

# SmartGen

MAKING CONTROL SMARTER

## HMC9000A/HMC9000S DIESEL ENGINE CONTROLLER (With J1939 Interface) USER MANUAL



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**Table 1 Software Version**

Date	Version	Content
2016-08-08	1.0	Original release.
2017-03-26	1.1	Modified Volvo-EMS2 wiring connection mode.
2017-11-25	1.2	Added Enabled ECU Shutdown function and ECU alarms display mode.
2018-12-25	1.3	Added HMC9000S module description and model comparison list.
2023-05-23	1.4	Updated the logo of SmartGen.
2024-09-21	1.5	Added the description of self-check mode, and new functions and alarms of inputs/outputs.
2024-10-24	1.6	1. Add parameter description for the tail shaft sensor; 2. Add parameters and alarm descriptions for the expansion module AIN8-2; 3. Add descriptions for the custom combined output function and programmable function for the output ports.

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## 1 OVERVIEW

**HMC9000A/HMC9000S Diesel Engine Controller** integrates digitization, intelligentization and network technologies together, and is applicable for one-set diesel engine automation and monitoring system to achieve remote control on the engine, local automatic start/stop, data measurement, alarm protection and “three remotes” (remote control, remote measuring and remote communication). It employs TFT-LCD display screen with optional Chinese/English languages interface. It is simple and steady to operate.

**HMC9000A/HMC9000S Diesel Engine Controller** employs 32-bit ARM processor and can achieve precise measuring for multiple parameters, fixed value adjustment, time setting, and integer value adjustment etc. They can be configured and monitored from the front panel or by communication interface on PC. It has compact structure, simple wire connection and high reliability, which can be used for all kinds of diesel engine automation system. It is widely used in marine emergency genset, main propulsion engines, main generator engines and pump engines.

**HMC9000A/HMC9000S Diesel Engine Controller** has SAE J1939 Interface, which can communicate with electrical injection engines with J1939 interface. Speed, water temperature, fuel temperature and oil pressure etc. parameters can be displayed and read on the LCD directly through communication interface. Users are needless to install sensors and it reduces complex wires. This interface can also do all kinds of module expansion. Simple wiring ensures fast transport speed and high reliability.

**HMC9000A/HMC9000S Diesel Engine Controller** has remote-distance monitoring interface, which is used for remote monitoring and can perform start/stop and other functions remotely.

## 2 PERFORMANCE AND CHARACTERISTICS

- Core of 32-bit ARM micro-processor, 4.3-inch LCD display with backlight, optional Chinese/English language, touch-button operation.
- Ability of controlling and communicating with dozens of electrical injection engines with J1939 interface. It can also connect with digital output module, security module, electric quantity protection module, analog input module etc. for users' convenience and needs.
- Realizing the function of remote-distance monitoring the engine via REMOTE (CANBUS) interface. Under the remote monitoring mode, other buttons on the controller do not work except Stop button. It is safe and convenient.
- Equipped with RS485 and USB communication interfaces. It can realize the functions of data communication and "three-remotes" by installing monitoring software on PC and MODBUS protocol.
- Protection control function: it can realize the Start/Stop, Alarm protection function under remote or local control mode.
- Override mode function: under this mode only over speed shutdown and emergency shutdown can stop the engine.
- Parameter setting function: it allows users to change and set the parameters and meanwhile they shall be stored in the FLASH memorizer so that they will not disappear in case of power outage.
- Four 4-20mA inputs: it can put in pressure or liquid level messages.
- Four resistance sensor inputs: it can put in pressure signal, PT100 temperature signal, liquid level signal or other signals.
- Two K-type thermocouple inputs: it can put in exhaust temperature signals.
- Real-time calendar, real-time clock, and total running time accumulation function.
- Displaying the total start accumulation times.
- Built-in speed detection equipment: it can precisely judge successful start status, normal running status and over speed status.
- Circularly 99 event logs preservation function: users can search the documentation on the spot.
- Double power supply monitoring and transferring function: power supply switchover can be performed through external interface by setting switchover voltage value.
- All parameters are done by digitalized modification: it gets rid of the analog adjustment methods of ordinary potentiometers and improves the reliability and stability of the whole genset.
- Break wire detection function for some Input/output ports.
- Modular structure design, and embedded installation way: Structure compact; size small; and operation easy and convenient.

### 3 MODEL COMPARISON

HMC9000 has two types: HMC9000S and HMC9000A.

**Table 2 Comparison of the Two Types**

Items	HMC9000S	HMC9000A	Note
LCD Size/Resolution	4.3" 480*272	4.3" 480*272	
Input Port No.	18	18	
Output Port No.	16	16	
Resistance Sensor No.	4	4	
Current Sensor No.	4	4	
K Type Input	2	2	
Expansion CANBUS Interface	•	•	
Remote CANBUS Interface	•	•	
RS485 Interface	•	•	
USB Interface	•	•	
RPU560A Module Derivation	•	•	
DIN16 Module Derivation	•		
DOUT16A Module Derivation	•	•	
LA16 Module Derivation	•		
HRM3300 Module Derivation	•	•	
AIN16-C Module Derivation	•		
AIN16-PT/K Module Derivation	•		
AIN16-M01 Module Derivation	•		
HMP300 Module Derivation		•	
AIN8 Module Derivation		•	
AIN16 Module Derivation	•		

#### 4 TECHNICAL PARAMETERS

**Table 3 Technical Parameters**






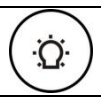






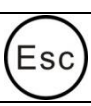
Parameter	Details
Working Voltage	DC18.0V to DC35.0V continuous power supply. (Only for 24V system)
Overall Power Consumption	<3W (Standby mode: ≤2W)
Speed Sensor Voltage	1.0V to 24V (RMS)
Speed Sensor Frequency	Max 10,000 Hz
Starter Relay Output	16 A connecting to common output port
Fuel Relay Output	16 A connecting to common output port
Auxiliary Relay Output 1	7 A connecting to common output port
Auxiliary Relay Output 2	7 A connecting to common output port
Auxiliary Relay Output 3	7 A connecting to common output port
Auxiliary Relay Output 4	7 A connecting to common output port
Auxiliary Relay Output 5	7 A connecting to common output port
Auxiliary Relay Output 6	7 A 250VAC voltage free output
Auxiliary Transistor Output 7~14	B+ DC supply output. Output current: 0.5A.
Case Dimension	266 mm x 182 mm x 46mm
Panel Cutout	214mm x 160mm
Working Conditions	Temperature: (-25~+70)°C; Relative Humidity: (20~93)%RH
Storage Conditions	Temperature: (-25~+70)°C
Protection Class	IP65: adding a waterproof gasket between controller and screen
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current is not more than 3mA within 1min.
Weight	0.90kg



## 5 OPERATOR INTERFACE

### 5.1 PUSHBUTTON DESCRIPTION

**Table 4 Pushbutton Function Description**

Icons	Keys	Description
	Stop	In machine side mode, stop the working generator; In the stop process, fast stop the generator.
	Start	In machine side mode, start the quiet engine.
	Alarm Reset	Recover when alarms happen.
	Self-Check	Enter self-check mode automatically and check all threshold alarms without speed.
	Home	Return to home page after pressing this button.
	Lamp Test	Test panel LED indicators and the display screen.
	Mute	Remove the audible alarms.
	Up/Increase	1. Turn over the page. 2. Move the cursor up and increase the value in setting menu.
	Down/Decrease	1. Turn over the page. 2. Move the cursor down and decrease the value in setting menu.
	Left	1. Turn over the page. 2. Move the cursor left in setting.
	Right	1. Turn over the page. 2. Move the cursor right in setting.
	Set/Confirm	1. Enter parameter setting menu by pressing for more than 3 seconds. 2. Confirm the settings.
	Exit	1. Return to the main screen. 2. Return to the previous screen in settings menu.

**⚠ WARNING:** Default password is 01234. It can be changed by users to prevent others randomly altering the settings. Please clearly remember the password after the change. If it is forgotten, please contact SmartGen service department and feedback all the information on the “**ABOUT**” page of the controller.

## 5.2 LCD DISPLAY


### 5.2.1 MAIN SCREEN DISPLAY

The main screen displays a tachometer (range: 0~3000 r/min), a thermometer (range: 0~150 °C; connected sensor is user-configurable, for example: default-configured sensor 1), an oil manometer (range: 0~1000 kpa; connected sensor is user-configurable, for example: default-configured sensor 5), and two powers' voltage display. The main screen displays as follows:



**Fig. 1 Main Screen Display**

### 5.2.2 MEASURED DATA DISPLAY

The main screen is divided into two separate display areas: the right and left parts. Left displays status data steadfast and cannot turn over, and the right can turn over by using  button.

- a) Status page includes the following contents:  
engine working and running status and power status;
- b) Engine page includes the following contents:  
engine speed, sensor 1-4 (resistance), sensor 5-8 (current), sensor 9~10(K-type thermocouple), main power voltage, spare power voltage, charger voltage, accumulated running time and total start times.

Note: sensor names can be users-defined.

- c) If J1939 is enabled, ECU data display shall appear on the main screen. ECU data includes: cooling liquid pressure, coolant level, engine oil temperature, fuel temperature, fuel pressure, air inlet temperature, air outlet temperature, turbine pressure, fuel consumption, total fuel consumption etc. (Different engines include different parameters).
- d) Alarm page.  
It displays all kinds of warning alarms and shutdown alarms. It displays at most 5 SPN and corresponding FMI at the same time when ECU alarms happen.

**▲NOTE:** About ECU alarms and shutdown alarms if it displays the detailed alarm contents, please check the engine according to them, otherwise please check the engine manual according to SPN alarm code.

- e) Event log page.  
It records all shutdown events and the time when they occur.
- f) Other information about the module includes the following contents:  
Module date and time, input and output interface status.
- g) About page includes the following contents:

Release software version, and hardware version.

Status	Engine
Generator status	Engine speed
Standby mode	1500 r/min
Normal running	Engine temp.
Power status	85°C 185°F
Main power normal	Engine oil pressure
Backup power normal	465kPa 67.4psi 4.65Bar
	Fuel level
	100%
	Main battery voltage
	27.6V
	Backup battery voltage
1500 r/min	No Alarm

**Fig. 2 Engine Page**

## 6 OPERATION

### 6.1 REMOTE START/STOP OPERATION

#### 6.1.1 CONFIGURATION REQUIREMENTS

Any one of the auxiliary input ports can be configured to remote mode input. When the input port is active, the controller shall be in remote control mode.

#### 6.1.2 REMOTE START SEQUENCE

- When "Remote Start" input is active, "Start Delay" starts.
- LCD status page displays "Start Delay" countdown.
- After "Start Delay" time, pre-heating relay is energized (if configured), and LCD status page displays "Preheat Delay XX".
- After "Preheat Delay" time, fuel relay outputs for 1 second, and then start relay output. If during the "starting time" the engine does not start successfully, the fuel relay and the start relay stop outputting and enter "Crank Rest Time" and wait for next start.
- In the start times configured, if the engine does not start, the controller shall output starting failure signal and stop and at the same time LCD alarm page displays starting failure alarm.
- Among the starting times, if it starts, it enters "Safety On Time", in which low oil pressure, high water temperature, low speed, charging failure alarms are invalid. After "Safety On Time", it enters "Start Idle Delay" (if configured).
- During the "Start Idle Delay" time, under speed alarm is disabled. When "Start Idle Delay" is finished, "High Speed Warm-up Delay" time starts (if configured).
- When "High Speed Warm-up Delay" ends, if engine speed and oil pressure are normal, then the generator works normally, if they are abnormal, then the controller shutdown alarm happens (LCD alarm screen displays shutdown alarm data.).

**NOTE:** If remote monitoring controller is use to start the genset, press the Start key and there is not starting delay, and other processes are the same as the above start input.

## 6.1.3 REMOTE STOP SEQUENCE

- When the "Remote Stop" input is active, the "Stop Delay" is initiated.
- Once the "Stop Delay" has expired, "High Speed Cooling Delay" is energized.
- When "Stop Idle Delay" (if configured) starts, idling relay is energized and outputs.
- When "ETS Solenoid Hold" begins, ETS relay is energized and outputs and meanwhile fuel relay and is de-energized and automatically judges whether stop is completed.
- When "Fail to Stop Delay" begins, complete stop is detected automatically.
- When the generator stops completely, it enters standby mode. Otherwise, it enters stop failure mode and has Stop Failure Alarm (If it stops completely after the alarm, then it enters standby mode and press Alarm Reset key, and it shall remove the failure alarm.).


**▲NOTE:** If remote monitoring controller is used to stop the genset, press the Stop key and there is not stopping delay, and other processes are the same as the above stop input.

## 6.2 LOCAL START/STOP OPERATION


### 6.2.1 CONFIGURATION REQUIREMENTS

Any one of the input ports can be configured to machine side mode input. After machine side mode input is active, the controller shall be in machine side mode.

### 6.2.2 LOCAL START SEQUENCE

- Press  and preheating relay outputs (if configured). LCD status screen displays "Preheat Delay XX".
- After the preheating delay time ends, fuel relay outputs for 1 second, and starter relay outputs. If the generator does not start during "Cranking Time", fuel relay and starter relay stop outputting and enter "Crank Rest Time", waiting for another starting.
- In the starting times set, if the generator does not start, the controller initiates starting failure shutdown and meanwhile LCD alarm screen displays starting failure alarm.
- Among the starting times, if the generator starts, it shall enter "Safety On Time", in which low oil pressure, high water temperature, under speed, charging failure etc. alarm data are all inactive. After "Safety On Time", it enters "Start Idle Delay" (if configured).
- During "Start Idle Delay" time, under speed alarm is active. After "Start Idle Delay" it enters high-speed "Warming up Delay" (if configured).
- After high speed warming up delay, if the oil pressure and speed of the generator are normal, then it works normally. If they are abnormal, then the controller shall operate alarm and shutdown (LCD alarm screen displays shutdown alarm data.).

### 6.2.3 LOCAL STOP SEQUENCE

- Press  and the high speed "Cooling Delay" is then initiated.
- "Stop Idle Delay" (if configured) starts, and idling relay is energized and outputs.
- When "ETS Solenoid Hold" begins, ETS relay is energized and fuel relay is de-energized and automatically judges whether the generator stops completely.
- "Fail to Stop Delay" begins, and complete stop is detected automatically.

