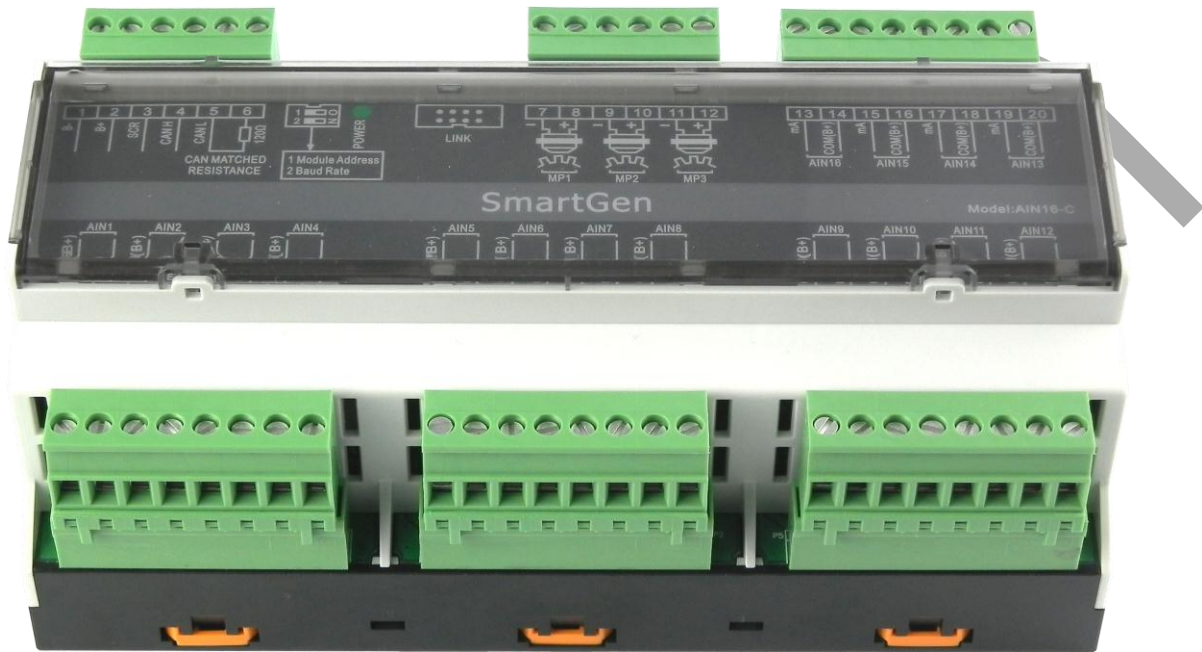


# Smartgen®

## AIN16-C Analog Input Module

### USER MANUAL



Smartgen

Smartgen Technology



众智电子 Chinese trademark

**Smartgen**<sup>®</sup> English trademark

**Smartgen** — make your generator *smart*

Smartgen Technology Co., Ltd.

No. 28 Jinsuo Road

Zhengzhou City

P. R. China

Tel: +86-371-67988888

+86-371-67981888

+86-371-67991553

+86-371-67992951

+86-371-67981000 (overseas)

Fax: 0086-371-67992952

Web: <http://www.smartgen.com.cn/>

<http://www.smartgen.cn/>

Email: [sales@smartgen.cn](mailto:sales@smartgen.cn)

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If the colors of actual products are different from the manual, please take the actual product as the standard.

Software Version

Date	Version	Content
2014-06-16	1.0	Original release.

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

Clarification of notation used within this publication.

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-C analog input module is an expansion module which has 16 analog input channels and each channel is 4mA~20mA current sensor 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.

