

# GL101E Intelligent Temperature Controller User's Guide



## 1 Caution

Abnormal operating conditions can lead to one or more undesirable events that, in turn, could lead to injury to personnel or damage to the equipment or other property. Do not touch the AC terminals while the power is supplied to the controller to prevent an electric shock. Make sure power is disconnected while checking the unit inside. To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment.

## 2 Features

- Compact size, only 24x48x75mm.
- RTD input (PT100, CU50) or Thermocouple input (T, R, J, B, S, K, E, WRe3-WRe25).
- Display the temperature in Celsius or Fahrenheit.
- Built-in 2A SCR, for up to 220W load when work with 110V AC.
- Set control mode to PID or on/off.

## 3 Specifications

- Power supply: AC/DC85~260V (50Hz/60Hz).
- Built-in 2A SCR
- Temperature accuracy: 0.2%FS.
- Dimensions: 48x24x75mm.
- Mounting panel cutout: 45x22mm

## 4 Back terminals

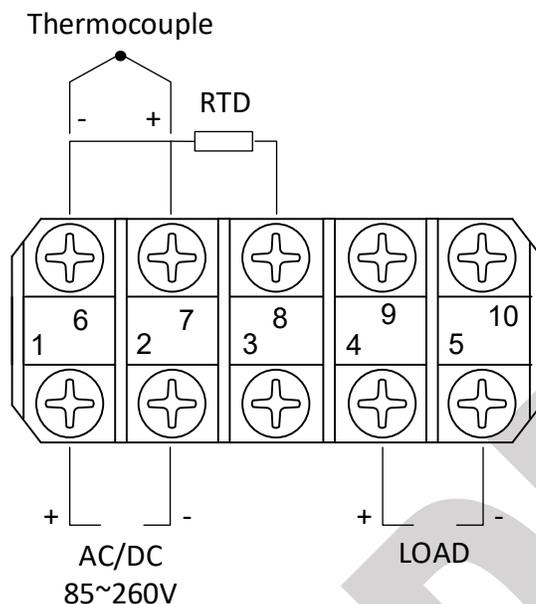


Figure 1 Back Terminals Wiring Diagram

### 4.1 Sensor connection

The default setting for the input type is for K type thermocouple, for different probe type, the parameter **Inty** in [Table 1](#) need to be changed.

For thermocouple, connect the positive wire to terminal 7 and the negative wire to terminal 6. For K type thermocouple, if the wires are red and yellow, the yellow wire is positive. If they are red and other color (blue, white, green...), the red is positive. If the polarity is reversed, when the temperature goes higher, the readout will decrease.

For three-wire PT100 probe, if the wire color code is red, red and white (to IEC60751), connect the two red wires to terminals 6 and 7 respectively, and connect the white wire to terminal 8. For two-wire PT100 probe, connect one wire to terminal 7 and connect the other wire to terminal 8, and short the terminals 6 and 7. The parameter **Inty** need to be changed to P10.0 (for 0.1 degree display resolution) or P100 (for 1 degree display resolution).

### 4.2 Load connection

When the **Outy** in [Table 1](#) is set to 2 or 3, the output is enabled. You can directly connect the load to terminals 4 and 5. In the case of DC power, the polarity of terminals 1 and 2 will match that of terminals 4 and 5. For instance, if terminal 1 is positive, then terminal 4 will also be positive.

### 4.3 Power to the controller

The controller can be powered by AC/DC from 85 to 260V. The ground power line is not necessary.

## 5 Front Panel

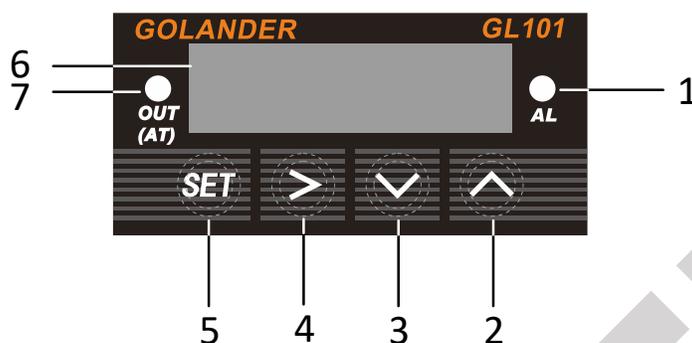


Figure 2 Front Panel

- 1 – AL indicator, relay J1 output indicator
- 2 – Up key, select next parameter or increase value
- 3 – Down key, select previous parameter or decrease value
- 4 – Shift Key, Shift the digit when changing the setting, or press and hold the key to start [Auto tune](#).
- 5 – SET key, parameter set/confirm
- 6 – Measured value (PV) display
- 7 – SSR control output indicator/auto tune indicator