- e) When the generator stops completely, it enters standby mode. Otherwise, it enters stop failure mode and has Stop Failure Alarm (If it stops completely after the alarm, then it enters standby mode and press Alarm Reset key, and it shall remove the failure alarm.).

## 6.3 SELF-CHECK OPERATION

### 6.3.1 SELF-CHECK MODE 1

The default self-check mode of the controller is "Self-Check Mode 1". Press the "Self-Check" button under the "Self-Check Mode 1", then the self-check indicator will stay on, and the controller enters the self-check mode. In the main screen, the display interface will be polled and switched at an interval of 2 seconds. Press the "Self-Check" button again, the self-check indicator will turn off, and the controller exits the self-check mode. The main screen will display the current interface.

### 6.3.2 SELF-CHECK MODE 2

Set the self-check mode to "Self-Check Mode 2", and configure the relevant sensors that need to be self-checked and their alarm thresholds (such as speed, water temperature, oil pressure, expansion sensor, etc.). Then press the "Self-Check" button in the "Self-Check Mode 2", the self-check indicator will stay on, and the controller enters the self-check mode. The value of all sensors that have been set and used will increase/decrease in sequence. The sensor value update can be checked through the data display in the main interface. The alarm is triggered when the alarm threshold is reached, and the alarm information is displayed in the alarm bar. The self-check indicator turns off automatically after the controller completes one round of self-check and exits the self-check mode later.

### 6.3.3 SELF-CHECK MODE 3

Set the self-check mode to "Self-Check Mode 3", and configure the relevant sensors that need to be self-checked and their alarm thresholds (such as speed, water temperature, and oil pressure, expansion sensor will not be self-checked under this mode). Then press the "Self-Check" button in the "Self-Check Mode 3", the self-check indicator will stay on, and the controller enters the self-check mode. The value of all sensors that have been set and used will increase/decrease in sequence. The sensor value update can be checked through the data display in the main interface. The alarm is triggered when the alarm threshold is reached, and the alarm information is displayed in the alarm bar. The self-check indicator turns off automatically after the controller completes one round of self-check and exits the self-check mode later.

## 7 PROTECTION

### 7.1 WARNING

When warning signals are detected by the controller, it only sounds warnings and does not stop. And at same time it displays the alarm type.

**Table 5 Warning types**

No.	Type	Detection Range	Description
1	Overspeed Warning	Always active.	When the controller detects that the engine speed has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
2	Underspeed Warning	"Waiting For Load"→ "Cooling Delay"	When the controller detects that the engine speed has fallen below the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
3	Loss of Speed Signal	"Start Idle Delay" →"Stop Idle Delay"	When the controller detects that the engine speed is 0, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
4	Start Failure	Start finished in the preset start times.	If engine fails to start after preset start attempts, controller initiates warning alarm and the corresponding alarm information will be displayed on LCD.
5	Stop Failure	After "Fail to Stop Delay"	After "Fail to Stop Delay", if gen-set does not stop completely, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
6	Charging Alternator Failure	When generator is normal running	When the controller detects that charger voltage has fallen below the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
7	Auxiliary Input 1-18	User-defined effective range	When the controller detects that the auxiliary input 1-18 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
8	ECU Warning	Always active.	When the controller detects that ECU warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
9	Sensor 1~10 High	> preset warning speed	When the controller detects that the sensor 1-10 high warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
10	Sensor 1~10 Low	>preset warning speed	When the controller detects that the sensor 1-10 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
11	Sensor 1~10 Open Circuit	Always active	When the controller detects that the sensor 1-10 open circuit warning signals, it will initiate a



No.	Type	Detection Range	Description
			warning alarm and the corresponding alarm information will be displayed on LCD.
12	Battery Under-voltage	1 Always active	When the controller detects that the B1 battery voltage has fallen below the pre-set value for more than 20s, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
13	Battery Over-voltage	1 Always active	When the controller detects that the B1 battery voltage has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
14	Battery Under-voltage	2 Always active	When the controller detects that the B2 battery voltage has fallen below the pre-set value for more than 20s, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
15	Battery Over-voltage	2 Always active	When the controller detects that the B2 battery voltage has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
16	Speed Broken Wire Warning	Always active	When the controller detects disconnection signals of the speed-detecting sensor, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
17	Fuel Broken Wire Warning	Always active	When the controller detects disconnection signals of the fuel-detecting sensor, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
18	Input 1 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 1 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
19	Input 2 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 2 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
20	Input 3 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 3 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
21	Input 4 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 4 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
22	Input 5 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 5 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
23	Input 6 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects input 6 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.

No.	Type	Detection Range	Description
		is enabled)	corresponding alarm information will be displayed on LCD.
24	Output 1 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects output 1 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
25	Output 2 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects output 2 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
26	Output 3 Broken Wire Warning	Always active (if disconnection detection is enabled)	When the controller detects output 3 disconnection signal, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
27	Stern Shaft Sensor Open	Always active (Detection after stern shaft sensor is enabled)	When the controller detects the open warning of stern shaft sensor is active, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
28	Gearbox Direction Error Alarm	Always active (Detection after the gearbox function is enabled)	When the controller detects the alarm of gearbox direction error is active, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
29	RPU 560A Communication Failure	Always active (after RPU560A is enabled)	When the controller detects RPU560A module communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
30	DOUT16 Module 1 Communication Failure	Always active (after DOUT16 Module 1 is enabled)	When the controller detects DOUT16 module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
31	DOUT16 Module 2 Communication Failure	Always active (after DOUT16 Module 2 is enabled)	When the controller detects DOUT16 module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
32	HMP300 Communication Failure	Always active (after HMP300 Module is enabled)	When the controller detects HMP300 module communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
33	AIN8 Communication Failure	Always active (after AIN8 Module is enabled)	When the controller detects AIN8 module communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
34	AIN8-2 Communication Failure	Always active (after AIN8-2 Module is enabled)	When the controller detects AIN8-2 module communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
35	LED-Module 1 Communication Failure	Always active (after LA16 Module 1 is enabled)	When the controller detects LA16 module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.



No.	Type	Detection Range	Description
36	LED-Module Communication Failure	2 Always active (after LA16 Module 2 is enabled)	When the controller detects LA16 module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
37	AIN16-C-Module Communication Failure	1 Always active (after AIN16-C Module 1 is enabled)	When the controller detects AIN16-C module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
38	AIN16-C-Module Communication Failure	2 Always active (after AIN16-C Module 2 is enabled)	When the controller detects AIN16 module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
39	AIN16 Module Communication Failure	1 Always active (after AIN16 Module 1 is enabled)	When the controller detects AIN16 module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
40	AIN16 Module Communication Failure	2 Always active (after AIN16 Module 2 is enabled)	When the controller detects AIN16 module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
41	AIN16-PT Module Communication Failure	1 Always active (after AIN16-PT Module 1 is enabled)	When the controller detects AIN16-PT module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
42	AIN16-PT Module Communication Failure	2 Always active (after AIN16-PT Module 2 is enabled)	When the controller detects AIN16-PT module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
43	AIN16-M01 Module 1 Communication Failure	Always active (after AIN16-M01 Module 1 is enabled)	When the controller detects AIN16-M01 module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
44	AIN16-M01 Module 2 Communication Failure	Always active (after AIN16-M01 Module 2 is enabled)	When the controller detects AIN16-M01 module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
45	Input Module Communication Failure	1 Always active (after Input Module 1 is enabled)	When the controller detects Input module 1 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
46	Input Module Communication Failure	2 Always active (after Input Module 2 is enabled)	When the controller detects Input module 2 communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.

**▲NOTE:** The warning types of auxiliary inputs must be active when they are configured by users. External input port alarms are only active when they are configured as external expansion panel input.

**▲NOTES:**

1. DOUT16 Module 1: expanding 16 channels of digital output module 1
2. RPU560A: expanding security module
3. HMP300: power quantity protection module

No.	Type	Detection Range	Description
4.	AIN8: analog signal input module		
5.	LA16: expanding 16 channels of LED lamp indication module		
6.	AIN16-C: expanding 16 channels of 4~20mA analog signal input module		
7.	AIN16-PT/K: expanding 16 channels of PT100 analog signal input module/expanding 16 channels of K-type measurement module (Either-or for common channel)		
8.	AIN16: expanding 16 channels of analog signal input module		
9.	AIN16-M01: expanding analog signal input/output module		
10.	DIN16: expanding 16 channels of switch signal input module		

## 7.2 SHUTDOWN ALARMS


When controller detects shutdown alarm, it stops immediately and displays alarm type.





**Table 6 Shutdown alarms**


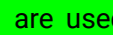


No.	Type	Detection range	Description
1	Emergency Stop Alarm	Always active	When the controller detects an emergency stop alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
2	Overspeed Alarm	Always active	When the controller detects that the generator speed has exceeded the pre-set value, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
3	Underspeed Alarm	"Waiting For Load" → "Cooling Delay"	When the controller detects that the generator speed has fallen below the pre-set value, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
4	Loss of Speed Signal Alarm	"Start Idle Delay" → "Stop Idle Delay"	When the controller detects that the genset speed is 0, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
5	Auxiliary Input 1-18 Alarm	User-defined	When the controller detects that the auxiliary input 1-18 shutdown alarm input, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
6	ECU Alarm	Always active	When the controller detects ECU shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
7	ECU Communication Failure Alarm	Do not detect in stop or standby mode	If the module cannot detect CAN signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
8	Sensor 1~10 High Alarm	>preset warning speed	When the controller detects sensor 1-10 active shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
9	Sensor 1~10 Low Alarm	>preset warning speed	When the controller detects sensor 1-10 active shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
10	Low OP	Start idle → Stop idle	When the controller detects low OP input active





No.	Type	Detection range	Description
			shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
11	High Water Temp.	Always active	When the controller detects high water temperature input active shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
12	Louver Fault	Safety on Time → Stop idle	When the engine is running, if the controller detects feedback signal of louver open is missing, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
13	Exhaust Flap Fault	Safety on Time → Stop idle	When the engine is running, if the controller detects feedback signal of louver open is missing, and the louver fault action is set as shutdown, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
14	Low Gearbox Working OP	Safety on Time → Stop idle	When the controller detects low gearbox working OP input active shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
15	Low Gearbox OP	Always active	When the controller detects low gearbox OP input active shutdown alarm signal, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
<p><b>⚠ CAUTION:</b> The alarm types of auxiliary inputs are active only when they are configured by users. If the controller is in override mode, only "Emergency Shutdown" and "Overspeed Shutdown" can work.</p> <p><b>NOTE1:</b> ECU shutdown happens when "ECU Shutdown" is enabled and ECU shutdown alarm signal is detected.</p>			



## 8 PANEL CONFIGURATION







Press  for over 3 seconds and the controller enters configuration interface by which all parameters can be set for the controller. For details please see below.

Return	>Start Delay	Interface 1:   are used to change the contents needed to set.  is used to enter setting (Interface 2),  is used to exit setting interface.
Module Set	>Stop Delay	
<b>Timer Set &gt;</b>	>Preheat Delay	Interface 2:
Engine Set	>Cranking Time	
Sensor Set	>Crank Rest Time	
Digital Inputs	>Safety On Time	
Relay Outputs	>Start Idle Time	
	>Warming Up Time	
	>Cooling Time	
	>Stop Idle Time	
	>ETS Hold Time	
	>Start Delay	
Return	>Stop Delay	

Module Set	>Preheat Delay	  are used to change the contents needed to set.  is used to confirm the setting (Interface 4),  is used to return to the previous screen (Interface 1).
<b>Timer Set</b> >	>Cranking Time	
Engine Set	>Crank Rest Time	
Sensor Set	>Safety On time	
Digital Inputs	>Start Idle time	
Relay Outputs	>Warming Up time	
	>Cooling Time	
	>Stop Idle Time	
	>ETS Hold Time	


Return	>Start Delay	<b>Interface 3:</b>   are used to change the contents needed to set.  is used to confirm the setting (Interface 4),  is used to return to the previous screen (Interface 1).
Module Set	>Stop Delay	
<b>Timer Set&gt;</b>	>Preheat Delay	
Engine Set	<b>&gt;Cranking Time</b>	
Sensor Set	>Crank Rest Time	
Digit Inputs	>Safety On Time	
Relay Outputs	>Start Idle Time	
	>Warming Up time	
	>Cooling Time	
	>Stop Idle Time	
	>ETS Hold Time	

>Start Delay	<b>00008</b>	<b>Interface 4:</b> Press  to enter settings (Interface 5),  to return to the previous screen (Interface 6).
>Stop Delay		
>Preheat Delay		
<b>&gt;Cranking Time</b>		
>Crank Rest Time		
>Safety On Time		
>Start Idle Time		
>Warming Up Time		
>Cooling Time		
>Stop Idle Time		
>ETS Hold Time		

>Start Delay	<b>00008</b>	<b>Interface 5:</b> Press   to change cursor position,   are used for changing cursor value,  Confirm setting (Interface 4),  exit setting (Interface 4).
>Stop Delay		
>Preheat Delay		
<b>&gt;Cranking Time</b>		
>Crank Rest Time		
>Safety On Time		
>Start Idle Time		
>Warming Up Time		
>Cooling Time		
>Stop Idle Time		
>ETS Hold Time		

>Start Delay	<b>00008</b>	<b>Interface 6:</b>   are used for changing the setting
>Stop Delay		
>Preheat Delay		
<b>&gt;Cranking Time</b>		

<ul style="list-style-type: none"> <li>&gt;Crank Rest Time</li> <li>&gt;Safety On Time</li> <li>&gt;Start Idle Time</li> <li>&gt;Warming Up Time</li> <li>&gt;Cooling Time</li> <li>&gt;Stop Idle Time</li> <li>&gt;ETS Hold Time</li> </ul>	<p>contents  to enter settings (Interface 4),</p> <p> to return to the previous screen (return to Interface 1).</p>
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**NOTE:** Press  and it can exit directly in the process of configuration.