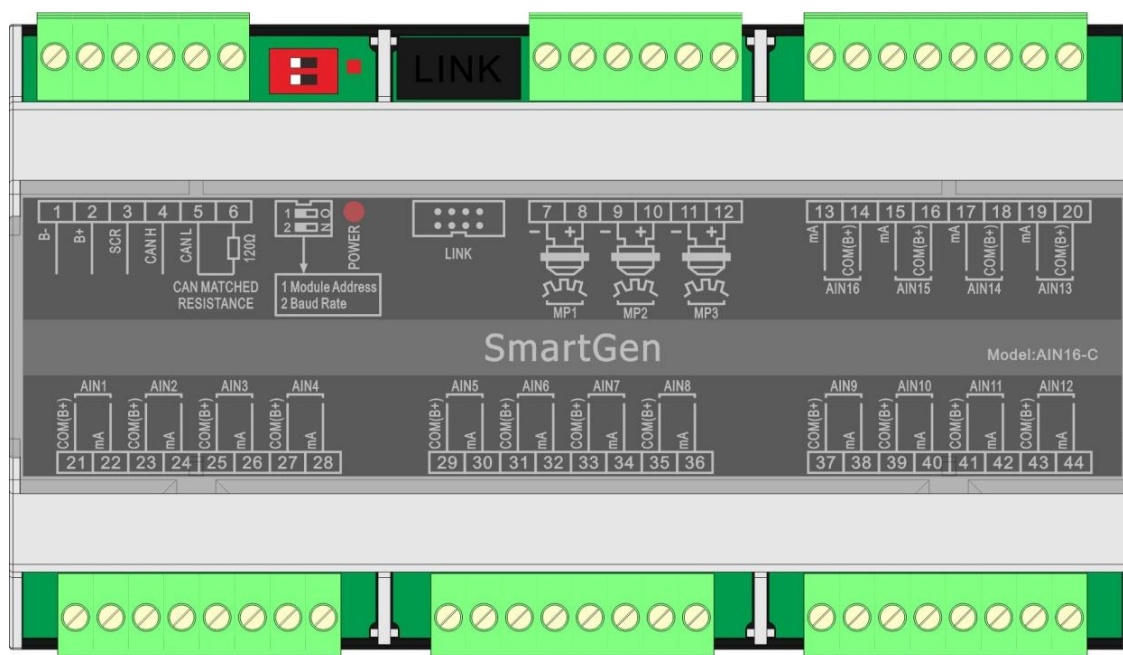
## 2 PERFORMANCE AND CHARACTERISTICS

- 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.

### 3 TECHNICAL PARAMETERS

Item	Content
Working Voltage	DC18.0V~35.0V continuous power supply
Power Consumption	<0.5W
Sensor Type	4mA~20mA; Current type
Measurement Accuracy Class	Class 0.25
Case Dimension	161.6mm x 89.7mm x 60.7mm
Rail Dimension	35mm
Working Conditions	Temp.: (-25~+70)°C Humidity: (20~93)%RH
Storage Conditions	Temp.: (-25~+70)°C
Weight	0.33kg

## 4 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	SCR	0.5mm <sup>2</sup>	CANBUS shielding wire; shielding wire with its one end grounded is recommended.
4	CAN(H)	0.5mm <sup>2</sup>	A CANBUS port which communicate with HMC9000 controller.
5	CAN(L)		
6	120Ω	0.5mm <sup>2</sup>	If needed, make terminal 5, 6 short circuits.
7	MP1(-)	0.5mm <sup>2</sup>	Connected with Speed sensor, shielding line is recommended. (B-) has already connected internally.
8	MP1(+)	0.5mm <sup>2</sup>	
9	MP2(-)	0.5mm <sup>2</sup>	Connected with Speed sensor, shielding line is recommended. (B-) has already connected internally.
10	MP2(+)	0.5mm <sup>2</sup>	
11	MP3(-)	0.5mm <sup>2</sup>	Connected with Speed sensor, shielding line is recommended. (B-) has already connected internally.
12	MP3(+)	0.5mm <sup>2</sup>	
13	AIN16(mA)	0.5mm <sup>2</sup>	(4-20)mA analog input;
14	AIN16(Com(B+))		B+ voltage output; (Provide power for Pressure Transmitter).
15	AIN15(mA)	0.5mm <sup>2</sup>	(4-20)mA analog input;
16	AIN15(Com(B+))		B+ voltage output; (Provide power for Pressure Transmitter).



