



Please read this document carefully before using this product. The guarantee will be invalidated if the device is damaged by not following instructions detailed in the manual. The company shall not be responsible for any damage or losses however caused, which may be experienced as a result of the installation or use of this product.

## ENDA ET401 PID TEMPERATURE CONTROLLER

Thank you for choosing ENDA ET401 Temperature Controller Devices.

- ▶ 48x48mm Sized.
- ▶ 14.2mm Led display.
- ▶ Selectable thermocouple types.
- ▶ Auto calculation for PID parameters (SELF TUNE).

**⚠ Self tune for automatic PID calculation or manually enter PID parameters if known.**

- ▶ Soft-Start feature.
- ▶ Single SSR control selection.
- ▶ Programmable digital control input.
- ▶ Dual temperature setpoint value can be set.
- ▶ Zero point input shift.
- ▶ SSR output state can be selected or periodically operated in case of probe failure.
- ▶ CE marked according to European Norms.



Order Code : ET401 -      
 1 - Supply Voltage  
 230.....230V AC  
 LV.....10-30V DC /  
 8-24V AC



### TECHNICAL SPECIFICATIONS

Input Type		Temperature Range		Accuracy
		°C	°F	
J (Fe-CuNi) Termokupl	EN 60584	-30....600°C	-22....999 °F	± 0,5% (of full scale) ± 1 digit
K (NiCr-Ni) Termokupl	EN 60584	-30....999°C	-22....999°F	± 0,5% (of full scale) ± 1 digit
L (Fe-CuNi) Termokupl	DIN 43710	-30....600°C	-22....999°F	± 0,5% (of full scale) ± 1 digit

#### ENVIRONMENTAL CONDITIONS

Ambient/storage Temperature	0 ... +50°C/-25... +70°C (with no icing)
Max. Relative Humidity	Relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
Rated Pollution Degree	According to EN 60529 Front panel : IP65, Rear panel : IP20
Height	Max. 2000m

**⚠ KEEP AWAY device from exposed to corrosive, volatile and flammable gases or liquids and DO NOT USE the device in similar hazardous locations.**

#### ELECTRICAL CHARACTERISTICS

Supply	230V AC +%-10-%20 50/60Hz ;10-30V DC / 8-24V AC SMPS
Power Consumption	Max. 5VA
Wiring	Power connector: 2.5mm <sup>2</sup> screw-terminal, Signal connector: 1,5mm <sup>2</sup> screw-terminal conenction.
Line Resistance	Max. 100Ω
Data Retention	EEPROM (minimum 10 years)
EMC	EN 61326-1: 2013 (Performance criterion B is satisfied for EN 61000-4-3)
Safety Requirements	EN 61010-1: 2010 (Pollution degree 2, overvoltage category II)

#### CONTROL OUTPUT

SSR Output	Max 20mA 12Volt logic control output.
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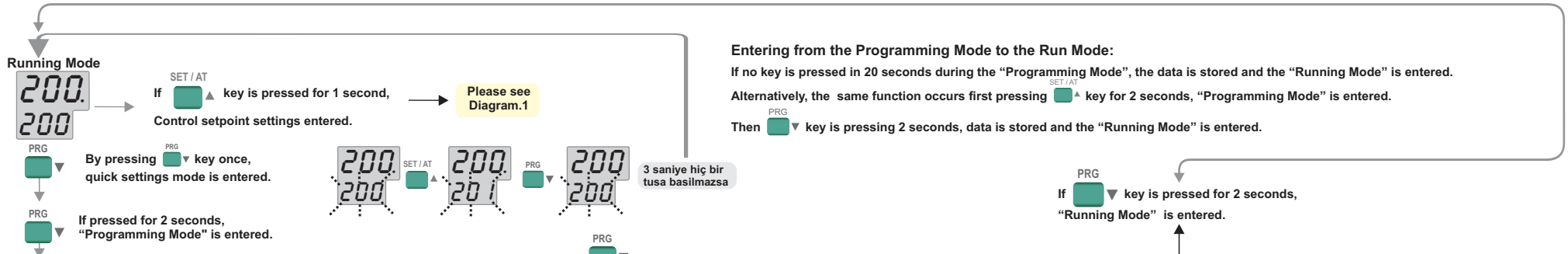
#### CONTROL

Control Type	Dual setpoint selection
Control Algorithm	On-Off / P, PI, PD, PID (selectable)
A/D Converter	12 bit
Sampling Time	100ms
Proportional Band	Adjustable between 0% and 100% (If Pb parameter is set to 0, On / Off control is applied).
Control Period	Adjustable between 1 and 125 seconds
Hysteresis	Adjustable between 1 and 50°C/F
Output Power	The ratio in setpoint value can be adjusted between 0% and 100%.

