

# **Operation And Maintenance Manual For FJ4000D**

## **Engine Control Box (Cabinet) V1.1**

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# CONTENTS

<b>1</b>	<b>Product Overview.....</b>	<b>1</b>
<b>2</b>	<b>Product Features .....</b>	<b>1</b>
<b>3</b>	<b>Main Technical Parameters .....</b>	<b>1</b>
<b>4</b>	<b>Function Description.....</b>	<b>3</b>
<b>5</b>	<b>Start/Stop Operating Instructions.....</b>	<b>4</b>
<b>6</b>	<b>GEC16W Main Function Description.....</b>	<b>5</b>
<b>7</b>	<b>Sensor Installation and External Wiring.....</b>	<b>7</b>
<b>8</b>	<b>Safety Precautions.....</b>	<b>9</b>
<b>9</b>	<b>Common Troubleshooting.....</b>	<b>9</b>
<b>10</b>	<b>Warranty Period .....</b>	<b>10</b>

## **1. Product Overview**

FJ4000D Engine Control Box (Cabinet) is a consisting by GEC16W Monitor Display Module and GEC8000-K1 Security Module's control system , fully automatic diesel engine operating condition electronic measurement and control system. GEC16W Monitor Display Module uses a large LCD display , It has CAN interface for communicatiaon and can accurately detect and display the engine revolution speed, oil pressure, water temperature, oil temperature, battery voltage, total engine running time and other parameters. Also it can be monitor the above measured parameters in real time. When an alarm signal occurs ,The control box can give sound and light alarms. When an emergency stop signal (such as overspeed alarm) occurs, it will automatically send out a stop control signal to control engine stop. The control box enables automatic engine start and stop operations.

This product is designed to satisfy the requirements of China Classification Society (CCS) rules. Its technical performance and quality meet the International Electrotechnical Commission (IEC) standards.

## **2. Product Features**

FJ4000D Engine Control Box is a consisting by GEC16W Monitor Display Module and GEC8000-K1 Security Module's control system , as better reliability and stability, higher measurement accuracy, a smaller size and more highlighted and is easier to install and maintain than similar products. As an advanced electromechanical integrated electronic instrumentation system, it can be used in engines for vessels and land power plants and can be easily equipped with an electronic governor.

## **3. Main Technical Parameters**

### **3.1 Environmental Parameters**

#### **3.1.1 Ambient air temperature**

Marine environment:  $+5^{\circ}\text{C} \sim +55^{\circ}\text{C}$  (normal operation at a temperature of  $70^{\circ}\text{C}$  for 2h);

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

#### **3.1.2 Relative air humidity**

If the temperature is smaller than or equal to  $45^{\circ}\text{C}$  , the relative humidity will be  $90 \pm 3\%$ ;

If the temperature is greater than  $45^{\circ}\text{C}$  , the relative humidity will be  $60 \pm 3\%$ .

### 3.1.3 Vibration

The control box (cabinet) can work normally under the vibration conditions listed in Table 3.1.3. If resonance occurs within the following frequency range and the vibration exceeds the following set values, appropriate measures should be taken.

Table 3.1.3: Vibration Conditions

Installation Locations	Vibration Parameters	
General places	2.0~13.2 Hz, amplitude: $\pm 1\text{mm}$	13.2~100 Hz, acceleration: $\pm 0.7\text{g}$
Engines	2.0~25 Hz, amplitude: $\pm 1.6\text{mm}$	25~100 Hz, acceleration: $\pm 4\text{g}$

### 3.1.4 Tilt and swing

The control box (cabinet) should be able to run smoothly at a tilt and swing of  $22.5^\circ$  (10s) in all directions and at a vertical linear acceleration of  $\pm 9.8\text{m/s}^2$ .

3.1.5 The control box (cabinet) should be able to work reliably for a long time in a salt spray, oil mist, mold, or dust environment.

## 3.2 Power Supply

The control box (cabinet) should be able to work normally at a rated voltage deviation of -25%~+30%.

