FPSS7950 PARALLEL GENSET CONTROLLER USER MANUAL

SHANGHAI FORTRUST POWER ELECTRIC CO., LTD

V1.0

CONTENTS

FOREWORD

Dear:

We are deeply honored that FPSS7950 controller can get your trust. In order to give you a general understanding of our company's products and facilitate your use, we have specially configured this user manual for you, including the performance and characteristics, specification, operation, protection instructions, wiring connection, parameter settings, trial operation, installation, fault finding, etc. Before use, please read the user manual carefully, which will be of great help for you to use the controller effectively. In addition, if you have any questions in the process of using, please call or write emails to inquire and we will try our best to help you.

NOTE: The parallel controller must must be powered by the battery. Direct power supply by built-in charging generators is strictly prohibited.

NOTE: If you have any question about the controller, please scan the PFSS Cloud Service QR code on the panel for more services.

NOTE: Do not use the emergency stop button except in emergency.

SHANGHAI FORTRUST POWER ELECTRIC CO., LTD

Table 1 Version History

DATE	VERSION	CONTENTS
2022/07/20	V1.0	Original release.

1 OVERVIEW

The FPSS7950 controller is a deeply integrated product, which simplifies user operation and saves installation time. It is used for manual/automatic parallel system of single or multiple gensets with the same capacity or different capacity, realizing automatic startup and shutdown/parallel operation, data measurement, alarm protection and "three remote" functions of gensets. It fits with LCD display, graphical data display and multi language display, which can accurately locate and find problems in case of corresponding faults. Customers can get the simplest operation in the most professional way to realize the fastest fault finding and maintenance.

The FPSS7950 controller has built-in intelligent charger, buzzer, emergency stop switch, power switch, featured function keys, and reserved installation holes of cloud module and electric governor. The powerful 32-bit microprocessor 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 all parameters can be configured by USB interface (or RS485) to adjust via PC. It can be widely used in all types of automatic genset control system with compact structure, advanced circuits, simple connections and high reliability.

The cloud module built in FPSS7950-4G controller can realize the genset to access the Internet. After logging in to the cloud server, the data information of the genset can be uploaded to the corresponding cloud server in real time. Users can monitor the genset in real time and query the operation status and historical records of the genset through mobile APP, computer and other terminal devices. At the same time, the controller's parameters can be configured through the cloud server, and you can also check the startup, alarm and other curves of the genset, which is convenient to understand the operation status of the genset.

2 PRODUCT MODULE

Table 2 Module Comparison

ITEM		FPSS7950T	FPSS7950T-R	FPSS7950T-R-4G	FPSS7950P-R	FPSS7950P-R-4G
LCD	Dimension	4.3"				
	Pixel	480 * 272				
BUS		●	●	●	●	●
Input Port		5	5	5	5	5
Output Port		8	8	8	7	7
Sensor Number		5	5	5	-	-
RS485		-	●	●	●	●
J1939		-	-	-	●	●

USB	●	●	●	●	●
Real-time Clock	●	●	●	●	●
Event Log	●	●	●	●	●
Cloud Module	-	-	●	-	●

NOTE:

1. Two of the outputs are fixed: start output and fuel output.
2. In FPSS7950T series, fuel output and idle output are led to the electric governor mounting hole by internal wiring, so they are not marked on the back cover.
3. FPSS7950 analog sensors are composed by 4 fixed sensors (water temperature, oil temperature, oil pressure, fuel level) .

3 PERFORMANCE AND CHARACTERISTICS

- With ARM-based 32-bit SCM, dual chip processing, high integration of hardware and accurate data, built-in cloud module.
- 480x272 LCD, more direct graphical data display, Chinese and English optional, which can be directly operated in the interface.
- Improved LCD wear-resistance and scratch resistance due to hard screen acrylic.
- Silicon panel and buttons for better operation in high/low temperature environment, effectively waterproof and oil proof and high elastic material button with better hand feel.
- RS485 communication port enables remote control, remote measuring, remote communication via ModBus protocol.
- Fitted with CANBUS port and can communicate with J1939 genset. Not only can you monitor frequently-used data (such as water temperature, oil pressure, engine speed and so on) of EFI machine, but also raising speed and speed droop via CANBUS port.
- Suitable for 3-phase 4-wire, 3-phase 3-wire, single phase 2-wire, and 2-phase 3-wire systems with voltage 120/240V and frequency 50/60Hz.
- Collects and shows 3-phase voltage, current, frequency and power parameter of Bus/Gens.
- The Bus has reverse phase sequence detection function, and the power generation has over-voltage, under-voltage, over-frequency, under-frequency, over-current, under power factor, over-voltage, reverse power, reverse phase sequence detection function.
- Protection: automatic start/stop of the genset, ATS (Auto Transfer Switch) control with perfect fault indication and protection function.
- Four fixed analog sensors (cooling water temperature, oil temperature, oil pressure, fuel level).
- More kinds of curves of temperature, oil pressure, fuel level can be used directly and users can define

the sensor curves by themselves.

- Precision measure and display parameters about Engine: temperature, oil pressure, fuel level, speed, battery voltage, charging mechanical voltage, cumulative startup time and startup times, etc.
- Parameter setting: parameters can be modified and stored in internal EEPROM memory and cannot be lost even in case of power outage; most of them can be adjusted using front panel of the controller and all of them can be modified using PC via USB or RS485 ports.
- Save 100 alarm history records to facilitate fault query and analysis.
- Internal real-time clock function is available, and users can calibrate themselves, and can also by cloud automatically.
- Accumulative total run time and total electric energy which make convenience to check the operation condition; with characteristic cloud service functions, the built-in cloud module can be selected to realize cloud data display, cloud start and stop , start curve and alarm curve, which is convenient for genset maintenance.
- All parameters used digital adjustment, simple use, more reliable and stable.
- Internal integrated charger, can be directly connected to the terminal.
- Integrated design, self-extinguishing ABS plastic shell, pluggable terminal, airborne installation, compact structure with easy installation, IP55 protection level.
- It can replace the control box product, with high cost performance, modular function design, and expandable and removable function module.
- The hardware is highly integrated, the harness interface is reserved, and the function expansion is more convenient and flexible, improving the installation efficiency and saving the installation time;
- Cabinet installation optional, cabinet color can be customized according to the genset color, beautiful appearance, easy operation.

4. QUICK USE

4.1 INSTALLATION

FPSS 7950 series controller supports airborne installation and cabinet installation.

- **Airborne Installation**

Overall dimensions and panel cutout dimensions are as follows:

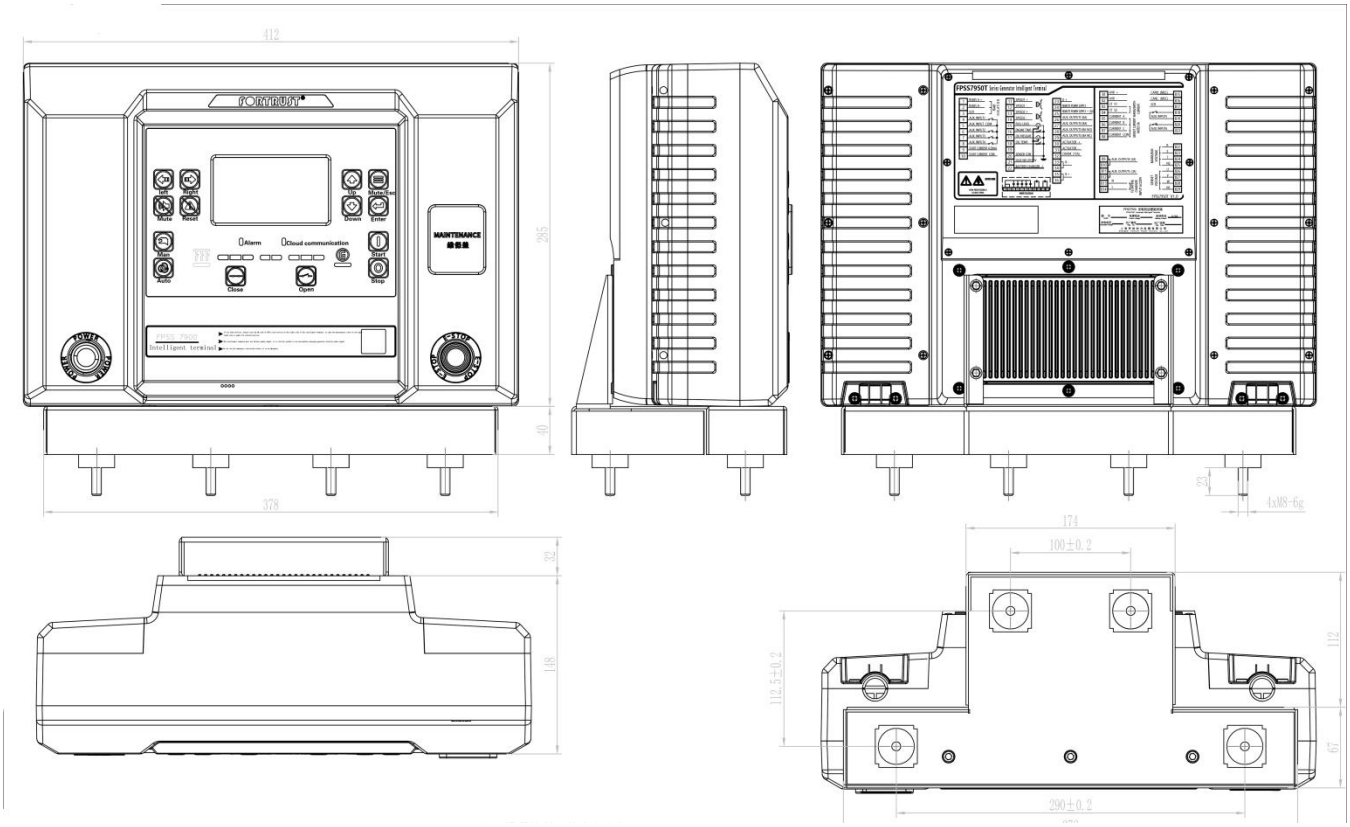


Fig. 1 Overall Dimensions and Panel Cutout

➢ Cabinet Installation

Cabinet color can be customized according to customer's requirement. Overall dimension is as follows:

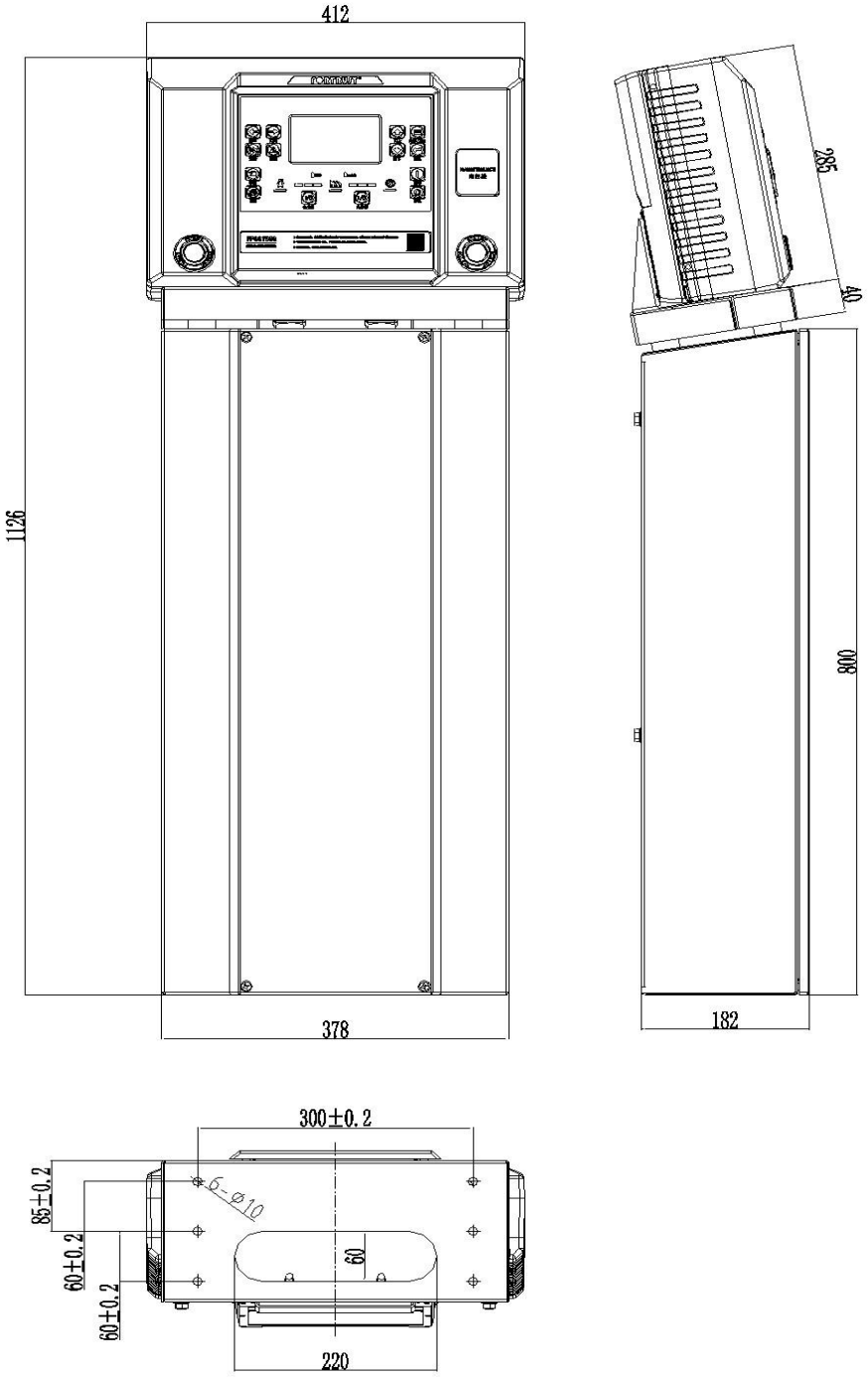


Fig2. Cabinet Overall Dimensions

4.2 PARAMATER SETTING

4.2.1 TECHNICAL AGREEMENT

Each parallel controller has a corresponding technical agreement, which provides the basis for the parameter setting of the parallel controller when it leaves the factory. The following figure shows a brief sketch of the product technical agreement. See Appendix I for more details.

	QRT	Product status agreement (FPSS7900 power service system)						No:		
	Change number							Fuchuang (City)1021-5A		
	1							2019/01/01 implement		
Customer name	Customer general				Customer order number/piece number					
Complete model set	FPSS7950T-R-4G				Operating voltage (V)	8-36V				
Customer model	Engine type:	Weichai electric adjustment general	Model of generator:		unknown			Application:	Generator set	
Customer customization	Boot interface:	Fu Chuang (default)	logo:	Fu Chuang (default)	Front Shell Mask:	Fu Chuang (default)		Back Cover Mask:	Fu Chuang (default)	
Control function configuration	Fuelsystem:	Electric control system	Electric modulation model:	C2002		Remarks:				
	Software program:	FPSS7950-M-V1.66.hex FPSS7950-S-V1.66.hex				Calibration program	FPD001-03-20220722-DTWC-200.TXT			
	Hardware version:	FPSS7950T-R-4G-00								
Cloud cat configuration	GSM/GPS (built-in)	☐ Private cloud ■ Public cloud	IP address:	121.199.25.046 (Fuchuang)		Port number:	50159 (Fuchuang)	APN:	CMET CMET	
Control drive parameters (total current output must not exceed 15A)	name		Back cover stitching	Set up outlet	Output current (A)	Output form (V)	polarity	External expansion drive	supplier	Model number
	■	Start output	32#	fix	15	+	Normally open		customer	
	■	Fuel output	Internal wiring	fix		+	Normally open		customer	
	■	D+ output	23#	fix		Instant excitation +	Normally open		customer	
	■	High and low speed	Internal wiring	fix			Normally closed		customer	
	☐	Standby output 1	26#	Outlet 1	8	-	Normally open		customer	
	☐	Standby output 2	27#	Outlet 2	8	+	Normally open		customer	
	☐	Standby output 3	28#29#	Outlet 3	8	+	Normally open		customer	
	■	Generator	B9#B10#	Outlet 4	2	passive				
Customer name	Customer general				Customer order number/piece number					
Complete model set	FPSS7950T-R-4G				Operating voltage (V)	8-36V				
Customer model	Engine type:	Weichai electric adjustment general	Model of generator:		unknown			Application:	Generator set	
mark	Number of places	Change number	signature	date	mark	Number of places	Change number	signature		date
establishment		audit		Inventory code		158516745				
proofread		approve		Page FPD001-03		FPSS7950T-R-4G				

Fig.3 Technical Agreement

4.2.2 CLOUD SETTING

If there is no on-site technical personnel to adjust parallel controller parameters, you can scan the QR code at the lower left of the panel to apply for service. After being accepted by the cloud terminal, remote modification can be performed on the cloud terminal to solve onsite problems quickly with

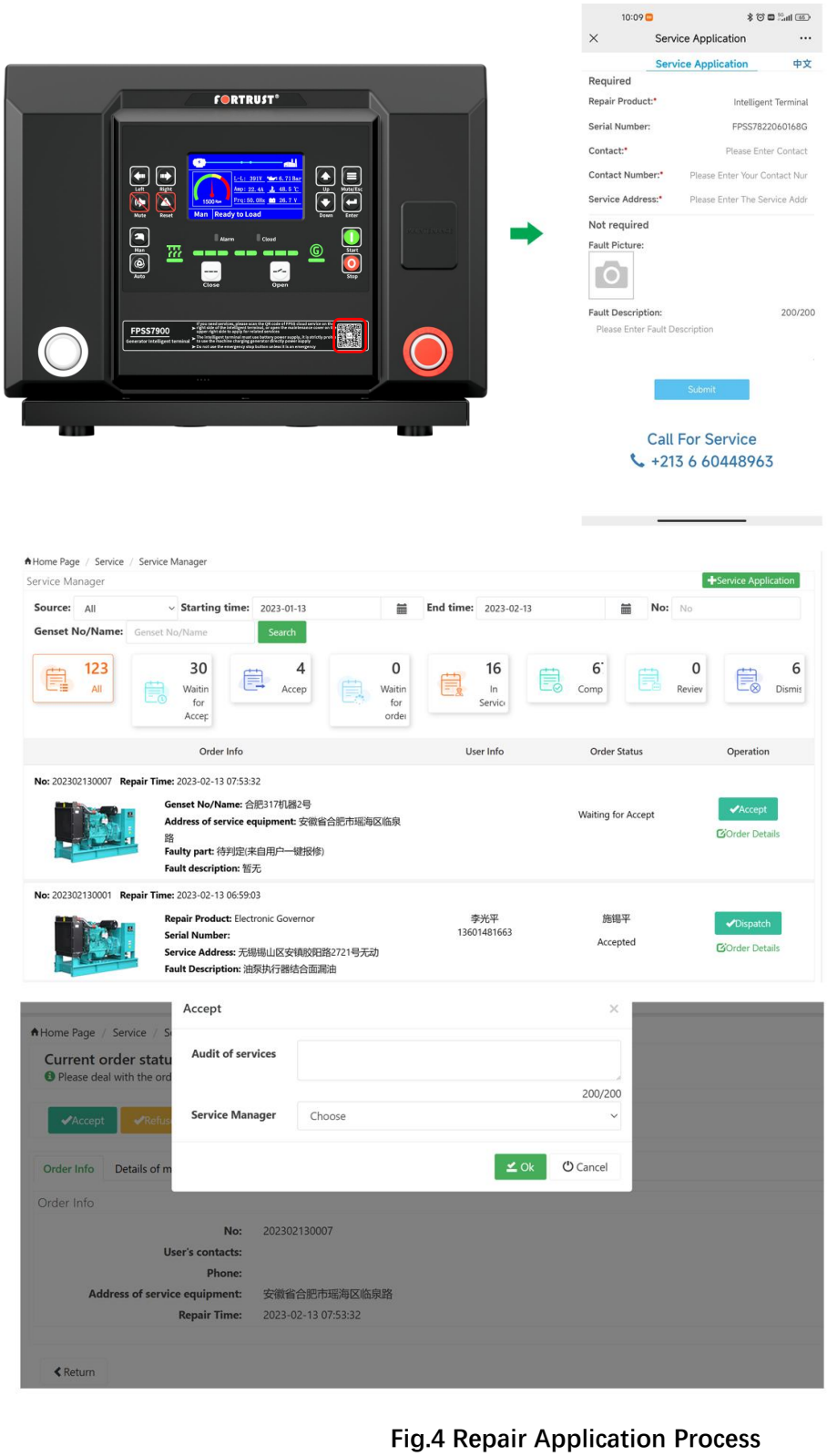


Fig.4 Repair Application Process

4.3 TYPICAL APPLICATION WIRING DIAGRAM

4.3.1 PARALLEL NON-EFI TYPICAL APPLICATION WIRING DIAGRAM

This scheme is applied to parallel automatic startup scenario. In the case of non-EFI gensets, it can be built according to this typical application diagram. Compared with the general scheme, the scheme with FPSS7950 controller has the following advantages:

- The controller is of integrated design, reducing external wiring and connection points; The power supply has its own fuse to reduce external corresponding lines; With 5V power supply, it meets the power supply of precision sensors, so it does not need 5V voltage module; The emergency stop has its own process connection point to reduce the merging of terminals; It is equipped with multiple GND grounding points to reduce peripheral paralleling; Improve the overall manufacturability and contact reliability.
- Total five groups of sensor input; The control system can expand the measurement and acquisition of maintenance data.
- Integrated the measurement of cloud module, floating charging current and electromagnetic actuator current.

Please refer to Annex II. Parallel non-EFI typical application diagram for more details.

4.3.2 PARALLEL EFI TYPICAL APPLICATION WIRING DIAGRAM

This scheme is applied to parallel automatic startup scenario. In the case of EFI gensets, it can be built according to this typical application diagram. Compared with the general scheme, the scheme with FPSS7950 controller has the following advantages:

- The controller is of integrated design, reducing external wiring and connection points; The power supply has its own fuse to reduce external corresponding lines; With 5V power supply, it meets the power supply of precision sensors, so it does not need 5V voltage module; The emergency stop has its own process connection point to reduce the merging of terminals; It is equipped with multiple GND grounding points to reduce peripheral paralleling; Improve the overall manufacturability and contact reliability.
- Integrated the measurement of cloud module, floating charging current.

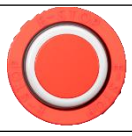
Please refer to Annex II. parallel EFI typical application diagram for more details.

