

# INDUCTION HEATING UNIT INSTRUCTION and SETTING MANUAL

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PRODUCT NUMBER  
A-2 0 3 4

AKAI ELECTRONIC INDUSTRY CO.,LTD.

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# 1 Introduction

Thank you very much for purchasing this Induction Heating Unit. This unit will need to provide a separate control unit. Please read these instructions carefully before using this product.  
This document are for maintenance and inspection / operation / connection / installation.

## 2 Safety Precautions

Carefully read the manual before installation, operation, maintenance and inspection. This document uses the following two symbols to indicate the degree of damage and harm caused by misuse of the UNIT.

In this document, "CAUTION" or "WARNING" safety precautions are ranked.

### < WARNING >

Indicates the risk of death or serious injury if the instructions are ignored or if the product is used improperly.

### < CAUTION >

Indicates the risk of slight injury or physical damage if the instructions are ignored or if the product is used improperly.

Note that some items described as < CAUTION >, some situations may lead to serious consequences.

### < WARNING > (for applications)

- Primary power to this unit is 200V. This unit does not operate when connected to other voltage and it may cause damage to the unit.
- Primary power supply to this unit, be sure to connect it to step down from 480V(the public utility power line) to 200V step-down transformer.
- Don't modify this UNIT.
- This unit is designed to shrink fitting to heat the ring gear. Use in another application is not possible.
- This unit can not be connected to the public utility power line.
- This unit can not be relocated without the permission of our company.
- This unit can be incorporated only to the device that has received the permission of our company.

**< WARNING > (Operations)**

- During operation, please be sure to close the door and panel.  
There is a risk of electric shock.
- Don't operate the switch with wet hands.  
There is a risk of electric shock.
- Heating coil and the Induction Heating UNIT, don't touch even during the heating off. After turning off the power breaker, always wait at least five minutes, if you touch the induction heating unit or heating coil, please touching.  
There is a risk of electric shock.
- If you need to touch any of the internal parts for maintenance, after turning off the power breaker, always wait at least five minutes, please touch.  
There is a risk of electric shock.
- Since there is a possibility that the induced voltage is generated in the vicinity of the metal heating coil, during operation, be careful.  
There is a risk of electric shock and burns.
- During operation, there is a risk of electric shock by touching the cooling water tube of the unit. If such water leakage, after stopping the operation of all, please to touch.  
There is a risk of electric shock.

**< CAUTION > (Operations)**

- Noise is generated from the power supply unit and the heating coil and wiring. Please note that malfunction of the nearby sensors and devices. There is a risk of an accident.

### **3 CAUTION**

Power-supply unit for induction heating on this manual generates high AC voltage while operating. There is a danger of life if you touch the high voltage department while operating. The safety measures in the design production are considered enough, but in use, please follow the following instructions enough.

- (1) In operation, never touch the conductors such as leads for heating coil and coils.
- (2) When you touch the high voltage department, be sure to off master switches, and touch it after confirming safety.
- (3) Operations must be performed in two or more people, and perform it while confirming every work each other.
- (4) The workers should put on safe harness, and perform it.
- (5) After work, workers must confirm the alteration part.
- (6) Do not take off the interlock of each protection apparatus.

## 4 Rated Value

Power Dissipation	5kw
Input Voltage	3-phase AC200V
Input Frequency	50/60Hz
Oscillate Frequency	frequency around 30kHz
Ground Connection	Ground resistance (Under 10 $\Omega$ )

## 5 Constructions

Constructions of this Unit are as follows:

- (1) Inverter Power Source for High Frequency Heating
- (2) High Frequency Feeder Cable
- (3) Heating Coil

