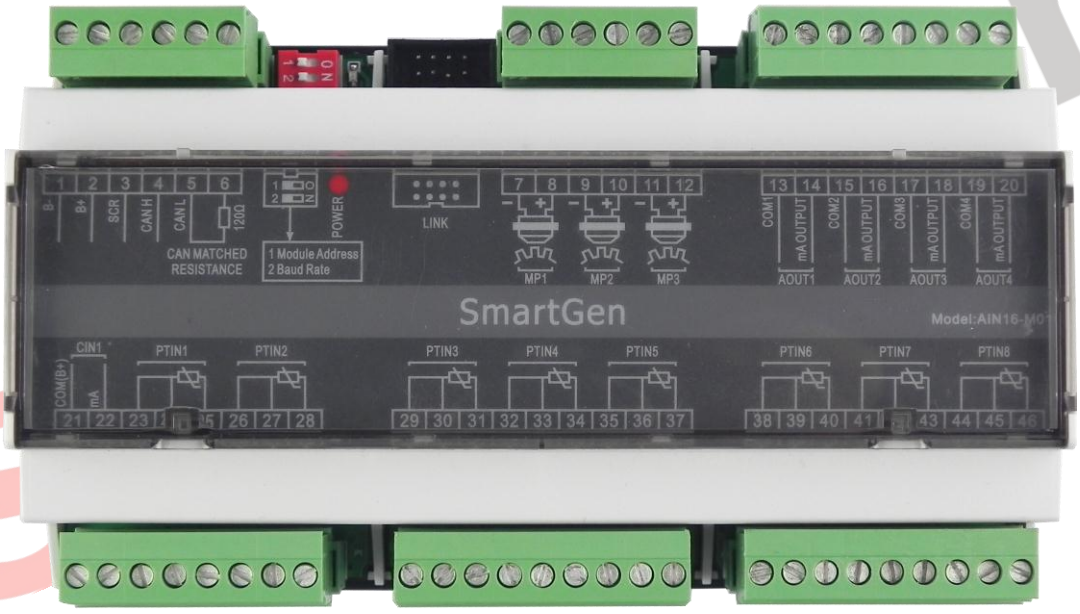
AIN16-M01

ANALOG INTEGRATED MODULE

USER MANUAL



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SmartGen — make your generator ***smart***

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Software Version

Date	Version	Content
2017-03-17	1.1	Original release.

This user manual only suits for AIN16-M01 Analog Integrated Module.

Notation Clarification as follows,

Symbol	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 a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

CONTENTS

1 OVERVIEW

AIN16-M01 analog integrated module contains 8 PT100 sensor input channels, 3 speed input channels, 4 4~20mA output channels and one 4~20mA input channel. The data are transmitted to the HMC9000 controller for processing via CANBUS port, then HMC9000 transfers 4~20mA data back into AIN16-M01 module via CANBUS port and AIN16-M01 outputs corresponding 4~20mA signals. Values can be set for each sensor via HMC9000 controller as demands.

