

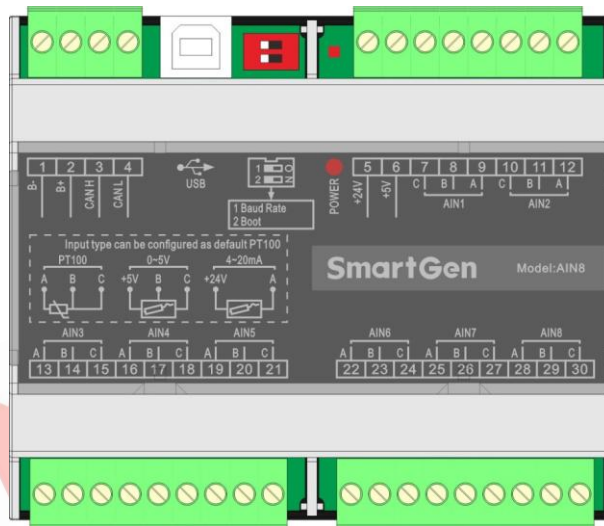


**SmartGen**  
ideas for power

## AIN8

### ANALOG INPUT MODULE

### USER MANUAL



**SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.**



Chinese trademark

**SmartGen** English trademark

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Table 1 - Software Version

Date	Version	Content
2017-12-01	1.0	Original release.



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## 1 OVERVIEW

**AIN8 analog input module** is an expansion module which has 8 analog input channels and the PT100 resistor-type sensor input, (4~20)mA current-type sensor input or (0-5)V voltage-type sensor input can be chosen for each channel. The data collected by AIN8 are transmitted to the host controller for processing via CANBUS port. Different alarm threshold values and sensor names can be set for each sensor via host controller, if sensor meet with alarm condition, corresponding alarm information will be displayed on the host controller.

## 2 PERFORMANCE AND CHARACTERISTICS

- Each channel can be set as PT100 resistor-type sensor input, (4~20)mA current-type sensor input or (0-5)V voltage-type sensor input;
- User can define each channel sensor's name;
- Alarm threshold of each channel can be configured;
- Changing sensor types can be realized via software configuration, and there is no need to change hardware interface;
- AIN8 CANBUS communication baud rate can be configured as 250kbps or 125kbps by DIP switch;
- AIN8 must be used with the host controller;
- Widely power voltage range (8~35)VDC, which is suitable for different voltage requires of starter battery;
- Modular structure, flame retardant ABS shell, pluggable wiring terminals, guide rail mounting, compact structure and easy operation.

## 3 SPECIFICATION

Table 2 – Technical Parameters

Item	Content
Working Voltage	DC8.0V~35.0V continuous power supply
Overall Power Consumption	<2W
PT100 Resistor-type Input	(0-300) $\Omega$
(0-5)V Voltage-type Input	(0-5)V
(4-20)mA Current-type Input	(0-20)mA
Case Dimension	107.6mm x 89.7mm x 60.7mm
Guide Rail Dimension	35mm
Working Conditions	Temp.: (-25~+70) $^{\circ}$ C Humidity: (20~93)%RH
Storage Conditions	Temp.: (-25~+70) $^{\circ}$ C
Insulation Strength	Apply AC 2.2kV voltage between AV high and low voltage terminals, and the leakage current is not more than 3mA within 1min.
Weight	0.22kg

