



บริษัท เอดีดี เฟอร์เนส จำกัด

ADD FURNACE CO.,LTD.

44 ซอยบรมราชชนนี 70 ถนนบรมราชชนนี แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กรุงเทพฯ 10170

โทร: 02-888-3472 โทร: ออกแบบ:08-08-170-170 แฟกซ์: 02-888-3258

<https://www.add-furnace.com> E-mail: sales@add-furnace.com

ARTIFICIAL INTELLIGENCE TEMPERATURE CONTROLLER

User Manual

AI-508/509 Version 7.5

I. Model Code Symbol

The type of AI-508 is made up of 5 parts:

<u>AI-508/509</u>	<u>A</u>	<u>G</u>	<u>L2</u>	<u>L2</u>
1	2	3	4	5

1. Basal function of instrument

AI-508 Economical Intelligent Temperature Controller 0.3%FS $\pm 1^{\circ}\text{C}$

AI-509 Economical Intelligent Temperature Controller 0.3%FS $\pm 0.1^{\circ}\text{C}$

2. Front panel dimension

Size	Front Panel width×height	Cut Out width×height	Depth Behind Mounting Surface
A	96×96mm	92×92mm	100mm
D	72×72mm	68×68mm	95mm
D2	48×48mm	45×45mm	95mm
E	48×96mm	45×92mm	100mm
F	96×48mm	92×45mm	100mm

3, 4 and 5 indicate the module installed in OUTP, ALM and AUX sockets. Allowed modules in each socket are as below:

Allowed Type Module Socket	N	L1	L2	L5	G	W1	K1	K3
3. OUTP (main output)		✓	✓		✓	✓	✓	✓
4. ALM (Alarm)	✓	✓	✓	✓				
5. AUX (Auxiliary output)	✓	✓	✓	✓				



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- N** (or none) no module installed
- L1** relay contact output module (Capacity: 2A/250VAC, normal open terminal can absorb spark)
- L2** relay contact output module (Capacity: 1A/250VAC, small volume)
- L5** output module of dual normal open relay contact (Capacity: 2A/250VAC, support AL1 and AL2 alarm output)
- G** SSR voltage output module (30mA/5DC)
- W1** TRIAC no contact normal open discrete output module, suitable for AC contactors up to 80A, and has low interference and long life.
- K1** TRIAC zero crossing trigger output module. One loop output, suitable for single-phase power.
- K3** Three phases TRIAC zero crossing trigger output module (can trigger triple of TRIAC, 2 inversely parallel connected SCR or TRIAC power module of current 5-500A)

Note1: For instrument of dimension D2, because of the volume limit, when L1 or L5 module is installed in ALM, L1 can't be installed in OUPT, but L2, which is smaller can be installed instead.

Note2: K3 can't be installed in instrument with dimension D or D2. There isn't AUX slot in D2 instruments. L5 module can't be installed in ALM slot of instrument with dimension D.



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II. Technical Specifications

Input Type	Thermocouple						RTD
	K	S	R	E	J	N	PT100
Range °C	0~1300	0~1700	0~1600	0~1000	0~1200	0~1300	-200~+800

Accuracy AI-508	0.3%FS ± 1°C
AI-509	0.3%FS ± 0.1°C

Temperature Display Resolution AI-508	1°C/1°F
AI-509	0.1°C/0.1°F

Control Method	ON / OFF Control
	AI PID Control with Auto Tuning (AT)

Output Type (Modularization)	Relay Output
	Voltage Output for SSR
	Triac switch output
	Triac zero crossing trigger Output (1 or 3 phase)

Alarm (Modularization)	Limit High / Low
	Deviation High

Supply Voltage	100_240VAC (-15%, +10%)
	50_60Hz

Power Consumption	≤ 3W
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Operating Environments	Temperature: -10~+60°C / 14~140°F humidity: 0~90RH%
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Electromagnetic compatibility (EMC)	IEC61000-4-4: ± 4KV/5KHz IECy1000-4-5: 4KV
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III. PARAMETER AND SETTING

Field parameter table (Primary parameters)