**Table 7 Parameter Configuration Items**

Parameter Name	Range	Default	Remarks
1. Start Delay	(0-3600)s	1	Timer setting
2. Stop Delay	(0-3600)s	1	Timer setting
3. Preheat Delay	(0-3600)s	0	Timer setting
4. Cranking Time	(3-60s)	8	Timer settings
5. Crank Rest Time	(3-60s)	10	Timer settings
6. Safety On Time	(0-3600)s	10	Timer settings
7. Start Idle Time	(0-3600)s	0	Timer settings
8. Warming Up Time	(0-3600)s	10	Timer settings
9. Cooling Time	(0-3600)s	10	Timer settings
10. Stop Idle Time	(0-3600)s	0	Timer settings
11. ETS Hold Time	(0-3600)s	20	Timer settings
12. Fail To Stop Time	(0-3600)s	0	Timer settings
13. J1939 Enable	(0-1)	0 Disable	Engine settings HMC9000E without
14. Engine Type	(0-39)	0 Normal Genset	Engine settings
15. SPN Alarm Version	(1-3)	Version 1	Engine settings
16. Flywheel Teeth	(1-300)	118	Engine settings
17. Rated Speed	(1-5999)r/min	1500	Engine settings
18. Speed On Load	(0-200)%	90%	Engine settings
19. Oil Pressure On Load	(1-1000)kpa (Related to sensor 5 )	200	Engine settings
20. Start Attempts	(1-30)	3	Engine settings
21. Disc. Condition	(0-2) 0: Engine Speed 1: Oil Pressure 2: Engine Speed+ Oil Pressure	0: Engine Speed	Engine settings
22. Disconnect Speed	(0-200)%	25%	Engine settings
23. Disconnect OP	(10-1000)kPa	80	Engine settings
24. Under Speed Shut	(0-200)%	85%	Engine settings
25. Under Speed Delay	(0-3600)s	1	Engine settings
26. Under Speed Warn	(0-200)%	90%	Engine settings
27. Under Speed Return	(0-200)%	92%	Engine settings
28. Over Speed Shut	(0-200)%	115%	Engine settings
29. Over Speed Delay	(0-3600)s	1	Engine settings
30. Over Speed Warn	(0-200)%	110%	Engine settings
31. Over Speed Return	(0-200)%	108%	Engine settings

Parameter Name	Range	Default	Remarks
32. Speed Lose Delay	(0-3600)s	1	Engine settings
33. Speed Lose Act	(0-2) 0: No Action 1: Shutdown 2: Warn	1: Shutdown	Engine settings
34. Charge Alt Fail	(0-60.0)V	16.0	Engine settings
35. Bat Rated Volt	(0-60.0)V	24.0	Engine settings
36. Bat1 Over Volt	(0-200)%	125%	Engine settings
37. Bat2 Over Volt	(0-200)%	125%	Engine settings
38. Bat1 Under Volt	(0-200)%	75%	Engine settings
39. Bat2 Under Volt	(0-200)%	75%	Engine settings
40. ECU Shutdown Enabled	(0-1) 0:Disabled 1:Enabled	1	Engine settings
41. Main Switch Spare Volt	(0-200)%	75%	Engine settings
42. Spare Switch Main Volt	(0-200)%	90%	Engine settings
43. Heating Up Limit	(0-100)°C	42	Engine settings
44. Heating Down Limit	(0-100) °C	37	Engine settings
45. Fuel Pump Out	(0-100)%	20	Engine settings
46. Fuel Pump Cut	(0-100)%	30	Engine settings
47. Cycle Lubricate Enable	(0-1) 0:Disabled 1:Enabled	0	Engine settings
48. Cycle Gap Time	(0-7200)min	300	Engine settings
49. Lubricate Time	(0-7200)s	300	Engine settings
50. Speed Adjust. Rate	(1-100)	10	Engine settings
51. RPU Overspeed Shutdown	(0-200)%	113%	Engine settings When the genset type is an engine with ECU, the controller's speed sensor input is the RPU speed.
52. RPU Overspeed Delay	(0-3600)s	1	
53. Normal Running Speed	(0-200)%	85%	Engine settings When the speed is above normal running speed, normal running output will be closed. When the speed is below off speed, normal running output will be opened.
54. Normal Running Off Speed	(0-200)%	75%	
55. Speed BW Setting	(0-1) 0: Disabled 1: Enabled	1: Enabled	Engine settings
56. Louver Open Time	(0-200)	10	Engine settings
57. Droop Speed	1-100	30	Engine settings If the genset type is 31: YC-6K-AUTO-DROP, it can simulate the droop



Parameter Name	Range	Default	Remarks
			speed value.
58. Exhaust Flap Open Time	(0-200)s	10	Engine settings
59. Exhaust Flap Fault Action	(0-1) 0: Warning 1: Shutdown	1: Shutdown	Engine settings
60. Device ID	(1-254)	1	Module settings
61. Language select	(0-1) 0: Chinese 1: English	0: Chinese	Module settings
62. Password set	(0-9999)	01234	Module settings
63. RS485 Baud set	(0-4) 0: 2400 bps 1: 4800bps 2: 9600bps 3: 19200bps 4: 38400bps	2: 9600bps	Module settings RS485 Baud Rate
64. RPU560A Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings
65. DOU16 Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings
66. DOU16 Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
67. DIN16 Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
68. DIN16 Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
69. LA16 Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
70. LA16 Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
71. AIN16C Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
72. AIN16C Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
73. AIN16PT Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
74. AIN16PT Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
75. AIN16M01 Module 1	(0-1)	0: Disabled	Module settings

Parameter Name	Range	Default	Remarks
	0: Disabled 1: Enabled		(not available in HMC9000A)
76. AIN16M01 Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
77. AIN24 Module 1	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
78. AIN24 Module 2	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000A)
79. AIN8 Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
80. AIN8-2 Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
81. Expansion Module Baud Rate	(0-1) 0: 250kbps 1: 125kbps	0: 250kbps	Module settings
82. Remote Control CAN Baud Rate	(0-1) 0: 250kbps 1: 125kbps	0: 250kbps	Module settings
83. HMP300 Module	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
84. HMC9800RM Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
85. CAN Module ID	(0-1)	0	Module settings (not available in HMC9000S)
86. Maintenance Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
87. Maintenance Time	(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S)
88. Stop Bit	(1-2)	2-bit	Module settings Setting of RS485 stop bit, it takes effect after power-on reset.
89. Self-Check Mode	(1-2) 1: Self-check mode 1 2: Self-check mode 2	Self-check mode 1	Module settings Setting of two self-check modes. Self-check mode 1: It won't start the engine. The sensor alarm will be triggered only when the sensor value



Parameter Name		Range	Default	Remarks
				reaches the threshold. Self-check mode 2: It won't start the engine and the sensor value will increase/reduce automatically. And the sensor alarm will be triggered only when the sensor value reaches the threshold.
90. Remote Reset Enable		(0-1) 0: Disabled 1: Enabled	0: Disabled	Module settings (not available in HMC9000S) If it is enabled, it can reset the local alarm by pressing the reset button of the remote monitoring controller.
91. Time Settings			Current Time	Module settings
92. Sensor 1 set (Resistance input, default: coolant temperature)		See 9.5 Sensor function configuration Note: Resistance type input range is not applicable.		Sensor settings
93. Sensor 2 set (Resistance input, default: engine oil temperature)		See 9.5 Sensor function configuration Note: Resistance type input range is not applicable.		Sensor settings
94. Sensor 3 set (Resistance input)		See 9.5 Sensor function configuration Note: Resistance type input range is not applicable.		Sensor settings
95. Sensor 4 set (Resistance input, default: liquid level)		See 9.5 Sensor function configuration Note: Resistance type input range is not applicable.		Sensor settings
96. Sensor 5 set (4~20mA input, default: lubricating oil pressure)		See 9.5 Sensor function configuration		Sensor settings
97. Sensor 6 set (4-20mA input)		See 9.5 Sensor function configuration		Sensor settings
98. Sensor 7 set (4-20mA input)		See 9.5 Sensor function configuration		Sensor settings
99. Sensor 8 set (4-20mA input)		See 9.5 Sensor function configuration		Sensor settings
100. Sensor 9 set (k-thermocouple input)		See 9.5 Sensor function configuration		Sensor settings
101. Sensor 10 set (k-thermocouple input)		See 9.5 Sensor function configuration		Sensor settings
102. Stern Shaft Sensor Set		See 9.5 5Sensor function configuration		Not available in HMC9000S
103. Gearbox Direction Error Alarm		(0-1) 0: Disabled 1: Enabled	0: Disabled	Not available in HMC9000S
104. Wrong Alarm Delay		(0-3600)s	3	Not available in HMC9000S
105. Input 1 Set	Function	(0-99)	15: Override Mode Input	Input port settings

Parameter Name		Range	Default	Remarks
106.Input 2 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	16: Emergency Stop	Input port settings
107.Input 3 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	1: Custom (Fuel Leak)	Input port settings
108.Input 4 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	1: Custom (Air Pressure Low)	Input port settings
109.Input 5 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	1: Custom (Crankcase Pressure Low)	Input port settings
110.Input 6 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	9: Local mode input	Input port settings
111.Input 7 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	10: Remote control mode input	Input port settings
112.Input 8 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	11: Remote Start	Input port settings
113.Input 9 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	12: Remote Stop	Input port settings
114.Input 10 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	31: Turning Gear	Input port settings
115.Input 11 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not Used	Input port settings
116.Input 12 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not Used	Input port settings
117.Input 13 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
118.Input 14 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
119.Input 15 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
120.Input 16 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
121.Input 17 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
122.Input 18 Set	Active type	(0-1)	0: Close to activate	Input port settings
	Function	(0-99)	0: Not used	Input port settings
123. Output 1 Set	Output type	(0-1)	0: Normally open	Output port settings
	Function	(0-255)	8: ETS Hold	Output port settings
124. Output 2 Set	Output type	(0-1)	0: Normally open	Output port settings
	Function	(0-255)	71: Over Speed Shutdown	Output port settings
125. Output 3 Set	Output type	(0-1)	0: Normally open	Output port settings
	Function	(0-255)	75: Fail To Start	Output port settings
126. Output 4 Set	Output type	(0-1)	0: Normally open	Output port settings
	Function	(0-255)	3: Audible Alarm	Output port settings

Parameter Name		Range	Default	Remarks
127. Output 5 Set	Function	(0-255)	18: Ready Go	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
128. Output 6 Set	Function	(0-255)	49: Crank Success	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
129. Output 7 Set	Function	(0-255)	27: Common Alarm	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
130. Output 8 Set	Function	(0-255)	2: Air flap	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
131. Output 9 Set	Function	(0-255)	15: Pre-lubricate	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
132. Output 10 Set	Function	(0-255)	50: Normal Running	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
133. Output 11 Set	Function	(0-255)	0: Not Used	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
134. Output 12 Set	Function	(0-255)	0: Not Used	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
135. Output 13 Set	Function	(0-255)	0: Not Used	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
136. Output 14 Set	Function	(0-255)	0: Not Used	Output port settings
	Output type	(0-1)	0: Normally open	Output port settings
Note 1: Input ports 1-18 correspond to controller terminals A-R.				
Note 2: Output ports 1-14 correspond to controller terminals A-R.				

**Table 8 Other parameters configuration: Only by PC software**

Parameter Name	Contents
Resistance sensor 1 settings	User-defined sensor curve settings
Resistance sensor 2 settings	User-defined sensor curve settings
Resistance sensor 3 settings	User-defined sensor curve settings
Resistance sensor 4 settings	User-defined sensor curve settings
Sensor 1~10 name settings	User-defined sensor name
Output 1 custom settings	Name / Button/ Active period /Output delay / Output time
Output 2 custom settings	Name / Button/ Active period /Output delay / Output time
Output 3 custom settings	Name / Button/ Active period /Output delay / Output time
Output 4 custom settings	Name / Button/ Active period /Output delay / Output time
Output 5 custom settings	Name / Button/ Active period /Output delay / Output time
Output 6 custom settings	Name / Button/ Active period /Output delay / Output time
Output 7 custom settings	Name / Button/ Active period /Output delay / Output time
Output 8 custom settings	Name / Button/ Active period /Output delay / Output time
Output 9 custom settings	Name / Button/ Active period /Output delay / Output time
Output 10 custom settings	Name / Button/ Active period /Output delay / Output time
Output 11 custom settings	Name / Button/ Active period /Output delay / Output time
Output 12 custom settings	Name / Button/ Active period /Output delay / Output time
Output 13 custom settings	Name / Button/ Active period /Output delay / Output time
Output 14 custom settings	Name / Button/ Active period /Output delay / Output time

## 9 INPUT/OUTPUT PORTS CONFIGURATION


### 9.1 AUXILIARY INPUTS 1~18 FUNCTIONAL DEFINITION

**Table 9 Digital Input Port Configuration**

No.	Settings	Contents	Description
1	Function Choice	(0-100)	<b>Please see Table 10.</b>
2	Active type	(0-1)	0: Close to activate 1: Open to activate
3	Active Range	(0-3)	0: From Safety On Delay 1: From Crank 2: Always 3: Never
4	Active Action	(0-2)	0: Warning 1: Shutdown 2: Indication
5	Input Delay	(0-20.0)s	
6	Broken Wire Alarm Detection Enable	(0-1)	0: Disabled 1: Enabled Only input ports 1~6 and speed input have this function.
7	Character String Display	User-defined input port names	20 English symbols/10 Chinese characters

**Table 10 Input Port Functions**

No.	Function	Description
0	Not used	Not used
1	User-defined	Users-defined contents
2	Alarm Mute	Stop "Audible Alarm" output when it is active.
3	Alarm Reset	Reset all alarms when it is active.
4	Speed Raise	Speed raise output close when the input is active.
5	Speed Drop	Speed drop output close when the input is active.
6	Reserved	
7	Reserved	
8	Lamp Test	All LED indicators are illuminated when input is active.
9	Local Mode Input	Local mode is activated when input is active.
10	Remote Mode Input	Remote mode is activated when input is active.
11	Remote Start	Under the remote control mode, when the input is active, it can automatically start the generator, and when the stop output is active, it can stop the engine moving. (pressing for 1 second or over, or continuously are Ok.)
12	Remote Stop	The generator stops when it is active.
13	Remote Start/Stop	Under the remote control mode, when the input is active, it can automatically start the generator; when it is inactive, the generator stops.

No.	Function	Description
14	Pre-lubrication	If the output is set as pre-lubrication, when it is active, the relay opens after outputting the pre-lubrication time.
15	Override Mode Input	Override mode is activated when the input is active; in override mode only overspeed shutdown and emergency shutdown will stop the engine.
16	Emergency Stop Input	The controller shuts down the engine immediately and records occurrence time.
17	Panel Key Lock	All buttons in panel are inactive and there is  on the left of first row on LCD when input is active.
18	EATS Override	It is available when the engine type is 23: Volvo-Genset-Engine. Not available in HMC9000S.
19	Backup Power Switchover	Main Power is changed into backup power when it is active.
20	Speed Raising Aid	Speed-raising relay is disconnected when it is active.
21	Emergency Mode	The text of "EDG" will be displayed in the front panel of controller when it is active. Not available in HMC9000S.
22	Speed Drop Aid	Speed-dropping relay is disconnected when it is active.
23	Water Heating Feedback	Feedback signal of water heating output; The screen displays <i>Water Heating feedback</i> when the input is active.
24	Pre-lubrication Feedback	Feedback signal of pre-lubrication output; The screen displays <i>Pre-lubrication feedback</i> when the input is active.
25	Charging Feedback	Feedback signal of charging output; The screen displays <i>Charging feedback</i> when the input is active.
26	Remote Emergency Stop	Remote emergency stop alarm is made when input is active.
27	Exhaust Flap Open	Feedback of exhaust flap open status. Not available in HMC9000S.
28	Quick start	Cranking will start directly (without preheating) when the input is active.
29	Exhaust Flap Closed	Feedback of exhaust flap closed status. Not available in HMC9000S.
30	60Hz Input	Frequency selection of ECU engine
31	Turning Gear Interlock	The generator is prohibited to start when the input is active.
32	Cylinder Cleaning Input	Starter relay outputs when cylinder cleaning input is active.
33	Gearbox Misalignment Alarm Input	Gearbox misalignment alarm status input. Not available in HMC9000S.
34	Low Gearbox Working OP	Low gearbox working OP alarm input. Not available in HMC9000S.
35	Auto Mode Input	The controller enters auto mode when it is active.
36	Auto Start Input	Starting via this input port when it is active.
37	Gearbox Forward	Controller Screen displays gearbox forward when it is active.

No.	Function	Description
		Not available in HMC9000S.
38	Gearbox Backward	Controller Screen displays gearbox backward when it is active. Not available in HMC9000S.
39	Remote Control Mode Input (1)	The controller enters remote control mode when it is active, and under this mode the starting attempt of the engine is 1 and there is not starting failure alarm. Not available in HMC9000S.
40	High Water Temp. Shutdown Input	When it is active, the controller will issue the alarm of High Water Temperature Shutdown. Not available in HMC9000S.
41	Low OP Shutdown Input	When it is active, the controller will issue the alarm of Low Oil Pressure Shutdown. Not available in HMC9000S.
42	Gearbox Interlock	It will be active only under the standby status. If the input is active, the controller cannot start the genset. And the gearbox interlock will be displayed in the status bar of main screen. Not available in HMC9000S.
43	Louver Feedback Input	Feedback input of louver open status. Not available in HMC9000S.
44	Time Calibration Input (12 o'clock)	When it is active, the controller's time will be the calibrated as 12h 0min 0sec.
45	Idle/High Speed Transfer (ECU)	When the input is active, some ECU genset can switch the idle/high speed running mode manually under local mode. Not available in HMC9000S.
46	Instrument Mode	Under the instrument mode, all external output will be disconnected, the engine will transfer to the standby status. Not available in HMC9000S.
47	Louver Closed Input	Feedback input of louver closed status. Not available in HMC9000S.
48	Low Gearbox OP	Low gearbox oil pressure shutdown input. Not available in HMC9000S.
49	Gearbox Idle	Gearbox idle status input. Not available in HMC9000S.
50	Time Calibration Input (0 o'clock)	When it is active, the controller's time will be the calibrated as 0h 0min 0sec.
51	Gearbox Forward command	Not available in HMC9000S.
52	Gearbox Backward command	Not available in HMC9000S.
53	Gearbox Idling Command	Not available in HMC9000S.
54-99	Reserved	Reserved

**NOTE:** The name of the input ports 1~18 only can be configured via PC software.

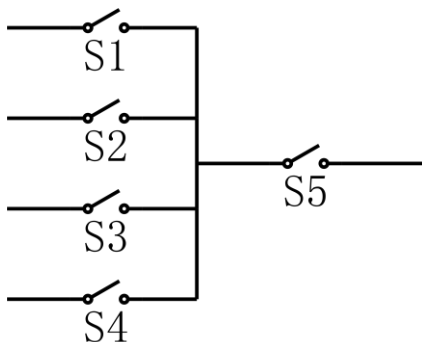
## 9.2 OUTPUT PORTS 1~14 FUNCTION DEFINITION

**Table 11 Users-defined Output Port Definition**

No.	Items	Contents	Remarks
1	Function Choice	(0-255)	See: <b>Table 12.</b>
2	Output Type	0: Normally Open 1: Normally Close	
3	Button Output	0 Not Used 1 Start Button 2 Stop Button 3 Reset Button 4 Mute Button	
4	Active Period Output	Bit1: Standby Bit2: Preheating Bit3: Fuel on Bit4: Cranking Bit5: Crank rest Bit6: Safety on Bit7: Start idle Bit8: Warming up Bit9: Wait for load Bit10: Normal running Bit11: Cooling down Bit12: Stop idle delay Bit13: ETS hold Bit14: Wait For Stop Bit15: Fail to stop	
5	Output Delay Time	(0-100.0)s	
6	Lasting Output Time	(0-3600)s	
7	Broken Wire Alarm Detection Enable	0: Do not detect 1: Detect	Only outputs 1-3 and oil output port have this function.

## 9.3 DEFINED COMBINATION OUTPUT

Defined combination output is composed by 3 parts, condition output S1, S2, S3, S4 and condition output S5.



S1, S2, S3 or S4 are **TRUE**, while S5 is **TRUE**, Defined combination output is outputting;

S1, S2, S3 and S4 are **FALSE**, or S5 is **FALSE**, Defined combination output is not outputting.



**NOTE:** S1, S2, S3, S4 and S5 can be set as any contents except for “defined combination output” in the output setting.

**NOTE:** 3 parts of defined combination output (S1, S2, S3, S4 and S5) couldn't include or recursively include themselves.

Example,

Contents of probably condition output S1: output port 1 is active;

Close when probably condition output S1 is active /inactive: close when active (disconnect when inactive);

Contents of probably condition output S2, output port 2 is active;

Close when probably condition output S2 is active /inactive: close when active (disconnect when inactive);

Contents of probably condition output S3: output port 3 is active;

Close when probably condition output S3 is active /inactive: close when active (disconnect when inactive);

Contents of probably condition output S4: output port 4 is active;

Close when probably condition output S4 is active /inactive: close when active (disconnect when inactive);

Contents of probably condition output S5: output port 5 is active;

Close when probably condition output S5 is active /inactive: close when active (disconnect when inactive);

When input port 1 active or input port 2 or input 3 or input 4 is active, if input port 5 is active, Defined combination output is outputting; If input port 5 is inactive, Defined combination output is not outputting;

When input port 1 inactive and input port 2 and input 3 and input 4 are inactive, whatever input port 5 is active or not, Defined combination output is not outputting.

## 9.4 DEFINITION OF PROGRAMMABLE FUNCTION FOR OUTPUT PORTS

**Table 12 Function Definition of Output Ports**

No.	Items	Description
0	Not used	This port is not used.
1	Users-defined	Please see <b>Table 11</b> .
2	Air Flap Control	Act when overspeed shutdown and emergency stop occur by closing the air flap.
3	Audible Alarm	Act when warning and shutdown happen. It can be connected to alarm apparatus externally. It can be configured to “Alarm Mute” input port. When “Alarm Mute” is active, it can prohibit “Audible Alarm” output.
4	ECU power	Used for ECU connection.
5	ECU Stop	Used for ECU connection.
6	Starter Relay Output	Act when genset is starting and disconnect when starting is completed.
7	Fuel Relay Output	Act when genset is starting and disconnect at the time when genset is waiting for a complete stop.
8	ETS Stop Output	Act during the “ETS Stop Delay” period.
9	Interlock Alarm Output	Output when turning gear interlock occurs.
10	Fuel Pump Control	It is controlled by the upper and lower bounds of the fuel level.



No.	Items	Description
11	Reserved	
12	Louver Control	Act when generator is starting and disconnect when generator stops completely.
13	Loss of Speed Signal	Act when the engine speed is detected to be 0 after safe running.
14	Water Heating Output	Act when the sensor detects that the water temperature is lower than the lower bound set and disconnect when it is higher than the upper bound set.
15	Pre-lubrication Output	Output when the generator is in standby mode and the output time can be set. When it is active it is outputted.
16	Remote Control Output	Output when remote control signal is active and disconnect when it is invalid.
17	Override Mode Output	Output when it is in override mode.
18	Preparation Completed	Output when the controller is in standby mode and there is not alarm happening.
19	Reserved	
20	Idling/High Speed Control	Act from starting to "starting idling speed" and from "stopping idling speed" to "waiting for stopping completely".
21	Pre-Supply Fuel	Act during the period from starting to safe running.
22	Speed Raising	Output when speed raising input is active via mechanical speed adjustment, and disconnect when it is invalid.
23	Speed Dropping	Output when speed dropping input is active via mechanical speed adjustment, and disconnect when it is invalid.
24	Second Start Output	If this configuration is valid, the relay shall output when the first starting route fails and the second begins. (Note: if external expansion starter relay is needed).
25	Power Switch Output	Output when power 1 voltage is lower than the set value of power switch and disconnect when it is higher than the set value.
26	High Speed/Idling Speed Output	Act during the period from warming up to cooling down. (Logically contrary to idling speed/high speed outputs)
27	Common Alarm	Act when common warnings and common shutdown alarms happen.
28	Common Shutdown Alarm	Act when common shutdown alarm happens.
29	Common Warning Alarm	Act when common warning alarm happens.
30	Aux. Input 1 Active	Act when input port 1 is active.
31	Aux. Input 2 Active	Act when input port 2 is active.
32	Aux. Input 3 Active	Act when input port 3 is active.
33	Aux. Input 4 Active	Act when input port 4 is active.
34	Aux. Input 5 Active	Act when input port 5 is active.

No.	Items	Description
35	Aux. Input 6 Active	Act when input port 6 is active.
36	Aux. Input 7 Active	Act when input port 7 is active.
37	Aux. Input 8 Active	Act when input port 8 is active.
38	Aux. Input 9 Active	Act when input port 9 is active.
39	Aux. Input 10 Active	Act when input port 10 is active.
40	Aux. Input 11 Active	Act when input port 11 is active.
41	Aux. Input 12 Active	Act when input port 12 is active.
42	Aux. Input 13 Active	Act when input port 13 is active.
43	Aux. Input 14 Active	Act when input port 14 is active.
44	Aux. Input 15 Active	Act when input port 15 is active.
45	Aux. Input 16 Active	Act when input port 16 is active.
46	Aux. Input 17 Active	Act when input port 17 is active.
47	Aux. Input 18 Active	Act when input port 18 is active.
48	Lamp Test Output	Output when lamp test is conducted.
49	Successful Start Output	Output when the genset speed is more than or equal to 500 RPM. Disconnect when the speed is less than or equal to 100 RPM.
50	Normal Running Output	When the controller is under status from Safety On to Stop Idle, it will output when the more than or equal to the normal running speed, and disconnect when the speed is less than normal running off speed.
51	Remote Control Mode	Output when the controller is in the remote control mode.
52	Local Mode Output	Output when the controller is in the local mode.
53	Waiting For Loading Output	Output when the controller is waiting for loading mode.
54	AIN16-C Communication Failure	Output when the controller detects communication with AIN16-C cannot be achieved (for 3s or more). Reserved in HMC9000A.
55	RAIN16-PT Communication Failure	Output when the controller detects communication with AIN16-PT cannot be achieved (for 3s or more). Reserved in HMC9000A.
56	Stop Pulse Output	Act during "stop delay" time, and close after "stop delay" time.
57	Running Status Output	Output when the controller is under status from Safety On to Stop Idle.
58	DIN16 Communication Failure	Output when the controller detects communication with DIN16 cannot be achieved (for 3s or more). Reserved in HMC9000A.
59	RPU560A Communication Failure	Output when the controller detects communication with RPU560A safeguard module cannot be achieved. (for 1s or more)
60	DOUT16 Communication	Output when the controller detects communication with digital output module DOUT16 cannot be achieved (for 3s or more).