### 5.1 Outline Drawing

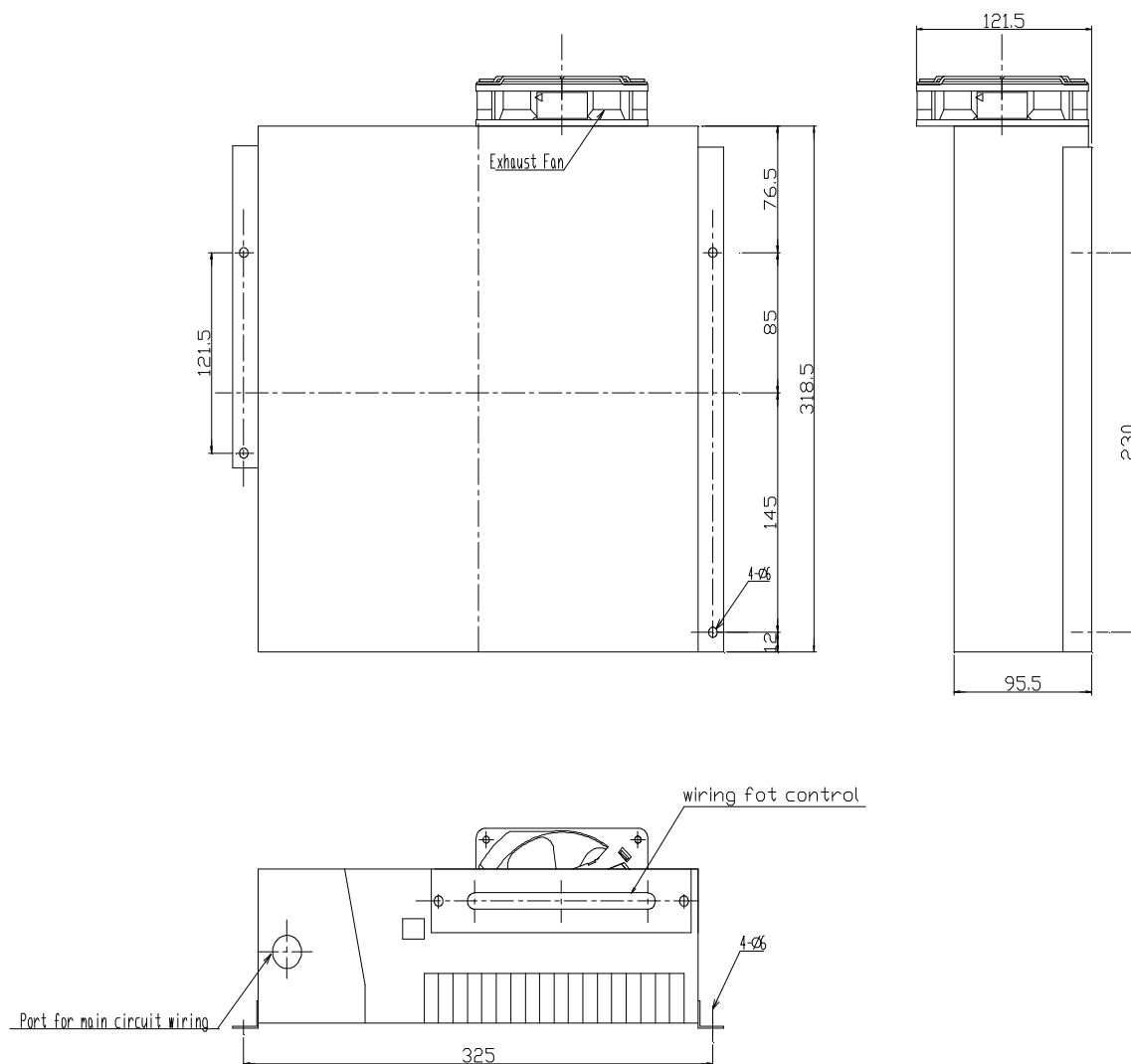


Figure 1: Outline Drawing

## 6 About Built-in

### 6.1 Usable Environment

Place	Indoor
Surrounding Temperatures	-10 ~ +50 °C
Surrounding Humidity	5 ~ 90 % (Not being condensation)
Atmosphere	Keep away from corrosive gases, fine particles, oil mist and waterdrops.
Sea Level	Under 1000m
Air Pressure	86 ~ 106 k Pa

### 6.2 Built-in

To keep a good radiation of heat from IH Unit, Please secure space around the IH Unit as the following Figure 2

