⊞ EMKO

ESD-9950-N TEMPERATURE CONTROLLER

ESD-9950-N Temperature Controller
- 4 digits display
- J type Thermocouple Input or
  K type Thermocouple Input or
  R type Thermocouple Input or
  S type Thermocouple Input or
  2 or 3 wire PT 100 Input
- 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

ESD-9950-N 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 and S (IEC584.1)(ITS90)
Thermoresistance (RTD): 2 or 3 wire Pt100 (IEC 751) (ITS90)
Measurement Range: Please refer to parameter $P00$ in parameters section.
Accuracy: ± 0.25% of scale for thermocouple and thermoresistance.
Cold Junction Compensation: Automatically ±0.1°C/1°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∼ (±15%) 50/60Hz - 3VA
115V∼ (±15%) 50/60Hz - 3VA
24V∼ (±15%) 50/60Hz - 3VA
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...50ºC
Humidity : 0-90%RH (none condensing)
Protection Class: IP65 at front , IP20 at rear
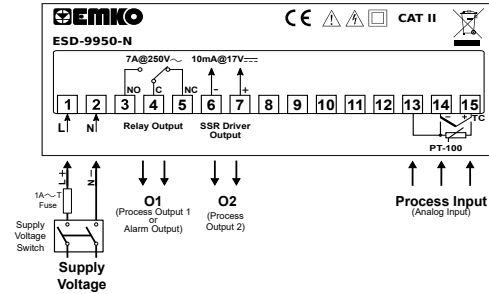**Weight:** 350 gr.
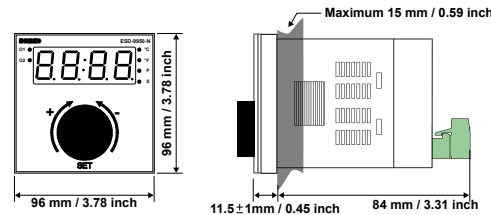**Dimension:** 96 x 96 mm, Depth: 100 mm
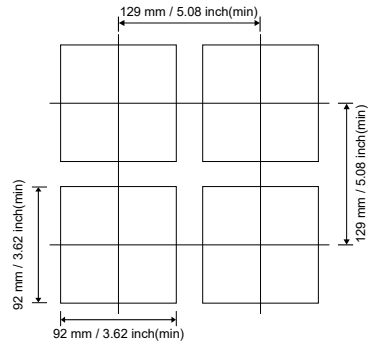**Panel CutOut:** 92 x 92 mm

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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 abd shield must be connected to ground only one side.
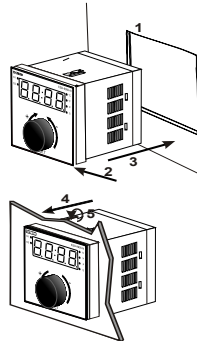
Dimensions

96 mm / 3.78 inch   Maximum 15 mm / 0.59 inch   96 mm / 3.78 inch
11.5±1mm / 0.45 inch   84 mm / 3.31 inch

Panel Cut-out

129 mm / 5.08 inch(min)
5.08 inch (min)
92 mm / 3.62 inch(min)
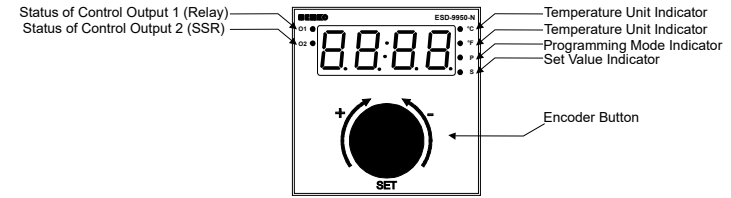129 mm / 5.08 inch(min)
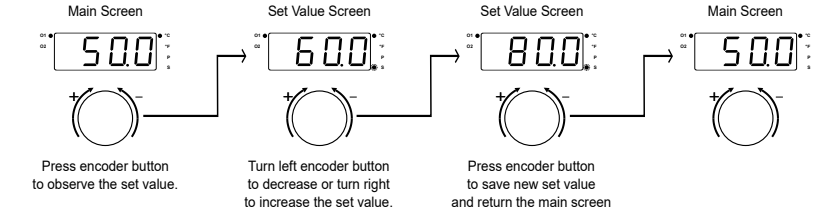92 mm / 3.62 inch(min)

