ALTEC®

AL807 Series Temperature Controller
Instruction Manual

1. Introduction

The AL807 is a precision PID temperature controller, with PID auto-tuning. The input covers all standard thermocouples and the Pt100 resistance thermometer. The control outputs can be configured for heating, cooling or alarms.

2. Coding

AL807-□-□-□-□
① ② ③ ④

① Dimensions(W×H×D, unit: mm)

none	96×96×100(panel cut-out: 92×92)
D	48×96×100(panel cut-out: 45×92)
E	96×48×100(panel cut-out: 92×45)
M	72×72×100(panel cut-out: 68×68)

②③ Output 1 & Output 2

0	None
R	Relay, Normally open, 3A 250VAC
L	Logic, 20V/10mA, drive SSR
T	TRIAC, drive SCR

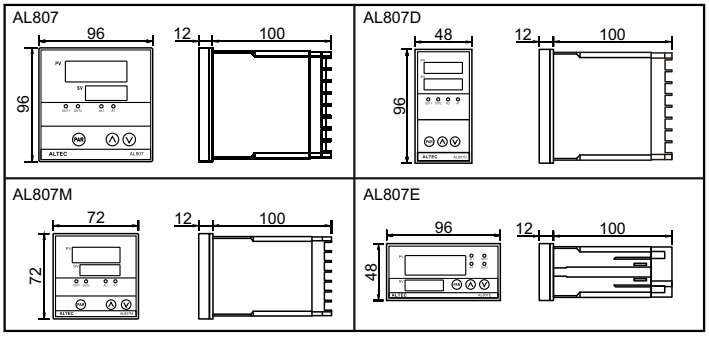
④ Alarm 1

0	None
R	Relay, 3A/250V AC

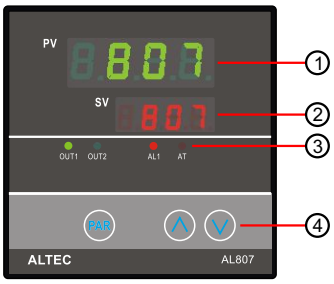
eg. AL807-R-R-R
The controller with relay for output1 & output2, have alarm1 output.
Dimension: 96×96×100mm.

3. Dimensions and Mounting

1. Prepare a square cut-out in the mounting panel to the appropriate size(see "Coding" for accurate dimensions). If a number of controllers are to be mounted in the same panel they should be spaced 25mm each other.
2. Insert the controller through the cut-out.
3. Catch the mounting bracket to the holes top and bottom of the case, and screw to fix.



4. Front Panel Layout



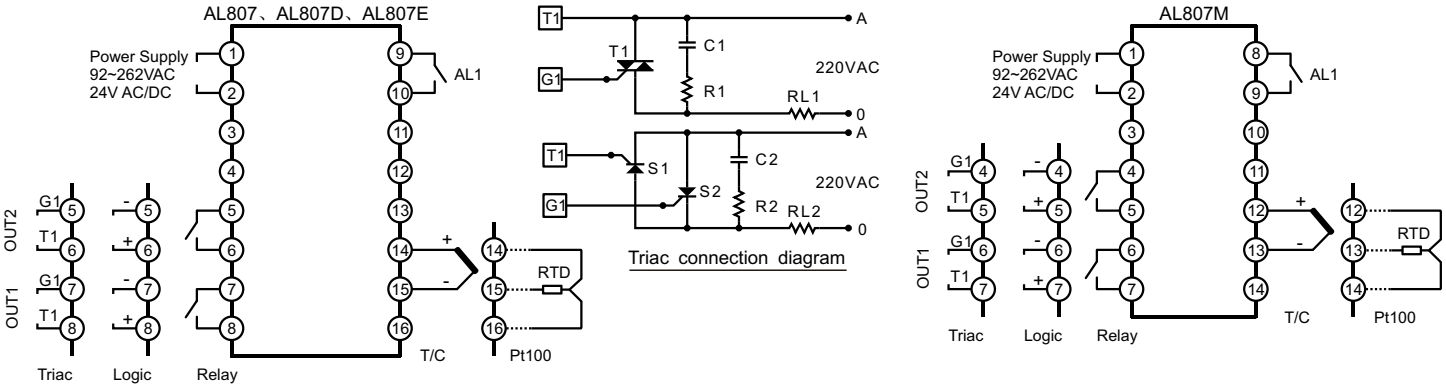
① **PV Display**
Indicates Process Value and parameters

② **SV Display**
Indicates Setpoint and parameter Values

③ **Indicators**
OUT1 - output1 indicator
OUT2 - output2 indicator
AL1 - alarm1 indicator
AT - PID Auto-Tuning indicator
Flashes during auto-tuning execution

④ **Keys**
PAR - Parameter key
∧ - Up key
∨ - Down key

5. Electrical Connection



6. Operation

6.1 Overview

When the controller is powered on, the upper display indicates the model code of the controller, and the lower display indicates the software version. 3 seconds later, the upper display will indicate measured values (PV), on selecting a parameter, the appropriate parameter abbreviation appears. The lower display indicates setting values (SV), or on selecting a parameter, the appropriate parameter value appears here.
The LED indicators indicate the current status of the controller.

6.2 Setpoint Adjusting

During the basic functioning, press keys ∧ or ∨ to increase or decrease setpoint. Keeping it pressed results in a progressively faster variation. Setpoint adjustable range: SP L ~ SP H.

6.3 Parameter List

When the controller is in the PV/SV displaying status, depress PAR key for 3 seconds, the first parameter will appear in the upper display, the lower display will show the value of the parameter. At this time, use keys ∧ or ∨ to modify the value of the parameter. After modification, press PAR key, the controller will display the next parameter, at the same time, the modified data will be saved in the memory. If the last parameter is displayed or there is no key operation within 16 seconds, the controller will return to the PV/SV displaying status.

Parameter List

S.N.	Mnemonic	Parameter	Adjustable range	Comments
1	tunE	Active auto-tune	oFF on	Stop PID auto-tune Start PID auto-tune
2	AL1	Alarm 1	Measurement range	appears if AL1 is available
3	HYS1	AL1 Hysteresis	1~300℃	
4	AL2	Alarm 2	Measurement range	appears if OP2 is configured as alarm mode
5	HYS2	AL2 Hysteresis	1~300℃	
6	ProP	Proportional band	1~300℃	
7	intt	Integral time	oFF, 1~8000 sec.	disappears if CtrL = On.oF
8	dErt	Derivative time	oFF, 1~999 sec.	
9	H ct	Heat cycle time	0.1~240.0 sec.	
10	rELc	Ralative cool	0.1~10.0	Appears during heat/cool
11	db	Dead band	oFF, 0.01~99.99	
12	C ct	Cool cycle time	0.1~240.0 sec.	
13	Loc	Set data lock	0~9999	set to 808 to enter the next level menu

The following parameter appears if Loc = 808:

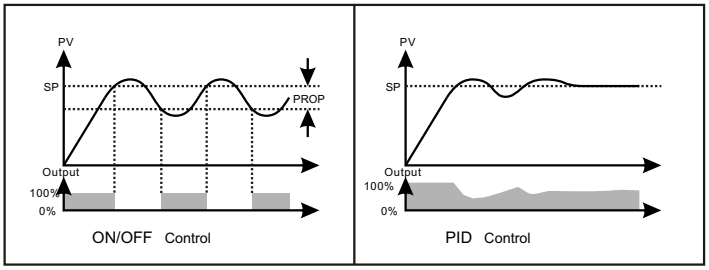
S.N.	Mnemonic	Parameter	Adjustable range	Comments
14	SP H	Setpoint high limit	Measurement range	to limit SV´s adjustable range
15	SP L	Setpoint low limit	Measurement range	
16	OFSt	Input/calibration offset	-19.99~99.99℃	
17	Sn	Input signal	J tc CRtc E tc r tc S tc b tc t tc rtd (rtd)	J Thermocouple K Thermocouple E Thermocouple R Thermocouple S Thermocouple B Thermocouple T Thermocouple Pt100(0.1 prec)
18	CtrL	Control algorithm	On.OF Pi d	ON/OFF control PID control
19	OP2	Output 2	OFF H i AL LoAL HdA LdA CooL	Off Full-scale high alarm Full-scale low alarm High-deviation alarm Low-deviation alarm Cooling(option of OP2)
20	ALoi	Alarm1 output mode (AL1)		
21	Act	Control Action	rEv di r	Reverse (Heating System) Direct (Cooling System)

4). Control algorithms - CtrL

There are 2 different control algorithms can be selected: ON/OFF and PID.

If CtrL=On.OF, the controller is configured as an ON/OFF controller, the output hysteresis is set using the proportional band(ProP).

If CtrL=Pi d, the controller is configured as a PID controller, PID is intended for high precision control applications.



6. 4 Parameter description

1). Control parameters(ProP, inLt, dErt)

These three parameters directly affect the precision of control. The PID auto-tuning function could automatically measure, compute, and set these three constants. If the controller is configured as an ON/OFF controller, the proportional band(PROP) becomes the output hysteresis.

Proportional band(ProP) is the band of error within which the power output is proportional to the error. Error values outside this band give 100% or 0% power output. If the proportional band is too narrow it will give control resembling on/off control with continuous oscillation. Wide proportional bands give stable but sluggish control with an offset in the steady-state condition.

Parameter inLt provides automatic compensation for long term control offsets. It is the time taken for the output to change by one proportional band width for a constant error equal to the proportional band. Typically this must be set to a value longer than the response time of the process being controlled.

