



**SmartGen**  
ideas for power

**HMC4100**

**MARINE ENGINE CONTROLLER**

**USER MANUAL**



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



Chinese trademark

**SmartGen** English trademark

SmartGen — make your generator *smart*

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Date	Version	Content
2018-09-20	1.0	Original release

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## 1 OVERVIEW

**HMC4100** marine engine controller integrates digitization, intelligentization and network technology which are used for genset automation and monitor control system of single unit to achieve remote controlling for diesel engine, local start/stop, data measure, alarm protection and “three remote” (remote control, remote measuring and remote communication). It fit with 132\*64 liquid display, optional Chinese/English languages interface, and it is reliable and easy to use.

The powerful 32-bit ARM processor contained within the module allows for precision parameters measuring, fixed value adjustment, time setting and set value adjusting and etc..Majority parameters can be configured from front panel and can be configured by communication interface via PC. Due to its compact structure, simple connections and high reliability, **HMC4100** can be widely used in marine emergency engines, main propulsion engines, main generator engines and pumping engines.

**HMC4100** marine engine controller has an expansion CANBUS port that will be connected to a remote control module or expansion digital output module, LED indicator expansion module and security module.

## 2 PERFORMANCE AND CHARACTERISTICS

- 32-bit ARM micro-processor, 132\*64 liquid display, optional Chinese/English interface, push-button operation;
- Connect with remote monitoring module via CANBUS port to realize remote monitoring and remote start/stop control;
- RPU560A security module can be expanded via CANBUS port;
- Dozens of engines compatible with J1939 protocol can be monitored via CANBUS port;
- RS485 communication ports enable data transmission as well as remote control, remote measurement and remote communication;
- Control and protection: remote/local start and stop, alarm protection;
- Override mode, in which only overspeed and manual emergency shutdown can stop the engine;
- Parameter setting: parameters can be modified and stored into internal FLASH memory and can not be lost even in case of power outage;
- Six sensor inputs for pressure, temperature, fuel level or other sensors; pressure sensor, Flexible sensor2~3 also can be set to (4~20)mA inputs and (0~5)V inputs;
- Real-time clock, engine total run-time accumulation, display the total start times;
- Built-in speed detection, which can accurately judge crank disconnect status, rated speed running and overspeed status.
- 99 event logs can be saved circularly and can be inquired on the spot;
- Digital regulation of all parameters - instead of analog regulation using conventional potentiometer -

and, therefore, higher reliability and stability;







- Modular design, self extinguishing 50% ABS+50%PC plastic enclosure and embedded installation way; small size and compact structure with easy mounting.

### 3 TECHNICAL PARAMETERS

Table 2 – Technical Parameters

Parameter	Details
Working Voltage	DC8.0V 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
Start Relay Output	5A DC28V
Programmable Relay Output 1	5A DC28V
Programmable Relay Output 2~6	1A DC28V
Analog Sensor	3 Fixed resistor type sensors(temperature, oil temperature, and flexible sensor 1) 3 sensors can be configured as resistor/current/voltage type (oil pressure, flexible sensor 2, and flexible sensor 3).
Case Dimension	135 mm x 110 mm x 44 mm
Panel Cutout	116mm x 90mm
Working Conditions	Temperature: (-25~+70)°C; Relative Humidity: (20~93)%RH
Storage Conditions	Temperature: (-25~+70)°C
Protection Level	IP65: when water-proof gasket ring inserted between panel and enclosure
Weight	0.35kg









#### 4 INFORMATION INTERFACE

Display Screen	Display Content	Description
After pressing Enter for 1s, the controller will enter into parameter setting and information selection interface.	Return Parameter Setting <b>Controller Information</b> Event Log USB Enabled	After selected controller information, press Enter to enter into controller information interface.
First Panel	Controller Information Software Version: 1.1 Release Date: 2018-09-20 2018.10.15(5)09:30:10	This panel will display software version, hardware version and controller time.  Press  or  to scroll screen.
Second Panel	O:C 1 2 3 4 5 6 ┘┘┘┘┘┘  Standby	This panel will display output port status, and genset status.  Press  or  to scroll screen.
Third Panel	I: 1 2 3 4 5 6 ┘┘┘┘┘┘  Standby	This panel will display input port status, and engine status.  Press  or  to scroll screen.

#### 5 OPERATOR INTERFACE

##### 5.1 PUSHBUTTONS DESCRIPTION

Table 4 – Keys 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.
	Alarm Mute	Alarm sound off.
	Self-Check	In standby mode, pressing this button can test alarm without rotate speed.
	Alarm Reset	If alarm occurs, pressing this button will reset it.
	Up	1. Screen scroll. 2. Up cursor and increase value in setting menu.
	Down	1. Screen scroll. 2. Down cursor and decrease value in setting menu.
	Set	1. Pressing and holding for more than 1 second entry the parameter configuration menu; 2. In settings menu confirms the set value

## 5.2 CONTROLLER PANEL

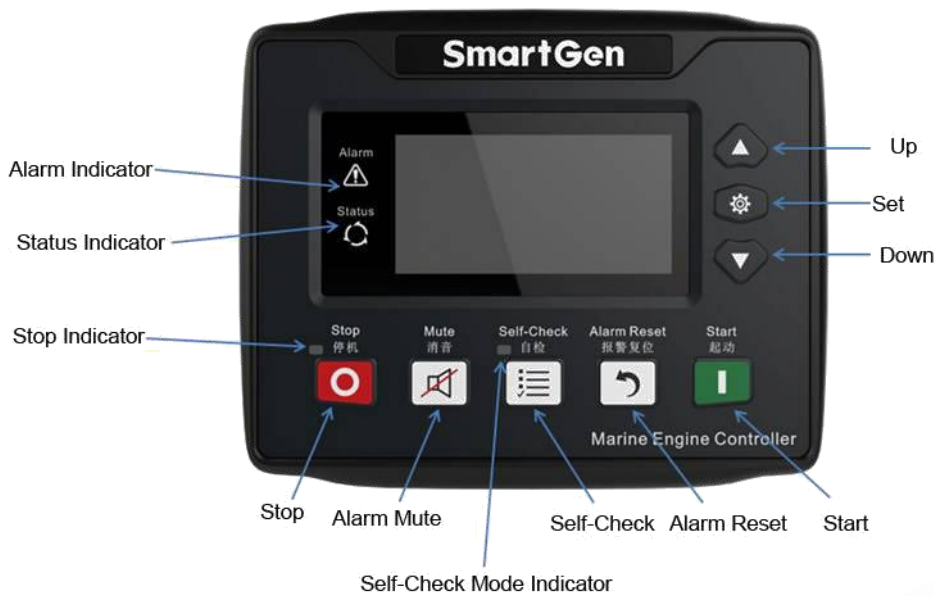


Fig.1 - HMC4100 Front Panel Drawing

## 5.3 START/STOP OPERATION OF REMOTE CONTROL

### 5.3.1 ILLUSTRATION

Deploy any aux. input port of HMC4100 to remote start input. After the “remote mode” is active, remote start/stop operation can be achieved via remote monitoring module..

### 5.3.2 REMOTE START SEQUENCE

- When “Remote Start” is active, “Start Delay” timer is initiated(if remote start command is active, unit enters “Preheat” directly);
- “Start Delay” countdown will be displayed on status page of LCD;
- When start delay is over, 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 waits for the next crank attempt;
- Should this start sequence continue beyond the set number of attempts, the controller will initiate “Fail to Start” alarm, and alarm information will be displayed on the alarm page of LCD;
- In case of successful crank attempt, the “Safety On” timer is activated. As soon as this delay is over, “start idle” is started (if configured);
- After the start idle delay expired, controller will enter into “Warming Up” (if configured);
- When “Warming Up” delay is over, the generator will enter into “Normal Running” status.

