

G A R G
ELECTROHEAT

Induction Melting Machine

(2 Kg - 24CT)

Owner's Manual

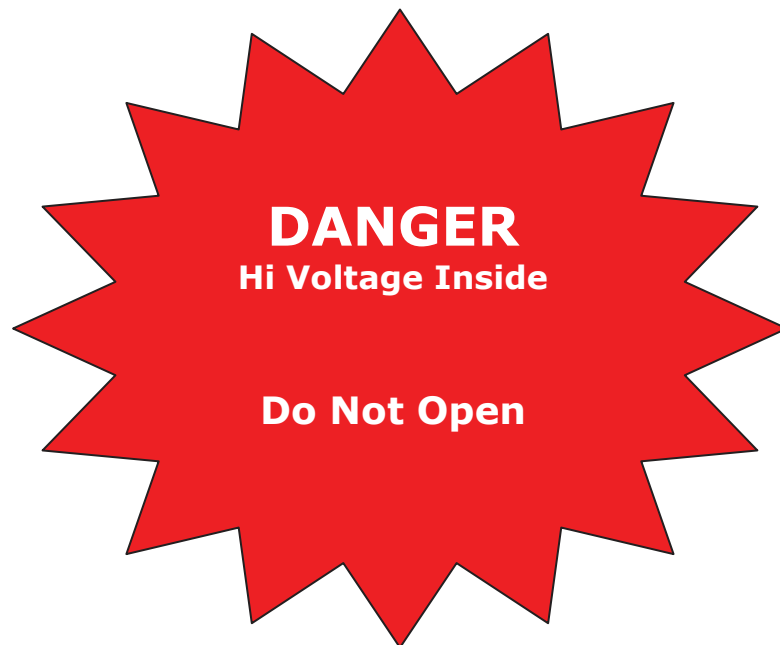
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Note of Thanks

We take this opportunity to thank you for vesting your interest in our product. We strongly recommend that you should carefully read the operating instructions before attempting to operate the unit. We also recommend noting and displaying the precautions where the machine is installed.

Warning : Please do not attempt to open the machine when it is running. It may be extremely hazardous, as very high voltage exists inside the machine. Trained professionals only should open this machine.



Machine Specifications

Voltage	:	415 Volts / 3 Phase
Current	:	8 A (Max) / Per Phase
Power	:	6 KW (Approx.)
Capacity	:	2 Kg. (Gold 24Kt)
Max. Temp.	:	1200 ⁰ C
Frequency	:	Medium Frequency
Crucible	:	Graphite 2 Kg
Time to first Melt	:	10 - 12 Minutes (Approx.)
Water Circulation	:	6 - 8 Liters per Minute (Min.)
Water Temperature	:	45 ⁰ C (Max.)
Weight	:	120 Kg. (Approx)

