



SmartGen
ideas for power

HMC9000
DIESEL ENGINE CONTROLLER
(With J1939 Interface)
USER MANUAL
















ZHENGZHOU SMARTGEN TECHNOLOGY CO.,LTD.

4 TECHNICAL PARAMETERS

Parameter	Details
Working Voltage	DC18.0V to DC35.0V, uninterrupted power supply.
Power Consumption	<3W (Standby mode: ≤2W)
Speed Sensor Voltage	1.0V to 24V (RMS)
Speed Sensor Frequency	Max 10,000 Hz
GOV Output Voltage	DC (-10~10)V
Start Relay Output	16 A Connect to common output port.
Fuel Relay Output	16 A Connect to common output port.
Auxiliary Relay Output 1	7 A Connect to common output port.
Auxiliary Relay Output 2	7 A Connect to common output port.
Auxiliary Relay Output 3	7 A Connect to common output port.
Auxiliary Relay Output 4	7 A Connect to common output port.
Auxiliary Relay Output 5	7 A Connect 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	240 mm x 172 mm x 57mm
Panel Cutout	214mm x 160mm
Working Conditions	Temperature: (-25~70)°C; Humidity: (20~93)%RH
Storage Conditions	Temperature: (-25~70)°C
Protection Level	IP55 Gasket
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Weight	0.90kg

5 OPERATOR INTERFACE

5.1 PUSHBUTTONS DESCRIPTION

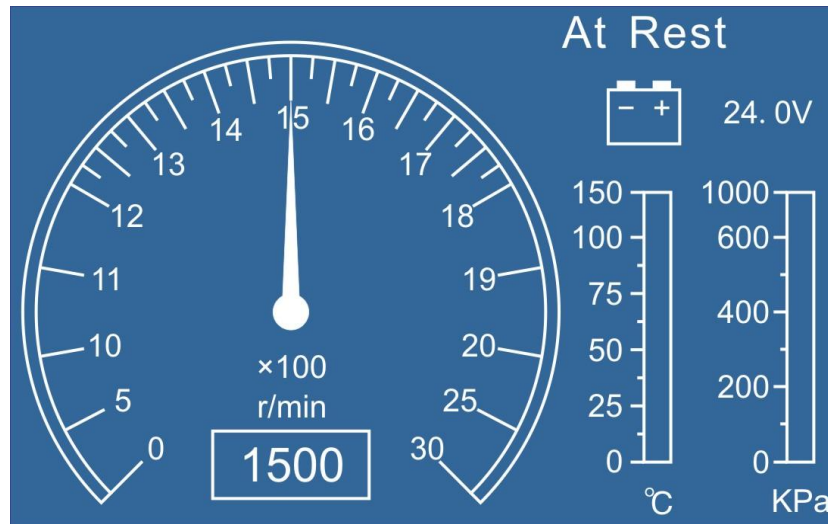
	Stop	Stop running generator in local mode; During stopping process, press this button again to stop generator immediately.
	Start	Start genset in local mode.
	Remote Mode	Places controller into its remote mode. In remote mode, engine operation can be controlled via remote control module. In local mode, except for stop button, all the other panel buttons will be locked.
	Local Mode	Places controller into its local mode. In local mode, controller can be started using panel button while remote control will have no effect.
	Reset	If alarm occurs, pressing this button will reset it. All alarm only can be removed after reset.
	Lamp Test	Press this button will test panel LED indicators and display screen.
	Mute	Alarm sound off;
	Up/Increase	Screen scroll. Up cursor and increase value in setting menu.
	Down/Decrease	Screen scroll. Down cursor and increase value in setting menu.
	Left	Screen scroll. Left move cursor in setting menu.
	Right	Screen scroll. Right move cursor in setting menu.
	Set/Confirm	1. Pressing and holding for more than 3 seconds enters parameter configuration menu; 2. In settings menu confirms the set value
	Exit	1. Returns to the main screen. 2. In settings menu returns to the previous screen.