Code	Description	Remarks	Setting Range	Default																									
HIAL	High limit alarm	Alarm on when PV>HIAL alarm off when PV<HIAL-AHYS	-999—+3000	3000																									
LOAL	Low limit alarm	Alarm on when PV<LoAL; alarm off when PV>LoAL+AHYS	-999—+3000	-999																									
HdAL	Deviation high alarm	Alarm on when PV-SV>HdAL; alarm off when PV-SV<HdAL-AHYS	-999—+3000	3000																									
P	Proportion band	Proportion band in PID with unit °C or °F	10—999	30																									
I	Time of Integral	No integral effect when I=0	1—9999 Sec	100 s																									
d	Time of Derivative	No derivative effect when d=0	0—999.9 Sec	50.0s																									
Ctl	Control period	Small value can improve control accuracy. For SSR or TRIAC output, generally 0.5 to 3 seconds. Large value can increase using life of relay. For Relay output, generally 15 to 40 seconds.	0.5—120 Sec	2 s Or 20 s																									
FILt	PV input filter	The value of FILt will determine the ability of filtering noise. When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, if great interference exists, then you can increase parameter "FILt" gradually to make momentary fluctuation of measured value less than 2 to 5. When the meter of the instrument is being examined at laboratory, "FILt" should be set to 0 or 1 to short the response time.	0—40	1																									
Loc	Parameter Lock	<table border="1"> <thead> <tr> <th>Loc</th><th>Auto Tuning</th><th>SV</th><th>Primary Parameter</th><th>Secondary Parameter</th></tr> </thead> <tbody> <tr> <td>0</td><td>√</td><td>√</td><td>√</td><td>X</td></tr> <tr> <td>1</td><td>X</td><td>√</td><td>√</td><td>X</td></tr> <tr> <td>2</td><td>X</td><td>X</td><td>√</td><td>X</td></tr> <tr> <td>808</td><td>√</td><td>√</td><td>√</td><td>√</td></tr> </tbody> </table> √ : allow to modify data or execute AT X : not allow to modify data or execute AT	Loc	Auto Tuning	SV	Primary Parameter	Secondary Parameter	0	√	√	√	X	1	X	√	√	X	2	X	X	√	X	808	√	√	√	√	0—255	0
Loc	Auto Tuning	SV	Primary Parameter	Secondary Parameter																									
0	√	√	√	X																									
1	X	√	√	X																									
2	X	X	√	X																									
808	√	√	√	√																									



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System parameter table (Secondary parameters)

Set the parameter 'Loc'=808 to enter:

AHYS	Alarm Hysteresis	Avoid frequent alarm on-off action because of the fluctuation of PV				0—200	2																								
AOP	Alarm output assignment	<table><tr><td>Alarm Output to</td><td>HdAL (x100)</td><td>LoAL (x10)</td><td>HIAL (x1)</td></tr><tr><td>None</td><td>0</td><td>0</td><td>0</td></tr><tr><td>AL1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>AL2</td><td>2</td><td>2</td><td>2</td></tr><tr><td>AU1</td><td>3</td><td>3</td><td>3</td></tr><tr><td>AU2</td><td>4</td><td>4</td><td>4</td></tr></table> eg: AOP=101 means HdAL and HIAL are outputted to AL1 and LoAL has no output.				Alarm Output to	HdAL (x100)	LoAL (x10)	HIAL (x1)	None	0	0	0	AL1	1	1	1	AL2	2	2	2	AU1	3	3	3	AU2	4	4	4	0—444	111 Or according to fixed module
Alarm Output to	HdAL (x100)	LoAL (x10)	HIAL (x1)																												
None	0	0	0																												
AL1	1	1	1																												
AL2	2	2	2																												
AU1	3	3	3																												
AU2	4	4	4																												
Ctrl	Control mode	onoF : On-off control APId : AI PID control, high precision and no-overshot				onoF, APId	APId																								
CHYS	Control Hysteresis	CHYS is used for ON-OFF Control. PV > SV, Output turns OFF; PV<SV-CHYS, Output turns ON.				0—200	2																								
InP	Input specification	<table><tr><td>InP</td><td>Input spec.</td><td>InP</td><td>Input spec.</td></tr><tr><td>0</td><td>K</td><td>1</td><td>S</td></tr><tr><td>2</td><td>R</td><td>3</td><td>Spare</td></tr><tr><td>4</td><td>E</td><td>5</td><td>J</td></tr><tr><td>6</td><td>Spare</td><td>7</td><td>N</td></tr><tr><td>8-20</td><td>Spare</td><td>21</td><td>Pt100</td></tr></table>				InP	Input spec.	InP	Input spec.	0	K	1	S	2	R	3	Spare	4	E	5	J	6	Spare	7	N	8-20	Spare	21	Pt100	0— 21	0
InP	Input spec.	InP	Input spec.																												
0	K	1	S																												
2	R	3	Spare																												
4	E	5	J																												
6	Spare	7	N																												
8-20	Spare	21	Pt100																												
dPt	Resolution (only AI-509 have)	0 : 1 °C/°F 0.0 : 0.1 °C/°F					0.0																								
Scb	Input Shift	Parameter Sc is used to make input shift to compensate the error produced by sensor or input signal itself. PV-after-compensation= PV-before-compensation + Scb.				-200— +400	0																								
Fru	Selection of power frequency and temperature scale	50C: 50Hz, °C 50F: 50Hz, °F 60C: 60Hz, °C 60F: 60Hz, °F				50C, 50F, 60C, 60F	50C																								
SPL	Low limit of SV					-999— 3000	0																								
SPH	Upper limit of SV					-999— 3000	400																								