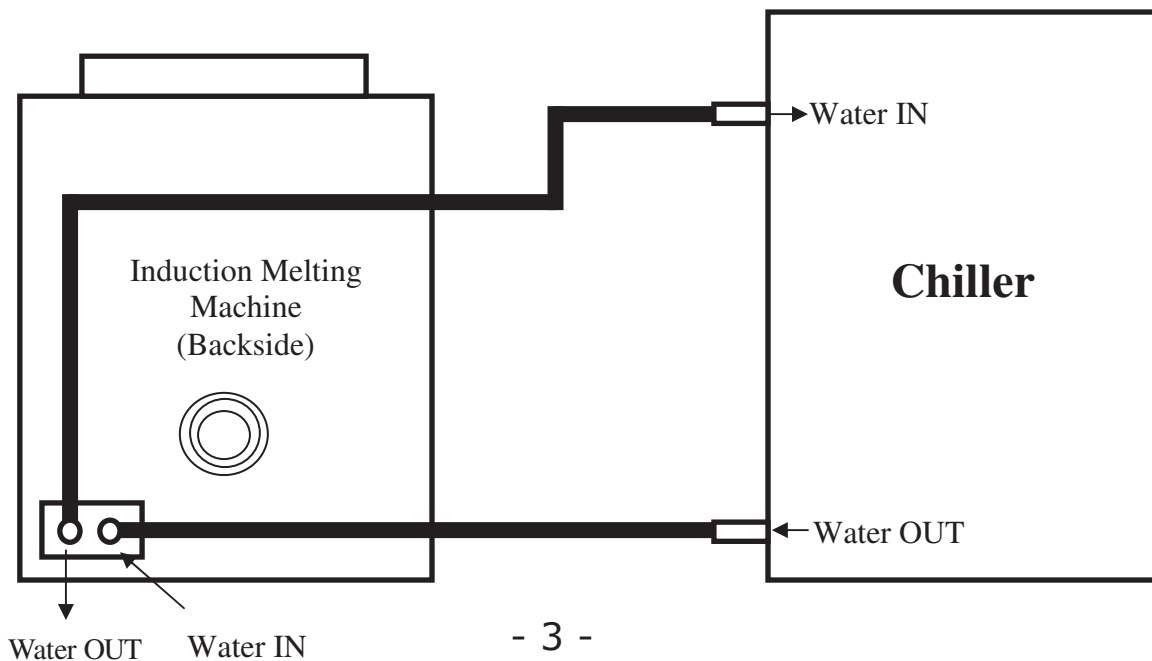
Machine Settings

Please follow the steps as below to set up the machine

- Place the machine in airy place (if possible) at least 6" from the wall.
- Make the water connections as indicated at the backside of the machine.
- There should be provision for 20 A / 3 Ph. plug output for machine and 15/5 A plug output for Chiller (if using).
- Always check for water temperature. If it goes above 45^oC stop the machine and wait for temperature to go down. It should not go below 18 deg. C.
- **If the electricity fails in the middle of the operations or for any other reason machine stops when the crucible is hot please take out the crucible and place any other cold crucible.**

IMPORTANT : PLEASE DO NOT USE HARD WATER

Water connection Diagram :



Operating the Machine

- First set up the machine as discussed above.
- Turn ON the POWER. A fan will start at the backside.
- Turn ON the Tripper. The red POWER OFF indicator will glow and red Buzzer of Water Fail will also glow Buzz. The temperature controller will boot and will display room temperature in some moments.
- Turn ON the Water Pump. The red Buzzer of water fail should put off.
- Confirm that the proper crucible (2Kg graphite) is in the place. An indicator is provided to show whether crucible is present or not. Machine will not start without Crucible.
- Set the required temperature as detailed in temp. controller's manual and marked with ink.
- Press POWER ON green push button to start the machine.
- The ampere meter will display the current taken by the machine and temperature controller will start showing the raise in the temperature on the display.
- The machine reaches 1050⁰C within 6-8 Minutes (Approx).
- When the melting is done Turn the machine off by pressing red POWER OFF push button.
- Now you may take out the crucible for casting or any other application.
- For next melting place the crucible in its place and press green POWER ON push button.
- When the work is done and red push button is pressed, keep the water running until temperature goes below 100⁰C. It is advisable to keep the crucible out of the machine when the work is done.
- When machine sensor shows 100⁰C you may turn off the water and the tripper of the machine.

Troubleshooting

Please note that a trained electrician should open the machine. Please disconnect the machine from Power before opening. Always discharge the capacitors first and then proceed for repairing.

1. Machine does not start no display on temperature controller and no LED indication.
 - * Wire from tripper is disconnected.
 - * Wire from mains connector is open or loose.
 - * Check the three-pin plug for wire connections.
 - * Check the mains chord continuity.
2. Machine stops in the mid of melting and water fail LED glows.
 - * Check the output of the water for proper pressure.
 - * Check the water line for clogging.
 - * If everything is fine set the screw on water pressure switch and adjust for that pressure.
3. Machine starts, current builds and then machine trips.
 - * Check that crucible is not very thin if so please replace by a new one.
 - * Reduce the power by power-adjustment knob and restart.
 - * If the problem persists again reduce the power and restart.
4. Machine Turns ON but current does not built, Temperature controller shows some odd display.
 - * Sensor is open. Replace it.

5. Machine Turns ON but current does not built, Temperature controller shows Room Temperature.

- * Check the Fuse, if it is open. Replace it.
- * Check the transformer primary connections, if found open or loose please correct it.

6. Water is very hot at the outlet or no water at all.

- * Check the water circulation inside the machine maybe there is some sharp bend in the pipe. If yes please remove the sharp bend and let the water flow.
- * If there is no sharp bend then there may be a water clog in heat sink. You may use air pressure to clean the water clog.

