SmartGen RPU560A Marine Engine Controller User Manual

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Contents

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Table 1 – Software Version

Date	Version	Note
2015-08-10	1.0	Original Release
2015-12-15	1.1	Change the name Security Module to Redundant Protection Unit
2021-08-15	1.2	Add the emergency stop break wire detection, and change the voltage input description of power supply.

This manual is suitable for RPU560A redundant protection unit only.

Table 2 – Clarification of notation used within this publication.

Sign	Instruction
NOTE 	Highlights an essential element of a procedure to ensure correctness.
CAUTION! 	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
WARNING! 	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

OVERVIEW

RPU560A Redundant Protection Unit is a redundant protection unit that can autonomously maintain the engine running and protect it in the case of master control fault. The module is connected to HMC9000/HMC6000 via CONBUS port. All parameters and alarm types can be checked on the master controller. It can be widely used in marine emergency units, main propulsion units, main generator units and pumping units.

PERFORMANCE AND CHARACTERISTICS

- Speed sensor enables accurate control and protection of the running engine;
- Optional working mode; one is synchronized with master controller to protect engine normal running; the other is protect engine automatically when master controller failure occurs.
- 4 digital shutdown inputs;
- 5 relay outputs: shutdown output, fuel output, common warning output, common shutdown output, auxiliary output;
- Emergency shutdown input port: after emergency shutdown is initiated, regardless of whether main controller

failure occurred or not, shutdown signal will still be sent;

- Remote mode, in which only overspeed shutdown and emergency shutdown signals will be able to stop the unit;
- Modular design, compactness structure, small size, easy use.

TECHNICAL PARAMETERS

Table 3 – Technical Parameters

Item	Details
Working Voltage	DC18.0V~DC35.0V
Power Consumption	<2.5W
Shutdown output	7A relay output, break wire detection function
Fuel output	16A relay output, break wire detection function
Common warning output	7A relay output
Common shutdown output	7A relay output
Auxiliary output	7A relay output
Case dimension	107.6mm x 89.7mm x 60.7mm
Working conditions	Temperature: (-25~+70)°C Humidity: (20~93)%RH
Storage Temperature	Temperature: (-30~+80)°C
Weight	0.27kg

OPERATION

MAIN PROTECTED MOD

In this mode, RPU560A redundant protection unit will detect engine parameters and shutdown inputs automatically to protect the engine in real time whether the main module is active or not.
If overspeed shutdown or other shutdown alarm input is occurred, the stop relay is energized while the fuel relay is disengaged, then the common shutdown relay is engaged. When the engine is stop successfully, users can reset the alarm by pressing reset button mounted on the HMC9000/HMC6000 panel or by pressing the reset button contained within the RPU560A module.

STANDBY PROTECTED MODE

1. When main control is active (CANBUS communication is normal), if the engine speed has exceeded the fuel output speed, the fuel relay is energized. Only the active shutdown input and overspeed signal will be able to stop the generator.
2. When main control is deactivated (CANBUS communication is failed), if overspeed shutdown or other shutdown signal is detected, the stop relay is energized while the fuel relay is disengaged, then the common

shutdown relay is engaged. When the engine is stop successfully, users can reset the alarm by pressing reset button.

3. In override mode, if main control is deactivated, only overspeed shutdown and emergency shutdown signals will be able to stop the unit.

PROTECTION

WARNINGS

Table 4 – Warnings

No.	Warning type	Detection range	Description
1	Bat 1 over volt	Always active	Active when the battery voltage has fallen below the pre-set threshold and last for 20s. Then lamp BAT.1, BAT.2 will blink and the common warn relay outputs at the same time.
2	Bat 2 over volt		
3	Bat 1 under volt		
4	Bat 2 under volt		
5	Input 1 BW Warn		When the controller detects wire disconnection, the disconnection indicators begin to blink and the common warn relay outputs, and the corresponding information will displayed on the LCD screen.
6	Input 2 BW Warn		
7	Input 3 BW Warn		
8	Input 4 BW Warn		
9	Override input BW Warn		
10	Shutdown output BW Warn		
11	Fuel BW Warn		
12	Speed BW Warn		
13	EM. STOP Wire Break Warn		

SHUTDOWN ALARM

If shutdown alarm signal is detected, shutdown relay and common shutdown relay activates while fuel relay deactivates.

