



Type FJ4000D engine control
box (cabinet) service and
maintenance manual V 1.0

catalogue

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1. Product overview

Type FJ4000D engine control box (cabinet) (hereinafter referred to as engine control box) is an automatic engine electronic measurement and control system composed of FPSS8607M-10 monitoring module and GEC 8000-K1 safety protection module. FPSS8607M-10 monitoring display module adopts large-screen LCD display; CAN communication interface can accurately display parameters such as engine speed, oil pressure, water temperature and oil temperature, detect battery voltage and engine accumulated running time, and monitor the above parameters in real time. When the control box detects an alarm signal, the control box automatically emits sound and optical alarm signal; when the fault stop signal is detected (such as overspeed stop), the control box will automatically output the shutdown control signal to control the engine shutdown. Through the control box system, the engine can start automatically and stop automatically.

The design of this product meets the requirements of China Classification Society CCS Specification. The technical performance and quality requirements of this product comply with the International Electrotechnical Commission IEC standards.

1. Product characteristics

The control system of FJ 4000D engine control box is composed of FPSS8607M-10 monitoring display module and GEC8000-K1 safety and protection module. It has the characteristics of good reliability, good stability, high measurement accuracy, small volume, and convenient installation and maintenance among similar products. It can be used for ships and land power stations and other engines, and is a more advanced electromechanical integration electronic instrument system.

2. Main technical indicators

(A) Product use environment requirements

Ambient air temperature

Marine environment: $+ 5^{\circ}\text{C} \sim + 55^{\circ}\text{C}$, and can withstand the 70°C high temperature of 2h without failure;

Non-marine environment: $-25^{\circ}\text{C} \sim + 55^{\circ}\text{C}$.

(B) Relative air humidity

The temperature is less than or equal to 45°C , and the relative humidity is $90 \pm 3\%$;

Temperature was greater than 45°C , and the relative humidity was $60 \pm 3\%$.

(c) vibrate

The control box can operate normally under the vibration conditions described in Table 3.1.3. If the resonance occurs in the following frequency range, appropriate measures should be taken to suppress the vibration which exceeds the following specified value.

Table 3.1.3:

installation site	Vibration parameters	
General premises	2.0 vs. 13.2 Hz amplitude \pm 1mm	Acceleration from 13.2 to 100 Hz \pm 0.7g
On the engine	From 2.0 to 25 Hz, the amplitude was \pm 1.6mm	From 25 to 100 Hz, the acceleration was \pm 4g

(D) Tilting and sway

The control box shall be capable of leaning and rocking 22.5° (cycle 10s) and 9.8m / s in the vertical direction²When working normally.

(E) The control box can work reliably for a long time in the environment with salt spray, oil mist, mold and dust.

3.2 Power supply

The control box can work normally when the voltage deviates from the rated value of -25% - - + 30%.

3.3 Meet the relevant electromagnetic compatibility requirements

3.4, Measurement range and accuracy

3.4.1, the rotational speed sensor

Display range: 0-9999r / min;

Measurement accuracy: \pm 2 r/min;

Signal type: magneto-resistance type pulse signal;

Operating temperature range: 40~ + 100°C

.23.4 Oil pressure sensor

Display range: 0-1.0Mpa;

Measuring accuracy: \pm 0.02 Mpa;

Signal type: 0.5V-4.5V

Operating temperature range: 40~ + 100°C

.33.4 Temperature Sensor

Display range: 0-150°C;

Measuring accuracy: \pm 2.5°C;

Signal type: NTC

Operating temperature range: 40~ + 100°C

3.4.4 Voltage detection of working power supply or standby power supply

Display range: 8-36V;

Measuring accuracy: $\pm 0.4V$;

Signal type: DC voltage

4. Description of the control box

4.1 Description of the indicator light on the panel

Power supply indication: the control box power supply, the indicator light is on.

Comprehensive alarm: when any fault alarm occurs, the indicator light is on.

Automatic: The indicator light is on when the <remote control / local / automatic> switch is placed in the <automatic> position.

Note: When the unit is an emergency unit, select the automatic state, the unit protection function is automatic, and display "automatic" on the LCD screen.