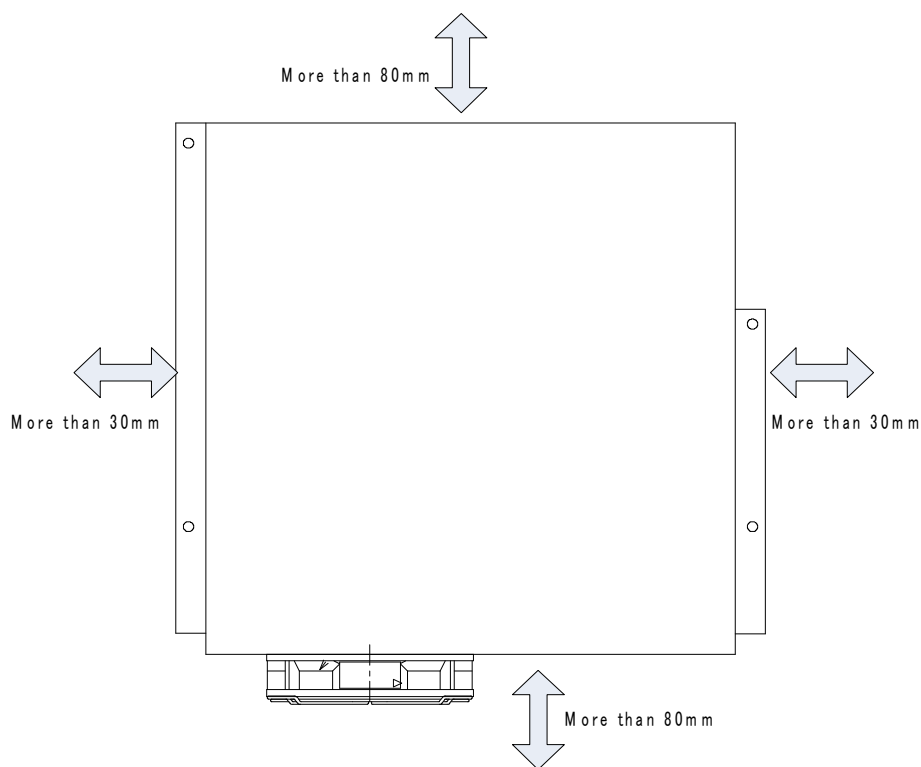


Figure 2: Built-in Space

## 6.3 Connection

If you take off the Main circuit Cover, Control terminal Cover and Front panel Cover, you can find the Main circuit, Output terminal, and Control terminal stand.

Read the following headings with attention, and connect them correctly.

### 6.3.1 Main Circuit Terminal Stand

Main circuit terminal stand is as the following Figure 3. Connect them according to the followings. Please use the insulating tubing to connect to crimped terminals.

Earth Leakage Circuit Breaker		Size of Cable
Rated Current (A)	Sensitivity Current(mA)	
30A	30mA	5.5 mm <sup>2</sup>



Figure 3: Main Circuit Terminal Stand

### 6.3.2 Output Terminals

Output terminal is as the following Figure 4. There are no polarities, but connect the cables not to touch each others.

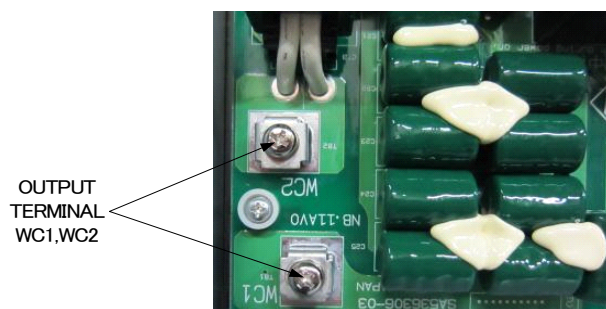


Figure 4: Output Terminal

### 6.3.3 Control Terminal Stand

Control terminal stand is as the following Figure 5.  
(ATTENTION:Please do not connect to "NC".)