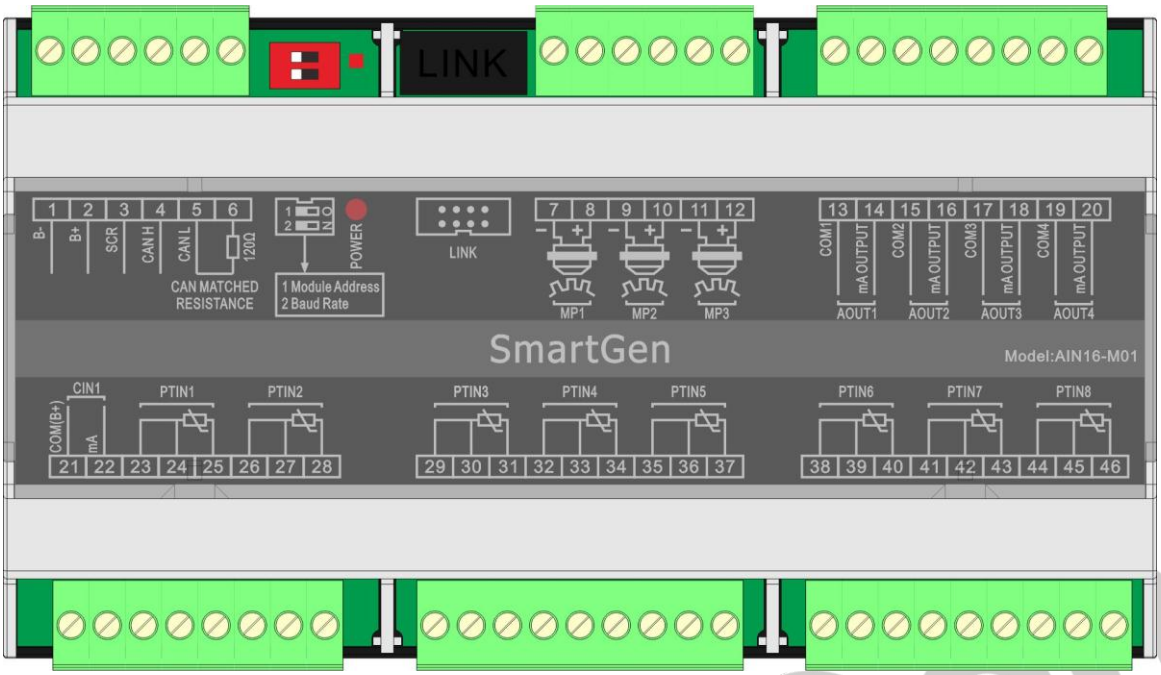
2 PERFORMANCE AND CHARACTERISTICS

- 32-bit ARM micro-processor with 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
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-		1.0mm²	DC power supply negative input.
2	B+		1.0mm²	DC power supply positive input.
3	SCR		0.5mm²	CANBUS shielded wire, with single end earthed.
4	CAN(H)			A CANBUS port which communicate with HMC9000 controller.
5	CAN(L)			
6	120Ω Terminal Resistor			Short out 5 and 6 terminals if 120Ω terminal resistor is needed.
7	MP1	-	0.5mm²	Connect with speed sensor(shielded wire is recommended). Speed sensor input (-), B- has been connected in the controller.
8		+		
9	MP2	-	0.5mm²	
10		+		
11	MP3	-	0.5mm²	
12		+		
13	AOUT1	COM1	0.5mm²	4~20mA output common port
14		mAOUTPUT1		4~20mA output port
15	AOUT2	COM2	0.5mm²	4~20mA output common port
16		mAOUTPUT2		4~20mA output port
17	AOUT3	COM3	0.5mm²	4~20mA output common port
18		mAOUTPUT3		4~20mA output port
19	AOUT4	COM4	0.5mm²	4~20mA output common port
20		mAOUTPUT4		Sensor terminal
21	CIN1	COM(B+)	0.5mm²	4~20mA analog input. B+ input (supply power for pressure transmitter)
22		mA		

23	PTIN1	C	0.5mm²	PT100 sensors are three-wire system terminals, and C terminal stands for common port. A and B terminals are amphenol connectors.
24		B		
25		A		
26	PTIN2	C	0.5mm²	
27		B		
28		A		
29	PTIN3	C	0.5mm²	
30		B		
31		A		
32	PTIN4	C	0.5mm²	
33		B		
34		A		
35	PTIN5	C	0.5mm²	
36		B		
37		A		
38	PTIN6	C	0.5mm²	
39		B		
40		A		
41	PTIN7	C	0.5mm²	
42		B		
43		A		
44	PTIN8	C	0.5mm²	
45		B		
46		A		
47				
	SWITCH		HMC9000 can connect to two AIN16-M01 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.	
	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-M01 modules at the same time and users can select module address via dial switch. Following parameters can be set via HMC9000:

1) AIN16-M01 module enable: HMC9000 can communicate with the module and collect the data;

2) Each of sensor's alarm threshold and alarm are enabled;

AIN16-M01 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	PTIN1~ PTIN8 High	From "Waiting for load" delay to "Cooling" delay	When the controller detects the sensor warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on HMC9000 LCD.
2	MP1~MP3 High	Always active.	
3	CIN1 High	From "Waiting for load" delay to "Cooling" delay	
4	PTIN1~ PTIN8 Low	From "Waiting for load" delay to "Cooling" delay	
5	CIN1 Low	From "Waiting for load" delay to "Cooling" delay	
6	PTIN1~ PTIN8 Open Circuit	Always active.	
7	CIN1 Open Circuit	Always active.	

