

AI-7021 DUAL TEMPERATURE TRANSMITTER / SIGNAL ISOLATOR

Operation Instruction

Ver. 7.5

CONTENTS

1. SUMMARY.....	1
2. TECHNICAL SPECIFICATION.....	1
3. LAYOUT OF TERMINALS AND INDICATION LIGHTS AND WIRING.....	2
4. DISPLAYS AND OPERATIONS	2
5. SETTING PARAMETERS.....	4

1. SUMMARY

AI-7021 provides two-channel transmitters or signal isolators. It has the following features:

- It provides 2 channels of configurable inputs, and supports multiple voltage, RTD, thermocouple inputs with auto reference junction compensation. If parallel connected to an external precise resistance, it accepts current signal input. Each channel has its own digital filtering and can adjust its filtering degree.
- It generates two isolated current outputs, 4-20mA or 0 – 20mA. The range of retransmission output can be freely defined.
- This model uses high performance hardware, which leads to greatly decreased temperature drift and interference among the two channels. As a result, this multi-channel instrument achieves the same measurement accuracy and anti-interference ability as that of single channel instrument.
- It generates digital adjusted current output without potentiometer, making the current output precise and stable.
- The model is DIN rail mounted. Its width is only 22.5mm. The instrument can be easily configured by connecting to our E8 handset display.
- Universal power supply of 100-240VAC or 24VDC.
- ISO9001 and CE certified and meets EMC standards. Its power and all I/O terminals pass 4KV/5KHz EFT test and can work reliably under interference.

2. TECHNICAL SPECIFICATION

- **Input type:**

Thermocouple: K, S, R, E, J, T, B, N, WRe5-WRe26

RTD: Pt100, Cu50

Linear voltage: 0~20mV, 0~60mV, 0~100mV, 0~1V, 0.2~1V, -20~+20mV, -100~+100mV etc.

- **Instrument Input range**

K(-50~+1300°C), S(-50~+1700°C), R(-50~+1700°C), T(-200~+350°C), E(0~1000°C), J(0~1200°C), B(0~1800°C), N(-50~+1300°C), WRe5-WRe26(0~2300°C), Pt100(-200~+900°C)

Linear Input: -9990~+30000 units defined by user.

- **Retransmission accuracy** : 0.3%FS ± 1 digit (including input and output error)
- **Output Specification**: can be freely defined in the range of 0~22mA with maximum output voltage ≥ 11V
- **Temperature drift** : ≤0.015%FS /°C (including the temperature drift of input and output)
- **Electromagnetic compatibility (EMC)** : ±4KV/5KHz according to IEC61000-4-4 (EFT); 4KV according to IEC61000-4-5.
- **Isolation withstanding voltage** : voltage between power, signal input and output terminals ≥2300VDC; between inputs or 2 outputs ≥200VDC
- **Power supply** : 100~240VAC, -15%, +10% / 50-60Hz; or 24VDC/AC.
- **Power consumption**: ≤ 3W
- **Operating Ambient** : temperature -10~+60°C; humidity ≤90%RH

Note 1: B thermocouple obtains the above measurement accuracy only at the range of 400~1800°C. Its measurement from 60~400°C. is less accurate.

3. LAYOUT OF TERMINALS AND INDICATION LIGHTS AND WIRING

Layout of AI-7021D5 indication lights and terminals is illustrated below:

Terminal 1 and 2 are for power supply of 100-240VAC or 24VAC/DC.

Terminal 5 and 6 are the positive and negative pole of channel 1 current retransmission output.

Terminal 7 and 8 are the positive and negative pole of channel 2 current retransmission output.

Terminal 14~16 are for channel 1 input.

Terminal 10~12 are for channel 2 input.

Indication light OP1~OP2: indicate the outputs of channel 1 and 2. The degree of luminosity of the light indicates the magnitude of the output.

