GEC100A

燃气发动机控制器

产品使用说明书

GEC100A

Gas Engine Controller

大同市欧特讯动力控制有限公司

一 Overview

The GEC100A gas engine (power generation) control system integrates ignition control, speed control and air-fuel ratio detection. The steady-state and dynamic indicators of the speed control are set at the factory when the general parameters are set. Generally, most users or models can meet the requirements. If there is instability, the adjustment can be made. The GEC100A air-fuel ratio detection function can measure the air-fuel ratio through the oxygen sensor and display it on the display. It is convenient for the user to adjust the gas intake amount of the proportional mixer on the gas engine, so that the user can adjust to the required air-fuel ratio. At the same time, through the engine exhaust temperature and vibration detection instrumentation to ensure that the gas engine exhaust temperature and vibration meet the engine's factory requirements.

The controller is suitable for a wide range of gas sources, such as natural gas, oilfield associated gas, biogas, coalbed methane and straw gas.

二 Electrical parameter

◆ Power: 20～32V DC, 5A maximun

◆Rated / idle speed range: 0～9KHz

◆Synchronous control range: 0～5V

◆Output overcurrent protection: >4A 5s

◆input device: 1 way Camshaft position sensor input

1 way Speed sensor input

1 way Oxygen sensor input

1 way Parallel port

◆Output device: 6 way Ignition output

1 way Throttle output

1 way High and low speed switch

◆Vibration condition: <80Hz

◆Operating temperature: -20℃～+70℃

◆Shock: 2G

◆Protection level: IP65

☰ Instructions for use

3.1 Panel operation

3.2 Button and indicator function description

S/N	BUTTON	function	using
①	OK	Set/confirm button	1、 Enter the settings interface. 2、 The parameter setting value is confirmed.
②	ESC	Back button	1、The menu returns. 2、The parameter settings are returned.
③	∧	Up / increase	Scroll through the screen to move the cursor up or increase the parameter value in the setup menu
④	∨	Down/reduce	Scroll through the cursor or decrease the parameter value in the setup menu
⑤	<	Left/turn	Flip the screen and increase the parameter value in the setup menu
⑥	>	Right/turn	Scroll through the screen and reduce the parameter value in the setup menu
⑦	Error	Error indicator	Under normal circumstances, the indicator light is always off; after ignition, when the air-fuel ratio module fails, the indicator light is always on.
⑧	Ignite	Ignition indicator	When the controller is not igniting, the indicator light is off. When the controller is ignited, the indicator light flashes, and the blinking frequency becomes faster as the speed becomes faster.
⑨	Power	Power Indicator	The indicator light is always on when the controller is powered on; the indicator is off when the power is off

3.3 Instructions

● The menu consists of a setting interface and real-time data, and the real-time data is the default interface. Real-time data parameters are only displayed and cannot be changed by ∧, ∨ keys. The setting interface is entered by the OK button. After the setting is completed, press the ESC key to return to the real-time data interface.

● Real-time data display: working status, advance angle, speed, air-fuel ratio, throttle position, throttle current; display interface through the ∧ and ∨ keys to turn pages, as shown in the figure:

< UI >

Real-time data	
Working status	high speed
Advance angle	20
Rotating speed	1500

Real-time data	
Air-fuel ratio	0.95
Throttle position	200
Throttle current	0.50

● After the controller is powered on, the air-fuel ratio is 20.9±2 after the system is initialized. If the air-fuel ratio is not within this range, please power on again or check if the oxygen sensor is aging. The ideal air-fuel ratio is 1.0 after starting the engine, and the normal range is 0.7 to 2.0. If the air-fuel ratio is less than 0.7, it means that it is too rich, and the mixer or intake air quantity needs to be adjusted; If the air-fuel ratio is greater than 1.5, it means that it is too thin, and the mixer or intake air quantity needs to be adjusted;

● The parameter setting consists of engine setting, ignition setting, speed setting, system information, fault code and language selection. ∧ and ∨ key to select the setting bar, the selected menu is highlighted, press OK to enter the menu, ESC key returns to the previous menu, as shown in the figure.

