

GD12A

高能点火控制器 产品使用说明书



GD12A

IGNITION CONTROLLER

— Product description

GD12A series ignition controller is the latest high-energy ignition controller for gas engines developed by Autosun. Suitable for medium and large multi-cylinder V-type 12-cylinder engines with various gas fuels. This product has outstanding advantages such as high ignition energy, high reliability, wide application range and long life. The LCD display can display real-time operating information such as ignition energy, ignition advance angle, and engine speed. At the same time, function keys are provided, which can set the ignition energy conveniently and quickly according to the engine displacement and gas methane content and fine-tune the compensation of the single cylinder ignition advance angle.

二 Product functions and performance indicators

GD12A is a microprocessor-controlled high-energy output ignition controller. It consists of a 32-bit main controller and an ignition output part. It is a dedicated controller for gas engines, with up to 12 ignition outputs and up to 500mJ of ignition energy output. And the output energy can be adjusted, and the single cylinder ignition advance angle can be adjusted precisely. The controller uses wide voltage input and high voltage output. It is the first choice of high-energy ignition controller for gas engines.

The main parameters

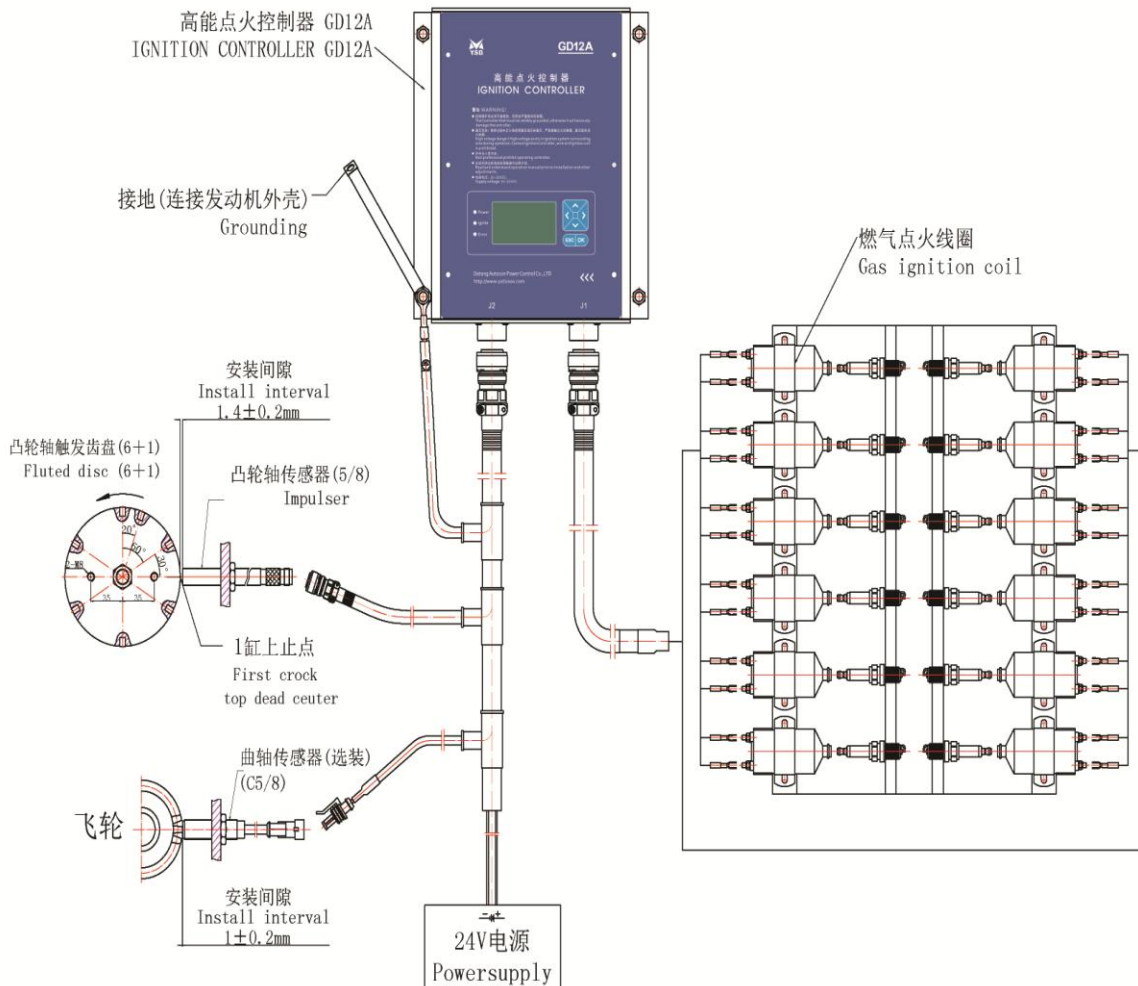
- ◆ Power supply voltage: 20 ~ 32V
- ◆ Working current: 7.0A max
- ◆ Power: 24V maximum power 100W
- ◆ Output: 12 outputs
- ◆ Output voltage: 250V
- ◆ Ignition output energy: 100 ~ 500mJ
- ◆ Dimensions: 258 * 292 * 66mm
- ◆ Net weight: 3.8kg
- ◆ Vibration conditions: <80Hz
- ◆ Working temperature: -30 °C ~ + 60 °C
- ◆ Ambient humidity: up to 85% non-condensing
- ◆ Impact: 2G
- ◆ Protection level: IP65