5.2 SHUTDOWN ALARM

Shutdown types are as follows,

No.	Items	DET Range	Description
1	PTIN1~ PTIN8 High	From “Waiting for load” delay to “Cooling” delay	When the controller detects the sensor shutdown alarms, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on HMC9000 LCD.
2	MP1~MP3 High	Always active	
3	CIN1 High	From “Waiting for load” delay to “Cooling” delay	
4	PTIN1~ PTIN8 Low	From “Waiting for load” delay to “Cooling” delay	
5	CIN1 Low	From “Waiting for load” delay to “Cooling” delay	

5.3 PARAMETER CONFIGURATION

AIN16-M-01 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
PTIN1~ PTIN8 and CIN1 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 the following chapter	
MP1~MP3 Set	Sensor Enable/Teeth Number Set/ High Shutdown Enable / High Shutdown Value / High Shutdown Delay/ High Warn Enable / High Warn Value / High Return Value / High Warn Delay	
4~20mA Output Set	Output can be configured as relevant to the sensor	

5.4 PTIN1~PTIN8 AND CIN1 SETTINGS

No.	Items	Contents	Remarks
1	Sensor types	0：Not Used 1：Oil Pressure Sensor 2：Temperature Sensor	
2	Sensor Curve	0：PT100 1：4~20mA	
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 Exhaust sensor. User-defined string can be edited via HMC9000 PC software only.	

5.5 MP1~MP3 SETTINGS

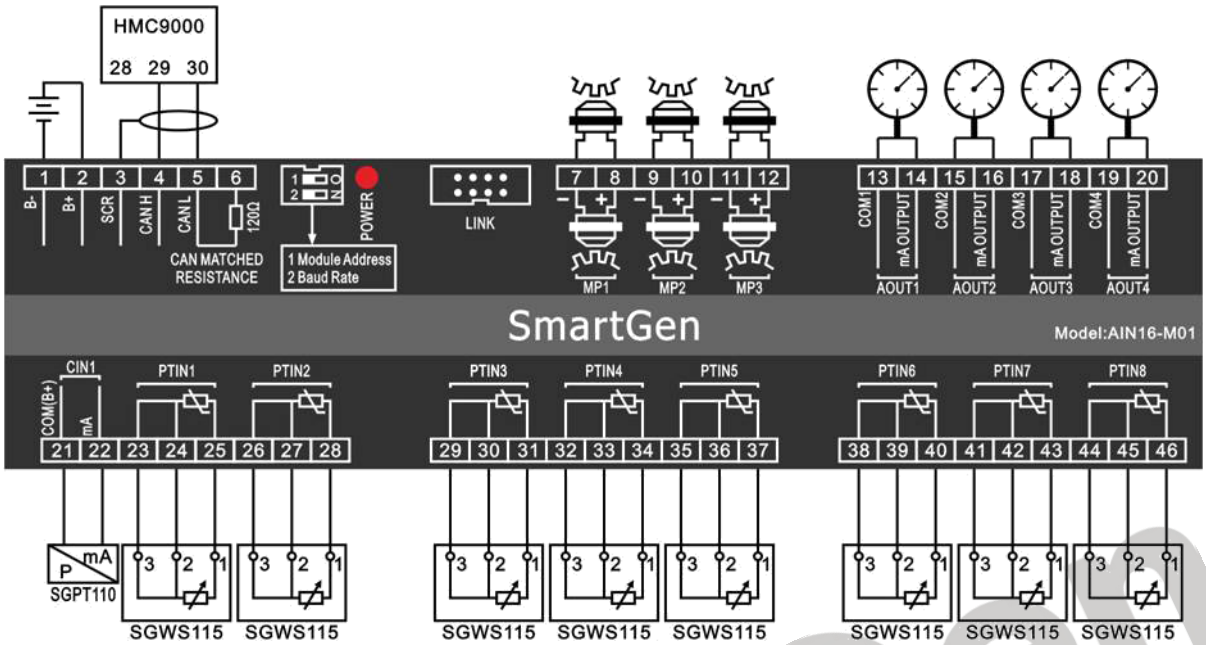
No.	Items	Contents	Remarks
1.	Sensor Enable	0：Disable 1：Enable	
2.	Teeth Number	(1-300)	
3.	High Shutdown Enable	0：Enable 1：Disable	
4.	High Shutdown Value	(0-6000)	
5.	High Shutdown Delay	(0-3600)s	
6.	High Warn Enable	0：Enable 1：Disable	
7.	High Warn Value	(0-6000)	
8.	High Warn Delay	(0-3600)s	