4 WIRE CONNECTION

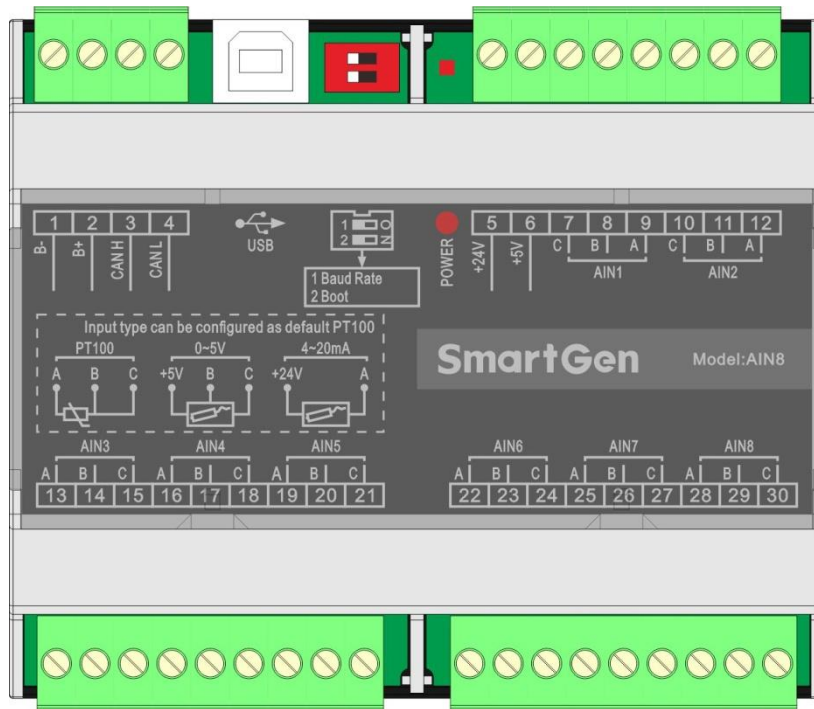


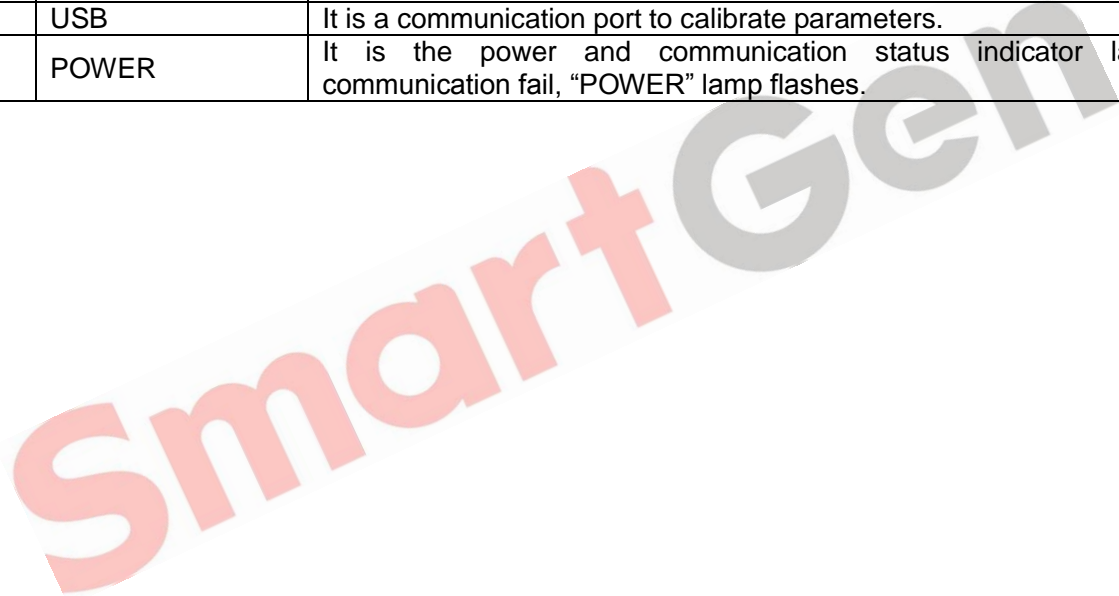
Fig.1 – AIN8 Terminal Diagram

Table 3 – Wire Connection Description

No.	Function	Cable Size	Remark
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>	Connect with CANBUS port of the host controller. 120Ω impedance shielding wire is recommended with single en earthed.
4	CAN(L)		
5	+24V	1.0mm <sup>2</sup>	Supply power for(4~20)mA sensor.
6	+5V	1.0mm <sup>2</sup>	Supply power for (0-5)V sensor.
7	AIN1	C	1 <sup>st</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see “7. APPLICATION”.
8		B	
9		A	
10	AIN2	C	2 <sup>nd</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see “7. APPLICATION”.
11		B	
12		A	
13	AIN3	A	3 <sup>rd</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see “7. APPLICATION”.
14		B	
15		C	
16	AIN4	A	4 <sup>th</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see “7. APPLICATION”.
17		B	
18		C	
19	AIN5	A	5 <sup>th</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see “7. APPLICATION”.
20		B	
21		C	
22	AIN6	A	6 <sup>th</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is
23		B	



