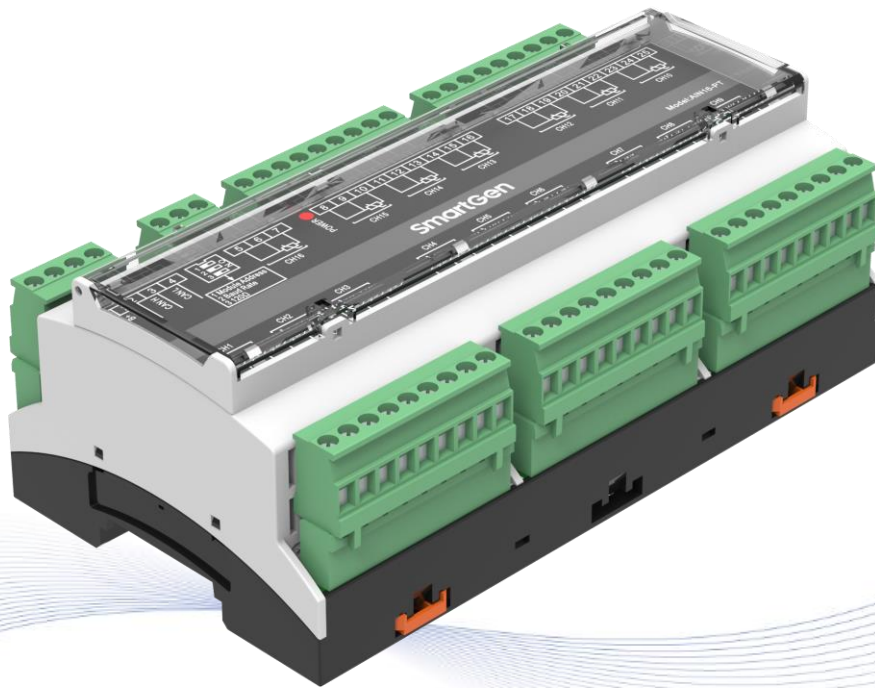


# SmartGen

MAKING CONTROL SMARTER

## AIN16-PT ANALOG INPUT MODULE

### USER MANUAL



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Table 1 Software Version

Date	Version	Content
2014-06-16	1.0	Original release.
2023-02-21	1.1	Updated the manual format, the logo of SmartGen and the figure of case dimensions.

This manual is suitable for AIN16-PT Analog Input Module only.

Table 2 Clarification of Notation

SIGN	INSTRUCTION
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates error operation may cause death, serious injury and significant property damage.

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## 1 OVERVIEW

AIN16-PT analog input module is an expansion module which has 16 analog input channels and each channel is resistance PT100 input. The data are transmitted to the HMC9000 controller for processing via CANBUS port. Different alarm threshold values can be set for each sensor via HMC9000 controller, enabling module to basically meet all kinds of customer demands.

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## 2 PERFORMANCE AND CHARACTERISTICS

- With ARM-based 32-bit SCM, high integration of hardware and more reliable;
- Must be used with HMC9000 together;
- CANBUS communication baud rate can be set as 250kbps or 125kbps via dial switch;
- Module address can be set as 1 or 2.
- Widely power supply range DC(18~35)V, suitable to different starting battery voltage environment;
- 35mm rail mounting type;
- Modular design, pluggable terminal, compact structure with easy installation.

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**3 TECHNICAL PARAMETERS**

Table 3 Technical Parameters

Item	Content
Working Voltage	DC18.0V~35.0V continuous power supply
Power Consumption	<0.5W
Sensor type	PT100
Measurement accuracy	0.5°C
Case Dimension	161.6mm x 89.7mm x 60.7mm
Rail Dimension	35mm
Working Temp.	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage	Temp.: (-25~+70)°C
Weight	0.33kg



## 4 CONNECTION

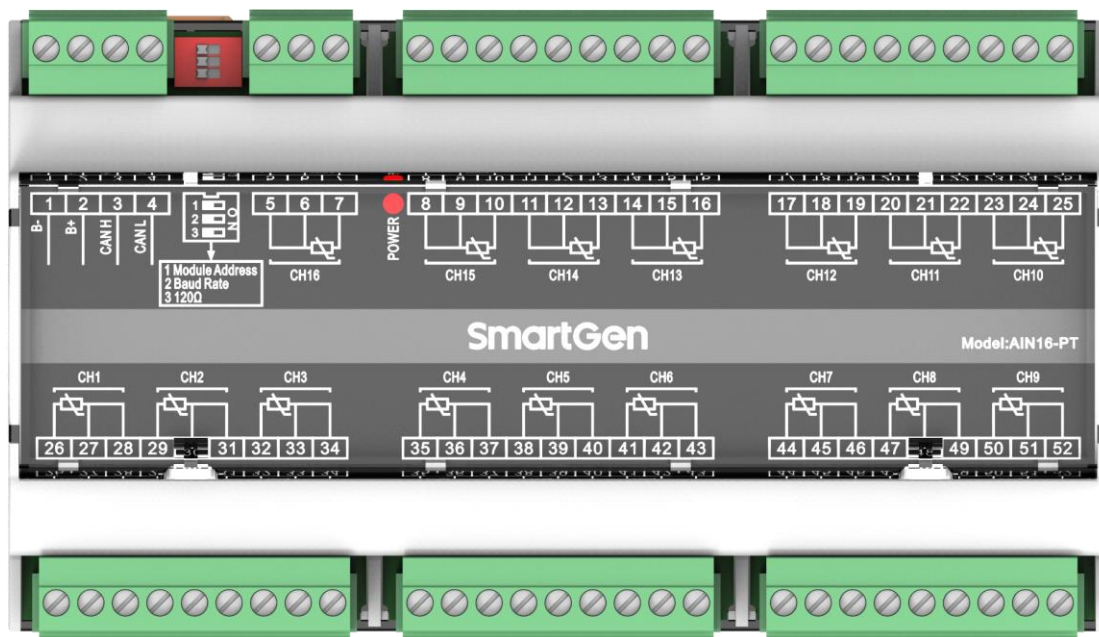


Fig.1 – AIN16-PT Front Panel

Table 4 Terminal Connection

No.	Function	Cable Size	Description
1	B-	1.0mm <sup>2</sup>	DC power supply negative input.
2	B+	1.0mm <sup>2</sup>	DC power supply positive input.
3	CAN(H)	0.5mm <sup>2</sup>	A CANBUS port which communicate with HMC9000 controller. 120Ω shielding wire with its one end grounded is recommended.
4	CAN(L)		
5	CH16	C	PT100 Sensor 16 COM
6		B	PT100 Sensor 16 terminal
7		A	
8	CH15	C	PT100 Sensor 15 COM
9		B	PT100 Sensor 15 terminal
10		A	
11	CH 14	C	PT100 Sensor 14 COM
12		B	PT100 Sensor 14 terminal
13		A	
14	CH 13	C	PT100 Sensor 13 COM
15		B	PT100 Sensor 13 terminal
16		A	
17	CH 12	C	PT100 Sensor 12 COM
18		B	PT100 Sensor 12 terminal
19		A	
20	CH 11	C	PT100 Sensor 11 COM
21		B	PT100 Sensor 11 terminal



No.	Function	Cable Size	Description
22	A		
23	CH 10	0.5mm <sup>2</sup>	PT100 Sensor 10 COM
24			PT100 Sensor 10 terminal
25			
26	CH 1	0.5mm <sup>2</sup>	PT100 Sensor 1 terminal
27			
28			PT100 Sensor 1 COM
29	CH 2	0.5mm <sup>2</sup>	PT100 Sensor 2 terminal
30			
31			PT100 Sensor 2 COM
32	CH 3	0.5mm <sup>2</sup>	PT100 Sensor 3 terminal
33			
34			PT100 Sensor 3 COM
35	CH 4	0.5mm <sup>2</sup>	PT100 Sensor 4 terminal
36			
37			PT100 Sensor 4 COM
38	CH 5	0.5mm <sup>2</sup>	PT100 Sensor 5 terminal
39			
40			PT100 Sensor 5 COM
41	CH 6	0.5mm <sup>2</sup>	PT100 Sensor 6 terminal
42			
43			PT100 Sensor 6 COM
44	CH 7	0.5mm <sup>2</sup>	PT100 Sensor 7 terminal
45			
46			PT100 Sensor 7 COM
47	CH 8	0.5mm <sup>2</sup>	PT100 Sensor 8 terminal
48			
49			PT100 Sensor 8 COM
50	CH 9	0.5mm <sup>2</sup>	PT100 Sensor 9 terminal
51			
52			PT100 Sensor 9 COM
	SWITCH		<p>HMC9000 can connect to two AIN16-PT modules at the same time.</p> <p>Address selection: It is module 1 when the switch 1 is connected to terminal 123 while module 2 when connect to ON terminal.</p> <p>Baud rate selection: It is 250kbps when the switch 2 is connected to terminal 123 while 125kbps when connect to ON terminal.</p> <p>120Ω resistance selection: There is no matched resistance when the switch 3 is connected to terminal 123 while 120Ω matched resistance has been connected when the switch 3 is connected to ON terminal.</p>
	POWER		Power supply indicator and communication status indicator; It is flashing when the communication is abnormal.