#### HOUSING

Housing Type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	W48xH48xD53mm
Weight	Approx. 230g (after packing)
Enclosure Material	Self extinguishing plastics.

**⚠ Avoid any liquid contact when the device is switched on. DO NOT clean the device with solvent (thinner, gasoline, acid etc.) and / or abrasive cleaning agents**



- Coa**: If pressed for 2 seconds, "Running Mode" is entered.
- CsL**: SSR output control setpoint lower limit. Adjustable between 0 and CsU parameter value.
- CsU**: SSR output control setpoint upper limit. Adjustable between CsL parameter value and upper scale value.
- CPb**: SSR output proportional band value. Adjustable between %0.0 and %100.0. If CPb = %0.0, On-Off control is applied.
- CHY**: SSR output hysteresis value. Adjustable between 1 and 50 °C. **!** If CPb parameter is selected 0, this parameter will be active.
- Cti**: SSR output integral time value. Adjustable between 0.0 and 50.0 minutes. If Cti = 0.0, integral impact is disable. **!** If CPb parameter is different from "0", this parameter will be active.
- Ctd**: SSR output derivative time value. Adjustable between 0.00 and 9.99 minutes. If Ctd = 0.0, derivative time is disable. **!** If CPb parameter is different from "0", this parameter will be active.
- CCt**: SSR output period time. Adjustable between 1 and 125 second. **!** If CPb parameter is different from "0", this parameter will be active.
- CPs**: SSR ratio of output power percentage at SSR setpoint value. Adjustable between 0% and 100%.
- CEP**: In case of sensor failure SSR output power percentage can be adjusted between 0% and 100%. If CPb = 0.0 (On/Off control) and CEP = 0, in case of failure output is OFF. If the parameter is different from 0, in case of failure output is ON.
- SSt**: Soft starter timer set value. This parameter indicates the time to reach set point value when the device is first energised. Adjustable between 0 and 250 minutes. If 0 is selected, soft start feature will be enable and the device reaches set point value quickly. **!** Setting Pb = 0, soft start feature will be disabled.

- RtU**: Automatic PID calculation (Self Tune) parameter. on = Auto calculation ON. off = Auto calculation OFF.
- inP**: Probe input type section. J = J Type, K = K Type, L = L Type.
- Un**: Temperature unit value. °C = °C, °F = °F. **!** (This parameter change, causes some parameters to change).
- CEP**: Control type selection. HER = Heating selection (Above the set value; "OFF"). CoL = Cooling selection (Above the set value; "ON").
- FLL**: Digital filter coefficients. Enables filtering the measured value. Adjustable between 1 and 200. If this parameter is 1, digital filter runs most quick. If the parameter is 200, the filter runs most slow. The value of parameter should be increased in interference.
- d.i**: Digital input selection. C2S = C/A2 (Relay) out selection. S5F = SSR out selection.
- oF5**: Zero point input shift (Offset) value. Zero point input shift value is added to the measuring value. This feature which is the point of measurement due to its distance measurement probe, is used to eliminate errors that might occur. Adjustable between -99 and 100°C. Normal value=0.

**STARTING SELF TUNE**

**Running Mode**

If the **RtU** parameter is on and if, **SET/AT** key is pressed for 3 seconds in Running Mode, self tune starts automatically.

if the temperature is not high, **RtU** message flashes on display and self tune process starts automatically. If the initial temperature is higher to self tune, **CHY** message appears and the device waits until the temperature goes down. Then **RtU** message appears and automatically self tune procedure is starts. After the self tune procedure, **CPb**, **Cti**, **Ctd** and **CCt** values are recorded in memory, then the device returns to Run Mode.

**STOPPING SELF TUNE**

The self-tune process can be terminated by pressing to **SET/AT** key for 2 seconds.