⚠ WARNING: Factory default password is 01234. Operator can change the password to prevent others from free altering of the settings. Please clearly remember the password after changing. In case of password loss, please contact Smartgen service department enclosing all the information from the “ABOUT” page of the controller.

5.2 LCD DISPLAY

5.2.1 Main Screen

The main screen displays revolution meter (0~3000r/min), thermograph (0~150 °C; related sensor is user-configurable, for example: HMC9000 sensor 1), oil manometer (0~1000kpa; related sensor is user-configurable, for example: HMC9000 sensor 5) and two batteries voltage. The main screen displays as follows:



5.2.2 Measured Data Display

The main screen is divided into two separate viewing areas: right and left. Left area display status and cannot be scrolled; Right area can be scrolled using  button.

★**Status**, including as below:

Status of genset , power supply status.

★**Engine**, including as below:

Engine speed, sensors 1-4 (resistance type), sensors 5-8 (current type), main battery voltage, standby battery voltage, charger voltage, total running time, total start times and GOV output percentage.

(Note: sensor names are user-set)

★If J1939 is enabled, the following ECU data will also be displayed: coolant pressure, coolant level, oil temperature, fuel temperature, fuel pressure, inlet temperature, exhaust temperature, turbo pressure, fuel consumption, total fuel consumption and others. (Different engine with different parameters).

★ **Alarm**, including as below:

It displays all kinds of warning alarms and shutdown alarms which detected by controller.

▲**Note:** For ECU alarms and shutdown alarms, if the alarm information is displayed, check engine according to it, otherwise, please check the manual of generator according to SPN alarm code. HCM9000E has no J1939 port.

★**Event log**, including as below:

Records all shutdown events (shutdown alarm, trip and shutdown alarm) and the real time when alarm occurs.

★ **Others**, including as below:

Date and time, inputs/outputs status.

9 INPUT/OUTPUT PORTS CONFIGURATION

9.1 AUXILIARY INPUTS 1~18 FUNCTIONAL CONFIGURATION

9.1.1 Digital Input Port Configuration

No.	Settings	Contents	Description
1	Feature Set	(0-50)	See 8.1.2 INPUT PORT FUNCTIONS
2	Active type	(0-1)	0: Close to activate 1: Open to activate
3	Arming	(0-3)	0: From Safety on 1: From Crank 2: Always 3: Never
4	Active action	(0-4)	0: Warn 1: Shutdown 2: Indication
5	Input Delay	(0-20.0)s	
6	Open Check Enable	(0-1)	0:Disabled 1:Enable Only input ports 1~6 and speed input have this function.
7	Display string	User-defined input port names	20 English symbols or 10 Chinese characters

9.1.2 Input Ports Functions

No.	Function	Description
0	Not used	
1	User-defined	Users configured input port settings
2	Alarm Mute	Can prohibit "Audible Alarm" output when input is active.
3	Reset alarm	Can reset all alarms when input is active.
4	Raise Speed	The generator will increase speed by GOV when the input is active.
5	Drop Speed	The generator will decrease speed by GOV when the input is active.
6	Reserved	
7	Reserved	
8	Lamp test	All LED indicators are illuminating when input is active.
9	Local mode in	Local mode is activated when input is active.
10	Remote mode in	Remote mode is activated when input is active.
11	Remote start	Automatically starts the generator in remote mode when the input is active. Only the active shutdown input will be able to stop the generator. (Inch or hold the button for more than 1s)
12	Remote stop	Stops the generator in remote mode when the input is active.
13	Remote start/stop	Automatically starts the generator in remote mode; the generator will shut down when this input is deactivated.
14	Pre-lubricate	If output is set as pre-lubrication output, the relay disconnects after the set pre-lubrication delay.

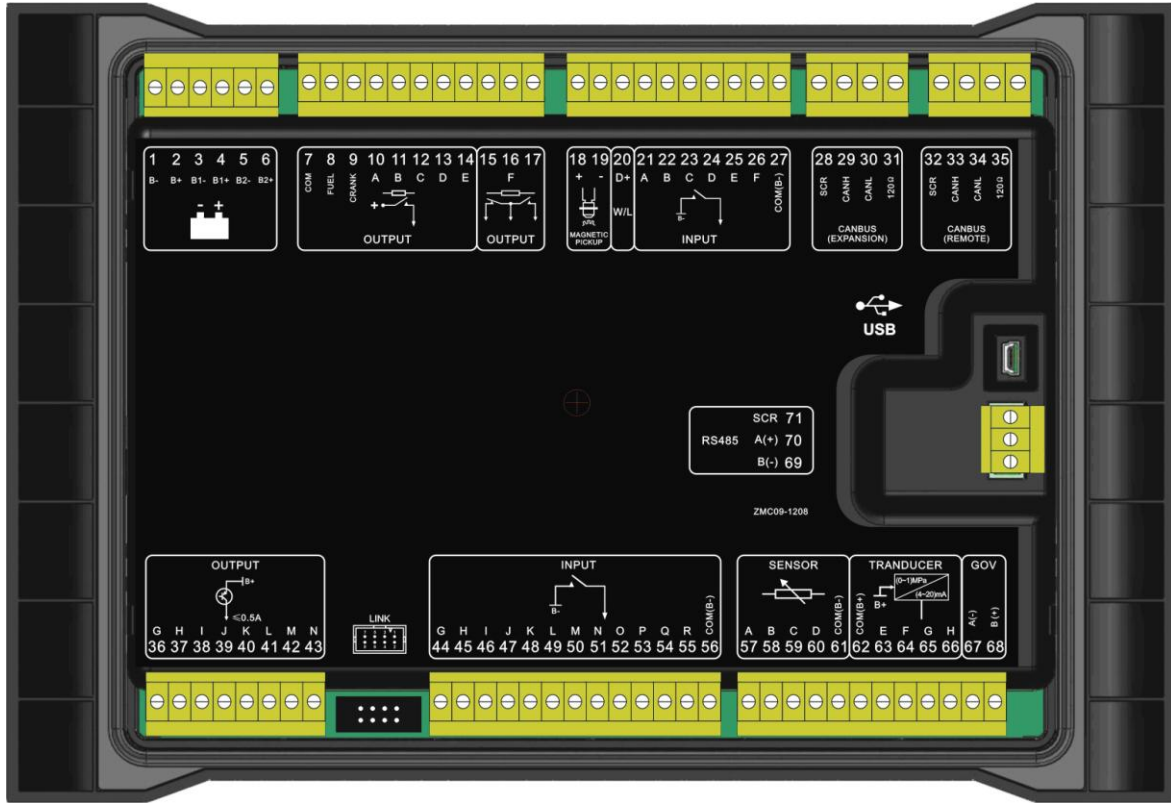


15	Override mode in	Override mode is activated when the input is active; in override mode only overspeed shutdown and emergency shutdown will stop the engine.
16	Emergency stop	The controller shuts down the engine immediately and records occurrence time.
17	Panel lock	All buttons in panel is inactive except       and there is  in the left of first row in LCD when input is active.
18	Reserved	
19	Power Change	Transfers from main battery to standby battery.
20	Raise Speed Aid	Raise speed relay will disconnect when the input is active.
21	Reserved	
22	Drop Speed Aid	Drop speed relay will disconnect when the input is active.
23	Water Heating feedback	The feedback signal of water heating output; The screen displays <i>Water Heating feedback</i> when the input is active.
24	Pre-lube feedback	The feedback signal of Pre-lube output; The screen displays <i>Pre-lube feedback</i> when the input is active.
25	Charging feedback	The feedback signal of Charging output; The screen displays <i>Charging feedback</i> when the input is active.
26	Reserved	
27	Reserved	
28	Quick start	Cranking will start directly (without preheating) when the input is active.
29	Reserved	
30	60Hz Select	Frequency selection of ECU engine
31	Turning Chain	Start inhibition when the input is active.
32	Clean Cylinder	Start relay outputs when clean cylinder input is active.
33	Reserved	Reserved
34	Self-check	Alarms can test with no rotated speed when self-check input is active.
35-50	Reserved	

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


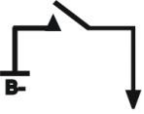
10 BACK PANEL

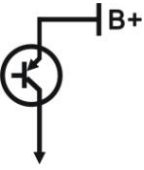
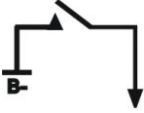

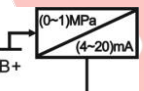

HMC9000 controller back panel layout:



Description of terminal connection:

Icon	No.	Function	Cable Size	Description
	1	DC input B-	2.5mm ²	DC power supply negative input. Connected with negative of starter battery.
	2	DC input B+	2.5mm ²	DC power supply negative input. Connected with positive of starter battery.
	3	B1- input	2.5mm ²	Battery 1 voltage input
	4	B1+ input	2.5mm ²	
	5	B2- input	2.5mm ²	Battery 2 voltage input
	6	B2+ input	2.5mm ²	
	7	COM Relay	2.5mm ²	Common relay power supply input
	8	Fuel relay	2.5mm ²	DC power is supplied by 7 terminal, rated 16A. Break wire protection function is fitted.
	9	Start relay	2.5mm ²	DC power is supplied by 7 terminal, rated 16A.
	10	Aux. output 1(A)	1.5mm ²	DC power is supplied by 7 terminal, rated 7A. Break wire protection function is fitted (Configurable).
	11	Aux. output 2(B)	1.5mm ²	DC power is supplied by 7 terminal, rated 7A. Break wire protection function is fitted (Configurable).
	12	Aux. output 3(C)	1.5mm ²	DC power is supplied by 7 terminal, rated 7A.

