

# **G A R G**

# **ELECTROHEAT**

**Induction Melting Machine**

10 Kg (24 CT Gold)

**Owner's Manual**

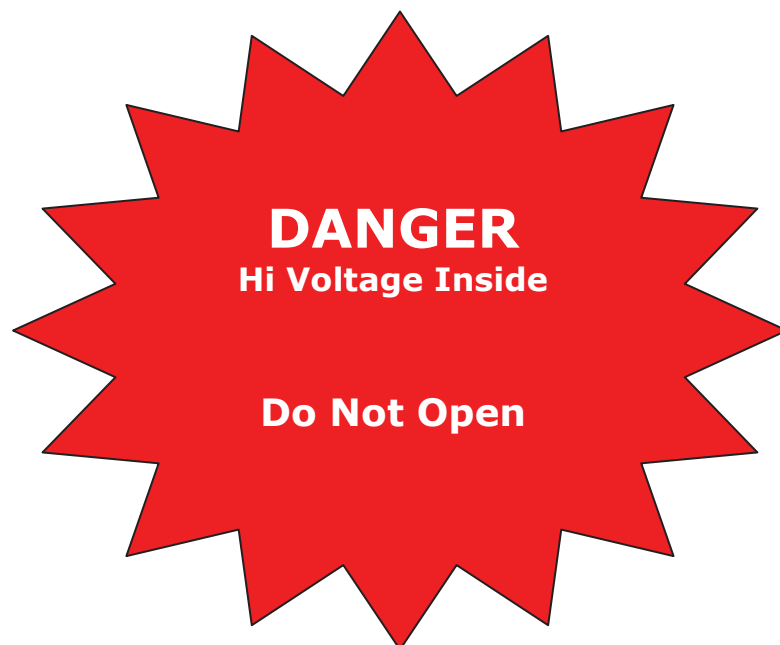
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## **Note of Thanks**

We take the opportunity to thank you for vesting your interest in our product. We strongly recommend that you study carefully 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	:	16 A (Max.) Per Phase
Power	:	12 KW (Approx.)
Capacity	:	10 Kg. (Gold 24 Carat)
Max. Temp.	:	1200 <sup>0</sup> C
Frequency	:	Medium Frequency
Crucible	:	Graphite 10 Kg.
Time to first Melt	:	15 - 18 Minutes (Approx.)
Water Circulation	:	8 Liters per Minute (Min.)
Water Temperature	:	20 <sup>0</sup> C - 45 <sup>0</sup> C (Max.)
Weight	:	200 Kg. (Approx)
Dimensions	:	24'' X 24'' X 30'' (WXDXH)