### 5.3.3 REMOTE STOP SEQUENCE

- When the “Remote Stop”, the “Stop Delay” is initiated (if remote stop command is active, unit enters “Cooling” directly).
- Once this “stop delay” has expired, “Cooling” starts;



- After “Cooling” completed, the genset enters into “Stop Idle” status (if configured), and idle relay is energized;
- Once “Stop Idle” delay has expired, the “ETS Solenoid Hold” begins. ETS relay is energized while fuel relay is de-energized.
- Once this “ETS Solenoid Hold” has expired, the "Fail to Stop Delay" begins. Complete stop is detected automatically.
- Generator is placed into its standby mode after its complete stop. Otherwise, fail to stop alarm is initiated and the corresponding alarm information is displayed on LCD (If generator is stop successfully after “Fail to Stop” alarm has initiated, it will enter into "Engine Standby" status).

## 5.4 AUTO MODE START/STOP OPERATION

### 5.4.1 ILLUSTRATION

Deploy any Aux. input port to auto-mode input. After the “auto mode” is active, Start/Stop operation can be initiated.

### 5.4.2 AUTO START SEQUENCE

- When “Auto Start” input is active or “Start/ Stop” input is active, “Preheat Delay” will be started;
- Preheat relay outputs, and “preheat delay XX s” information will be displayed on LCD;
- After the above delay, the fuel relay is energised, and then one second later, the start relay is engaged. The genset is cranked for a pre-set time. If the 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 waits for the next crank attempt;
- Should this start sequence continue beyond the set number of attempts, the controller will initiate “Fail to Start” alarm, and alarm information will be displayed on the alarm page of LCD;
- 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);
- When the “start idle” delay is over, “warming up” will start (if configured).
- When “warming up” delay is over, generator will enter into “Normal Running” status.

### 5.4.3 AUTO STOP SEQUENCE

- When “Stop Input” is active or “Start/Stop” input open, “Cooling” started;
- Once the “Cooling” delay has expired, the “Stop Idle” delay is initiated (if configured). During “Stop Idle” Delay, idle relay is energized;
- Once the “Stop Idle” delay has expired, “ETS Solenoid Hold” begins. ETS relay is energized while fuel relay is de-energized;
- Once this “ETS Solenoid Hold” has expired, the "Fail to Stop" delay begins. Complete stop is detected automatically.
- Generator is placed into its standby mode after its complete stop. Otherwise, fail to stop alarm is

initiated and the corresponding alarm information is displayed on LCD (If generator is stop successfully after “Fail to Stop” alarm has initiated, it will enter into "Engine Standby" status).


## 5.5 LOCAL START/STOP OPERATION

### 5.5.1 ILLUSTRATION

Deploy any aux. input port to local-mode input. After the “local mode” is active, Start/Stop operation will be doable by pressing buttons on the controller.

Under local-mode, “Idle Output” is unavailable.

### 5.5.2 LOCAL START SEQUENCE

- Press  button to start the gen-set; preheat relay energizes (if configured), “preheat delay XX s” information will be displayed on LCD;
- After the above delay, the “Fuel Relay” is energised, and then one second later, the “Start Relay” is engaged. The genset is cranked for a pre-set time. If the genset fails to fire during this cranking attempt then “ETS Solenoid Hold” will start;
- In case of successful crank attempt, the “Safety On” timer is activated;
- After the “Safety On” delay expired, if the rotate speed, temperature and oil pressure of controller are regular, the generator will enter into “Normal Running” status directly.

### 5.5.3 LOCAL STOP SEQUENCE


- Press  button to enter into “ETS Solenoid Hold”. ETS relay is energized while fuel relay is de-energized.
- Once the “ETS Solenoid Hold” has expired, "Fail to Stop Delay" begins. Complete stop is detected automatically.
- Generator is placed into its standby mode after its complete stop. Otherwise, fail to stop alarm is initiated and the corresponding alarm information is displayed on LCD (If generator is stop successfully after “Fail to Stop” alarm has initiated, it will enter into "Engine Standby" status).

Table 5 – HMC4100 Start/Stop Description

System Mode	Local Start	Local Stop	Remote Start Input	Stop Input	Remote Start/Stop Input	Auto Start Input	Remote Module Start	Remote Module Stop
Local	●	●	-	-	-	-	-	-
Remote	-	-	●	●	-	-	●	●
Auto	-	-	-	●	●	●	-	-

## 6 ALARMS

### 6.1 WARNING

Warning alarms does not lead to shutdown and the detailed alarm information will be displayed on LCD.

Table 6 - Warning Alarms

No.	Type	Detection Range	Description
1.	Over speed	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.	Under speed	From "Warming up" to "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	From "Start Idle" delay to "Stop Idle" delay	When the controller detects that the engine speed is 0 and alarm action select as "Warning", it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
4.	Failed to start	Among set crank times, after "Start Completed"	Among set crank times, if genset failed to start, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD. Note: in local mode, start attempt forced set as 1 time, if fails to start, no alarms will occur.
5.	Failed to stop	After "Fail to Stop" Delay	After "fail to stop" delay, if speed signal still can be detected, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
6.	Charge Alt Fail	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.	Aux. Input 1-6	User defined	When the controller detects that the auxiliary input 1-6 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
8.	High Water Temperature	Bigger than set speed	When the controller detects that the high water temperature warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.



No.	Type	Detection Range	Description
9.	High Oil Temperature	Bigger than set speed	When the controller detects that the high oil temperature warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
10.	Low Oil Pressure	Bigger than set speed	When the controller detects that the low oil pressure warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
11.	Flexible sensor 1-3 High	Bigger than set speed	When the controller detects that the Flexible sensor 1-3 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
12.	Flexible sensor 1-3 Low	Bigger than set speed	When the controller detects that the Flexible sensor 1-3 warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
13.	Water Temperature Open	Always active.	When the controller detects that the water temperature sensor open warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
14.	Oil Temperature Open	Always active.	When the controller detects that the oil temperature sensor open warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
15.	Oil Pressure Open	Always active.	When the controller detects that the oil pressure sensor open warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
16.	Flexible sensor 1-3 Open	Always active.	When the controller detects that the Flexible sensor 1-3 open warning signals, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
17.	Supply Under Volt	Always active.	When the controller detects that the supply 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.
18.	Supply Over Volt	Always active.	When the controller detects that the supply voltage has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
19.	DOUT 16 Comm. Fail	Always active (When DOUT16 is	When the controller detects DOUT 16 module communication failure, it will initiate a warning alarm and



No.	Type	Detection Range	Description
		enabled).	the corresponding alarm information will be displayed on LCD.
20.	HMC4000RM Comm. Fail	Always active (When HMC4000RM is enabled)	When the controller detects HMC4000RM module communication failure, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
21.	RPU560A Comm. Fail	Always active (When 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.
22.	Fresh Water Pressure Low Input	Always active.	When the input port defines this function, the controller will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
23.	Fresh Water Level Low Input	Always active.	When the input port defines this function, the controller will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
24.	Grease Level Low Input	Always active.	When the input port defines this function, the controller will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
25.	Fuel Leakage Input	Always active.	When the input is active, the controller will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
26.	ECU Warning	Always active.	When there is an ECU warning, the corresponding alarm information will be displayed on LCD; meanwhile, SPN and FMI of changing ECU alarm will be displayed. Maximum 5 SPN codes of ECU alarm can be displayed.
<p><b>▲ Note: warning type of aux. input must be active when configured by users.</b></p> <p><b>DOUT16 module: expand 16 chanel of discrete output.</b></p> <p><b>RPU560A module: expand security module.</b></p>			

## 6.2 SHUTDOWN

If the controller detects shutdown alarms, controller will shutdown genset and the detailed alarm information will be displayed on LCD.