Remote control: The indicator light is on when the <remote / local / automatic> switch is placed in the <remote control> position. Oil-water heating: When the oil-water heater is in the operating state, the indicator light is on.

.24 Description of push button switch of control box panel

Power switch: control the on and off of the power supply in the control box.

Remote / Local / Automatic: Select switch for Remote and Local and Automatic control modes.

Heating switch: the engine oil-water heater control switch. Under normal circumstances, the transfer switch shall be in the "off" position; when the oil-water heater is required to operate, place the transfer switch in the "on" position and the oil-water heating indicator is on.

Emergency shutdown: use during engine emergency shutdown. This button has self-locking function, press the engine to stop; after the engine stops, the <emergency stop> button must be reset before starting again. Whether local or automatic, the button works.

Idle / Rating: used to control the conversion of engine speed between idle and rated.

5. Operation instructions for startup and shutdown

5.1 Operation instructions for automatic startup and shutdown

The <remote control / local / automatic> transfer switch is placed in the <automatic> position, and the automatic status indicator light is on, indicating that the engine is in the automatic control mode.

5.1.1 Automatic start-on sequence

- 1) When the control box receives the start trigger signal (passive normally open contact, closed work), that is, when the terminal X2 "1,2" (passive contact) is closed, the delay 2S (the time can be set) will automatically send out the start signal;
- 2) Start the starting time at the same time as the starting output. If the engine does not start successfully in the "starting time", the starting relay stops the output and enters the "start interval time" to wait for the second automatic start;
- 3) If the engine does not start successfully for 3 times, display the start failure alarm and issue sound and light alarm at the same time;

.1.25. Automatic shutdown sequence:

- 1) In the normal operation of the engine, that is, the terminal X2 "3,4" (passive contact) is closed, enter the "stop delay" and send the switch signal at the same time; the default is 120S (can be set by parameter setting page) to facilitate the heat dissipation of the engine;
- 2) After the "stop delay", the stop signal will be sent automatically; after the stop signal is sent 20S (the time can be set), the stop output will be automatically cancelled and determine whether the engine has stopped. If the engine has stopped, enter the next start preparation; if the engine does not stopped, send the stop failure alarm.

5.2 Operation instructions for local startup and shutdown

The <remote / local / automatic> transfer switch is in the <local> position and the engine is in local control mode.

5.2.1 Local startup

In the "local" mode, press the start button on the control box or the <start> button on the control module to start the engine. After successful start, the engine speed can be raised to the rated state through the idle / rated switch on the panel;

When high water temperature, low oil pressure, overspeed and abnormal voltage occur during the engine operation, the control box can effectively protect and stop the engine quickly.

5.2.2 Local downtime

In the "local" mode, press the stop button on the control box or the <Stop> button on the control module to shut down the running engine.

5.3 Operation instructions for remote control startup and shutdown

The <remote / local / automatic> transfer switch is in the <remote> position and the engine is in remote local control mode.

.15.3 Remote control and local boot

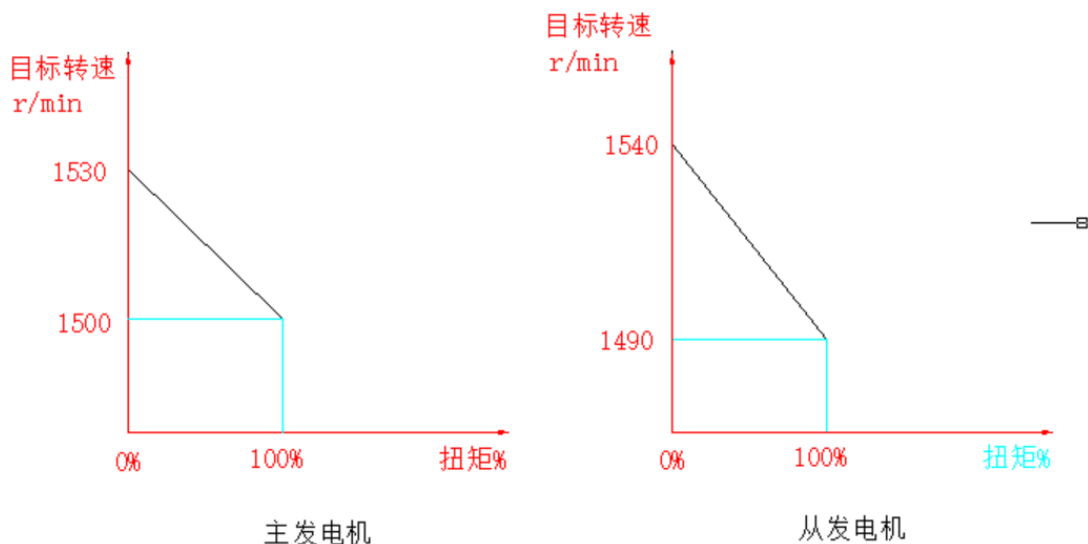
In the "Remote control" mode, press the <start> button on the remote control module to start the engine;