No.	Items	Description
	Failure	
61	AIN16-M01 Communication Failure	Output when the controller detects communication with AIN16-M01 cannot be achieved (for 3s or more). Reserved in HMC9000A.
62	LA16 Communication Failure	Output when the controller detects communication with LA16 cannot be achieved (for 3s or more). Reserved in HMC9000A.
63	ECU Communication Failure and Engine Stop	When ECU is energized, if connection with ECU cannot be detected then ECU communication failure and shutdown alarm come up.
64	ECU Warning	ECU warning signal outputs since ECU receives the warning data.
65	ECU Shutdown Alarm	ECU shutdown signal outputs since ECU receives the shutdown data.
66	Power Under-voltage Warning 1	Output when the controller detects that Power 1 voltage has fallen below the set value.
67	Power Under-voltage Warning 2	Output when the controller detects that Power 2 voltage has fallen below the set value.
68	Underspeed Warning	Act when underspeed warning occurs.
69	Underspeed Shutdown	Act when underspeed shutdown occurs.
70	Overspeed Warning	Act when overspeed warning occurs.
71	Overspeed Shutdown Alarm	Act when overspeed shutdown alarm occurs.
72	Emergency Stop Alarm	Act when emergency stop alarm occurs.
73	Charging Alternator Failure	Act when charging alternator failure warning alarm occurs.
74	Alarm Flash	Output when alarm occurs. If the alarm occurs again, it will output again after the port is disconnected for 2 seconds.
75	Starting Failure Alarm	Act when starting failure alarm occurs.
76	AIN8 Communication Failure	Output when AIN8 module communication failure occurs.
77	Oil Pre-Lubrication Control	During the engine start process, there are three conditions which will disconnect the oil pre-lubrication output. It will output under any other conditions. 1: Disconnect when oil temperature is lower than 50°C, and oil pressure is less than or equal to 150kPa. 2: Disconnect when oil temperature is more than or equal to 50°C,

No.	Items	Description
		and oil pressure is less than or equal to 100kPa. 3: Disconnect when oil temperature is more than 70°C, and oil pressure is less than or equal to 80kPa.
78	Sensor 1 Open	Act when sensor 1 open circuit alarm occurs.
79	Sensor 1 Warning	Act when sensor 1 warning alarm occurs.
80	Sensor 1 Shutdown	Act when sensor 1 shutdown alarm occurs.
81	Sensor 2 Open	Act when sensor 2 open circuit alarm occurs.
82	Sensor 2 Warning	Act when sensor 2 warning alarm occurs.
83	Sensor 2 Shutdown	Act when sensor 2 shutdown alarm occurs.
84	Sensor 3 Open	Act when sensor 3 open circuit alarm occurs.
85	Sensor 3 Warning	Act when sensor 3 warning alarm occurs.
86	Sensor 3 Shutdown	Act when sensor 3 shutdown alarm occurs.
87	Sensor 4 Open	Act when sensor 4 open circuit alarm occurs.
88	Sensor 4 Warning	Act when sensor 4 warning alarm occurs.
89	Sensor 4 Shutdown	Act when sensor 4 shutdown alarm occurs.
90	Sensor 5 Open	Act when sensor 5 open circuit alarm occurs.
91	Sensor 5 Warning	Act when sensor 5 warning alarm occurs.
92	Sensor 5 Shutdown	Act when sensor 5 shutdown alarm occurs.
93	Sensor 6 Open	Act when sensor 6 open circuit alarm occurs.
94	Sensor 6 Warning	Act when sensor 6 warning alarm occurs.
95	Sensor 6 Shutdown	Act when sensor 6 shutdown alarm occurs.
96	Sensor 7 Open	Act when sensor 7 open circuit alarm occurs.
97	Sensor 7 Warning	Act when sensor 7 warning alarm occurs.
98	Sensor 7 Shutdown	Act when sensor 7 shutdown alarm occurs.
99	Sensor 8 Open	Act when sensor 8 open circuit alarm occurs.
100	Sensor 8 Warning	Act when sensor 8 warning alarm occurs.
101	Sensor 8 Shutdown	Act when sensor 8 shutdown alarm occurs.
102	AIN8 Sensor 1 Open	Act when AIN8 sensor 1 open circuit alarm occurs. Reserved in HMC9000S.
103	AIN8 Sensor 1 Warning	Act when AIN8 sensor 1 warning alarm occurs. Reserved in HMC9000S.
104	AIN8 Sensor 1 Shutdown	Act when AIN8 sensor 1 shutdown alarm occurs. Reserved in HMC9000S.
105	AIN8 Sensor 2 Open	Act when AIN8 sensor 2 open circuit alarm occurs. Reserved in HMC9000S.
106	AIN8 Sensor 2 Warning	Act when AIN8 sensor 2 warning alarm occurs. Reserved in HMC9000S.
107	AIN8 Sensor 2 Shutdown	Act when AIN8 sensor 2 shutdown alarm occurs. Reserved in HMC9000S.
108	AIN8 Sensor 3 Open	Act when AIN8 sensor 3 open circuit alarm occurs. Reserved in HMC9000S.
109	AIN8 Sensor 3	Act when AIN8 sensor 3 warning alarm occurs. Reserved in

No.	Items	Description
	Warning	HMC9000S.
110	AIN8 Sensor 3 Shutdown	Act when AIN8 sensor 3 shutdown alarm occurs. Reserved in HMC9000S.
111	AIN8 Sensor 4 Open	Act when AIN8 sensor 4 open circuit alarm occurs. Reserved in HMC9000S.
112	AIN8 Sensor 4 Warning	Act when AIN8 sensor 4 warning alarm occurs. Reserved in HMC9000S.
113	AIN8 Sensor 4 Shutdown	Act when AIN8 sensor 4 shutdown alarm occurs. Reserved in HMC9000S.
114	AIN8 Sensor 5 Open	Act when AIN8 sensor 5 open circuit alarm occurs. Reserved in HMC9000S.
115	AIN8 Sensor 5 Warning	Act when AIN8 sensor 5 warning alarm occurs. Reserved in HMC9000S.
116	AIN8 Sensor 5 Shutdown	Act when AIN8 sensor 5 shutdown alarm occurs. Reserved in HMC9000S.
117	AIN8 Sensor 6 Open	Act when AIN8 sensor 6 open circuit alarm occurs. Reserved in HMC9000S.
118	AIN8 Sensor 6 Warning	Act when AIN8 sensor 6 warning alarm occurs. Reserved in HMC9000S.
119	AIN8 Sensor 6 Shutdown	Act when AIN8 sensor 6 shutdown alarm occurs. Reserved in HMC9000S.
120	AIN8 Sensor 7 Open	Act when AIN8 sensor 7 open circuit alarm occurs. Reserved in HMC9000S.
121	AIN8 Sensor 7 Warning	Act when AIN8 sensor 7 warning alarm occurs. Reserved in HMC9000S.
122	AIN8 Sensor 7 Shutdown	Act when AIN8 sensor 7 shutdown alarm occurs. Reserved in HMC9000S.
123	AIN8 Sensor 8 Open	Act when AIN8 sensor 8 open circuit alarm occurs. Reserved in HMC9000S.
124	AIN8 Sensor 8 Warning	Act when AIN8 sensor 8 warning alarm occurs. Reserved in HMC9000S.
125	AIN8 Sensor 8 Shutdown	Act when AIN8 sensor 8 shutdown alarm occurs. Reserved in HMC9000S.
126	Class II Warning Indication	Act when class II warning occurs. Reserved in HMC9800S.
127	Gearbox Direction Error Alarm	Act when gearbox direction error alarm occurs. Reserved in HMC9800S.
128~149	Reserved	
150	Input 1 Active (Expansion 1)	Act when Input 1 is active (Expansion 1). Reserved in HMC9000A.
151	Input 2 Active (Expansion 1)	Act when Input 2 is active (Expansion 1). Reserved in HMC9000A.

No.	Items	Description
152	Input 3 Active (Expansion 1)	Act when Input 3 is active (Expansion 1). Reserved in HMC9000A.
153	Input 4 Active (Expansion 1)	Act when Input 4 is active (Expansion 1). Reserved in HMC9000A.
154	Input 5 Active (Expansion 1)	Act when Input 5 is active (Expansion 1). Reserved in HMC9000A.
155	Input 6 Active (Expansion 1)	Act when Input 6 is active (Expansion 1). Reserved in HMC9000A.
156	Input 7 Active (Expansion 1)	Act when Input 7 is active (Expansion 1). Reserved in HMC9000A.
157	Input 8 Active (Expansion 1)	Act when Input 8 is active (Expansion 1). Reserved in HMC9000A.
158	Input 9 Active (Expansion 1)	Act when Input 9 is active (Expansion 1). Reserved in HMC9000A.
159	Input 10 Active (Expansion 1)	Act when Input 10 is active (Expansion 1). Reserved in HMC9000A.
160	Input 11 Active (Expansion 1)	Act when Input 11 is active (Expansion 1). Reserved in HMC9000A.
161	Input 12 Active (Expansion 1)	Act when Input 12 is active (Expansion 1). Reserved in HMC9000A.
162	Input 13 Active (Expansion 1)	Act when Input 13 is active (Expansion 1). Reserved in HMC9000A.
163	Input 14 Active (Expansion 1)	Act when Input 14 is active (Expansion 1). Reserved in HMC9000A.
164	Input 15 Active (Expansion 1)	Act when Input 15 is active (Expansion 1). Reserved in HMC9000A.
165	Input 16 Active (Expansion 1)	Act when Input 16 is active (Expansion 1). Reserved in HMC9000A.
166	Sensor 9 Open	Act when sensor 9 open circuit alarm occurs.
167	Sensor 9 Warning	Act when sensor 9 warning alarm occurs.
168	Sensor 9 Shutdown	Act when sensor 9 shutdown alarm occurs.
169	Sensor 10 Open	Act when sensor 10 open circuit alarm occurs.
170	Sensor 10 Warning	Act when sensor 10 warning alarm occurs.
171	Sensor 10 Shutdown	Act when sensor 10 shutdown alarm occurs.
172	Input 1 Shutdown (RPU)	Act when Input 1 Shutdown (RPU) is active.
173	Input 2 Shutdown (RPU)	Act when Input 2 Shutdown (RPU) is active.
174	Input 3 Shutdown (RPU)	Act when Input 3 Shutdown (RPU) is active.
175	Input 4 Shutdown (RPU)	Act when Input 4 Shutdown (RPU) is active.

No.	Items	Description
176	Overspeed Shutdown (RPU)	Act when Overspeed Shutdown (RPU) is active.
177	Exhaust Flap Output	When there is an input port defined as 27: Exhaust Flap Open, the genset will control the exhaust flap to open when starting. After it is opened, if there is an exhaust flap open feedback within the preset exhaust flap open time, the controller will enter the starting process, if the feedback is not detected, it will enter the stopping process, and issue an "Exhaust Flap Open Failure" warning. Available in HMC9000A.
	Pre-lubrication Interlock Output	Act when Pre-lubrication Interlock Output is active. Available in HMC9000S.
178	Louver Open Interlock	The genset will control the louver to open when starting. After sending out the louver open command, if there is a louver open feedback within the preset louver open time, the controller will enter the starting process, if the feedback is not detected, it will enter the stopping process, and issue a " Louver Open Failure" warning. Reserved in HMC9000S.
179	High Water Temp. Shutdown (IN)	When it is active, the controller will issue a "High Water Temp. Shutdown" alarm. Reserved in HMC9000S.
180	Low OP Shutdown (IN)	When it is active, the controller will issue a " Low Oil Pressure Shutdown" alarm. Reserved in HMC9000S.
181	PLC Flag 1	
182	PLC Flag 2	
183	PLC Flag 3	
184	PLC Flag 4	
185	PLC Flag 5	
186	PLC Flag 6	
187	PLC Flag 7	
188	PLC Flag 8	
189	PLC Flag 9	
190	PLC Flag 10	
191	PLC Flag 11	
192	PLC Flag 12	
193	PLC Flag 13	
194	PLC Flag 14	
195	PLC Flag 15	
196	PLC Flag 16	
197	PLC Flag 17	



No.	Items	Description
198	PLC Flag 18	
199	PLC Flag 19	
200	PLC Flag 20	
201	PLC Flag 21	
202	PLC Flag 22	
203	PLC Flag 23	
204	PLC Flag 24	
205	PLC Flag 25	
206	PLC Flag 26	
207	PLC Flag 27	
208	PLC Flag 28	
209	PLC Flag 29	
210	PLC Flag 30	
211	PLC Flag 31	
212	PLC Flag 32	
213	PLC Flag 33	
214	PLC Flag 34	
215	PLC Flag 35	
216	PLC Flag 36	
217	PLC Flag 37	
218	PLC Flag 38	
219	PLC Flag 39	
220	PLC Flag 40	
221	Fault Shutdown	Output when other shutdown alarms occur, except for "Emergency Stop", "Remote Emergency Stop" and "RPU Emergency Stop".
222	Power Supply Fault	Output when the voltage input of Power Supply 1 or Power Supply 2 is less than or equal to 5V.
223	RPU Sensor 1 Low Shutdown Input 1 Active (Expansion 2)	Act when RPU Sensor 1 Low Shutdown alarm occurs. Available in HMC9000A.  Act when Input 1 is active (Expansion 2). Available in HMC9000S.
224	RPU Sensor 1 High Shutdown Input 2 Active (Expansion 2)	Act when RPU Sensor 1 High Shutdown alarm occurs. Available in HMC9000A.  Act when Input 2 is active (Expansion 2). Available in HMC9000S.
225	RPU Sensor 2 Low Shutdown Input 3 Active (Expansion 2)	Act when RPU Sensor 3 Low Shutdown alarm occurs. Available in HMC9000A.  Act when Input 3 is active (Expansion 2). Available in HMC9000S.
226	RPU Sensor 2 High Shutdown Input 4 Active	Act when RPU Sensor 2 High Shutdown alarm occurs. Available in HMC9000A.



No.	Items	Description
	(Expansion 2)	Act when Input 4 is active (Expansion 2). Available in HMC9000S.
227	RPU Sensor 1 Open Warning Input 5 Active (Expansion 2)	Act when RPU Sensor 1 Open Warning alarm occurs. Available in HMC9000A.  Act when Input 5 is active (Expansion 2). Available in HMC9000S.
228	RPU Sensor 1 High Warning Input 6 Active (Expansion 2)	Act when RPU Sensor 1 High Warning alarm occurs. Available in HMC9000A.  Act when Input 6 is active (Expansion 2). Available in HMC9000S.
229	RPU Sensor 1 Low Warning Input 7 Active (Expansion 2)	Act when RPU Sensor 1 Low Warning alarm occurs. Available in HMC9000A.  Act when Input 7 is active (Expansion 2). Available in HMC9000S.
230	RPU Sensor 2 Open Warning Input 8 Active (Expansion 2)	Act when RPU Sensor 2 Open Warning alarm occurs. Available in HMC9000A.  Act when Input 2 is active (Expansion 2). Available in HMC9000S.
231	RPU Sensor 2 High Warning Input 9 Active (Expansion 2)	Act when RPU Sensor 2 High Warning alarm occurs. Available in HMC9000A.  Act when Input 1 is active (Expansion 2). Available in HMC9000S.
232	RPU Sensor 2 Low Warning Input 10 Active (Expansion 2)	Act when RPU Sensor 2 Low Warning alarm occurs. Available in HMC9000A.  Act when Input 10 is active (Expansion 2). Available in HMC9000S.
233	RPU Overspeed Warning Input 11 Active (Expansion 2)	Act when RPU Overspeed Warning alarm occurs. Available in HMC9000A.  Act when Input 11 is active (Expansion 2). Available in HMC9000S.
234	Custom Combined Output 1 Input 12 Active (Expansion 2)	Act when meeting the condition of custom combined output 1. Available in HMC9000A.  Act when Input 12 is active (Expansion 2). Available in HMC9000S.
235	Custom Combined Output 2 Input 13 Active (Expansion 2)	Act when meeting the condition of custom combined output 2. Available in HMC9000A.  Act when Input 13 is active (Expansion 2). Available in HMC9000S.
236	Custom Combined Output 3 Input 14 Active (Expansion 2)	Act when meeting the condition of custom combined output 3. Available in HMC9000A.  Act when Input 14 is active (Expansion 2). Available in HMC9000S.
237	Custom Combined Output 4	Act when meeting the condition of custom combined output 4. Available in HMC9000A.