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.
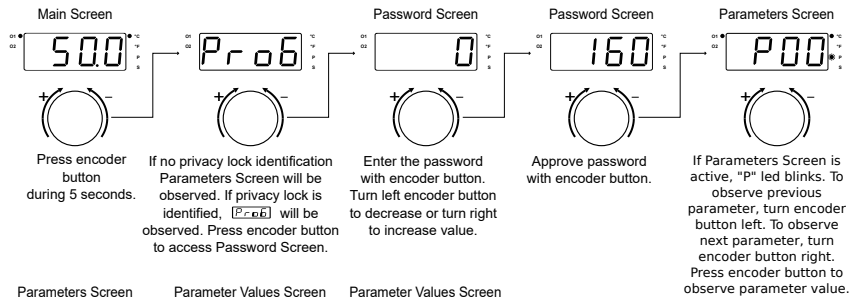

Front Panel Definition

Status of Control Output 1 (Relay)
Status of Control Output 2 (SSR)
Temperature Unit Indicator
Temperature Unit Indicator
Programming Mode Indicator
Set Value Indicator
Encoder Button

Access and Change Set Value

Main Screen	Set Value Screen	Set Value Screen	Main Screen
50.0	60.0	80.0	50.0

Press encoder button to observe the set value. / Turn left encoder button to decrease or turn right to increase the set value. / Press encoder button to save new set value and return the main screen.

Note : If no operation for 10 seconds, device automatically exits from Set Value Screen without saving the value.
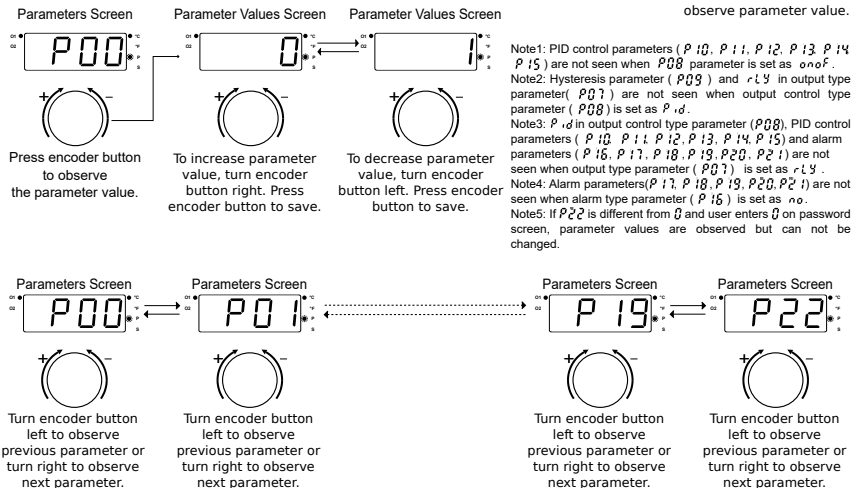
Access, Change and Record the Parameter Values

Main Screen	Password Screen	Password Screen	Parameters Screen
50.0	$Pro6$	0	160	$P00$

Press encoder button during 5 seconds. / If no privacy lock identification Parameters Screen will be observed. If privacy lock is identified, $Pro6$ will be observed. Press encoder button to access Password Screen. / Enter the password with encoder button. Turn left encoder button to decrease or turn right to increase value. / Approve password with encoder button. / If Parameters Screen is active, "P" led blinks. To observe previous parameter, turn encoder button left. To observe next parameter, turn encoder button right. Press encoder button to observe parameter value.

Parameters Screen	Parameter Values Screen	Parameter Values Screen
$P00$	0	1

Press encoder button to observe the parameter value. / To increase parameter value, turn encoder button right. Press encoder button to save. / To decrease parameter value, turn encoder button left. Press encoder button to save.

Note1: PID control parameters ($P10$, $P11$, $P12$, $P13$, $P14$, $P15$) are not seen when $P08$ parameter is set as $onoF$.
Note2: Hysteresis parameter ($P09$) and rLY in output type parameter($P07$) are not seen when output control type parameter ($P08$) is set as Pid.
Note3: Pid in output control type parameter ($P08$), PID control parameters ($P10$, $P11$, $P12$, $P13$, $P14$, $P15$) and alarm parameters ($P16$, $P17$, $P18$, $P19$, $P20$, $P21$) are not seen when output type parameter ($P07$) is set as rLY.
Note4: Alarm parameters($P17$, $P18$, $P19$, $P20$, $P21$) are not seen when alarm type parameter ($P16$) is set as no.
Note5: If $P22$ is different from 0 and user enters 0 on password screen, parameter values are observed but can not be changed.