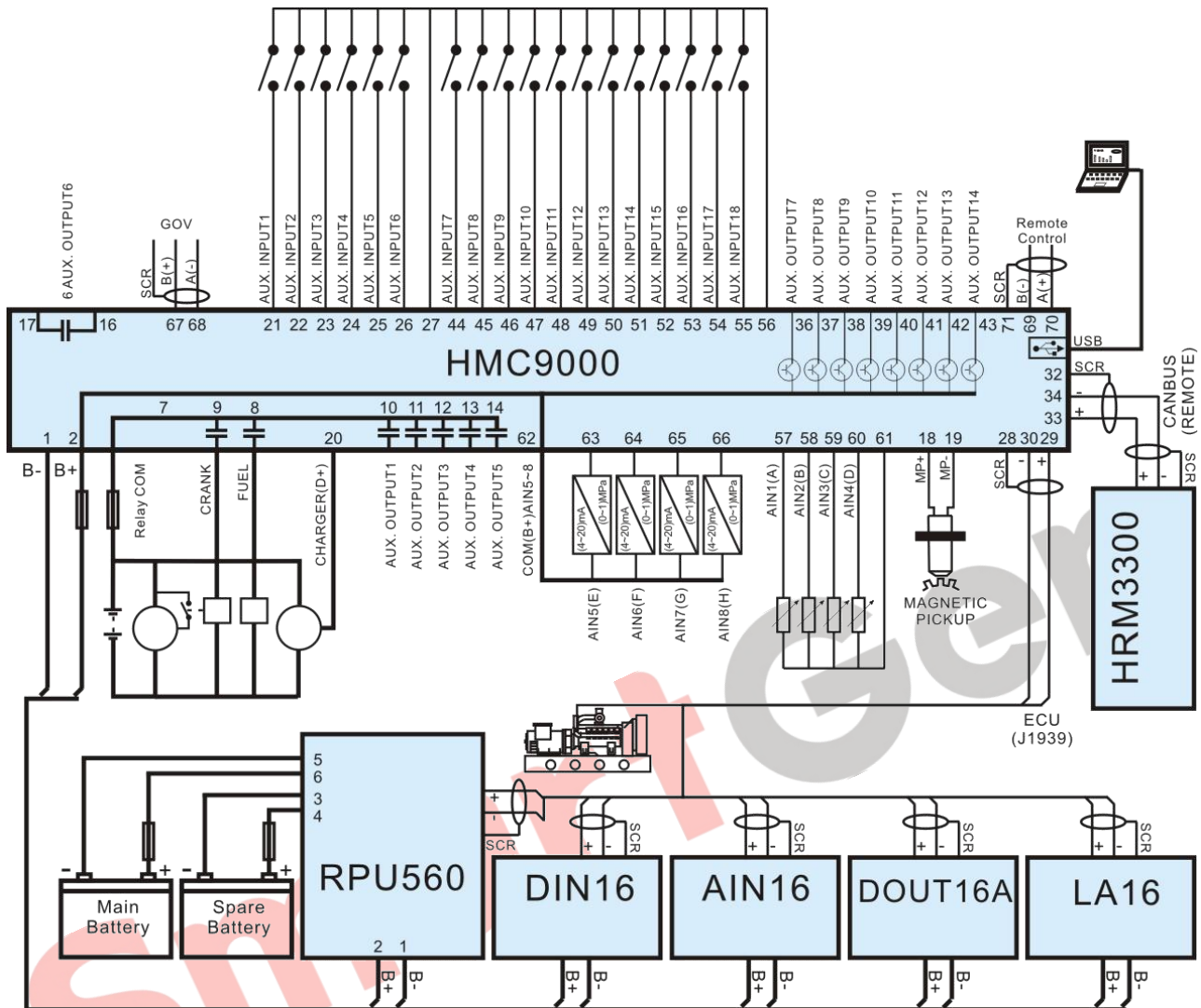
Icon	No.	Function	Cable Size	Description
				Break wire protection function is fitted (Configurable).
	13	Aux. output 4(D)	1.5mm ²	DC power is supplied by 7 terminal, rated 7A.
	14	Aux. output 5(E)	1.5mm ²	DC power is supplied by 7 terminal, rated 7A.
	15			
	16	Aux. output 6(F)	1.5mm ²	Volts Free; Rated current: 7A
	17			
	18	MP1 (Magnetic pickup+)	1.0mm ²	Speed sensor input.
	19	MP2 (Magnetic pickup-)	1.0mm ²	
D+	20	D+ Charge input	1.0mm ²	Charging generator D+ terminal input; Ground connected is not allowed.
	21	AUX. input 1(A)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	22	AUX. input 2(B)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	23	AUX. input 3(C)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	24	AUX. input 4(D)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	25	AUX. input 5(E)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	26	AUX. input 6(F)	1.0mm ²	Digital input; Break wire protection function is fitted (Configurable).
	27	COM(B-)	1.0mm ²	
CANBUS (EXPANSION)	28	SCR (EXPANSION)	0.5mm ²	For ECU module and expansion module connection. Impedance-120Ω shielding wire is recommended, its single-end earthed. There is 120Ω terminal resistance inside already; if needed, make terminal 30, 31 short circuits. (HCM9000E without)
	29	CAN(H) (EXPANSION)		
	30	CAN(L) (EXPANSION)		
	31	120Ω		
CANBUS (REMOTE)	32	SCR (REMOTE)	0.5mm ²	For remote control module connection. Impedance-120Ω shielding wire is recommended, its single-end earthed. There is 120Ω terminal resistance inside already; if needed, make terminal 34, 35 short circuits.
	33	CAN(H) (REMOTE)		
	34	CAN(L) (REMOTE)		
	35	120Ω		
	36	Aux. output 7 (G)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	37	Aux. output 8 (H)	0.5mm ²	B+ voltage output, rated current is 0.5A.

