiometer on the control board, ensure D–02 value correspond to the test value. (D–02 value = test value * 1.414).

Alarm Code			
Fault Code	Fault Instruction	Reason	Fault Inspection
A00	No alarm information		
A01	No load or undetectable load	No load or incorrect load position, the coil is too far away from the load	Adjust coil or load.
A02	Current limit running	Running frequency is too low	Reduce output coil inductance.
A03	Derating power running	The voltage is low, the actual three–phase input voltage is lower than 80% of the rated input voltage	Check whether the input voltage meets the rated voltage requirements.
		Radiator temperature overhigh lead to forced derating power running	Reduce the ambient temperature, clean the air duct, and check whether the fan is operating normally.

Fault Code	Fault Instruction	Reason	Fault Inspection
A04	Reservation		
A05	Low voltage alarm	DC busbar voltage is lower than 424V	1. After stop, use multimeter to measure 3-phase input voltage, if value lower than 300V, check power supply. 2. After stop, use multimeter to measure 3-phase input voltage, if value higher than 300V, adjust the regulator potentiometer on the control board, ensure D-02 value correspond to the test value. (D-02 value= test value * 1.414).
A06	485 Communication isconnection warning	485 communication disconnection	1. Check the communication between the host machine and the local machine; 2. Change F018 to 0 to disable communi-cation disconnection detection.

9.2 Common Faults and Settle Methods

When induction heating equipment with below abnormal condition during use, refer to the following methods to exclude faults:

① Power on, keyboard display abnormal or lose control

Check keyboard whether properly installed or bad contact, confirm whether input voltage in the scope of the induction heating machine working voltage.

Try to replace keyboard display panel or control board if above items can not work.

② Power on, keyboard can properly work, external terminal can not start

Set F007 value as 0.

Turn off temperature sensor switchgear and restart.

Check connection terminal.

③ Keyboard can not properly work

Set F007 value as 1.

④ Fan abnormal

If the fan does not run, the fan speed is slow, or there is vibration when the fan is running, first check whether the fan fixing screws and wiring ports are loose, whether the fan is too oily, etc.

10. Modbus Communication Protocol

(1) Register address
Function parameters F000–F102: 1099–1201
Monitoring parameters D00–D50: 999–1049
Error code: 1299
Warning code: 1300
Modbus power adjustment address: 2000（0–100.0%）
Run control commands/Run state: 1399　1: Run　2: Stop（only 06 fuction code can be used to write data）
(2) Communication format
① Function code 03: read multiple registers
Send data format: device address 03　initial address (16 bits)　number of register (16 bits)　CRC check code (16 bits)
Receiver data format: device address 03　data length (8 bits)　data (16 bits * register numbers)　CRC check code
② Function code 13: read single registers
Send data format: device address 03　initial address (16 bits)　number of register (16 bits)　CRC check code (16 bits)
Receiver data format: device address 03　data length (8 bits)　main parameters (16 bits) attributes (16 bits) maximun (16 bits)　minimum (16 bits) CRC check code
③ Function code 06: write a register
Send data format: device address 06　address (16 bits)　data (16 bits)　CRC check code
Receiver data format: device address 06　address (16 bits)　data (16 bits)　CRC check code
④ Function code 10: write multiple registers
Send data format: device address 10　initial address (16 bits)　number of register (16 bits)　data CRC check code
Receiver data format: device address 10　initial address (16 bits)　number of register (16 bits)　CRC check code
(3) Modbus communication error code
Format: Machine address 80+ function code Error code CRC check code

Code No.	Description	Reason
1	Illegal function	Command number error
2	Illegal address	Incorrect register address
3	Illegal data	The data exceeds the parameter dara range
4	Illegal register length	Incorrect number of read/write registers
5	CRC check length	Data sending and receiving error
6	Parameters cannot be modified during operation	
7	Parameters cannot be modified	
8	The upper computer control command is invalid	
9	Parameters are protected by password	
A	Wrong password	

(4) Usage example
Run command: 01 06 0577 0001 F8 DC
Stop command: 01 06 0577 0002 B8 DD
Read output power: 01 03 03E7 0001 3479
Read output current: 01 03 03EC 0001 45 BB

Appendix: Plastic Machinery Installation Instruction

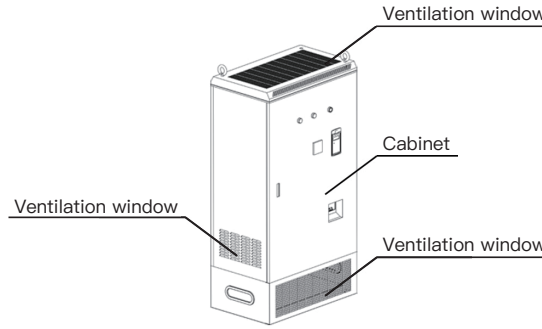
(1) Safety precaution, please strictly follow the below

In order to avoid a risk to the user's own or other people's life and property safety, please observe the following instructions before use:

★ Distribution cabinet must install electric leakage protection equipment.

★ Induction heating power source and plastic machinery must be well grounding.

(2) Distribution cabinet choice or design precaution



Notice: ensure distribution cabinet ventilate, radiate, dustproof, anti-explosion!

(3) Installation site notice

★ Install indoor and avoid direct sunlight or rain.