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IV. Symbol Description

Symbol	Description
orAL	Input specification setting is incorrect
	Or
	Input wiring is disconnected
	Or
	Short circuited
HIAL	High limit alarm
LoAL	Low limit alarm
HdAL	Deviation high alarm
dLAL	Negative deviation alarm



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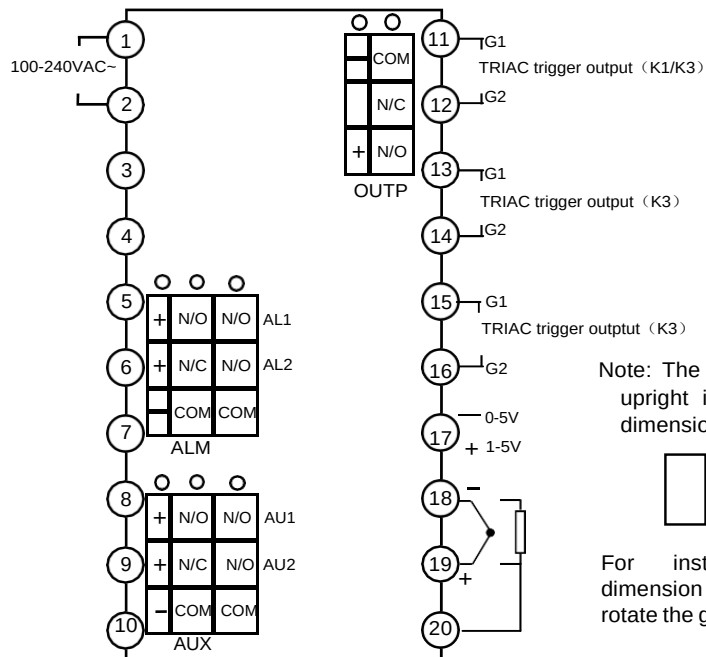
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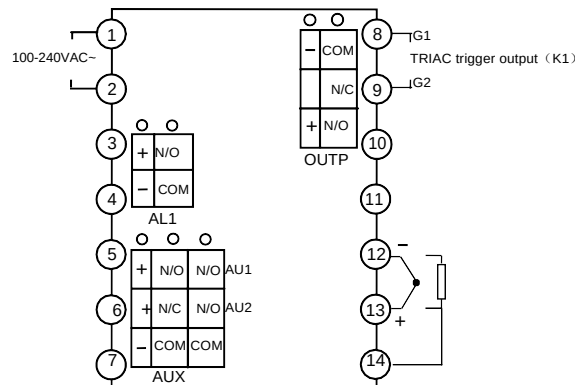
V. INSTRUMENT INSTALLATION AND WIRING

Wiring graph for instruments with dimension A, B or F

Note: The compensation wires for different kinds of thermocouple are different, and should be directly connect to the terminals. Connecting the common wire between the compensation wire and the terminals will cause measurement error.



Wiring graph for D dimension (72mmX72mm) instruments



Wiring graph for D2 dimension (48X48mm) instruments:

