



**SmartGen**  
ideas for power

# HMC6000A

## MARINE ENGINE CONTROLLER







### USER MANUAL



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

4 CONTROLLER INFORMATION DISPLAY












Table 3 Controller Information Display

Screen	Display	Description
After pressing “Enter” for 1s, the controller will enter into parameter setting and information selection interface.	Return Parameter Setting Controller Information	After selected controller information, press “Enter” to enter into controller information interface.
First Screen	Controller Information Software Version 1.1 Release Date 2018-09-05 2018.10.15(5)09:30:10	This screen will display software version, hardware version and controller time. Press  or  to scroll screen.
Second Screen	O: S F S H A 1 2 3 4 5                     6 7 8 9 10 11 12                 Standby	This screen will display output port status, and engine status. Press  or  to scroll screen.
Third Screen	I: E 1 2 3 4 5 6 7 8 9                     10   Standby	This screen will display input port status, and engine status. Press  or  to scroll screen.

## 5 OPERATION

### 5.1 PUSHBUTTON DESCRIPTION

**Table 4 Key Function Description**

Icon	Button	Description
	Stop	Stop running generator in local mode; During stopping process, press this button again to stop generator immediately.
	Start	Start standby genset in local mode.
	Mute	Alarm sound off.
	Self-Check	In standby mode, pressing this button, the controller can test alarms in the situation of no rotate speed.
	Alarm Reset	If alarm occurs, pressing this button will reset it.
	Lamp Test	Press this button will test panel LED indicators and display screen.
	Home	Shortcut to return to the main screen.
	Event Log	Shortcut to the alarm history page.
	Up	<ol style="list-style-type: none"> <li>1. Screen scroll.</li> <li>2. Up cursor and increase value in setting menu.</li> </ol>
	Down	<ol style="list-style-type: none"> <li>1. Screen scroll.</li> <li>2. Down cursor and decrease value in setting menu.</li> </ol>
	Enter	<ol style="list-style-type: none"> <li>1. Pressing and holding for more than 1 second to entry the parameter configuration and controller info selection menu.</li> <li>2. In settings menu confirms the set value.</li> </ol>

## 5.2 CONTROLLER PANEL

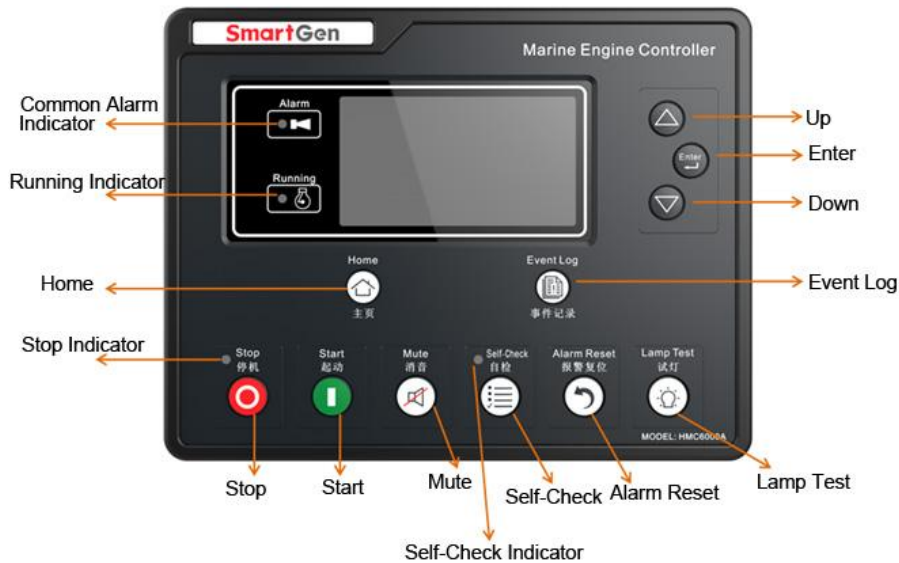


Fig.1 HMC6000A Panel

## 5.3 START/STOP OPERATION OF REMOTE CONTROL


### 5.3.1 ILLUSTRATION

Deploy any digital input port of HMC6000B to remote start input. After the “remote mode” is active, remote start/stop operation can be initiated.