7. For any other reason please call us at the address and telephone nos. provided.

PLEASE DISPLAY THE FOLLOWING AT THE WORKING AREA

*** TURN OFF THE MACHINE BY RED PUSH BUTTON WHEN YOU WANT TO TAKE OUT THE CRUCIBLE**

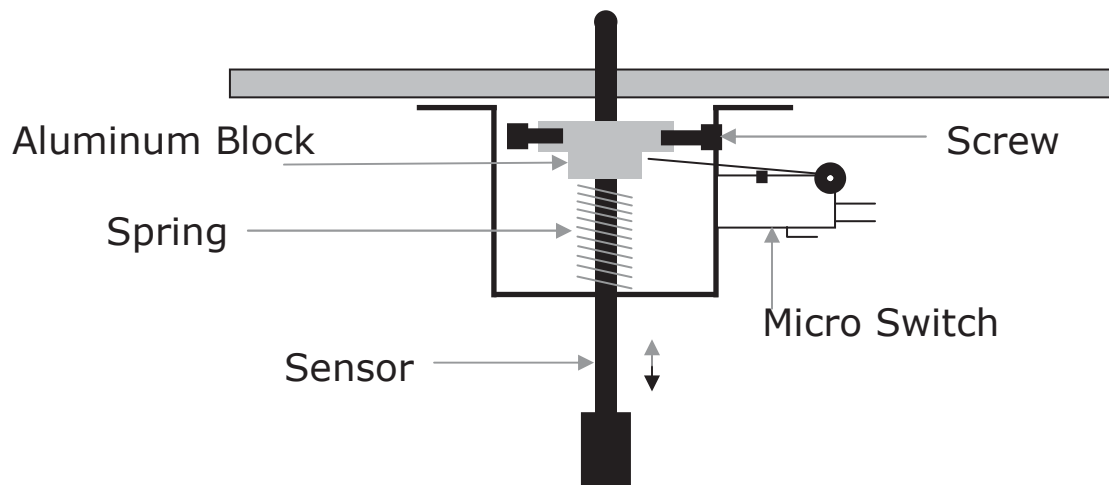
*** PLEASE INSURE THE PROPER WATER FLOW WHEN THE CRUCIBLE IS HOT INSIDE THE MACHINE**

*** TURN OFF THE WATER SUPPLY ONLY WHEN THE TEMPERATURE INDICATOR READS 100 OR BELOW**

*** INSURE THAT YOUR WATER TEMPERATURE IS BETWEEN 20 AND 30 DEG. CENTIGRADE.**

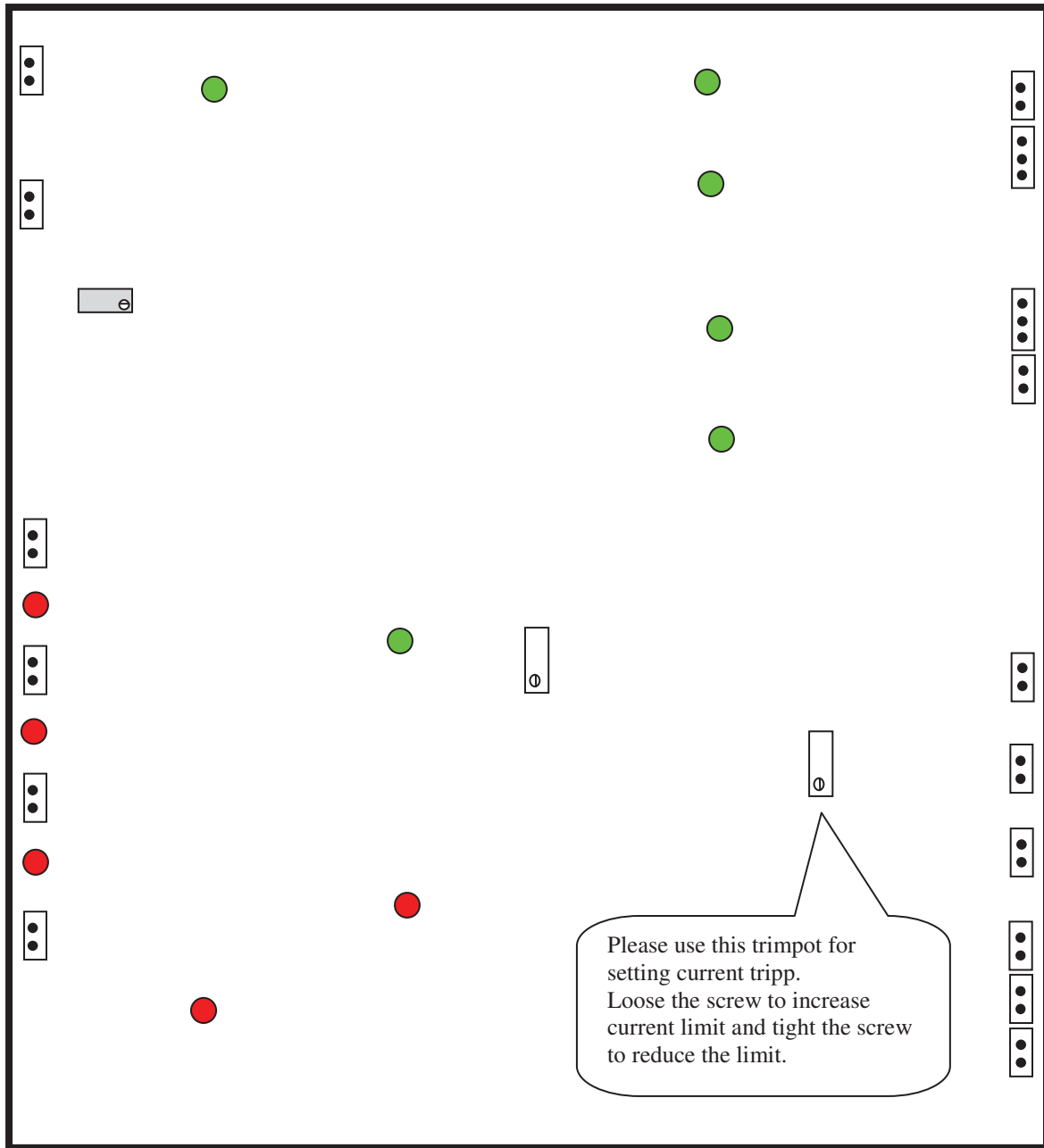
8. When you place the crucible but NO CRUCIBLE Light does not stop and machine does not start.