Table 5 – Shutdown Alarms

No.	Alarm Type	Detection range	Description
1	Emergency shutdown	Always active	After alarm shutdown signal is initiated, shutdown rel ay and common shutdown relay are activated while f uel relay deactivates. When failure shutdown is activ e, the corresponding lamp will be always initiated.
2	Input 1 shutdown	Always active	When failure shutdown input is active and engine sp eed has exceeded or been equal with pre-set value, shutdown relay and common shutdown relay are acti vated while fuel relay deactivates. When failure shutdown is active, the corresponding lamp will be al ways initiated, and the controller possesses with bre ak wire detection function (it can be defined by users).
3	Input 2 shutdown		
4	Input 3 shutdown		
5	Input 4 shutdown		

PARAMETER CONFIGURATION

RPU560A Redundant protection unit parameters can only be configured via PC software (the LINK port of RPU560A must be connected with SG72 transfer module and then connect with PC).

Table 6 – Parameter Configuration

Parameter	Range	Factory default value
1. Input 1 Delay	(0-20.0)s	2.0s
2. Input 1 BW Detection	(0-1)	0: Do not detect
3. Input 1 Alarm Speed	(0-200)%	0
4. Input 2 Delay	(0-20.0)s	2.0s
5. Input 2 BW Detection	(0-1)	0: Do not detect
6. Input 2 Alarm Speed	(0-200)%	0
7. Input 3 Delay	(0-20.0)s	2.0s
8. Input 3 BW Detection	(0-1)	0: Do not detect
9. Input 3 Alarm Speed	(0-200)%	0
10. Input 4 Delay	(0-20.0)s	2.0s
11. Input 4 BW Detection	(0-1)	0: Do not detect
12. Input 4 Alarm Speed	(0-200)%	0
13. Override Input BW Detection	(0-1)	0: Do not detect
14. EM. Stop Wire Break Detection Enable	(0-1)	0: Do not detect

15. Output 1 Set	(0-10)	1: Main Control Fail
16. Output 1 Type	(0-1)	0: Normally open
17. Flywheel Teeth	(1-300)	118
18. Rated Speed	(0-5999) r/min	1500 r/min
19. Fuel Output	(0-200)%	25% The fuel relay is active when the speed has exceeded the default value while deactivated when the speed has fallen below the default value.
20. Over Speed Shut	(0-200)%	115%
21. Over Speed Delay	(0-3600)s	1s
22. Over Speed Warn	(0-200)%	110%
23. Over Speed Return	(0-200)%	108%
24. Bat Rated Volt	(0-60.0)V	24.0V
25. Bat 1 Over Volt Warn	(0-200)%	125%
26. Bat 2 Over Volt Warn	(0-200)%	125%
27. Bat 1 Under Volt Warn	(0-200)%	80%
28. Bat 2 Under Volt Warn	(0-200)%	80%
29. Work Mode	(0-1)	0: Main protected mode The RPU560A module will detect engine parameters and alarm information automatically to protect the engine in real time whether the main module is active or not. 1: Standby protected mode The RPU560A module will protect engine automatically when the main module is deactivated.

OUTPUT PORT FUNCTION DEFINITION

Table 7 – Output Port Function Definition

No.	Contents	Description
0	Not used	
1	HMC9000 Com Fail	Active when the main module is deactivated.
2	Main battery supply	Active when the main battery supply feed.
3	Standby battery supply	Active when the standby battery supply feed.
4	Common alarm	Active when warning or shutdown alarm.
5	Working Normally	Active when working normally; deactivated when fail.
6	Overspeed Shutdown	Active when overspeed shutdown.
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	