No.	Items	Description
	Input 15 Active (Expansion 2)	Act when Input 15 is active (Expansion 2). Available in HMC9000S.
238	Input 16 Active (Expansion 2)	Act when Input 15 is active (Expansion 2). Reserved in HMC9000A.
239	Sensor 1 Warning (M01)	Act when Sensor 1 Warning alarm occurs (M01). Reserved in HMC9000A.
240	Sensor 1 Shutdown (M01)	Act when Sensor 1 Shutdown alarm occurs (M01). Reserved in HMC9000A.
241	Sensor 2 Warning (M01)	Act when Sensor 2 Warning alarm occurs (M01). Reserved in HMC9000A.
242	Sensor 2 Shutdown (M01)	Act when Sensor 2 Shutdown alarm occurs (M01). Reserved in HMC9000A.
243	Sensor 3 Warning (M01)	Act when Sensor 3 Warning alarm occurs (M01). Reserved in HMC9000A.
244	Sensor 3 Shutdown (M01)	Act when Sensor 3 Shutdown alarm occurs (M01). Reserved in HMC9000A.
245	Sensor 4 Warning (M01)	Act when Sensor 4 Warning alarm occurs (M01). Reserved in HMC9000A.
246	Sensor 4 Shutdown (M01)	Act when Sensor 4 Shutdown alarm occurs (M01). Reserved in HMC9000A.
247	Sensor 5 Warning (M01)	Act when Sensor 5 Warning alarm occurs (M01). Reserved in HMC9000A.
248	Sensor 5 Shutdown (M01)	Act when Sensor 5 Shutdown alarm occurs (M01). Reserved in HMC9000A.
249	Sensor 6 Warning (M01)	Act when Sensor 6 Warning alarm occurs (M01). Reserved in HMC9000A.
250	Sensor 6 Shutdown (M01)	Act when Sensor 6 Shutdown alarm occurs (M01). Reserved in HMC9000A.
251	Sensor 7 Warning (M01)	Act when Sensor 7 Warning alarm occurs (M01). Reserved in HMC9000A.
252	Sensor 7 Shutdown (M01)	Act when Sensor 7 Shutdown alarm occurs (M01). Reserved in HMC9000A.
253	Sensor 8 Warning (M01)	Act when Sensor 8 Warning alarm occurs (M01). Reserved in HMC9000A.
254	Sensor 8 Shutdown (M01)	Act when Sensor 8 Shutdown alarm occurs (M01). Reserved in HMC9000A.
255	Reserved	

**NOTE:** The name of the output ports 1~14 only can be configured via PC software.

## 9.5 SENSOR FUNCTION DEFINITION

### 9.5.1 SENSOR CONFIGURATION LIST

**Table 13 Detailed Sensor Definitions**

No.	Settings	Contents	Remarks
1	Sensor Type	(0-3) 0: Not Used 1: Oil Pressure Sensor 2: Temperature Sensor 3: Fuel Level Sensor	Sensor 9 and sensor 10 are fixed temperature sensors. Curve type is fixed "K type thermocouple"
2	Sensor Curve (resistance type)	Curve types list	See 9.5.2/9.5.3/9.5.4 curve lists
3	Alarm Speed	(0-200)%	Alarm when the engine speed has exceeded the set value.
4	Range (Current type)	(0-6000)kpa	
5	High Shutdown Enable	(0-1) 0: Enable; 1: Disable	
6	High Shutdown Value	(0-6000)	
7	High Shutdown Delay	(0-3600)s	
8	Low Shutdown Enable	(0-1) 0: Enable; 1: Disable	
9	Low Shutdown Value	(0-4000)	
10	Low Shutdown Delay	(0-3600)s	
11	High Warn Enable	(0-1) 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	(0-1) 0: Enable; 1: Disable	
16	Low Warn Value	(0-4000)	
17	Low Return Value	(0-4000)	
18	Low Warn Delay	(0-3600)s	
19	First point X (Resistance)	Resistance type (not PT100)	
20	Second point X (Resistance)	Resistance type (not PT100)	
21	Third point X (Resistance)	Resistance type (not PT100)	
22	Fourth point X (Resistance)	Resistance type (not PT100)	
23	Fifth point X (Resistance)	Resistance type (not PT100)	
24	Sixth point X (Resistance)	Resistance type (not PT100)	
25	Seventh point X (Resistance)	Resistance type (not PT100)	
26	Eighth point X (Resistance)	Resistance type (not PT100)	
27	First point Y (Value)	Resistance type (not PT100)	
28	Second point Y (Value)	Resistance type (not PT100)	
29	Third point Y (Value)	Resistance type (not PT100)	
30	Fourth point Y (Value)	Resistance type (not PT100)	
31	Fifth point Y (Value)	Resistance type (not PT100)	
32	Sixth point Y (Value)	Resistance type (not PT100)	
33	Seventh point Y (Value)	Resistance type (not PT100)	
34	Eighth point Y (Value)	Resistance type (not PT100)	
35	User-defined string	User-defined sensor names	

## 9.5.2 TEMPERATURE CURVES

**Table 14 Temperature Curve List**

No.	Contents	Range	Description
0	Not Used		
1	PT100		
2	Custom Resistance Curve		
3	VDO		
4	CURTIS		
5	VOLVO-EC		
6	DATCON		
7	SGX		
8	SGD		
9	SGH		
10	Reserved		
11	Reserved		
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved		

**NOTE:** PT100 Resistance type temperature sensor division value is set as 0.385 (0.385Ω corresponds to 1°C).

## 9.5.3 PRESSURE CURVES

**Table 15 Resistance Pressure Curve List**

No.	Contents	Range	Description
0	Not Used		
1	4-20mA		
2	Custom Resistance Curve		
3	VDO 10Bar		
4	CURTIS		
5	VOLVO-EC		
6	DATCON 10Bar		
7	SGX		
8	SGD		
9	SGH		
10	Reserved		
11	Reserved		
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved		

**NOTE:** There is no need to set curve type if the pressure sensor is current type.

## 9.5.4 LIQUID LEVEL CURVES

Table 16 Liquid Level Curve List

No.	Contents	Range	Description
0	Not used		
1	Reserved		
2	Custom resistance curve		
3	SGD		
4	SGH		
5	Reserved		
6	Reserved		
7	Reserved		
8	Reserved		
9	Reserved		
10	Reserved		
11	Reserved		
12	Reserved		
13	Reserved		
14	Reserved		
15	Reserved		

## 9.5.5 STERN SHAFT SENSOR CONFIGURATION

Table 17 Detailed Definition Value of Stern Shaft

No.	Items	Contents	Remarks
1.	Data Source	(0-6) 0: Not Used 1: HMC9000A Sensor 5 2: HMC9000A Sensor 6 3: HMC9000A Sensor 7 4: HMC9000A Sensor 8 5: Reserved 6: Reserved	HMC9000S doesn't have this function.
2.	Reserved		
3.	Alarm Speed	(0-200)%	Alarm occurs when over than this speed
4.	Reserved		
5.	Upper Limit Stop Enable	Reserved	
6.	Upper Limit Stop Value	Reserved	
7.	Stop Delay Time	Reserved	
8.	Lower Limit Stop Enable	Reserved	
9.	Lower Limit Stop Value	Reserved	
10.	Stop Delay Time	Reserved	
11.	Sensor Upper Limit Warning Enable	Reserved	

No.	Items	Contents	Remarks
12.	Upper Limit Warning Value	Reserved	
13.	Upper Limit Warning Return Value	Reserved	
14.	Upper Limit Warning Delay	Reserved	
15.	Sensor Lower Limit Warning Enable	Reserved	
16.	Lower Limit Warning Value	Reserved	
17.	Lower Limit Warning Return Value	Reserved	
18.	Lower Limit Warning Delay	Reserved	
19.	The 1 <sup>st</sup> point X (current, mA)	4.0 (Default Value)	This curve value can be set.
20.	The 2 <sup>nd</sup> point X (current)	8.0	
21.	The 3 <sup>rd</sup> point X (current)	10.0	
22.	The 4 <sup>th</sup> point X (current)	12.0	
23.	The 5 <sup>th</sup> point X (current)	14.0	
24.	The 6 <sup>th</sup> point X (current)	16.0	
25.	The 7 <sup>th</sup> point X (current)	18.0	
26.	The 8 <sup>th</sup> point X (current)	20.0	
27.	The 1 <sup>st</sup> point Y (Speed Value)	-1000	
28.	The 2 <sup>nd</sup> point Y (Speed Value)	-500	
29.	The 3 <sup>rd</sup> point Y (Speed Value)	-250	
30.	The 4 <sup>th</sup> point Y (Speed Value)	0	
31.	The 5 <sup>th</sup> point Y (Speed Value)	250	
32.	The 6 <sup>th</sup> point Y (Speed Value)	500	
33.	The 7 <sup>th</sup> point Y (Speed Value)	750	
34.	The 8 <sup>th</sup> point Y (Speed Value)	1000	

## 10 BACK PANEL

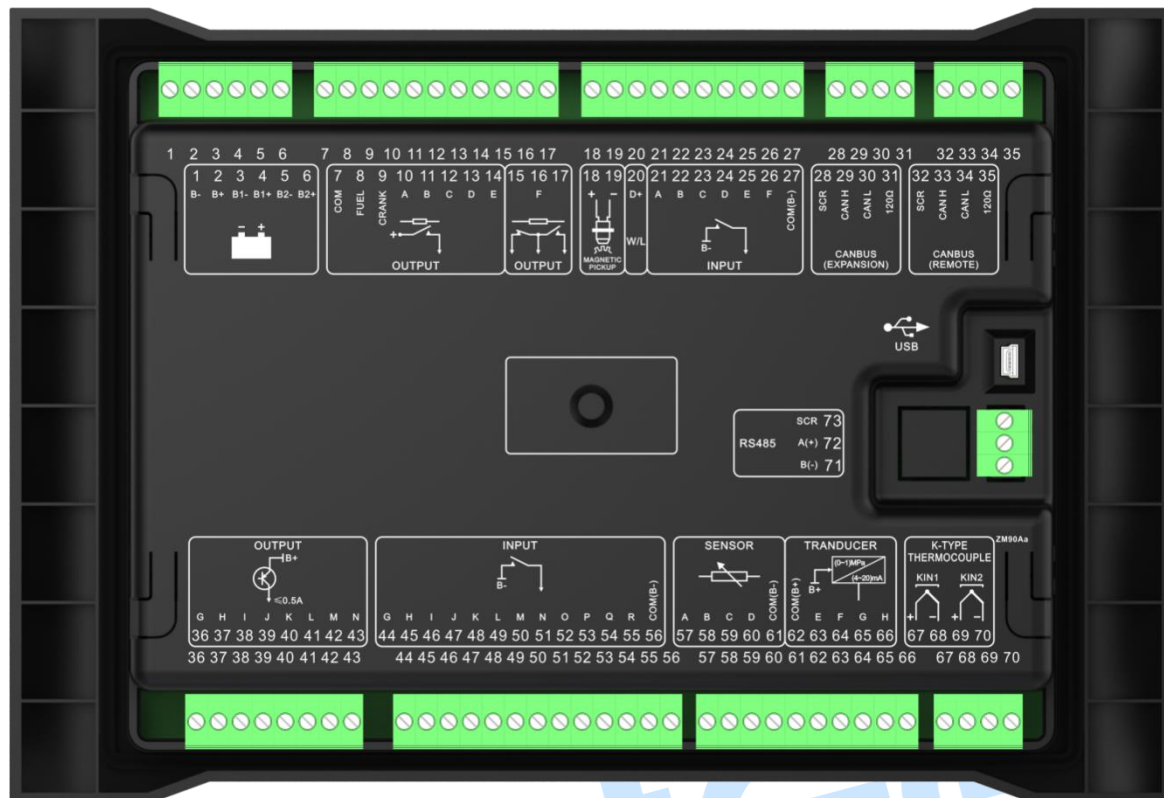

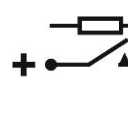

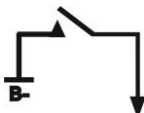


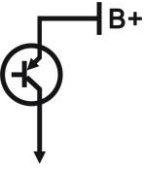
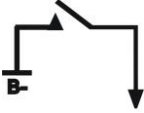

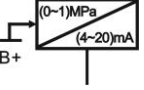

Fig. 3 HMC9000A/S Controller Back Panel


Table 18 Back Panel Terminals Connection Description

Icon	No.	Function	Cable Size	Description
	1	DC input B-	2.5mm <sup>2</sup>	DC power supply negative input. It is connected with starter battery negative.
	2	DC input B+	2.5mm <sup>2</sup>	DC power supply positive input. It is connected with starter battery positive.
	3	B1- input	1.0mm <sup>2</sup>	Power 1 voltage input
	4	B1+ input	1.0mm <sup>2</sup>	
	5	B2- input	1.0mm <sup>2</sup>	Power 2 voltage input
	6	B2+ input	1.0mm <sup>2</sup>	
	7	COM Relay Common Port	2.5mm <sup>2</sup>	Common power supply input
	8	Fuel Relay Output	2.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 16A. Broken wire protection function is fitted.
	9	Crank Relay Output	2.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 16A.
	10	Aux. output 1(A)	1.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 7A. Broken wire protection function is fitted (if configured).
	11	Aux. output 2(B)	1.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 7A. Broken wire protection function is fitted (if configured).