< Set interface >

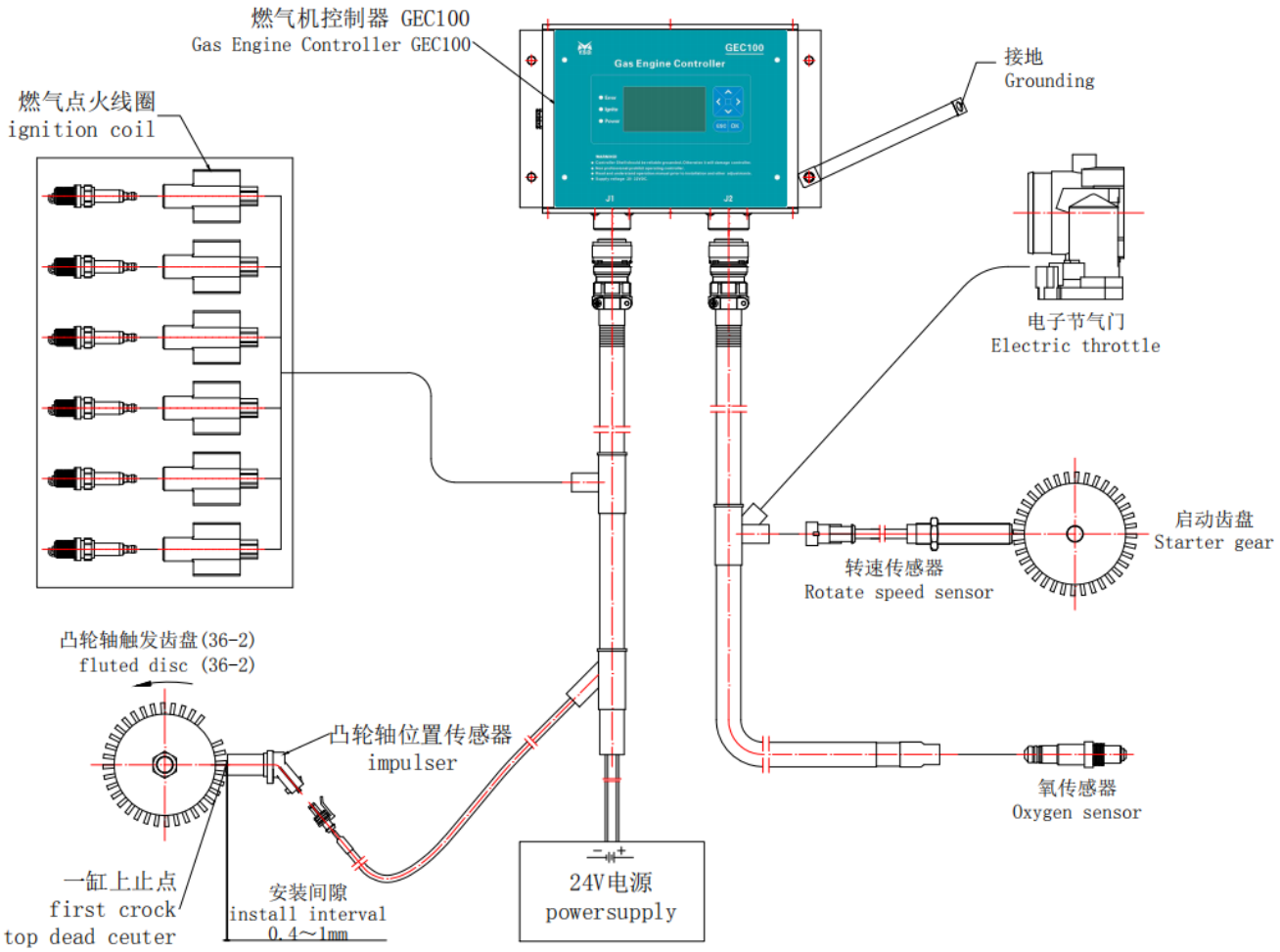
parameter settings
Engine parameters
Ignition parameter
Speed regulation parameter

parameter settings
system message
error code
language selection

四 List of supporting parts

S/N	Photo	name	quantity	brand	mark
1		Controller cable	1	Autosun	
2		Position execution valve	1	KZ series	
3		Camshaft position sensor	1	Autosun	
4		Speed sensor	1	C181568	
5		Ignition coils	6	Torch	
6		Spark plug	6	Torch	
7		Ignition coils cable	6	ordered	
8		sensor plate	1	Autosun	
9		Signal generator	1	ordered	
10		Gas mixer	1	Autosun	