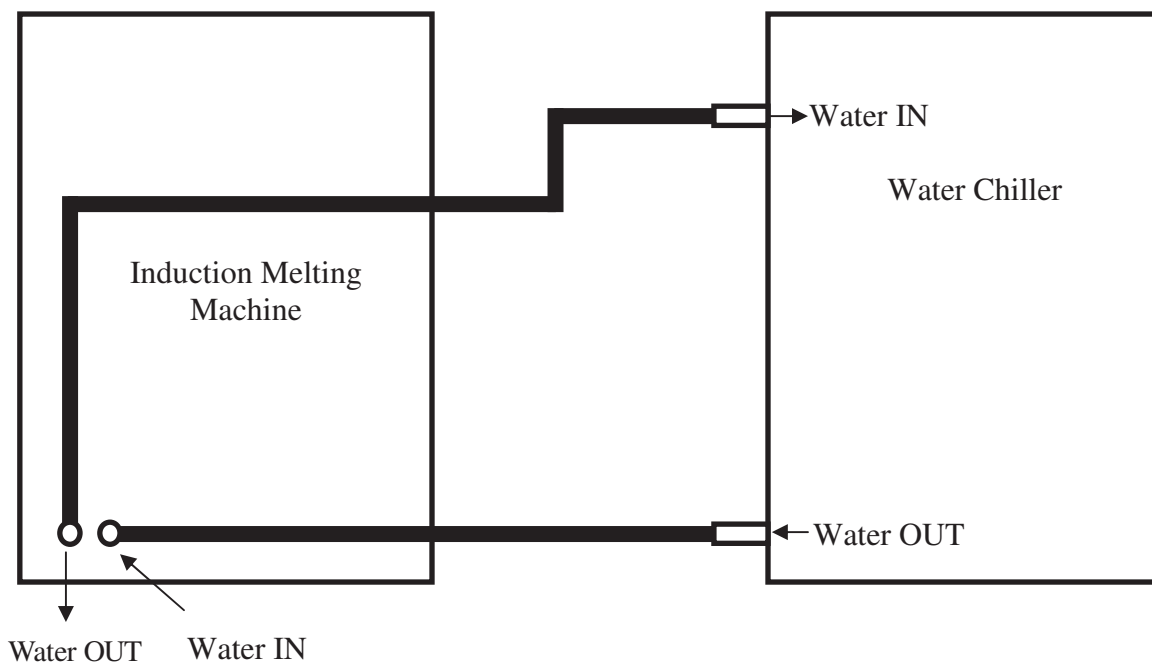
## Machine Settings

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 Generator.
- There should be provision for 3 Phase 4 Pole tripper output for machine and 3 Phase output for Chiller (if using).
- Always check for water temperature. If it goes above 45°C stop the machine and wait for temperature to go down.
- **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 hot crucible and place any cold crucible in place.**

**IMPORTANT : PLEASE DO NOT USE HARD WATER**

Water connection Diagram :



- 1.) Please connect ½ inches hose pipe with chiller and machine. (Water Out of Chiller connected to Water In of Machine and Water out of machine connected to water In of Chiller)
- 2.) Please set the chiller temperature to 28 deg so that there is no sweating inside the machine.
- 3.) Place Water Cooled Cable Connections as shown in Picture. Please place rubber sleeve on them as there is high voltage on them.
- 4.) Please ensure that the chain is mounted on Sprocket wheels, and weight is sufficient to keep them straight.
- 5.) Try the movement of tilt head.
- 6.) Whenever you place the crucible on it, please fasten it by sliding the support.
- 7.) Once the water connection is done, please start the water flow and check if there is any water leakage. If there is leakage please tighten the screws to ensure no leakage.
- 8.) Connect the sensor and micro switch connectors. (Yellow cable is sensor and red/black pair is micro switch connectors from the tilt head to Generator)

## 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 3 phase Tripper and tripper on the left side of machine. The red POWER OFF indicator will glow and red Buzzer of "WATER FAIL" will also glow along with "NO CRUCIBLE" Indicator if crucible is not placed. The temperature controller will boot and will display room temperature in some moments.
- Turn ON the Chiller and Water Pump. The red Buzzer of "WATER FAIL" should put off.
- Confirm that the crucible is in the place. The machine will not start without crucible. When you place the crucible "NO CRUCIBLE" Indicator will turn off.
- Set the required temperature as detailed in temperature controller's manual and marked.
- Press "POWER ON" green push button to start the machine.
- The ampere meter will display the current taken by machine and temperature controller will start showing the rise in the temperature on the display.
- The machine reaches 1050<sup>0</sup>C within 10 - 15 Minutes (Approx).
- When the melting is done, You can pour thr metal by turning the wheel.
- You must bring the graining tank below the tilt head before turning the wheel. The graining tank must be prepared before attempting to make grains.
- For next melting place the metal in crucible 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 100<sup>0</sup>C.
- When machine sensor shows 100<sup>0</sup>C 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 in place.
  - \* If it is in place check that it 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.