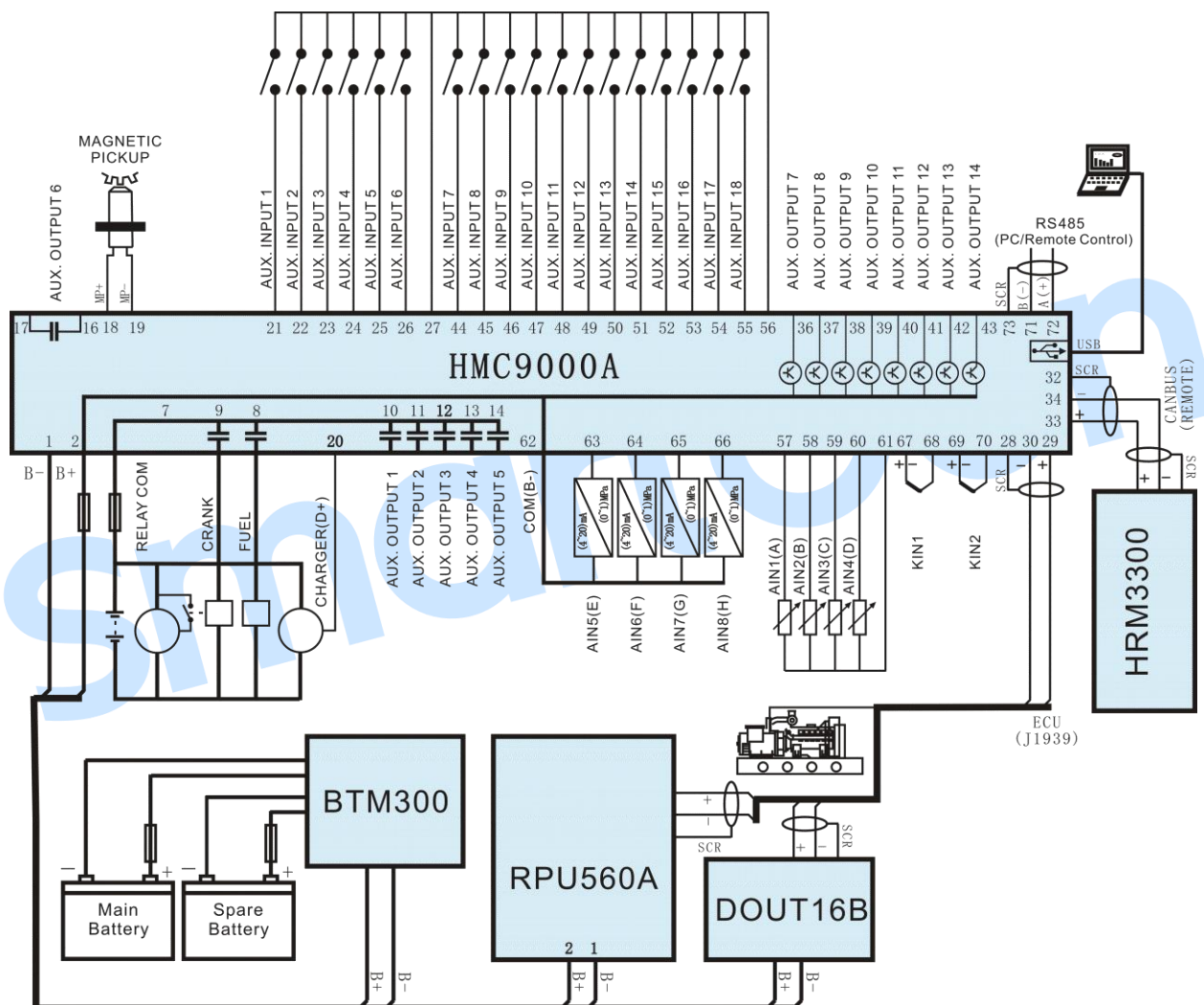
Icon	No.	Function	Cable Size	Description
				fitted (if configured).
	12	Aux. output 3(C)	1.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 7A. Broken wire protection function is fitted (if configured).
	13	Aux. output 4(D)	1.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 7A.
	14	Aux. output 5(E)	1.5mm <sup>2</sup>	DC voltage is supplied by No.7 terminal with rated 7A.
	15	Aux. output 6(F)	1.5mm <sup>2</sup>	Power free; Rated current: 7A.
	16			
	17			
	18	Magnetic Pickup "+" Input	1.0mm <sup>2</sup>	Speed sensor input
	19	Magnetic Pickup "-" Input	1.0mm <sup>2</sup>	
D+	20	D+ Charging Input	1.0mm <sup>2</sup>	Charging generator D+ input; Ground connection is not allowed.
	21	AUX. input 1(A)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	22	AUX. input 2(B)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	23	AUX. input 3(C)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	24	AUX. input 4(D)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	25	AUX. input 5(E)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	26	AUX. input 6(F)	1.0mm <sup>2</sup>	Digital input; Broken wire protection function is fitted (if configured).
	27	COM(B-) Aux. Input Common Port	1.0mm <sup>2</sup>	
CANBUS (EXPANSION)	28	SCR (EXPANSION)	0.5mm <sup>2</sup>	It is externally connected to ECU modules and expansion modules. Impedance-120Ω shielding wire shall be employed and the single-end shall be connected to the ground. There is already 120 terminal resistance in the module and it is only needed to connect 30 and 31 terminals.
	29	CAN(H) (EXPANSION)		
	30	CAN(L) (EXPANSION)		
	31	120Ω		
CANBUS (REMOTE)	32	SCR (REMOTE)	0.5mm <sup>2</sup>	It is externally connected to remote control modules. Impedance-120Ω shielding wire shall be employed and the single-end shall be connected to the ground. There is already 120 terminal resistance in the module and it is
	33	CAN(H) (REMOTE)		
	34	CAN(L)		

Icon	No.	Function	Cable Size	Description
		(REMOTE)		only needed to connect 34 and 35 terminals.
	35	120Ω		
	36	Aux. output 7 (G)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	37	Aux. output 8 (H)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	38	Aux. output 9 (I)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	39	Aux. output 10(J)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	40	Aux. output 11(K)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	41	Aux. output 12(L)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	42	Aux. output 13(M)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	43	Aux. output 14(N)	0.5mm <sup>2</sup>	B+ voltage output, rated current is 0.5A.
	44	Aux. digital input 7(G)	1.0mm <sup>2</sup>	Digital input
	45	Aux. digital input 8(H)	1.0mm <sup>2</sup>	Digital input
	46	Aux. digital input 9(I)	1.0mm <sup>2</sup>	Digital input
	47	Aux. digital input 10(J)	1.0mm <sup>2</sup>	Digital input
	48	Aux. digital input 11(K)	1.0mm <sup>2</sup>	Digital input
	49	Aux. digital input 12(L)	1.0mm <sup>2</sup>	Digital input
	50	Aux. digital input 13(M)	1.0mm <sup>2</sup>	Digital input
	51	Aux. digital input 14(N)	1.0mm <sup>2</sup>	Digital input
	52	Aux. digital input 15(O)	1.0mm <sup>2</sup>	Digital input
	53	Aux. digital input 16(P)	1.0mm <sup>2</sup>	Digital input
	54	Aux. digital input 17(Q)	1.0mm <sup>2</sup>	Digital input
	55	Aux. digital input 18(R)	1.0mm <sup>2</sup>	Digital input
	56	COM(B-) digital input common port	1.0mm <sup>2</sup>	
	57	AIN1 (A)	1.0mm <sup>2</sup>	Resistance sensor input
	58	AIN2 (B)	1.0mm <sup>2</sup>	Resistance sensor input
	59	AIN3 (C)	1.0mm <sup>2</sup>	Resistance sensor input
	60	AIN4 (D)	1.0mm <sup>2</sup>	Resistance sensor input
	61	COM(B-) AIN1-4 Common Port	1.0mm <sup>2</sup>	
	62	COM(B+) AIN5-8 Common Power Terminal	1.0mm <sup>2</sup>	Power B+ output
	63	AIN5 (E)	1.0mm <sup>2</sup>	4-20mA sensor input
	64	AIN6 (F)	1.0mm <sup>2</sup>	4-20mA sensor input
	65	AIN7 (G)	1.0mm <sup>2</sup>	4-20mA sensor input
	66	AIN8 (H)	1.0mm <sup>2</sup>	4-20mA sensor input
	67	KIN 1+	1.0mm <sup>2</sup>	K-Thermocouple input
	68	KIN1-	1.0mm <sup>2</sup>	
	69	KIN2+	1.0mm <sup>2</sup>	K-Thermocouple input
	70	KIN2-	1.0mm <sup>2</sup>	
RS485	71	RS485(B-)	0.5mm <sup>2</sup>	PC programming and monitoring port (isolation type); The single-end shall be
	72	RS485(A+)	0.5mm <sup>2</sup>	

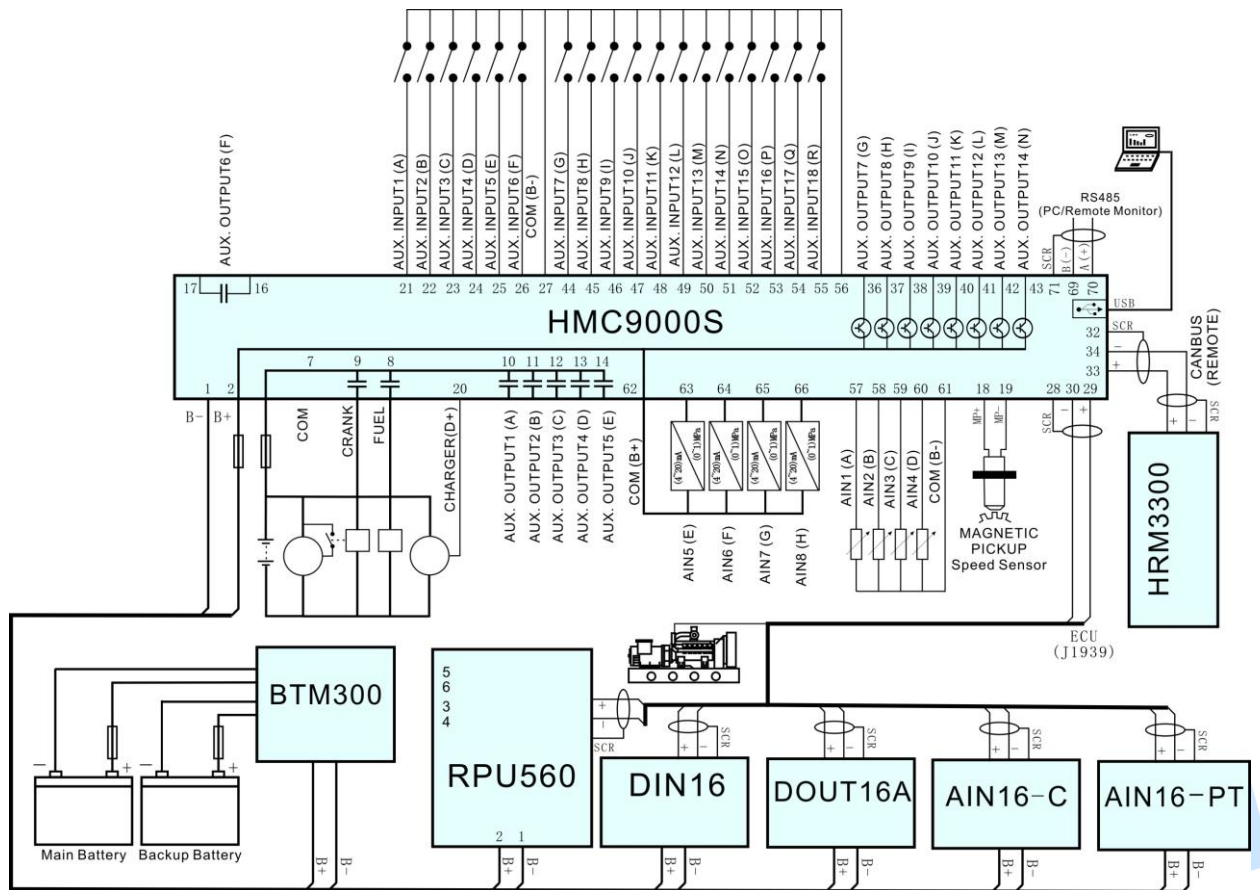
Icon	No.	Function	Cable Size	Description
	73	SCR	0.5mm <sup>2</sup>	connected to the ground.
USB	 USB	USB	0.5mm <sup>2</sup>	Communication with PC monitoring software can be realized.

**⚠NOTE:** It is strictly prohibited to take out the starting battery when the engine is running, otherwise the control system will be burned because of the over high DC input voltage! Failure to do so can create excessive DC input voltage and result in damage or destruction of equipment!

## 11 TYPICAL WIRING DIAGRAM



### Fig. 4 HMC9000A Typical Wiring Diagram



**Fig. 5 HMC9000S Typical Wiring Diagram**

**NOTE:**

1. Power supply for fuel relay, starting relay and auxiliary outputs 1~5 are provided by terminal 7.
2. Auxiliary outputs 7-14 are working via transistors and drive current is 0.5A; it can be connected directly if the external device is lower than 0.5A.
3. Controller expansion modules can only be used together with the main controller; however, the main controller can be used separately.
4. Communication with PC can be realized via RS485 and USB ports.
5. Remote module is equipped with CANBUS port, which can be connected to REMOTE port of main control module to do remote control.

## 12 COMMUNICATION CONFIGURATION AND CONNECTION

**HMC9000A/HMC9000S** genset automation controller possesses RS485 port and USB communication port, which allow the controller to connect with open-structured Local Area Network (LAN). RS485 and USB employ ModBus communication protocol. With the help of PC or the software on the DAS (Data Acquisition System), they can provide a simple and useful marine engine monitoring system management scheme and realize remote control, remote measurement and remote communication ("three remotes") functions.

For more information about communication protocols, please refer to *HMC9000 Communication Protocol*.

RS485 Communication parameters:

Module address	1 (Range: 1~254, user-defined, default: 1)
Baud rate	9600 bps
Data bit	8 bit
Parity check bit	None
Stop bit	2 bit



**Fig. 6 HMC9000A/HMC9000S USB And PC Connection Diagram**

### 13 CONTROLLER AND ENGINES EXPANSION (CANBUS) CONNECTION

Users can control a large number of ECU engines by controller expansion ports. Besides, various expansion modules can be connected to the controller for user to adapt different working environments at the same time.