In this case you will have to adjust the sensor of the machine as directed in diagram below.



- A] Loosen the screw on Aluminum Block so that sensor can move.
- B] Place the crucible and adjust the sensor so that sensor lifts the crucible by 5 - 8 mm.
- C] Now tighten the screws. In this case when you place the crucible the spring is pressed by 5-10 mm and the micro switch will record that crucible is in place.
- D] Make sure that when you place the crucible the No Crucible signal stops.

Electrical Diagrams



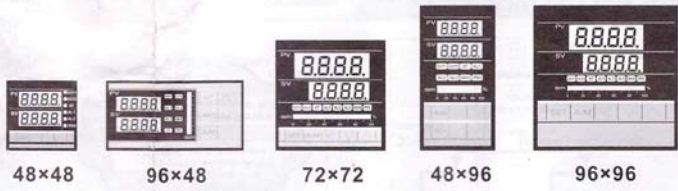
Main Board

Please connect the cable as below

Red	-----	RED PHASE
Yellow	-----	YELLOW PHASE
Blue	-----	BLUE PHASE
Black	-----	NEUTRAL
Green	-----	EARTH

User's Manual

Digital PID Controller



1 Notice

Please confirm the specification of controllers is to totally with your requirement before using it, also read this user's manual in detail.

⚠ Danger

1. Danger ! Electric Shock !
DON'T touch AC power wiring terminal when controller has been powered !
Keep the power off until all of the wiring are completed !

⚠ Warning

1. Please confirm the AC power wiring to controller is correct, otherwise it would be caused aggravated damage on controller.
(48x48 connecting with Pin 1 and 6, 96x48/72x72/48x96/96x96 with Pin 1 and 2).
2. Be sure to use the rated power supply(AC85~265V or DC24V),otherwise it would be caused aggravated damage on controller.
3. Please confirm wires are connected with correct terminal (Input, Output).
4. Use M3 screw-compatible crimp-on terminals with an insulation sleeve, as shown below



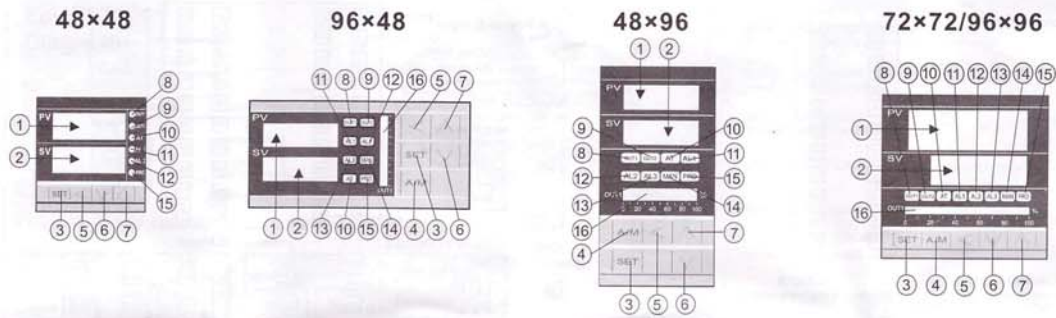
Torque : 0.4 N.m (4kgf.cm)