TERMINAL CONNECTIONS

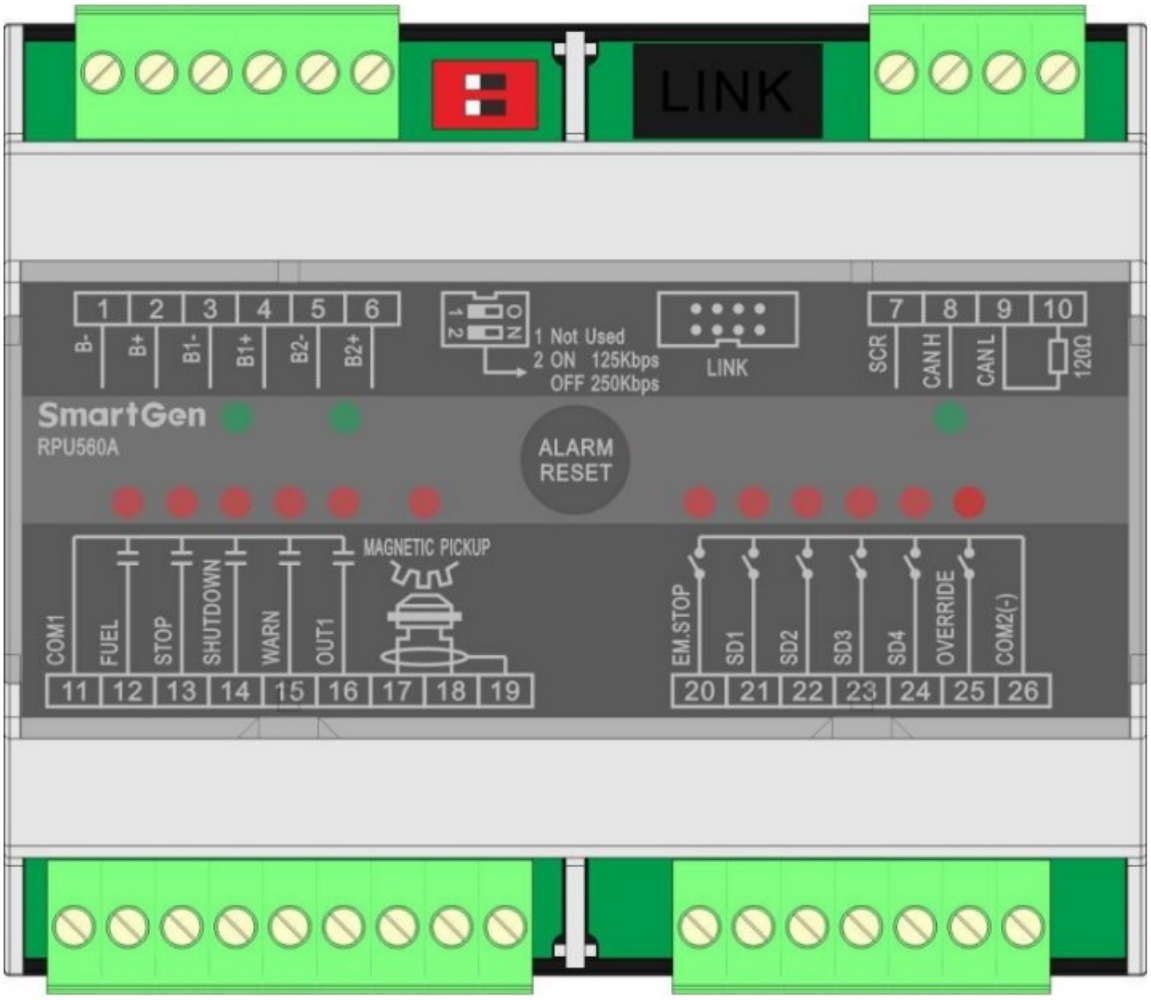

Fig.1 – Terminal Description Drawing

Table 8 – Terminal Description

Terminal	Function	Cable Size	Description
1.	B-	2.5mm2	Power supply negative input.
2.	B+	2.5mm2	Power supply positive input.
3.	B1-	2.5mm2	1# power supply negative input.
4.	B1+	2.5mm2	1# power supply positive output
5.	B2-	2.5mm2	2# power supply negative input.
6.	B2+	2.5mm2	2# power supply positive input.
7.	SCR (CANBUS)	0.5mm2	A CANBUS port which communicate with main control. Impedance-120Ω shielded wire with its one end connected to SCR is recommended.
8.	CAN(H) (CANBUS)	0.5mm2	
9.	CAN(L) (CANBUS)	0.5mm2	
10	120Ω	0.5mm2	
11.	COM1	2.5mm2	Common output port
12.	FUEL	1.0mm2	Output as working indication when the module detects engine speed exceeded preset “fuel output speed”, deactivate when shutdown, and possess break wire detection function.
13.	STOP	1.0mm2	Output when the module detects a warning alarm, connect to shutdown electromagnet, and possess break wire detection function.
14.	SHUTDOWN	1.0mm2	Output when the module detects a warning alarm, alarm status will be locked to save, and it can be reset by pressing reset button.