#### 13.1 CUMMINS ISB/ISBE

**Table 19 Fuel and Starting Relay Wiring**

Terminals of controller	Connector B	Remark
Fuel relay output	39	
Start relay output	-	Connected to starter coil directly.
Auxiliary output port 1	Expansion 30A relay, providing power voltage for 01, 07, 12, 13 terminals.	ECU power; It is set as "ECU power".

**Table 20 9-pin Connector Wiring**

Controller Terminals	9-pin Connector	Remark
SCR (EXPANSION)	SAE J1939 shield	CAN communication shielding line (connecting to ECU terminal only)
CAN(H) (EXPANSION)	SAE J1939 signal	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	SAE J1939 return	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Cummins ISB.

#### 13.2 CUMMINS QSL9

It is suited for CM850 engine controller module.

**Table 21 Fuel and Starting Relay Wiring**

Controller Terminals	50-pin Connector	Remark
Fuel relay output	39	
Start relay output	-	Connected to starter coil directly.

**Table 22 9-pin Connector Wiring**

Terminals of controller	9 pin connector	Remark
SCR (EXPANSION)	SAE J1939 shield-E	CAN communication shielding line (connect to ECU terminal only)
CAN(H) (EXPANSION)	SAE J1939 signal-C	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	SAE J1939 return-D	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Cummins-CM850.



### 13.3 CUMMINS QSM11

It is suited for CM750 engine controller module. Engine types: QSM11 G1, QSM11 G2.

**Table 23 Fuel and Starting Relay Wiring**

Controller Terminals	C1 Connector	Remark
Fuel relay output	5&8	
Start relay output	-	Connected to starter coil directly.

**Table 24 3-pin Connector Wiring**

Controller Terminals	3-pin Data Line Connector	Remark
SCR (EXPANSION)	C	CAN communication shielding line (connected to ECU terminal only)
CAN(H) (EXPANSION)	A	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	B	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Cummins ISB.

### 13.4 DETROIT DIESEL DDEC III / IV

**Table 25 Engine Wiring**

Controller Terminals	Engine CAN Port	Remark
Fuel relay output	Expansion 30A relay, providing power voltage for ECU.	
Start relay output	-	Connected to starter coil directly
SCR (EXPANSION)	-	CAN communication shielding line (connected to this terminal only)
CAN(H) (EXPANSION)	CAN(H)	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	CAN(L)	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: General J1939.

### 13.5 DEUTZ EMR2

**Table 26 Engine Wiring**

Controller Terminals	F Connector	Remark
Fuel relay output	Expansion 30A relay, providing power voltage for Terminal 14. The fuse is 16A.	
Start relay output	-	Connected to starter coil directly
-	1	Connected to power negative.
SCR (EXPANSION)	-	CAN communication shielding line (connected to this terminal only)
CAN(H) (EXPANSION)	12	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	13	Impedance 120Ω connecting line is



Controller Terminals	F Connector	Remark
		recommended.

**NOTE:** Engine type of the testing software chooses: Volvo EDC4.

### 13.6 JOHN DEERE

**Table 27 Engine Wiring**

Controller Terminals	21-pin Connector	Remark
Fuel relay output	G, J	
Start relay output	D	
SCR (EXPANSION)	-	CAN communication shielding line (connected to this terminal only)
CAN(H) (EXPANSION)	V	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	U	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: John Deere.

### 13.7 MTU MDEC

The engine types suitable for MTU engines are 2000 series, 4000 series.

**Table 28 Engine Wiring**

Controller Terminals	X1 Connector	Remark
Fuel relay output	BE1	
Start relay output	BE9	
SCR (EXPANSION)	E	CAN communication shielding line (connected to one of the terminals only.)
CAN(H)(EXPANSION)	G	Impedance 120Ω connecting line is recommended.
CAN(L)(EXPANSION)	F	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: MTU-MDEC-303.

### 13.8 PERKINS

It is suited for ADEM3/ADEM4 Engine Control Module. Engine types: 2306; 2506; 1106; 2806.

**Table 29 Engine Wiring**

Controller Terminals	Connector	Remark
Fuel relay output	1,10,15,33,34	
Start relay output	-	connected to starter coil directly
SCR (EXPANSION)	-	CAN communication shielding line (connected to controller's terminal only)
CAN(H) (EXPANSION)	31	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	32	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Perkins.

## 13.9 SCANIA

It is suited for S6 Engine Control Module. Engine types: DC9, DC12, DC16.

**Table 30 Engine Wiring**

Controller Terminals	B1 Connector	Remark
Fuel relay output	3	
Start relay output	-	Connected to starter coil directly
SCR (EXPANSION)	-	CAN communication shielding line (connected to controller's terminal only)
CAN(H) (EXPANSION)	9	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	10	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Scania.

## 13.10 VOLVO EDC3

It is suited for engine types: TAD1240; TAD1241; TAD1242.

**Table 31 Fuel and Starting Relay Wiring**

Controller Terminals	"Stand Alone" Connector	Remark
Fuel relay output	H	
Start relay output	E	
Auxiliary output 1	P	Set auxiliary output 1 as "Preheating until cranking" and set preheating time as 5 seconds.

**Table 32 CANBUS Wiring**

Controller Terminals	"Data Bus" Connector	Remark
SCR (EXPANSION)	-	CAN communication shielding line (connected to controller's terminal only)
CAN(H) (EXPANSION)	1	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	2	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Volvo.

## 13.11 VOLVO EDC4

The suitable engine types are TD520, TAD520 (optional), TD720, TAD720 (optional), TAD721, and TAD722.

**Table 33 Engine Wiring**

Controller Terminals	Connector	Remark
Fuel relay output	Expansion 30A relay, providing power voltage for Terminal 14. The fuse is 16A.	
Start relay output	-	Connected to starter coil directly.
	1	Connected to battery negative.
SCR (EXPANSION)	-	CAN communication shielding line (connected to controller's terminal only)

Controller Terminals	Connector	Remark
CAN(H) (EXPANSION)	12	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	13	Impedance 120Ω connecting line is recommended.

**NOTE:** Engine type of the testing software chooses: Volvo EDC4.

## 13.12 VOLVO-EMS2

It is suitable for Volvo engines: D9、D13、D16、EMS.

**Table 34 Engine Wiring**

Controller Terminals	Engine CAN Port	Remark
Auxiliary output 2	5	ECU power supply; Set auxiliary output 2 as "ECU Power Supply".
CAN(H) (EXPANSION)	1(CAN H)	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	2(CAN L)	Impedance 120Ω connecting line is recommended.
This engine type supports input port speed adjustment. Set Input 1 speed raising input; and Input 2 speed dropping input. After normal running speed raising/dropping function shall be realized via input ports.		

**NOTE:** Engine type of the testing software chooses: Volvo-EMS2.

## 13.13 BOSCH

It is suited for Yuchai Bosch common rail electronically controlled engines.

**Table 35 Engine Wiring**

Controller Terminals	42-pin Engine Port	Remark
Fuel relay output	1.40	Connected to engine ignition switch.
Start relay output	-	Connected to starter coil directly
SCR (EXPANSION)	-	CAN communication shielding line (connected to controller's terminal only)
CAN(H) (EXPANSION)	1.35	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	1.34	Impedance 120Ω connecting line is recommended.

**Table 36 Power Wiring**

Battery	2-pin Engine Port	Remark
Battery negative	1	Wire size: 2.5mm <sup>2</sup>
Battery positive	2	Wire size: 2.5mm <sup>2</sup>

**NOTE:** Engine type of the testing software chooses: BOSCH.

**NOTE:** Please contact us if you have any questions about the controller and ECU connection.

## 13.14 EXPANSION APPLICATIONS

By EXPANSION communication ports users can develop different application modules. For details please see as follows:

- RPU560A Safeguard Module: It is used with the main controller together via CANBUS port. If safeguard module does not receive signals from the main controller for more than 1 second, and the main controller has faults and inputs are inactive, it will take over engine control; until stop input or overspeed stop the working engine it can stop. The input port function, output port function and overspeed threshold alarm can be users-defined. It can be connected with HMC9000A/HMC9000S.
- AIN16 Analog Input Module: It is used with the main controller together via CANBUS port. It has 16-way inputs and all inputs are PT100 and 4-20mA, and analog inputs are 10, 11. It can also choose K type thermocouple input. All alarm threshold values and ranges can be set through HMC9000S and they will not miss when power is off.
- DIN16 Digital Input Module: It is used with the main controller together via CANBUS port. It has 16-way inputs. All inputs can be configured through HMC9000S. All input parameters are stored in HMC9000A/HMC9000S and they will not miss when power is off.
- DOUT16 Digital Output Module: It is used with the main controller together via CANBUS port. It has 16-way inputs. All inputs can be configured through HMC9000S/HMC9000A. All input parameters are stored in HMC9000A/HMC9000S and they will not miss when power is off.
- LA16 Lamp Indication Module: It is used with the main controller together via CANBUS port. It has 16-way LED outputs. Every LED way has red, green, and yellow colors which are optional and light intensity can be adjusted. The output power of every way can be set by HMC9000S controller. The parameters configured are stored in HMC9000S and they won't lose when power is off.
- HRM3300 Remote Monitoring Controller: It is used with the main controller together via CANBUS port. It can realize start, stop, alarm mute etc. operations on the engine from remote-distance. All parameters and records are all displayed on the remote monitoring controller.
- AIN16-C 4~20mA Collection Module: It is used with the main controller together via CANBUS port. It has 16-way 4~20mA inputs. Alarms and names of every analog input can be configured by HMC9000S controller. The parameters configured are stored in HMC9000S and won't lose when power is off.
- AIN16-PT PT100 Collection Module: It is used with the main controller together via CANBUS port. It has 16-way PT100 inputs. Alarms and names of every analog input can be configured by HMC9000S controller. The parameters configured are stored in HMC9000S and won't lose when power is off.
- AIN16-M01 Analog Input/Output Module: It is used with the main controller together via CANBUS port. It has 1 way 4~20mA input, 8-way PT100 sensor inputs, 3-way speed sensor inputs and 4-way 4~20mA outputs. Alarms and names of every analog input and the sensors related with analog outputs can be configured through HMC9000S controller. The parameters configured are stored in HMC9000S and won't lose when power is off.
- AIN8 Analog Signal Collection Module: It is used with the main controller together via CANBUS port. It has 8-way analog (optional resistance, voltage and current type) inputs. Alarms and names of every analog input can be configured by HMC9000A controller. The parameters configured are stored in HMC9000A and won't lose when power is off.

- HMP300 Power Quantity Protection Module: It is used with the main controller together via CANBUS port. It can collect voltage, current, power etc. data and when the data is out of the range it can protect the outputs. It can only be connected with HMC9000A.

**NOTE:** Only in remote mode can the remote control module control the engine; in local mode, it can only monitor the engine, but not control.

## 14 REMOTE MONITORING INTERFACE

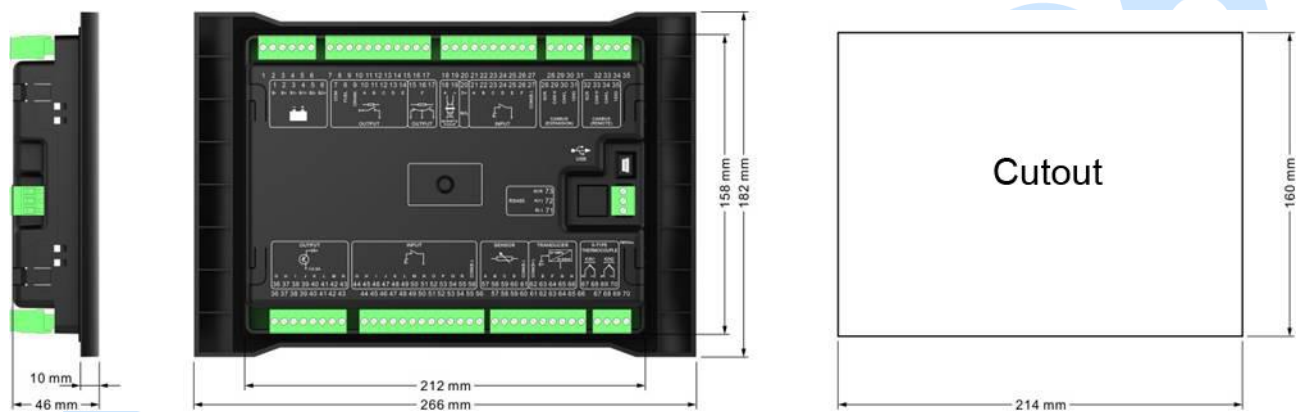
This expansion port is a CANBUS port for connecting remote control module.

HRM3300 Remote Control Module: It is used with the main controller together via CANBUS port. It can realize start, stop, alarm mute etc. operations on the engine from remote-distance. All parameters and records are all displayed on the remote monitoring controller.

**NOTE:** Only in remote mode can the remote control module control the engine; in local mode, except Stop, other keys are inoperative.

## 15 INSTALLATION

**HMC9000A/HMC9000S** has embedded panel structure. It is fixed with the help of fixing clips. Overall dimensions and cutout sizes can be seen below.



**Fig. 7 Installation Size**

Table 37 Troubleshooting List

Problem	Possible Solution
No response on controller when it is energized.	Check starting batteries; Check controller connection wirings; Check DC fuse.
Genset shutdown	Check whether the water/cylinder temperature is too high or not; Check DC fuse.
Emergency shutdown	Check emergency shutdown button function is correct or not; Check whether there is error in connecting wires.
Low oil pressure alarm after engine has started.	Check oil pressure sensor and its connection wirings.
High water temperature alarm after engine has started.	Check water temperature sensor and its wirings.
Shutdown alarm when engine is running	Check relevant switches and its wirings based on the information on LCD; Check auxiliary digital input port.
Start failure	Check fuel return circuit and its connection wirings; Check starting power; Check speed sensor and its connection wirings; Consult engine manual.
No response on starter	Check starter wirings; Check starting power.
RS485 abnormal communication	Check wirings; Check if RS485 A and B wires are connected in the opposite way; Check if RS485 transfer module is damaged; Check if PC communication port is damaged.
ECU communication failure or wrong data	Check wirings; Check if H and L CANBUS wires are connected in the opposite way; Check if ECU is damaged; Check if the engine type is correct; Check if ECU power output is correct.
Auxiliary input alarm	Check input connection wirings; Check if input polarity configuration is correct.