OP088-V06

PID528
Operating Instructions



#### **AUTOTUNE PID TEMPERATURE CONTROLLER**

# **FEATURES**

## **SENSOR**

Sensor type	Temperature range (°C)	Resolution (°C)
J	-99 to 750	0.1
K	-99 to 1350	0.1
Т	-99 to 400	0.1
R	-99 to 1750	1
S	-99 to 1750	1
RTD	-99 to 850	0.1

**DISPLAY TYPE** 

7 segment LED Upper Display: 10mm high Red (Process value) Lower Display: 7mm high Green(Set value)

MAIN CONTROL

CONTINOL

OUTPUT

A) PROPORTIONAL BAND

B) ON/OFF CONTROL AUTO TUNE MANUAL RESET

**ACCURACY** 

\*SET POINT LIMIT RELAY ACTION

SENSOR BREAK TC REVERSE OUTPUT Set1 is in PID or ON/OFF
Set2 is in ON/OFF
Time Proportioning or
Linear DC
0 to 400 °C (Programmable)
Cycle time: Auto/Manual
(1 to 100 sec Programmable)
Hysteresis from 0.1 to 99.9°C
Via Keys on front Panel

Hysteresis from 0.1 to 99.9°C Via Keys on front Panel For 1° resolution (-99 to 99°C) For 0.1°: -99.9 to 99.9°C  $\pm$  0.25 % of full scale/  $\pm$ 1°C

(Whichever is greater)
High limit settable by user

a) Forward- for Coolingb) Reverse - for Heating

Indicated on display,Indicated on display,

One relay per set point (SSR drive models available on request)

Relay rating: For SET1 : 5A,

For SET2: 5A

POWER SUPPLY 85 to 270 VAC / DC @

50/60Hz, 24 VAC / DC

models available on request

 OPERATING TEMP.
 0 - 50°C

 HUMIDITY
 95% RH

 WEIGHT
 200 grams

 COMPLIANCE
 CE

## **SAFETY SUMMARY**

This manual is meant for the personnel involved in wiring, installation, operation, and routine maintenance of the equipment. All safety related codifications; symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

**CAUTION:** Read complete instructions prior to installation and operation of the unit.

**CAUTION:** Risk of electric shock.

### **INSTALLATION GUIDELINES**

## **⚠** CAUTION:

- 1.This equipment, being built-in-type,normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
- **2.**Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
- 3.Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to an operator.

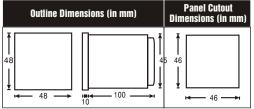
# **♠CAUTION**

- **1.**The equipment shall not be installed in environmental conditions other than those specified in this manual.
- **2.**Fuse Protection: The equipment does not contain built-in fuse. Installation of external fuse for electrical circuitry is highly recommended. Recommended rating of such fuse is supposed to be 275 VAC/1 Amp.
- 3.Since this is a built-in-type equipment (finds place in main control panel), its output terminals get connected to host equipment. Such equipment shall also comply with basic EMI/EMC and safety requirements like BS EN 61326-1 and BS EN 61010 respectively.
- 4.Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
- **5.**The output terminals shall be strictly loaded to the manufacturer specified values/range.

## **MECHANICAL INSTALLATION:**

For installing the controller

1. Prepare the panel cutout with proper dimensions as shown



- 2. Remove the clamp from the controller.
- 3. Push the controller into the panel cutout. Secure the controller in its place by pushing the clamp on the rear side.

# **⚠** CAUTION:

The equipment in its installed state must not come in close proximity to any heating sources, caustic vapours, oils, steam, or other unwanted process by-products.

### **EMC Guidelines:**

- Use proper input power cables with shortest connections and twisted type.
- Layout of connecting cables should be away from any internal EMI source.

### WIRING GUIDELINES

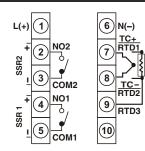
### **ACAUTION**

- **1.**To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement.
- Terminals and electrically charged parts must not be touched when the power in ON.
- Wiring shall be done strictly according to the terminal layout with shortest connections. Confirm that all connections are correct.
- 4.Use lugged terminals to meet M3.5 screws.
- 5.To eliminate electromagnetic interference use of short wire with adequate ratings and twists of the same in equal size can be made.
- 6.Cable used for connection to power source, must have a cross section of 1 or greater. These wires should have insulation capacity made of at least 1.5KV.

