

# SYL-1512B PID TEMPERATURE CONTROLLER INSTRUCTION MANUAL

## Version 2.2

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### WARNING

#### ·Wiring precautions

-Install an external protection circuit if failure of this instrument could result in damage to your system.

-In order to prevent instrument damage or failure, protect the power line and the input/output lines from high currents by using fuses with appropriate ratings.

#### ·Power supply

-Supply power of the specified rating.

-Do not turn on the power until all of the wiring is completed.

-Never use this instrument in the presence of inflammable gases or vapor.

-In order to prevent electric shock or burns, never touch the inside of the instrument.

-Do not attempt to modify this instrument.

#### ·Maintenance

-Only authorized service engineers should replace parts.

-In order to use this instrument continuously and safely, conduct periodic maintenance. Some parts used in this instrument have a limited service life and may deteriorate over time.



### Caution

·Only clean the instrument when power is off.

·Please use a soft cloth or tissue to clean up stains on the display.

·Never use sharp & hard objects such as screwdrivers or ball pens to touch the buttons on the panel.

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## 1. Features

- ◆ Compact size, 1/32 DIN that is only 24 x 48 x 75 mm (1x2 x3")
- ◆ Custom modified for espresso machine, offering small temperature overshoot and fast recover after shot.

## 2. Specification

- ◆ Power supply: 85~260VAC or 85~360VDC
- ◆ Power consumption: <2W
- ◆ Sampling rate: 4 sample/sec
- ◆ Accuracy: 0.2% full scale
- ◆ Display range: -1999~9999
- ◆ Display resolution: 1 °C, 1°F, or 0.1 °C, 0.1°F with Pt100 RTD sensor input.
- ◆ SSR driving output: 10VDC, 40 mA
- ◆ LED display: 0.28" red color
- ◆ Out of range display: "EEEE"
- ◆ Working condition: 0~50°C, ≤85%RH
- ◆ Outside dimensions: 48×24×75mm
- ◆ Mounting cutout dimension: 45×22mm

## 3. Front Panel and Operation

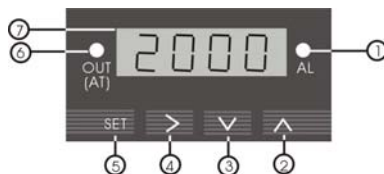


Figure 2

- ① AL- Not used for this model
- ② Select next parameter/value increment.
- ③ Select previous parameter/value decrement
- ④ Digit shift/Auto tuning
- ⑤ Set/Confirm
- ⑥ OUT- Output indicator  
(AT) - blinking during auto-tuning process
- ⑦ Parameter Display

#### 4. Parameter Setting

##### a) Configuration Parameters

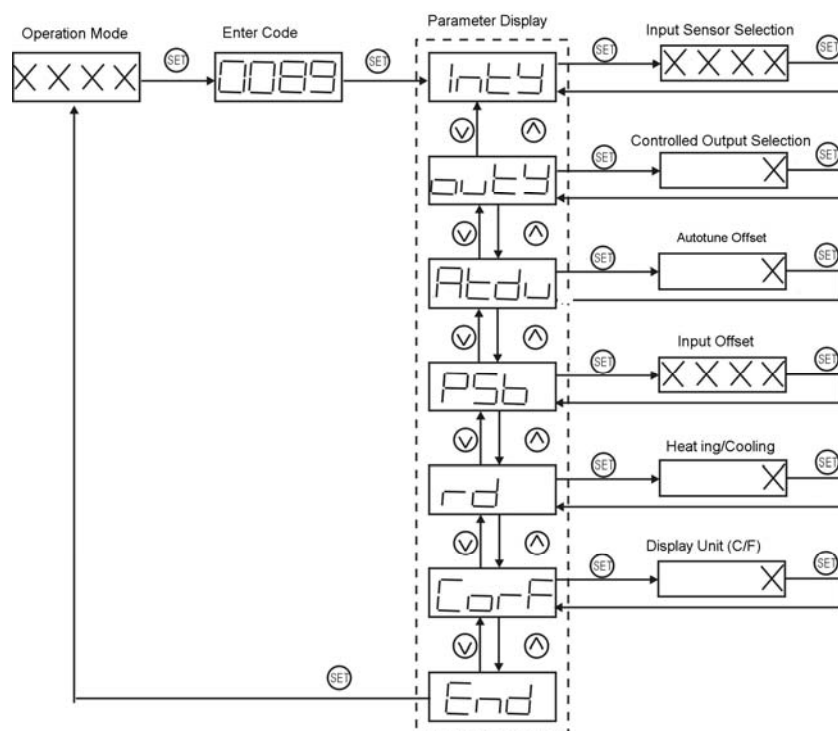
Table 1, Configuration Parameter Setting

Code	Description	Setting Range	Initial Setting	Note
Inty	Inty	Input Type	See table 2	Pt100
outy	outy	Controlled output device	0, 1, 2,3	3
Atdu	Atdu	Autotune offset	0~200(deg)	10
PSb	PSb	Input offset	-100~100(deg)	0
rd	rd	Control function	0: heating 1: Cooling	0
CorF	CorF	Display Unit	0: °C 1: °F	1
End	End	Exit		

**Note 1.** This has to be set to 3 for this model.

**Note 2.** The autotune offset will shift the SV value down by the the Atdu value during the auto tune process. That will preventing the system from damaging from over temperature during the autotune.