5. Avoid to install controller in following spaces:
 - I. A place where the ambient temperature may reach beyond the range from 0 to 50°C
 - II. A place where the ambient humidity may reach beyond the range from 50 to 85% RH.
 - III. A place where the controller likely to come into contact with water,oil,chemicals,steam and vapor.
 - IV. A place where the controller is subject to interface with static electricity,magnetism and noise.
6. For thermocouple(TC) input, use shield compensating lead wire.
7. For RTD input, use shield wires which have low resistance and no resistance difference between the 3 wires.

2 External Dimension and Panel Cutout < Unit : mm >

48x48		
96x48		
72x72		
48x96		
96x96		

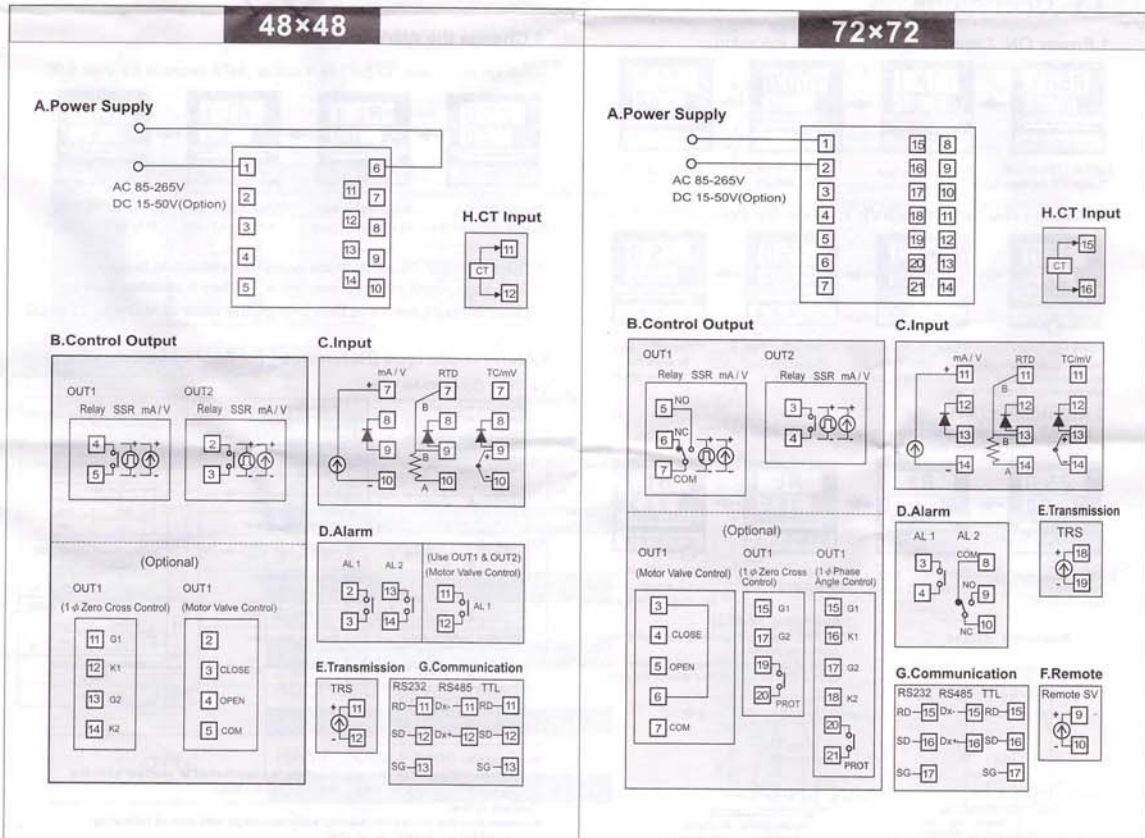
3 Parts Description

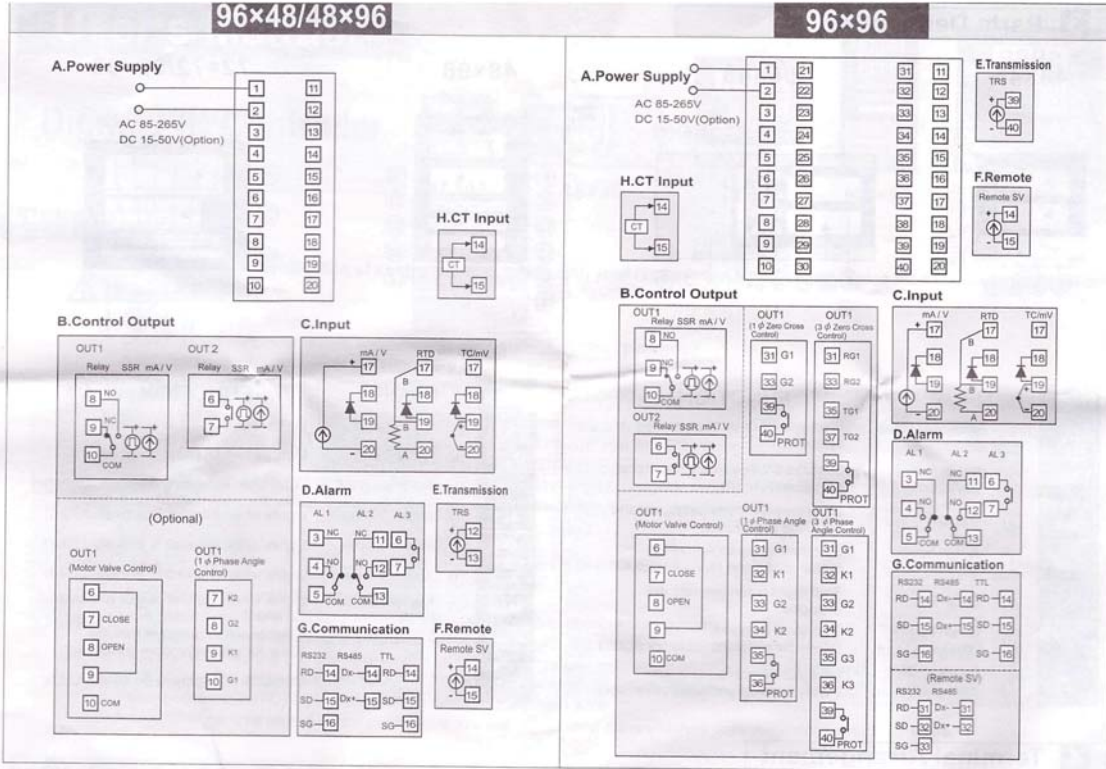


SYMBOL	NAME	FUNCTION
PV ①	Measured value (PV)display	Displays PV or various parameter symbols(Red)
SV ②	Setting value (SV)display	Displays SV or various parameter set values(Green)
SET ③	Set Key	Used for parameter calling up and set value registration
A/M ④	Auto/Manual key	Switches between Auto(PID) output mode and Manual output