Table 7 – Shutdown Alarms

No.	Type	Detection Range	Description
1.	Emergency Stop	Always active	When the controller detects that emergency stop is active, it will initiate a warning alarm and the corresponding alarm information will be displayed on LCD.
2.	Over speed	Always active.	When the controller detects that the engine speed has exceeded the pre-set value, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
3.	Aux. Input 1-6	User defined	When the controller detects that the auxiliary input 1-6 shutdown signals, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
4.	High Water Temperature	Bigger than set speed	When the controller detects that the high water temperature shutdown is active, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
5.	High Oil Temperature	Bigger than set speed	When the controller detects that the high oil temperature shutdown is active, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
6.	Low Oil Pressure	Bigger than set speed	When the controller detects that the low oil pressure warning shutdown is active, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
7.	Flexible sensor 1-3 High	Bigger than set speed	When the controller detects that the Flexible sensor 1-3 shutdown is active, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
8.	Flexible sensor 1-3 Low	Bigger than set speed	When the controller detects that the Flexible sensor 1-3 shutdown is active, it will initiate a shutdown alarm and the corresponding alarm information will be displayed on LCD.
9.	ECU Shutdown	Always active.	When there is an ECU shutdown, the corresponding alarm information will be displayed on LCD; meanwhile, SPN and FMI of changing ECU alarm will be displayed. Maximum 5 SPN codes of ECU alarm can be displayed.
<p><b>▲ Note: shutdown type of aux. input must be active when configured by users .</b></p>			

## 7 PARAMETER CONFIGURATION


Hold and press  for 1s to enter into parameter setting 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 List

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. Return delay	(1-3600) s	1	The time from remote stop signal active to complete stop when the controller is in remote mode.
3. Preheat 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 time when genset start.
8. Warming Up Time	(0-3600) s	10	Warming up time after genset running up.
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 Time	(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 Time	(0.2-5.0) s	0.2	The time from pressing stop button to stop performance when the controller stops by button-press.
15. Engine Type	(0-39)	0: Conventional Engine	Factory default: conventional engine (not J1939). Please select related engine type when connect with J1939.
16. SPN Version	(1-3)	1	It is analysis type of SPN alarm.
17. ECU Shutdown Enable	(0-1)	0: Disabled	Shutdown when detect a red lamp alarm after it is enabled.
18. Flywheel Teeth	(1-300)	118	The flywheel teeth installed in genset is used for judgement of separate conditions and detection of rotate speed. See following Installations.

Parameter	Range	Default	Remarks
19. Rated Speed	(1-5999)r/min	1500	Provide standard for judgement of over speed, under speed and on load rotate speed.
20. Start	(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.
21. Crank Disconnect Condition	(0-2) 0: Speed 1: Oil Pressure 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.
22. Disconnect OP	(10-1000)kPa	80	Disconnect when Oil Pressure exceeds preset value.
23. Disconnect Speed	(0-200)%	25%	Set value is percentage of rated rotate speed. When speed exceeds pre-set value, starter will separate.
24. Under Speed Shutdown	(0-1) 0 Disabled 1 Enabled	0 Disabled	Under speed shut setting.
25. Set Value	(0-200)%	85%	
26. Delay	(0-3600) s	3	
27. Under Speed Warn	(0-1) 0 Disabled 1 Enabled	0 Disabled	Under speed warn setting.
28. Set Value	(0-200)%	90%	
29. Return Value	(0-200)%	92%	
30. Delay	(0-3600) s	3	
31. Over Speed Shutdown	(0-1) 0 Disabled 1 Enabled	1 Enabled	Over speed shut setting.
32. Set Value	(0-200)%	115%	
33. Delay	(0-3600) s	1	
34. Over Speed Warn	(0-1) 0 Disabled 1 Enabled	1 Enabled	Over speed warn setting.
35. Set Value	(0-200)%	110%	
36. Return Value	(0-200)%	108%	
37. Delay	(0-3600) s	3	
38. Speed Lose Delay	(0-3600) s	3	The time from that detecting speed is 0 to confirm action.
39. Speed Lose Action	(0-2) 0:Warn 1: Shutdown 2: No Action	1: Shutdown	The action after detecting loss of speed signal.
40. Charge Alt Fail	(0-60.0)V	16.0	If the voltage of charger falls below the setting limit after engine is normal running, controller



Parameter	Range	Default	Remarks
			will initiate corresponding alarm.
41. Bat Rated Volt	(0-60.0)V	24.0	Provide standard for judgement of over voltage and under voltage.
42. Power Over Volt	(0-200)%	125%	Set value is percentage of power supply rated voltage.
43. Power Under Volt	(0-200)%	75%	
44. Heating Up Limit	(0-100)°C	42	Open when temperature of water temperature sensor is larger than pre-set value.
45. Heat Down Limit	(0-100)°C	37	Close when temperature of water temperature sensor is less than pre-set value.
46. Pre-lubricate Enable	(0-1)0 Disabled 1 Enabled	0 Disabled	It can circulate prelubricate for genset after setting enabled.
47. Cyc Gapi Time	(0-7200)min	300	It can set circulate period after circulate prelubrication.
48. Lubri Time	(0-7200)s	300	The time of each prelubrication.
49. Idle Set	(0-2000)r/min	700	Value of rated idle speed of the controller.
50. Dead Band	(0-10.0)%	1.0	Relay automatic speed regulation setting. <b>Note:</b> as rated idle percent (in no working area idle); as rated speed percent (in high speed )
51. Gain	(0-100)%	10	
52. Response	0.25-4.00	0.50	
53. Stability	(0.05-1.60)s	1.0	
54. Device ID	(1-254)	1	RS485 Comm. Address.
55. Language Select	(0-1) 0: Chinese 1: English	0: Chinese	Language selections.
56. Password	(0-65535)	00318	Password of parameter setting.
57. DOUT16 Enable	(0-1)	0 Disabled	If DOUT16 module is needed to expand, this setting enabled is needed.
58. HMC4000RM Enable	(0-1)	0 Disabled	If HMC4000RM module is needed to expand, this setting enabled is needed.
59. RPU560A Enable	(0-1)	0: Disabled	If RPU560A module is needed to expand, this setting enabled is needed.
60. Baud Rate	(0-1) 0: 250kbps 1: 125kbps	0: 250kbps	CANBUS port communication Baud rate.
61. Self-Check Type	(0-1) 0: Self-Check Mode 1 1: Self-Check Mode 2	0	When self-check is set as 1, it can test alarm by connecting with corresponding sensor with no rotated speed after self-check is active; when self-check is set as 2, it can test alarm with system auto-regulating the sensor after self-check is active;
62. Date & Time			Date&Time setting.
63. Water Temp.Sensor set (Resistance input)	See 8.3. Sensor function settings Note: Resistance type input measuring range is not applicable.		Water temperature sensor setting.