## 6 Initial function parameters (input passcode 0089 after pressing the SET key)

Table 1

Symbol	Name	Description	Range	Factory Value	Mark
<i>Inty</i>	Inty	Input type	See <a href="#">Table 2</a>	K	<a href="#">Note 1</a>
<i>Outy</i>	Outy	Control output mode	0, 1, 2, 3, 4	2	<a href="#">Note 2</a>
<i>Hy</i>	Hy	Hysteresis Band	0~9999	3	<a href="#">Note 3</a>
<i>PSb</i>	PSb	Display temperature offset	-100~100 (degrees)	0	<a href="#">Note 4</a>
<i>rd</i>	rd	Control action type	0: heat; 1: cool	0	
<i>CorF</i>	CorF	Display Unit selection	0: °C; 1: °F	1	
<i>End</i>	END	Exit			

**To access the 0089 menu**, press and hold the **SET** key, the display will show 0000, use the **UP/DOWN** key to change the value to 0089. Press **SET** key, the display will change to be *Inty*. Press **UP/DOWN** key to change the display to other parameters, or press **SET** key again to modify the value for *Inty*, then press **SET** key to confirm the change. When changing the value, user can use the > key to shift the digit. Use the same operation to access the [SV and alarm parameters](#) (input passcode 0001 after pressing the **SET** key) and [PID parameters](#) (input passcode 0036 after pressing the **SET** key) menu.

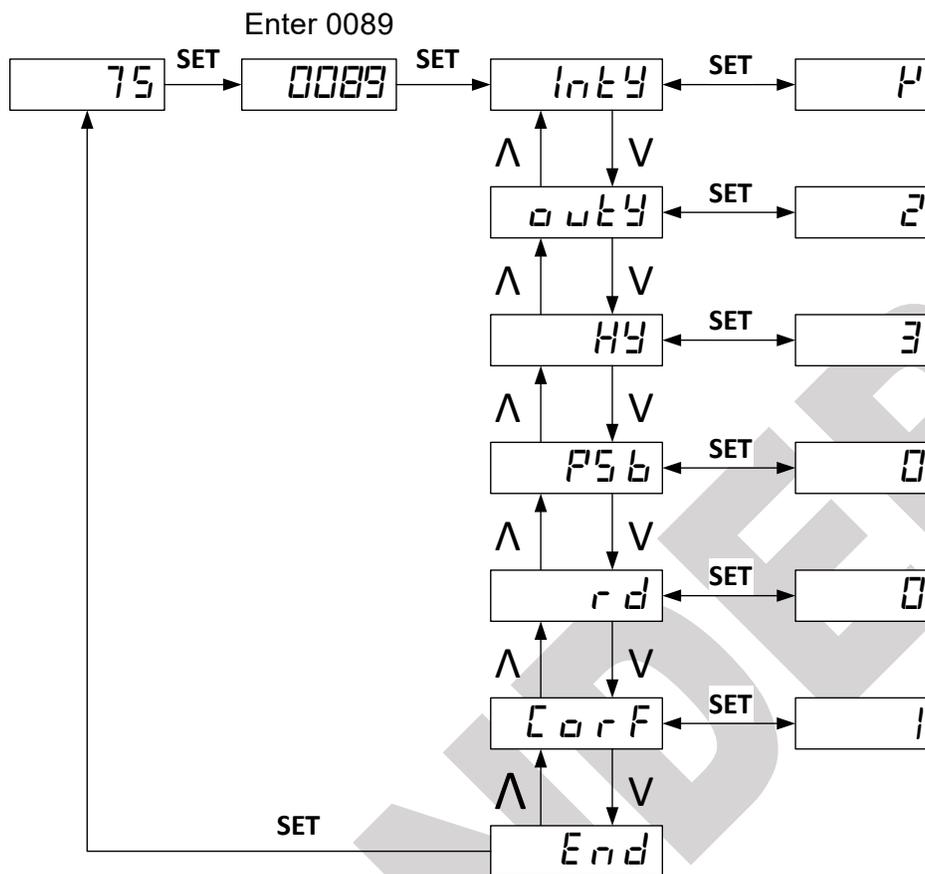


Figure 3. Initial function parameters setup

**Note 1.** The default setting for the input probe type is K type thermocouple. If the probe is not K, please change the **Inty** to the one of the input type shown in [Table 2](#).

