



雨滴科技
Raindi Technologies

雨润万物 滴水成河

Digital Inductive Heater

Stable, Energy Saving, Easy to Use



Focus on Technical Innovation of
Digital Inductive Heater

Instruction Manual



Determinants of Digital Heater Replacing Analog Heater



PK



- **Good Confidentiality:** digital information is easy to be encrypted and not easy to be stolen.
- **Higher Efficiency:** it can optimize the working point, and the power tubes always work on ZVS state.
- **More reliable:** fewer components, lower operating temperature, more flexible sensor response.
- **Visual interface:** all information parameters are displayed with friendly human operating interface.
- **Stronger stability:** digital control can provide better compensation effect than analog scheme.
- **Faster transient response:** the control mechanism greatly improves the transient response rate.
- **Wider frequency range:** digital phase-locked technology is adopted to lock and follow the frequency change of load in real time.
- **Higher adjustment precision:** the adjustment accuracy is defined according to voltage, load and temperature, and digital control can better monitor these parameters and adjust the control in real time.



Main Parameters

- Digital Phase-Locked Technology
- Output Power: $P \leq 45\text{KVA}$
- Input Current: $I \leq 25\text{A}$
- Working Frequency: 560K-670K



Control Parameters

- PWM Pulse Signal Input
- PWM frequency is 100Hz
- PWM precision is 1%
- PWM voltage is 12V or 24V
- Low PWM level is effective to control



System Block Diagram

Control Device: PLC or MCU



Display Screen



Heating Head



Thermometer



Cooler



Notices:

- Be sure to check the connecting wires of each unit and ensure they are accurate before power on.
- Be sure to check the water circuit, make sure the cooler has been started and the water circuit is smooth before power on.
- Be sure the thermometer is aligned with the target before working.
- Be sure the parameters on the display screen are normal before working.

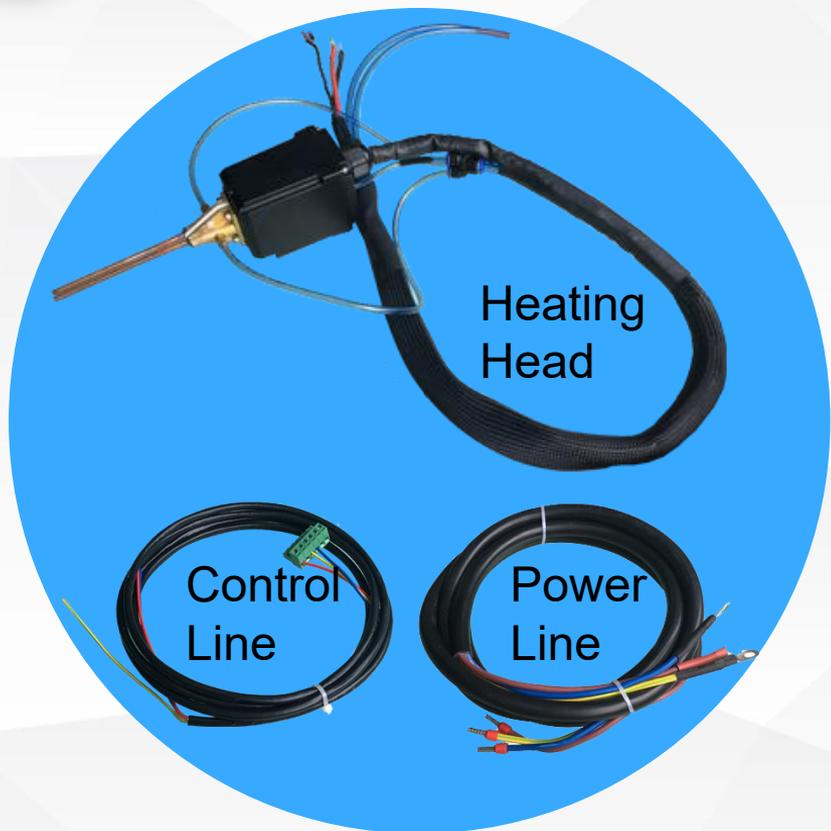
Interface Illustrations



1	Heating power adjustment (press the key + / - to adjust the current power and maximum power, short press 1%, long press 10%)
2	Start / Stop (long press stop key for three seconds to enter the maximum power setting, and save the setting when exit)
3	Display Screen with real-time function and information display
4	Main Instructions and Notices
5	Interfaces of control signals and controlled signals
6	Software upgrade Interface
7	Heating Head Interface
8	Control signal lines definition
9	AC 220v-50/60Hz single phase input interface
10	Water cooler system interface
11	Power switch



Back Panel Wiring Illustrations



The connection between the Digital Inductive Heater, the Heating Head, the Power Line, the Control Line and the Cooler is illustrated as below. Just connect according to the same color and sequence.