## 3.3 Necessary Electromagnetic Compatibility (EMC)

## 3.4 Measurement Range and Accuracy

### 3.4.1 Rotational velocity transducer

Indication range: 1~9999r/min;

Measurement error:  $\leq \pm 5\text{r/min}$ ;

Type: Magnetic resistance pulse rotational velocity transducer;

Ambient temperature:  $-40\sim+100^\circ\text{C}$ ;

### 3.4.2 Oil pressure transmitter

Measurement range: 0~1.0MPa;

Measurement error:  $\leq \pm 0.02\text{MPa}$ ;

Type: Switzerland ceramic pressure transmitter, 4~20mA signal output;

Ambient temperature:  $-40\sim+125^\circ\text{C}$ ;

### 3.4.3 Temperature sensor

Measurement range: 0~150 $^\circ\text{C}$ ;

Measurement error:  $\leq \pm 2.5^\circ\text{C}$ ;

Type: Thermal resistance PT100;

Ambient temperature:  $-40\sim+125^{\circ}\text{C}$ ;

### 3. 4. 4 Battery voltage measurement

Measurement range: 8~36V;

Measurement error:  $\leq\pm 0.4\text{ V}$ ;

## 4. Function Description Of The Control Box

### 4.1 Description of Panel Indicator Lights

**Power indicator:** When the control box is powered on, the indicator light will come on.

**General alarm:** When a fault alarm occurs, the indicator light will come on.

**Automatic indicator:** When the <Remote/Manual/Automatic> switch is in the <Automatic> position, the indicator light will come on.

Note: If the generator set used for emergency set, choose the automatic state, the generator is overcontrolled.

**Remote indicator:** When the <Remote/Manual/Automatic> switch is in the <Remote> position, the indicator light will come on.

**Oil water heater:** When the oil water heater is in operating state, the indicator light will come on.

### 4.2 Description of Buttons and Switches

**Power switch:** The control box power is in “ON” or “OFF.”

**Remote/Manual/automatic:** Remote/Manual/Automatic control mode selector switch.

**Heater switch:** Control switch for the oil water heater of the engine. Under normal circumstances, the changeover switch should be in the “OFF” position; when the oil water heater is required to run and the changeover switch is pushed to the “ON” position, the oil water heating indicator light will come on.

**Emergency stop:** Used for engine emergency stop. The <Emergency Stop> button has an auto-lock function. When the button is pressed, the engine will stop; after the engine stops smoothly, reset the button to start it again. Whether in manual or automatic mode, the button will function.

**Idle/rated speed:** The changeover switch is used to manually control the engine idle and rated speeds. The changeover switch will be active only in <Manual> mode.

**Spare start button:** When the GEC16W model was broken, press this

button can start the engine .

## **5. Start/Stop Operating Instructions**

### **5.1 Automatic Start/Stop Operating Instructions**

When the <Remote/Manual/Automatic> changeover switch is in the <Automatic> position, the automatic status indicator light will come on, indicating that the engine is in the automatic start mode.

#### **5.1.1 Automatic start sequence**

- 1) When the control box (cabinet) receives a power grid failure signal (passive normally open contact, closed), i.e. when terminals “37 and 38” (passive contact) are closed, it will automatically send out a start signal after a delay of 2S (adjustable);
- 2) Timing will start when the output starts. If the engine fails to start within the “Starting Time”, the starter relay will stop output and enter the “Starting Time Interval” before the secondary automatic start;
- 3) If the engine fails to start three times, the LCD will display a start failure alarm and give a sound and light alarm;

#### **5.1.2 Automatic stop sequence**

- 1) If the mains supply is back to normal during normal engine operation, i.e. if terminals “1 and 2” (passive contact) are disconnected, it will enter the “Stop Idle Speed Delay” and give a separating brake signal; the default Stop Idle Speed Delay is 120S (adjustable via the Parameter Settings page) to facilitate heat dissipation of the engine;
- 2) After the “Stop Idle Speed Delay” ends, it will automatically give stop signals consecutive for 20S (adjustable) until automatic cancellation of stop output, and determine whether the engine has completely stopped. If the engine has completely stopped, it will prepare for the next start; if not, it will give a stop failure alarm.

### **5.2 Manual Start/Stop Operating Instructions**


When the <Remote/Manual/Automatic> changeover switch is in the <Manual> position, the engine will be in the manual control mode.

#### **5.2.1 Manual start**

In the “Manual” mode, press the <Start>button on the control module to start the engine; after the engine starts smoothly, push the <Idle Speed/Rated> changeover switch to manually increase the engine revolution speed from the idle speed to the rated speed.

In case of high water temperature, low oil pressure, overspeed, abnormal voltage during engine operation, the control box should have emergency stop protection.