### **MAINTENANCE**

- **1.**The equipment should be cleaned regularly to avoid blockage of ventilating parts.
- Clean the equipment with a soft cloth. Do not use Isopropyl alcohol or any other cleaning agent.

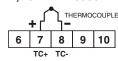
### **TERMINAL CONNECTIONS**



#### TERMINAL DESCRIPTION NO. LIVE (SUPPLY) 1 2 NO of relay 2 3 COM of relay 2 4 NO of relay 1 5 COM of relay 1 **NEUTRAL (SUPPLY)** 6 Positive of thermocouple or RTD1 (Pt100) 7 Negative of thermocouple or RTD2 (Pt100) 8 9 Third wire of RTD (PT-100)

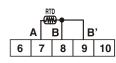
### **CONNECTION DIAGRAM:**

#### 1) FOR THERMOCOUPLE



THERMOCOUPLE
Connect Thermocouple (T/C) according to polarity shown.
Positive of TC at terminal no 7 & Negative of TC at terminal no 8

#### 2) FOR RTD (PT-100) 2 WIRE / 3 WIRE

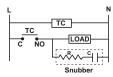


1) FOR 2 WIRE PT-100: Short terminals 8 & 9. Connect PT100 between terminal no. 7 & 8

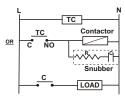
2) FOR 3 WIRE PT-100: Connect RTD1 & RTD2 of 3 wire PT100 to terminal no. 7 & 8. Connect RTD3 of 3 wire PT100 to terminal no. 9.

#### **TYPICAL CONNECTIONS FOR LOADS:**

1) For load current less than 0.5A



2) For bigger loads; use interposing relay/contactor.



**NOTE**: Use snubber as shown above to increase life of internal relay of temperature controller.

# CONFIGURATION SCHEME

(parameter setting)

To enter configuration: Press ♠ & ♥ for 3 seconds.

To enter configuration: Press ▲ & ♥ for 3 seconds.					
Key	Dis	play	Name	Description	
press	Upper	Lower	Ivanic	·	
Press • + ♥ for 3 sec.	5882	0000	Set Point 2	- 99 to max. range of sensor for 1° C resl - 99.9 to 999.9 for 0.1°C resl	
Press 🛕	FNUE	OFF	* Tuning mode	Autotune: To tune the instrument select Tune  Offine and come out of config. Tune LED will blink indicating tune is in progress	
Press 🛕	ē N L	00	* Manual reset	Programmable from -99.9 to 99.9 for 0.1°C	
Press 🛕	rocs	0000	* Config lock code	Fixed Lock Code: 0085. Refer user guide for explanation	
Press 🛕	INPE		Input sensor	Select input sensor type options: J (J)/ K (Ł)/T(Ł)/ R (P)/S(S)/ RTD(PŁJ)	
Press 🛕	resu		Display resolution	Resolution 0.1 or 1°C [ Valid only for J ( d ) / K ( b ) / RTD( f b d )]	
Press 🛆	(LFA)	ſΈ	Output mode of relay 1	Select reverse  Fel for heating forward  Fel for cooling application	
Press 🛕	(LFAS)	LE	Output mode of relay 2	Select reverse  PE for heating & forward  Fd for cooling application	
Press 🛕	SEE2	RBS	Set Point 2	Absolute/Deviation Toggle between Rb5 / dEU mode by pressing of D + \( \Delta \) keys	
Press 🕰	HAZS	0 (0	Hysteresis of Set2	Programmable from 0.1 to 99.9°C	
Press 🛕	РЬ	0 10	Proportional band	Proportional band programmable from 0.0 to 400.0 °C	
Note : To operate in ON/OFF mode make Pb = 00					