## 5 PROTECTION

All data can be protected via HMC9000 controller. HMC9000 can connect to two AIN16-PT modules at the same time and users can select module address via dial switch. Following parameters can be set via HMC9000:

1. AIN16-PT module enable: HMC9000 can communicate with the module and collect the AIN16-C data only when the module is enabled;
2. Alarm threshold and alarm enable of each sensor;

AIN16-PT can collect data only and all alarms are initiated by HMC9000 controller. HMC9000 will initiate alarm when the sensor value is abnormal. There are two kinds of alarm: warning alarm and shutdown alarm. All alarms are handled by HMC9000 controller only.

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**5.1 WARNING**

Table 5 Warning Types

No.	Items	Range	Description
1	Sensor 1~16 high	From "Waiting for load" delay to "Cooling" delay	When the controller detects that the sensor 1-16 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on HMC9000 LCD.
2	Sensor 1~16 Low	From "Waiting for load" delay to "Cooling" delay	
3	Sensor 1~16 open	Always active.	



**5.2 SHUTDOWN ALARM**

Table 6 Shutdown Types

NO.	Items	DET Range	Description
1	Sensor 1~16 High	From "Waiting for load" delay to "Cooling" delay	When the controller detects that the sensor 1-16 shutdown alarm, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on HMC9000 LCD.
2	Sensor 1~16 Low	From "Waiting for load" delay to "Cooling" delay	



**5.3 PARAMETER CONFIGURATION**

AIN16-PT parameters can be set via HMC9000 controller or HMC9000 PC software; more details please refer to specific instruction of HMC9000.

Table 7 Parameter Configuration List

Parameter	Contents	Default
Module Enable	0: Enable 1: Disable	Disable
Sensor 1~16 set	Sensor types/ Alarm Speed /Range/ High Shutdown Enable / High Shutdown Value / High Shutdown Delay / Low Shutdown Enable / Low Shutdown Value / Low Shutdown Delay / High Warn Enable / High Warn Value / High Return Value / High Warn Delay/ Low Warn Enable / Low Warn Value / Low Return Value / Low Warn Delay For more details please refer to chapter 5.4	Sensor type : Temperature Sensor

## 5.4 SENSOR SETTINGS

Table 8 Sensor Configuration

NO.	Items	Contents	Remarks
1	Sensor types	0: Not Used 1: Oil Pressure Sensor 2: Temperature Sensor	
2	Sensor Curve	PT100	
3	Alarm Speed	(0-200)%	
4	Range (current type)	(0-6000)	
5	High Shutdown Enable	0: Enable 1: Disable	
6	High Shutdown Value	(0-6000)	
7	High Shutdown Delay	(0-3600)s	
8	Low Shutdown Enable	0: Enable 1: Disable	
9	Low Shutdown Value	(0-6000)	
10	Low Shutdown Delay	(0-3600)s	
11	High Warn Enable	0: Enable 1: Disable	
12	High Warn Value	(0-6000)	
13	High Return Value	(0-6000)	
14	High Warn Delay	(0-3600)s	
15	Low Warn Enable	0: Enable 1: Disable	
16	Low Warn Value	(0-6000)	
17	Low Return Value	(0-6000)	
18	Low Warn Delay	(0-3600)s	
19	User-defined string	User can reset the sensors' names which are displayed on HMC9000 LCD. e.g. rename sensor 1 as Temperature sensor. User-defined string can be edited via HMC9000 PC software only.	