Parameter	Range	Default	Remarks
64. Oil Temp.Sensor set (Resistance input)	See 8.3. Sensor function settings Note: Resistance type input measuring range is not applicable.		Oil temperature sensor setting.
65. Oil Pressure Sensor set (Resistance/current/volt input)	See 8.3. Sensor function settings Note: Resistance type input measuring range is not applicable.		Oil pressure sensor setting.
66. Aux. sensor 1 Set (Resistance input)	See 8.3. Sensor function settings <b>Note:</b> Resistance type input measuring range is not applicable.		Flexible sensor1 setting.
67. Aux. sensor 2 Set (Resistance/current/volt input)	See 8.3. Sensor function settings <b>Note:</b> Resistance type input measuring range is not applicable.		Flexible sensor2 setting.
68. Aux. sensor 3 Set (Resistance/current/volt input)	See 8.3. Sensor function settings <b>Note:</b> Resistance type input measuring range is not applicable.		Flexible sensor3 setting.
69. Input 1 Set	(0-50)	25: Emergency Shutdown	See table 8.1.2.
70. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
71. Input 2 Set	(0-50)	18: Local Mode IN	See table 8.1.2.
72. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
73. Input 3 Set	(0-50)	19: Remote Mode IN	See table 8.1.2.
74. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
75. Input 4 Set	(0-50)	0: Not Used	See table 8.1.2.
76. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
77. Input 5 Set	(0-50)	0: Not Used	See table 8.1.2.
78. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
79. Input 6 Set	(0-50)	0: Not Used	See table 8.1.2.
80. Active type	(0-1)	0: Close Activate	Set up input port active of close or open.
81. Output 1 Set	(0-100)	0: Not Used	See table 8.2.2.
82. Active type	(0-1)	0: Open	Set up output port be always open or always close.
83. Output 2 set	(0-100)	0: Not Used	See table 8.2.2.
84. Active type	(0-1)	0: Open	Set up output port be always open or always close output.
85. Output 3 set	(0-100)	0: Not Used	See table 8.2.2.

Parameter	Range	Default	Remarks
86. Active type	(0-1)	0: Open	Set up output port be always open or always close output.
87. Output 4 set	(0-100)	0: Not Used	See table 8.2.2.
88. Active type	(0-1)	0: Open	Set up output port be always open or always close output.
89. Output 5 set	(0-100)	0: Not Used	See table 8.2.2.
90. Active type	(0-1)	0: Open	Set up output port be always open or always close output.
91. Output 6 set	(0-100)	0: Not Used	See table 8.2.2.
92. Active type	(0-1)	0: Open	Set up output port be always open or always close output.

## 8 INPUT/OUTPUT PORTS CONFIGURATION

### 8.1 AUXILIARY INPUTS 1~6 FUNCTIONAL CONFIGURATION


#### 8.1.1 DIGITAL INPUT PORT CONFIGURATION


Table – 9 Digital Input Port Definitions

No.	Settings	Contents	Description
1	Feature Set	(0- 50)	See 8.1.2 Input Port Functions
2	Active type	(0-1)	0: Close Activate    1: Open Activate
3	Active Range	(0-3)	0: After Safe        1: After Start 2: Always            3: Never
4	Action	(0-2)	0: Warn    1: Shutdown    2: Indication
5	Input Delay	(0-20.0)s	
6	Displayed string	User-defined input port names	20 English symbols or 10 Chinese characters

### 8.1.2 INPUT PORTS FUNCTIONS

Table 10 – Input Port Functional Definition

No.	Function	Description
0.	Not used	Not used
1.	Custom	Users configured input port settings
2.	Alarm Mute	Can prohibit “Audible Alarm” output when it is active.
3.	Reset Alarm	Can reset all alarms when input is active.
4.	Pre-Lubricate	If output is set as pre-lubrication output, the relay disconnects after the set pre-lubrication delay.
5.	Reserved	
6.	Panel Lock	All buttons in panel are inactive except  and  .
7.	Quick Start	Cranking will start directly (without preheating) when the input is active.
8.	Remote Start/Stop	Automatically starts the generator in remote mode; the generator will shut down when this input is deactivated. Note: only one method can be chose between remote start/stop input, and remote start input and remote stop input.
9.	AUTO Mode IN	When the input is active, enter into auto mode, the local mode and remote mode is inactive and start/stop can only be achieved via input port.
10.	Turning Chain	Start inhibition when the input is active.
11.	Fuel Leakage Input	When the input active, alarm initiate if fuel leak occurs.
12.	Water Press Low	Connect to digital input of sensor.
13.	Water Level Low	Connect to digital input of sensor.
14.	Oil Level Low	Connect to digital input of sensor.
15.	Water Temp. High IN	Connect to digital input of sensor.
16.	Oil Temp. High IN	Connect to digital input of sensor.
17.	Oil Pressure Low IN	Connect to digital input of sensor.
18.	Local Mode IN	The genset is in local mode when active.
19.	Remote Mode IN	The genset is in remote mode when active.
20.	Remote Start Input	When remote start input is active in Remote Control Mode, controller initiate start command.
21.	Stop Input	When stop input is active in Remote Control Mode or Auto Mode, controller initiate stop command.
22.	Auto Start Input	When auto start input is active in Auto Mode, controller initiate start command.
23.	Override Mode	When over ride mode input is active, only over speed stop and emergency stop are available.
24.	Local/Remote Mode	Inactive stands for local mode, and active stands for remote mode.
25.	Emergency Shutdown	After it is active, controller will shut down the genset immediately and initiate related alarms.
26~50	Reserved	

 **Note:** The name of the input ports 1~6 only can be configured via PC software.

## 8.2 OUTPUTS PORTS DEFINITION

### 8.2.1 DIGITAL OUTPUT DEFINITION CONTENTS

Table 11 – Digital Outputs Definition

No.	Items	Contents	Note
1	Output Function Configuration	(0-100)	
2	Effective ways	0 Open 1 Close	
3	Effective duration	Bit1: Standby Bit2: Pre-heat Bit3: Fuel On Bit4: Crank Bit5: Crank Rest Bit6: Safety On Bit7: Start Idle Bit8: Warm Up Bit9: Wait For Load Bit10: Working Order Bit11: Cooling Bit12: Stop Idle Bit13: ETS Hold Bit14: Wait For Stop Bit15: Stop Failure	
5	Output Delay	(0-100.0)s	
6	Output Time	(0-3600)s	

### 8.2.2 OUTPUT PORT 1-12 FUNCTIONS DEFINITION

Table 12 – Output Port 1-6 Functional Definition

No.	Items	Description
0.	Not Used	Not used
1.	Custom	
2.	Air Flap	Action when over speed shutdown and emergence stop. It also can close the air inflow to stop the engine as soon as possible.
3.	Audible alarm	Action when warning, shutdown alarms occur. Can be connected annunciator externally. When “alarm mute” configurable input port is active, it is inhibit to output.
4.	Crank Relay	Action when genset is starting and disconnect when crank success.
5.	Fuel Output	Action when genset is starting and disconnect when stop is completed.
6.	ETS Hold	Action period: ETS hold delay.
7.	Reserved	
8.	Reserved	
9.	Loss of Speed	After safety on delay, the controller active when the engine speed is 0.