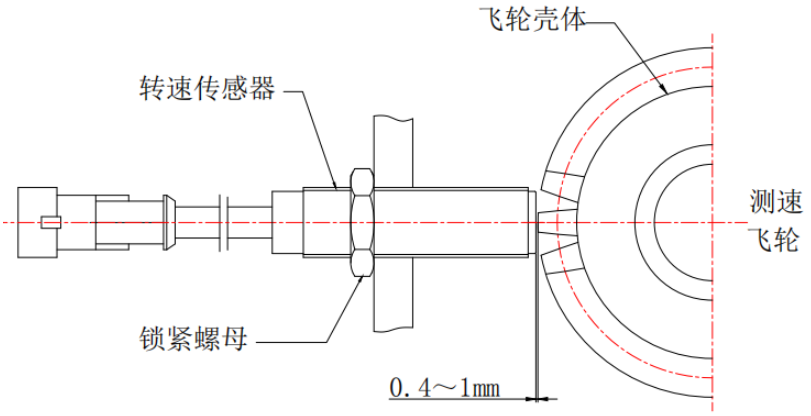
五 System installation

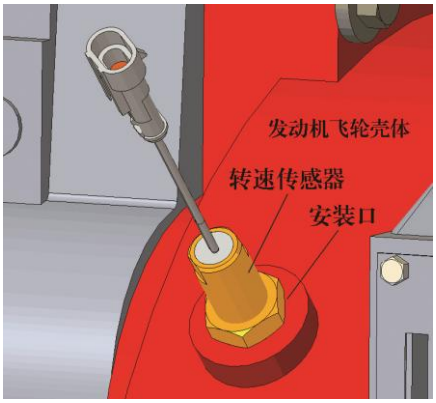


系统安装示意图

5.1 Speed sensor installation

The speed sensor uses a magnetoelectric sensor. The function of the speed sensor is to collect the engine speed signal and input the GEC100 to calculate the engine speed and control the electronic throttle opening to control the intake air volume, Thereby controlling engine speed. This sensor communicates with the GEC100 via a two-wire connector. Installation location: mounted on the flywheel housing as shown:





5.2 Camshaft position sensor installation

In the direction of rotation of the signal disc, the falling edge of the third tooth after the tooth is missing, corresponding to the top dead center of the first cylinder of the engine. When installing the camshaft position sensor, the sensor must be in a positive relationship with the signal plate and the distance between 0.4 and 1 mm is guaranteed.

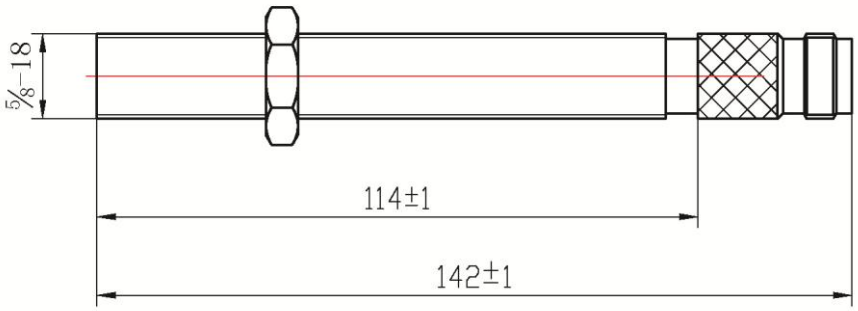


图 5.2.1 Camshaft position sensor size

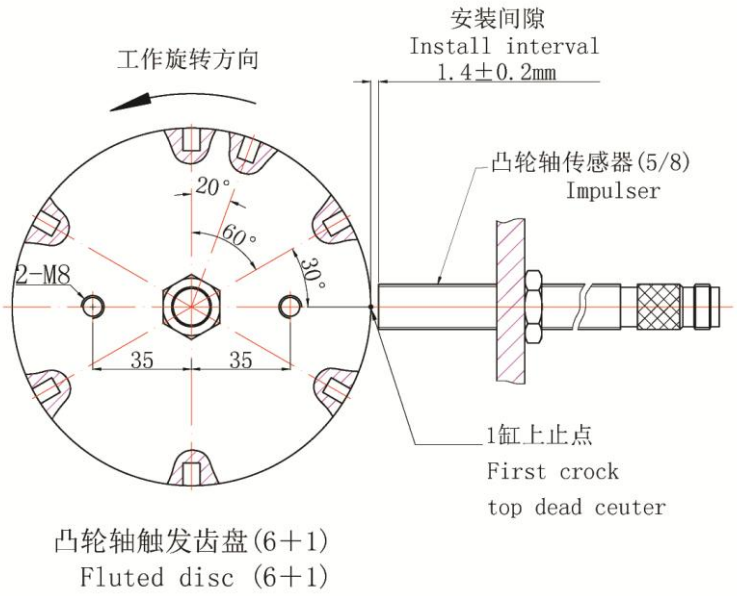


图 5.2.2 The signal triggers the relative position of the disc and the camshaft position sensor

