# SmartGen
MAKING CONTROL SMARTER

AIN16

ANALOG INPUT MODULE

USER MANUAL
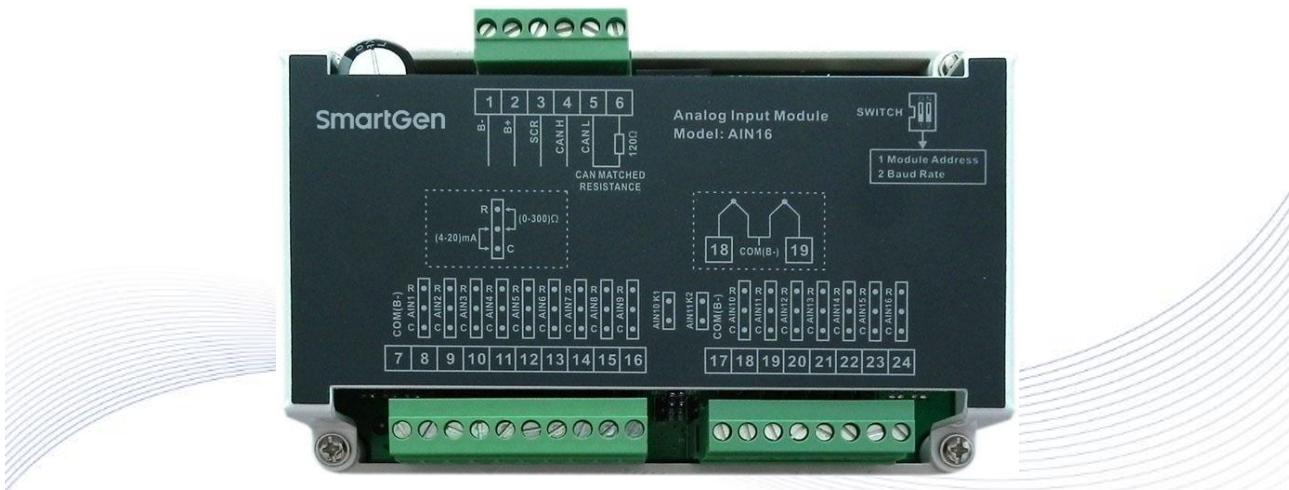
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SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

SmartGen众智 Chinese trademark

SmartGen English trademark

SmartGen — make your generator *smart*

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Software Version

Date	Version	Content
2013-11-18	1.0	Original release.
2017-04-28	1.1	Modify Case Dimension
2022-11-17	1.2	Update the manual format, information and logo of SmartGen.

Contents

1 OVERVIEW

AIN16 analog input module is an expansion module which has 16 analog input channels and the Pt100 temperature sensor input or 4mA~20mA current sensor input can be chosen for each channel; otherwise, two of them can be chosen as K type thermocouple. The data collected by AIN16 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

➢ Must be used with HMC9000 together.

➢ Each channel can be set as Pt100 temperature sensor input or 4mA~20mA current sensor input via jumper; otherwise, two of them can be chosen as K type thermocouple.

➢ The data is sent to HMC9000 controller via CANBUS port with high speed transmission and short delay.

➢ Modular structure，epoxy resin coat, pluggable terminal block and easy for installation.

3 TECHNICAL PARAMETERS

Item	Content
Working Voltage	DC18.0V~35.0V continuous power supply
Power Consumption	<2W
Sensor type	Pt100，4mA~20mA，K type thermocouple
Case Dimension	144mm x 96mm x 39.3mm
Working Temp.	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Conditions	Temp.：(-25~+70)°C
Weight	0.50kg