No.	Items	Description
10.	Pre-lubricate	The controller output when the engine is in standby mode (user-defined output delay) if pre-lubrication input is active.
11.	Override Output	The controller output when it is in Override mode.
12.	Ready Go(1)	The controller output when it is in standby mode and no open circuit alarms occur.
13.	Heater Control	It is controlled by heating temperature sensor's limited threshold.
14.	Idle Control	Action from "crank delay" to "start idle delay" and from "stop idle delay" to "wait for stop delay". When in local mode, idle control is unavailable.
15.	Common Alarm	Action when genset common warning, common shutdown alarms occur.
16.	Common Shutdown	Action when common shutdown alarms occur.
17.	Common Warn	Action when common warning alarms occur.
18.	Input 1 Active	Action when digital input port 1 is active.
19.	Input 2 Active	Action when digital input port 2 is active.
20.	Input 3 Active	Action when digital input port 3 is active.
21.	Input 4 Active	Action when digital input port 4 is active.
22.	Input 5 Active	Action when digital input port 5 is active.
23.	Input 6 Active	Action when digital input port 6 is active.
24.	Crank Success	It is output when the engine speed reaches requirements of disconnecting with start motor.
25.	Normal Running	The gen-set is normal running when the speed reaches rated requirements.
26.	Remote Mode Output	The controller output in remote control mode.
27.	Local Mode Output	The controller output in local mode.
28.	Ready Go(2)	Output when there is no shutdown alarm.
29.	DOUT16 Com Fail	Action when the controller detects communication failure with DOUT16. (3s overtime)
30.	Shutdown Output	The controller output when it is shutdown mode.
31.	Power Under Volt	Action when the controller detects that the power voltage has fallen below the set value.
32.	Power Over Volt	Action when the controller detects that the power voltage has exceeded the set value.
33.	Under Speed Warn	Action when under speed warning alarm occurs.
34.	Under Speed Shutdown	Action when under speed shutdown alarm occurs.
35.	Over Speed Warn	Action when over speed warning alarm occurs.
36.	Over Speed Shutdown	Action when over speed shutdown alarm occurs.
37.	Emergency Stop	Action when emergency stop alarm occurs.
38.	Charge Alt Fail	Action when charge failure warning alarm occurs.
39.	Failed To Start	Action when failed start alarm occurs.
40.	Failed To Stop	Action when failed stop alarm occurs.
41.	Reserved	



No.	Items	Description
42.	Water Temp. Open	Action when water temperature sensor is open circuit.
43.	Water Temp. High Warn	Action when high water temperature sensor warning alarm.
44.	Water Temp. High Stop	Action when high water temperature sensor shutdown alarm.
45.	Oil Temperature Open	Action when oil temperature sensor is open circuit.
46.	Oil Temperature High Warn	Action when high oil temperature sensor warning alarm.
47.	Oil Temperature High Stop	Action when high oil temperature sensor shutdown alarm.
48.	Oil Pressure Open	Action when oil pressure sensor is open circuit.
49.	Oil Pressure Low Warn	Action when low oil pressure sensor warning alarm.
50.	Oil Pressure Low Stop	Action when low oil pressure sensor shutdown alarm.
51.	Sensor 1 Open Warn	Action when Flexible sensor 1 is open circuit.
52.	Sensor 1 Warn	Action when Flexible sensor 1 warning alarm.
53.	Sensor 1 Shutdown	Action when Flexible sensor 1 shutdown alarm.
54.	Sensor 2 Open Warn	Action when Flexible sensor 2 is open circuit.
55.	Sensor 2 Warn	Action when Flexible sensor 2 warning alarm.
56.	Sensor 2 Shutdown	Action when Flexible sensor 2 shutdown alarm.
57.	Reserved	
58.	RPU560A Comm. Fault	Action when the controller detects communication failure with RPU560A safeguard module. (3s overtime)
59.	RPU560A Power1 Fault	Security module output when 1 way power fault.
60.	RPU560A Power2 Fault	Security module output when 2 way power fault.
61.	Rise Speed	When the controller is in idle mode and speed doesn't arrive at rated idle, it output when speed is rising and open automatically when speed arrives at rated idle. When the controller is running up and speed doesn't arrive at rated rotate speed, it output when speed is rising and open automatically when speed arrives at rated rotate speed. Note: Active only when controller is in remote/auto mode.
62.	Drop Speed	When the controller is in idle mode and speed exceeds rated idle, it output when speed is dropping and open automatically when speed arrives at rated idle. When the controller is running up and speed exceeds at rated rotate speed, it output when speed is dropping and open automatically when speed arrives at rated rotate speed. Note: Active only when controller is in remote/auto mode.
63.	Sensor 3 Open Warn	Action when Flexible sensor 3 is open circuit.
64.	Sensor 3 Warn	Action when Flexible sensor 3 warning alarm.
65.	Sensor 3 Shutdown	Action when Flexible sensor 3 shutdown alarm.
66.	Fuel Leakage Alarm	Output when this alarm is active.
67.	Reserved	
68.	Reserved	
69.	Lamp Test	Output while lamp testing.
70~100	Reserved	

## 8.3 SENSOR FUNCTIONAL CONFIGURATION

### 8.3.1 SENSOR CONFIGURATION

Table 13 – Sensors Configuration

No.	Settings	Contents	Remarks
1.	Sensor type	(0-3) 0: Not Used 1: Pressure 2: Temperature 3: Level	Types such as water temperature sensor, oil temperature sensor, and oil pressure sensor are not optional and configuration is fixed temperature or pressure.
2.	Curve Type	Curve types list	See 8.3.2/8.3.3/8.3.4 curve lists
3.	Alarm Speed	(0-200)%	Alarm and test when the engine speed has exceeded the set value.
4.	Sensor Range	(0-6000)	Active when current of sensor is between (4~20)mA. Corresponding unit of pressure sensor is kPa; Corresponding unit of level sensor is %.
5.	Display Units	Temperature 0: °C 1: °F Pressure 0: kPa 1: bar 2: Psi	The units displayed on LCD. After selection of units, the displayed data will automatically convert according to units.
6.	Sensor High Shutdown	(0-1) 0: Enable 1: Disable	
7.	Set Value	(0-6000)	
8.	Delay	(0-3600)s	
9.	Sensor Low Shutdown	(0-1) 0: Enable 1: Disable	
10.	Set Value	(0-4000)	
11.	Delay	(0-3600)s	
12.	Sensor High Warn Enable	(0-1) 0: Enable 1: Disable	
13.	Set Value	(0-6000)	
14.	Return Value	(0-6000)	
15.	Delay	(0-3600)s	
16.	Sensor Low Warn Enable	(0-1) 0: Enable 1: Disable	
17.	Set Value	(0-4000)	
18.	Return Value	(0-4000)	
19.	Delay	(0-3600)s	
20.	First point X (Resistance)	Resistance type (not PT100)	Sensor curve is user-defined X axis: 8 Y axis: 8
21.	Second point X (Resistance)	Resistance type (not PT100)	
22.	Third point X (Resistance)	Resistance type (not PT100)	





No.	Settings	Contents	Remarks	
23.	Fourth point X (Resistance)	Resistance type (not PT100)		
24.	Fifth point X (Resistance)	Resistance type (not PT100)		
25.	Sixth point X (Resistance)	Resistance type (not PT100)		
26.	Seventh point X (Resistance)	Resistance type (not PT100)		
27.	Eighth point X (Resistance)	Resistance type (not PT100)		
28.	First point Y (Value)	Resistance type (not PT100)		
29.	Second point Y (Value)	Resistance type (not PT100)		
30.	Third point Y (Value)	Resistance type (not PT100)		
31.	Fourth point Y (Value)	Resistance type (not PT100)		
32.	Fifth point Y (Value)	Resistance type (not PT100)		
33.	Sixth point Y (Value)	Resistance type (not PT100)		
34.	Seventh point Y (Value)	Resistance type (not PT100)		
35.	Eighth point Y (Value)	Resistance type (not PT100)		
36.	User-defined string	User-defined sensor names		Only can be set via upper computer software.