- SEC**: Security menu access code. Security parameter 401 must be entered.
- SEd**: Security menu access code. Security parameter 401 must be entered.
- Factory Defaults**: Press **PRG** key while **SEd** displaying, Set the **SEd** parameter to 0, and press key for 4 seconds. **dPr** message appears on the display and factory defaults will be applied.
- CoS**: Coa menu security, access level parameter. non = Menu invisible. **PYE** = Modification can be performed. **Pno** = Only visible.
- CnS**: CnF menu security, access level parameter. non = Menu invisible. **PYE** = Modification can be performed. **Pno** = Only visible.

**SENSOR ERROR MESSAGE**

**CEP** parameter appears (as error output percentage) on display in sensor fail condition. Once pressed **PRG** key, **CEP** value flashes on display. The requested value can be set by using **SET/AT** navigation keys.

If no operation is performed in 3 seconds, returns to the "Running Mode".

**Parameter Setting Diagram**

While **CHY** parameter seen, if **PRG** button is pressed and released, the selected parameter value flashes and pass to parameter setting status. In this case, parameter is set to the desired value with **SET/AT** keys.

If **SET/AT** key is pressed and held 0.6 seconds, the value of the selected parameter increases rapidly. If waited enough, the value increases a hundred at each step. After 1 second, following the release of the key, initial increasing condition is returned. Same procedure is valid for the decrementing.

If wait for 3 seconds without pressing any key, returns to the parameter display.

**Diagram.1 CONTROL SETPOINT SETTINGS**

**Running Mode**

200  
200

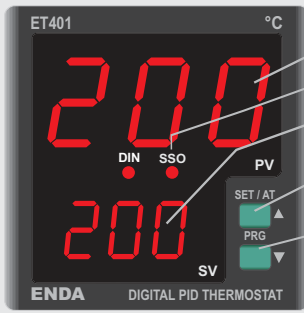
By pressing to **SET/AT** key for 1 second, "Control Set1" and "Control Set2" settings entered.

If no operation performed in 5 seconds or by pressed to **PRG** key for 2 seconds the latest change(s) (if any) stored and returned to the "Running Mode".

