



TEMPERATURE CONTROLLER



Temperature Controller

- 4 digits display
- Temperature sensor input (TC / RTD)
- Adjustable Process Offset Value
- Programmable ON/OFF, P, PI, PD ve PID control types
- Adaptation of PID coefficients to the system by Auto Tune/Self Tune
- Programmable control and alarm functions for control outputs

Temperature controllers are designed for measuring and controlling a temperature value in industry. They can be used in many applications with their TC and RTD temperature measurement input, multi-function control outputs, programmable control and alarm functions. They are mainly used in glass, plastic, petro-chemistry, textile, automotive and machine production industries. Accurate and advanced controlling is performed with selectable ON-OFF, P, PI, PD, PID, Self Tune PID, Auto Tune PID functions.

SPECIFICATIONS

INPUT

Process Input: TC/RTD

Thermocouple (TC): J, K, R, S, T and L (IEC584.1)(ITS90)

Thermoresistance (RTD): Cu-50 and Pt100 (IEC 751) (ITS90)

Measurement Range: Please refer to parameter $P00$ in parameters section.

Accuracy: $\pm 0.25\%$ of scale for thermocouple and thermoresistance.

Cold Junction Compensation: Automatically $\pm 0.1^\circ\text{C}/1^\circ\text{C}$

Line Compensation: Maximum 10 Ohm

Sensor Break Protection: Upscale

Sampling Cycle: 0.1 second

CONTROL

Control Forms: ON/OFF, P, PI, PD veya PID (Control form can be programmed by the user.)

OUTPUT

Process Output: Relay(7A@250V~ at resistive load) or SSR Driver Output (Maximum 10mA, Max. 17V=)

Alarm Output:Relay (7A@250V~ at resistive load)

SUPPLY VOLTAGE

230V~ ($\pm 15\%$) 50/60Hz - 3VA

115V~ ($\pm 15\%$) 50/60Hz - 3VA

24V~ ($\pm 15\%$) 50/60Hz - 3VA

24V= ($\pm 15\%$) 50/60Hz - 3VA

10 - 30 V=

Must be determined in order

DISPLAY

Temperature Display: 16 mm Red 4 digits LED Display

Led Indicators: O1 (Relay Process Output Status LED), O2 (SSR Process Output Status LED), P(Programming Mode LED), S(Set Value LED), °C, °F LEDs

ENVIRONMENTAL RATINGS and PHYSICAL SPECIFICATIONS

Operating Temperature: 0...50°C

Humidity: 0-90%RH (none condensing)

Protection Class: IP65 at front, IP20 at rear

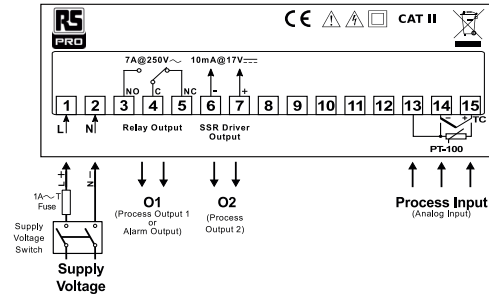
Weight: 350 gr.

Dimension: 96x96 mm, Depth: 100 mm

Panel CutOut: 92x92 mm

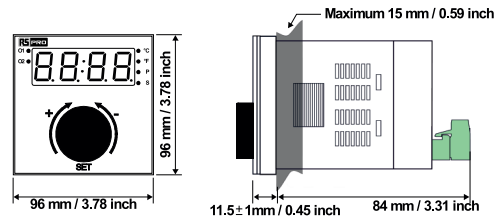


Electrical Wirings

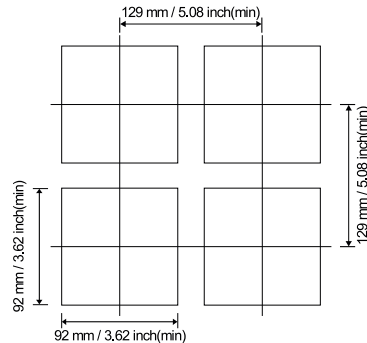


To reduce the effect of electrical noise on device, low voltage line (especially sensor input cables) wiring must be separately from high current and voltage line. If possible, use shielded cable and shield must be connected to ground only one side.