### 5.3.2 REMOTE START SEQUENCE

- When “Remote Start” input is active, “Start Delay” timer is initiated;
  - “Start Delay” countdown will be displayed on LCD;
  - After “Start Delay” expired, preheat relay energizes (if configured), “Preheat Delay XX s” information will be displayed on LCD;
  - After the above delay, the “Fuel Relay” is energized, and then one second later, the “Start Relay” is engaged. Genset is cranked for a pre-set time. If genset fails to fire during this cranking attempt then the fuel relay and start relay are disengaged for the pre-set rest period; “crank rest time” begins and wait for the next crank attempt;
  - Should this start sequence continue beyond the set number of attempts, the start sequence will be terminated, the first line of LCD display will be highlighted with black and Fail to Start fault will be displayed;
  - In case of successful crank attempt, the “Safety On” timer is activated. As soon as this delay is over, “start idle” delay is initiated (if configured);
  - After the start idle, the generator enters into “Warming Up” status (if configured);
  - When “Warming Up” delay is expired, engine will normally running.
- ▲ Note:** If engine is started by remote monitoring module, there is no “Start Delay” step, and will jump to “Preheat Delay” directly.

## 7 PARAMETER CONFIGURATION LIST

Hold and press  for 1s to enter into parameter configuration and controller info selection menu after input the correct password (Default password as 00318). Please contact the manufacturer if forget password or need sensor resistance/current calibration.


**Table 8 Parameter Configuration Items**

Parameter	Range	Default	Remarks
1. Start delay	(1-3600) s	1	The time from remote start signal active to complete start when the controller is in remote mode.
2. Stop delay	(1-3600) s	1	The time from remote stop signal active to complete stop when the controller is in remote mode.
3. Pre-heating delay	(0-3600) s	0	The time of heater plug energized before starter energized.
4. Cranking Time	(3-60) s	8	The every starter energized time.
5. Crank Rest Time	(3-60) s	10	The waiting time before second energizes start when starter failed to start.
6. Safety on Time	(0-3600) s	10	First running time after machine started.
7. Start Idle time	(0-3600) s	0	Idle running time when genset start.
8. Warming Up Time	(0-3600) s	10	Warming up time after genset enters into hi-speed running.
9. Cooling Time	(0-3600)s	10	Cooling time before stop.
10. Stop Idle Time	(0-3600) s	0	Stop idle time when stop.
11. ETS Hold Time	(0-3600) s	20	Stop magnet energized time when the genset is to stop.
12. Wait Stop Time	(0-3600) s	0	Time from idle delay finished to wait stop when "ETS Hold Time" is set to 0; time from ETS hold to wait stop when "ETS Hold Time" isn't set to 0.
13. Start Key Confirm	(0.2-5.0) s	0.2	The time from pressing start button to start performance when the controller starts by button-press.
14. Stop Key Confirm	(0.2-5.0) s	0.2	The time from pressing stop button to stop performance when the controller stops by button-press.
15. J1939 Enable	(0-1) 0: Disabled 1: Enabled	0: Disabled	After enabled, J1939 monitoring can be achieved via select related engine type.
16. Engine Type	(0-39)	0: Conventional Engine	Default: Conventional Genset. When connect to J1939 genset, please select related engine type.
17. SPN Version	(1-3)	1	Alarm analysis type of SPN
18. ECU Shutdown Enable	(0-1)	0: Disabled	After enabled, genset shuts down when detected red lamp alarms.