三 Working principle

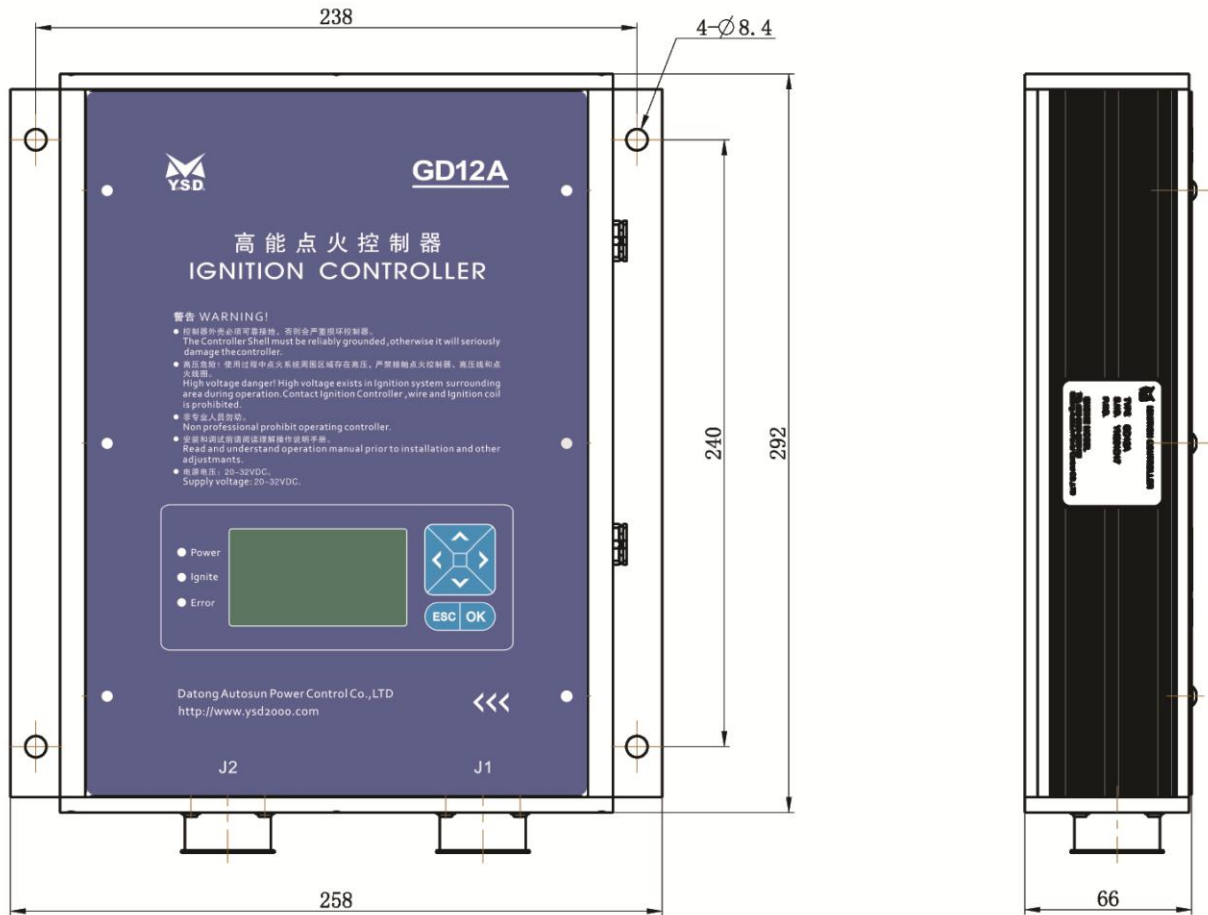
GD12A series ignition controller determines the ignition timing and ignition advance angle through the collected camshaft sensor signal as the cylinder judgment signal and the crankshaft signal as the auxiliary (optional). The collected camshaft sensor signal is sent to a 32-bit processor for processing. The controller converts the precise ignition signal generated by the CPU into a high-voltage ignition output signal with an output of up to 250V. And through a series of complex correlation control, the ignition output energy and ignition advance angle can be accurately controlled.

