



Current Input Module

AI714-H11

User Manual

IM23H54-E
20230628

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Zhejiang SUPCON Technology Co., Ltd.
No.309 Liuhe Road, Binjiang District
Hangzhou, 310053
P.R.China
<http://global.supcon.com>

Symbol Definitions



WARNING:

Indicates a potentially hazardous situation which, if not avoided, could result in serious injuries or death.



RISK OF ELECTRICAL SHOCK:

Indicates a Potential shock hazard where HAZARDOUS LIVE voltages greater than 30V RMS, 42.4V peak, or 60V DC may be accessible.



ESD HAZARD:

Indicates the 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 users.

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1 Overview

The 16-channel current signal input module AI714-H11 is a current signal input module with HART communication function. AI714-H11 can realize III current signal input and provide power supply.

AI714-H11 has the free-span function. According to the span setting, it can realize high-accuracy measurement by changing the measurement range automatically in range (4~20) mA. The HART communication supports connecting to the handheld communicator and is compatible with break-out communication mode. It supports 1: 1 redundancy.

Indicators on the front panel of the module indicate status of module, network and power directly.

2 Technical Specifications

Table 2.1 AI714-H11 Module Specification

Parameter		Description
Model		AI714-H11
Type		Current signal input module
Channel		16
Redundancy		Support
Isolation type		Isolated
Temperature	Operation temperature	(-20 ~ 70) °C
	Storage temperature	(-40 ~ 85) °C
Humidity	Operation humidity	10%RH~90%RH, no condensation
	Storage humidity	5%RH~95%RH, no condensation
System power supply		24 V DC \pm 10%
Module system power consumption		<1.8 W
Module auxiliary power consumption		<0.7 W/Channel
Short protection current		<40 mA
Signal type	Current	(4 ~ 20) mA+HART
Precision		0.1%
Max. scope of signal input		(2.4 ~ 21.6) mA
Sampling period (selected by software)	Anti-working frequency	400 ms
	Fast	100 ms
Input impedance	Power on	230 Ω ~ 650 Ω
	Power off	>1 M Ω
Common-mode rejection ratio		\geq 120 dB
Series-mode rejection ratio		\geq 60 dB
Offline check		Support

Table 2.1 AI714-H11 Module Specification (continued)

Parameter		Description
Response time of communication between the device management software and HART communication module	Response time to single instrument configuration, adjustment, rectification etc. operation	<2 s
	Response time to reading real time data of HART equipment (16 pcs)	<0.4 s
	Multi-variate data update interval (16 pcs)	<0.1 s

3 Terminals Definition & Connection

The connections of two-wire current signal with power supply and current signal without power supply can be performed when AI714-H11 works with change-over bases MB745-S11, MB746-S11 and change-over terminal unit TUA711-AIO16. Please refer to *TUA711-AIO16 User Manual* for connection details.

The connections of current signal without power supply can be performed when AI714-H11 works with I/O base MB735-S11, MB736-S11 or change-over bases MB745-S11, MB746-S11 and change-over terminal unit TUA711-GS00. Take I/O base as an example and the terminal wiring is shown below. TUA711-GS00 corresponds to the 36 terminals of I/O base respectively.

CH* refers to the channel number. 1 means CH1. CH-1 and CH-2 refer to the 2 terminals of each channel.

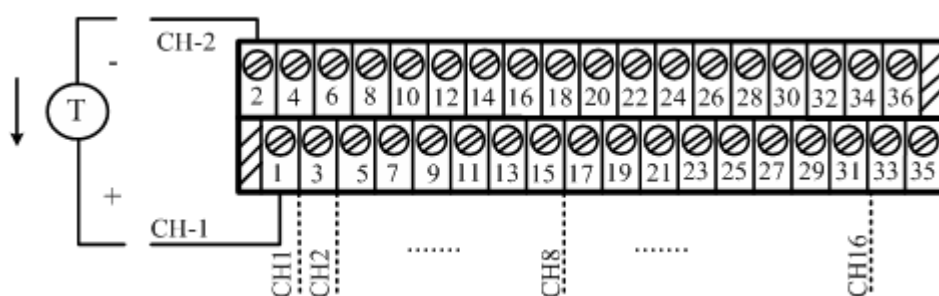


Figure 3.1 Terminal Connection Diagram

Table 3.1 Connection Instruction

Connection Diagram	Terminal	Description	Instruction	Channel
	1	CH-1	+	CH1
	2	CH-2	-	
	3	CH-1	+	CH2
	4	CH-2	-	
	5	CH-1	+	CH3
	6	CH-2	-	
	7	CH-1	+	CH4
	8	CH-2	-	
	9	CH-1	+	CH5
	10	CH-2	-	
	11	CH-1	+	CH6