Control Device: PLC, MCU or Foot Switch

PLC or MCU

Often used to realize some automatic heating, welding, quenching and equipment that need to auto control and monitor the temperature.

Foot Switch

Commonly used for manual heating, manual tooth extraction, manual welding, manual tooth repair.





Control Method 1: PLC or MCU

PLC	Heater	Descriptions
Output COM	①	Connected, to PLC+24V Power
Output Switch	③	Connected, the PLC output signal starts or stops the heater, and the low-level control is effective
Output Switch	④	Connected, the PLC outputs 100Hz frequency, 1% precision PWM signal to control the heater output power, and the low-level signal is effective.



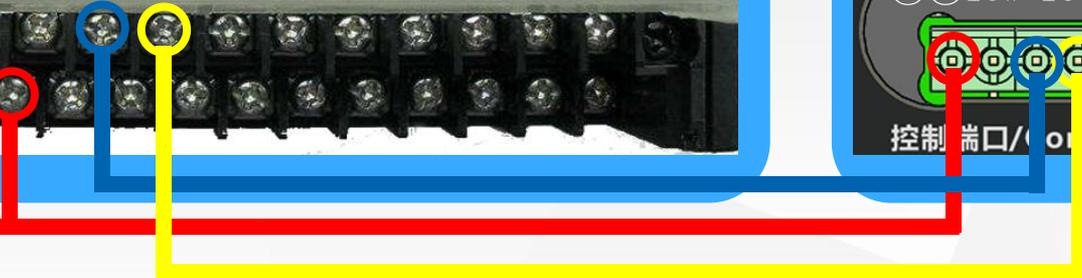
PLC Control Output Ports



Heater Control Input Ports

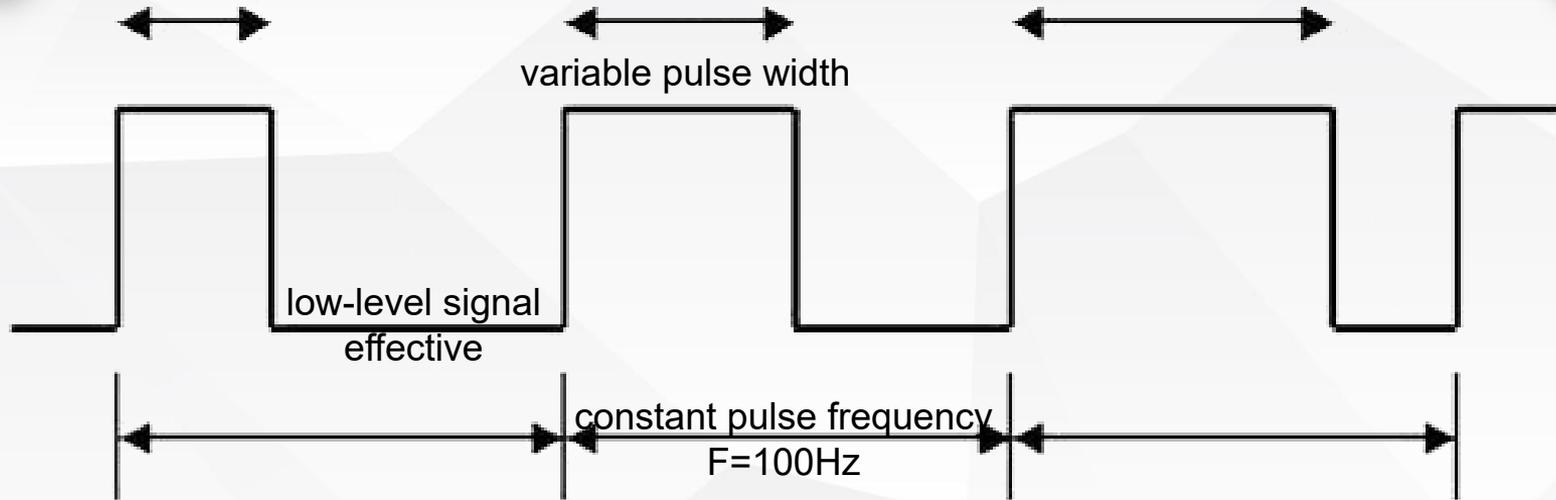


+24V





PWM Output Notices



- In order to precisely control, the PLC or MCU outputs 100Hz frequency , 1% precision PWM signal.
- The recommended PWM low-level pulse width range: 10% - 100%
- When the low-level pulse width is $\leq 6\%$, the heater does not work.
- When the temperature control is stable, the PWM output is about 13% (varies with the size of the workpiece).