5 OPERATION

5.1 KEY FUNCTION DESCRIPTION

Table 3 Key Function Description

Icon	Button	Description
	Start	Start genset in Manual mode.
	Stop	Stop running generator in Manual mode. During stopping process, press this button again to stop generator immediately.
	Auto Mode	Press this key to place the controller in automatic mode. In automatic mode, the controller can automatically control the genset. For example, when one of the switch input or dispatch is valid, the genset will automatically run and synchronize . After the synchronization is successful, the load switch will be closed. When the start signal is removed, the controller will automatically execute the shutdown process.
	Manual Mode	Press this key and controller enters in Manual mode. In manual mode, the controller starts the genset without load by the start button.
	Mute	Press this key to mute the alarm buzzer and invalid buzzer output.
	Reset	Press this key to clear and remove the triggered alarm.
	Close	Close breaker in manual mode.
	Open	Open breaker in manual mode.
	Menu/ Return	Press this key and enter 1921 to enter the parameter setting screen. Press this key again to return to the previous level of content.

Icon	Button	Description
	Up/Increase	1) Screen scroll; 2) Up cursor and increase value in setting menu.
	Down/Decrease	1) Screen scroll; 2) Down cursor and decrease value in setting menu.
	Left	1) Page scroll; 2) Left move cursor in setting menu.
	Right	1) Page scroll; 2) Right move cursor in setting menu.
	Confirm	Confirm the information in the setting.
	EM-Start	When the controller fails, press this key will force the output to start, and release this key to disconnect the output.
	Maintenance	Pressing this key to collect the data curve when it is pressed and upload it to the cloud. (This function needs to be configured with a cloud module before it can be used normally)
	Override	Except for overs-peed alarm shutdown, other alarm will only alarm and not shutdown.
	Cloud Service	Press this key into the cloud service operation page. (This function needs to be configured with a cloud module before it can be used normally.)
	Power	Press this key to supply power to the entire controller so that it can work normally.
	EM-Stop	Press this key to make an emergency stop of the genset.

5.2 PANEL LAYOUT

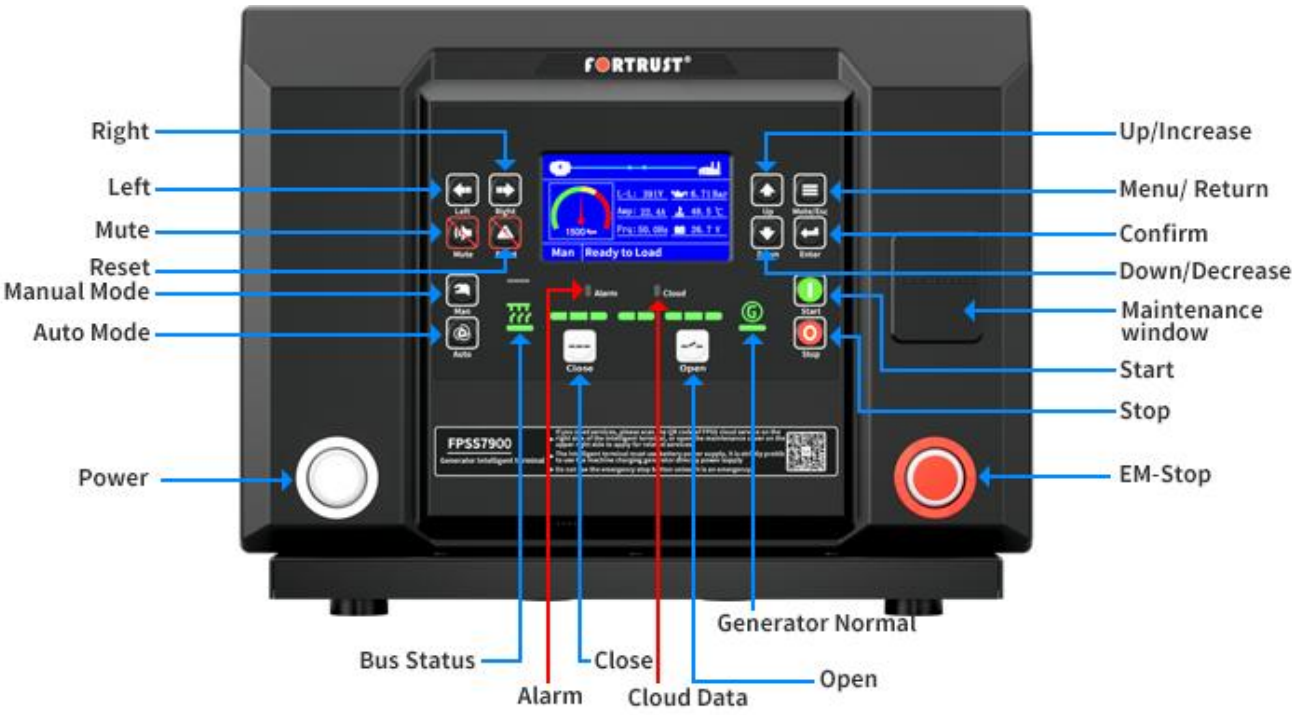


Fig.5 Panel Layout

Table 4 Indicator Description

Indicator	Description
Bus Status	It is green on when Bus is normal; red when Bus is abnormal; off when there is no Bus.
Alarm	Flashing when there is an alarm and is not muted; light on after muting; off when there is no alarm.
Cloud Data	Flashing when communication with the cloud module; off when no communication.
Generator Normal	It is green on when generator is normal; red when generator state is abnormal; off when there is no generator power.

5.3 AUTO START/STOP OPERATION

Auto mode is selected by pressing the  button; a LED beside the button will illuminate to confirm the operation.

Automatic Start Sequence：

1) When "Remote Start" is active, "Start Delay" timer is initiated;
2) "Start Delay" countdown will be displayed on LCD;
3) When start delay is over, preheat relay energizes (if configured), "preheat delay XX s" information will be

displayed on LCD;

4) After the above delay, the Fuel Relay (if configured) is energized, and then XX second later, the Start Relay is engaged. The engine is cranked for a pre-set time. If the engine 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.
5) If this start sequence continue beyond the set number of attempts, the start sequence will be terminated, and Fail to Start fault will be displayed on LCD alarm page.
6) In case of successful crank attempt, "idle warming up" delay is initiated.
7) During "idle warming up" delay, under speed, under frequency, under voltage alarms are inhibited. When this delay is over, "speed output XX s" is initiated (if configured).
8) If the rated speed is reached within "speed output XX s", then "Speed warming up Delay" is initiated (if configured); If no, the controller will send "Fail to Stop" alarm.
9) If the number of online intelligent terminals on the communication network is one, when the Speed warming up delay ends, if the genset reaches the operating speed, the generator status icon will be on; when the generator voltage and frequency meet the load requirements, the generator closing relay will output, the generator set is loaded, the closing switch and the Bus icon will be on, and the generator set will enter the normal operation state; If the voltage or frequency of the generator set is abnormal, the intelligent terminal will alarm and shut down, and the power generation status indicator will light red.
10) If the number of online intelligent terminals on the communication network is more than one, when the speed warming up delay ends:

a. If the system Bus has no voltage signal, send a closing signal to the other units to be paralleled, and then power closing relay output to avoid other units closing at the same time.

b. If the system Bus has voltage or other gensets have been closed, the intelligent terminal will control the GOV speed regulation and AVR voltage regulation to achieve synchronization between the genset and the Bus. When the synchronization conditions are met, it will send a closing signal to merge the genset into the Bus. Once the genset is integrated into the Bus, the intelligent terminal will control the engine to gradually increase the throttle and other paralleled gensets to share the load.

Automatic Stop Sequence:

1) When the "Remote Start" signal is removed, the Stop Delay is initiated;
2) Once this "stop delay" has expired, the intelligent terminal will control the genset to gradually transfer the load to other gensets, and then send the opening signal to start the speed cooling delay. In the process of speed cooling delay, if the remote startup signal is valid again, the intelligent terminal will enter the parallel status again. When the speed cooling delay is expired, "idle cooling delay"is initiated;
3) "ETS Solenoid Hold" begins, ETS relay is energized while fuel relay is de-energized, complete stop is detected automatically; If the stop requirements don't been met during "ETS Solenoid Hold", the controller will send a "fail to stop" alarm;
4) When the genset stops, "After stop" delay is initiated;
5) Generator is placed into its standby mode after its "After stop" delay.

5.4 MANUAL START/STOP OPERATION

Manual mode is selected by pressing the  button; a LED besides the button will illuminate to confirm the operation.

Manual Start Sequence：

1) Press the  button，“Start Delay” begins；
2) “Start Delay” countdown will be displayed on LCD;
3) When start delay is over, preheat relay energizes (if configured), “preheat delay XX s” information will be displayed on LCD;
4) After the above delay, the Fuel Relay (if configured) is energized, and then XX second later, the Start Relay is engaged. The engine is cranked for a pre-set time. If the engine fails to fire during this cranking attempt then the fuel relay and start relay are disengaged for the pre-set rest period; then manual startup.
5) If this start sequence continue beyond the set number of attempts, the start sequence will be terminated, and Fail to Start fault will be displayed on LCD alarm page.
6) In case of successful crank attempt, “idle warming up” delay is initiated.
7) During “idle warming up” delay, under speed, under frequency, under voltage alarms are inhibited. When this delay is over, “speed output XX s” is initiated (if configured).
8) If the rated speed is reached within "speed output XX s", then "Speed Cooling Delay" is initiated (if configured); If no, the controller will send “Fail to Stop” alarm.
9) After the “speed warming up” delay, if generator status is normal, its indicator will be illuminated. If generator voltage and frequency have reached on-load requirements, then the generator close relay will be energized; genset will take load; generator power indicator will illuminate and generator will enter into Normal Running status. If voltage or frequency is abnormal, the controller will initiate shutdown alarm and generator power indicator will be red.

Manual Stop Sequence：

1) Press the  button，the Stop Delay is initiated;
2) Once this “stop delay” has expired, the intelligent terminal will control the genset to gradually transfer the load to other gensets, and then send the opening signal to start the speed cooling delay. In the process of speed cooling delay, if the remote startup signal is valid again, the intelligent terminal will enter the parallel status again. When the speed cooling delay is expired, “idle cooling delay”is initiated;
3) “ETS Solenoid Hold” begins, ETS relay is energized while fuel relay is de-energized, complete stop is detected automatically; If the stop requirements don’t been met during “ETS Solenoid Hold”, the controller will send a “fail to stop” alarm;
4) When the genset stops, “After stop” delay is initiated;
5) Generator is placed into its standby mode after its “After stop” delay.

5.5 EMERGENCY START OPERATION

When the controller fails, press the EM-START 紧急启动 button to skip the controller and directly start the output. At this time, the starter is controlled by the operator. When the operator observes that the genset has been started successfully, after releasing the EM-START 紧急启动 button, the output will stop.

6 SWITCH CONTROL PROCEDURES

6.1 MANUAL CONTROL PROCEDURE

When controller is in Manual moe, the switch control procedures will start through manual transfer procedures. Users can control the loading transfer of ATS via pressing button to switch on or off.

Closing operation: When the generator work normally and generator voltage and frequency have reached on-load requirements, then Press the I/O button;

a. If the system Bus has no voltage signal, send a closing signal to the other units to be paralleled, and then power closing relay output to avoid other gensets closing at the same time.
b. If the system Bus has voltage or other gensets have been closed, the intelligent terminal will control the GOV speed regulation and AVR voltage regulation to achieve synchronization between the genset and the Bus. When the synchronization conditions are met, it will send a closing signal to merge the genset into the Bus. Once the genset is integrated into the Bus, the intelligent terminal will control the engine to gradually increase the throttle and other paralleled gensets to share the load.