5.6 AOUT1~ AOUT4 SETTINGS

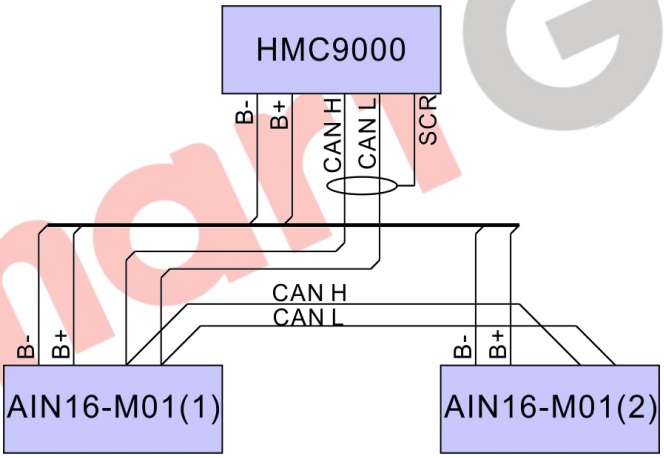
No.	Items	Description	Remark
0	HMC9000 Speed	After analog output selected corresponding sensor, HMC9000 transfers data to related 4~20mA output port of the AIN16-M01 module via CANBU.	
1~8	HMC9000 Sensor1~ Sensor 8		
9~11	AIN16-C Module1 Speed 1~3		
12~27	AIN16-C Module1 Sensor 1~16		
28~30	AIN16-C Module2 Speed 1~3		
31~46	AIN16-C Module2 Sensor 1~16		
47~62	AIN16-PT Module1 Sensor 1~16		
63~78	AIN16-PT Module2 Sensor 1~16		
79~81	AIN16-M01 Module1 Speed 1~3		
82~89	AIN16-M01 Module1 PT00 Sensor 1~8		
90	AIN16-M01 Module1, 4~20mA Sensor 1		
91~93	AIN16-M01 Module2 Speed 1~3		
94~101	AIN16-M01 Module2 PT00 Sensor 1~8		
102	AIN16-M01 Module2, 4~20mA Sensor 1		
102~149	Reserved		

6 ELECTRICAL CONNECTIONS

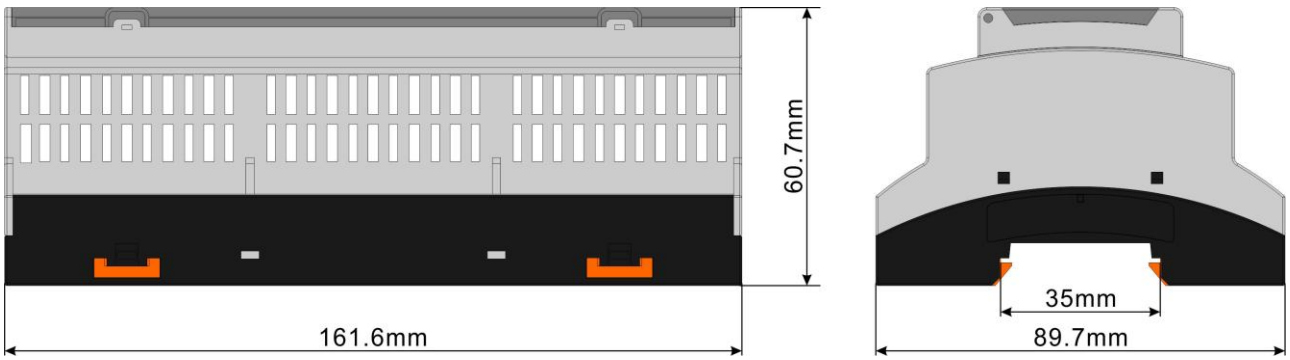
AIN16-M01Electrical connection diagram is as follows,



HMC9000 with two AIN16-M01 modules connection diagram is as follows,



7 INSTALLATION



8 TROUBLE SHOOTING

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.