15.	WARN	1.0mm2	Output when the module detects a warning alarm, the status will not be locked to save.
16.	OUT1	1.0mm2	It can be configured by users; output after it is energized.
17.	MAGNETIC PICK UP	0.5mm2	Speed sensor input with break wire detection function.
18.		0.5mm2	
19.		0.5mm2	

20.	EM.STOP	0.5mm2	Emergency shutdown input port (connect to COM2(-) to activate) Note: Break wire detection function can be configured; it need to connect COM2(-) port with a 10kΩ resistance.
21.	SD1	0.5mm2	Failure shutdown input port (connect to COM2(-) to activate) ; It can control engine to stop when it is active. Note: Break wire detection function can be configured; it need to connect COM2(-) port with a 10kΩ resistance
22.	SD2	0.5mm2	
23.	SD3	0.5mm2	
24.	SD4	0.5mm2	
25.	OVERRIDE	0.5mm2	Override mode (connect to COM2(-) to activate); In this mode, only Emergency shutdown and Over speed shutdown can stop the engine in case of main controller dea ctivate.
26.	COM2(-)	0.5mm2	Common input port
	ALARM RESET		Pressing this button can reset the alarm.
Note: When the communication of CAN and HMC9000/HMC6000 is normal, then CAN indicator will blink, other wise it will be distinguished.			