No.	Function	Cable Size	Remark
24		C	confirmed, wire connection details please to see "7. APPLICATION".
25	AIN7	A	7 <sup>th</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see "7. APPLICATION".
26		B	
27		C	
28	AIN8	A	8 <sup>th</sup> channel sensor input (resistor-type, current-type and voltage-type can be chosen). After input type is confirmed, wire connection details please to see "7. APPLICATION".
29		B	
30		C	
	SWITCH		Host controller can connect with not more than 1 AIN8 module; Baud rate selection: It is 250kbps when the switch 1 is connected to terminal 12 while 125kbps when connect to ON terminal.  BOOT mode select: It is NON-BOOT mode when the switch 2 is connected to terminal 12 while BOOT mode when connect to ON terminal. <b>NOTE: BOOT mode is used to update the software, please caution to use!</b>
	USB		It is a communication port to calibrate parameters.
	POWER		It is the power and communication status indicator lamp, if communication fail, "POWER" lamp flashes.



## 5 PROTECTION

### 5.1 PARAMETER SETTING

All data can be protected via host controller. Following parameters can be set via host controller:

- AIN8 module enable: host controller can communicate with the module and collect the AIN8 data only when the module is enabled;
- Alarm threshold, alarm enable and alarm delay of each sensor;

**▲ NOTE: AIN8 can collect data only and all alarms are initiated by host controller controller. Host controller will initiate alarm when the sensor value is abnormal. There are two kinds of alarm: warning alarm and shutdown alarm. Alarms information totally processed by the host controller only.**

### 5.2 WARNING

Table 4 – Warning Alarms

No.	Items	Detection Range	Description
1	Sensor 1~8 high	Active when engine speed exceeds pre-set alarm speed.	When the controller detects that the sensor 1-8 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
2	Sensor 1~8 Low	Active when engine speed falls below pre-set alarm speed.	
3	Sensor 1~8 open circuit	Always active	
Remark: sensor names can be defined by users from PC software.			

### 5.3 SHUTDOWN ALARM

Table 5 - Shutdown Alarms

NO.	Items	Detection Range	Description
1	Sensor 1~8 High	Active when engine speed exceeds pre-set alarm speed.	When the controller detects that the sensor 1-8 shutdown alarm, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
2	Sensor 1~8 Low	Active when engine speed falls below pre-set alarm speed.	
Remark: sensor names can be defined by users from PC software, and sensor name in the alarm information is user-defined. .			

## 6 PARAMETER CONFIGURATION

AIN8 parameters can be set via host controller or PC software; more details please refer to specific instruction of the host controller.

Table 6 - Parameter Configuration List

Parameter	Contents	Default
Module Enable	0: Disable 1: Enable	0: Disable
Sensor 1~8 set	Sensor types/ Alarm speed/ Range/ High shutdown enable/ High shutdown value/ Low shutdown enable/ Low shutdown value/ Low shutdown delay/ High warning enable/ High warning value/ High warning return value/ High warning delay/ Low warning enable/ Low warning value/ Low warning return value/ Low warning delay For more details please refer to <i>Table 7</i> as below.	Sensor type: PT100 Temperature Sensor

Table 7 – Sensor Content Setting

NO.	Items	Content	Remarks
1	Sensor types	0: Not Used 1: Pressure Sensor 2: Temperature Sensor	
2	Sensor Curve	please refer to <i>Table 8</i>	
3	Alarm Speed	(0-200)%	Alarm detection starts when engine speed exceeds alarm speed.
4	Range (current type)	(0-6000)kpa	Current sensor can be set 4-20mA corresponding range.
5	High Shutdown Enable	0: Enable 1: Disable	After it is enabled, high shutdown alarm detection starts.
6	High Shutdown Value	(0-6000)	
7	High Shutdown Delay	(0-3600)s	
8	Low Shutdown Enable	0: Enable 1: Disable	After it is enabled, low shutdown alarm detection starts.
9	Low Shutdown Value	(0-4000)	
10	Low Shutdown Delay	(0-3600)s	
11	High Warning Enable	0: Enable 1: Disable	After it is enabled, high warning alarm detection starts.
12	High Warning Value	(0-6000)	





NO.	Items	Content	Remarks
13	High Return Value	(0-6000)	
14	High Warning Delay	(0-3600)s	
15	Low Warn Enable	0: Enable 1: Disable	After it is enabled, low warning alarm detection starts.
16	Low Warn Value	(0-4000)	
17	Low Return Value	(0-4000)	
18	Low Warn Delay	(0-3600)s	
19	User-defined string	User can reset the sensors' names which are displayed on host controller LCD. e.g. rename sensor 1 as " Fresh Water Temp.". User-defined string can be edited via PC software only.	