When high water temperature, low oil pressure, overspeed and abnormal voltage occur during the engine operation, the control box can effectively protect and stop the engine quickly.

.25.3 Remote control and local shutdown

In Remote Control mode, pressing the <Downtime> key on the control module stops the running engine. Regardless of the remote control, local, automatic status, in an emergency, pressing the <Emergency stop> button, can shut the engine down.

5.4 Software droop function



Description: Torque percentage is read in the instrument CAN message ECU, specification as per J1939. ID: 0CF00400

After the test setting, the no-load target speed and full-load target speed can be set on the panel to facilitate the generalization of the controller.

In addition, the module and the control software need to set a switching quantity input port for receiving the signal. The control process is performed as follows:


After the engine starts, the engine control module sends a message at the target speed of 0% torque. When the distribution board sends the acceleration


and deceleration signal, the target speed is increased or decreased according to the set step length. When the parallel module receives a passive contact signal from the distribution board, the target speed will restore the target speed described in the figure above figure.


6. Function description of the FPSS8607M-10 main control module


6.1 Operation instructions of the FPSS8607M-10 monitoring and display module





- 1)  Turn the page button: switch the displayed content (engine parameters, etc.) in the main interface, select the parameter number in the parameter selection interface, and set the number when editing the parameter interface.


- 2)  Left and right page turning button: switch the displayed page in the main interface, select the parameter bit when selecting the parameter interface, and set the number when editing the parameter interface.


- 3)  Set button: Press this button to enter the setting page, and you can choose to set different parameters.

- 4)  Confirm button: in the parameter selection setting page to enter the corresponding sub-menu, press this button to complete the write function after the parameter modification state.

- 5)  Self-test button: When the engine is stopped, press this button and the system enters the self-test program. The self-test program will successively display the engine parameters pre-set by the user, such as the number of flywheel teeth, rated speed, overspeed alarm value, etc. After the self-test, the system will automatically return to the initial state.

- 6)  Silencing button: when the sound alarm signal is used, press the "sound elimination" button to eliminate the sound signal output, and the corresponding alarm light is indicated by flashing and flattening light.