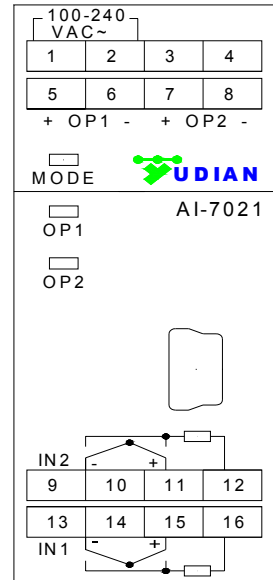
Indication light MODE: indicate the status of communication and alarm. When the instrument is communicating with the host computer, the light flickers. Each flicker indicates one occurrence of communication between the instrument and the host computer. When the instrument hasn't received signal from the host computer for 6 seconds, the indication light will flicker at a steady frequency, with different frequency indicating different status of the connection between the instrument and the host computer.

When the light flickers at a rate of once (on and off) every 1.6 seconds, it indicates that there is currently no communication between the instrument and the host computer, the computer is working properly and no event to set off alarm.

When the light flickers faster, at a rate of once (on and off) every 0.6 second, it indicates that there is no communication, and, there is alarm setting event and other minor problems.

When the light flickers even faster, at a rate of once every 0.3 second, it indicates no communication and severe errors such as input exceeding its acceptable range.

When the light is off, it indicates that the instrument has no power or it is out of order. When the light is on (for at least longer than 8 seconds), it indicates that the instrument has power on but is out of order.

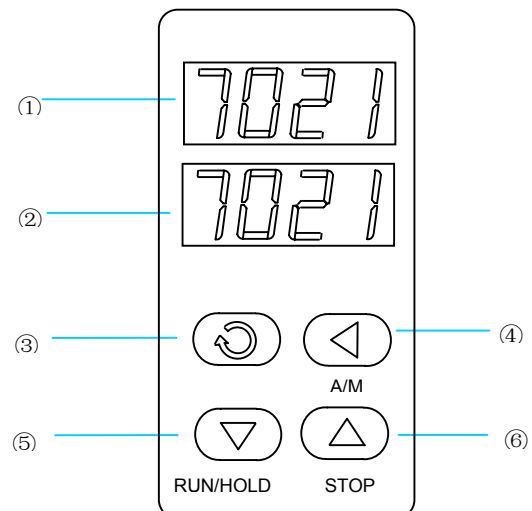


4. DISPLAYS AND OPERATIONS

The parameters of AI-7021D5 can be set by an external E8 display which is connected to the instrument via 1394 socket. E8 handset display supports hot plug. E8 handset can be used to configure AI-7021D5 at the initial set up, as well as remain connected to AI-7021D5 and serves as an external display.

The functions of the parts of E8 external display panel is as below:









- ① Upper display window, displays PV of channel 1 or parameter code, etc.




-
- ② Lower display window, displays PV of channel 2 or parameter value.
 - ③ Setup key, for accessing parameter table and conforming parameter modification.
 - ④ Data shift key.
 - ⑤ Data decrease key
 - ⑥ Data increase key.

Operation Instructions:

1. Setting parameters:

When the parameter lock "Loc" isn't locked, pressing  and holding for about 2 seconds will bring up the Full Parameter Table. Pressing  (but not holding) will bring up the parameters one by one. Press ,  or  to modify the value of a parameter. Pressing and holding  will return to the preceding parameter. Pressing and holding  and at the same time press  key will get out of the parameter table.

When the parameter lock "Loc" is locked, pressing  will bring up Field Parameter Table which includes up to 12 parameters pre-selected by user.

The instrument will automatically leave the parameter table if no key is pressed in the past 25 seconds, and the change of the last parameter will not be saved.

Note: The 1394 socket of the instrument only supports Yudian ADP1 display.

5. SETTING PARAMETERS

x means channel number. It can be 1~2.