## 6 ELECTRICAL CONNECTIONS

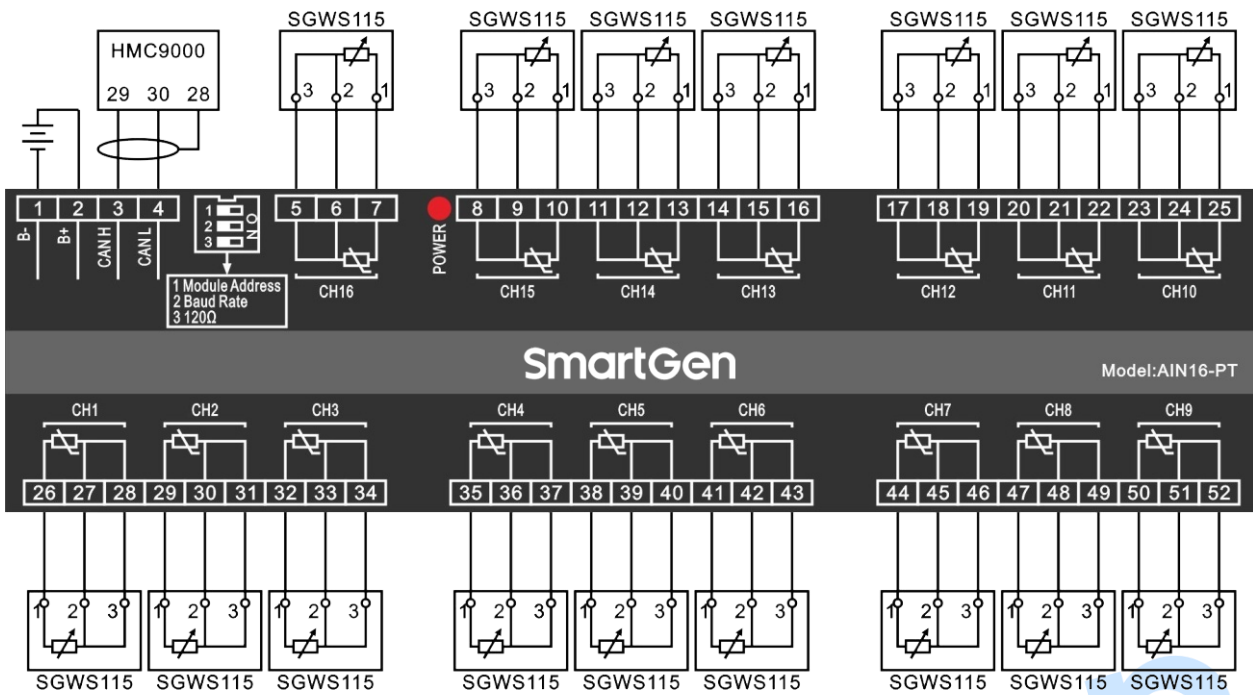


Fig.2 – AIN16-PT ELECTRICAL CONNECTION

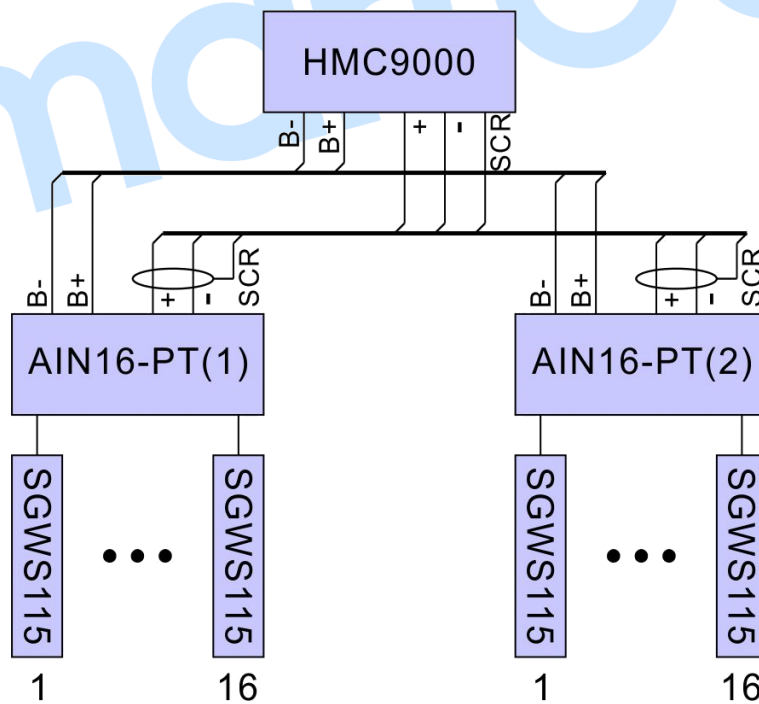


Fig.3 – HMC9000 controller connect with two AIN16-PT module

7 INSTALLATION

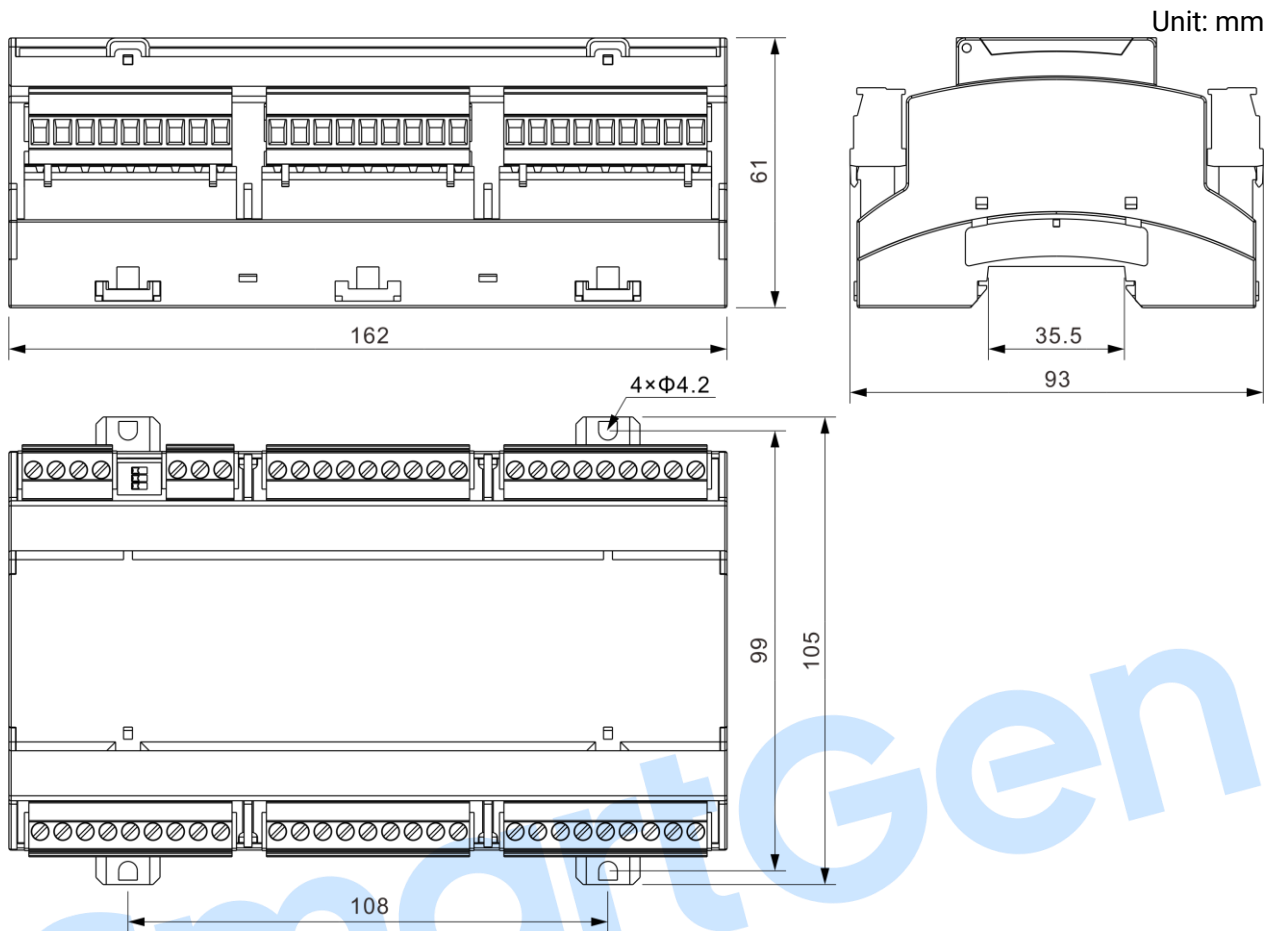


Fig.4 – Case Dimensions and Cutout



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## 8 TROUBLESHOOTING

PROBLEM	POSSIBLE SOLUTION
Controller no response with power.	Check batteries; Check controller connection wirings; Check DC fuse.
CANBUS communication failure	Check if CANBUS wires are connected in the opposite way.

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