Opening operation: Press the I/O button;

c. If the number of closing intelligent terminals on the communication network is one, the opening signal will be sent directly;
d. If the number of closing intelligent terminals on the communication network is more than one, the intelligent terminal will first transfer the load to other gensets, and then send the opening signal.

6.2 AUTO CONTROL PROCEDURE

When controller is in auto mode, the switch control procedure is automatic control procedure.

Note: The power generation closing feedback input must be configured in the input port and correctly wired.

7 WIRING CONNECTION

7.1 FPSS7950T SERIES

FPSS7950T series controller back panel is as following:

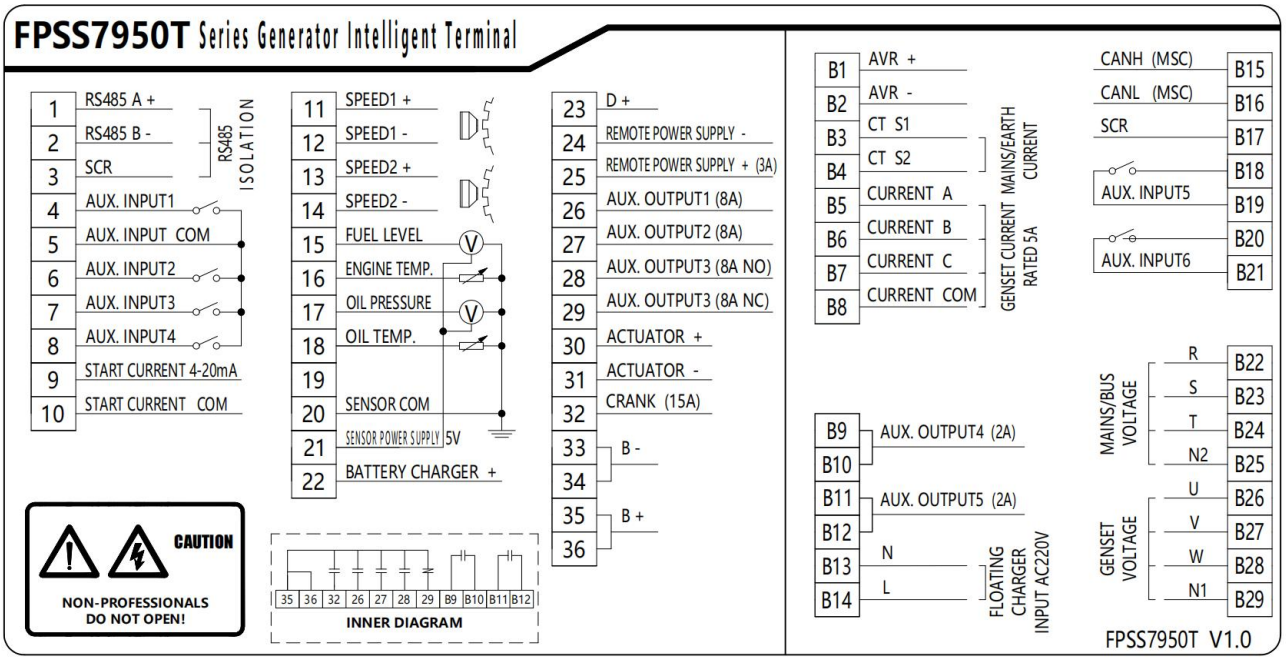


Fig.6 FPSS7950T Back Panel

Table 5 Terminal Connection Description

No.	Functions	Cable Size	Remark
Left			
1	RS485 A+	0.5mm²	Impedance-120 shielding wire is recommended
2	RS485 B-	0.5mm²	
3	Shield		
4	Aux. input 1	1.0mm²	Default:remote auto startup. Ground connected is active (B-)
5	Input COM GND	1.0mm²	Aux. Input COM
6	Aux. input 2	1.0mm²	Default: under oil pressure shutdown digital input. Ground connected is active (B-)
7	Aux. input 3	1.0mm²	Default: over water temperature shutdown digital input. Ground connected is active (B-)
8	Aux. input 4	1.0mm²	Default: under fuel level shutdown digital input.Ground connected is active (B-)
9	Crank Current 4 - 20 mA	1.0mm²	Connect to current sensor
10	Crank Current COM GND	1.0mm²	Connect to current sensor GND

No.	Functions	Cable Size	Remark
11	GOV +	1.0mm²	Connect to GOV sensor +
12	GOV -	1.0mm²	Connect to GOV sensor –
13	Controller speed +	1.0mm²	Connect to the controller to detect the speed+
14	Controller speed -	1.0mm²	Connect to the controller to detect the speed -
15	Fuel Level	1.0mm²	Connect to fuel level sensor
16	Water Temp.	1.0mm²	Connect to water temperature sensor
17	Oil Pressure	1.0mm²	Connect to oil pressure sensor
18	Oil Temp.	1.0mm²	Connect to oil temperature sensor
19	Reserved		
20	Sensor COM GND	1.0mm²	A public terminal of sensor
21	Sensor Supply 5V	1.0mm²	Output DC+5V，rated 200mA
22	Charger Output	2.5mm²	12V charger: charging current range 4A-6A, error ±2%, factory charging current 6A, maximum output power 85W, minimum output voltage 7.5V, no-load output voltage 13.8V, error ±1%, no-load energy consumption < 3W 24V charger: charging current range 2A-3A, error ±2%, factory charging current 3A, maximum output power 85W, minimum output voltage 7.5V, no-load output voltage 27.6V, error ±1%, no-load energy consumption < 3W
23	Excitation Output D+	1.0mm²	Connect the charging generator D+(WL) terminal
24	Remote Supply Negative	2.5mm²	Connect to remote supply negative
25	Remote Supply Positive	2.5mm²	Connect to remote supply positive
26	Aux. output 1	1.5mm²	B+ is supplied by power positive, rated 8A
27	Aux. output 2	1.5mm²	B+ is supplied by power positive, rated 8A
28	Aux. output 3（NO）	1.5mm²	B+ is supplied by power positive, rated 8A
29	Aux. output 3（NC）	1.5mm²	B+ is supplied by power positive, rated 8A
30	Actuator +	1.0mm²	Connect to actuator +
31	Actuator -	1.0mm²	Connect to actuator -
32	Crank Output	1.5mm²	B+ is supplied by EM shutdown, rated 16A
33	DC Input B-	2.5mm²	Connect to crank battery negative
34			
35	DC Input B+	2.5mm²	Connect to crank battery positive
36			
Right			
B1	AVR +	1.0mm²	Shielding line is recommended. Shielding layer connect to earth at AVR end.
B2	AVR -	1.0mm²	
B3	Mains/zero sequence CT S1	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)

No.	Functions	Cable Size	Remark
B4	Mains/zero sequence CT S1 S2	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B5	A phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A))
B6	B phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B7	C phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B8	CT COM	1.5mm²	Outside connected to common line of secondary coil of current transformer
B9	Aux. Output 4	1.5mm²	Default: Gen closing output. Normally open passive outputs, rated 8A
B10			
B11	Aux. Output 5	1.5mm²	Default: Mains closing output. Normally open passive outputs, rated 8A
B12			
B13	Charger Input N	1.0mm²	Standard operating voltage range AC 100 ~ 250V, maximum allowable operating voltage range AC 90 ~ 280V, frequency 50Hz/60Hz, maximum input current 2A.
B14	Charger Input L	1.0mm²	
B15	Parallel CAN H	0.5mm²	Impedance-120 Ωshielding wire is recommended
B16	Parallel CAN L	0.5mm²	
B17	Shield		
B18	Aux. Input 5	1.0mm²	Default: Gen closing feedback digital input. Ground connected is active (B-)
B19			
B20	Aux. Input 6	1.0mm²	Default: Mains closing feedback digital input. Ground connected is active (B-)
B21			
B22	Mains/ Bus R-phase Voltage	1.0mm²	Connect to R-phase of Mains/Bus (2A fuse is recommended)
B23	Mains/ Bus S-phase Voltage	1.0mm²	Connect to S-phase of Mains/Bus (2A fuse is recommended)
B24	Mains/ Bus T-phase Voltage	1.0mm²	Connect to T-phase of Mains/Bus (2A fuse is recommended)
B25	Mains/ Bus N2-phase Voltage	1.0mm²	Connect to N-phase of Mains/Bus
B26	Gen-set U-phase Voltage	1.0mm²	Connect to U-phase of gen-set (2A fuse is recommended)
B27	Gen-set V-phase Voltage	1.0mm²	Connect to V-phase of gen-set (2A fuse is recommended)
B28	Gen-set W-phase Voltage	1.0mm²	Connect to W-phase of gen-set (2A fuse is recommended)
B29	Gen-set N1-phase Voltage	1.0mm²	Connect to N-phase of gen-set

7.2 FPSS7950P SERIES

FPSS7950P series controller back panel is as following:

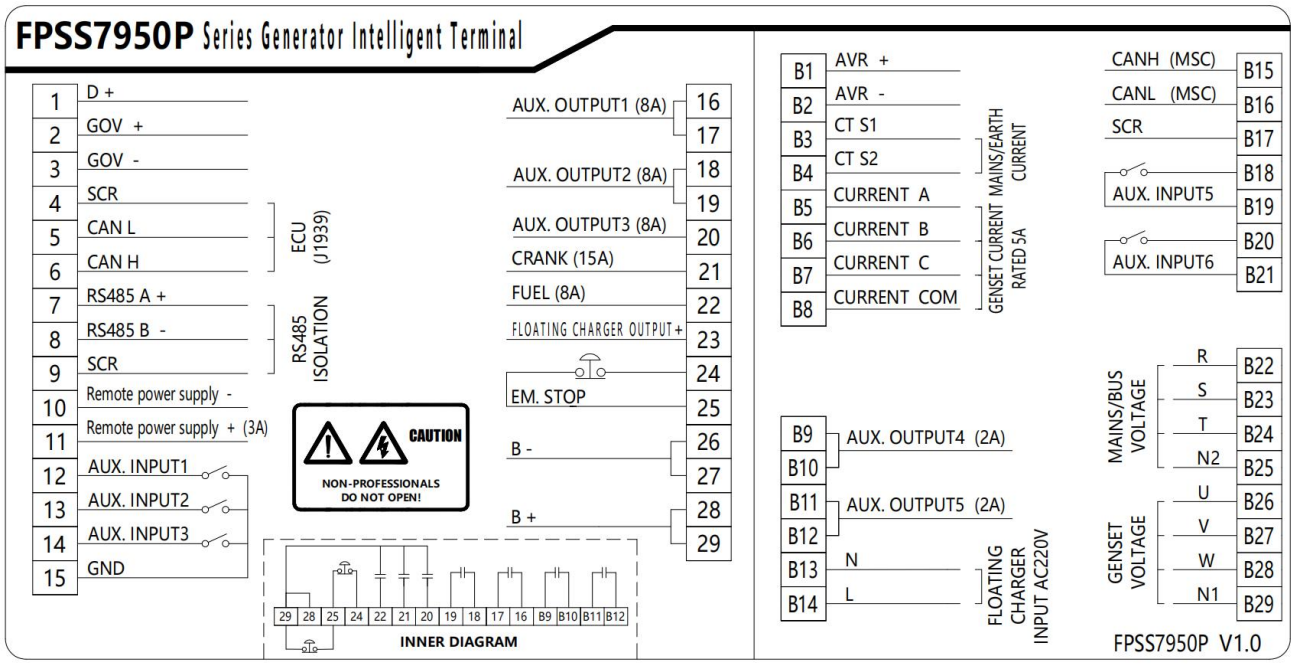


Fig.7 FPSS7950T Back Panel

Table 6 Terminal Connection Description

No.	Functions	Cable Size	Remark
Left			
1	Excitation Output D+	1.0mm²	Connect the charging generator D+(WL) terminal
2	GOV +	1.0mm²	Shielding line is recommended. Shielding layer connect to earth at GOV end.
3	GOV -	1.0mm²	
4	Shield		Impedance-120Ω shielding wire is recommended
5	ECU CAN L	0.5mm²	
6	ECU CAN H	0.5mm²	
7	RS485 A+	0.5mm²	Impedance-120Ω shielding wire is recommended
8	RS485 B-	0.5mm²	
9	Shield		
10	Remote Supply Negative	2.5mm²	Connect to remote supply negative
11	Remote Supply Positive	2.5mm²	Connect to remote supply positive
12	Aux. Input 1	1.0mm²	Default:remote auto startup. Ground connected is active (B-)
13	Aux. Input 2	1.0mm²	Default: under fuel level shutdown digital input. Ground connected is active (B-)
14	Aux. Input 3	1.0mm²	Default: under water level shutdown