< ⑤	Shift Key	Shift digits when settings are changed
∨ ⑥	Down Key (*Program Hold)	Decrease numbers (*Only for programmable controller)
∧ ⑦	Up Key (*Program Run)	Increase numbers (*Only for programmable controller)

SYMBOL	NAME	FUNCTION
OUT1 ⑧	OUT1 lamp	Lights when OUT1 is on(Green)
OUT2 ⑨	OUT2 lamp	Lights when OUT2 is on(Green)
AT ⑩	Autotuning lamp	Lights when Autotuning is activated(Orange)
AL1 ⑪	Alarm 1 lamp	Lights when Alarm 1 is activated(Red)
AL2 ⑫	Alarm 2 lamp	Lights when Alarm 2 is activated(Red)
AL3 ⑬	Alarm 3 lamp	Lights when Alarm 3 is activated(Red)
MAN ⑭	Manual output lamp	Lights when manual output is activated (Orange)
PRO ⑮	Program Running lamp	Flashes when program running (Only for programmable controller)
OUT% ⑯	Output % Bar-Graph display	Output% is displayed on 10-dot LEDs

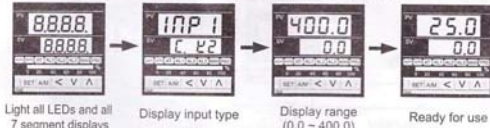
4 Terminal Arrangement





5 Operations

1. Power ON: Controller will display as following



2. Change the Set Value(SV): Change SV from 0.0 to 100.0

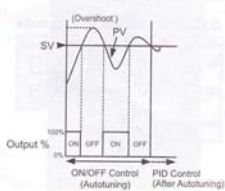


3. Autotuning (AT):

Use AT function to automatically calculate and set the optimize PID value for your system.