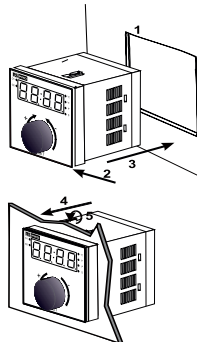
Dimensions



Panel Cut-out

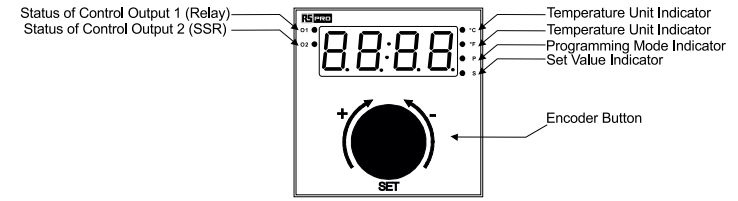


Panel Mounting

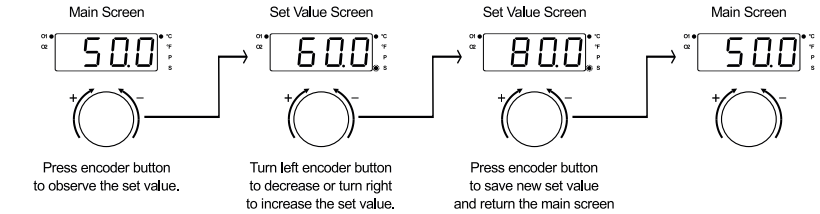


- 1- Before mounting the device in your panel, make sure that the cutouts is of the right size.
- 2- Check front panel gasket position.
- 3- Insert the device through the cutout. If the mounting clamps are on the unit, put out them before inserting the unit to the panel.
- 4- Insert the mounting clamps to the two of designated holes that located on four sides of device.
- 5- Drag the mounting clamps in direction 5 until the device completely immobile within the panel.
- 6- In order to remove device push on the mounting clamp as shown with arrow 6 and pull back.

Front Panel Definition

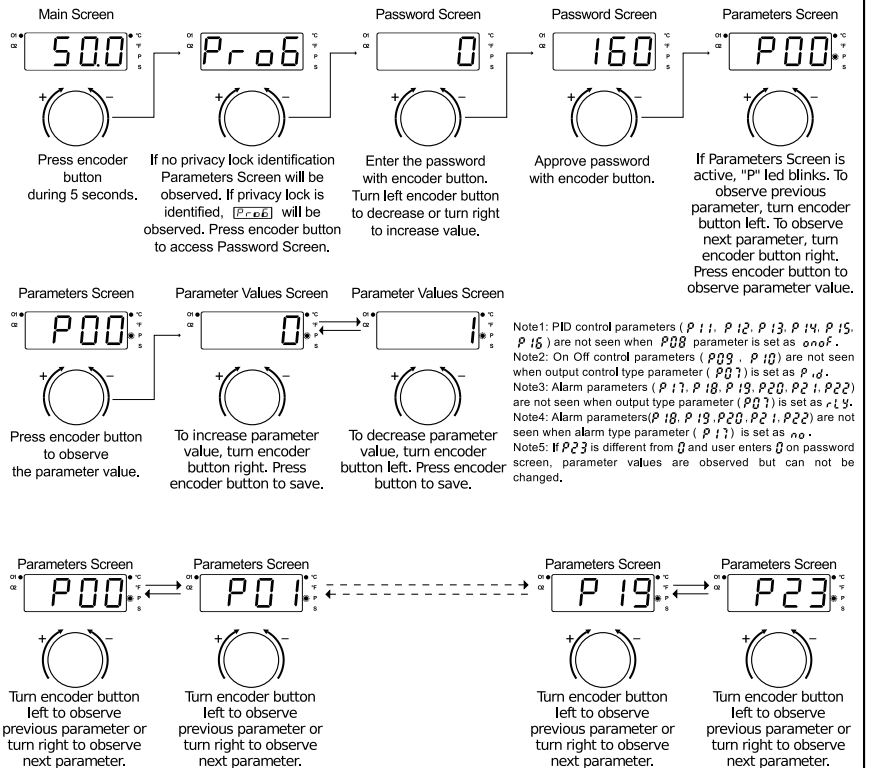


Access and Change Set Value



Note : If no operation for 10 seconds, device automatically exits from Set Value Screen without saving the value.