No.	Functions	Cable Size	Remark
			digital input.Ground connected is active (B-)
15	Input COM GND	1.0mm²	Aux. Input COM
16	Aux. output 1	1.5mm²	Default: idle/rated speed switching output. Normally open passive outputs, rated 8A
17			
18	Aux. output 2	1.5mm²	Default: pre-supply output. Normally open passive outputs, rated 8A
19			
20	Aux. output 3	1.5mm²	Default: Integrated alarm output. B+ is supplied by power positive, rated 8A
21	Crank Output	1.5mm²	B+ is supplied by EM shutdown, rated 16A
22	Fuel Output	1.5mm²	B+ is supplied by power positive, rated 8A
23	Charger Output	2.5mm²	12V charger: charging current range 4A-6A, error ±2%, factory charging current 6A, maximum output power 85W, minimum output voltage 7.5V, no-load output voltage 13.8V, error ±1%, no-load energy consumption < 3W 24V charger: charging current range 2A-3A, error ±2%, factory charging current 3A, maximum output power 85W, minimum output voltage 7.5V, no-load output voltage 27.6V, error ±1%, no-load energy consumption < 3W
24	Emergency stop	1.5mm²	Connect to external emergency shutdown switch
25			
26	DC Input B-	2.5mm²	Connect to crank battery negative
27			
28	DC Input B+	2.5mm²	Connect to crank battery positive
29			
Right			
B1	AVR +	1.0mm²	Shielding line is recommended. Shielding layer connect to earth at AVR end.
B2	AVR -	1.0mm²	
B3	Mains/zero sequence CT S1	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B4	Mains/zero sequence CT S1 S2	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B5	A phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A))
B6	B phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)

No.	Functions	Cable Size	Remark
B7	C phase Current	1.5mm²	Outside connected to secondary coil of current transformer (rated 5A)
B8	CT COM	1.5mm²	Outside connected to common line of secondary coil of current transformer
B9	Aux. Output 4	1.5mm²	Default: Gen closing output. Normally open passive outputs, rated 8A
B10			
B11	Aux. Output 5	1.5mm²	Default: Gen opening output. Normally open passive outputs, rated 8A
B12			
B13	Charger Input N	1.0mm²	Standard operating voltage range AC 100 ~ 250V, maximum allowable operating voltage range AC 90 ~ 280V, frequency 50Hz/60Hz, maximum input current 2A.
B14	Charger Input L	1.0mm²	
B15	Parallel CAN H	0.5mm²	Impedance-120Ω shielding wire is recommended
B16	Parallel CAN L	0.5mm²	
B17	Shield		
B18	Aux. Input 5	1.0mm²	Default: Gen closing feedback digital input. Ground connected is active (B-)
B19			
B20	Aux. Input 6	1.0mm²	Default: Mains closing feedback digital input. Ground connected is active (B-)
B21			
B22	Mains/ Bus R-phase Voltage	1.0mm²	Connect to R-phase of Mains/ Bus (2A fuse is recommended)
B23	Mains/ Bus S-phase Voltage	1.0mm²	Connect to S-phase of Mains/ Bus (2A fuse is recommended)
B24	Mains/ Bus T-phase Voltage	1.0mm²	Connect to T-phase of Mains/ Bus (2A fuse is recommended))
B25	Mains/ Bus N2-phase Voltage	1.0mm²	Connect to N-phase of Mains/ Bus
B26	Gen-set U-phase Voltage	1.0mm²	Connect to U-phase of gen-set (2A fuse is recommended)
B27	Gen-set V-phase Voltage	1.0mm²	Connect to V-phase of gen-set (2A fuse is recommended)
B28	Gen-set W-phase Voltage	1.0mm²	Connect to W-phase of gen-set (2A fuse is recommended)
B29	Gen-set N1-phase Voltage	1.0mm²	Connect to N-phase of gen-set

8 COMMISSIONING

8.1 PREPARATION

1) Check the brand and model of the engine. When using an EFI engine, you need to confirm whether the engine speed regulation function has been turned on. It is also necessary to confirm if the connection between the engine ECU and the intelligent terminal is correct.
2) When using a non-EFI engine, it is necessary to know the brand and model of the governor, the connection mode between the speed controller and the intelligent terminal, and the corresponding center point voltage and range voltage set in the intelligent terminal; AVR referring to the speed controller.
3) Check whether the fuel, oil and cooling water of the engine are normal and whether the battery power is sufficient.

8.2 STEP1-SINGLE GENSET DEBUGGING

1) Start the machine manually and check whether the engine and generator data are normal;
2) When the speed controller wiring is not connected, the genset shall operate at the rated frequency when the genset operates without load and not closing. If it is not at the rated frequency, adjust the speed controller;
3) When the speed controller wiring is connected and the genset operates without load and not closing, the percentage of speed regulation output of the intelligent terminal should be as close to 0% as possible after the genset reaches the rated frequency.
4) Increase the rated frequency of 2.5 Hz and start the genset. The genset should firstly run to 50 Hz corresponding to the center point, and then increase the speed to 52.5 Hz; Reduce the rated frequency of 2.5 Hz and start the genset. The genset should firstly run to 50 Hz of the center point, and then slow down to 47.5 Hz;
5) Increase the rated voltage by 10% to start the genset. The genset should firstly run to 230V corresponding to the center point, and then boost to 253V; Reduce the rated voltage by 10% and start the genset. The genset should firstly run to 230 V corresponding to the center point, and then reduce the voltage to 207 V.
6) After confirming the speed regulation and voltage regulation function, start the machine manually and check whether the circuit breaker switch is closed and opened normally.
7) Manually start the machine with load, observe whether the power factor, active power and reactive power are normal. If the power factor, active power and reactive power are abnormal, check the phase sequence of the generation voltage and current, the incoming direction of the current transformer, and the secondary current of the current transformer with the same terminal.
8) Start the machine manually and conduct the performance test of the genset according to the national standard.

8.3 STEP2-NO LOAD MANUAL PARALLEL

1) Check to ensure that all intelligent terminals have connected to the MSC communication wiring and communicate successfully. If the number of online devices detected is less than the number set, then there is a MSC communication failure. We need to determine the cause of the failure by connecting the

MSC one by one.

2) Start the genset, manually closing and parallel connection, observe whether the synchronous parallel connection of the genset is stable, and whether the closing impulse current is too large.
3) After the gensets are paralleled with no load, check whether the current display of the genset has a large circulating current.
4) After the gensets are paralleled at no load, check whether the output of active power and reactive power is zero. If not, observe whether there is power oscillation. If so, adjust the gain and stability value of power control appropriately, or adjust the gain and stability potentiometer on the engine GOV or generator AVR to make the active power and reactive power not oscillate, and the output display is close to zero;

8.4 STEP3-LOAD MANUAL PARALLEL

1) After manual parallel connection, carry out load test to check whether the active and reactive power distribution of each genset is uniform.
2) After manual parallel connection, soft loading test shall be conducted to observe whether there is very large overshoot or power oscillation during the loading process. If there is, the loading slope can be adjusted appropriately.
3) Perform soft unloading test after manual parallel loading; Observe whether the genset unloading reaches the minimum load percentage setting value and then opening.
4) After manual parallel connection, perform load sudden increase and sudden discharge test, and observe whether the genset has power oscillation.

9 CLOUD SERVICE DESCRIPTION

Note: This function is optional and the controller is not equipped with built-in cloud module by default.

9.1 GENSET REMOTE MONITORING

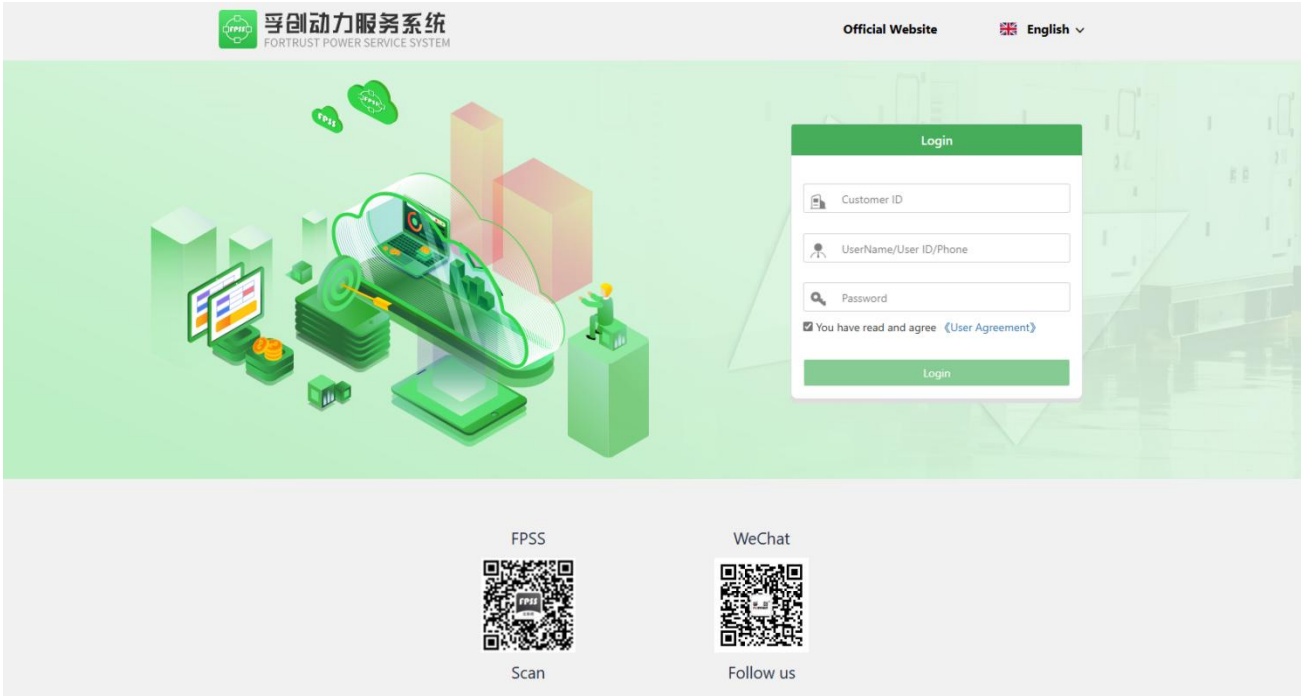


Fig.8 Cloud Login Page

If the FPSS7950 controller is equipped with a 4G cloud module, you can log in to the FPSS Fortrust Power Service System to monitor the equipment remotely. The monitoring content includes: real-time data, real-time status, remote control operations and other basic monitoring functions.