★ No installing where easily touch, inflammable, corrosive gas or greasy dirt, metal powder.

(4) Output, insulation blanket and inductance precaution

★ Recommend using temperature resistance 500℃ mica high temperature line coil.

★ Recommend insulation blanket temperature resistance more than 600℃, heat conductivity coefficient $\lambda \leqslant 0.039 W/m \cdot k$.

★ Inductance value is tested by digit electricity bridge under the condition of series resonance, 10KHz gear.

★ Various machine type inductance, wire cross-sectional area, insulation blanket type as the following table:

Machine Power (KW) (CR1300 Series)	Output Cable Sectional Area (mm^2)	Insulation Blanket Thickness (cm)	Inductance (uh)
5.0KW	10	2.0–2.5	60–200
8.0KW	16	2.0–2.5	60–200
10KW	16	2.0–2.5	60–200
15KW	16	2.0–3.0	80–135
20KW	16	2.0–3.0	80–135
25KW	25	2.0–3.0	80–160
30KW	25	2.0–3.5	80–160
35KW	25	2.0–3.5	60–160
40KW	25	2.0–3.5	60–160
50KW	35	2.0–4.0	60–135
60KW	35	2.0–4.0	60–135
80KW	50	2.0–4.0	60–135

Machine Power (KW) (CR1300 Series)	Output Cable Sectional Area (mm^2)	Insulation Blanket Thickness (cm)	Inductance (uh)
100KW	75	2.0–4.0	60–135
120KW	95	2.0–4.0	60–135
160KW	120	2.0–4.0	60–135

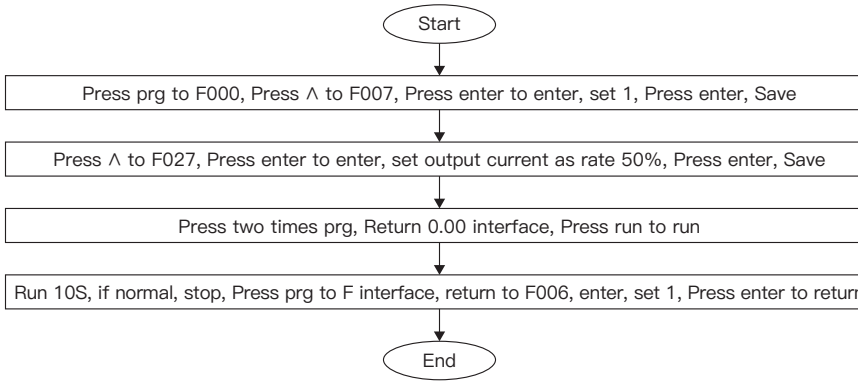
★ Notice: insulation blanket thinner, inductance less. insulation thicker, inductance more, but not beyond the scope above.
★ Check whether match best standard: power on, D–00 whether reach rated power; D–06 output power whether in 12–25KHz.

(5) Installation precaution

★ Screws at the connection terminal must be tight, check after connection.
★ The voltage at both ends of the output line is as high as 1000V, so must install insulation bushing and high–temperature waterproof rubber sleeve to prevent leakage.
★ The output cable from the induction heating power supply to the coil can be wired in parallel after the insulation sleeve is installed.
★ Keep coil dry without water.
★ Distance between coils, refer to the diagram above, in the situation of meet the needs of the process, the bigger the better.
★ Thermocouple line separated from coils or cover insulating bush for shield.

(6) Debugging Running

★ Check input,output connection terminal whether tight, inductance value whether in the required range.
★ Measure the grid voltage with a multimeter (normal value 340–460V) before operation after power on.
★ Display panel with three 0 is normal, if faults alarm, check faults code.



★ Installation finished, check monitoring parameter during running:
① Check D–00 output power (normal value: output power marked on equipment nameplate)
② Check D–05 output current (normal value: rated output current marked on equipment nameplate)
③ Check D–06 output frequency (normal value: 12–25KHz)
④ Check D–37 duty ratio (normal value: 75%–99%)

(7) Machine inductive load common problems:

Output Power (D-00)	Output Current (D-05)	Output Frequency (D-06)	Duty Ratio (D-37)	Available or Not	Reason	Solution
Less than rated	Within rated scope	——	More than 98%	×	Insulation blanket too thin	Increase insulation blanket thickness and inductance value
Less than rated	Approximate rated	Normal value	Normal value	×	Inductance is too small	Increase inductance value
Less than rated	Approximate rated	Normal value	Less than normal value	×	Insulation blanket too thick	Reduce insulation blanket thickness
Approximate rated	Less or equal to rated	Normal value	Normal value	√	Normally run	——

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) Eguipment 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 lie earthquke, fire, flood, thunderstrike, abnormal voltage, or other naturtal disasters;
   (6) Damage caused by improper delivery or extermal force.
3. Manufacturer preserves the right to refuse warranty service for the following conditon:
   (1) Damage of beyond recognition of brand, trade mark, serial number, nameplate, and other manufacturer marks;
   (2) Payment is not finished according to contrace;
   (3) Intenional concealment to our after-sale service provider of wrong operation during setting, wirting, operation, maintenance or other process.
4. For failing products, our preserve the right to entrust others for warranty issues.

Certificate

Inspector: QC 001

The product is inspected according to the standard.

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REV: V2.2