AIN16-C Analog Input Module

No.	Function	Cable Size	Description
17	AIN14(mA)	0.5mm <sup>2</sup>	(4-20)mA analog input;
18	AIN14(Com(B+))		B+ voltage output; (Provide power for Pressure Transmitter).
19	AIN13(mA)	0.5mm <sup>2</sup>	(4-20)mA analog input;
20	AIN13(Com(B+))		B+ voltage output; (Provide power for Pressure Transmitter).
21	AIN1(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
22	AIN1(mA)		(4-20)mA analog input;
23	AIN2(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
24	AIN2(mA)		(4-20)mA analog input;
25	AIN3(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
26	AIN3(mA)		(4-20)mA analog input;
27	AIN4(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
28	AIN4(mA)		(4-20)mA analog input;
29	AIN5(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
30	AIN5(mA)		(4-20)mA analog input;
31	AIN6(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
32	AIN6(mA)		(4-20)mA analog input;
33	AIN7(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
34	AIN7(mA)		(4-20)mA analog input;
35	AIN8(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
36	AIN8(mA)		(4-20)mA analog input;
37	AIN9(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
38	AIN9(mA)		(4-20)mA analog input;
39	AIN10(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
40	AIN10(mA)		(4-20)mA analog input;
41	AIN11(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
42	AIN11(mA)		(4-20)mA analog input;
43	AIN12(Com(B+))	0.5mm <sup>2</sup>	B+ voltage output; (Provide power for Pressure Transmitter).
44	AIN12(mA)		(4-20)mA analog input;
	SWITCH	HMC9000 can connect to two AIN16-C modules at the	

AIN16-C Analog Input Module

No.	Function	Cable Size	Description
			<p>same time.</p> <p>Address selection: It is module 1 when the switch 1 is connected to terminal 12 while module 2 when connect to ON terminal.</p> <p>Baud rate selection: It is 250kbps when the switch 2 is connected to terminal 12 while 125kbps when connect to ON terminal.</p>
	POWER		Power supply indicator and communication status indicator; It is flashing when the communication is abnormal.
	LINK		System upgrade port ; modify the default parameters.

## 5 PROTECTION

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

1. AIN16-C 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-C 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.

## 5.1 WARNING

Warning types are as follows:

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

Shutdown types are as follows,

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

### 5.3 PARAMETER CONFIGURATION

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

#### Parameter Configuration List

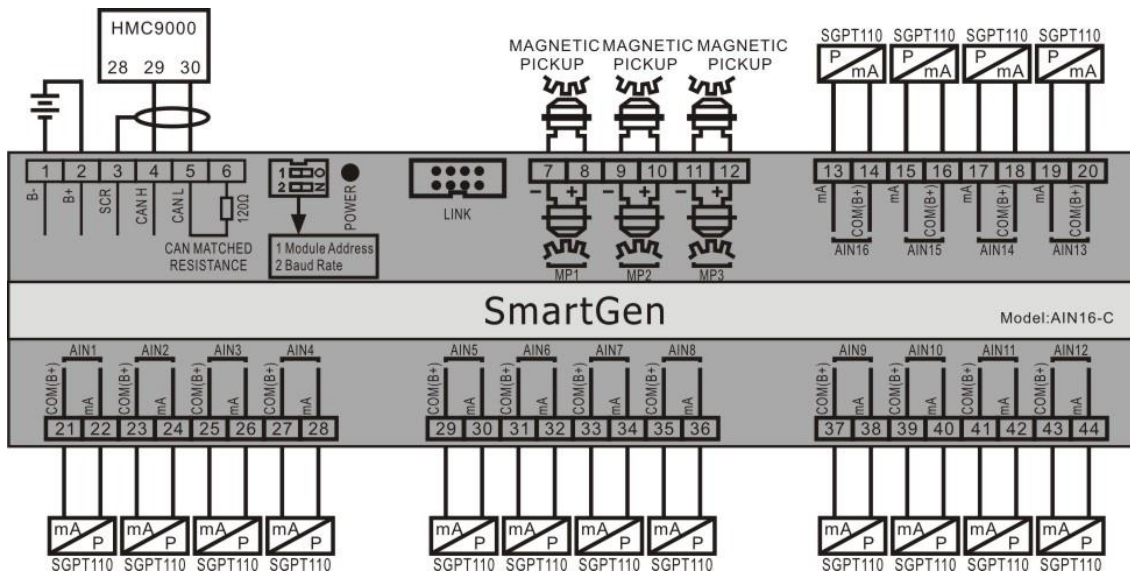
Parameter	Contents	Default
Module Enable	0: Enable 1: Disable	Disable
Sensor 1~16 set	Sensor types/ Alarm Speed /Range/ High Shutdown Enable / High Shutdown Value / High Shutdown Delay / Low Shutdown Enable / Low Shutdown Value / Low Shutdown Delay / High Warn Enable / High Warn Value / High Return Value / 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