Icon	No.	Function	Cable Size	Description
	38	Aux. output 9 (I)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	39	Aux. output 10(J)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	40	Aux. output 11(K)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	41	Aux. output 12(L)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	42	Aux. output 13(M)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	43	Aux. output 14(N)	0.5mm ²	B+ voltage output, rated current is 0.5A.
	44	Aux. input 7(G)	1.0mm ²	Digital input
	45	Aux. input 8(H)	1.0mm ²	Digital input
	46	Aux. input 9(I)	1.0mm ²	Digital input
	47	Aux. input 10(J)	1.0mm ²	Digital input
	48	Aux. input 11(K)	1.0mm ²	Digital input
	49	Aux. input 12(L)	1.0mm ²	Digital input
	50	Aux. input 13(M)	1.0mm ²	Digital input
	51	Aux. input 14(N)	1.0mm ²	Digital input
	52	Aux. input 15(O)	1.0mm ²	Digital input
	53	Aux. input 16(P)	1.0mm ²	Digital input
	54	Aux. input 17(Q)	1.0mm ²	Digital input
	55	Aux. input 18(R)	1.0mm ²	Digital input
56	COM(B-) input	1.0mm ²		
	57	AIN1(A)	1.0mm ²	Resistance sensor input
	58	AIN2(B)	1.0mm ²	Resistance sensor input
	59	AIN3(C)	1.0mm ²	Resistance sensor input
	60	AIN4(D)	1.0mm ²	Resistance sensor input
	61	COM(B-) AIN1-4	1.0mm ²	
	62	COM(B+) AIN5-8	1.0mm ²	B+ Power supply output
	63	AIN5(E)	1.0mm ²	4-20mA sensor input
	64	AIN6(F)	1.0mm ²	4-20mA sensor input
	65	AIN7(G)	1.0mm ²	4-20mA sensor input
	66	AIN8(H)	1.0mm ²	4-20mA sensor input
GOV	67	GOV A(-)	1.0mm ²	2 core shielding wire is recommended. Its GOV terminal earthed. (HCM9000E without)
	68	GOV B(+)	1.0mm ²	
RS485	69	RS485(B-)	0.5mm ²	PC programming and monitoring port (isolation type). Its single end earthed.
	70	RS485(A+)	0.5mm ²	
	71	RS485 SCR	0.5mm ²	
USB		USB	0.5mm ²	Enables connection to PC monitoring software

⚠Note: It is strictly prohibited to take out start battery when the engine is running. Failure to do so can create excessive DC input voltage and result in damage or destruction of equipment!

11 TYPICAL WIRING DIAGRAM

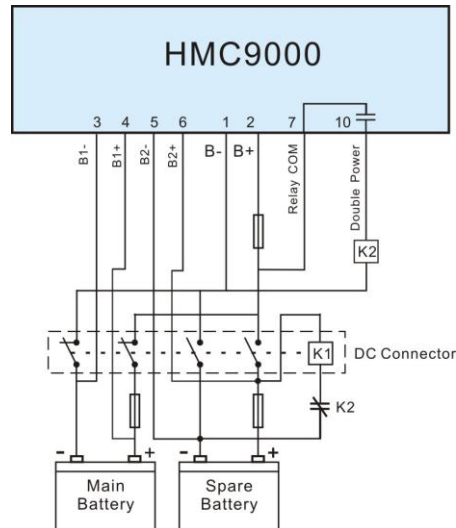
HMC9000 Typical Wiring Diagram



Note:

1. Power supply for fuel relay, start relay and auxiliary outputs 1~5 are supplied by terminal 7.
2. To activate battery transfer output you need to connect expansion relay with at least 50A current.

As following:



1. Auxiliary outputs 7-14 use transistors (drive current is 0.5A); if you connect external device with current lower than 0.5A, it can be connected directly.
2. Controller expansion modules can only be used together with the main controller; however, the main controller can be used separately.
3. RS485 and USB ports can communicate with PC.
4. Remote modules that have CANBUS and RS485 ports can be connected to REMOTE or RS485 ports for remote control.