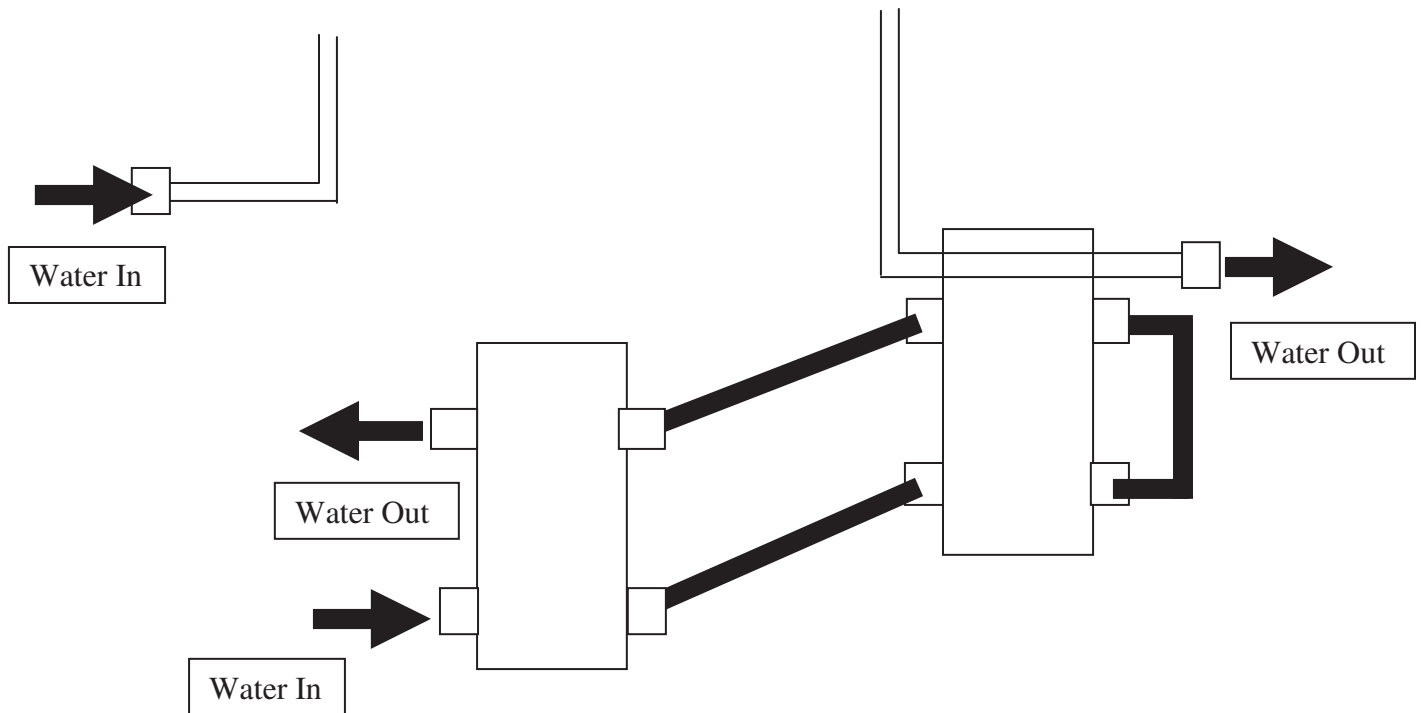
5. Machine Turns ON but current does not built, Temperature controller shows Room Temperature.

\* Fuse is open. Replace it.

6. Water does not come out of the machine or the water flow is very slow or the water out temperature is very high.

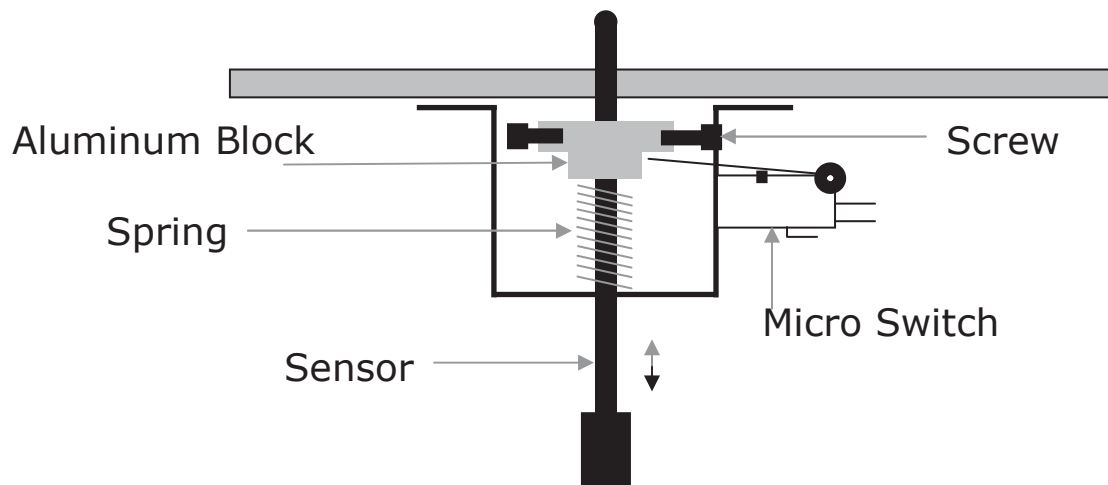
\* Maybe the water circulation path is not clear. Try and clear the water tubes. You may use air pressure to clear the water line.