Table 2

Symbol	Name	Sensor Type	Temperature Range	Note
T	T	T type thermocouple	-200~400 °C; -320~752 °F	Internal resistance 100Kohms
R	R	R type thermocouple	-50~1600 °C; -58~2900 °F	
J	J	J type thermocouple	-200~1200°C; -320~2200 °F	
WRE	WRE	Wre type thermocouple	0~2300 °C; 32~4200 °F	
B	B	B type thermocouple	350~1800 °C; 660~3300 °F	
S	S	S type thermocouple	-50~1600 °C; -58~2900 °F	
K	K	K type thermocouple	-200~1300 °C; -320~2372 °F	
E	E	E type thermocouple	-200~900 °C; -320~1650 °F	Constant current output 0.2mA
P10.0	P10.0	PT100 RTD, 0.1° resolution	-99.9~600.0 °C; -99.9~999.9 °F	
P100	P100	PT100 RTD, 1° resolution	-200~600 °C; -320~1100 °F	
Cu50	Cu50	CU50 RTD	-50.0~150.0 °C; -60~300 °F	

### Note 2. Outy - Control output mode

The Outy needs to be set to 2 or 3.  
0, 1, 4: Output disabled.

- 2: Set output as PID control output.  
3: Set output as on/off control output.

### Note 3. Hy - Hysteresis Band

The parameter Hy is only for on/off control. For heating control mode, when the measured temperature PV reaches the target temperature SV, the control output will be off; when PV drops down to SV-Hy, the control output will be on again. For cooling control mode, when PV drops down to SV, the control output will be off, when PV increases to SV+Hy, the control output will be on again.

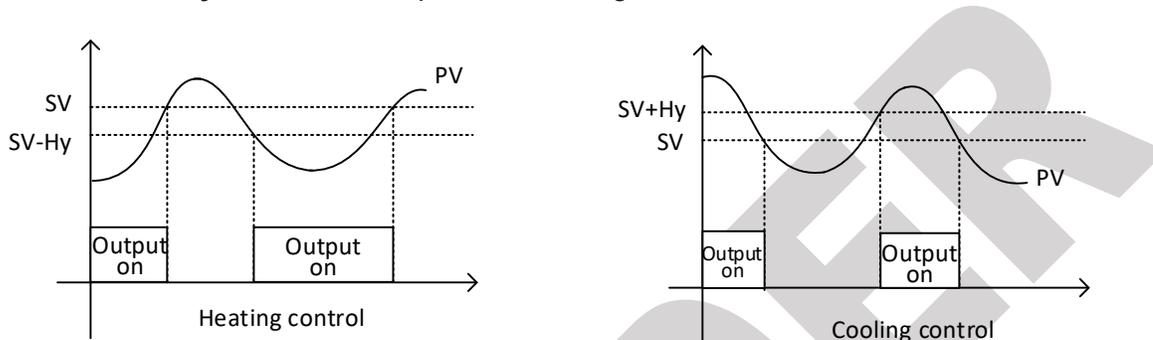


Figure 4. on/off control

### Note 4. PSb - Display temperature offset

This feature allows the input value to be changed to agree with an external reference or to compensate for sensor error. For example, if the measured temperature of the controller is 100 degrees, but the reference temperature is 98 degrees. By setting the PSb= -2, the PV display of the controller would change to be 98. To set the negative value for PSb, use the > key to move the focus digit to the first digit from the left, then use the down key to change the digit to show the negative symbol.

## 7 PID parameters (input passcode 0036 after pressing the SET key)

Table 3

Symbol	Name	Description	Range	Factory value	Mark
P	P	Proportional band	0.1~99.9%	5.0	<a href="#">Note 5</a>
I	I	Integral time	2~1999 Seconds	100	<a href="#">Note 6</a>
d	d	Derivative time	0~399 Seconds	20	<a href="#">Note 7</a>
SouF	SouF	Overshoot suppression factor	0.0~1.0	0.2	<a href="#">Note 8</a>
ot	ot	Proportional cycle	2~199 seconds	2	<a href="#">Note 9</a>
FiLt	FiLt	Digital filter factor	0~3	0	<a href="#">Note 10</a>
END	END	Exit			

### Note 5. P – Proportional band

### Note 6. I – Integral time

### Note 7. d – Derivation time

### Note 8. SouF – Overshoot suppression factor

Overshooting and undershooting are restricted by the Souf and increase of the parameter can suppress the overshooting.