Parameters Screen	Parameters Screen	Parameters Screen	Parameters Screen
$P00$	$P01$	$P19$	$P22$

Turn encoder button left to observe previous parameter or turn right to observe next parameter. / Turn encoder button left to observe previous parameter or turn right to observe next parameter. / Turn encoder button left to observe previous parameter or turn right to observe next parameter. / Turn encoder button left to observe previous parameter or turn right to observe next parameter.

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

Parameters Descriptions

$P00$: 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 tipi (Pt13%RhPt) Thermocouple; 0.0°C,999.9°C ; 32.0°F,999.9°F
- 6 : S tipi (Pt10%RhPt) Thermocouple; 0°C,1700°C ; 32°F,3092°F
- 7 : S tipi (Pt10%RhPt) Thermocouple; 0.0°C,999.9°C ; 32.0°F,999.9°F
- 8 : PT100 Thermoresistance; -200°C,650°C ; -328°F,1202°F
- 9 : PT100 Thermoresistance; -199.9°C,650.0°C ; -199.9°F,999.9°F

$P01$: Unit selection parameter. °C or °F can be chosen. (Default:°C)

$P02$: Operation scale minimum(Low Limit) value. It changes according to the process input type and scale. (Default: -200)

$P03$: Operation scale maximum(High Limit) value. It changes according to the process input type and scale. (Default: 900)

$P04$: Process set value low limit parameter. It can be adjusted between Operation Scale Minimum($P02$) and Process Set Value High Limit($P05$). (Default: -200)

$P05$: Process set value high limit parameter. It can be adjusted between Process Set Value Low Limit($P04$) and Operation Scale Maximum($P03$). (Default: 900)

$P06$: Process offset value. It can be adjusted as a degree(°C or °F), from -10% of scale to 10% of scale. It is added to the process display value. (Default: 0)

$P07$: Process output type. Process output can be selected Relay(rLY) or SSR(SSr). (Default:SSr)

$P08$: Output control type selection. Output control type can be selected $onoF$ or $P.id$. (Default:$onoF$)

$P09$: Hysteresis value. It can be adjusted from 1°(point representation is 0.1°) to 20°. (Default: 3)

$P10$: Proportional band (P) value. It can be adjusted from %1.0 to %100.0. (Default: 10.0)

$P11$: Output control period. It can be adjusted from 0.5 to 150 seconds. (Default: 10.0)

$P12$: Proportional Offset value. This parameter is used for shifting the proportional band. It can be adjusted from (-Operation Scale Maximum /2) to (Operation Scale Maximum /2). (Default: 0)

$P13$: Integral Time. It can be adjusted from 0 to 3600 seconds. (Default: 100)

$P14$: Derivative Time. It can be adjusted from 0.0 to 999.9 seconds. (Default: 25.0)

$P15$: If tune parameter is set to $SELF$ or $AUto$, device starts to calculate PID parameters automatically. (Default: no)
- no : Device does not calculate PID parameters.
- $SELF$: Step Response Tuning operation.
- $AUto$: Limit Cycle Tuning operation.

$P16$: Alarm type selection.(Default: $PH.iA$)

$P17$: Alarm set value parameter. It can be adjusted between Operation Scale Minimum to Operation Scale Maximum. (Default: 300)

$P18$: Alarm hysteresis value. It can be adjusted from 1° (point representation: 0.1°) to 50% of scale. (Default: 3)

$P19$: Alarm on delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)

$P20$: Alarm off delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)

$P21$: Alarm opening delay time. It can be adjusted from 0 to 9999 seconds. (Default: 0)