Note: During operation, give a low-level start signal to ③ first, then a PWM signal to ④, and the low-level signal on ③ lasts until the end of a heating cycle.

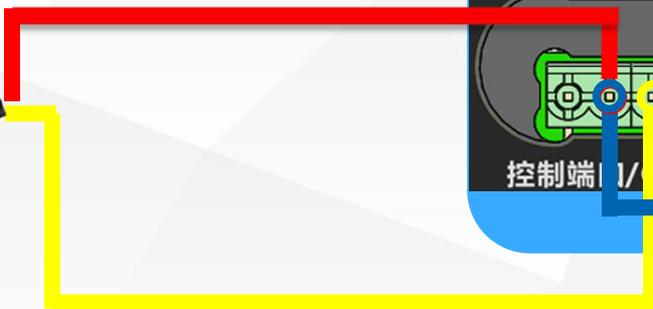
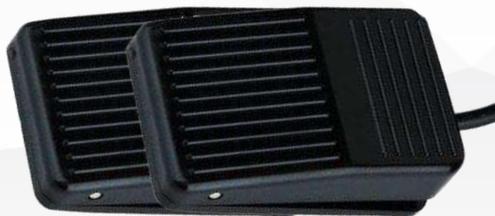


Control Method 2: Foot Switch

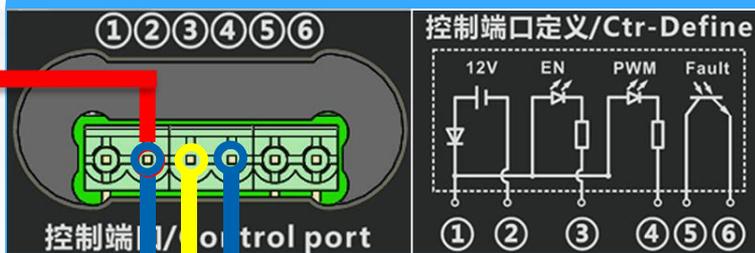
② and ③ on the heater back panel are respectively connected to two normally open lines of foot switch, ② and ④ are directly connected with wires.

When using, just press the foot switch to make the normally open switch to close, that will control the heater to work.

To adjust the power, press the heating power adjustment buttons on the front panel to increase or decrease the power.



Heater Control Input Ports





Normal Power On Process



俊知机械
Raindi
Induction Heater
IH-60/600

1

Power on logo

软件版本: V4.30
固件版本: 2C 20
水压正常 26C
电压12.0V 正常

2

Water pressure test, voltage test and heater head frequency test. When all parameters are normal, "正常"(normal) will appear.

-
- -
- -
- -

3

Power output self check, low power self operation, detect and lock the real-time frequency of the heater head. The peak value of the curve is near the middle line of the

强度 100%工作 开
频率 615KHz
水压正常 27C
工作频率 570-670K

6

In normal work mode, "strength" and "frequency" will change with the temperature of the heated workpiece

强度 0%工作 关
频率 616KHz
水压正常 27度
工作频率 570-670K

5

After frequency detection, it will enter the normal standby mode and display the real-time detected frequency

峰值频率: 601KHz
峰值功率: 1497W
拉宽、加长感应棒
窄短 --->>> 宽长

4

During self-test, peak power and peak frequency will be displayed, and prompt the status of the induction ring.





Frequent Problems and Solutions 1



软件版本: V3.1
固件版本: 20
水压不足: 27C
电压12.0V: 0

Insufficient water pressure: (water pressure should be $\geq 0.15\text{Mpa}$)

- ①Please check whether the water volume in water tank is sufficient and whether the cooler is working normally.
- ②Check whether the water inlet and outlet are connected correctly (not reversely)
- ③Check if any the water leakage

软件版本: V3.1
固件版本: 20
水压正常: 27C
电压11.2V: 0

Abnormal voltage: (should be: $11.5\text{V} \leq \text{voltage} \leq 12.5\text{V}$)

- ①The working voltage is between 11.5V and 12.5V. The displayed voltage 11.2V is not within the normal range.
- ②Check whether the AC input power is about 220V.
- ③Check whether the circuit is in good connection.