### 8.3.2 TEMPERATURE CURVES

Table 14 – Temperature Curve List

No.	Contents	Remarks
0	Not Used	The input range of user-defined resistance is between 0-1000Ω. The factory defaults of water temperature sensor and oil temperature sensor are PT100 sensors.
1	PT100	
2	Custom Res Curve	
3	VDO	
4	CURTIS	
5	VOLVO-EC	
6	DATCON	
7	SGX	
8	SGD	
9	SGH	
10	Reserved	
11	Cu50	
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).

### 8.3.3 PRESSURE CURVES LIST

Table 15 – Pressure Curves List

No.	Contents	Remarks
0	Not Used	The input range of User-defined resistance is between 0-1000Ω. The factory defaults of oil pressure sensor is (4-20)mA sensor.
1	4~20mA	
2	Custom Res Curve	
3	VDO 10bar	
4	CURTIS	
5	Voltage (0.5V-4.5V)	
6	DATCON 10Bar	
7	SGX	
8	SGD	
9	SGH	
10	Custom Voltage Curve	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

▲ Note: There is no need to set curve type but range if the pressure sensor is current type.

### 8.3.4 FUEL LEVEL CURVES


Table 16 – Fuel Level Curves List

No.	Contents	Remarks
0	Not Used	The default of HMC4100 sensor type doesn't have fuel level sensor. Please chose one of Flexible sensor 1/2/3 to use if need to.
1	(4~20)mA	
2	Custom Res 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	

▲ Note: There is no need to set curve type but range if the pressure sensor is current type.

## 9 PARAMETER SETTING

### 9.1 MATTERS NEED ATTENTION

Press the button  for 1 second after start the controller, and then enter into parameter setting menu, which is need to input correct password. The default password is 00318.

Please contact with manufacturer when forgets the password or need to calibrate 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 1-6 cannot be set to the same project, otherwise correct function cannot arrive. However, Auxiliary output port 1-6 can be set to same project.

### 9.2 SENSOR SETTINGS CLARIFICATION

- When reselect the sensors, the standard value of the selected sensor will be selected. If tempertuare sensor default is set to PT100 (120°C resistance), 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:

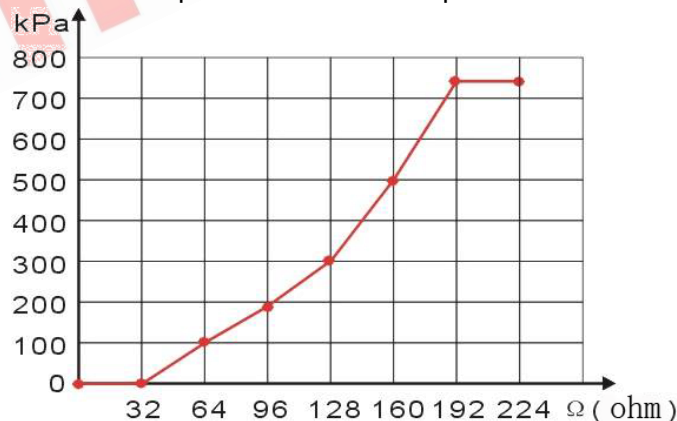


Fig.2 – Sensor Curves Set

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

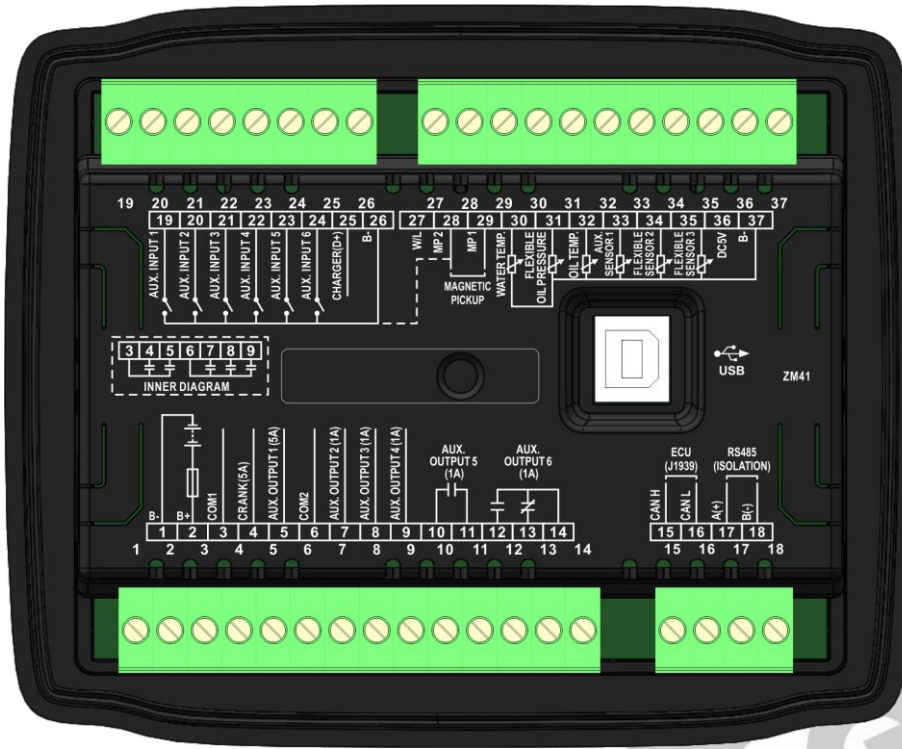


Fig.3 – HMC4100 Controller Panel

Table 18 - Description of Terminal Connection

No.	Function	Cable Size	Description
1.	B-	1.5mm <sup>2</sup>	Connected with negative of starter battery.
2.	B+	1.5mm <sup>2</sup>	Connected with positive of starter battery.
3.	COM1	1.5mm <sup>2</sup>	Connect to COM1 relay output, rated 5A DC28V
4.	CRANK	1.5mm <sup>2</sup>	
5.	Aux. Output 1(5A)	1.5mm <sup>2</sup>	
6.	COM 2	1.0mm <sup>2</sup>	Connect to COM2 relay output, rated 1A DC28V
7.	Aux. Output 2(1A)	1.0mm <sup>2</sup>	
8.	Aux. Output 3(1A)	1.0mm <sup>2</sup>	
9.	Aux. Output 4(1A)	1.0mm <sup>2</sup>	Relay normally open volt free contact, rated 1A DC28V
10.	Aux. Output 5(1A)	1.0mm <sup>2</sup>	
11.		1.0mm <sup>2</sup>	
12.		1.0mm <sup>2</sup>	
13.	Aux. Output 6(1A)	1.0mm <sup>2</sup>	Normally open output, rated 1A
14.		1.0mm <sup>2</sup>	Normally close output, rated 1 A
15.	ECU CAN H	0.5mm <sup>2</sup>	120Ω impedance shielding wire is recommended with one end grounded.
16.	ECU CAN L	0.5mm <sup>2</sup>	
17.	RS485 A(+)	0.5mm <sup>2</sup>	Parameters can be configured vai PC software.
18.	RS485 B(-)	0.5mm <sup>2</sup>	
19.	Aux. Input 1	0.5mm <sup>2</sup>	Ground is active (B-)
20.	Aux. Input 2	0.5 mm <sup>2</sup>	Ground is active (B-)
21.	Aux. Input 3	0.5 mm <sup>2</sup>	Ground is active (B-)