Parameter	Range	Default	Remarks
19. Flywheel teeth	(1-300)	118	The flywheel teeth installed in genset is used for judgment of separate conditions and detection of rotate speed. See 14 Installations.
20. Rated speed	(1-5999)r/min	1500	Provide standard for judgment of over speed and under speed.
21. Start Attempts	(1-30)	3	The maximum of start attempts when genset failed to start. When it arrive pre-set value, the controller will send failed to start signal.
22. Crank Disconnect Condition	(0-2) 0: Speed 1: Oil Press. 2: Speed+ OP	0: Speed	The three disconnection conditions of starter and engine, which can be used alone or simultaneously, are used to make starter motor disconnect with engine as soon as possible.
23. Disconnect OP	(10-1000)kPa	80	Disconnect when Oil Pressure exceeds preset value.
24. Disconnect Speed	(0-200)%	25%	Set value is percentage of rated rotate speed. When speed exceeds pre-set value, starter will separate.
25. Under Speed Shutdown	(0-1) 0 Disabled 1 Enabled	0 Disabled	Under speed shutdown setting.
26. Set Value	(0-200)%	85%	
27. Delay	(0-3600) s	3	
28. Under Speed Warn	(0-1) 0 Disabled 1 Enabled	0 Disabled	Under speed warning setting.
29. Set Value	(0-200)%	90%	
30. Return Value	(0-200)%	92%	
31. Delay	(0-3600) s	3	
32. Over Speed Shutdown	(0-1) 0 Disabled 1 Enabled	1 Enabled	Over speed shutdown setting.
33. Set Value	(0-200)%	115%	
34. Delay	(0-3600) s	1	
35. Over Speed Warn	(0-1) 0 Disabled 1 Enabled	1 Enabled	Over speed warning setting.
36. Set Value	(0-200)%	110%	
37. Return Value	(0-200)%	108%	
38. Dealy	(0-3600) s	3	
39. Speed Signal Lose Delay	(0-3600) s	3	The time from that detecting speed is 0 to confirm action.
40. Speed Signal Lose Action	(0-2) 0: Warn 1: Shutdown	1: Shutdown	The action after detecting loss of speed.

## 9 PARAMETER SETTING

### 9.1 MATTERS NEEDED ATTENTION

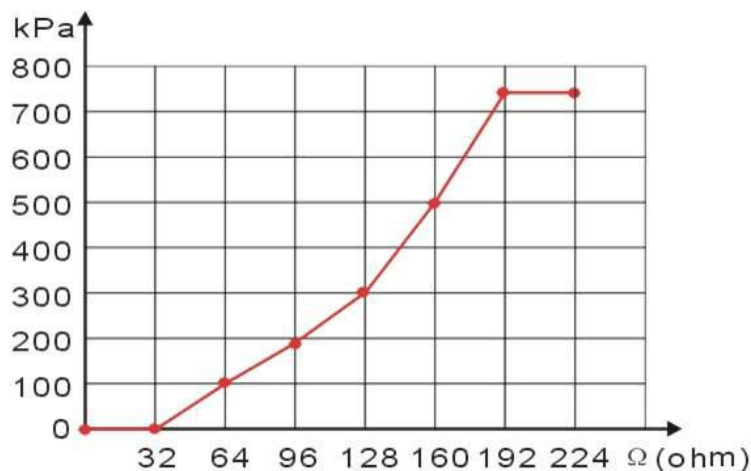
Press the button  for 1 second after start the controller, and then enter into parameter configuration and controller info selection menu, in which enter parameter configuration menu needs to input correct password. The default password is 00318.

Please contact with manufacturer when forgets the password or need to correct the resistance/current/voltage value.

- Please modify the controller internal parameters in standby mode(such as starting successfully condition selections, auxiliary inputs, output port configuration, time delay, etc), otherwise the alarm stop or other abnormal phenomena may occur.
- High sensor alarm threshold value must be bigger than the low alarm threshold, otherwise they will both alarm simultaneously.
- Over speed threshold value must be bigger than under speed threshold, otherwise there will be either overspeed or underspeed simultaneously.
- When setting the condition of successful start, the start speed threshold value is supposed to be set lower as possible for quick disconnection of starter.
- Auxiliary input port 1-10 cannot be set to the same project, otherwise correct function cannot arrive. Auxiliary output port 1-12 can be set to the same project.

### 9.2 SENSOR SETTING CLARIFICATION

- When reselect the sensors, the standard value of the selected sensor will be selected. If temperature sensor default is set to PT100, sensor curve will be the curve of PT100. If it is set to SGD (120°C resistance), sensor curve will be the curve of SGD.
- If standard sensor curve is mismatching with sensor in using, “User-defined sensor “could be chosen, then input user-defined sensor curve.
- When inputting sensor curve, X (resistance) must be input in accordance with the order of growing up, otherwise mistakes will occur.
- Can set ordinate of front several points or last several points to the same. As shown in below:

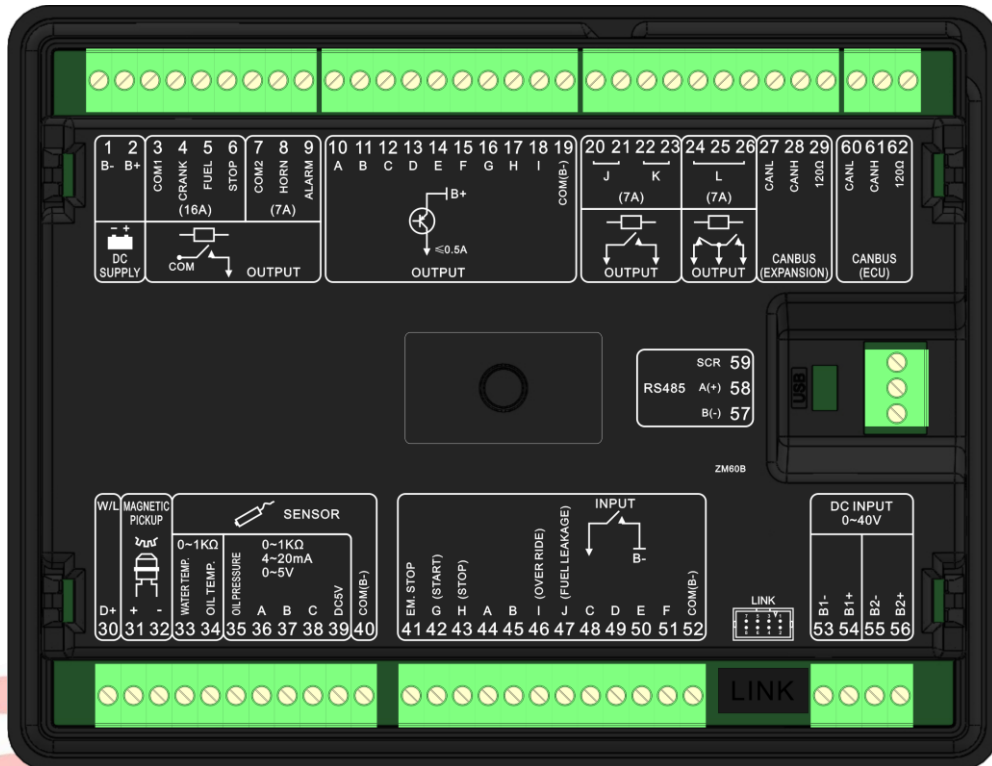


**Fig.2 Sensor Setting Curve**

**Table 17 Normal Pressure Unit Conversion Table**

	N/m <sup>2</sup> Pa	kgf/cm <sup>2</sup>	bar	psi
1Pa	1	1.02x10 <sup>-5</sup>	1x10 <sup>-5</sup>	1.45x10 <sup>-4</sup>
1kgf/cm <sup>2</sup>	9.8x10 <sup>4</sup>	1	0.98	14.2
1bar	1x10 <sup>5</sup>	1.02	1	14.5
1psi	6.89x10 <sup>3</sup>	7.03x10 <sup>-2</sup>	6.89x10 <sup>-2</sup>	1

**10 BACK PANEL**

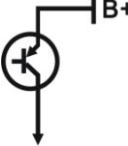
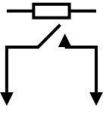
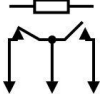




**Fig.3 HMC6000A Controller Back Panel**

**Table 18 Terminal Connection Description**

Icon	No.	Function	Cable Size	Description
	1.	DC input B-	2.5mm <sup>2</sup>	DC power supply negative input.
	2.	DC input B+	2.5mm <sup>2</sup>	DC power supply positive input.
	3.	COM1 Relay common port	1.5mm <sup>2</sup>	Connect to COM1 relay output; rated 16A
	4.	Start relay	1.5mm <sup>2</sup>	
	5.	Fuel relay	1.5mm <sup>2</sup>	
	6.	Stop relay	1.5mm <sup>2</sup>	Connect to COM2 relay output; rated 16A
	7.	COM2 Relay common port	1.0mm <sup>2</sup>	
	8.	Audio Alarm Relay	1.0mm <sup>2</sup>	
	9.	Common Alarm Relay	1.0mm <sup>2</sup>	
	10.	Aux. output 1(A)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.