Key	Dis	olay	Name	Description	
press	Upper	Lower	Name		
Press 🛕	INE.E	0150	Integral time	Integral time (reset) programmable from 0 to 3600 sec. This parameter is prompted only in PID mode, i.e. When PB>0	
Press 🛕	GET.E	030	Derivative time	Derivative time (rate) programmable from 0 to 200 sec. This parameter is prompted only in PID mode. i.e. When PB>0	
Press 🕰	[ 75]	020	Cycle time	Range: 1 to 100 sec	
Press 🛕	H Y S 1	0.0	Hysteresis of Set1	Valid only for ON/ OFF mode Programmable from 0.1 to 99.9	
Press 🛕	HICH	0750	High Level Limit	Select the maximum limit of setpoint.	
Press 🛕	L S P I	no	Lock set point	Lock setpoint1 Toggle between 10/955 with each press of + A keys	
Press 🛕	L 5 P 2	no	Lock set point	Lock setpoint1 Toggle between fig / YES with each press of + A keys	
Press 🛕	rsee	no	Reset	Reset all parameters to default values. Toggle between	

Press ▲ + ♥ for 3 sec. to come out of programming.

NOTE: \* mark explain in user guide.

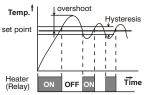
### **Programming Set Point**

- A) To view set point : Press D key
- B) To increase / decrease set point : Press □ + △ / ♥
- Continuous operation of above makes update speed faster in 3 stages after 7 seconds.

### **USER GUIDE:**

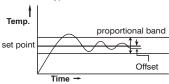
1. ON/OFF control action (For heating):

The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the Temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the Set point.



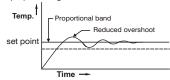
**HYSTERESIS:** The difference between the temperature at which relay switches 'ON' and at which relay switches 'OFF' is the hysteresis or dead band.

2. Time proportional control: In time proportional control, the relay 'ON' time and relay 'OFF' time varies in proportion to the deviation of the actual temperature from the set value. The proportional action occurs within a band about the set point. The proportional mode of control gives closer control than ON/OFF type.



- 3. Off set adjustment (manual reset): After some time the process temperature settles at some point and there is a difference between the set temperature & the controlled temperature. This difference can be removed by setting the manual reset value equal & opposite to the offset.
- **4. Auto tuning:** The auto tuning function automatically measures, compute and sets the proportional band (P), integral time (I) and Derivative time (D). While Auto tuning, the controller performs proportional Control and determine proper P.I.D. Values.

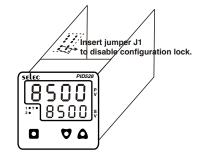
PID - time proportioning with auto reset & rate



5. Set point limit:

All set points are programmable from low to high limit. For 0.1  $^{\circ}$  resolution set points are programmable from low to high limit between -99.0 to + 999.9  $^{\circ}$  C/  $^{\circ}$  F

**6. Configuration lock code:** To enable configuration lock first remove the housing and then remove the jumper J1. To scroll through next functions set lock = 0085.



# **CALIBRATION CERTIFICATE**

Date:

Sr. No.:

woaei	NO:			

Claimed Accuracy: ± 0.25% of full scale ±1 digit

(After 20min warmup time)

Sources calibrated against:

Kusam-meco, model 405, Sr.No.:104446

Multimeter calibration report no:

CC/FCL/1131/09-10

IDEMI

The calibration of this unit has been verified at the following values:

SENSOR	CALIBRATION TEMP (°C) ( 0.1 resolution)	DISPLAY VALUE (°C)
	35.0	35.0
К	700.0	700.0
	1350	1350
	0.0	0.0
PT100	500.0	500.0
	800.0	800.0

The thermocouple / RTD curves are linearised in this microprocessor based product; and hence the values interpolated between the readings shown above are also equally accurate; at every point in the curve.

Unit is accepted as accuracy is within the specified limit of claimed accuracy and certificate is valid upto one year from the date of issue.

CHECKED BY:

(Specifications subject to change as development is a continuous process).

#### Selec Controls Pvt. Ltd., India.

(Formerly Selectron Process Controls Pvt. Ltd.)
Tel:91-22-28476443/1882, Fax:91-22-28471733,
Toll free: 1800 227 353, Website: www.selec.com
E- mail: sales@selec.com.