Access, Change and Record the Parameter Values



Note1: PID control parameters (P 11, P 12, P 13, P 14, P 15, P 16) are not seen when $P08$ parameter is set as $0.00F$.
 Note2: On Off control parameters (P09, P10) are not seen when output control type parameter (P07) is set as P.d.
 Note3: Alarm parameters (P 17, P 18, P 19, P20, P21, P22) are not seen when output type parameter (P07) is set as r.L.Y.
 Note4: Alarm parameters(P 18, P 19, P20, P21, P22) are not seen when alarm type parameter (P 17) is set as a_0 .
 Note5: If $P23$ is different from 0 and user enters 0 on password screen, parameter values are observed but can not be changed.

Note : If no operation for 20 seconds on Parameters Screen, device automatically return Main Screen .

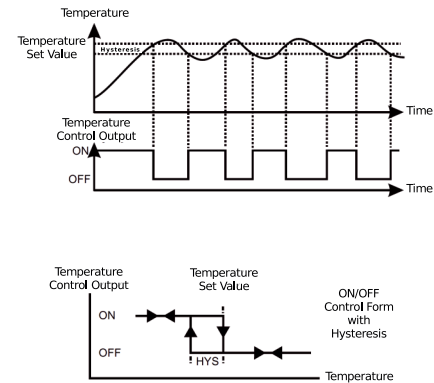
Parameters Descriptions

P000 : Process input type selection parameter. (Default: 0)
0 : J type (Fe,Cu,Ni) Thermocouple; -200°C,900°C ; -328°F,1652°F
1 : J type (Fe,Cu,Ni) Thermocouple; -199.9°C,900.0°C ; -199.9°F,999.9°F
2 : K type (Ni,Cr,Ni) Thermocouple; -200°C,1300°C ; -328°F,2372°F
3 : K type (Ni,Cr,Ni) Thermocouple; -199.9°C,999.9°C ; -199.9°F,999.9°F
4 : R type (Pt13%RhPt) Thermocouple; 0°C,1700°C ; 32°F,3092°F
5 : R type (Pt13%RhPt) Thermocouple; 0°C,999.9°C ; 32.0°F,999.9°F
6 : S type (Pt10%RhPt) Thermocouple; 0°C,1700°C ; 32°F,3092°F
7 : S type (Pt10%RhPt) Thermocouple; 0°C,999.9°C ; 32.0°F,999.9°F
8 : T type (Cu,Cu,Ni) Thermocouple; -199°C,400°C ; -199°F,752°F
9 : T type (Cu,Cu,Ni) Thermocouple; -199.0°C,400.0°C ; -199.0°F,752.0°F
10 : L type (Ni,Cr,Co/Ni,Fe,Mn,Cu) Thermocouple; -150°C,800°C ; -199°F,999°F
11 : L type (Ni,Cr,Co/Ni,Fe,Mn,Cu) Thermocouple; -150.0°C,800.0°C ; -199.0°F,999.0°F
12 : Cu-50 Thermoresistance; -199°C,200°C ; -199°F,392°F
13 : Cu-50 Thermoresistance; -199.0°C,200.0°C ; -199.0°F,392.0°F
14 : PT100 Thermoresistance; -200°C,650°C ; -328°F,1202°F
15 : PT100 Thermoresistance; -199.9°C,650.0°C ; -199.9°F,999.9°F