Icon	No.	Function	Cable Size	Description
	11.	Aux. output 2(B)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	12.	Aux. output 3(C)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	13.	Aux. output 4(D)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	14.	Aux. output 5(E)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	15.	Aux. output 6(F)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	16.	Aux. output 7(G)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	17.	Aux. output 8(H)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	18.	Aux. output 9(I)	1.0mm <sup>2</sup>	B+ output, rated 0.5A.
	19.	COM(B-)	1.0mm <sup>2</sup>	
	20.	Aux. output 10(J)	1.0mm <sup>2</sup>	Free volts contact always open; Rated current: 7A; volt free output.
	21.		1.0mm <sup>2</sup>	
	22.	Aux. output 11(K)	1.0mm <sup>2</sup>	
	23.		1.0mm <sup>2</sup>	
	24.	Aux. output 12(L)	1.0mm <sup>2</sup>	Free volts contact always open; Rated current: 7A; volt free output.
	25.		1.0mm <sup>2</sup>	
	26.		1.0mm <sup>2</sup>	
CANBUS (EXPANSION)	27.	CAN(L) (EXPANSION)	0.5mm <sup>2</sup>	Used for connect to remote control and extended output module. If connect CAN(L) to 120Ω, then there is no need to external connect 120Ω resistor.
	28.	CAN(H) (EXPANSION)	0.5mm <sup>2</sup>	
	29.	120Ω (EXPANSION)	0.5mm <sup>2</sup>	
W/L	30.	D+ Charge input	1.0mm <sup>2</sup>	Charging generator D+ terminal input; Ground connected is not allowed.
	31.	MP1 (Magnetic pickup+)	0.5mm <sup>2</sup>	Connect to speed sensor; Using shielding wire is recommended. MP1(-) internal connect B-.
	32.	MP1 (Magnetic pickup-)		
	33.	Water Temperature Sensor Input	1.0mm <sup>2</sup>	Water temperature sensor input(resistance)
	34.	Oil Temperature Sensor Input	1.0mm <sup>2</sup>	Oil temperature sensor input(resistance).
	35.	Oil Pressure Sensor Input	1.0mm <sup>2</sup>	Oil pressure sensor input(resistance/current)
	36.	Flexible sensor 1	1.0mm <sup>2</sup>	User configure (resistance/current/voltage)
	37.	Flexible sensor 2	1.0mm <sup>2</sup>	User configure (resistance/current/voltage)
	38.	Flexible sensor 3	1.0mm <sup>2</sup>	User configure (resistance/current/voltage)
	39.	DC5V	1.0mm <sup>2</sup>	Supply power for voltage type sensors.
	40.	COM(B-) input	1.0mm <sup>2</sup>	Input common port. Connect to (B-) inside
	41.	Emergency Shutdown Input	0.5mm <sup>2</sup>	Controller shutdown urgently if input

## 11 COMMUNICATION AND CONNECTION

### 11.1 RS485 AND LINK COMMUNICATION

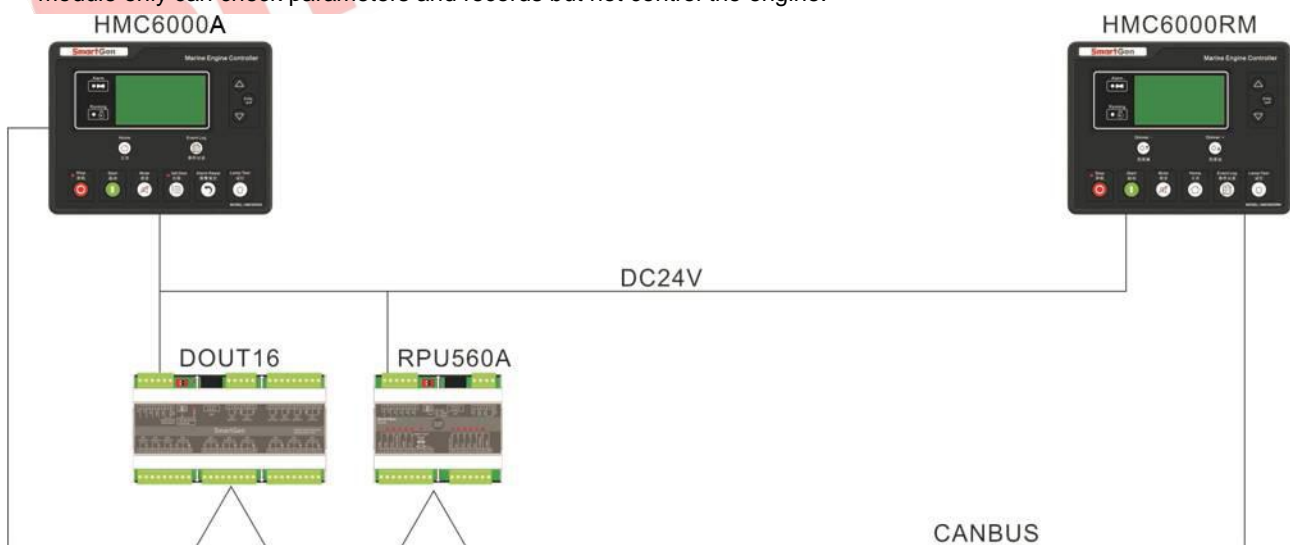
HMC6000A genset controller has RS485 port and Link port which allows the controller to connect to open-type LAN. RS485 and Link applies ModBus communication protocol with the help of PC or DAS (Data Acquisition Systems) operational software provides easy to use marine engine monitoring system management scheme and enables remote control, remote measurement and remote communication.