7. For any other reason please let your maintenance person open the machine and run it and note the status of LEDs on the PCB and contact us at the address and telephone nos. provided.



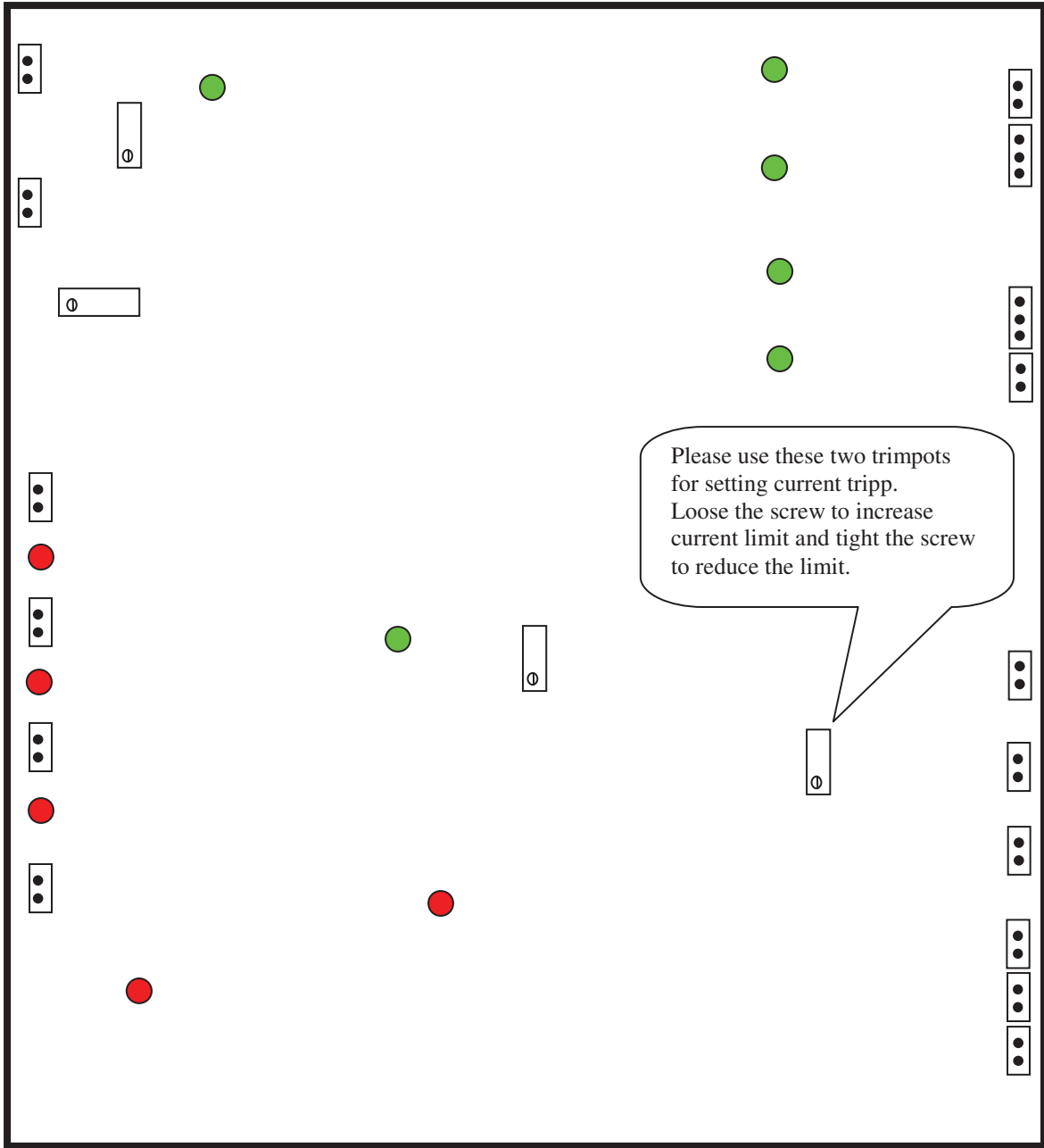
8. When you place the crucible but NO CRUCIBLE Light does not stop and machine does not start.