P001 : Unit selection parameter. θ_C or θ_F can be chosen. (Default: θ_C)
P002 : Operation scale minimum(Low Limit) value. It changes according to the process input type and scale. (Default: -200)
P003 : Operation scale maximum(High Limit) value. It changes according to the process input type and scale. (Default: 900)
P004 : Process set value low limit parameter. It can be adjusted between Operation Scale Minimum(**P002**) and Process Set Value High Limit(**P005**). (Default: -200)
P005 : Process set value high limit parameter. It can be adjusted between Process Set Value Low Limit(**P004**) and Operation Scale Maximum(**P003**). (Default: 900)
P006 : Process offset value. It can be adjusted as a degree(θ_C or θ_F), from -10% of scale to 10% of scale. It is added to the process display value. (Default: 0)
P007 : Process output type. Process output can be selected Relay(r_{LY}) or SSR(s_{Sr}). (Default: s_{Sr})
P008 : Output control type selection. It can be selected $onof$ or p_{id} . (Default: $onof$)
P009 : Hysteresis value. It can be adjusted from 1°(point representation is 0.1°) to 20°. (Default: 3)
P010 : Minimum ON/OFF control output time parameter. It can be adjusted from 0 to 60 seconds. (Default: 0)
P011 : Proportional band (P) value. It can be adjusted from %1.0 to %100.0. (Default: 10.0)
P012 : Proportional Period (Output Control Period). If control output is SSR. It can be adjusted from 0.5 to 150.0 seconds. If control output is Relay. It can be adjusted 60.0 to 150.0 seconds. (Default: 10.0)
P013 : Proportional Offset value. This parameter is used for shifting the proportional band. It can be adjusted as a degree(θ_C or θ_F), from (-Operation Scale Maximum /2) to (Operation Scale Maximum /2). (Default: 0)
P014 : Integral Time. It can be adjusted from 0 to 3600 seconds. (Default: 100)
P015 : Derivative Time. It can be adjusted from 0.0 to 999.9 seconds. (Default: 25.0)
P016 : If tune parameter is set as ξ_{ELF} or $R_{t_{do}}$, device starts to calculate PID parameters automatically. (Default: θ)
 θ : Device does not calculate PID parameters.
 ξ_{ELF} : Step Response Tuning operation.
 $R_{t_{do}}$: Limit Cycle Tuning operation.
P017 : Alarm type selection.(Default: $P_{H \cdot R}$)
P018 : Alarm set value parameter. It can be adjusted between Operation Scale Minimum to Operation Scale Maximum. (Default: 300)
P019 : Alarm hysteresis value. It can be adjusted from 1° (point representation: 0.1°) to 50% of scale. (Default: 3)
P020 : Alarm on delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)
P021 : Alarm off delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)
P022 : Alarm opening delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)
P023 : Password for accessing to the parameters section. It can be adjusted from 0 to 9999. If parameter value is 0, password screen is not seen. If parameter value is different from 0 and ;
 -If user enters different value from saved value, device will return to main screen automatically.
 -If user enters 0, all parameters can be observed except **P023**. But device does not allow to do any changes in parameters. (Default: 0)

Adjustment of Hysteresis Value for ON/OFF Control

In ON/OFF control algorithm, temperature value is tried to keep equal to set value by opening or closing completely last control element. ON/OFF controlled system, temperature value oscillates continuously. Temperature value's oscillation period or amplitude around set value changes according to controlled system. For reducing oscillation period of temperature value, a threshold zone is formed below or around set value and this zone is named hysteresis. Action of control output is described with figures below.



Tune Operation

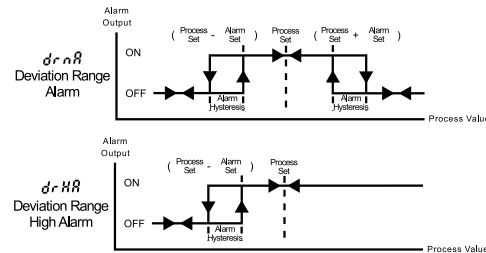
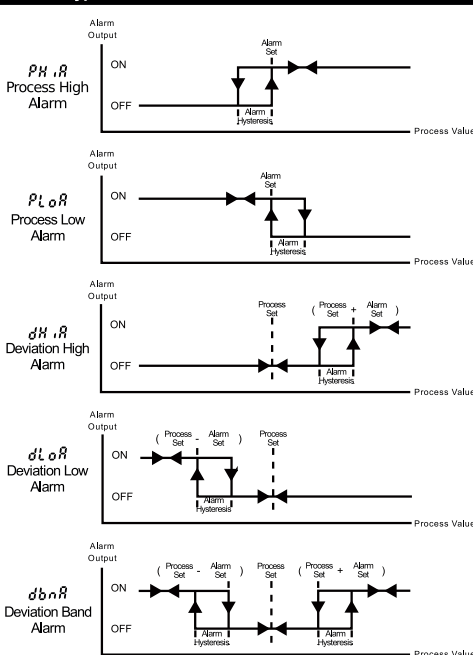
Starting the Tune operation