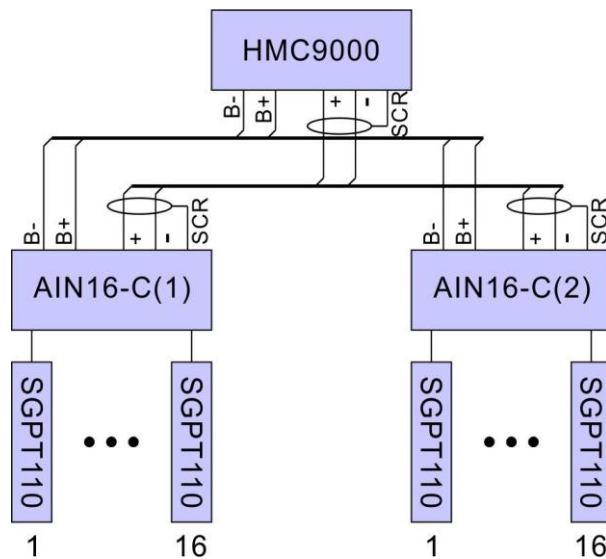
NO.	Items	Contents	Remarks
1	Sensor types	0: Not Used 1: Oil Pressure Sensor 2: Temperature Sensor	
2	Sensor Curve	4-20mA	
3	Alarm Speed	(0-200)%	
4	Range (current type)	(0-6000)kpa	
5	High Shutdown Enable	0: Enable 1: Disable	
6	High Shutdown Value	(0-6000)	
7	High Shutdown Delay	(0-3600)s	
8	Low Shutdown 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

### AIN16-C ELECTRICAL CONNECTION



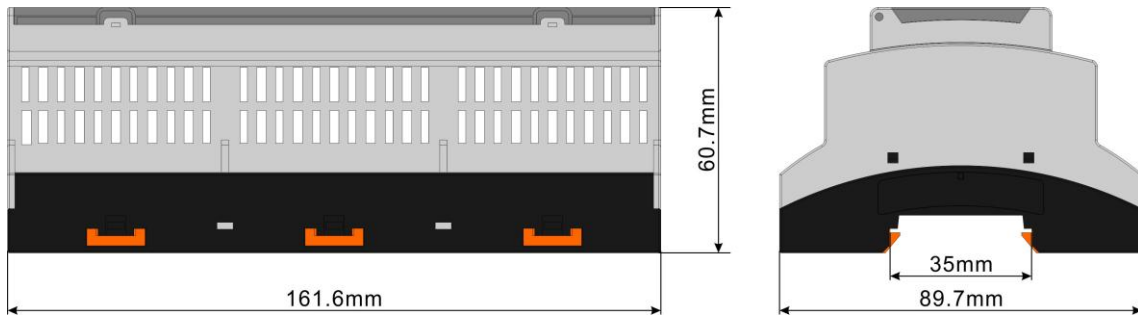
HMC9000 controller connect with two AIN16-C module





## 7 INSTALLATION

Case dimensions:



## 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.