### 11.2 CANBUS (EXPANSION) BUS COMMUNICATION

Various expansion modules can be connected to the controller via CANBUS (EXPANSION) port.

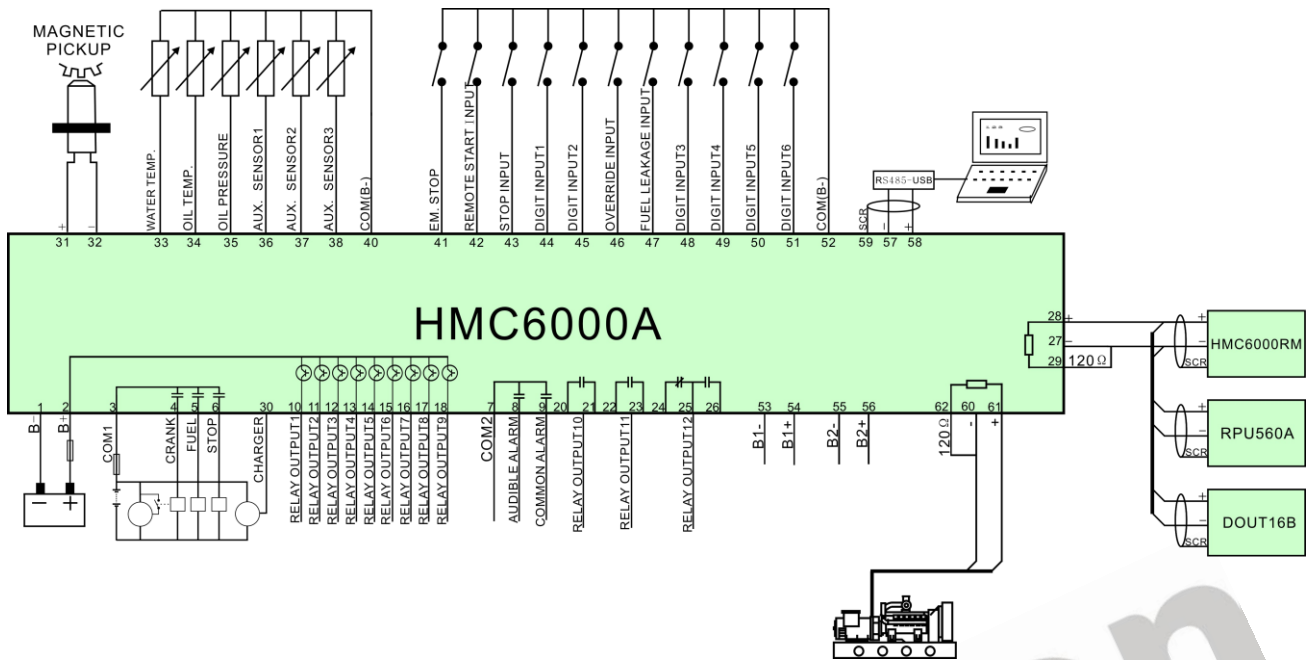
- DOUT16 Digital output module: The module connects to the main controller via CANBUS port. Main controller transfers the output condition data of digital output module to module to handle via CANBUS. All parameters of digital output port can be configured via main controller.
- HMC6000RM Remote control module: Remote control module can achieve control operations such as starting engine, stopping engine, etc. All kinds of parameters and records of the engine real-time display on remote controller.
- RPU560A Security module: The module connects to the main controller via CANBUS port. If security module receives no signal from the main controller for more than 1 second and the main controller failure input deactivates, security module will take over engine control; after that the engine will be stopped only by shutdown input or in case of overspeed. Module input function, output function and overspeed alarm threshold are user-set.

