



Cat. No. TC-C12

TC

# PID TEMPERATURE CONTROLLER



## INSTRUCTION SHEET

Thank you for selecting INNO for your requirement.

This sheet describes the procedure and precautions required for installing and operating the product.

Kindly read this sheet before operating or installing the product. Store the sheet for future reference.

### CAUTION FOR SAFETY

- ① Please keep this sheet for review before use of unit.
- ① Please observe the following:

**WARNING**  
Serious injury may occur if instructions are not followed

**CAUTION**  
Product failure or injury can occur if instructions are not followed

### WARNING

1. This is not a safety product and is not to be used with machinery that requires use of safety control.
2. Do not disassemble or modify this unit. It may lead to electric shock/ fire.

Do not connect touch the terminals when power is on.  
**RISK OF ELECTRIC SHOCK!**

### CAUTION

1. This unit shall not be used outdoors or in places with high sunlight, humidity or other harsh conditions.
2. Do not use the unit in places where there is flammable or explosive gas.
3. Do not use this unit beyond rated power.
4. Please check the unit for wrong wiring before power on.
5. Do not use this unit in places where there is vibration or impact.
6. Do not use water or oil based detergent for cleaning the unit.
7. Do not use unit in places with high EM noise as it may lead to product malfunction.
8. Do not use excessive force to tighten the unit and do not hammer the unit.
9. Please process it as industrial waste and dispose responsibly.

### SPECIFICATIONS

\*For details on Customized/ Special Models contact Seller

*Models	TC-R230AD	TC-S230AD
Power Supply	100-240 VAC/ DC $\pm$ 10%	
Power Consumption	30mA at 220 VAC	
Sensor Input	Thermocouple: K, J, E, T; RTD: Pt100, CU50, CU100	
Control Output	Type	SPDT - NO, Relay Output
	Specification	250 VAC, 3A (Resistive Load); Electrical life: 100, 00 operations, minimum load: 5V, 10mA
Alarm Output	Type	SPST - NO, Relay Module
	Specification	250 VAC, 1A (Resistive Load); Electrical life: 100, 00 operations, minimum load: 5V, 10mA
Control Method	ON/ OFF control or 2 - PID control with auto-tuning	
PV Display	4 digit, 7 Segment RED LED; Height: 9mm	
SV Display	4 digit, 7 Segment GREEN LED; Height: 7mm	
Resolution	Thermocouple: 1° C; RTD: 0.1° C	
Sampling Time	min. 0.5ms	
Dielectric Strength	At power terminals 2000 VAC, 50Hz, 1 min	
Ambient Temperature	Operation: 0° ~ 50°C; Storage: -10° ~ 60°C (non-freezing; non-condensing)	
Ambient Humidity	Operation: 45 ~ 85% RH; Storage: 25 ~ 85% RH (non-condensing)	
Protection Class	IP20, Front panel IP65	
Weight	approx. 150 grams	
Material	Front Panel: PU Cladding Housing: ABS or Equiv.	

### PRECAUTION FOR SAFE USE

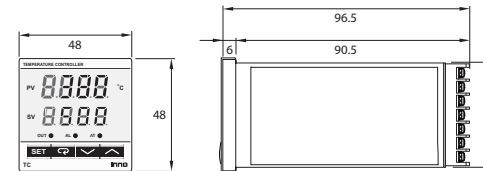
1. Provide sufficient space around the unit to allow for heat dissipation.
2. If several units are mounted side by side or vertically, the heat dissipation will cause the internal temperature of the products to rise. Compensate for the same by provide a cooling fan.
3. Install the product horizontally.
4. Mount to a panel with 1~8mm thickness only.
5. In order to prevent inductive noise, wire the lines connected to the product separately from the power lines.
6. Allow the product to operate without load for atleast 15 minutes.
7. Do not connect anything to the unused terminals.
8. Install an external circuit breaker or switch that confirms to IEC60947-1 and IEC60947-3 requirements and label them clearly so that the operator can quickly turn OFF power.
9. Use specified size of crimp terminals: M3, width: 5.8mm max.
10. Avoid use of bare wire for connection. If used length of exposed wire is to be between 6 ~8mm.

### CAUTION FOR SAFETY

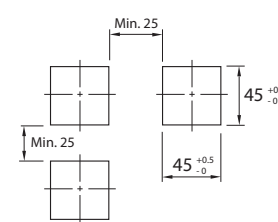
### CAUTION

1. Do not allow pieces of metal, wire clippings or metal shavings from installation to enter the product. Doing so may result in product failure.
2. Do not disassemble the unit when connected to power supply.
3. Do not use the equipment for measurements within measurement categories II, III, IV (according to IEC61010-1). Doing so may result in unexpected operation and may cause damage to equipment/ person.
4. Tighten the screws on the terminal block securely using the correct amount of torque. Loose screws may cause improper operation.  
Terminal Block Screws Tightening Torque = 0.43 ~ 0.58 Nm

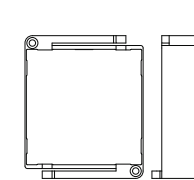
### DIMENSIONS



#### ① Panel Cut-out

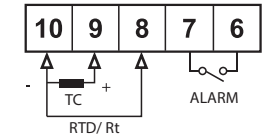
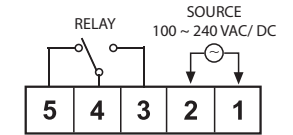