$P22$: 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 $P22$. 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.
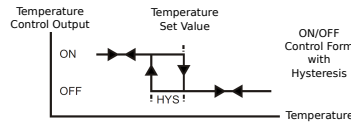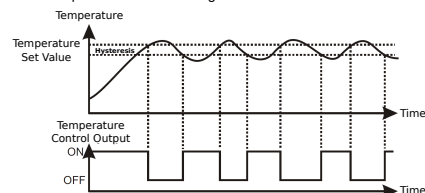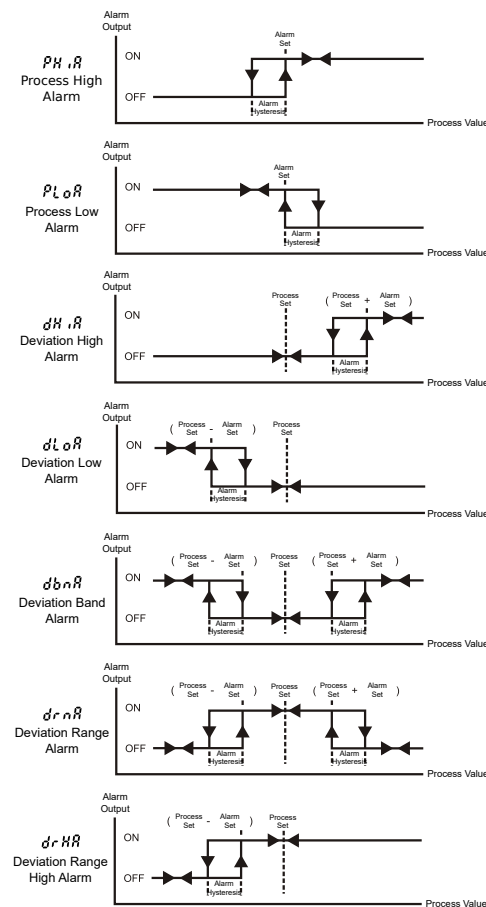

Tune Operation

Starting the Tune operation
1- Enter the $P15$ parameter and select $SELF$ or $AUto$. Observe that $tunE$ blinks. (If $SELF$ is selected and start conditions are not okay for Tune operation, $tErr$ blinks during 10 seconds.)
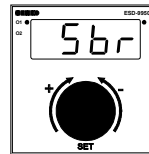2- Device calculates PID control coefficients and sets the process value to wanted value.

Cancelling 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.
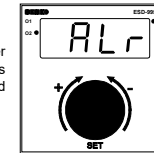
Alarm Types

PH.iA — Process High Alarm

PLoA — Process Low Alarm

dHiA — Deviation High Alarm

dLoA — Deviation Low Alarm

dbnA — Deviation Band Alarm

drnA — Deviation Range Alarm


drHA — Deviation Range High Alarm

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 ($P16$) is selected and the alarm condition has occurred, the temperature value is displayed alternately with ALr message on display .
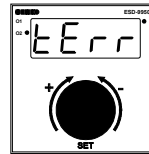
Tune failure. If $SELF$ is selected in PID Tune Parameter($P15$) and start conditions are not okay for Tune operation, the temperature value is displayed alternately with $tErr$ message on display during 10 seconds.

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 instruciton manual

A visual inspection of this product for possible damage occured 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 results 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

EMKO Elektronik 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.

Other Informations

Manufacturer Information:

Emko Elektronik Sanayi ve Ticaret A.Ş.
Demirtaş Organize Sanayi Bölgesi Karanfil Sk. No:6 16369
BURSA/TURKEY

Phone : +90 224 261 1900
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Repair and Maintenance Service Information:

Emko Elektronik Sanayi ve Ticaret A.Ş.
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Fax : +90 224 261 1912

Ordering Informations

ESD-9950-N(96x96 DIN 1/4)	A	BC	D	E		FG	HI		U	V	W	Z
	20	0	1		02	00		0	0	0	0

A	**Supply Voltage**
2	24V∿ (±%15) 50/60Hz
3	24V∼ (±%15) 50/60Hz
4	115V∼ (±%15) 50/60Hz
5	230V∼ (±%15) 50/60Hz
8	10 - 30 V ⎓
9	Customer

BC	**Input Type**	**Scale**
20	Configurable	See Parameters ($P00$)

E	**Output-1 (Process or Alarm)**
1	*Relay Output (7A@250V∼ at Resistive Load) (NO,NC,C)

FG	**Output-2**
02	*SSR Driver Output (Max.10mA,17V⎓)

* If Process Output Type Parameter ($P07$) is chosen as Relay (rLY) from Parameters, SSR Output will be passive and Output Control Type will be ON/OFF Control.

If Process Output Type Parameter ($P07$) is chosen as SSR (SSr) from Parameters, Relay Output will be set as Alarm Output and one of the Output Control Types (ON/OFF Control or PID Control) can be chosen.

⚠ Before commissioning the device, parameters must be set in accordance with desired use. Incomplete or incorrect configuration can cause dangerous sitiuations.

⚠ Because of limited mechanical life of relay output contact, SSR output is recommended which the device use PID control algoritm. The device with ON/OFF control algoritm, hysteresis parameter must be set a suitable value for your system, to avoid too much relay switching.

⚠ $\sim$ → Vac,
⎓ → Vdc,
$\approx$ → Vdc or Vac can be applied.

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