- 1- Enter the **P016** parameter and select ξ_{ELF} or $R_{t_{do}}$. Observe that t_{on} blinks. (If ξ_{ELF} is selected and start conditions are not okay for Tune operation, t_{ERR} blinks during 10 seconds.)
- 2- Device calculates PID control coefficients and sets the process value to wanted value.

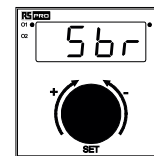
Canceling tune operation:

- 1- If sensor breaks;
 - 2- If tune operation can not be completed in 8 hours;
 - 3- While tune operation is running, if process value becomes greater than process set value;
 - 4- While tune operation is running, if user changes the process set value;
 - 6- While tune operation is running, if user changes the parameter in menu;
- Then tune operation is canceled and device continues to run with former PID parameters without changing PID parameters.

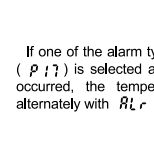
Alarm Types



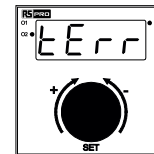
Error Messages



Sensor failure in analog inputs. If there is no sensor connection or the value that is read from the analog input goes out of the device scale, warning is observed.



If one of the alarm types in the alarm parameter (**P017**) is selected and the alarm condition has occurred, the temperature value is displayed alternately with ALr message on display.



Tune failure. If ξ_{ELF} is selected in PID Tune Parameter(**P016**) and start conditions are not okay for Tune operation, the temperature value is displayed alternately with t_{ERR} message on display during 10 seconds.

Installation



Before beginning installation of this product, please read the instruction manual and warnings below carefully.

In package,

- One piece unit
- Two pieces mounting clamp
- One piece instruction manual

A visual inspection of this product for possible damage occurred during shipment is recommended before installation. It is your responsibility to ensure that qualified mechanical and electrical technicians install this product.

If there is danger of serious accident resulting from a failure or defect in this unit, power off the system and the electrical connection of the device from the system.

The unit is normally supplied without a power switch or a fuse. Use power switch and fuse as required.

Be sure to use the rated power supply voltage to protect the unit against damage and to prevent failure.

Keep the power off until all of the wiring is completed so that electric shock and trouble with the unit can be prevented. Never attempt to disassemble, modify or repair this unit. Tampering with the unit may result in malfunction, electric shock or fire.

Do not use the unit in combustible or explosive gaseous atmospheres. During the equipment is put in hole on the metal panel while mechanical installation some metal burrs can cause injury on hands, you must be careful.

Montage of the product on a system must be done with it's mounting clamp. Do not do the montage of the device with inappropriate mounting clamp. Be sure that device will not fall while doing the montage.

It is your responsibility if this equipment is used in a manner not specified in this instruction manual.

Warranty

Warrants that the equipment delivered is free from defects in material and workmanship. This warranty is provided for a period of two years. The warranty period starts from the delivery date.

This warranty is in force if duty and responsibilities which are determined in warranty document and instruct on manual performs by the customer completely.

Maintenance

Repairs should only be performed by trained and specialized personnel. Cut power to the device before accessing internal parts. Do not clean the case with hydrocarbon-based solvents (Petrol, Trichlorethylene etc.). Use of these solvents can reduce the mechanical reliability of the device. Use a cloth dampened in ethyl alcohol or water to clean the external plastic case.