4 BACK PANEL
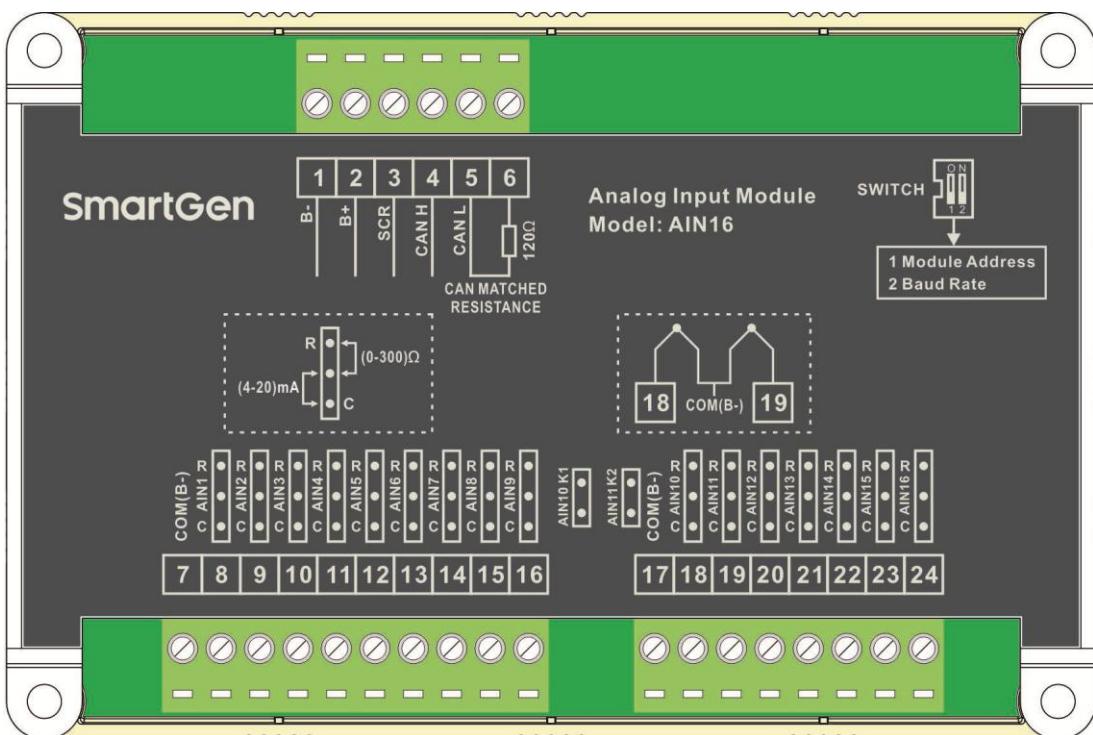
No.	Function	Cable Size	Description
1	B-	1.0mm^2	DC power supply negative input.
2	B+	1.0mm^2	DC power supply positive input.
3	SCR (CANBUS)	0.5mm^2	A CANBUS port which communicate with HMC9000 controller. Impedance-120Ω shielding wire with its one end grounded is recommended. There is 120Ω terminal resistance inside already; if needed, make terminal 5, 6 short circuits.
4	CAN(H) (CANBUS)		
5	CAN(L) (CANBUS)		
6	120Ω		
7	COM(B-)	1.0mm^2	AIN1-9 Common port
8	AIN1	0.5mm^2	The 1st~9th analog input: The analog is resistive type input (Pt100) when the jumper plugs into R terminal. It is current type input (4mA~20mA) when the jumper plugs into C terminal.
9	AIN2	0.5mm^2	
10	AIN3	0.5mm^2	
11	AIN4	0.5mm^2	
12	AIN5	0.5mm^2	
13	AIN6	0.5mm^2	
14	AIN7	0.5mm^2	
15	AIN8	0.5mm^2	
16	AIN9	0.5mm^2	
17	COM(B-)	1.0mm^2	AIN10-16 Common port