#### **5.2.2 Manual stop**


In the “Manual” mode, press the <Stop>  button on the control module to stop a running engine. Firstly, push the <Idle Speed/Rated> changeover switch to the “Idle Speed” position to run the engine at the idle speed for a while and ensure complete heat

radiation of the engine, and then press the <Stop>  button to stop it.


### 5.3 Remote Start/Stop Operating Instructions

When the <Remote/Manual/Automatic> changeover switch is in the <Remote> position, the engine will be in the remote control mode.

#### 5.3.1 Remote start

In the “Remote” mode, press the <Start>  button on the remote control module to start the engine; after the engine starts smoothly.

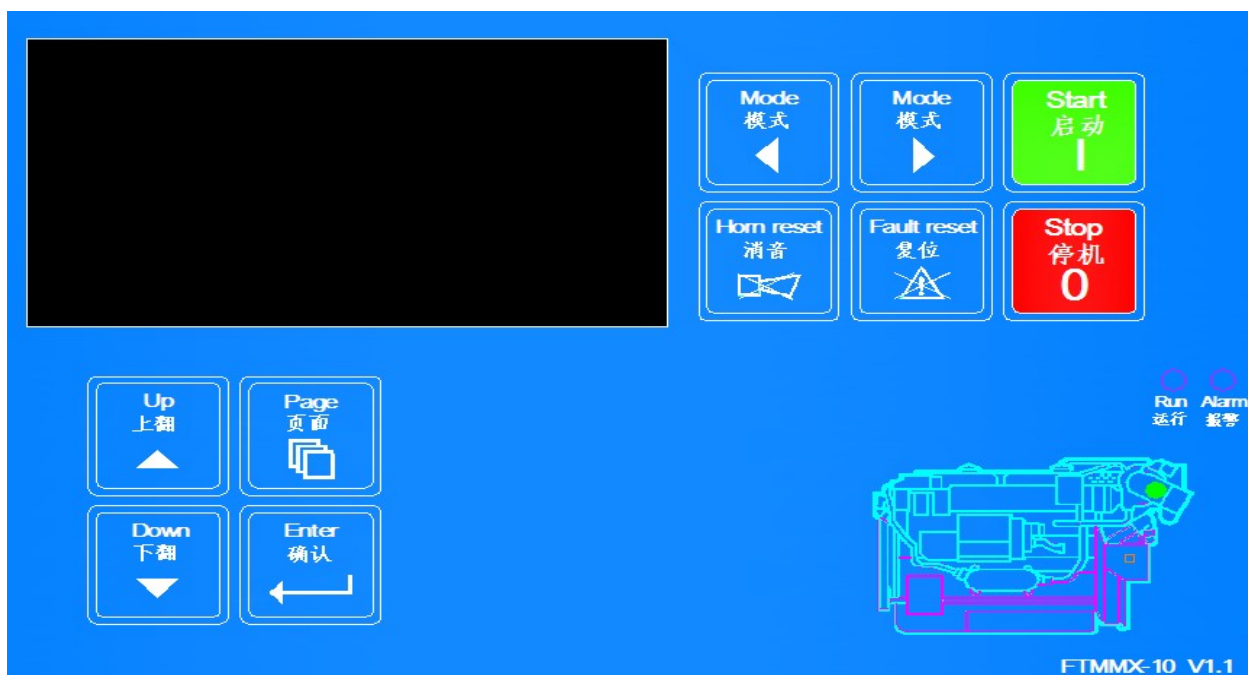
#### 5.3.2 Remote stop







In the “Remote” mode, press the <Stop>  button on the remote control module to stop a running engine.

In both manual and automatic modes, press the <Emergency Stop> button in case of emergency to stop the engine.





## 6 GEC16W Main Control Model Function

### 4.2.1 GEC16W Monitor Display Module Panel



- 1)   Page Up/Down button: Switches between parameters such as power generation, mains supply and engine parameters in the Main Screen, selects parameter No. in the Parameter Selection screen, and sets numbers in the Parameter Edit screen.
- 2)  Page button: Switches to the Parameter Selection screen in the Main Screen, returns to the Main Screen in the Parameter Selection page, and returns to the Parameter Selection page in the Parameter Modification status.
- 3)  Enter button: Press the button in the Parameter Modification status to complete the write function after parameter modification. The button is used to enter the submenu in the Parameter Selection page. In the Stop status, press the button, and the control box will start self-check, i.e. all indicator lights on the control module will come on, the Display page will display all alarm parameters of the engine, and the buzzer will sound.
- 4)   Self-test button: When press the two button at the same time, the system enter to self-test programe, It can display the teeth, rater speed, and so on.