9.2 REMOTE PARAMETERS SETTING APPLICATION

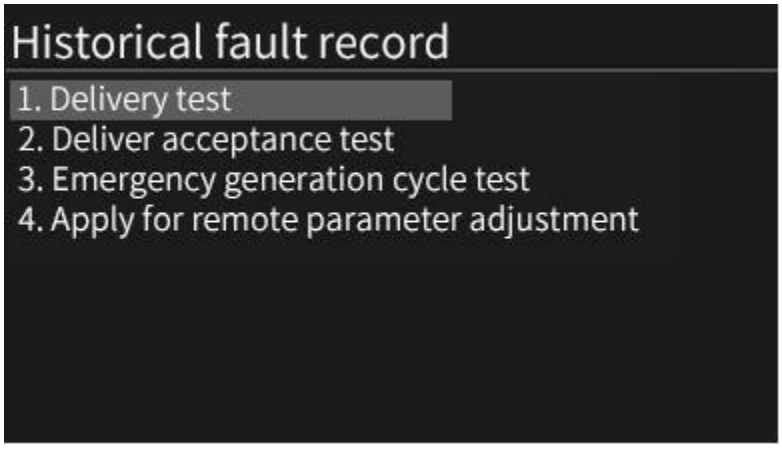


Fig.9 Controller Remote Parameter Setting Application

Press the CLOUD 云服务 button to enter the cloud service interface. When the controller is in the cloud service interface as shown in the figure, press the button to select up and down. When select " Remote Parameter Setting Application", press the button to confirm, and press the button to return.

After completing the above remote parameter setting, log in to the FPSS Power Service system and remotely adjust the parameters of controller in the "Remote Parameter Setting".

9.3 ONE-CLICK REPAIR

Press the MAINTE. 报修 button to enter the interface of one-click repair and start collecting repair data. The repair result will be displayed after completion, and press the button to return.

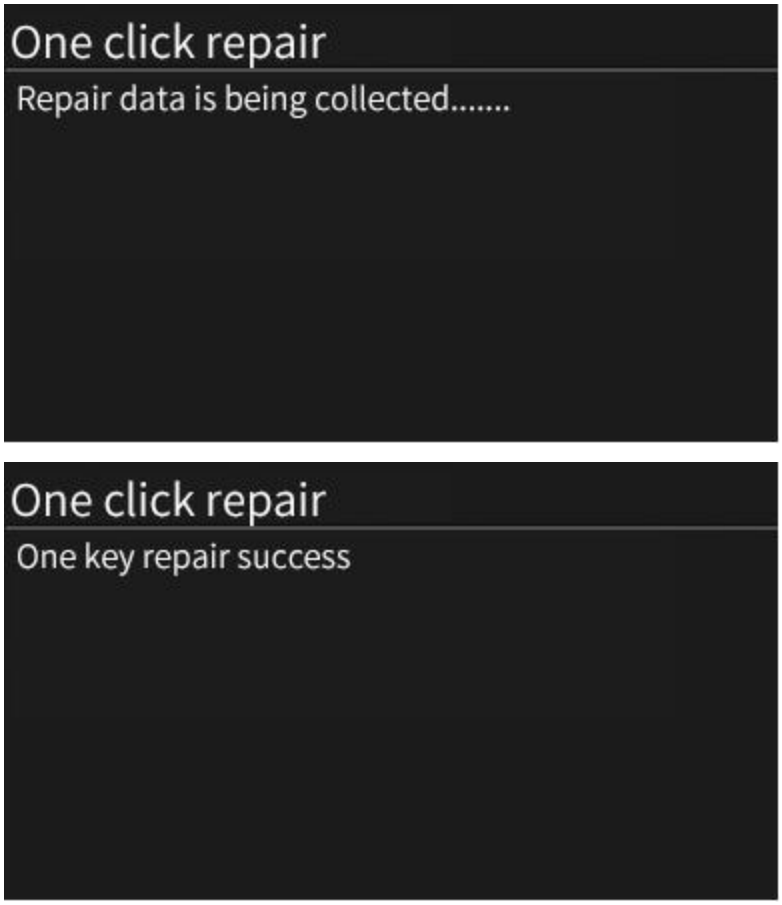


Fig.10 Controller One-click Repair

After the one-click repair report is completed, the controller will collect 0.1s data data of 5S before and after pressing the one-key repair report and upload it to the cloud. After log in the FPSS Power Service System, you can check the curve in the "One-Click Repair Record" in the "Genset Record".

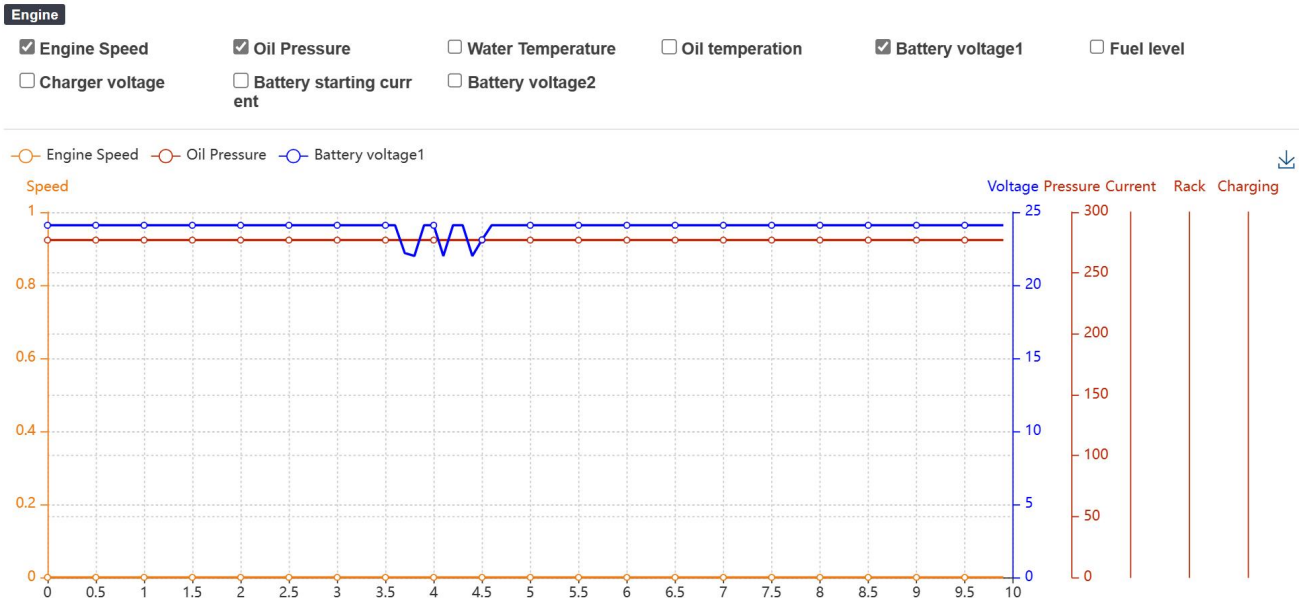


Fig.11 Engine Curve

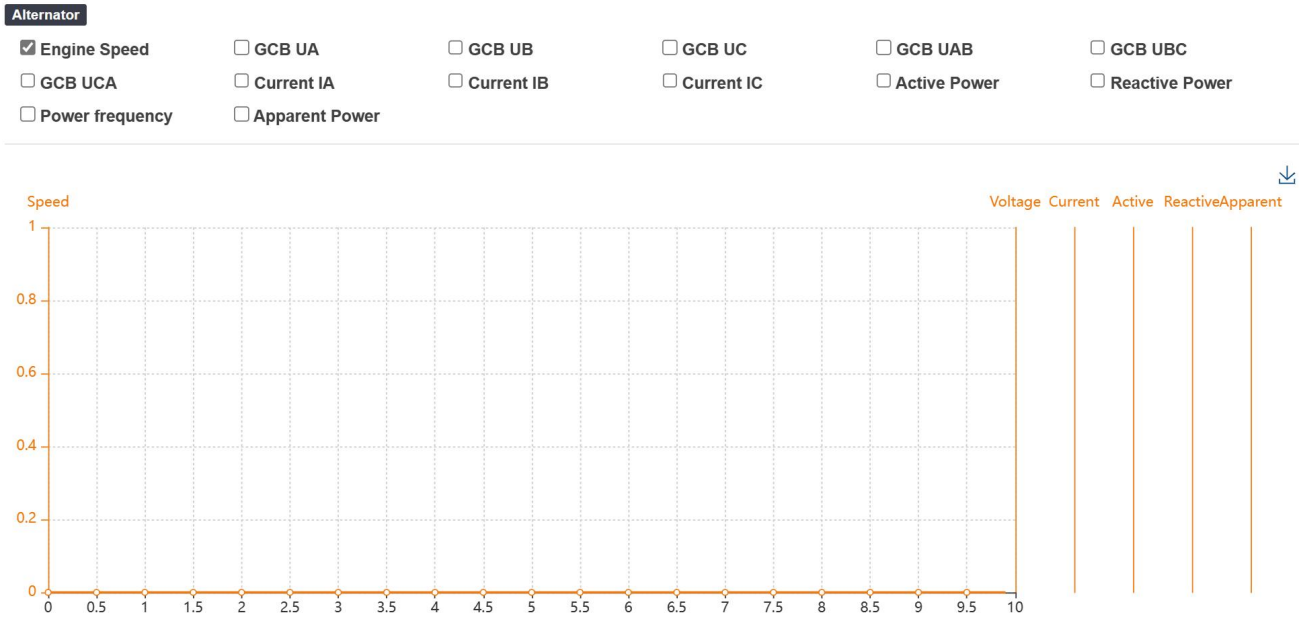


Fig.12 Generator Curve

9.4 STARTING CURVE

The FPSS7950 controller will collect the 0.1S startup data during each startup of the genset. After log

in the FPSS Power Service System, you can check the curve in "Startup Curve Record" in the "Genset Record".

