

Analog Input Module






AI711-S11

User manual

IM23H31-E

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Symbol Definition	
	WARNING: Indicates information that a potentially hazardous situation which, if not avoided, could result in serious injury or death.
	RISK OF ELECTRICAL SHOCK: Indicates information that Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.
	ESD HAZARD: Indicates information that Danger of an electro-static discharge to which equipment may be sensitive. Observe precautions for handling electrostatic sensitive devices
	ATTENTION: Identifies information that requires special consideration.
	TIP: Identifies advice or hints for the user.

Security& Caution Symbols

The following table lists Security& Caution symbols used on equipments.














No.	Symbol	Description
1		Direct current (DC)
2		Alternating current (AC)
3		Ground (Earth) terminal
4		Protective earth (ground) terminal
5		Reference ground (Earth) terminal
6		Frame or chassis
7		Equipotentiality
8		On (power)
9		Off (power)
10		Caution, risk of electric shock
11		Caution, hot surface
12		Caution, risk of danger
13		Electrostatic sensitive devices (ESD)

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Analog Input Module AI711-S11

Section 1 Description

As an 8-channel and channel-channel isolated multi-range voltage/current signal input module, analogue input module AI711-S11 can measure signals of several ranges, including voltage signals with range of (-10~10)V and current signals with range of (0~20) mA. It also has free range measurement function, which means it can automatically adjust the measure scope according to range, realizing high measure precision. And the module supports 1:1 redundancy.

Each channel of AI711-S11 has 4 terminals to realize current/voltage, distribution/non-distribution option, non-jumper optional. The module can realize automatic switch of current/voltage interface through judging the configuration information. Meanwhile, AI711-S11 provides with optional power distribution function.

Section 2 Technical Specifications

Table 2-1 Technical specifications of AI711-S11

Parameter		Description	
Module model		AI711-S11	
Type		Analog input module	
Channel No.		8	
Redundancy		Support	
Type of isolation		Channel-channel isolated	
Isolated power		500V AC	
Temperature	Operating temperature	(-20~70)°C	
	Storage temperature	(-40~85)°C	
Humidity	Operating humidity	10%RH~90%RH. No vapor condensation	
	Storage humidity	5%RH~95%RH. No vapor condensation	
System power supply		24V DC±10%	
	system power consumption	<1.2W	
	Power distribution consumption	<0.7W/channel	
Short-circuit protection current		<40 mA	
Signal type	Voltage	(0~5)V,(1~5)V, (-10~10)V	
	Current	(0~10)mA, (4~20)mA	
Precision		0.1%	
Max. scope of signal input	(0~5)V	(0~6.25)V	
	(1~5)V	(0.5~6)mA	
	(-10~10)V	(-11~11)V	
	(0~10)mA	(0~12.5)mA	
	(4~20)mA	(2~24)mA	
Sampling cycle (software selection)	Anti-working frequency	200ms	
	Fast	50ms	
Input impedance	Power on	Voltage	1MΩ
		Current	280Ω~300Ω
	Power off	Voltage	2MΩ
		Current	≥2MΩ
common-mode rejection ratio		≥120dB	
series-mode rejection ratio(SMRR)		≥60dB	
Offline check		Support	

Section 3 Usage Instruction

3.1 Led Indicators

Table 3-1 LED indicators

LED indicator	Fault (red)	Status (green)	Duplex (green)	L-Bus (green)	Supply (green)
Description Status	Fault indicator	Running indicator	Work/Standby indicator	Communication indicator	Auxiliary power supply status indicator
OFF	Normal	--	Standby	Communication link break	Abnormal auxiliary power supply
ON	Severe fault	Normal	Work	Normal	Normal
Flashing	--	No configuration	--	IP confliction	--

3.2 Installation of I/O Modules

AI711-S11 is installed on I/O Module base, which equips with power terminal and field signal terminal.

Please refer to *Control Station Hardware User Manual*.

3.3 Interface Features

AI711-S11 can collect voltage or current signals via changing connection modes of the signal terminals on base. When power distribution is needed, AI711-S11 module can provide channel to channel isolated power distribution source for driving local transmitters.

Each channel of AI711-S11 occupies 4 connecting terminals and signals of different types have different terminal connecting.

The interface circuits of AI711-S11 module are showed in the following figure.

1. Current signal by module power supply

If the current signal output devices in the field need power provided by AI711-S11. The connection circuit is shown as channel 1 in Figure 3-1 (The arrows indicate the directions of currents.). The measurable range of the current signal is (0~20) mA.

2. Current signal

If the current signal output devices in the field don't need power provided by AI711-S11, the connection circuit is shown as channel 7 in Figure 3-1. (The arrows indicate the directions of currents.)

3. Voltage signal

If the field is equipped with voltage signal output equipment, the connection circuit is shown as channel 8 in Figure 3-1.

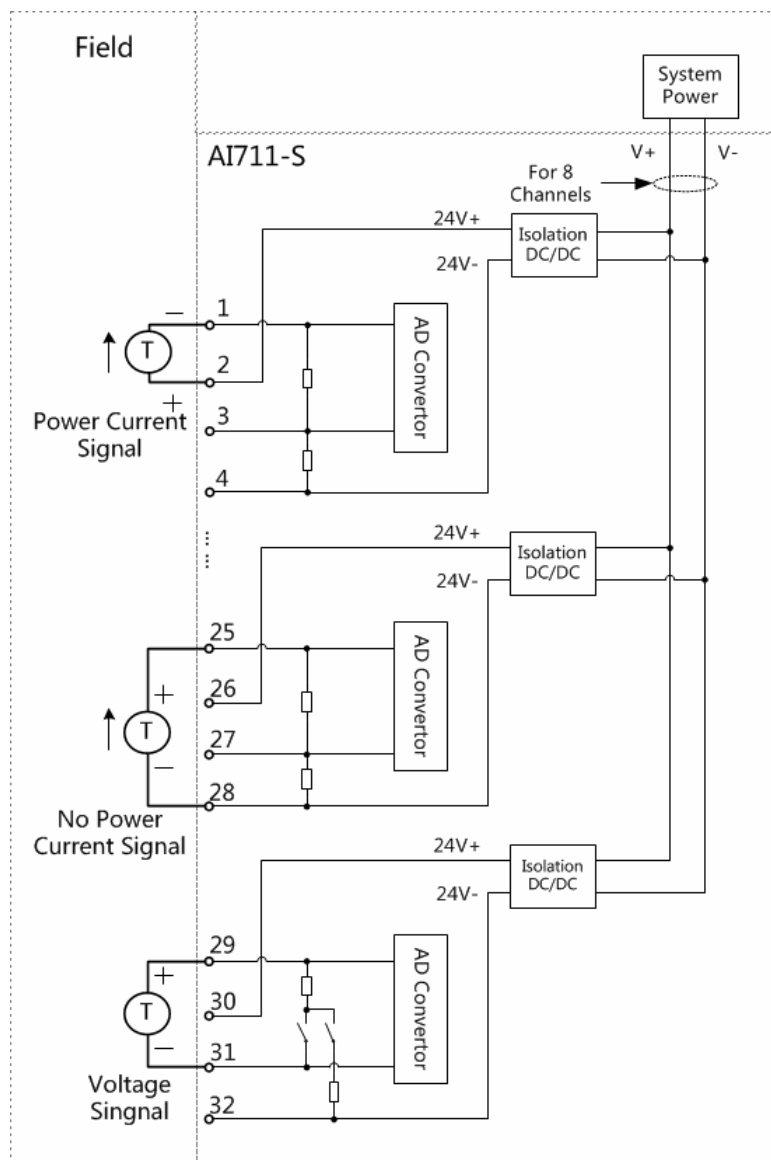


Figure 3-1 interface circuit

3.4 Terminals Definition & Connection

The terminal wiring of AI711-S11 working with the change-over bases MB745-S11 and MB746-S11 and the change-over terminal unit TUA711-GS00 or with the I/O bases MB735-S11 and MB736-S11 is shown below. TUA711-GS00 corresponds to the 36 terminals of I/O base respectively.

3.4.1 Current Signal by Module Power Supply

CH* is channel No., means 1 is CH1. The 4 terminals of each channel are described as CH-1, CH-2, CH-3, CH-4 respectively.

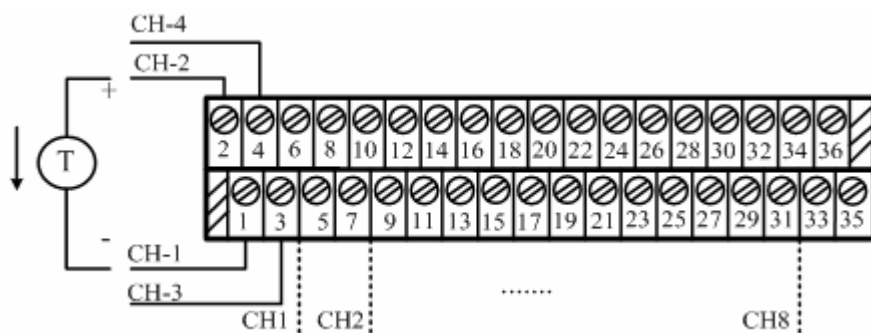


Figure 3-2 terminal interface circuit of current signals by module power supply

Table 3-2 connection of current signal by module power supply

Wiring diagram(current signal by module power supply)	terminals	Channel	Description	Remarks
	1	CH-1	-	CH1
	2	CH-2	+	
	3	CH-3	No connection	
	4	CH-4	No connection	
	5	CH-1	-	CH2
	6	CH-2	+	
	7	CH-3	No connection	
	8	CH-4	No connection	
	9	CH-1	-	CH3
	10	CH-2	+	
	11	CH-3	No connection	
	12	CH-4	No connection	
	13	CH-1	-	CH4
	14	CH-2	+	
	15	CH-3	No connection	
	16	CH-4	No connection	
	17	CH-1	-	CH5
	18	CH-2	+	
	19	CH-3	No connection	
	20	CH-4	No connection	
	21	CH-1	-	CH6
	22	CH-2	+	
	23	CH-3	No connection	
	24	CH-4	No connection	
	25	CH-1	-	CH7
	26	CH-2	+	

Wiring diagram(current signal by module power supply)	terminals	Channel	Description	Remarks
	27	CH-3	No connection	CH8
	28	CH-4	No connection	
	29	CH-1	-	
	30	CH-2	+	
	31	CH-3	No connection	
	32	CH-4	No connection	
	33, 34, 35, 36		No connection	

3.4.2 Current Signal

CH* is channel No., means 1 is CH1. The 4 terminals of each channel are described as CH-1, CH-2, CH-3, CH-4 respectively.

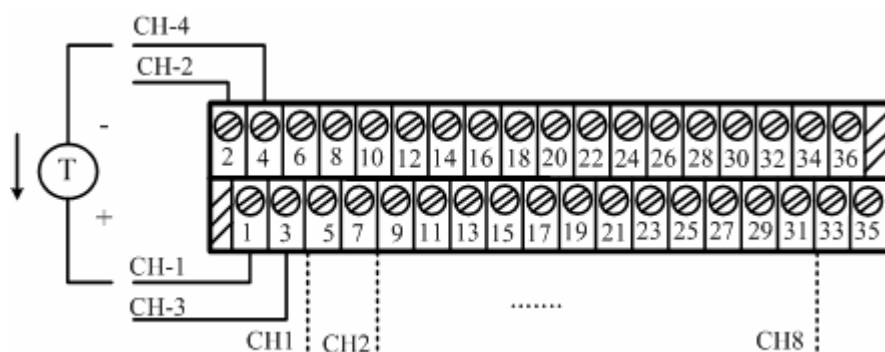


Figure 3-3 terminal interface circuit of current signals

Table 3-3 connection of current signal

Wiring diagram(current signal)	Terminal	Channel	Description	Remarks
	1	CH-1	+	CH1
	2	CH-2	No connection	
	3	CH-3	No connection	
	4	CH-4	-	
	5	CH-1	+	CH2
	6	CH-2	No connection	
	7	CH-3	No connection	
	8	CH-4	-	
	9	CH-1	+	CH3
	10	CH-2	No connection	
	11	CH-3	No connection	
	12	CH-4	-	
	13	CH-1	+	CH4
	14	CH-2	No connection	
	15	CH-3	No connection	

Wiring diagram(current signal)	Terminal	Channel	Description	Remarks
	16	CH-4	-	CH5
	17	CH-1	+	
	18	CH-2	No connection	
	19	CH-3	No connection	
	20	CH-4	-	
	21	CH-1	+	CH6
	22	CH-2	No connection	
	23	CH-3	No connection	
	24	CH-4	-	
	25	CH-1	+	CH7
	26	CH-2	No connection	
	27	CH-3	No connection	
	28	CH-4	-	
	29	CH-1	+	CH8
	30	CH-2	No connection	
	31	CH-3	No connection	
	32	CH-4	-	
	33, 34, 35, 36			No connection

3.4.3 Voltage Signal

CH* is channel No., means 1 is CH1. The 4 terminals of each channel are described as CH-1, CH-2, CH-3, CH-4 respectively.

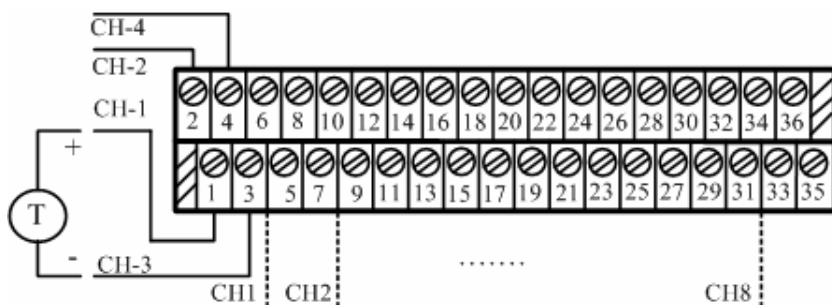
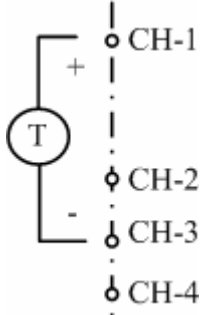


Figure 3-4 terminal interface circuit of voltage signal

Table 3-4 connection of voltage signal

Wiring diagram(voltage signal)	Terminal	Channel	Description	Remarks
	1	CH-1	+	CH1
	2	CH-2	No connection	
	3	CH-3	-	
	4	CH-4	No connection	
	5	CH-1	+	CH2
	6	CH-2	No connection	
	7	CH-3	-	

Wiring diagram(voltage signal)	Terminal	Channel	Description	Remarks
	8	CH-4	No connection	CH3
	9	CH-1	+	
	10	CH-2	No connection	
	11	CH-3	-	
	12	CH-4	No connection	CH4
	13	CH-1	+	
	14	CH-2	No connection	
	15	CH-3	-	
	16	CH-4	No connection	CH5
	17	CH-1	+	
	18	CH-2	No connection	
	19	CH-3	-	
	20	CH-4	No connection	CH6
	21	CH-1	+	
	22	CH-2	No connection	
	23	CH-3	-	
	24	CH-4	No connection	CH7
	25	CH-1	+	
	26	CH-2	No connection	
	27	CH-3	-	
	28	CH-4	No connection	CH8
	29	CH-1	+	
	30	CH-2	No connection	
	31	CH-3	-	
	32	CH-4	No connection	
	33, 34, 35, 36			No connection

3.5 Base/Terminal Unit Selection

Selection of bases/terminal unit matching AI711-S11 is shown in Table 3-5.

Table 3-5 Selection of bases/terminal unit matching AI711-S11

Signal connection requirement	Working mode of AI711-S11	Base model	Terminal unit
Direct connection	Single	MB735-S11	-
	Redundancy	MB736-S11	
Terminal changeover	Single	MB745-S11	TUA711-GS00
	Redundancy	MB746-S11	

AI711-S11 of this version is totally compatible with last version.

3.6 Configuration Instruction

Please refer to *Hardware Module Builder User Manual* for details.

The module address is determined according to the module's position in rack. When configuring, select the corresponding control domain address (0~15), controller address (2~126), IO link module address (1~7), IO rack address (0~3), module address (0~15) and channel No.(0~7) according to the position of the module in the rack.

3.7 Maintenance

Clean and fasten all the power and grounding points every six months (or system stops running).

Vacuum the modules, bases, racks, fan unit, power supply terminal unit, etc via static-resistant vacuum every six months (or system stops running).

Please refer to *Control Station Hardware User Manual* for the installation and disassembly.

Section 4 Application

4.1 Notices

AI711-S11 allows input signal to exceed a certain configuration range within the over-range limit. When input signals exceed the configuration range but within the over-range limit, AI711-S11 can continue measuring and sending sampling data. While input signals exceed the over-range limit, AI711-S11 will record the phenomenon and limit the sampling data.

For the signal (0~5) V or (0~10) mA , the over-range limit of AI711-S11 is 0%~125% of the configuration. For the signal (1~5) V or (4~20) mA , its over-range limit is -12.5%~125% of the configuration; For the signal (-10~10) V, its over-range limit is -5%~105% of the configuration(including free range configuration).

4.2 Fault Diagnosis and Troubleshooting

1. If the Fault indicator is ON all the time, there is a severe module fault. Module replacement is required.
2. If L-Bus indicator is OFF, there is a communication fault or L-Bus indicator circuit damage or there is no other node in the I/O bus. Please check the communication connection.
3. If the L-Bus indicator flashes, there is IP confliction. Please check if there is module confliction in the bus.
4. If Supply indicator is OFF, there is bad connection of periphery 24V power source or unreliable module connection. Please check the auxiliary power connection and the connection between module and base.
5. If all indicators are OFF when the module is energized, the power of module system has problem. Check the system power connection. If the connection is reliable, please replace the module.

Section 5 Revision

Table 5-1 Retrofit list of the version

Document Version	Applicable Module Model	Remarks
V1.1	AI711-S-11.11.00	
V1.2	AI711-S-12.12.00	Some specifications have been modified from last version.
V1.3	AI711-S-13.13.00	Some specifications have been modified from last version.
V1.4	AI711-S-14.14.00	Bases selection has been changed.
V2.0(20131029)	AI711-S11 V16.16.00 and later versions	Bases selection and power distribution have been changed Add model information
V2.1(20150917)	AI711-S11 V16.16.00 and later versions	Modify IO link module address
V2.2(20161116)	AI711-S11 V16.16.00 and later versions	Add code