Table 8 – Sensor Curves List

Temperature sensor curve type		
No.	Curve name	Remark
0	Not used	
1	PT100	
Pressure sensor curve type		
0	Not used	
1	4-20mA	
2	Reserved	
3	Reserved	
4	Reserved	
5	Reserved	
6	Reserved	
7	Reserved	
8	Reserved	
9	Reserved	
10	User-defined voltage curve	(0-5)V voltage-type curve can be user-defined.
11	(0.5-4.5)V voltage-type	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

## 7. APPLICATION

### 7.1 PT100 SENSOR APPLICATION DIAGRAM

AIN8 can connect with 3 types of sensor, and PT100 resistor-type wiring application diagram is as below,

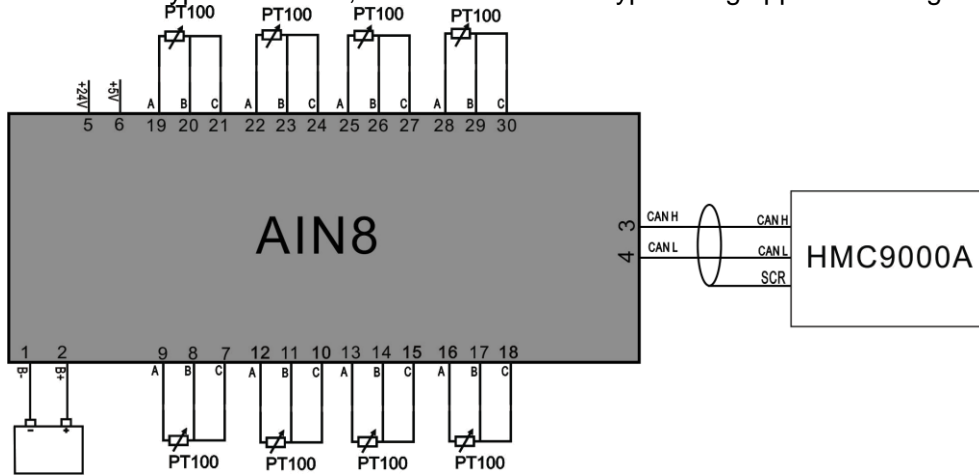


Fig.2 – PT100 Sensor Wiring Connection