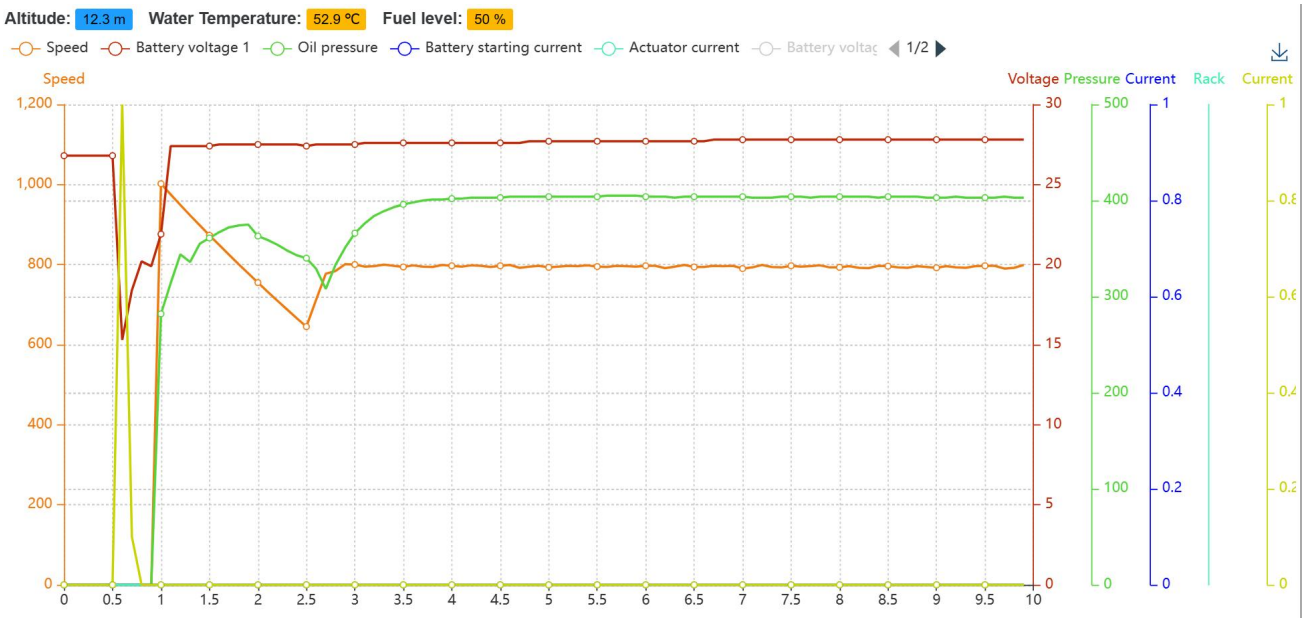


Fig.13 Starting Curve

9.5 ALARM CURVE

FPSS7950 controller will collect 0.1s alarm curve data in each failure during the operation of the genset. After log in the FPSS Power Service System, you can check the curve in "Alarm Curve Record" in the "Genset Record".

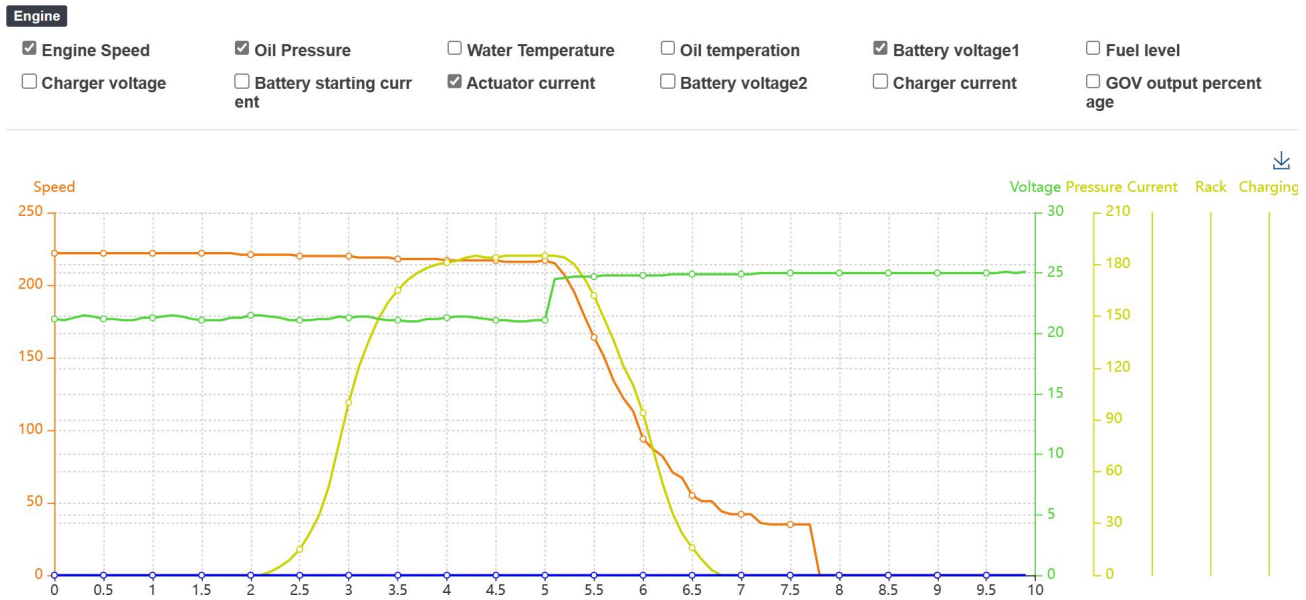


Fig.14 Engine Curve

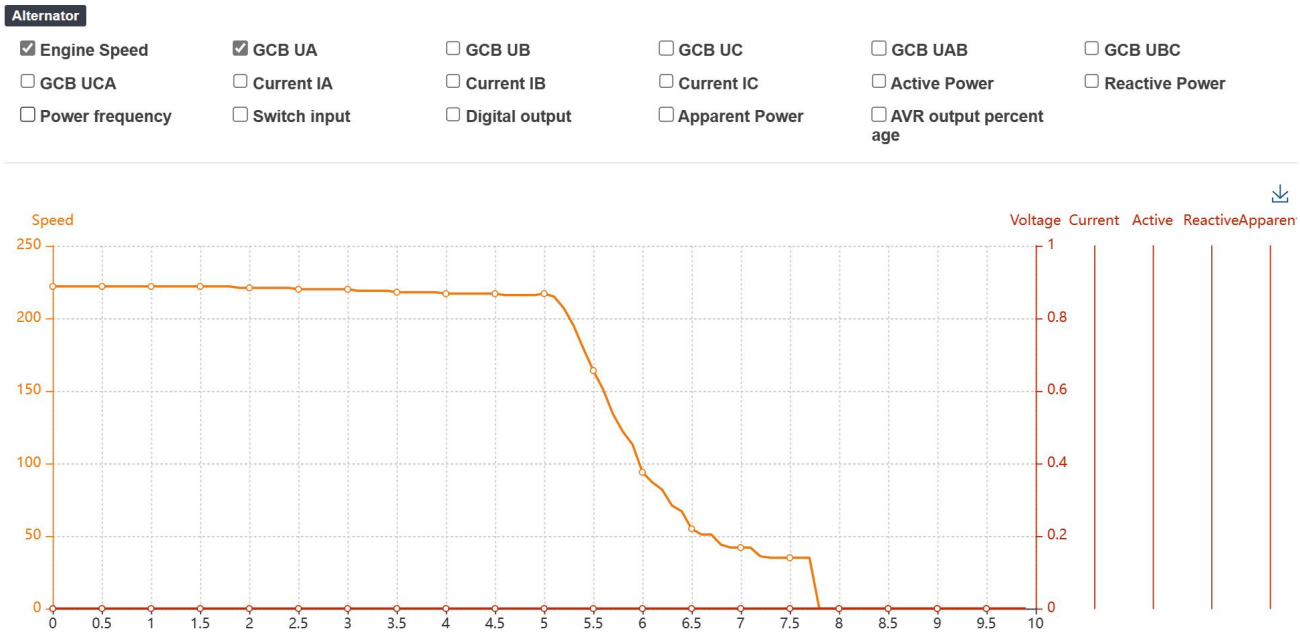


Fig.15 Generator Curve

10 FAULT FINDING

Table 7 Fault Finding

Symptoms	Possible Solutions
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; Check the AC genset voltage; Check DC fuse.
Controller emergency stop	Check emergence stop button is correct or not; Check whether the starting battery positive be connected with the emergency stop input; Check whether the circuit is open.
Low oil pressure alarm after crank Disconnect	Check the oil pressure sensor and its connections.
High water temperature alarm after crank disconnect	Check the water temperature sensor and its connections.
Shutdown alarm in running	Check related switch and its connections according to the information on LCD; Check programmable inputs.
Crank not disconnect	Check fuel oil circuit and its connections; Check starting batteries; Check speed sensor and its connections;

	Refer to engine manual.
Starter no response	Check starter connections; Check starting batteries.
Genset running while ATS not transfer	Check ATS; Check the connections between ATS and controllers.
RS485 communication abnormal	Check connections; Check setting of COM port is correct or not; Check RS485's connections of A and B is reverse connect or not; Check RS485 transfer module whether damage or not; Check communication port of PC whether damage.
ECU communication failure	Check connections of CAN high and low polarity; Check if correctly connected of 120Ω resister; Check if type of engine correct; Check if connections from controller to engine and setting of outputs correct.
ECU warning	Get information from LCD of alarm page; Refer to engine manual according to SPN alarm code

Appendix I Technical Agreement

<table>
<tr><td rowspan="3"></td><td>QRT</td><td colspan="5" rowspan="3">Product status agreement
(FPSS7900 power service system)</td><td colspan="3">No:</td></tr>
<tr><td>Change number</td><td colspan="3">Fuchuang (City)1031-5A</td></tr>
<tr><td>1</td><td colspan="3">2019/01/01 implement</td></tr>
<tr><td>Customer name</td><td colspan="4">Customer general</td><td>Customer order number/piece number</td><td colspan="3"></td></tr>
<tr><td>Complete model set</td><td colspan="4">FPSS7950T-R-4G</td><td>Operating voltage (V)</td><td colspan="3">8-36V</td></tr>
<tr><td>Customer model</td><td>Engine type:</td><td>Weichai electric adjustment general</td><td colspan="2">Model of generator:</td><td colspan="2">unknown</td><td>Application:</td><td>Generator set</td></tr>
<tr><td>Customer customization</td><td>Boot interface:</td><td>Fu Chuang (default)</td><td>logo:</td><td>Fu Chuang (default)</td><td>Front Shell Mask:</td><td>Fu Chuang (default)</td><td>Back Cover Mask:</td><td>Fu Chuang (default)</td></tr>
<tr><td rowspan="3">Control function configuration</td><td>Fuel system:</td><td>Electric control system</td><td>Electric modulation model:</td><td colspan="2">C2002</td><td colspan="3">Remarks:</td></tr>
<tr><td>Software program:</td><td colspan="4">FPSS7950-M-V1.66.hex FPSS7950-S-V1.66.hex</td><td>Calibration program</td><td colspan="2">FPD001-03-20220722-DTWC-200.TXT</td></tr>
<tr><td>Hardware</td><td colspan="7">FPSS7950T-R-4G-00</td></tr>
</table>

	version:										
Cloud cat configuration	GSM/GPS (built-in)		☐	Private cloud	IP address:	121.199.25.246 (Fuchuang)		Port number:	50159 (Fuchuang)	APN:	CMET
			■	Public cloud							CMET
Control drive parameters (total current output must not exceed 12A)	name		Back cover stitching		Set up outlet	Output current (A)	Output form (V)	polarity	External expansion drive	supplier	Model number
	■	Start output	32#		fix	15	+	Normally open		customer	
	■	Fuel output	Internal wiring		fix		+	Normally open		customer	
	■	D+ output	23#		fix		Instant excitation +	Normally open		customer	
	■	High and low speed	Internal wiring		fix			Normally closed		customer	
	☐	Standby output 1	26#		Outlet 1	8	-	Normally open		customer	
	☐	Standby output 2	27#		Outlet 2	8	+	Normally open		customer	
	☐	Standby output 3	28#29#		Outlet 3	8	+	Normally open		customer	
	■	Generator switching	B9#B10#		Outlet 4	2	passive				
	■	The mains is switched off	B11#B12#		Outlet 5	2	passive				
	■	Load switch	Output form		Output time (S)		Operating voltage (V)				
			Pulse output		5		220				
Switching input		name		stitching	Effective drive			name	stitching	Effective drive	
	☐	Custom input port 1		4	Closed effective		☐	Customize input port 4	8	Closed effective	
	☐	Custom input port 2		6	Closed effective		☐				
	☐	Custom input port 3		7	Closed effective		☐				
Harness matching	Harness name				Harness type						
		Engine harness			FPSS7900XS-ENG-DTWC-000-180						
	■	Generator harness			FPSS7900XS-GEN-01-180						
	☐	Remote wiring harness									
Sensor matching	Sensor name			supplier	Specification and model	curve	Sensor name		supplier	Specification and model	curve
	■	Speed sensor		company	M18*1.5 70s		☐	Fuel level			