**▲ Note:** Remote control module can only be used in remote mode of the engine; in local mode remote control module only can check parameters and records but not control the engine.



**Fig.4 CANBUS Communication Diagram**

**12 HMC6000A APPLICATION DIAGRAM**



**Fig.5 HMC6000A Application Diagram**

## 13 COMMISSIONING

Doing the following check before the system starting to run formally is recommended:

- Ensure all the connections are correct and wires diameter is suitable;
- Ensure that the controller DC power has fuse, controller's positive and negative connected to start battery are correct;
- Take proper action to prevent engine to crank success (e. g. Remove the connection wire of fuel valve). If checking is OK, make the start battery power on;
- Make the local mode active and then the controller enter into local mode. Press the Start button and the engine will start. If fail to start, genset will enter into ETS status automatically;
- Recover the action to prevent engine to crank success e. g. Connect wire of fuel valve), press start button again, and the engine will start. The engine will run from idle to formal if all works regularly. During this time, please watch the running status. If abnormal, stop engine and check all wires connection according to this manual;
- If there is any other question, please contact SmartGen's service.

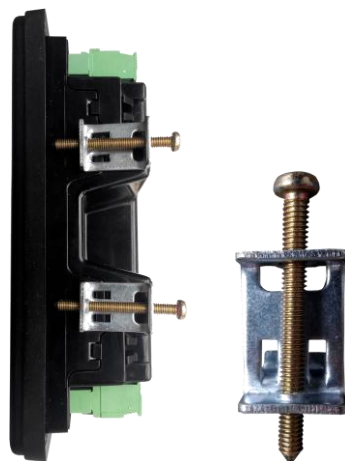
## 14 INSTALLATION

### 14.1 FIXING CLIPS

Controller is panel built-in design; it is fixed by clips when installed.

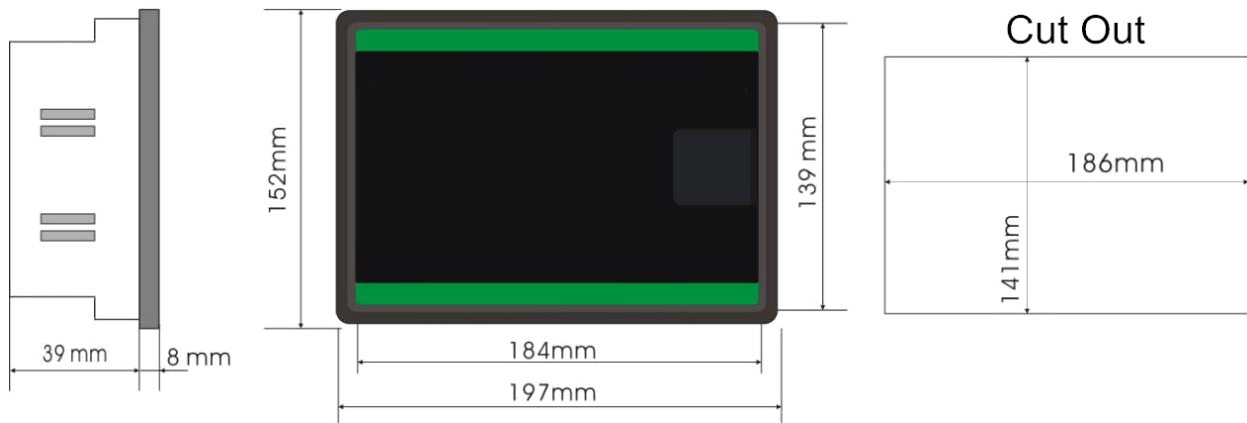
- Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position;
- Pull the fixing clip backwards (towards the back of the module) ensuring two clips are inside their allotted slots;
- Turn the fixing clip screws clockwise until they are fixed on the panel.