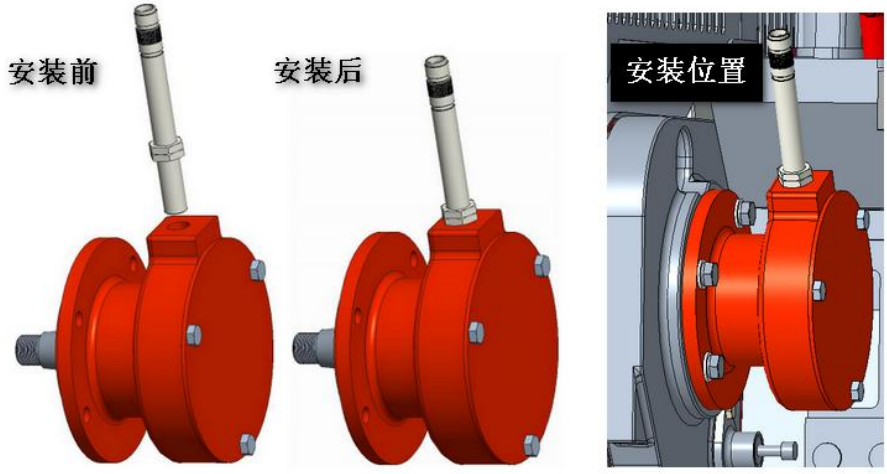


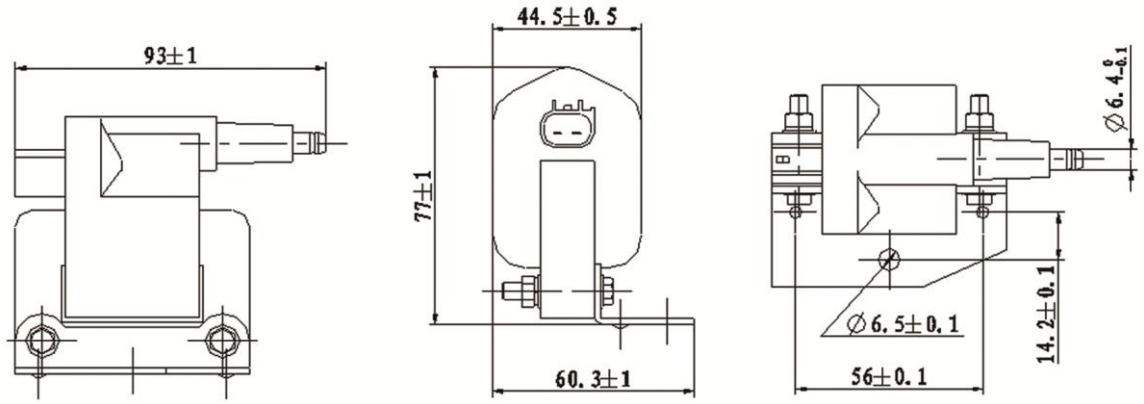
图 5.2.3 Camshaft position sensor installation

5.3 Ignition coil, spark plug and cables installation

The GEC100 sends an ignition signal to the ignition coil. The ignition coil generates a high-energy high-voltage, and the high-voltage line delivers a high voltage to the spark plug, and the spark generated by the spark plug discharges the mixture in the cylinder. This system uses an independent ignition coil, GEC100 controls the charging time and discharge time of the coil

Installation specification:

- Avoid touching the ignition wire and high voltage wire with liquid
- The plastic shell of the ignition coil is kept at a distance of at least 5 mm from the metal