Press (SET), The enter code “0089” press (SET) again. Then, following the flow chart in Fig. 3



**Figure 3 Setup flow chart**

- 1) Press **SET** to enter setting mode;
- 2) Press **>**, **✓** and **▲** to enter parameters;
- 3) Press **SET** to confirm;
- 4) Press **✓** or **▲** to select the new parameter

**Table 2, Temperature sensor code.**

Symbol		Description	Working Temperature Range
<b>t</b>	t	T Thermocouple	-200~400 °C; -320~752 °F
<b>r</b>	r	R Thermocouple	-50~1600 °C; -58~2900 °F
<b>j</b>	j	J Thermocouple	-200~1200°C; -320~2200 °F
<b>WRE</b>	WRE	WRe3- WRe25 Thermocouple	0~2300°C; 32~4200 °F
<b>b</b>	b	B Thermocouple	350~1800°C; 660~3300 °F
<b>S</b>	S	S Thermocouple	-50~1600°C; -58~2900 °F
<b>K</b>	K	K Thermocouple	-200~1300°C; -320~2400 °F
<b>E</b>	E	E Thermocouple	-200~900°C; -320~1650 °F
<b>P100</b>	P10.0	Pt100 RTD	-99.9~600.0°C; -99.9~999.9 °F
<b>P100</b>	P100	Pt100 RTD	-200~600°C; -320~1100 °F
<b>Cu50</b>	Cu50	Cu50 RTD	-50.0~150.0°C; -60~300 °F

#### **b) PID Parameters**

To enter PID parameter setting mode, press **SET**, then enter code “0036”, press **SET** again. The parameter flow chart is similar to Fig. 3

**Table 3, PID and relevant parameters**

Symbol		Description	Setting range	Initial Setting	note
<b>P</b>	P	Proportional	0.1~99.9 (%)	2.0	4

		Constant			
I	I	Integral time	2~1999(Sec)	60	5
d	d	Derivative time	0~399(Sec)	15	6
SouF	SouF	Damp constant	0.1~1.0	0.2	7
ot	ot	Cycle rate	2~199(sec)	2	8
FILT	FILT	Digital filter strength	0~3	0	9
End	End	Exit			

The values of the P, I, and D parameters are critical for good response time, accuracy and stability of the system. Using the Auto-Tune function to automatically determine these parameters is recommended for the first time user. If the auto tuning result is not satisfactory, you can manually fine-tune the PID constants for improved performance.

**Note 4.** Proportional Constant (P): Represents the gain of the signal amplifier. Larger gain means the controller will have more output power change for the same difference between set temperature (SV) and measured temperature (PV). Smaller P value represents higher gain, or faster action.

**Note 5.** Integration time (I): Brings the system up to the set value by adding a constant to the output that is proportional to how far the process value (PV) is from the set value (SV) and how long it has been there. When I decreases, response speed is faster but the system is less stable. When I increases, respond speed is slower, but system is more stable.

**Note 6.** Differentiation time (d): Responds to the rate of change of the process value so that the controller can compensate in advance before |SV-PV| gets too big. A larger number increases its action. Setting d-value too small or too large would decrease system stability, causing oscillation or even non-convergence.

**Note 7.** This function is deactivated for the espresso kit.

**Note 8.** Control Period (also called cycle rate) (ot): When ot gets smaller, heating/cooling cycle is drive faster, system respond speed is faster. For SSR output, ot is normally set at 2. But when using contact control (Relays), contacts wear out faster so it is normally at 5~30 seconds.

**Note 9.** Digital Filtering (Filt): Filt=0, filter disabled; Filt=1, weak filtering effect; Filt=3, strongest filtering effect. Stronger filtering increases the stability of the readout display, but causes more delay in the response to changes in temperature.

### c) Temperature setting

To enter the temperature and alarm parameter setting mode, press **SET**, enter the code “0001”, and press **SET** again. The parameter flow chart is shown in Fig. 3

Table 4. Temperature and Alarm Parameter

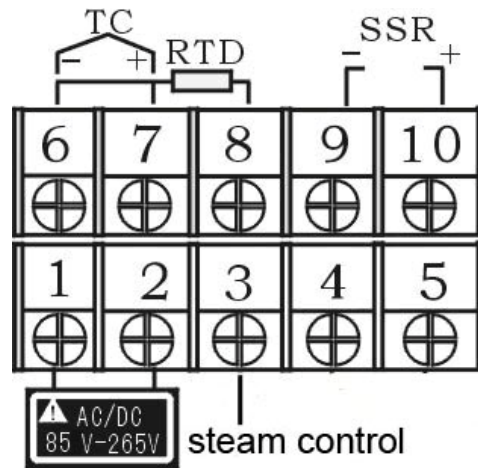
Symbol		Description	Initial setting	Note
Su	SV	Target temperature (Set Value)	221	11
AH1	AH1	Steam on temperature	283	
AL1	AL1	Steam off temperature	284	
End	End	Exit		

**Note 11.** The SV can also be set directly during the normal operation mode. Press (^) or (v) key to switch the display from process value (PV) to set value (SV). Press (^) or (v) key again to increase or decrease SV

by 1 degree.

#### 6. Terminal Wiring (back view)

The polarity of power at terminal 1 and 2 do not matter.



**Figure 7.** Wiring diagram with RTD input. Please note that if the RTD is connected by two wires instead of three wires (for short distance application), the terminal 6 and 7 need to be shorted.