### 7.2 4~20mA CURRENT TYPE SENSOR APPLICATION DIAGRAM

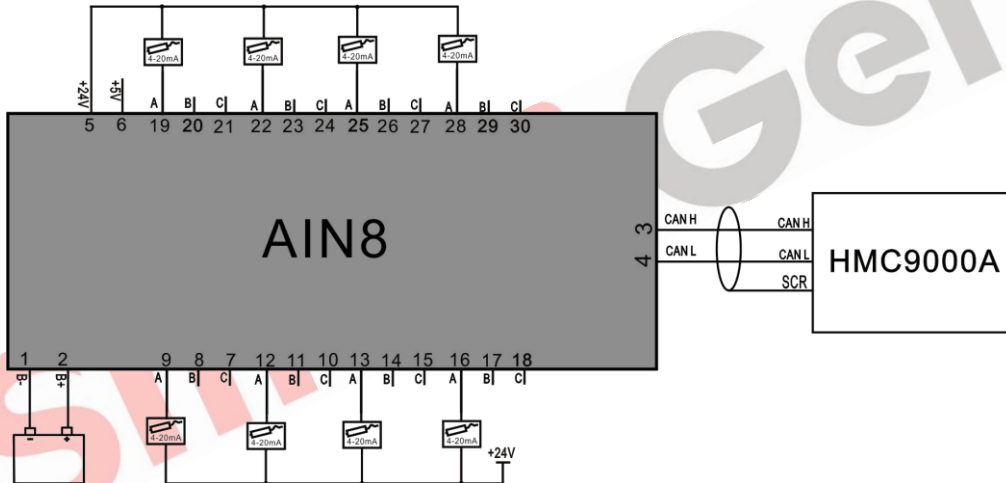


Fig.3 – (4~20)mA Sensor Wiring Connection

### 7.3 0~5V VOLTAGE TYPE SENSOR APPLICATION DIAGRAM

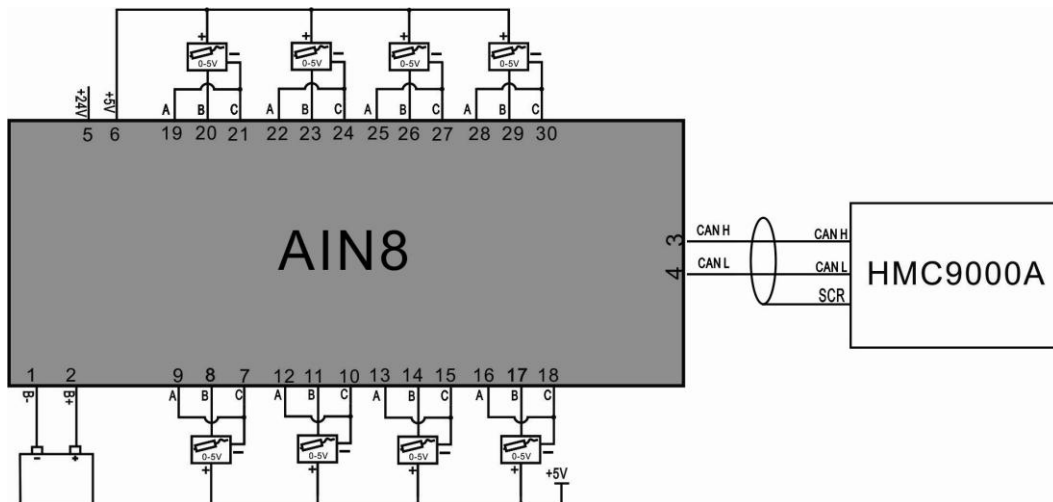


Fig.4 – (0-5)V Sensor Wiring Connection



## 6 INSTALLATION

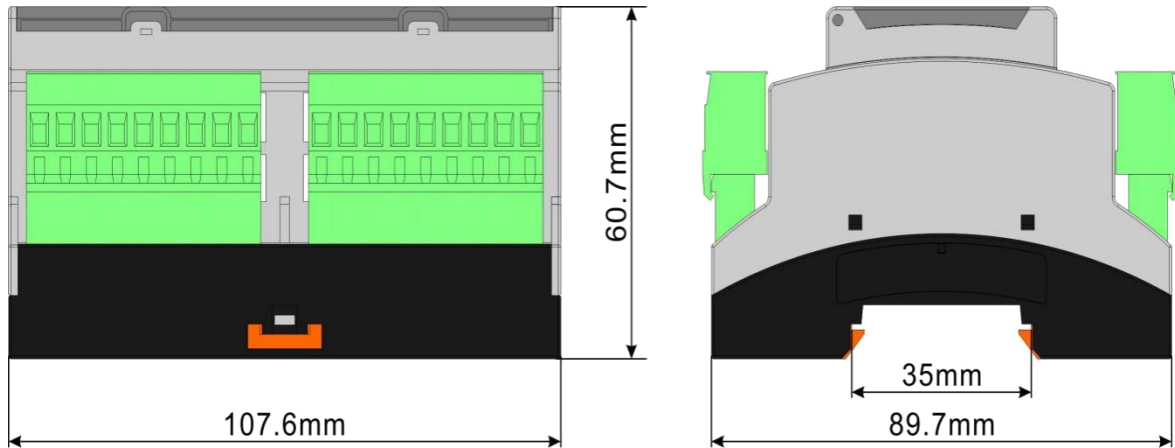


Fig.5 Overall Dimension

## 7 TROUBLESHOOTING

PROBLEM	POSSIBLE SOLUTION
Controller no response with power.	Check controller connection wirings;
Module communication failure	Check whether AIN8 module is enabled or not;
Large deviation of collected data	Check if the type of chosen sensor or wire connection is correct.