12 RS485 COMMUNICATION AND CONNECTION

HMC9000 gen-set controller has RS485 port and USB port which allows the controller to connect to open-type LAN. RS485 and USB applies ModBus communication protocol with the help of PC or DAS (Data Acquisition Systems) operational software provides a simple and useful marine engine monitoring system management scheme and enables remote control, remote measurement and remote communication.

For more information about communication protocols see Smartgen document "HMC9000 communication protocols".

RS485 Communication parameters

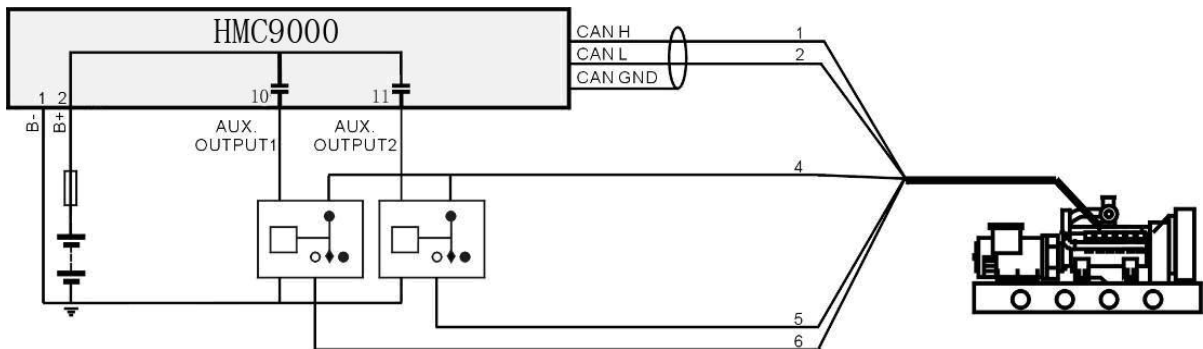
Module address	1 (Range: 1~254, user-defined, default: 1)
Baud rate	9600 bps
Data bit	8 bit
Parity check bit	None
Stop bit	2 bit

PC connects to the module's USB as shown below.



13.12 VOLVO-EMS2

Compatible with the following Volvo engines: TAD734, TAD940, TAD941, TAD1640, TAD1641, TAD1642.



Terminals of controller	Engine CAN port	Remark
Auxiliary output 1	With the help of expansion relay, when auxiliary output 1 is active, relay normally open contact closes, which leads to short circuit of engine 8 pin terminal #4 wire and #6 wire.	Set auxiliary output 1 as “ECU shutdown”
Auxiliary output 2	With the help of expansion relay, when auxiliary output 2 is active, relay normally open contact closes, which leads to short circuit of engine 8 pin terminal #4 wire and #5 wire.	Set auxiliary output 2 as “Preheating until cranking” and set preheating time as 5 seconds.
	3	Power supply negative
	4	Power supply positive
SCR (EXPANSION)	-	CAN communication shielding line (connect to controller’s terminal only)
CAN(H) (EXPANSION)	1(Hi)	Impedance 120Ω connecting line is recommended.
CAN(L) (EXPANSION)	2(Lo)	Impedance 120Ω connecting line is recommended.

Engine type: **Volvo-EMS2**

13.13 BOSCH

Compatible with BOSCH common rail electronic engines.

Terminals of controller	42 pin engine port	Remark
Fuel relay output	1.40	Connect to engine ignition switch.
Start relay output	-	Connect to starter coil directly
SCR (EXPANSION)	-	CAN communication shielding line (connect 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.

14 CONTROL PORT

This expansion port is a CANBUS port for connecting remote control module. Remote control module enables start, stop, alarm mute and other functions to be performed on the distance. All engine parameters and real-time events are displayed on the remote control module.

▲Note: Remote control module can only be used in remote mode of the engine; in local mode only shutdown button will have effect.

15 INSTALLATION

The front panel of **HMC9000** has embedded structure; the module is fixed with the help of fixing clips. Overall dimensions and cutout dimensions can be seen below.