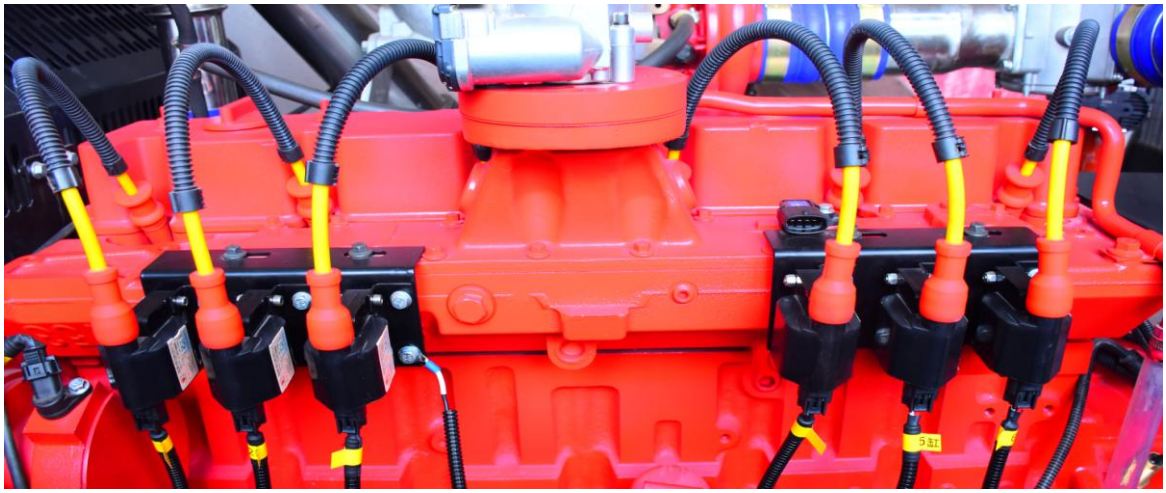


Spark plug installation specification:

- Use a spark plug wrench that matches the spark plug hex nut to prevent slippage
- Clean the spark plug seat in the engine, inspect the gasket, and then install the spark plug into the spark plug seat
- Install the spark plug vertically and tighten it by hand, then use a spark plug wrench to rotate 1/4 to 1/2 turn (if it is used for the second time, rotate 1/5 to 1/4 turn)
- Do not overtighten the spark plug as this may damage the engine or spark plug
- Thread size M14*1.25mm, tightening torque 28Nm

Cable:

- Insertion force 35～70N;
- Cable terminal pull-off force≥100N。
- Spark plug gap 0.8±0.1mm。



5.4 Electronic throttle installation

The electronic throttle is mounted on the engine intake manifold. The throttle body is fixed to the intake manifold by four bolts. The function of the electronic throttle is to control the intake flow of the engine and determine the operating conditions of the engine. The electronic throttle is completely controlled by the GEC100, and it generates a position signal to the GEC100 to precisely control the intake air volume of the engine cylinder, stabilize the engine speed, and obtain the necessary power.