SYSTEM CONNECTION DIAGRAM

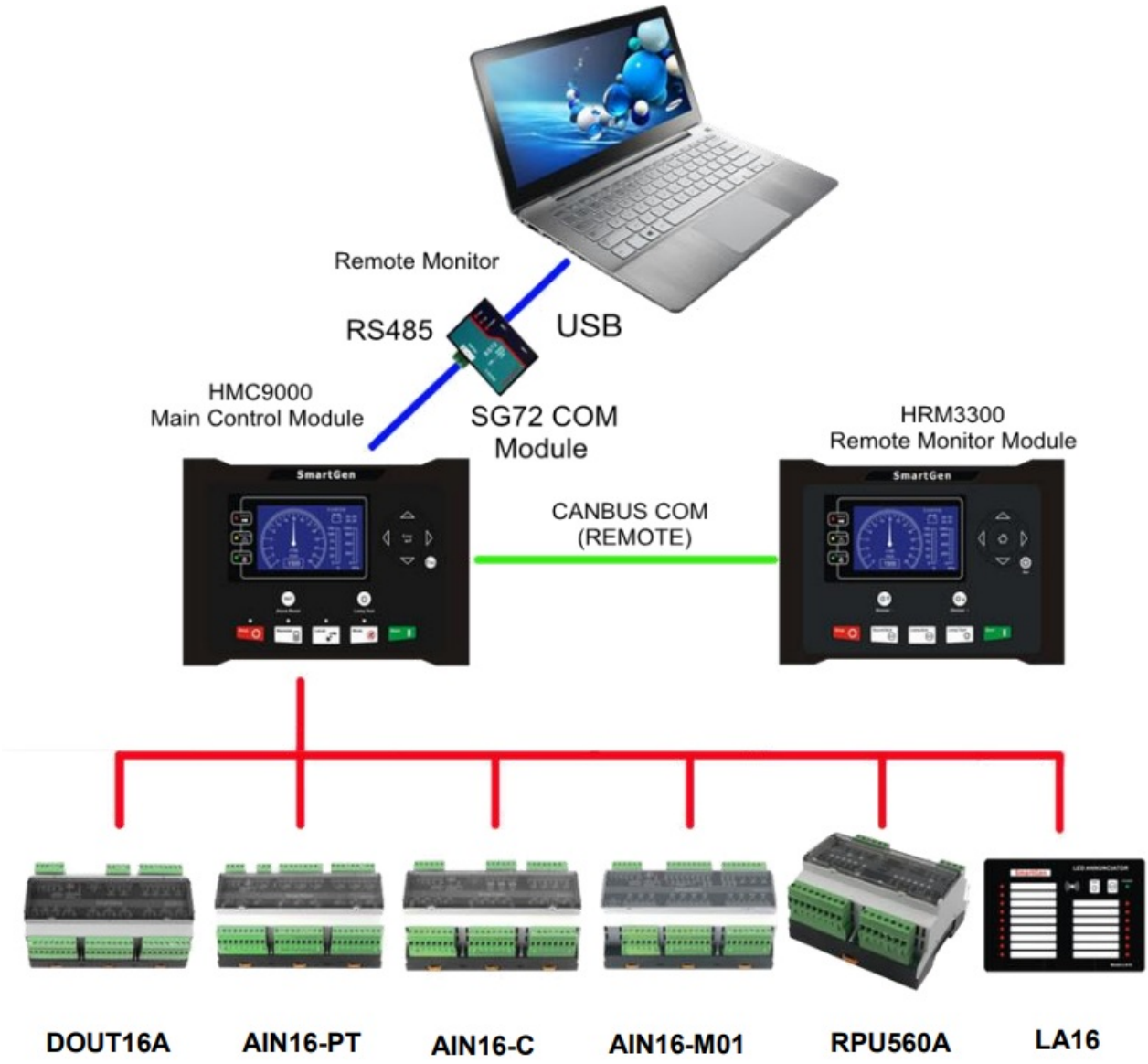

Fig.2 – System Connection Diagram

APPLICATION DIAGRAM

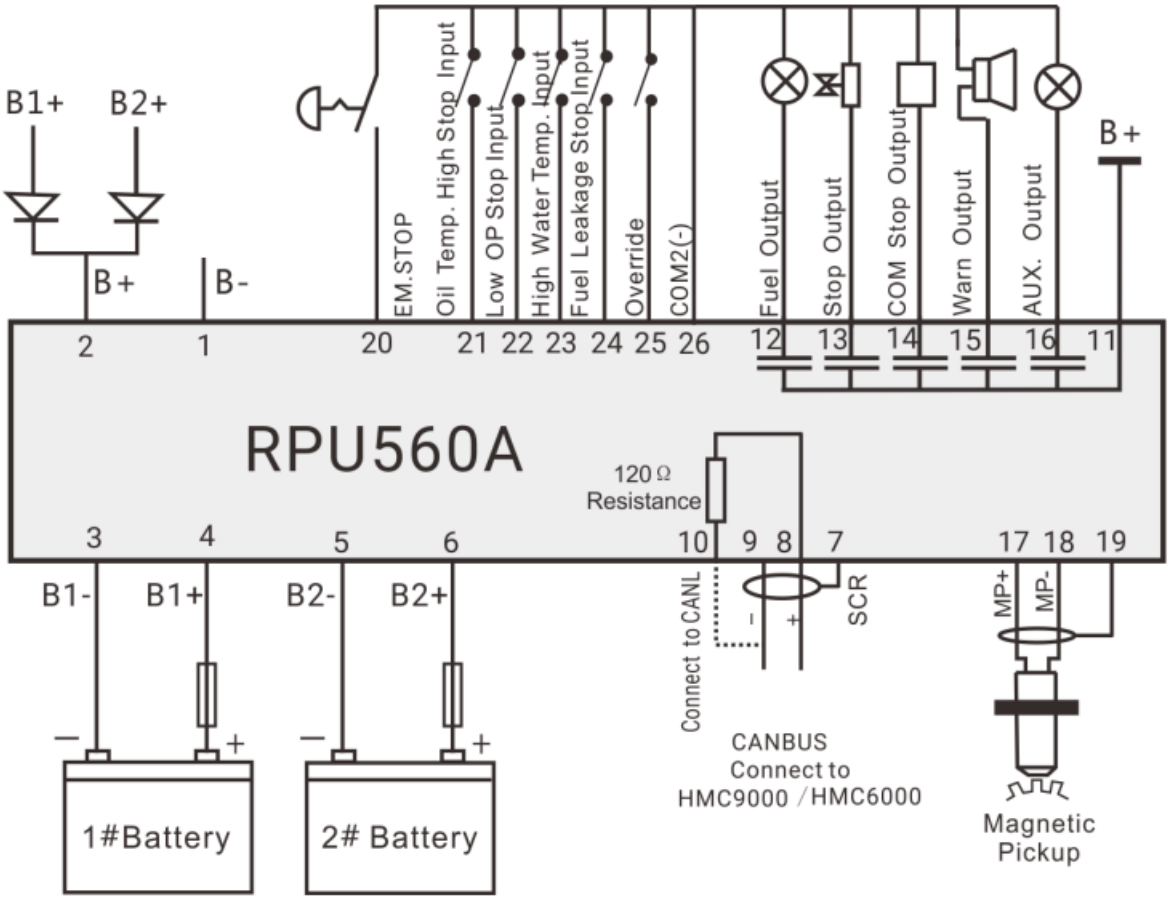

Fig.3 – Typical Application Diagram

INSTALLATION

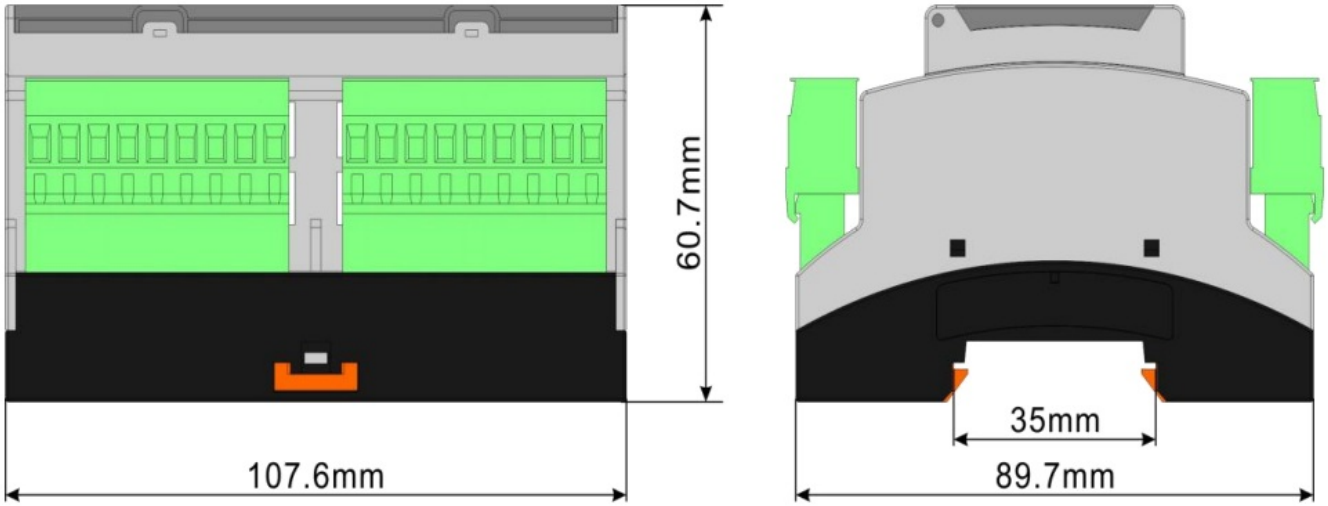

Fig.4 – Case Dimensions

TROUBLESHOOTING

Problem	Possible Solution
Controller no response with power.	Check start batteries; Check controller connection wirings;
CANBUS communication failure	Check if CANBUS wires are connected in the opposite way; Check if 120Ω resistance is connected; Check if Baud rate of the dial switch is correct.

Documents / Resources

	SmartGen RPU560A Marine Engine Controller [pdf] User Manual RPU560A Marine Engine Controller, RPU560A, Marine Engine Controller, Engine Controller, Controller

References

- 众智
- 众智