**▲ NOTE:** Care should be taken not to over tighten the screws of fixing clips.



**Fig.6 Fixing Clip Installation**

## 14.2 OVERALL DIMENSIONS AND CUTOUT DIMENSIONS



**Fig.7 Overall and Cutout Dimensions**

## 15 INSTALLATION CAUTIONS

### 15.1 BATTERY VOLTAGE INPUT

HMC6000A controller can suit for widely range of battery voltage DC (8~35) V. Negative of battery must be connected with the engine shell. The diameter of wire which is from power supply to battery must be over  $2.5\text{mm}^2$ . If floating charge configured, please firstly connect output wires of charger to battery's positive and negative directly, then, connect wires from battery's positive and negative to controller's positive and negative input ports in order to prevent charge disturbing the controller's normal working.

### 15.2 SPEED SENSOR INPUT

Speed sensor is magnetic equipment which is installed on engine body for testing flywheel teeth number. 2 core shielding wire is used for the connection of the sensor and controller. The wire is supposed to be connected to 32 terminal of controller with one end and the other end hanging in the air. The other two signal lines connect separately to 31, 32 terminal. Speed sensor output voltage is supposed to be at AC (1-24) V (virtual value) when it is in full speed range, and AC12V (when in rated rotate speed) is recommended. When install the speed sensor, screw it to contact the flywheel firstly, inverse it with 1/3 circle, and then tighten the nut finally.

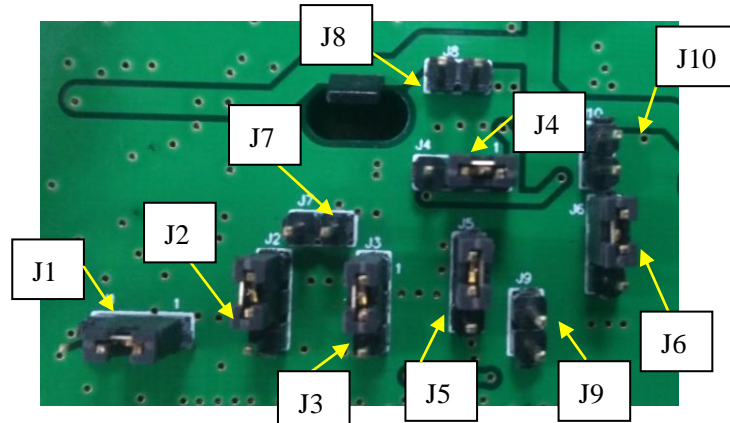
### 15.3 OUTPUT AND EXPANSION RELAY

All outputs of controller are relay contact output type. If expansion relays are needed, please add freewheel diode to both ends of expansion relay's coils (when coils of relay has DC current) or add resistance-capacitance return circuit (when coils of relay has AC current), in order to prevent charge disturbing the controller or others equipment.

### 15.4 SENSOR INPUT

All oil pressure sensor, auxiliary sensor1, auxiliary sensor2 and auxiliary sensor3 of HMC6000A series can be configured to current/power/resistance sensor (jumper switch over is as below). Water

temperature sensor and oil temperature sensor is fixed resistor sensor.



**Fig. 8 Sensor Wire Jumper**

**Table 37 Wire Jumper List**

Sensors	Jumper Hat	Resistor(Jumper)	Voltage(Jumper)	Current(Jumper)
OP Sensor	J3, J7	Connect to term.1,2 of J3	Connect to J7	Connect to term.2,3 of J3
Flexible Sensor1	J4, J8	Connect to term.1,2 of J4	Connect to J8	Connect to 2,3 of J4
Flexible Sensor2	J5, J9	Connect to term.1,2 of J5	Connect to J9	Connect to 2,3 of J5
Flexible Sensor3	J6, J10	Connect to term.1,2 of J6	Connect to J10	Connect to 2,3 of J6

**Remark:** Water temperature sensor and oil temperature sensor are resistance sensor that cannot be changed to others.

### 15.5 WITHSTAND VOLTAGE TEST

When controller has been installed in control panel, if need the high voltage test, please disconnect controller's all terminals in order to prevent high voltage into controller and damage it.