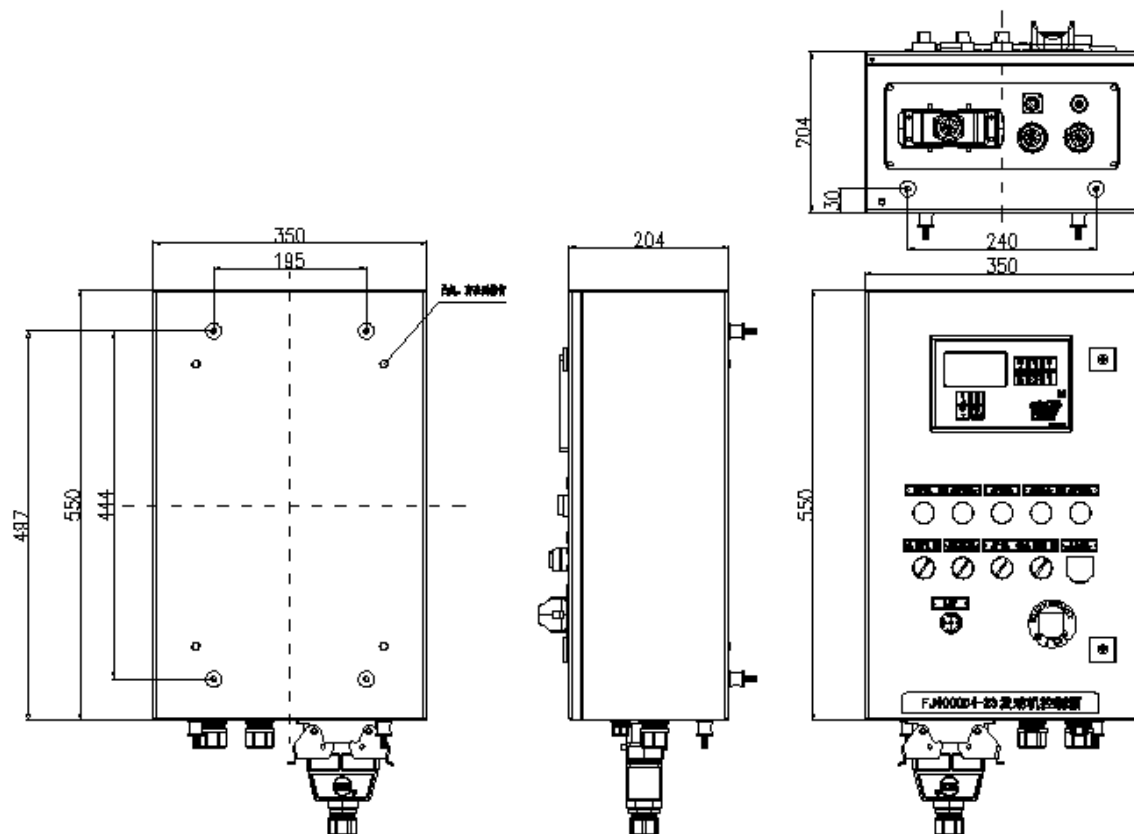
- 5)   Start/stop button: Controls engine start/stop in manual mode.
- 6)  Mute button: When a sound alarm signal is given, press the <Mute> button to eliminate sound signal output. Then the alarm light will stop flashing and change to plain glass display.
- 7)  Reset button: In the engine alarm stop status, the button must be pressed and the control box (cabinet) must be reset before the engine is restarted.

## 7 Installation and External Wiring

**Please read the manual's installation and maintenance instructions thoroughly and carefully before using the engine for the first time. The machine is accompanied by the manual. In order to extend the life of the instrument, please keep it properly for future use.**

### 7.1 Cabinet Installation

The control box (cabinet) should be equipped with a shock absorber, which should be installed at a place with small vibrations which is away from direct heat from the exhaust system or thermal radiation at close range. A strong impact on the control box and high voltage electric shock should be avoided during installation.