X1	X2	X3	X4	X5	CM	CM	FAN	Tha	Thb	DX+	DX-	SD	PW	C1	11	12	13	P15	30A	30B	30C	Y2A	Y2C
		NC	NC	NC		NC	NC	NC	NC	NC	NC	NC		NC				NC		NC		NC	NC

Figure 5: Control Terminal Stand

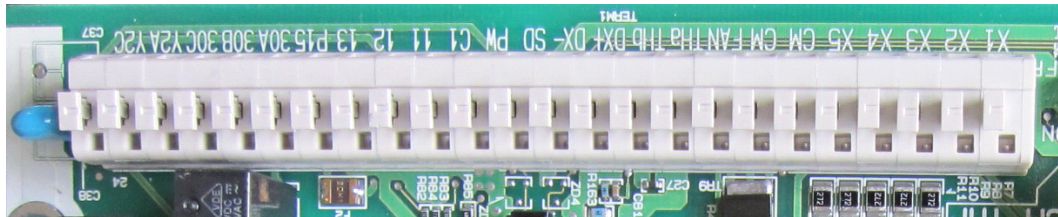


Figure 6: Photograph of Control Terminal Stand

### 6.3.4 Attentions in the Wiring

Please be careful as follows when wiring.

- (1) Power supply voltage should be in rated value.
- (2) Power line should be connected to main circuit terminal R, S, T(3-phase). If you turn on electricity when power line was connected to other terminals, this product will be broken down.
- (3) To prevent accidents such as electric shocks and a fire, ground wire must be wired.
- (4) Use the crimped terminals which have high reliability of connection, covered with insulating sleeves for connecting wires of main circuit terminal.

### 6.3.5 Functional Description for Control Terminal

<b>【X1】 【CM】</b>	When X1,CM is connected, instruction of Driving
<b>【X2】 【CM】</b>	When x2.CM is connected, instruction of reset to this product,
<b>【30A】 【30C】</b>	When 30A and 30C are at the state of electricity is on, alarm will be reported.
<b>【11】 【12】 【13】</b>	Connect the rheostat, and adjust the output.
<b>【PW】 【11】</b>	Output the monitor signal(Analog DC voltage 0 ~ +10V).