#### ① Panel Adapter

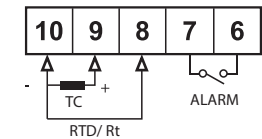
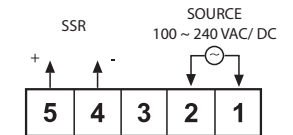


### CONNECTION DIAGRAM

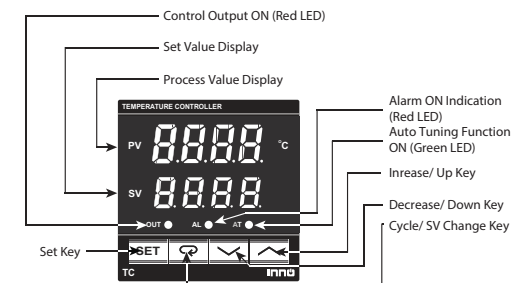
#### ◆ TC-R230AD



#### ◆ TC-S230AD



### NOMENCLATURE



### ERROR INDICATIONS

There is an error condition if the following values are displayed on the Temperature controller.

XXXX

Check if the inout sensor is connected.  
Check the FH, FL (Display Upper Limit, Display Lower Limit) values.  
Check the ambient temperature.

LLL

Check if the input signal is correct.  
Input sensor failure.  
Temperature controller input card failure.

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## SETTING MODE

Press the SET key for more than 3 seconds to enter or exit the Setting mode  
Cycle key enters the edit mode in each setting.

**Proportional Coefficient**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 999  
Default Setting : 10  
Changes the Proportional Coefficient value  
ON/ OFF control when P=0

**Integral Time**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 3600 (seconds)  
Default Setting : 120  
Changes the Integral Time

**Derivative Time**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 3600 (seconds)  
Default Setting : 120  
Changes the Derivative Time

**Hysteresis**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 50  
Default Setting : 5  
Changes the Hysteresis setting; works only when the Proportional co-efficient is set to '0' i.e. when ON/ OFF control is enabled

**Control Type**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 1 ~ 50  
Default Setting : 20  
Changes the control type; toggles between Relay and SSR control outputs.  
Relay Output : 1  
SSR : 4- 255

contd...

## SETTING MODE (Contd...)

contd...

**Alarm Value**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : FL ~ FH  
Default Setting : 200  
Changes the Alarm output value

**Alarm Hysteresis**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 50  
Default Setting : 1  
Changes the Alarm Hysteresis time

**Alarm Mode Setting**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : HL, HH, DL, DH  
Default Setting : HH  
Toggles between the various alarm modes.  
Alarm Modes in separate table

**PV Value Shift**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : -50 ~ 50  
Default Setting : 0  
Can be used to shift the current Process Value; this is useful if there is an error caused in the measuring unit

**Filter Constant**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 1 ~ 256  
Default Setting : 20  
Used to set the filter time constant

contd 2...

## SETTING MODE (Contd 2...)

contd...

**Display Unit**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : C / F  
Default Setting : C  
Toggles the temperature unit type between Centigrade celcius and Fahrenheit

**Input Sensor Type**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : Refer Input Sensor Table  
Default Setting : K  
Toggles the temperature sensor type between K, J, E, T, PT100, CU50, CU100.

**Display Lower Value**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : Refer Input Sensor Table  
Default Setting : -20  
Change the lower PV display value for the given sensor type

**Display Higher Value**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : Refer Input Sensor Table  
Default Setting : 1300  
Change the Higher PV display value for the given sensor type

**Password Lock Menu**

Press  $\odot$  to edit,  $\downarrow$ / $\uparrow$  keys are used to change the value. Set key saves.  
Setting Range : 0 ~ 9999  
Default Setting : 0  
"0000" is no password  
"0001" locks SV from change  
"0010" Locks all values from change

## INPUT SENSOR TABLE

Available Sensor types and their measuring range is given in the below table

Input Code	Input Type	Measuring Range	Resolution
K	K type	-20 ~ 1300°C	1°C
J	J Type	-20 ~ 1000°C	1°C
E	E Type	-20 ~ 600°C	1°C
T	T Type	-20 ~ 400°C	1°C
PT100	PT 100	-199.9 ~ 610°C	0.1°C
CU50	CU 50	-50 ~ 150°C	0.1°C
CU100	CU 100	-50 ~ 150°C	0.1°C

Accuracy: Across sensor types 0.5% FS  
Input Resistance: TC- >100KΩ; RTD- 0.2mΩ

## ALARM MODE TABLE

Alarm Code	Alarm Type	Alarm Output Graph
HH	On if PV above alarm value	
HL	On if PV below alarm value	
DH	On if PV exceeds SV by alarm value	
DL	On if PV falls below SV by alarm value	

## PID AUTO TUNING

PID function values are preset at the factory to suit general heating system requirements, this should be suitable for most requirements. PID settings can be set manually in the settings menu. However, auto-tuning function is also provided for quick operation. To enable auto-tuning press the Cycle key ( $\odot$ ) for 5 seconds or till the AT indication light turns on. The AT light goes off once Auto-tuning is complete. The auto-tuning function has to reset every time the SV is changed.

### NOTE:

Press and hold the SET key for more than 3 seconds to return to RUN mode from any setting position.

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