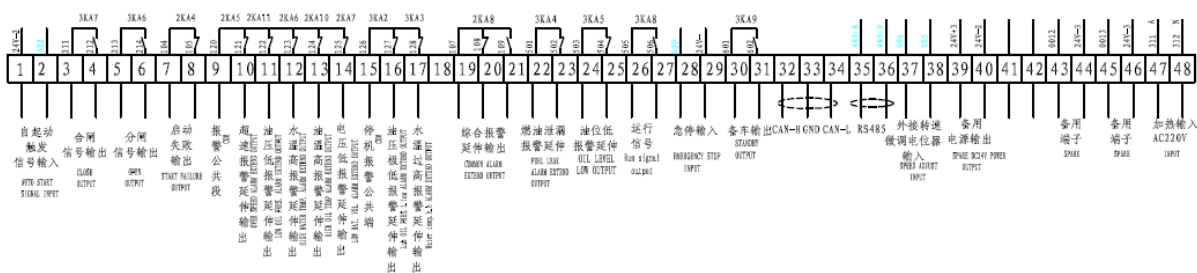
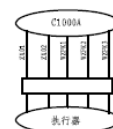


FJ4000D Series Control Box Outline Installation Drawing

7.2 The polarity should be correct when the control box (cabinet) is connected to the power supply.

7.3 Other external wiring is shown in the figure below:

A	名称	1	2	3	4	5	6	7	8	9	10
	线号	241+	241-	241+	241-	241+	241-	241+	241-	241+	241-
B	名称	1	2	3	4	5	6	7	8	9	10
	线号	048	048	048	048	048	048	048	048	048	048
C	名称	1	2	3	4	5	6	7	8	9	10
	线号	048	048	048	048	048	048	048	048	048	048
D	名称	1	2	3	4	5	6	7	8	9	10
	线号	048	048	048	048	048	048	048	048	048	048



## FJ4000D Series Control Box External Wiring Diagram

**8 Safety Precautions**

1) Switch on the control box (cabinet) and check whether all parameters are normal before starting the engine.

2) Be sure not to press the <Reset>, <Start> and <Stop> buttons during normal operation of the engine.

3) Be sure to regularly check whether the connection between the sensor and the control box (cabinet) is affected by oil and water corrosion and loose or not.

4) Control cables should be separated from power cables to prevent electromagnetic interference (EMI) and should be kept away from high temperature parts, such as exhaust pipes.

5) Be sure to align the locating hole on the connector with the sensor before replacing it to prevent them from being damaged.

6) Be sure to switch off the control box (cabinet) when an external power supply is used to charge the battery. After the switchover is completed, switch it on during normal charging of the battery.

7) The control box (cabinet) cannot be powered directly by a charging generator.

**9 Common Troubleshooting**

Common Faults	Fault Causes	Troubleshooting Solutions
The power supply indicator light does not come on during start	1, There is a short-circuit in the power supply or the polarity is reversed 2, The fuse blows	1. Check whether the wiring is correct 2, Replace the fuse
Oil pressure is abnormal and stays at 0.000 or 1.×××	1. The oil circuit is blocked 2. The pressure transducer is damaged 3. The connecting line is loose	1 Clean the oil circuit 2 Replace the sensor 3 Check the connecting line and reconnect it
Temperature display is not	1 The connecting line is	1 Replace the sensor

normal	loose The sensor is damaged	2 Check the connecting line and reconnect it
Abnormal start	<ol style="list-style-type: none"> <li>1. The starter motor does not work normally</li> <li>2. The battery connection is oxidized and loose</li> <li>3. The battery is under voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the starter motor</li> <li>2. Check the battery connection</li> <li>3. Charge the battery</li> </ol>
Revolution speed is abnormal and stays at 0000	<ol style="list-style-type: none"> <li>1. The sensor is damaged</li> <li>2. The sensor is loose</li> <li>3. The connecting line is loose</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace the rotational velocity transducer</li> <li>2. Reposition it to ensure that the gap between the rotational velocity transducer head and the gears is 0.3~1.0mm</li> </ol>

If the above faults cannot be removed by the above solutions, the control box may be damaged. In such case, please contact professionals for maintenance.

## 10. Warranty Period

The warranty period of the control box (cabinet) under normal storage, use and maintenance conditions is one (1) year after the shipment and use of a marine control box (cabinet) or eighteen (18) months from its ex-factory date, or one (1) year from the ex-factory date of a non-marine control box (cabinet).



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