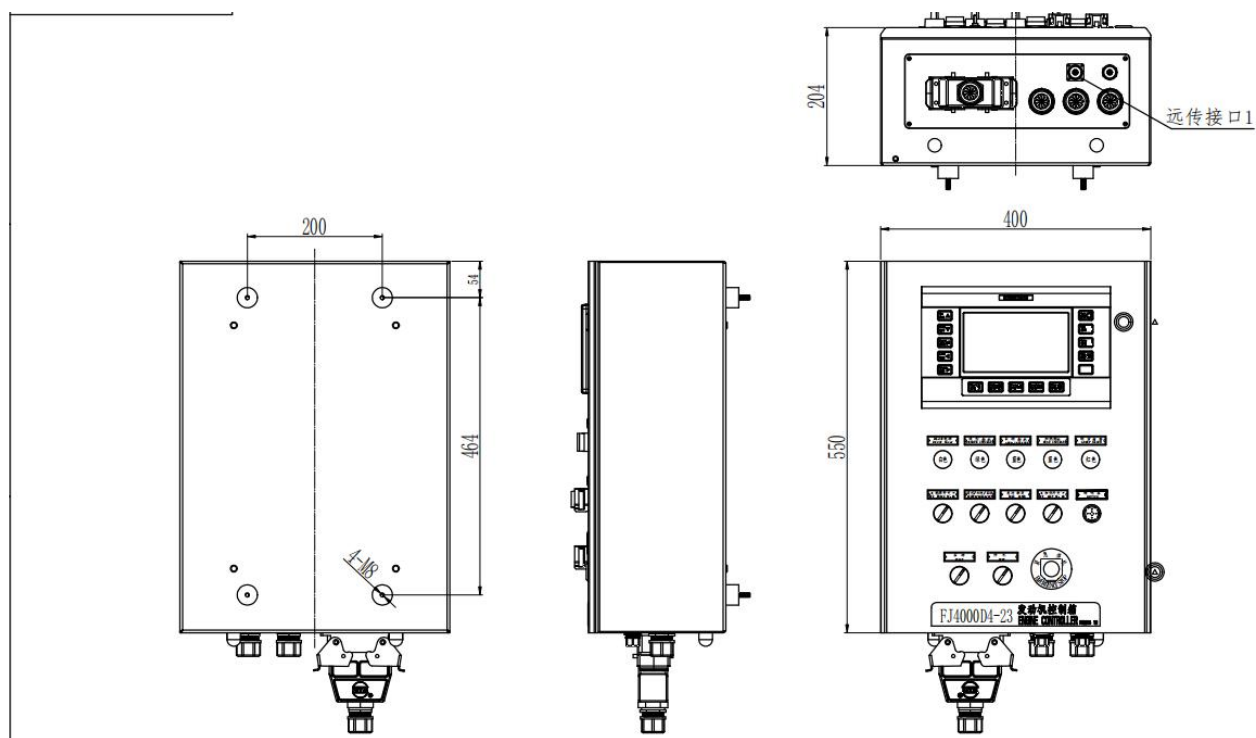
- 7)  Reset button: When the engine alarm is stopped, this button must be pressed and the control box is reset before starting the engine again.

- 8)  Expansion button: optional, program start, program shutdown, backlight enhancement, backlight weakening, display switch.