No.	Function	Cable Size	Description
18	AIN10	0.5mm^2	The 10th analog input can be set as resistive type, current type and K type thermocouple: 1. The input is resistive type input (Pt100) when the jumper plugs into R terminal. 2. It is current type input (4mA~20mA) when the jumper plugs into C terminal. 3. It is K type thermocouple when the jumper plugs into K1 and now the ends of AIN10 are hanging in the air.
19	AIN11	0.5mm^2	The 11th analog input can be set as resistive type, current type and K type thermocouple: 1. The input is resistive type input (Pt100) when the jumper plugs into R terminal. 2. It is current type input (4mA~20mA) when the jumper plugs into C terminal. 3. It is K type thermocouple when the jumper plugs into K2 and now the ends of AIN11 are hanging in the air.
20	AIN12	0.5mm^2	The 12th ~16th analog input: The input is resistive type input (Pt100) when the jumper plugs into R terminal. It is current type input (4mA~20mA) when the jumper plugs into C terminal.
21	AIN13	0.5mm^2	
22	AIN14	0.5mm^2	
23	AIN15	0.5mm^2	
24	AIN16	0.5mm^2	
	SWITCH		HMC9000 can connect to two AIN16 modules at the same time. Address selection：It is module 1 when the switch 1 is connected to terminal 12 while module 2 when connect to ON terminal. Baud rate selection: It is 250kbps when the switch 2 is connected to terminal 12 while 125kbps when connect to ON terminal.
	LINK		System upgrade port
	LED		Power supply indicator

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

1. AIN16 module enable: HMC9000 can communicate with the module and collect the AIN16 data only when the module is enabled;

2. All sensor types;

3. Alarm threshold and alarm enable of each sensor;

AIN16 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.

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 that 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 that 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 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/ Sensor Curve/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

NO.	Items	Contents	Remarks
1	Sensor types	0：Not Used 1：Oil Pressure Sensor 2：Temperature Sensor 3：K type Thermocouple	
2	Sensor Curve	1：4-20mA 2：PT100 3：K Type Thermocouple	
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 INSTALLATION

Case dimensions：
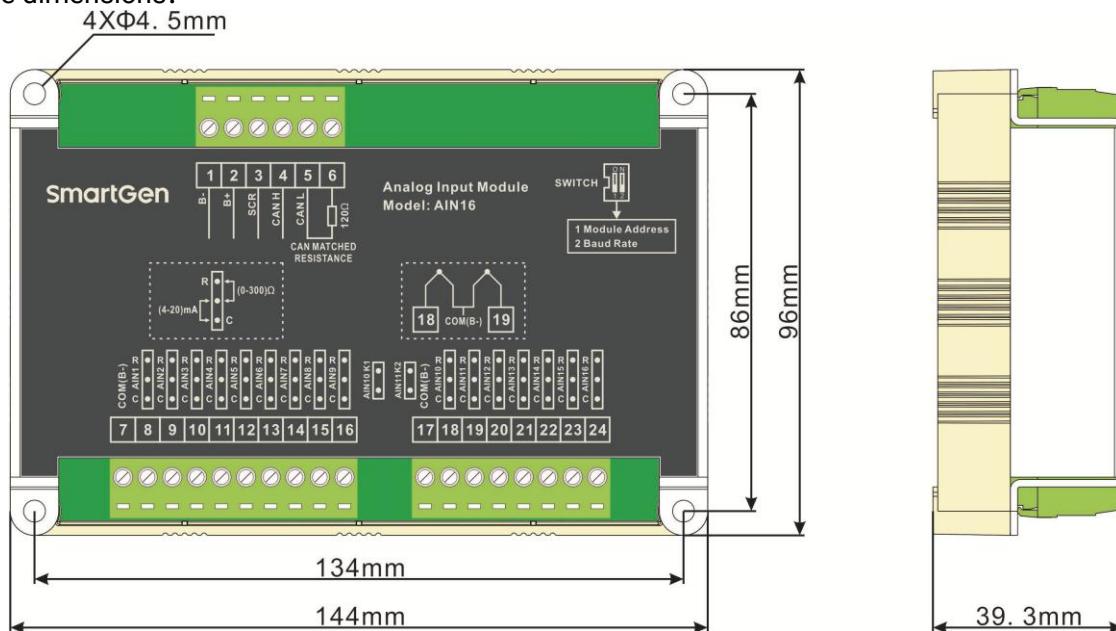
7 TROUBLESHOOTING

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;
Oversized collected data gap	Check if the type of chosen jumper socket is correct.