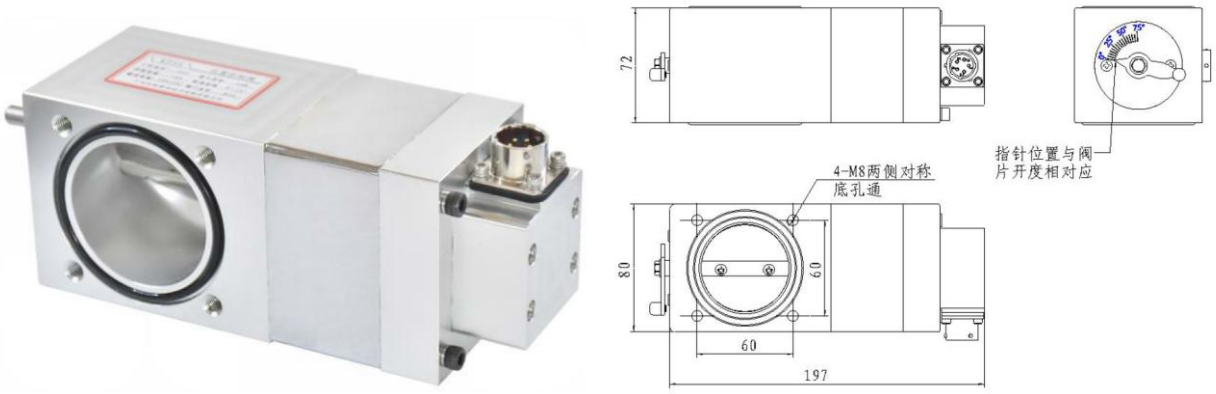


图 5.4.1 Electronic throttle installation size

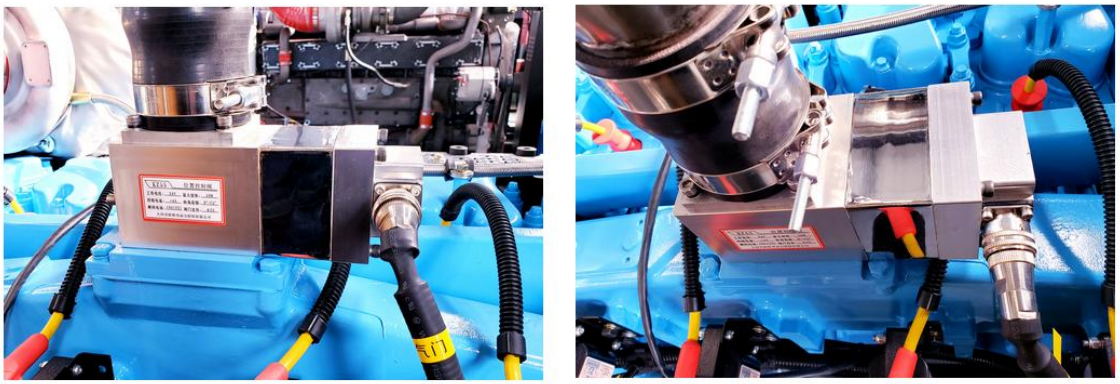


图 5.4.2 Position execution valve installation schematic

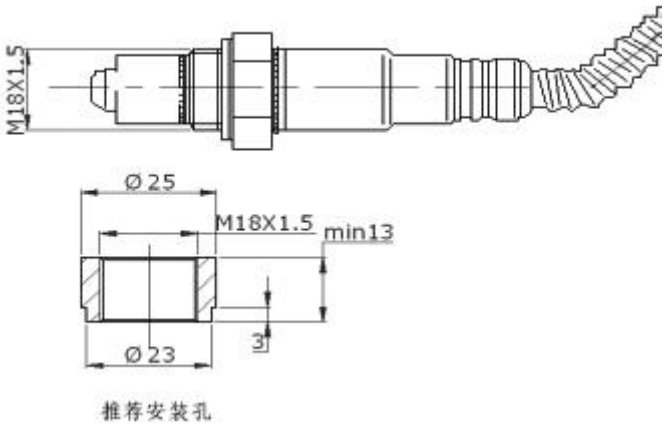
5.5 Oxygen sensor installation

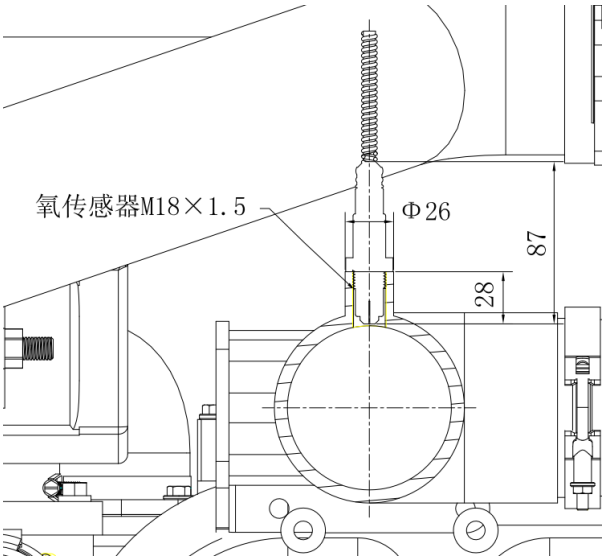
Installation position: The oxygen sensor is installed on the exhaust main pipe connected to the exhaust manifold, and is about 30cm away from the main pipe outlet.