		(instrument)					sensor			
	■	Speed sensor (electric control)	company			□	Oil temperature sensor			
	■	Water temperature sensor	company	WM14*1.5		□				
	■	Oil pressure sensor	company	YM18*1.5		□				

Basic parameter setting

Serial number	parameter	Set value	Serial number	parameter	Set value	Serial number	parameter	Set value
068	Transformer ratio (/5)	400	056	Rated generating frequency (Hz)	50	077	Rated power (KW)	200
094	Number of flywheel teeth	136	097	Stalling speed	40	099	Idle speed	750
100	Rated speed (RPM)	1500	104	Underspeed alarm shutdown percentage	default	105	Percentage of overspeed alarm shutdown	default
121	Charge generator excitation delay	default	135	Idle to up delay	10	136	Idle heat dissipation delay (S)	10
137	High-speed heating delay	10	138	High speed cooling delay	10	195	ECU-J1939 Correspondence address	3
206	Water temperature alarm threshold (° C)	95	208	Water temperature shutdown threshold (℃)	98	214	Oil pressure alarm threshold (bar)	2
216	Oil pressure shutdown threshold (bar)	1.6						

Note: Shielding apparent power alarm

Special function setting

Serial number	parameter	Set value	Serial number	parameter	Set value	Serial number	parameter	Set value
			Remarks:					

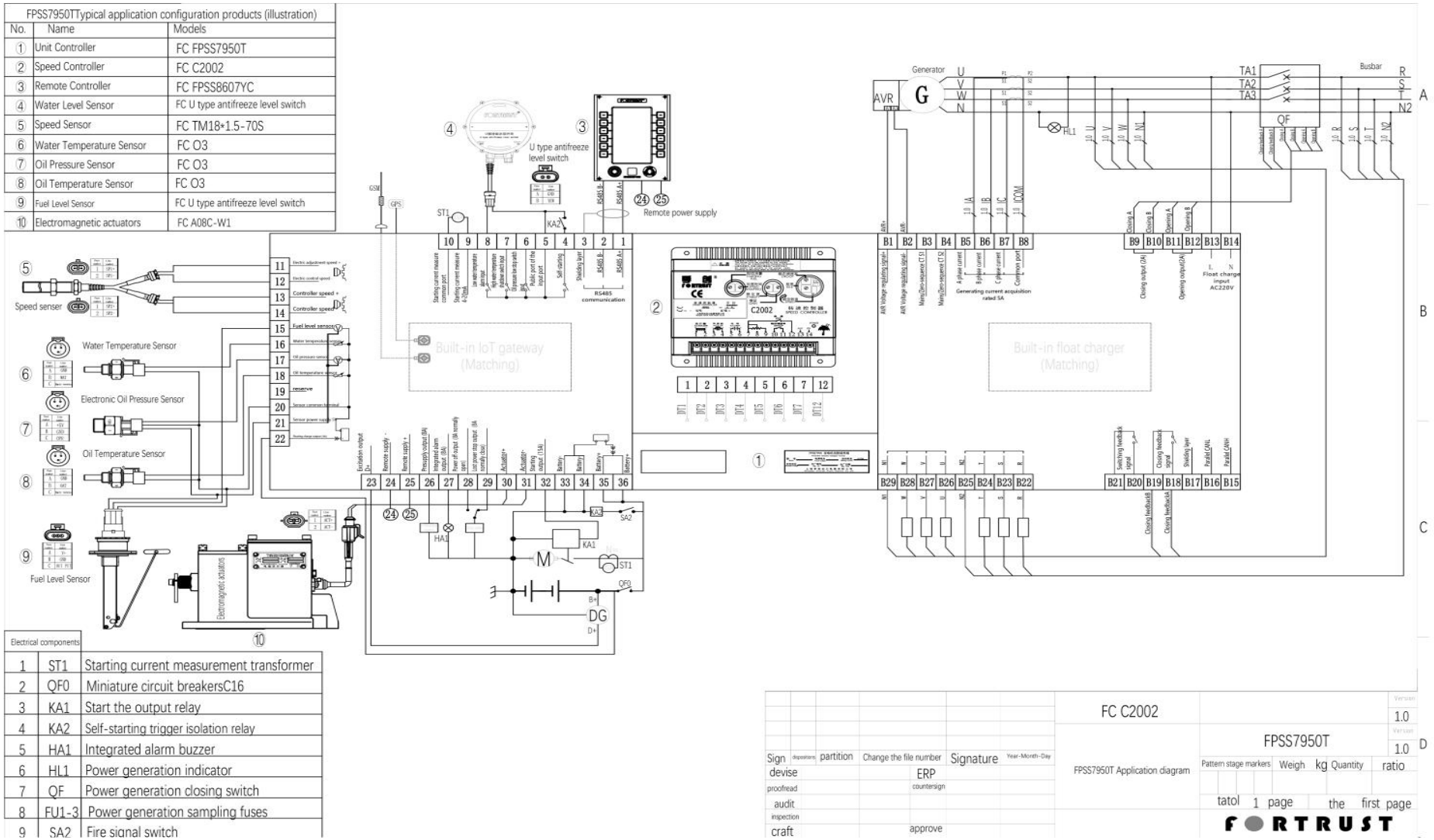
Installation mode	airborne	1.7900 airborne installation package 2.7900 vertical cabinet installation package					
Random data	■	specification	Chinese	■	Certificate of qualification	Chinese	
	■	Packing list	Chinese	□	Inspection report	Chinese	
Packing method	■	Single pack		□	Quadruple packing		
Outsourcing identification	Identification	■ standard		□	non-standard		

requirements	requirement		
	Item number, picture number, order number	Fill in the side of the packing box (working voltage, unit model, speed regulation mode, installation mode)	The order is attached to the customer code on the side of the outer packing box
	Barcode/QR code	Qr code subscript engine model	Qr code subscript customer order number
	Supplier code		

Shipping information	Receiving unit	Delivery address	Contact person	Contact number

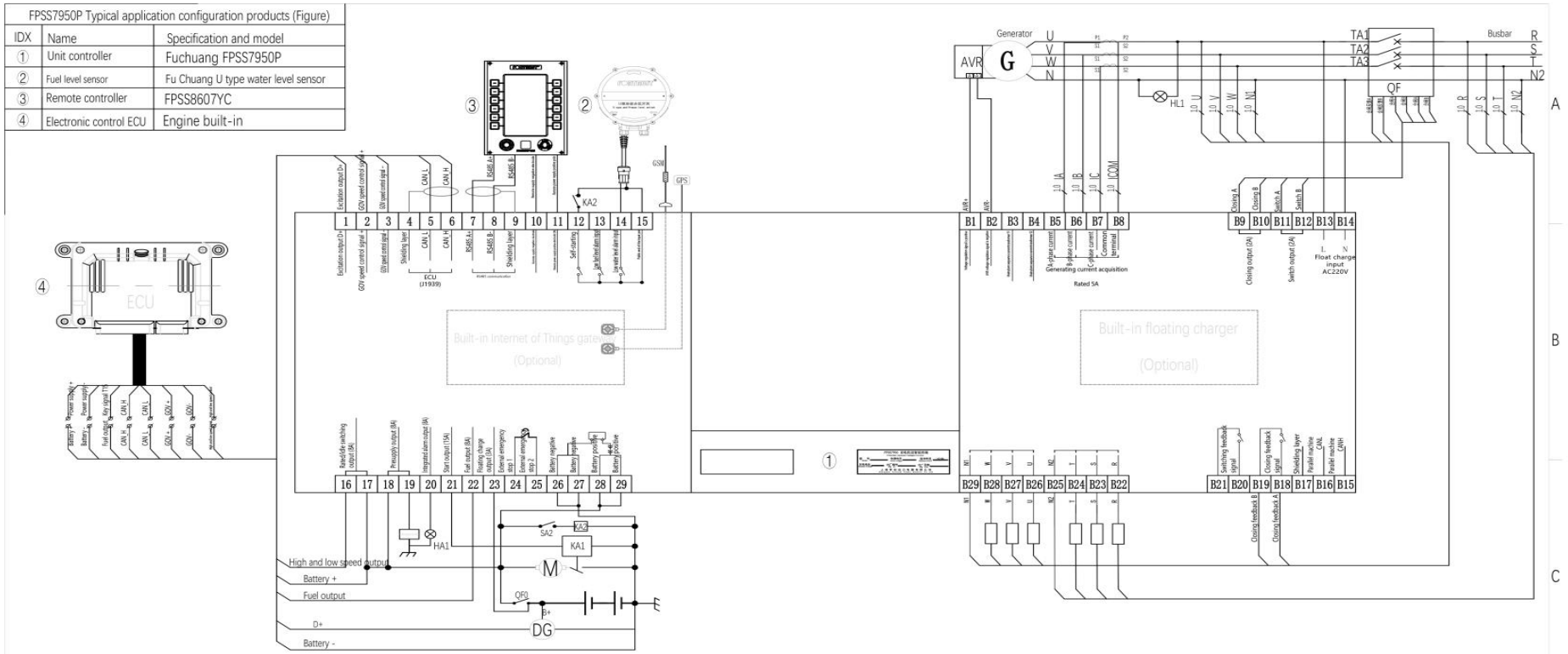
Customer name		Customer general				Customer order number/piece number				
Complete model set		FPSS7950T-R-4G				Operating voltage (V)		8-36V		
Customer model		Engine type:	Weichai electric adjustment general	Model of generator:		unknown		Application:	Generator set	
mark	Number of places	Change number	signature	date	mark	Number of places	Change number	signature		date
establishment			audit		Inventory code		158516745			
proofread			approve		Page FPD001-03		FPSS7950T-R-4G			

Appendix II Typical Parallel Non-EFI Typical Application Diagram



Appendix III Typical Parallel EFI Typical Application Diagram

FPSS7950P Typical application configuration products (Figure)		
IDX	Name	Specification and model
①	Unit controller	Fuchuang FPSS7950P
②	Fuel level sensor	Fu Chuang U type water level sensor
③	Remote controller	FPSS8607YC
④	Electronic control ECU	Engine built-in



Electrical component		
1	QF0	Micro circuit breaker C16
2	KA1	Start output relay
3	KA2	Self-starting trigger isolation relay
4	HA1	Integrated alarm buzzer
5	HL1	Generating light
6	QF	Power generation closing switch
7	FU1-3	Generating sampling fuse
8	SA2	Fire signal switch

Sign	dispositions	partition	Change the file number	Signature	Year-Month-Day	
devise			ERP			
proofread			countersign			
audit						
inspection						
craft			approve			

Application diagram of FPSS7950P

FPSS7950P

version 1.0

version 1.0

Pattern stage marking | weight kg | quantity | proportion

1 page | page 1

FORTRUST

FORTRUST®

Address: Room 803, Building A, Senlan Meilun Building, 555 Lansong Road, Pudong New District, Shanghai

Tel: 19851351321

Postcode: 200137

Factory Address: No.49 Mingzhu Road, Qidong Coastal Area, Jiangsu Province, China.

Tel:19851351386

Postcode：226236

Web：www.fortrustpower.com

Email: info@fortrust.cn