### 6.3.6 Basic Circuit Diagram

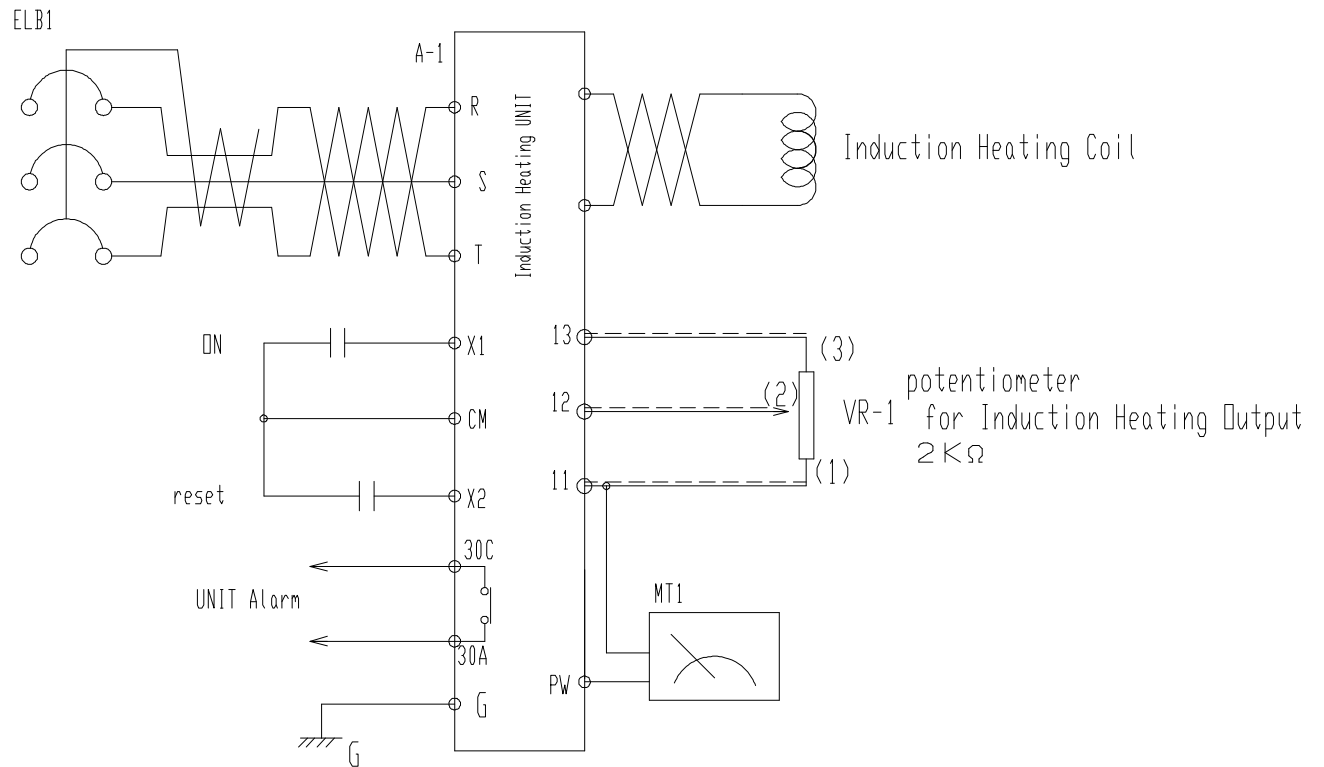


Figure 7: Basic Circuit Diagram

## 6.4 Heating Coil for Shrinkage Fit

This coil is shaped that can effectively heat the ring gear about  $\phi 152\text{mm}$ . This coil is made of  $\phi 6$  copper pipe, and cool with circulation water. Also, it is insulated with grass tube, and mold processing will provided by epoxy resin.

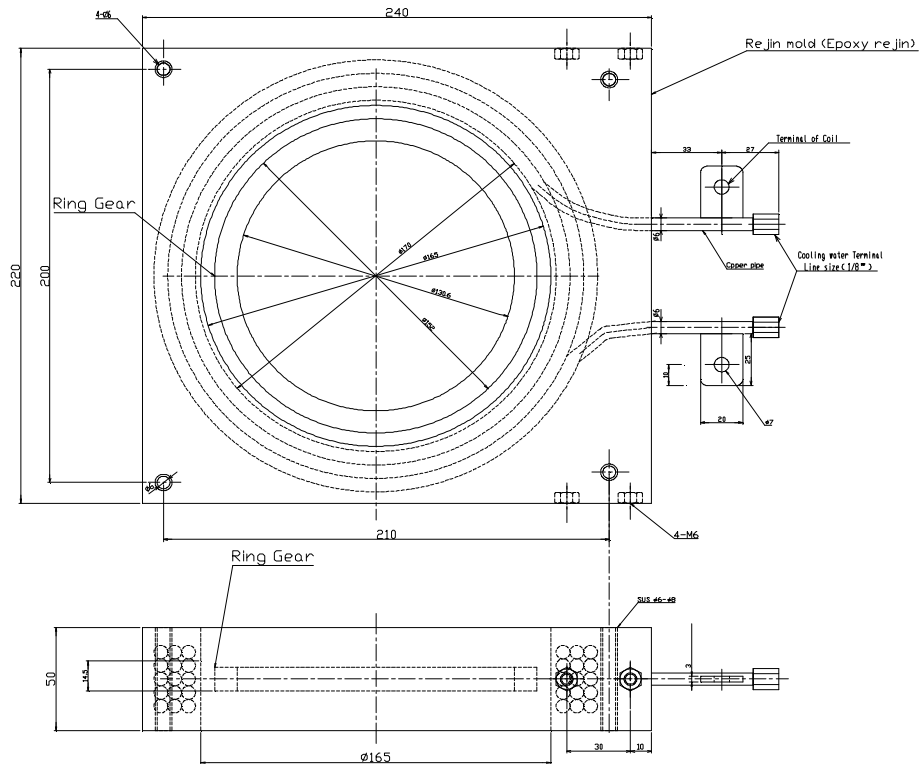


Figure 8: Heating Coil

### 6.4.1 High Frequency Feeder Cable

To connect the IH power supply unit and heating coil, use the high frequency feeder cable. Two twisted litz wires are used to high frequency feeder cable. These litz wires are insulated with grass tube, and covered with sealed tube to reduce the leakage of radio wave.