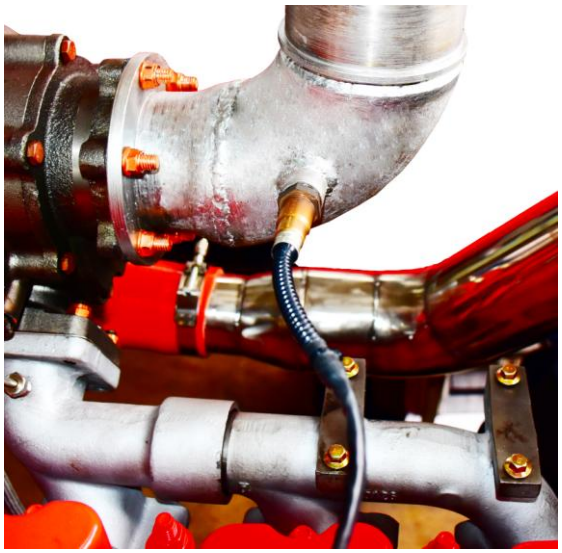
Installation specification:

- The head of the oxygen sensor is as close as possible to the most representative part of the exhaust gas component of the engine (ie, the mixture of exhaust gases of each cylinder measured by the sensor)
- Tilted 45° vertically with electrical connectors up
- When assembling, apply special grease to the threads. (The product has been greased)
- The sensor must be tightened to prevent leakage
- Do not force the joint too much when tightening, otherwise it will cause irreparable damage to the oxygen sensor.

Installation size:

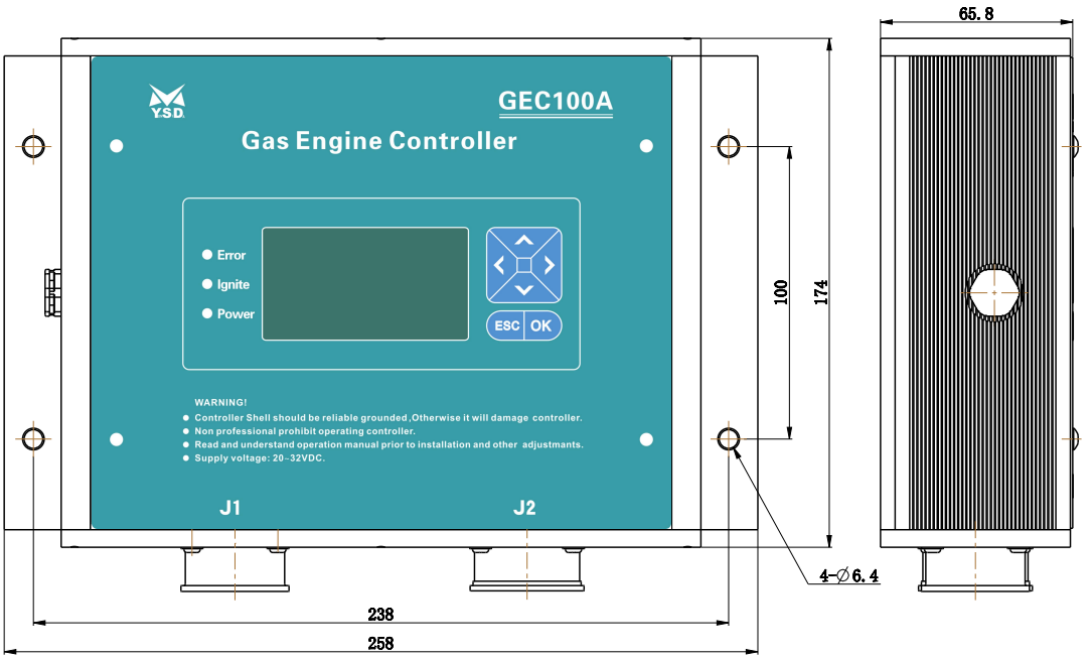






5.6 GEC100A installation

The GEC100 is mounted on the engine or installed in the control room.:



六 Possible faults, causes, and troubleshooting methods

- Improper operation of the engine is often the primary cause of various engine failures. In the event of a malfunction, it should first be confirmed whether the engine itself is in a normal state. Therefore, the control system should be disconnected from the engine first, and then the cause of the failure should be determined.