Parameter	Name	Remarks	Setting range																																																								
INPx	Input specification	Define the input specification of channel 1~ 2.	0 ~ 32																																																								
		<table border="1"> <thead> <tr> <th>INP</th> <th>Input spec.</th> <th>INP</th> <th>Input spec.</th> </tr> </thead> <tbody> <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>T</td> </tr> <tr> <td>4</td> <td>E</td> <td>5</td> <td>J</td> </tr> <tr> <td>6</td> <td>B</td> <td>7</td> <td>N</td> </tr> <tr> <td>8</td> <td>WRe5-WRe26</td> <td>9</td> <td>WRe3-WRe25</td> </tr> <tr> <td>10</td> <td>Extended input spec.</td> <td>11~19</td> <td>Spare</td> </tr> <tr> <td>20</td> <td>Cu50</td> <td>21</td> <td>Pt100</td> </tr> <tr> <td>22~24</td> <td>Spare</td> <td>25</td> <td>0~75mV</td> </tr> <tr> <td>26~27</td> <td>Spare</td> <td>28</td> <td>0~20mV voltage</td> </tr> <tr> <td>29</td> <td>0~100mV</td> <td>30</td> <td>0~60mV voltage</td> </tr> <tr> <td>31</td> <td>0~1V</td> <td>32</td> <td>0.2~1V</td> </tr> </tbody> </table>		INP	Input spec.	INP	Input spec.	0	K	1	S	2	R	3	T	4	E	5	J	6	B	7	N	8	WRe5-WRe26	9	WRe3-WRe25	10	Extended input spec.	11~19	Spare	20	Cu50	21	Pt100	22~24	Spare	25	0~75mV	26~27	Spare	28	0~20mV voltage	29	0~100mV	30	0~60mV voltage	31	0~1V	32	0.2~1V								
		INP		Input spec.	INP	Input spec.																																																					
		0		K	1	S																																																					
		2		R	3	T																																																					
		4		E	5	J																																																					
		6		B	7	N																																																					
		8		WRe5-WRe26	9	WRe3-WRe25																																																					
		10		Extended input spec.	11~19	Spare																																																					
		20		Cu50	21	Pt100																																																					
		22~24		Spare	25	0~75mV																																																					
		26~27		Spare	28	0~20mV voltage																																																					
		29		0~100mV	30	0~60mV voltage																																																					
31	0~1V	32	0.2~1V																																																								
bAud	Baud rate	When COMM module interface is used for communication, bAud defines the baud rate in the range from 300 to 19200 bit per second.	0 ~19.2K bit/S																																																								
Addr	Communication address	Every instrument on the same communication line should be assigned different communication address. The communication uses AIBUS protocol. Every input channel takes one address. For example, if channel number Cn=3 and Addr=10, then the communication address 10~12 are assigned to the instrument. (Dear Lilac, I am actually not following this example.)	0 ~80																																																								
SPx	Setpoint	Setpoints of channel 1~4.	-999~+3000℃																																																								
Atx	auto tuning	0: Auto tuning function is disable 1: Activates auto turning function to calculate the values of parameters P, I, d and Ctl. After auto tuning is accomplished, "At" will be automatically changed to 0.																																																									
INPx	Input specification	Define the input specification of channel 1~ 4.	0 ~ 39																																																								
		<table border="1"> <thead> <tr> <th>INP</th> <th>Input spec.</th> <th>INP</th> <th>Input spec.</th> </tr> </thead> <tbody> <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>T</td> </tr> <tr> <td>4</td> <td>E</td> <td>5</td> <td>J</td> </tr> <tr> <td>6</td> <td>B</td> <td>7</td> <td>N</td> </tr> <tr> <td>8</td> <td>WRe5-WRe26</td> <td>9</td> <td>WRe3-WRe25</td> </tr> <tr> <td>10</td> <td>Extended input spec.</td> <td>11~18</td> <td>Spare</td> </tr> <tr> <td>19</td> <td>BA2 (JPt100)</td> <td>20</td> <td>Cu50</td> </tr> <tr> <td>21</td> <td>Pt100</td> <td>22~25</td> <td>Spare</td> </tr> <tr> <td>26</td> <td>0~80ohm</td> <td>27</td> <td>0~400ohm</td> </tr> <tr> <td>28</td> <td>0~20mV voltage</td> <td>29</td> <td>0~100mV, 0~5V (J3) 0~20mA current (J4)</td> </tr> <tr> <td>30</td> <td>0~60mV voltage</td> <td>31</td> <td>0~1V</td> </tr> <tr> <td>32</td> <td>0.2~1V two-wire retransmitter (J5)</td> <td>33</td> <td>1~5V voltage (J3) 4~20mA current (J4)</td> </tr> <tr> <td>38</td> <td>extraction of the input of Sn=32</td> <td>39</td> <td>extraction of the input of Sn=33</td> </tr> </tbody> </table>		INP	Input spec.	INP	Input spec.	0	K	1	S	2	R	3	T	4	E	5	J	6	B	7	N	8	WRe5-WRe26	9	WRe3-WRe25	10	Extended input spec.	11~18	Spare	19	BA2 (JPt100)	20	Cu50	21	Pt100	22~25	Spare	26	0~80ohm	27	0~400ohm	28	0~20mV voltage	29	0~100mV, 0~5V (J3) 0~20mA current (J4)	30	0~60mV voltage	31	0~1V	32	0.2~1V two-wire retransmitter (J5)	33	1~5V voltage (J3) 4~20mA current (J4)	38	extraction of the input of Sn=32	39	extraction of the input of Sn=33
		INP		Input spec.	INP	Input spec.																																																					
		0		K	1	S																																																					
		2		R	3	T																																																					
		4		E	5	J																																																					
		6		B	7	N																																																					
		8		WRe5-WRe26	9	WRe3-WRe25																																																					
		10		Extended input spec.	11~18	Spare																																																					
		19		BA2 (JPt100)	20	Cu50																																																					
		21		Pt100	22~25	Spare																																																					
		26		0~80ohm	27	0~400ohm																																																					
		28		0~20mV voltage	29	0~100mV, 0~5V (J3) 0~20mA current (J4)																																																					
30	0~60mV voltage	31	0~1V																																																								
32	0.2~1V two-wire retransmitter (J5)	33	1~5V voltage (J3) 4~20mA current (J4)																																																								
38	extraction of the input of Sn=32	39	extraction of the input of Sn=33																																																								
SCLx	Scale low limit	SCL and SCH define the corresponding scale range of linear output. For example, for channel 1, in order to retransmit 0~600℃ to output channel 1, SCH1 should be set to 0, and SCH1 should be set to 600. For channel 2, to transmit 0~1000℃, then SCL2=0, SCH2=1000.	-9999~+30000 units																																																								
SCHx	Scale high limit																																																										
Scbx	Input offset	Scb is used to shift input to compensate the error caused by transducer, input signal, or auto cold junction compensation of thermocouple. PV_after_compensation=PV_before_compensation + Scb For thermocouple or three-wire RTD inputs, the units of Sc is 0.1℃. For example, when Scb=-100, the actual offset=-10℃, then the measured	-1999~+4000 units or 0.1℃																																																								