No.	Function	Cable Size	Description
22.	Aux. Input 4	0.5 mm <sup>2</sup>	Ground is active (B-)
23.	Aux. Input 5	0.5 mm <sup>2</sup>	Ground is active (B-)
24.	Aux. Input 6	0.5 mm <sup>2</sup>	Ground is active (B-)
25.	Chager (D+)	1.0mm <sup>2</sup>	Connect to charger D+(W/L); if without this terminal, please hang it in the air.
26.	Aux. Input COM	0.5 mm <sup>2</sup>	Internal has been connected to B-
27.	W/L	0.5 mm <sup>2</sup>	
28.	MP2 (connect with B-)	0.5mm <sup>2</sup>	Connect to speed sensor of engine, and shielding wire is recommended.
29.	MP1	0.5mm <sup>2</sup>	
30.	Temperature Sensor	1.0mm <sup>2</sup>	Connect to temperature sensor(resistor type)
31.	Oil pressure Sensor	1.0mm <sup>2</sup>	Connect to pressure sensor(resistor/current/voltage type)
32.	Oil Temperature Sensor	1.0mm <sup>2</sup>	User configured (resistor type)
33.	Flexible Sensor 1	1.0mm <sup>2</sup>	User configured (resistor type)
34.	Flexible Sensor 2	1.0mm <sup>2</sup>	User configured (resistor/current/voltage type)
35.	Flexible Sensor 3	1.0mm <sup>2</sup>	User configured (resistor/current/voltage type)
36.	DC5V	1.0mm <sup>2</sup>	Provide power for voltage type sensor.
37.	Sensor COM(B-)	1.0mm <sup>2</sup>	Sensor common port; internal of controller has been connect with B-.
	USB	/	Achieving software upgrading. Pressing "Set" button to enter into menu selection screen. If select "USB Communication Enabled", parameters can be configured by PC software via USB port connection. And then press "Set" button again to exit. Note: CANBUS is inactive while USB communicaiton.

Items see table 13

**▲ 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 of destruction of equipment!

## 11 COMMUNICATION AND CONNECTION

### 11.1 RS485 COMMUNICATION

HMC4100 genset controller has RS485 port which allows the controller to connect to open-type LAN. RS485 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 (J1939) BUS COMMUNICATION

Various expansion modules can be connected to the controller via CANBUS (J1939) 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.
- HMC4000RM Remote control module: Remote control module can achieve remote 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. Its 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.

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

A large number of ECU engines can be connected to the CANBUS (ECU) port of the controller. Besides, at the same time users can connect expansion module which makes it convenient and suitable for different working environments.

#### 11.3.1 CUMMINS ISB/ISBE

Table 19 – Fuel Start Wiring Connection

Terminals of controller	Connector B	Remarks
Fuel relay output	39	
Start relay output	-	Connect to starter coil directly
Auxiliary output port 1	Expand 30A relay, battery voltage of terminal 01,07,12,13 are supplied by relay.	ECU power; set auxiliary output 1 as “ECU power”.

Table 20 – 9-Pin Connector Wiring Connection

Terminals of controller	9 pin connector	Remarks
CAN(H) (ECU)	SAE J1939 signal	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	SAE J1939 return	Impedance 120Ω connecting line is recommended.

Engine type: **Cummins ISB**

### 11.3.2 CUMMINS QSL9

Compatible with CM850 engine controller module.

Table 21 - Fuel Start Wiring Connection

Terminals of controller	50 pin connector	Remark
Fuel relay output	39	
Start relay output	-	Connect to starter coil directly.

Table 22 – 9-Pin Connector Wiring Connection

Terminals of controller	9 pin connector	Remark
CAN(H) (ECU)	SAE J1939 signal-C	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	SAE J1939 return-D	Impedance 120Ω connecting line is recommended.

Engine type: **Cummins-CM850**

### 11.3.3 CUMMINS QSM11

Compatible with CM750 engine controller module. Engine types: QSM11 G1, QSM11 G2

Table 23 - Fuel Start Wiring Connection

Terminals of controller	C1 connector	Remark
Fuel relay output	5&8	
Start relay output	-	Connect to starter coil directly.

Table 24 – 3-Pin Connector Wiring Connection

Terminals of controller	3 pin data link connector	Remark
CAN(H) (ECU)	A	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	B	Impedance 120Ω connecting line is recommended.

Engine type: **Cummins ISB**

### 11.3.4 DETROIT DIESEL DDEC III / IV

Table 25 – Engine Wiring Connection

Terminals of controller	Engine CAN port	Remark
Fuel relay output	Expand 30A relay; battery voltage of ECU is supplied by relay	
Start relay output	-	Connect to starter coil directly
CAN(H) (ECU)	CAN(H)	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	CAN(L)	Impedance 120Ω connecting line is recommended.

Engine type: **Common J1939**

### 11.3.5 DEUTZ EMR2

Table 26 – Engine Wiring Connection

Terminals of controller	F connector	Remark
Fuel relay output	Expand 30A relay, battery voltage of terminal 14 is supplied by relay. Fuse is 16A.	
Start relay output	-	Connect to starter coil directly
-	1	Connect to battery negative.
CAN(H) (ECU)	12	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	13	Impedance 120Ω connecting line is recommended.

Engine type: **Volvo EDC4**

### 11.3.6 JOHN DEERE

Table 27 – Engine Wiring Connection

Terminals of controller	21 pin connector	Remark
Fuel relay output	G, J	
Start relay output	D	
CAN(H) (ECU)	V	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	U	Impedance 120Ω connecting line is recommended.

Engine type: **John Deere**



### 11.3.7 MTU MDEC

Compatible with MTU 2000 and 4000 series engines.

Table 28 – Engine Wiring Connection

Terminals of controller	X1 connector	Remark
Fuel relay output	BE1	
Start relay output	BE9	
CAN(H)(ECU)	G	Impedance 120Ω connecting line is recommended.
CAN(L)(ECU)	F	Impedance 120Ω connecting line is recommended.

Engine type: **MTU-MDEC-303**

### 11.3.8 PERKINS

Compatible with ADEM3/ ADEM4 engine control modules. Engine types: 2306, 2506, 1106, and 2806.

Table 29 – Engine Wiring Connection

Terminals of controller	Connector	Remark
Fuel relay output	1,10,15,33,34	
Start relay output	-	Connect to starter coil directly
CAN(H) (ECU)	31	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	32	Impedance 120Ω connecting line is recommended.

Engine type: Perkins

### 11.3.9 SCANIA

Compatible with S6 engine control module. Engines: DC9, DC12, DC16.

Table 30 – Engine Wiring Connection

Terminals of controller	B1 connector	Remark
Fuel relay output	3	
Start relay output	-	Connect to starter coil directly
CAN(H) (ECU)	9	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	10	Impedance 120Ω connecting line is recommended.

Engine type: Scania

### 11.3.10 VOLVO EDC3

Compatible with such engines as TAD1240, TAD1241, and TAD1242.