- The controller is abnormal during installation, debugging, and use. Please refer to Table 1 for processing. If the fault is not eliminated after checking the following table and the engine system is confirmed to be free, please contact the manufacturer. Users who do not have maintenance conditions should not blindly dismantle them to avoid expanding the fault.

fault	Possible reason	solution
Engine can't start	Gas pipeline is not connected or flow is not enough	After checking the pressure reducing valve, the KP gauge pressure should be kept greater than 2KP. If the pressure drop is 0 at startup, the intake pressure should be increased or the intake pipe diameter should be increased.
	Throttle Jam	Remove the electronic throttle and push the throttle valve plate by hand to confirm that the valve plate is flexible and the return spring force can push the valve plate to the closed position. If the stuck card should be replaced
	Controller has no power	Remove the plug from the controller. Measure +24V on +24V power and ground pins
	The stoping switch is not disconnected	Check the stoping g switch position and confirm that the stoping switch is reliable
	MPU installation clearance is too large	Remove the MPU and reinstall it as instructed. Manually cranking, check for interference
	MPU signal connection open	Disconnect the governor connector. Check the voltage between MPU+ and MPU- at least 1V when cranking
	Proportional mixer diaphragm damage	Replace the proportional mixer.
	Overspeed set point configuration is incorrect	Check the overspeed protection point configuration settings.
Engine start overspeed	Overspeed set point configuration is incorrect	Check the overspeed protection point configuration settings.
	Improper transient gain	If overspeed occurs during transients, increase

	setting	the gain to reduce overshoot.
	Improper start of fuel limit setting	Lower the rpm run threshold or lower the starting oil position.
	Flywheel tooth number parameter is incorrect	Reset the parameters via software.
	Speed throttle is stuck	Check the speed control throttle.
Engine instability	Speed PID adjustment is not suitable	Use the service tool to adjust the position dynamic parameters. In most cases, it can be defaulted.
	Inappropriate ignition advance angle	Adjust the ignition advance angle.
	The speed signal is intermittent or incorrect	Check the speed signal shielding. Check if the speed input line is clear.
	Spark plug carbon deposit, cable rust	Replace the new spark plug and cable.

Engine transients are too bad	Improper setting of speed control PID parameters	Adjust the PID parameters.
Idle speed is missing after starting	Ignition timing is incorrect	Check that the high voltage ignition line is connected correctly.
	Large air-fuel ratio	The air-fuel ratio λ value should be adjusted to 0.8 to 1.0.
Engine exhaust temperature is too high	The ignition advance angle is too small and the engine afterburn is severe	Increase the ignition advance angle.
	Air-fuel ratio is too small (gas rich)	The air-fuel ratio λ value is adjusted to be as large as possible by adjusting the gas intake amount.
Engine explosion	Engine super power operation	Reduce unit load.
	The ignition advance angle is too large	Adjust the advance angle to a reasonable value.
Engine plus insufficient power	Ignition advance angle is too small or too large	Adjust the advance angle.
	Insufficient gas pressure in gas line	Ensure engine gas intake pressure and intake pipe circulation area.
	Air-fuel ratio is incorrect	The air-fuel ratio λ value is adjusted to 1 to 1.15 by adjusting the gas intake amount.
	Valve leakage	Engine repair.
Ignition angle is incorrect	Measured and input angle error <5 degrees, mechanical installation error or viewing angle observation error.	Can be mechanically re-adjusted or software corrected.
	The angle is >5 degrees, the positive and negative poles of the sensor are reversed, or the gap of the spark plug is not suitable.	Reverse the sensor harness connector and replace the appropriate spark plug to ensure a clearance of 0.8±0.1mm.
Ignition angle frequently beats	Spark plug gap is not suitable	Replace the appropriate spark plug 0.8 ± 0.1mm.
There is a lack of cylinder after	Ignition timing is incorrect	Check that the high voltage ignition line is connected correctly.

starting	Wire harness loose	Re-plug the harness to ensure good beam contact.

Fault code number	type	Description
E01-Cylinder abnormality	Camshaft position signal failure	The camshaft position sensor cannot find the number of teeth or the number of teeth of the toothed disc does not match the control setting; please check the specifications of the toothed disc and the sensor installation, and whether the harness connector is reliable.
E02-Interrupt exception	Software failure	The controller software is confusing and enters an abnormal state; please restart the controller or contact the manufacturer.
E03-Speeding fire	Engine speed overspeed	If the engine speed exceeds the set overspeed, please check
E09-Overspeed protection	Engine speed overspeed	If the engine speed exceeds the set overspeed, please check
E10-Abnormal position	Electronic throttle position signal failure	The electronic throttle position signal cannot be detected. Please check carefully whether the electronic throttle is in good condition and the harness plug is reliable.
E11-Current protection	Electronic throttle current output protection	The electronic throttle current is too large. Please check the electronic throttle for stuck, and clean or replace the electronic throttle in time.