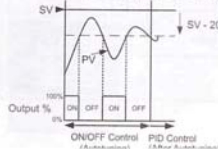


Autotuning ATVL=0



Autotuning ATVL=20

*Set ATVL to prevent overshoot occurred during autotuning process.
 To set ATVL, press < key for 5 seconds to enter Level 2 (PID Level) and then change the value.



4. Change the Alarm value:

Change AL1 value to "5.0" (AL1 active, if PV exceeds SV over 5.0)



* There are total 16 alarm mode types, referenced as below:
 * To change Alarm mode, press < + < key 5 seconds to enter Level 3 (Input Level) and then change the value of ALD1/ALD2/ALD3.

5. Alarm mode type (Referenced for ALD1/ALD2/ALD3)

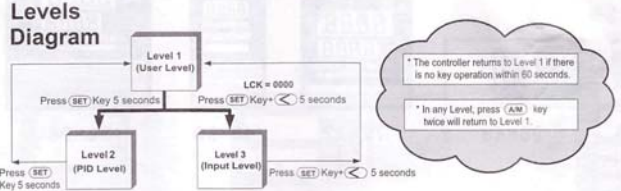
(▲ : SV ▲ : Alarm set value)

01 Deviation high alarm with hold action* OFF ON PV ▲ HIGH	04 Band alarm OFF ON OFF PV LOW ▲ HIGH	07 Segment End alarm (Only for Programmable controller) (1) ALD1-3, set 07 (2) ALD1-3 Alarm Segment (3) ALD1-3 defines as follows: # Richer alarm # continued alarm # alarm ON time
11 Deviation high alarm OFF ON PV ▲ HIGH	05 Process high alarm with hold action* OFF ON PV LOW ▲ HIGH	17 Program Run alarm (Only for Programmable controller) Run Stop ON OFF AL
02 Deviation low alarm with hold action* ON OFF PV ▲ HIGH	15 Process high alarm OFF ON PV LOW ▲ HIGH	08 System failed alarm* (ON) Normal Failed OFF ON AL
12 Deviation low alarm ON OFF PV ▲ HIGH	06 Process low alarm with hold action* ON OFF PV LOW ▲ HIGH	18 System failed alarm* (OFF) Normal Failed ON OFF AL
03 Deviation high/low alarm with hold action* ON OFF ON PV LOW ▲ HIGH	16 Process low alarm ON OFF PV LOW ▲ HIGH	09 Heater Break Alarm (HBA) No alarm
13 Deviation high/low alarm ON OFF ON PV LOW ▲ HIGH		10

*Hold action:
When Hold action is ON, the alarm action is suppressed at start-up until the measured value(PV) enters the non-alarm range.

*System failed:
It means that the controller display error message with one of following :

6 Parameter List



Level 1 (User Level)		Level 2 (PID Level)	
Process Value Set Value	P ⁺ 5.0	P ⁺ 3.0	Proportional band 1 (For output 1) Range : 0.0~200.0% ON/OFF control if set to 0 (0.0)
Output Limit	OUTL 100.0	I ⁺ 2.0	Integral time 1 (For output 1) Range : 0~3600 seconds PD control if set to 0
Autotuning	RT YES/NO	d ⁺ 6.0	Derivative time 1 (For output 1) Range : 0~900 seconds PI control if set to 0
Alarm 1 set value	RL1 0.0	dbt 0	Dead-band time Don't care
Heater current display HBA set value	e ⁺ 0.0	Auto tuning offset value	Range : 0~USPL
Alarm 2 set value	RL2 0.0	Output 1 cycle time	Range : 0~150 seconds Relay output : 10 Voltage pulse output : 1, mA output : 0
Alarm 3 set value	RL3 0.0	Hysteresis for output 1 ON/OFF control	Range : 0~1000
		P ⁺ 3.0	Proportional band 2 (For output 2) The same with P1
		I ⁺ 2.0	Integral time 2 (For output 2) The same with I1
		d ⁺ 6.0	Derivative time 2 (For output 2) The same with D1
		CYt2 1.0	Output 2 Cycle time The same with CYT1
		HYS2 1	Hysteresis for output 2 ON/OFF control The same with HYS1
		GAP1 0	Control gap 1 (For output 1) Set point of output 1 (Heating side) =SV - GAP1
		GAP2 0	Control gap 2 (For output 2) Set point of output 2 (Cooling side) =SV + GAP2
		LCV 000.0	Function lock