The parameter dErt provides anticipation and fast recovery from disturbances. It can be taken as the 'look ahead' period of the controller. It is typically set to a time approximately one sixth of the integral time.

2). Output cycle time(H c.t, C c.t)

The cycle time of the switching outputs(H c.t & C c.t) should be set to high values(e.g. 20 seconds) if contactors are used, and to low values(e.g. 1 second for logic output) if thyristors are used.

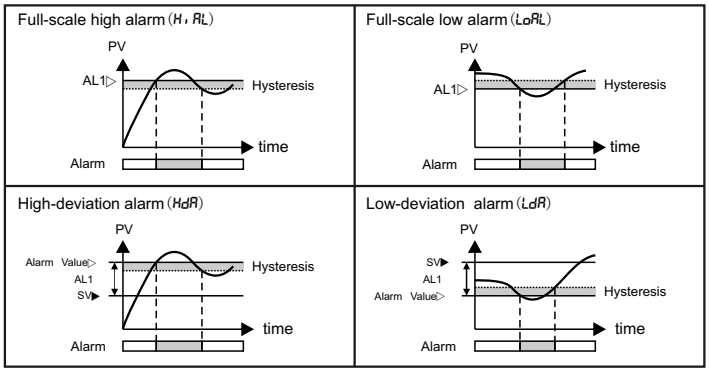
3). Input signal(Sn)

The parameter Sn should be set to the correct sensor type the controller connected, otherwise the display of PV will be incorrect.

5). Alarms - ALoi, OP2

Four different types of alarm can be configured with ALoi and OP2: H i AL, LoAL, HdA, LdA as the following table shows. The hysteresis is HYSI, HYS2.

Hysteresis is used to provide a definite indication of the alarm condition and to prevent alarm relay chatter.



7. PID Auto-Tuning

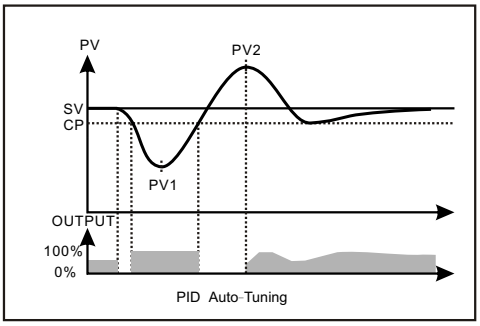
In order to achieve a good control performance, the PID control parameters(ProP, inLt, dErt) must be optimized first. The PID auto-tuning function could automatically measure, compute, and set PID constants.

Auto-tuning can be activated under the following conditions:
- Automatic operating(closed loop)
- PID control algorithm

Before activating the auto-tuning, the actual value should be broadly stable. By setting the parameter tunE to on, the auto-tunging will start. During auto-tuning execution, the AT indicator flashes. The tuning operation is finished when the AT indicator no longer flashes. The user can abort self-tuning at any time by setting the parameter tunE to OFF.

During auto-tuning, the controller will execute ON/OFF regulation, PV will oscillate, 1.5 period later, auto-tuning finished. According to the period and amplitude of the oscillation, the controller will calculate the optimum PID parameters and stored them in the memory automatically.

During auto-tuning, do not change any of the parameters, because each modification of setpoint will restart the auto-tuning.



8. Sensor Break

A sensor break and likewise an input error occurs when the input is open circuit or the measured value at the input over or underranges the linerisation span of the controller. If the input is open circuit or the measured value is overrange, SnbP appears on the upper display. In an underrange condition or the sensor is shorted, ur appears on the upper display. In both case, the output will be closed.

Once failure eliminated, the controller will return to automatic control mode.

Technical Data

Accuracy	±0.2%+1 digital
Resolution	1℃
Sample rate	125ms
Input	Thermocouple: J, K, E, R, S, B, T RTD: Pt100
Output	Relay, (NO, max. 3A 250 VAC) Logic, 20V/10 mA Triac
Alarm	Relay, (NO, max. 3A 250 VAC) Modes: upper and lower limit alarm, and deviation alarm
Control algorithm	ON/OFF PID, PID Auto-Tuning
Power supply	92~262VAC, 24V AC/DC; 45/60Hz, consumption < 3W
Environment	Temperature: 0~50°C, Rel. Humidity: ≤85%

Measurement Range

Code	Input	Measurement Range(°C)	Measurement Range(°F)
J t c	J thermocouple	-135~1000	-211~1832
cRtc	K thermocouple	-255~1395	-427~2543
Etc	E thermocouple	-99~749	-427~1380
rtc	R thermocouple	-50~1767	-58~3213
Stc	S thermocouple	-50~1767	-58~3213
btc	B thermocouple	-50~1967	-58~3313
ttc	T thermocouple	-260~400	-436~752
rtd	Pt100	-100~1000	-100~1000
rtd	Pt100	-99.9~999.9	-99.9~999.9

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