Frequent Problems and Solutions 2



软件版本: V3.1
固件版本: 20
水压正常 27C
电压12.0V 60

Heater head frequency abnormal: (feedback value should be ≥ 1000 , 60 is abnormal)

①Check whether the heater head is well connected and whether the feedback line is well connected.

②Check whether the 4 screws on the inductive rod are screwed properly, whether the inductive rod is in contact with the metal or in short circuit.

③Check whether the contact surface of the inductive rod and the heater head is oxidized, and polish the oxide layer with sandpaper.

软件版本: V3.1
固件版本: 20
水压正常 27C
电压12.0V 频率过低

Frequency is too low: (should be $570\text{kHz} < \text{frequency} < 670\text{kHz}$) the frequency scanned is lower than the setted minimum frequency.

①Check whether the size of induction ring is too large.

②Check whether the distance between the two copper tubes of the inductive rod is too close.



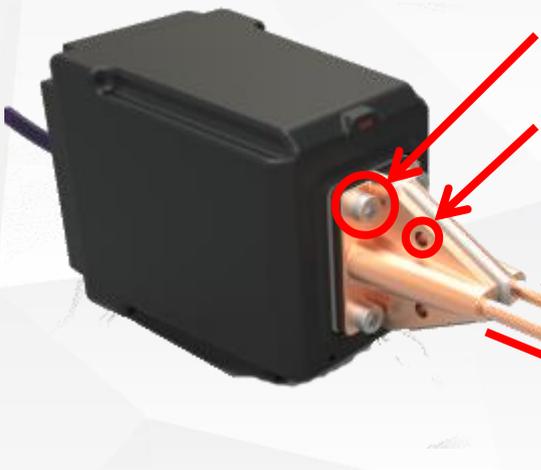
Frequent Problems and Solutions 3



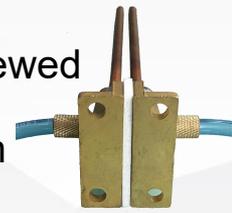
软件版本: V3.1
固件版本: 20
水压正常 27C
电压12.0V 频率过高

Frequency is too high: (should be $570\text{kHz} < \text{frequency} < 670\text{kHz}$) the frequency scanned is higher than the setted maximal frequency.

- ① Check whether the size of induction ring is too small, and set to the proper size.
- ② Check whether the distance between the two copper tubes of the inductive rod is too far, and set to the proper distance (5mm recommended)



The 4 metal screws to be well screwed
Use plastic screws for this position

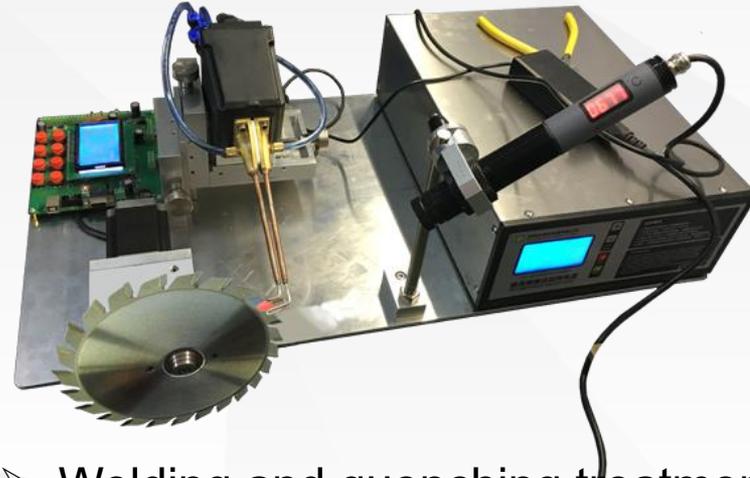


The contact surface of the inductive rod and the heater head shall be kept in good contact, and shall be polished off with sandpaper if oxidized.

The distance between the two copper tubes of the inductive rod should be set to the proper distance, 5mm recommended.



Applications in Cutting Tools and Hardwares



- Welding and quenching treatment of cutting tools (cutters and saw blades)
- Heating brazing of cemented carbides, diamond cutters, drills and bits.
- Heating and quenching treatment of medical scalpels and razor blades.



Raindi Technologies always takes "serving customers" as its purpose. Use our products and technical services to help our customers design products, reduce technical threshold, complete the development quickly, and ensure the product stability!

We sincerely look forward to work with you and create the future!