**Note 9. ot – Proportional cycle**

It is the cycle time to switch the output on/off. Within the cycle  $t$  time, the output will turn on and off once. For SSR, in general the cycle time is set to 2 seconds. For mechanical relays, set the cycle time to a higher value (for example, 5~60 seconds) to save the lifetime of the relay.

**Note 10. Filt – digital filter factor**

The filter is to increase the measured temperature display stability, but will delay the response. When **Filt** is set to 0, the filter is disabled. 1, 2 and 3 are weak, medium and strong, respectively.

**8 Auto tune**

For PID control mode, if the control with default **P**, **I** and **d** parameters settings are not able to hold the target temperature, the built-in auto tune function can find the right PID parameters for the system automatically. When on heating mode, it will heat up the system to the target temperature then let the system cool down. It will repeat this process for about 3 times, then the controller will calculate the parameters.

To activate the auto tune function, press and hold the **>** key until the “AT” indicator starts to blink. When auto tune process finished, the “AT” indicator will stop blinking. The new values for parameters **P**, **I** and **d** are calculated by the controller.

To stop the auto-tuning, press and hold **>** key for 3 seconds, until “AT” indicator stops blinking. The PID parameters values will not change.

Please note:

- Auto tune from time to time, there could be a significant temperature overshoot, if so, please lower **SV** value to prevent accident.
- The sensor, load (heater...) need to be connected properly, otherwise, the auto tune will not complete.
- The time for the auto tune depends on the system response time, would be from a few minutes to hours.
- Only need to run auto tune one time.

**9 SV and alarm parameters (input passcode 0001 after pressing the SET key)**

Table 4.

Symbol	Name	Description	Factory value	Mark
$S_v$	SV	Target temperature (Set Value)	80	<a href="#">Note 11</a>
$AH1$	AH1	N/A	800	<a href="#">Note 12</a>
$AL1$	AL1	N/A	900	
$E_{nd}$	END	Exit		

**Note 11.** The SV value can be set by accessing the 0001 menu. Or, when in normal operation mode, use the **UP** or **DOWN** key to change the **SV** directly.

**Note 12.** Alarm setting is not available for this unit.

## 10 Examples

### 10.1 Control a 110V Heater via SSR

Use SSR, thermocouple to work with the controller to hold the temperature at 300 °F. Please see [Figure 5](#) for wiring diagram.

Parameter setting: SV=300. Keep default settings for all the other parameters.

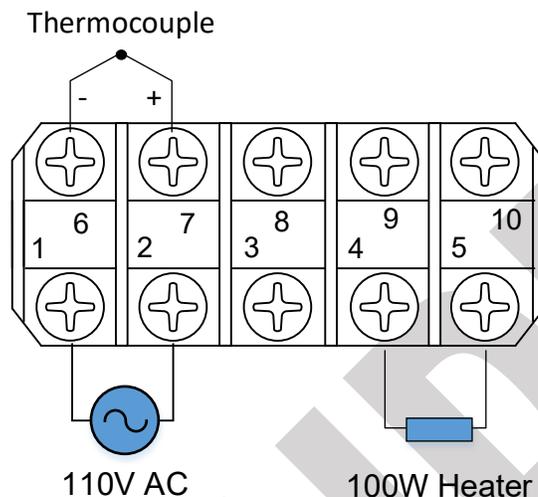


Figure 5. Wiring Diagram

## 11 Quick Guide

First, set the parameter **Inty** to the sensor type connected to the controller if it is not a K type thermocouple, and set the parameter **Outy** for the output control mode. For PID (**Outy**=2) mode, if the system is not able to hold the target temperature, run [Auto tune](#).

If the controller displays EEEE, that means something wrong with the input or with the setting of the input. Please check the sensor connection and the **Inty** parameter setting. Questions? Please contact us.

Golander LLC

<http://golanderusa.com>

email: [info@golanderusa.com](mailto:info@golanderusa.com)