		temperature will be 10°C lower than that when Scb=0.	
FILx	Digital filter	The value of FIL will determine the ability of filtering noise. FIL=0, no filtering; FIL=1, filtering with mean; FIL=2~40, filtering with mean and integral. When a large value is set, the measurement input is stabilized but the response speed is slow. Generally, it can be set to 1 to 3. If great interference exists, then you can increase parameter FIL gradually to make momentary fluctuation of measured value less than 2 to 5. When the instrument is being metrological verified, FIL can be set to 0 or 1 to shorten the response time.	0~40
OPn	Retransmission signal	OPn=1, OOTP is the retransmission output of input channel 1. OPn=2, OOTP is the retransmission output of input channel 2.	0~6
OPL	Low limit of current retransmission	Define the low limit and high limit of current retransmission at OOTP position. The engineering unit is 0.1mA. For example, to retransmit 0~600°C in input channel 1 to 4~20mA, then the parameter should be set as below: SCL1=0, SCH1=600, OPn=1, OPL=40, OPH=200.	0~110
OPH	High limit of current retransmission		0~220
OPL2	Low limit of current retransmission	Define the low limit and high limit of current retransmission of channel 2. The engineering unit is 0.1mA. For example, to retransmit 0~1000°C in input channel 2 to 4~20mA, then the parameter should be set as below: SCL1=0, SCH1=1000, OPn=1, OPL=40, OPH=200.	0~100
OPH2	High limit of current retransmission		0~220
IVF1	OP1 current correction	For adjusting the current of OP1 output. The greater IVF1, the greater current output. Note: This parameter was adjusted before delivery. It is better not to change this value by yourself.	0~3000
IVF2	OP2 current correction	For adjusting the current of OP2 output. The greater IVF1, the greater current output. Note: This parameter was adjusted before delivery. It is better not to change this value by yourself.	0~3000
Loc	Privilege	Loc=0 or 808, allow to display and modify the parameters. Otherwise, the parameters can't be modified.	0 ~9999