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

## Electrical Connections for Machine

Wire 1 ---->	Red Phase
Wire 2 ---->	Blue Phase
Wire 3 ---->	Yellow Phase
Wire 4 ---->	Neutral
Wire 5 ---->	Earth Connection
Wire 6 ---->	Earth Connection

## Electrical Connections for Chiller

Red Wire	-->	Red Phase
Blue Wire	-->	Blue Phase
Yellow Wire	-->	Yellow Phase
Black Wire	-->	Neutral

## **Warranty Conditions**

- 1. We Guarantee the Induction Gold Melting Machine of 10Kg 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.**

## **Our contact Details**

**Mailing Address :**

**Garg Electroheat  
D – 118, Ansa Indl. Estate,  
Saki Vihar Road,  
Andheri(E),  
Mumbai – 400072.**

**Tel. : 91 - 22 – 2857 6335**

**Fax : +91 – 22 – 4005 8576**

**E-Mail : [gargelectroheat@gmail.com](mailto:gargelectroheat@gmail.com)**

**Web : [www.gargelectroheat.com](http://www.gargelectroheat.com)**

# User's Manual

## Digital PID Controller



48×48



96×48



72×72



48×96



96×96

### 1 Notice

Please confirm the specification of controllers is 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.  
(48×48 connecting with Pin 1 and 6, 96×48/72×72/48×96/96×96 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



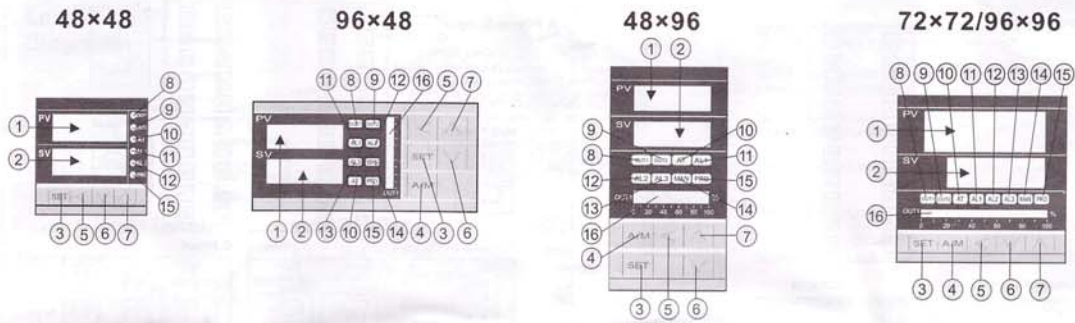
Torque : 0.4 N.m (4kgf.cm)

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 >

48×48			
96×48			
72×72			
48×96			
96×96			

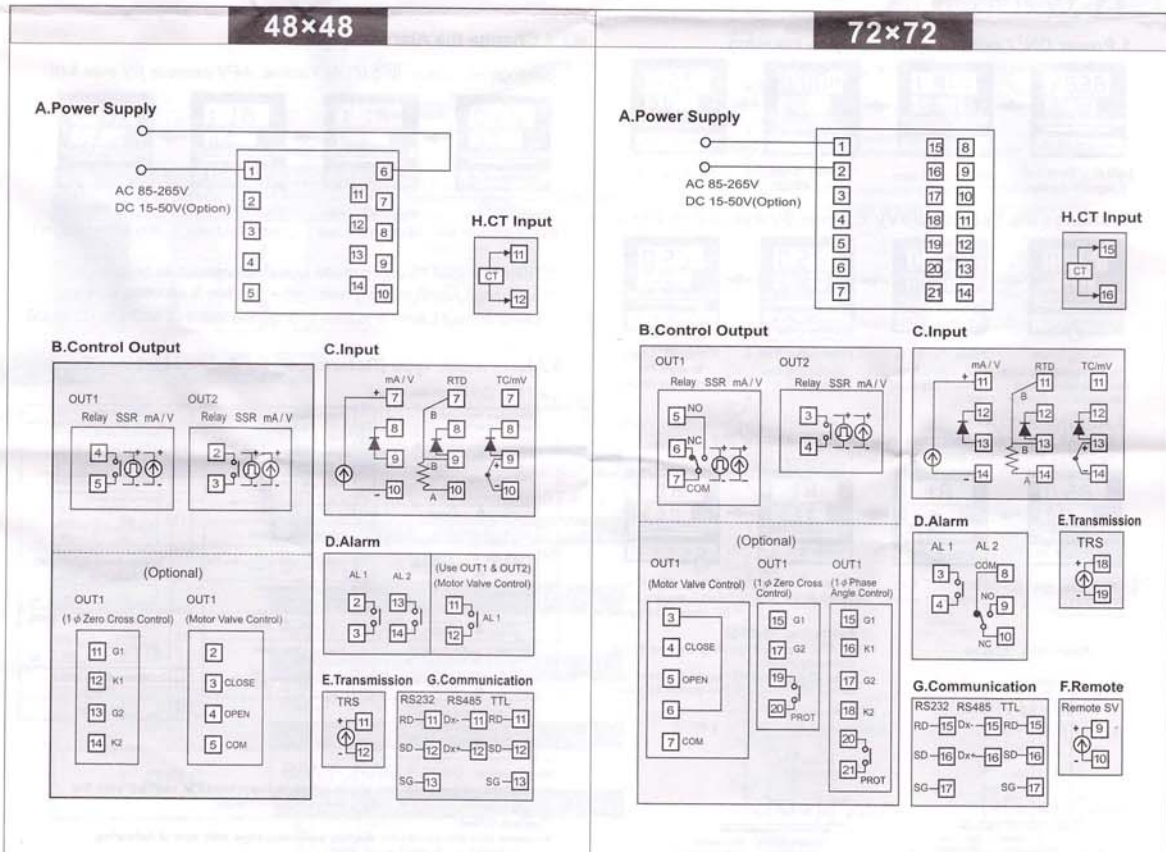
### 3 Parts Description



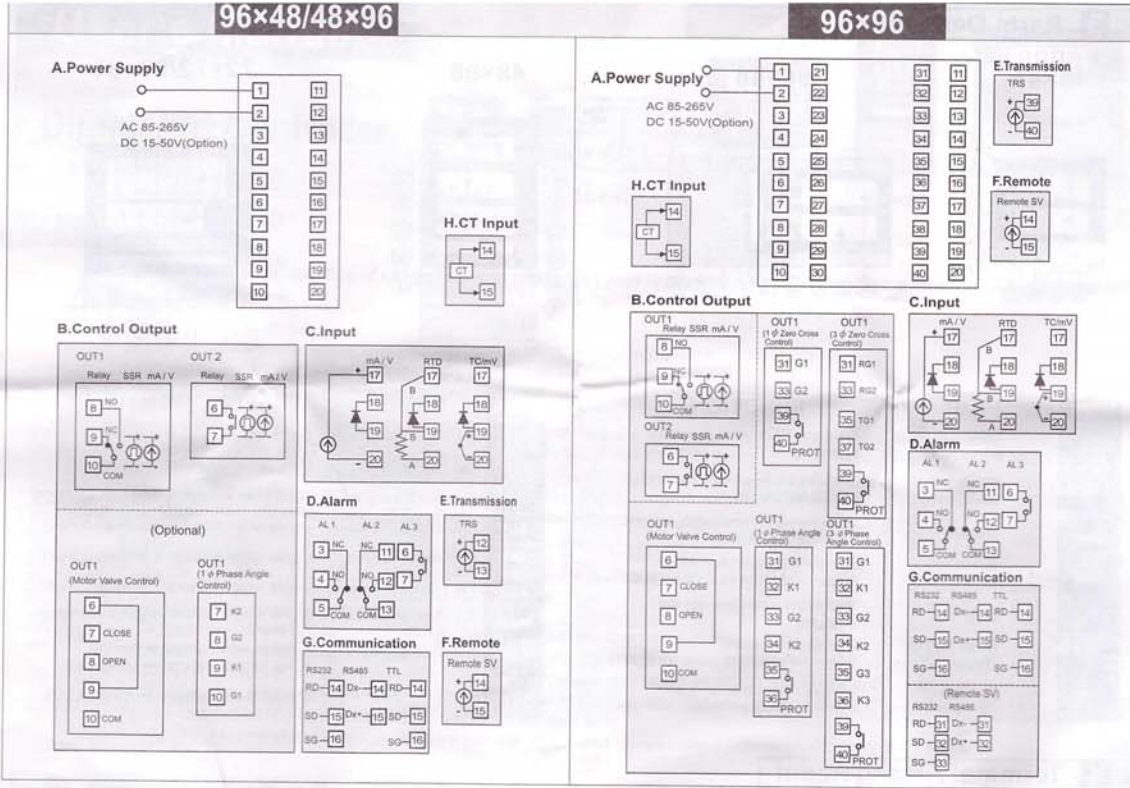
SYMBOL	NAME	FUNCTION
PV ①	Measured value (PV)display	Displays PV or various parameter symbols(Red)
SV ②	Setting value (SV)display	Displays SV or various parameter set values(Green)
SET ③	Set Key	Used for parameter calling up and set value registration
A/M ④	Auto/Manual key	Switches between Auto(PID) 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

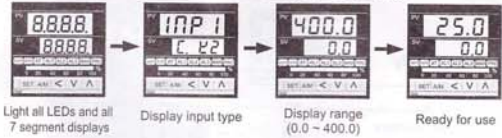




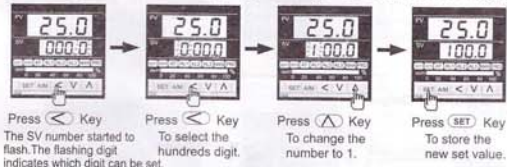


## 5 Operations

### 1. Power ON: Controller will display as following

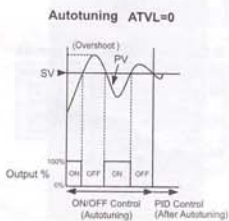
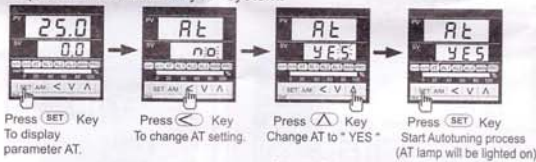


### 2. Change the Set Value(SV): Change SV from 0.0 to 100.0



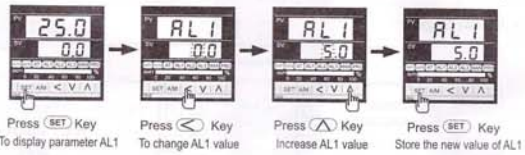
### 3. Autotuning (AT):

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



### 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 <Set> + <Left> 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*	04	Band alarm	07	Segment End alarm (Only for Programmable controller)
11	Deviation high alarm	11	Process high alarm with hold action*	17	Program Run alarm (Only for Programmable controller)
02	Deviation low alarm with hold action*	15	Process high alarm	08	System failed alarm* (ON)
12	Deviation low alarm	06	Process low alarm with hold action*	18	System failed alarm* (OFF)
03	Deviation high/low alarm with hold action*	16	Process low alarm	09	Heater Break Alarm (HBA)
13	Deviation high/low alarm			00	No alarm

\*Hold action:

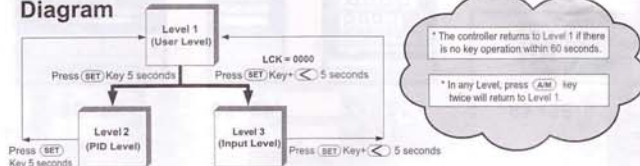
When Hold action is ON, the alarm action is suppressed at start-up until the measured value(PV) enters the non-alarm range.

\*System failed:

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

## 6 Parameter List

### Levels Diagram



### Level 1 (User Level)

Process Value	P11
Set Value	S11
Output Limit	OU1L
Autotuning	AE5/No
Alarm 1 set value	AL1
Heater current display (HBA set value)	C00
Alarm 2 set value	AL2
Alarm 3 set value	AL3

### Level 2 (PID Level)

P1	Proportional band 1 (For output 1)	Range : 0.0-200.0% ON/OFF control if set to 0 (0.0)
I1	Integral time 1 (For output 1)	Range : 0-3600 seconds PD control if set to 0
D1	Derivative time 1 (For output 1)	Range : 0-900 seconds PI control if set to 0
DB1	Dead-band time	Don't care
Auto	Auto tuning offset value	Range : 0-USPL
CYT1	Output 1 cycle time	Range : 0-150 seconds Relay output : 10 Voltage pulse output : 1, mA output : 0
HYS1	Hysteresis for output 1 ON/OFF control	Range : 0-1000
P2	Proportional band 2 (For output 2)	The same with P1
I2	Integral time 2 (For output 2)	The same with I1
D2	Derivative time 2 (For output 2)	The same with D1
CYT2	Output 2 Cycle time	The same with CYT1
HYS2	Hysteresis for output 2 ON/OFF control	The same with HYS1
GAP1	Control gap 1 (For output 1)	Set point of output 1 (Heating side) =SV - GAP1
GAP2	Control gap 2 (For output 2)	Set point of output 2 (Cooling side) =SV + GAP2
LCK	Function lock	

Display if output2 is provided

Display if P2=0

Return to "P1"

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

inIE	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.
RdCF	ADCF : A/D Convert Failed	Controller needs to be repaired.
RAMF	RAMF : RAM Failed	Controller needs to be repaired.

### Level 3 (Input Level)

INP1	Input type selection	
ANL1	Analog input low limit calibration (Used for mA and V input)	Range : -1999 ~ 9999
ANH1	Analog input high limit calibration (Used for mA and V input)	Range : 0 ~ 9999
dP	Decimal point position (Available for mA and V input)	0000 + 000.0 + 00.00 + 0.000
LSPL	Lower Set-Point Limit	Scaling Low Limit
USPL	Upper Set-Point Limit	Scaling High Limit
RNL2	Remote input low limit calibration	Range : -1999 ~ 9999
RNH2	Remote input high limit calibration	Range : 0 ~ 9999
ALd1	Alarm mode of AL1	Range: 00-19 Refer to "Alarm mode type"
ALt1	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	Alarm mode of AL2	The same with ALD1
ALt2	Alarm time of AL2	The same with ALT1
ALd3	Alarm mode of AL3	The same with ALD1
ALt3	Alarm time of AL3	The same with ALT1
HYSR	Hysteresis of all Alarm	Range : 0-1000
CLO1	Output 1 low limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CHO1	Output 1 high limit calibration (Used for mA and V output)	Range : 0 ~ 9999
CLO2	Output 2 low limit calibration (Used for mA and V output)	The same with CLO1
CHO2	Output 2 high limit calibration (Used for mA and V output)	The same with CHO1
CLO3	Retransmission low limit calibration	The same with CLO1
CHO3	Retransmission high limit calibration	The same with CHO1
rUCY	Full run time of proportional motor (Used for proportional motor valve control output)	Range : 5-2000 seconds
UR.E	Used for programmable controller to wait continued operation	0=Not wait Others=Wait value
SEEA		
PSL	Communication Protocol Selection	MODBUS RTU / MODBUS ASCII / TAIE
b.t.S	Communication Bits Configuration	0_81/O_82 / E_81 / E_82
Id.NO	ID number	Range : 0 ~ 255
bAUd	Baudrate	2400 / 4800 / 9600 / 19200 / 38400 bps
S.V	SV compensation	Range : -1000-1000
P.V	PV compensation	Range : -100.0-500.0
UNIT	Unit of PV & SV	C(°C) / F(°F) / A(Analog)
P.FE	PV Filter	PV will response faster if PVFT is smaller.
CR5C	Reserved	
OUd	Action mode	Heat / Cool
OPAd	Control algorithm	PID / Fuzzy
H=	Frequency	50 / 60HZ

Return to "INP1"