Table 3.1 Connection Instruction (continued)

Connection Diagram	Terminal	Description	Instruction	Channel
	12	CH-2	-	CH7
	13	CH-1	+	
	14	CH-2	-	
	15	CH-1	+	
	16	CH-2	-	
	17	CH-1	+	CH9
	18	CH-2	-	
	19	CH-1	+	CH10
	20	CH-2	-	
	21	CH-1	+	CH11
	22	CH-2	-	
	23	CH-1	+	CH12
	24	CH-2	-	
	25	CH-1	+	CH13
	26	CH-2	-	
	27	CH-1	+	CH14
	28	CH-2	-	
	29	CH-1	+	CH15
	30	CH-2	-	
	31	CH-1	+	CH16
	32	CH-2	-	
		33, 34, 35, 36		Unconnected

4 Usage Instruction

4.1 LED Indicators

Table 4.1 Instruction of Module Indicator

LED Indicator	Fault (Red)	Status (Green)	Duplex (Green)	L-Bus (Green)	Supply (Green)
Description Status	Fault Indicator	Running Indicator	Working/Standby Indicator	Communication Indicator	Auxiliary Power Supply Status Indicator
OFF	Normal	--	Standby	Communication Link is Broken off	Abnormal Auxiliary Power Supply
ON	Severe Fault	Normal	Working	Normal	Normal
Flashing	--	No Configuration	--	Address Conflict	--

4.2 Installation of I/O Module

AI714-H11 is installed on I/O Module base, which equips with power terminal and field signal terminal.

Please refer to *Control Station Hardware User Manual*.

4.3 Interface Features

The connection of current signal without power supply can be performed when AI714-H11 work with I/O module bases, the connection circuit is shown as channel 1 in the following figure.

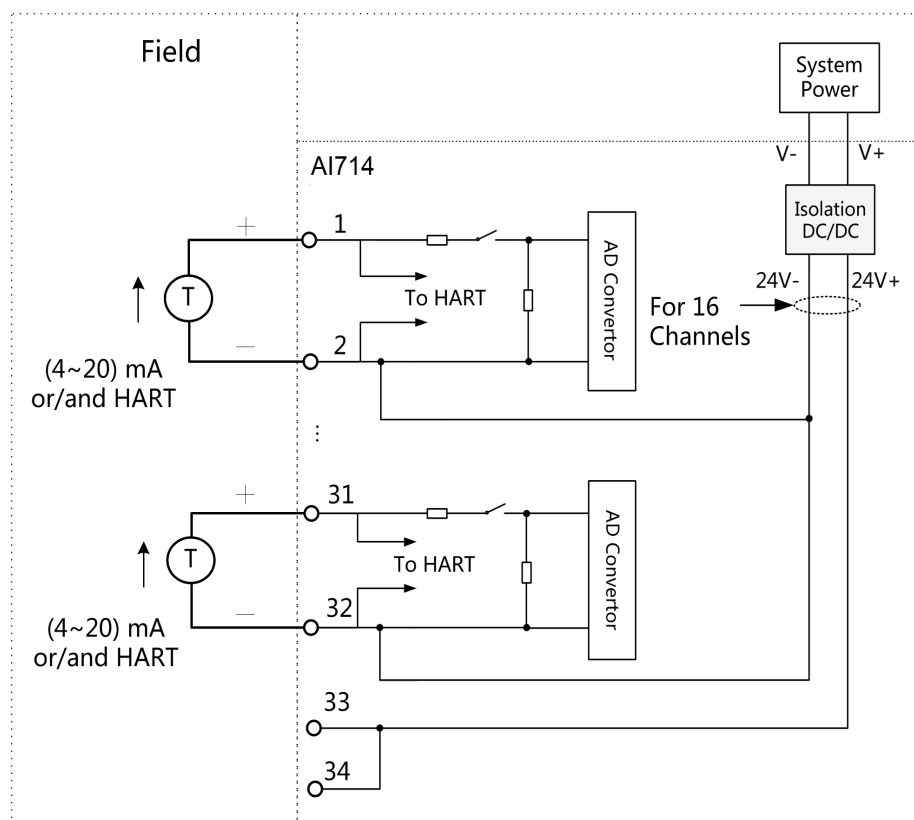


Figure 4.1 Interface circuit (I/O module base or universal terminal unit)

The connection of current signal without power supply and current signal with power supply can be performed when AI714-H11 work with I/O change-over bases and change-over terminal unit, the connection circuit is shown as channel 1 and channel 2 in the following figure, please refer to terminal unit user manual for the specific .

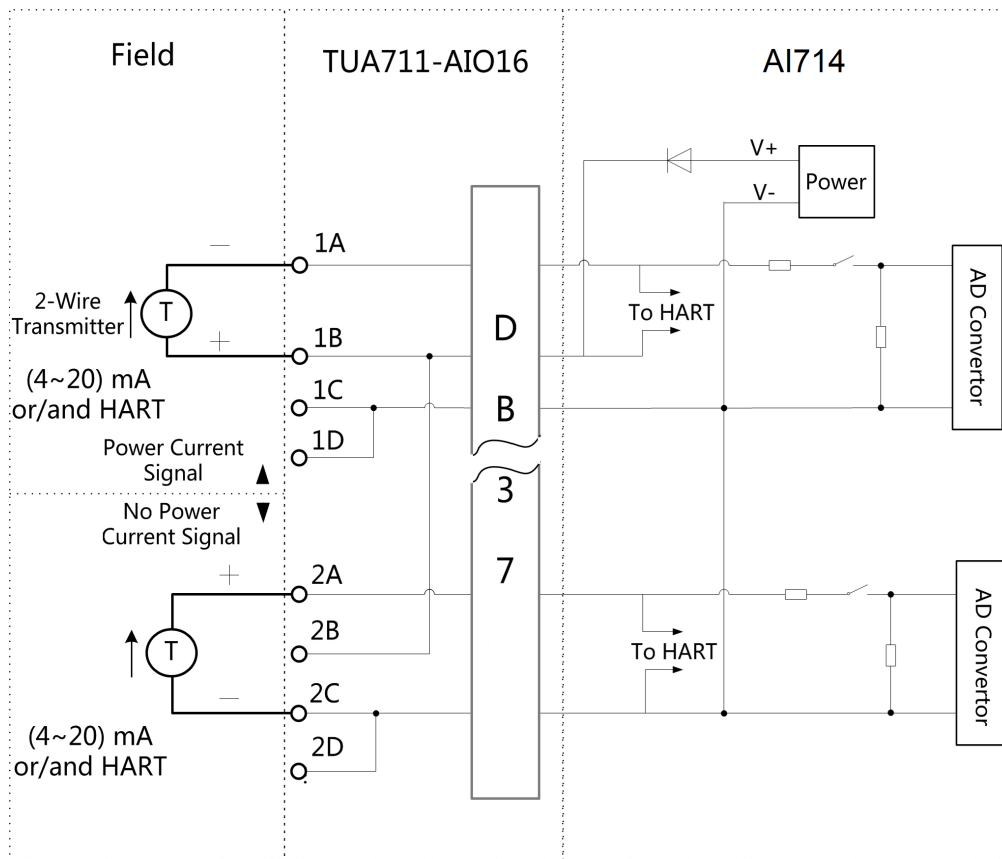


Figure 4.2 Interface circuit (16-channel change-over terminal unit)

4.4 Terminals Definition & Connection

The connections of two-wire current signal with power supply and current signal without power supply can be performed when AI714-H11 works with change-over bases MB745-S11, MB746-S11 and change-over terminal unit TUA711-AIO16. Please refer to *TUA711-AIO16 User Manual* for connection details.

The connections of current signal without power supply can be performed when AI714-H11 works with I/O base MB735-S11, MB736-S11 or change-over bases MB745-S11, MB746-S11 and change-over terminal unit TUA711-GS00. Take I/O base an example and the terminal wiring is shown below. TUA711-GS00 corresponds to the 36 terminals of I/O base respectively.

CH* refers to the channel number. 1 means CH1. CH-1 and CH-2 refer to the 2 terminals of each channel.

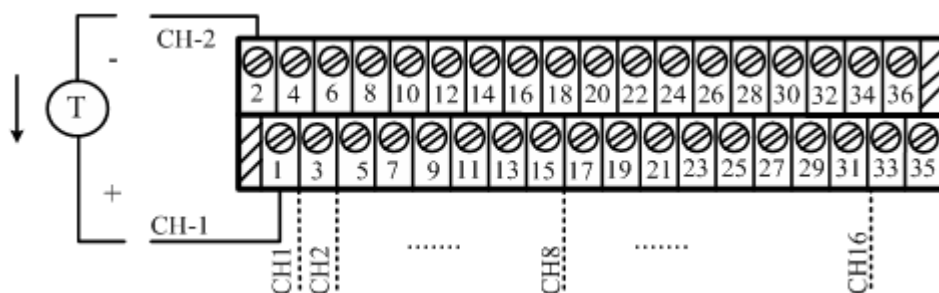


Figure 4.3 Terminal Connection Diagram

Table 4.2 Connection Instruction

Connection Diagram	Terminal	Description	Instruction	Channel
	1	CH-1	+	CH1
	2	CH-2	-	CH1
	3	CH-1	+	CH2
	4	CH-2	-	CH2
	5	CH-1	+	CH3
	6	CH-2	-	CH3
	7	CH-1	+	CH4
	8	CH-2	-	CH4
	9	CH-1	+	CH5
	10	CH-2	-	CH5
	11	CH-1	+	CH6
	12	CH-2	-	CH6
	13	CH-1	+	CH7
	14	CH-2	-	CH7
	15	CH-1	+	CH8
	16	CH-2	-	CH8
	17	CH-1	+	CH9
	18	CH-2	-	CH9
	19	CH-1	+	CH10
	20	CH-2	-	CH10

Table 4.2 Connection Instruction (continued)

Connection Diagram	Terminal	Description	Instruction	Channel
	21	CH-1	+	CH11
	22	CH-2	-	
	23	CH-1	+	CH12
	24	CH-2	-	
	25	CH-1	+	CH13
	26	CH-2	-	
	27	CH-1	+	CH14
	28	CH-2	-	
	29	CH-1	+	CH15
	30	CH-2	-	
	31	CH-1	+	CH16
	32	CH-2	-	
33, 34, 35, 36		Unconnected		

4.5 Base/Terminal Unit Selection

Selection of bases/terminal unit matching AI714-H11 is shown below.

Table 4.3 Selection of bases/terminal unit matching AI714-H11

Signal connection requirement	Module work model	Base model	Terminal unit model
Connected directly	Single	MB735-S11	-
	Redundancy	MB736-S11	-
Terminal switch	Single	MB745-S11	TUA711-GS00 TUA711-AIO16
	Redundancy	MB746-S11	

4.6 Configuration Instruction

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

The address of AI714-H11 is determined by its position in the rack, please refer to the *Control Station Hardware User Manual*. 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. (0~15) according to the module position in the rack.

4.7 Maintenance

Clean and fasten all power and ground points for every 6 months or during the time when system stops running.

Vacuum the modules, bases, racks, fan unit, power supply terminal unit, etc via static-resistant vacuum every 6 months or during the time when system stops running.

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

5 Application

5.1 Achievement of Channel-channel Isolation

Module can achieve the channel-channel isolation of field signal by setting the safety barrier.

In channel-channel isolation, the selection of base and safety barrier is shown in Table 5.1. The achievement of channel-channel isolation for safety barrier is shown in the following figure.

For baseplate isolated barriers, AI714-H11 should work with I/O module terminal change-over base.

For rail isolated barriers, AI714-H11 should work with I/O module base, and only connect active III current signal.

Table 5.1 Selection of base and safety barrier

Field Signal Type	I/O Module Base	I/O change-over Base	Baseplate Isolated Barrier	Rail Isolated Barrier
Active III current signal	√	-	-	√
III current signal	-	√	√	-

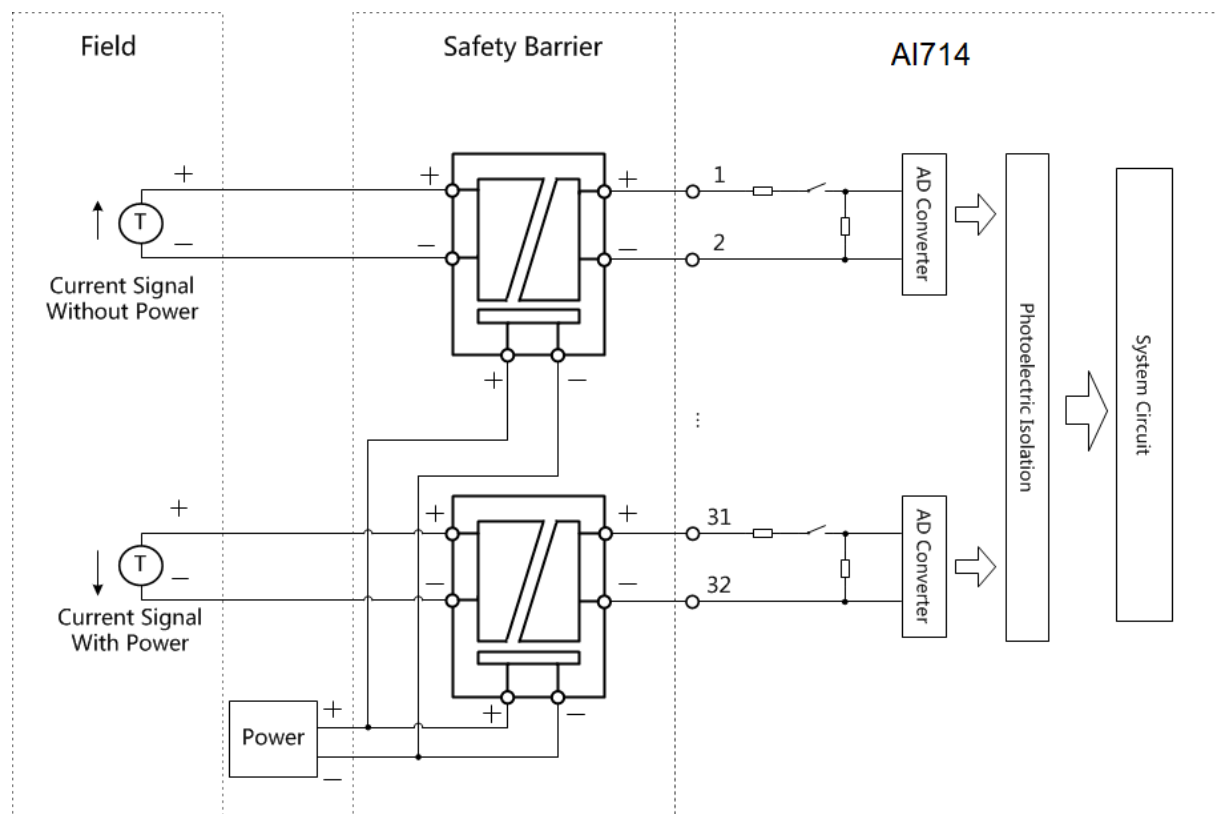


Figure 5.1 Selection of channel-channel isolation for safety barrier

5.2 Notices

- AI714-H11 allows input signals to exceed a certain configuration range within the over-range limit. When input signals exceed the configuration range but within the over-range limit, AI714-H11 can continue measuring and sending sampling data. While input signals exceed the over-range limit, AI714-H11 will record the phenomenon and the sampling data value will be within the limited range.
- AI714-H11 only supports one signal type within scope of (4 ~ 20) mA and the over-range limit is -10%~110% of the configuration range (including free range configuration).

5.3 Fault Diagnosis and Troubleshooting

1. The fault indicator being ON all the time indicates that module has the severe fault. The solution is to replace the fail module.
2. The L-Bus indicator being OFF all the time indicates communication fault or damage of L-Bus indicator circuit or there is no other node in the I/O bus. Please check the communication connection.
3. If the L-Bus indicator is flashing, there is address confliction. Please check if there is module confliction in the bus.
4. If Power Supply indicator is OFF, there is bad connection of auxiliary 24 V power source or unreliable module connection. Please check the auxiliary power supply connection and the connection between module and base.
5. If all indicators are OFF when the module is energized, the power supply of module has problem. Check the system power connection. If the connection is reliable, please replace the module.

6 Revision

Table 6.1 Retrofit List of The Version

Document Version	Applicable Module Model	Remarks
V1.0 (20230629)	AI714-H11 V10.10.00	First edition.