If no operation performed in 3 seconds

If no operation performed in 3 seconds

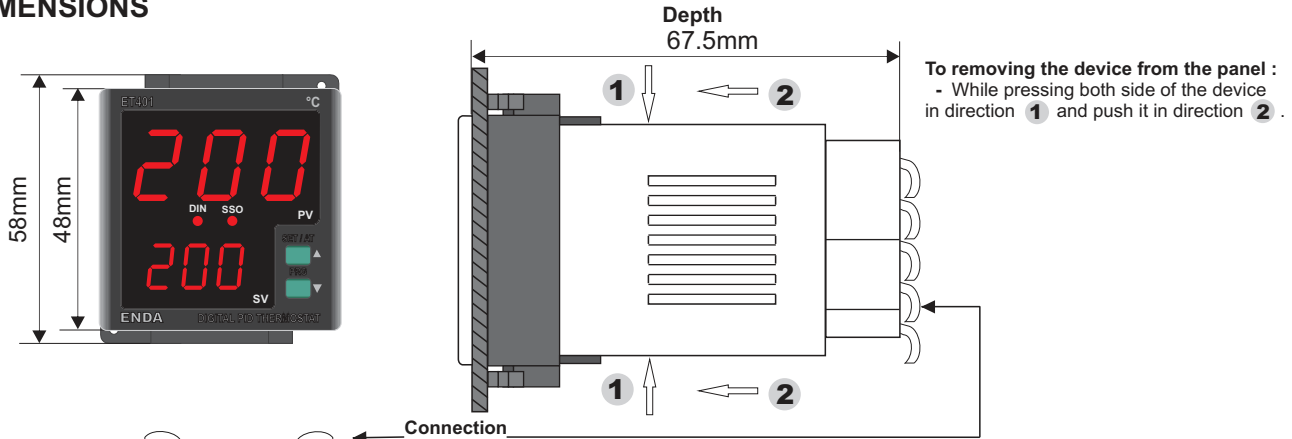
## TERMS



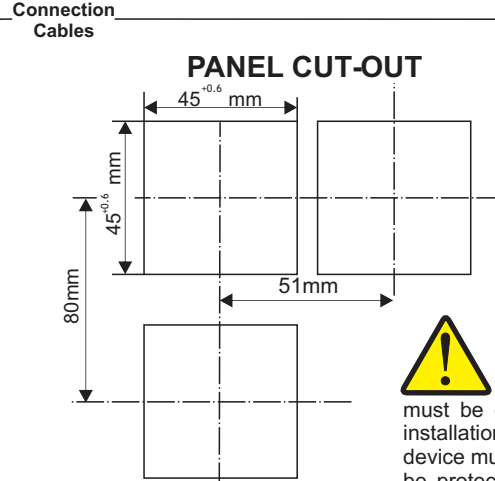
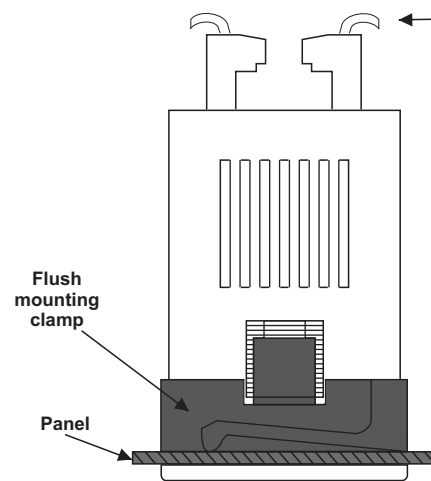
- (1) Measurement value indicator (Running Mode).  
Parameter name and indicator (Programming Mode).
- (2) Output state indicators.
- (3) Set value indicator (Running Mode).  
Parameter value indicator (Programming Mode).
- (4) Control setpoint input adjustment and self tune key (Running Mode).  
Parameter selection key (Programming Mode).  
Value increment key (Running Mode and Programming Mode).
- (5) Programming Mode enter key (Running Mode).  
Menu selection key (Programming Mode).  
Parameter setting transition key (Programming Mode).  
Value decrement key (Running Mode and Programming Mode).

(1),(3) PV and SV indicator	PV 7 Segment 3 digits red, SV 7 segment 3 digits red LED display
Character heights	PV indicator : 14.2mm, SV indicator : 9.1 mm
(4),(5) Keypad	Mikro switch
(2) State indicators	2 Red LEDs for Digital input and SSR outputs

## DIMENSIONS



**To removing the device from the panel :**  
- While pressing both side of the device in direction **1** and push it in direction **2**.



**Note :**  
1) While panel mounting, additional distance required for connection cables should be considered.  
2) Panel thickness should be 9mm maximum.  
3) If there is no free space at back side of the device, it would be difficult to remove it from the panel. 100mm clearance should be left behind the device.

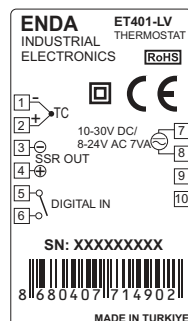
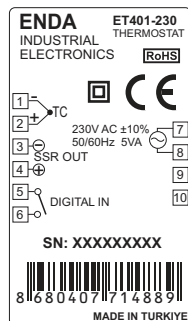


**ENDA ET401** is intended for installation within control panels. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of electrical power. The device must be protected against inadmissible humidity, vibrations, severe soiling. Make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried out by a qualified staff and must be according to the relevant locally applicable regulations.



Logic output of the device is not electrically isolated. Therefore, if the grounded thermocouple is used, logic outputs of the device should not be grounded.

## CONNECTION DIAGRAM



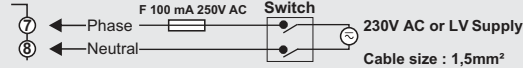
### NOTE :

#### SUPPLY :

184-253V AC  
or  
10-30V DC/  
8-24V AC  
50/60Hz 5VA



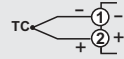
Fuse should be connected.  
F 100 mA 250V AC



#### SENSOR INPUT:

##### For Thermocouple :

Use the correct compensating cable. Do not make any supplement to cables. Connect the thermocouple cables to the right places at the input terminal



Holding screw  
0.4-0.5Nm.



Equipment is protected  
throughout by  
DOUBLE INSULATION