Figure 9: High Frequency Feeder Cable

## 7 Operate

### 7.1 Before Operating and preparations

Please start operating after confirming the following contents.

- Connection of the main circuit (R, S, T) are connected definitely.
- The grounding terminal is connected definitely.
- The control terminal is connected definitely.
- To avoid start heating while the injection of the power supply, be sure the circuit which is connected to a control terminal is OFF.
- The output terminal is connected (particularly each other's lines do not interfere it).
- Heating coil and high frequency feeder cable are connected definitely.
- Heating coil is cooled definitely.
- Work is set in a heating coil.

### 7.2 Trial Run

- (1) Spend a power supply and turn the output adjustment volume "0" and start the operation.
- (2) Please make sure that cooling fan is working.
- (3) Gradually raise volume, and confirm that an output indicator works.

#### WARNING

- Make sure ground the grounding terminal of the high frequency power supply unit.  
There is a possibility of electric shock.
- Do not operate while work is not set on.
- While and after operating, work becomes hot, so do not work in bare hands.  
There is a possibility of skin burn.
- Do not operate a switch by a wet hand  
There is a possibility of electric shock.

### 7.3 How to Operate

The basic operating method is as follows.

- (1) Spend a power supply.
- (2) Set the work.
- (3) Check the output adjustment volume is in the set point, and start the operation.
- (4) Stop operating after set time.
- (5) Take out the work.

### 7.4 Cautions about Operating

- Do not turn on/off the operation by main circuit power supply.
- Do not leave the work which is hot.
- Please operate the work stabilized well.
- Be careful about overheating of the work.

## 8 About Errors

### 8.1 Alarms which is Output

When errors occurred to this product, safeguard stops the work and out put the report of alarm. Safeguard is as follows.

Safeguard	Explanation	Return movement
Under voltage Protection	Shortage of power supply capacity. Drop of power supply voltage.	Automatical
Over current Protection	Short circuit in the heating coil.Short circuit of feeder cable. etc.	Manual
Heating without Works	Heating movements without the work	Automatical
Circuit Trouble	Troubles of internal circuit	Manual

Table 1: List of Safeguard

Remove the cause of error and reboot.  
If same error occurs after reboot, change the IH power source unit.

## 9 Maintenance Inspection

To lengthen the life of the product, and to reduce a trouble rate, regular maintenance is necessary.

But, at the time of the maintenance, make sure that five minutes or more passed after the main power supply dropped.

### 9.1 Daily Inspection

Please check it before and after work about the following item.

- Traces of heteromorphic and change of colors by the overheat of the heating coil.
- A abnormal smell and noise from a heating coil.
- Quantity of water from a heating coil.  
(When there is becoming shorter in the heating coil inside, cooling quantity of water decreases, and a heating coil might become defective.)
- Abnormal noise from IH power supply unit.

### 9.2 Periodic Inspection

Please check following list at stated periods.

- Environment such as ambient temperature, humidity and oil mist not having changed.
- The voltage of the main circuit and control circuit being normal.
- There not being a abnormal noise and vibration.
- Bolts not having the slack.And tighten up bolts.
- There not being deformations and damages.
- There not being deformations and damages.
- There not being the adhesion of damage and earthly affairs.
- There not being teats,cracks,or change of colors on covers of wire.
- A coolant of cooling a heating coil being pure.

At the time of the maintenance, make sure that five minutes or more passed after the main power supply dropped.

### 9.3 Cleaning

At the time of the cleaning, make sure that five minutes or more passed after the main power supply dropped.

- Please wipe off the dirt by neutral cloth.
- Please clean the dust with vacuum cleaners.
- Please clean the air filter diligently.
- Because the heating coil moiety has a small plumbing diameter, by adhesion condition of the scale, please wash the inside.