LCK	Levels entering available			Parameters which can be changed
	Level 1 (User Level)	Level 2 (PID Level)	Level 3 (Input Level)	
0000	⊙	⊙	⊙	All parameters (Factory set value)
1111	⊙	⊙	----	All parameters
0100	⊙	⊙	----	All parameters except Level 3
0110	⊙	⊙	----	Parameters in Level 1
0001	⊙	⊙	----	SV* and "LCK"
0101	⊙	⊙	----	Only "LCK"

7 Error Displays

IN1E	IN1E : Input 1 Error Check whether input loop is opened or wiring incorrect.
CJCE	CJCE : Cold Junction Compensation Failed Check the compensation diode outside controller.
UUU1	UUU1 : PV is above USPL Check whether the input value is correct or not.
NNN1	NNN1 : PV is below LSPL Check whether the input value is correct or not.
ADCF	ADCF : A/D Convert Failed Controller needs to be repaired.
RAMF	RAMF : RAM Failed Controller needs to be repaired.

INP1 U ⁺	Input type selection	
RL1 0	Analog input low limit calibration (Used for mA and V input)	Range : -1999 ~ 9999
RH1 5000	Analog input high limit calibration (Used for mA and V input)	Range : 0 ~ 9999
dP 0000	Decimal point position (Available for mA and V input)	0000 · 000.0 · 00.00 · 0.000
LSPL 0.0	Lower Set-Point Limit	Scaling Low Limit
USPL 400.0	Upper Set-Point Limit	Scaling High Limit
RL2 0	Remote input low limit calibration	Range : -1999 ~ 9999
RH2 5000	Remote input high limit calibration	Range : 0 ~ 9999
ALd1 1.1	Alarm mode of AL1	Range: 00~19 Refer to "Alarm mode type"
ALT1 99.59	Alarm time of AL1	Range : 0~99 Min 59 Secs 0=Flicker Alarm · 99.59=Continued Others=On delay time (If ALD=07, ALT means alarm on time)
ALd2 0	Alarm mode of AL2	The same with ALD1
ALT2 99.59	Alarm time of AL2	The same with ALT1
ALd3 0	Alarm mode of AL3	The same with ALD1
ALT3 99.59	Alarm time of AL3	The same with ALT1
HYSR 0.0	Hysteresis of all Alarm	Range : 0~1000
CLO1 230	Output 1 low limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CHO1 3600	Output 1 high limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CLO2 230	Output 2 low limit calibration (Used for mA and V output)	The same with CLO1
CHO2 3600	Output 2 high limit calibration (Used for mA and V output)	The same with CHO1
CLO3 0	Retransmission low limit calibration	The same with CLO1
CHO3 5000	Retransmission high limit calibration	The same with CHO1
rUCY 5	Full run time of proportional motor (Used for proportional motor valve control output)	Range : 5~200 seconds
WA 0.0	Used for programmable controller to wait continued operation	0=Not wait Others=Wait value
SETR 0000		
PSL rTU	Communication Protocol Selection	MODBUS RTU / MODBUS ASCII / TAIE
bts 0.81	Communication Bits Configuration	0_81 / 0_82 / E_81 / E_82
IDNO 1	ID number	Range : 0 ~ 255
bRUD 384	Baudrate	2400 / 4800 / 9600 / 19200 / 38400 bps
SVOS 0.0	SV compensation	Range : -1000~1000
PVOS 0.0	PV compensation	Range : -100.0~500.0
UNIT C	Unit of PV & SV	C(°C) / F(°F) / A(Analog)
PVFL 200	PV Filter	PV will response faster if PVFT is smaller.
CASC 0.0	Reserved	
UD HEAT	Action mode	Heat / Cool
OPRD P,d	Control algorithm	PID / Fuzzy
HZ 60HZ	Frequency	50 / 60HZ

Warranty Conditions

- 1. We Guarantee the Induction Gold Melting Machine of 2Kg against all manufacturing defects during 12 months from the date of sale by us or through our dealers.**
- 2. The guarantee will become INVALID**
 - a) If the machine is not operated as per instruction given in the manual.**
 - b) If the agreed payment terms and other conditions of sale are not followed.**
 - c) If the customer resale the machine to other party.**
 - d) If the customer tries to open the machine and creates any fault deliberately.**
- 3. The non-working of the machine is to be communicated to us immediately giving full details of the complaints and defects noticed. On receipt of this, we will give suitable instructions regarding the repair of machine and will send our representative for service.**

Our contact Details

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