Table 31 – Fuel Start Wiring Connection

Terminals of controller	“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 Connection

Terminals of controller	“Data bus” connector	Remark
CAN(H) (ECU)	1	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	2	Impedance 120Ω connecting line is recommended.

Engine type: Volvo

### 11.3.11 VOLVO EDC4

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

Table 33 – Engine Wiring Connection

Terminals of controller	Connector	Remark
Fuel relay output	Expand 30A relay, battery voltage of terminal 14 is supplied by relay. Fuse is 16A.	
Start relay output	-	Connect to starter coil directly.
	1	Connect to battery negative.
CAN(H) (ECU)	12	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	13	Impedance 120Ω connecting line is recommended.

Engine type: **Volvo EDC4**

### 11.3.12 VOLVO-EMS2

Compatible with the following Volvo engines: D9、D13、D16、EMS

Table 34 – Engine Wiring Connection

Terminals of controller	Engine CAN port	Remark
Auxiliary output 2	5	ECU power supply Set auxiliary output 2 as “ECU Power Supply”
CAN(H) (ECU)	1(CAN H)	Impedance 120Ω connecting line is recommended.
CAN(L) (ECU)	2(CAN L)	Impedance 120Ω connecting line is recommended.

Input ports can be set with speed control function, auxiliary input port 1 can be set as speed up input, and auxiliary input port 2 can be set as speed down input. After the normal running, raise/drop speed functions can be achieved by digital input ports.

Engine type: **Volvo-EMS2**

### 11.3.13 BOSCH

Compatible with BOSCH common rail electronic engines.

Table 35 – Engine Wiring Connection

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
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 Connection

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>

Engine type: **BOSCH**

Please contact us if you have any questions about controller and ECU connection.

## 12 HMC4100 APPLICATION DIAGRAM

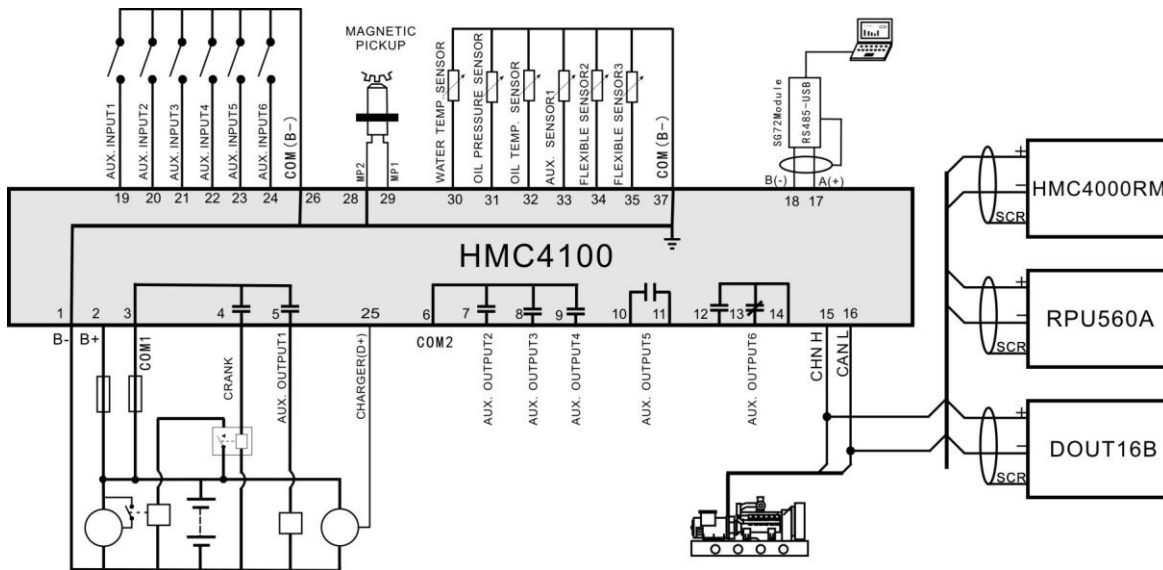


Fig.4 – HMC4100 Application Diagram

## 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 engine failed to fire, the 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 safety on delay to normal running 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.

### 14.2 OVERALL DIMENSIONS AND CUTOUT DIMENSIONS

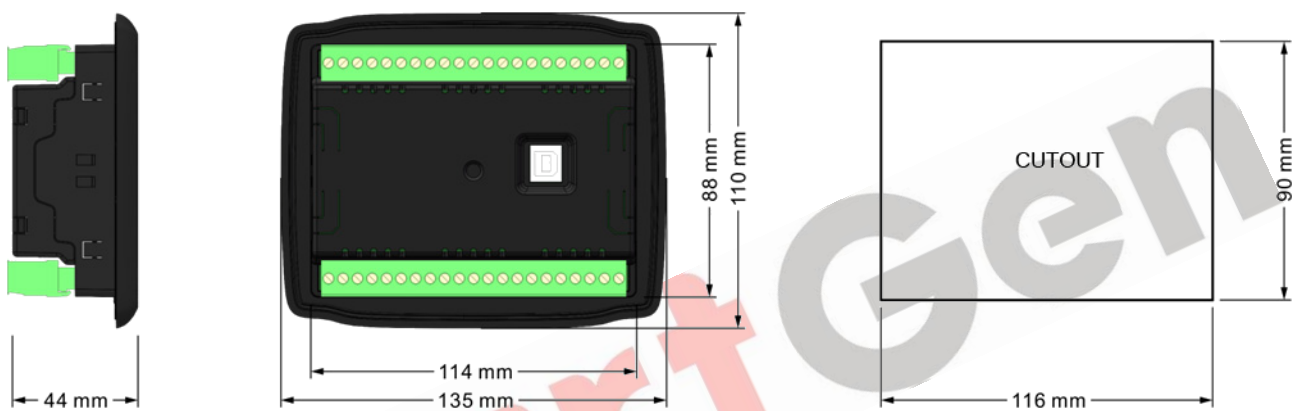


Fig.5 – Overall & Cutout Dimension

## 15 INSTALLATION ATTENTIONS

### 15.1 BATTERY VOLTAGE INPUT

HMC4100 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 2.5mm<sup>2</sup>. 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 26 terminal of controller with one end and the other end hanging in the air. The other two signal lines connect separately to 28, 29 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 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.

## 16 TROUBLESHOOTING

Table 38 – Trouble Shooting

Problem	Possible Solution
Controller no response with power.	Check starting batteries; Check controller connection wirings; Check DC fuse.
Genset shutdown	Check the water/cylinder temperature is too high or not.
Emergency shutdown	Check emergency shutdown button function;
Low oil pressure alarm after engine has fired.	Check oil pressure sensor and wiring.
High water temperature alarm after engine has fired.	Check water temperature sensor and its wiring.
Shutdown alarm when engine is running	Check relevant switch and its wiring according to the information on LCD. Check auxiliary digital input port.
Fail to start	Check fuel return circuit and its wiring. Check starting battery. Check speed sensor and its wiring. Consult engine manual.
Starter no respond	Check starter wiring; Check start battery
RS485 communication failure	Check wiring; Check if COM port setting is right; Check if RS485 A and B wires are connected in the opposite way; Check if PC communication port is damaged. Putting a 120Ω resistance between RS485 A and B is recommended.
CANBUS communication failure	Check wiring; Check if CANBUS CANH and CANL wires are connected in the opposite way; Check if CANBUS CANH and CANL wires at both ends are connected in the opposite way; Putting a 120Ω resistance between CANBUS CANH and CANL is recommended.