7. Installation and external wiring of the box body

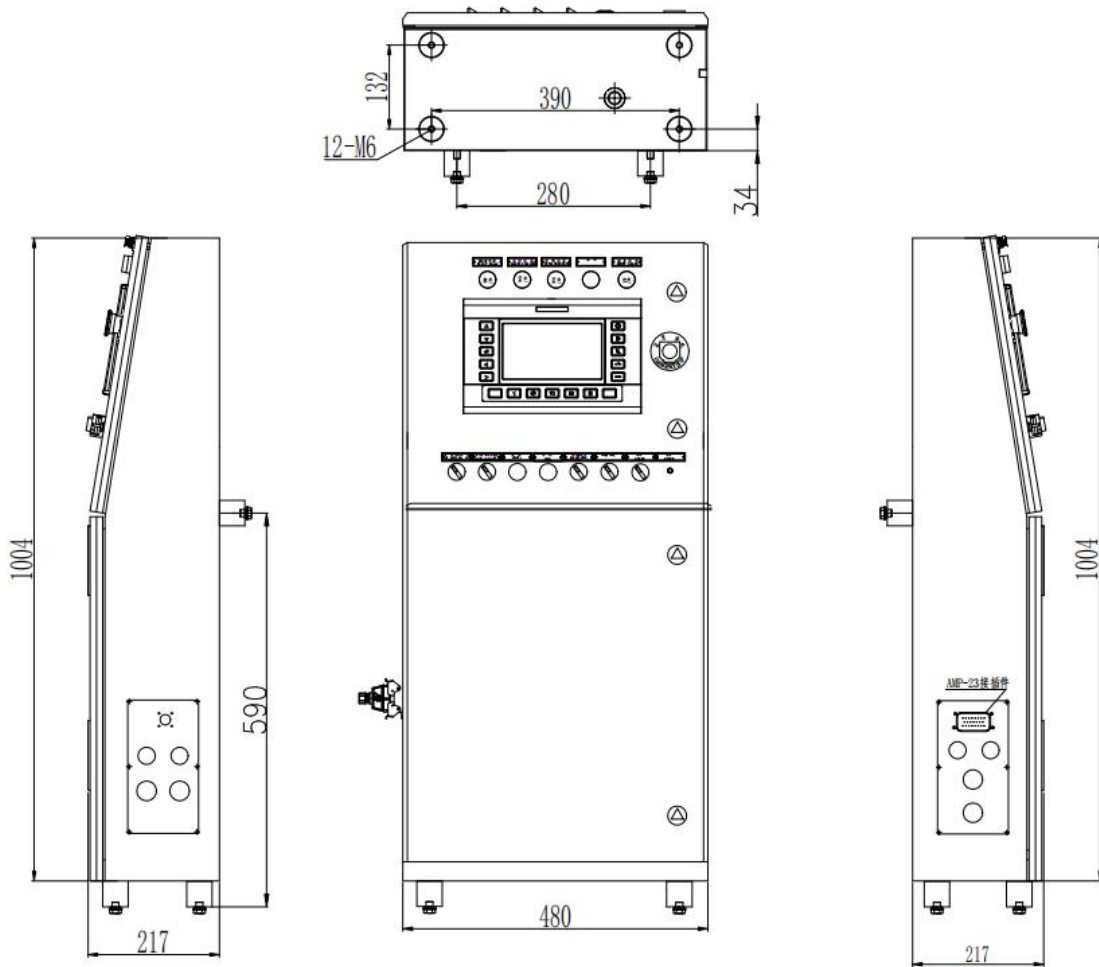
7.1 The control box is equipped with shock absorber, and the installation position should be selected in a place with small vibration to avoid direct heat transfer or close heat radiation from the exhaust system. Strong impact and high voltage electric shock to the box should be avoided during the installation process.

7.1.1 Wall-mounted installation:



7.1.2 Vertical

installation:



7. 2 When the control box is connected to the power supply, pay attention to the positive and negative poles to avoid the reverse polarity.

7. 3 Other external wiring is shown below:

8. Precautions

1) Before starting the engine, open the power of the control box and check the parameters before starting

engine.

2) When the engine is running normally, do not press the <reset>, start>, stop> and other buttons.

3) Often check whether the joints of the sensor and control box are eroded by oil and water and fall loose.

4) The signal cable should be wired separately from the power cable to avoid electromagnetic interference, and do not touch the high temperature parts such as the exhaust pipe.

5) When replacing the sensor, it must be noted that the positioning hole on the connector must be aligned, otherwise the connector and the sensor will be damaged.

6) When charging the battery with external power supply, turn off the power supply of the control box, end the switch and storage

When the battery is charged normally, turn on the control box power supply again.

7) The control box cannot be directly powered by the charging generator.

9. Common troubleshooting methods

Common faults	failure cause	Exclusion method
The power light is not on when starting up	1, power supply circuit or polarity reverse 2. Fuse broken	1. Check the line and connect it correctly 2. Change the fuse
The oil pressure is abnormal and the pressure remains 0.000 or 1.×××	1. Oil blocked 2. Loose connection 3. Oil pressure sensor is damaged	1. Clean up the oil road 2, check the line, and repeat the line 3. Replace the oil pressure sensor
The temperature is abnormal	1. Loose connection 2. The sensor is damaged	1, check the line and repeat the line 2. Change the sensor
The start is not normal	1. The starting motor can not work normally 2, the battery line oxidation, loose	1. Check the starting motor 2. Check the battery connection

	3. The battery voltage is too low	3, the battery charging
The speed indication is abnormal and the speed stays at 0000	1. Loose connection 2. The speed sensor is damaged	1. Check the connection 2. Change the rotational speed sensor

After the above treatment, if the fault still cannot be eliminated, please find a professional personnel for maintenance.

10., The Warranty Period

Under the condition of normal storage, use and maintenance of the control box, the warranty period is: one year for shipment or 18 months from the date of delivery, and one year for the non-Marine control box from the date of delivery.



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