四 System composition

GD12A ignition controller system consists of a main controller, camshaft trigger gear, camshaft sensor, crankshaft sensor (optional), input wiring harness, output wiring harness, and grounding copper belt.

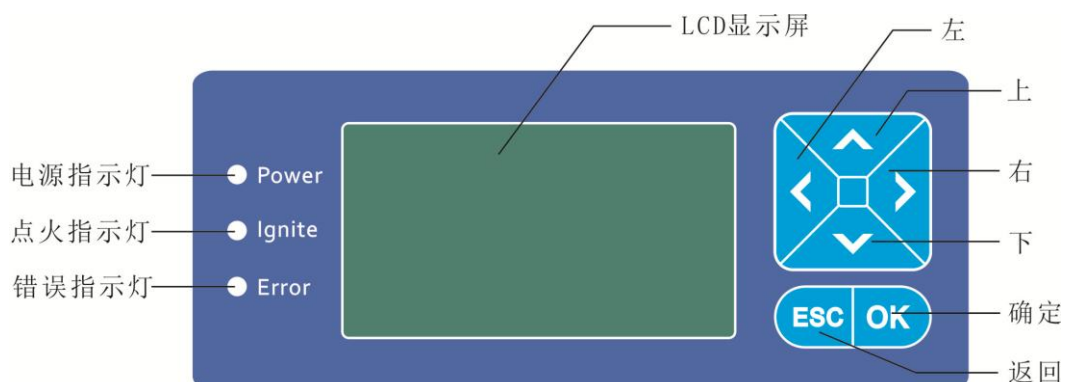


五 Controller assembly



六 Operation panel

The operation panel consists of three parts: three indicators on the left, power indicator, ignition indicator, and error indicator from top to bottom; the LCD area in the middle area; six function buttons on the right, the layout is as follows Illustration.



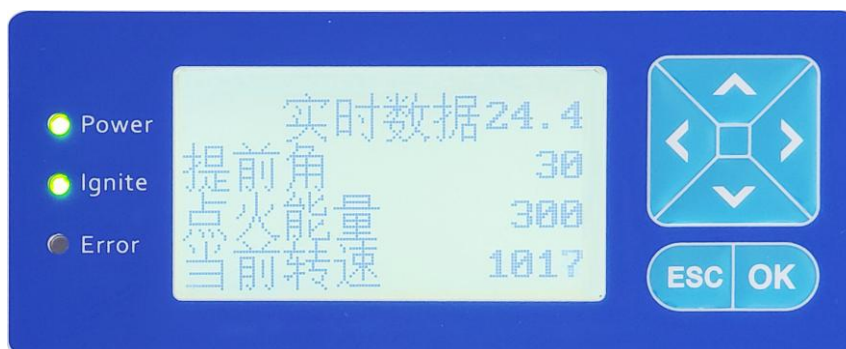
The working status of the three indicators from the left to the top of the controller operation panel are:

- Power: Power indicator, green after power on.
- Ignite: The ignition indicator does not light up after power-on, and flashes after starting ignition. The frequency changes with the speed of the speed.
- Error: The error indicator does not turn on after power-on, and the red light of the fault code flashes until it goes out after manually clearing the fault code.

As shown below

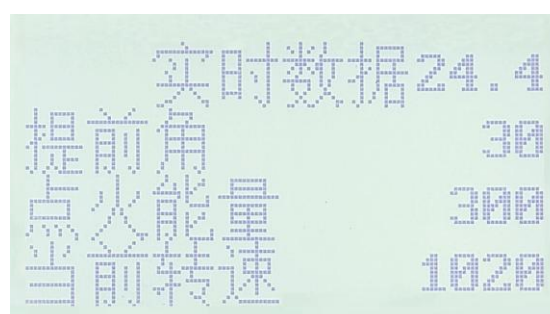


Indicator status and display of no camshaft sensor signal



Indicator status and display content of the camshaft sensor signal

LCD display: The middle part is the LCD display. For detailed configuration, please refer to the debugging method.



LCD display information example

The displayed contents are:

Current controller voltage: 24.4V

Ignition advance angle in the current state: 30 degrees

Ignition energy in the current state: 300mJ

Current speed: 1020r / min

Buttons: The right part is the operation buttons, which are up, down, left, right, back, and confirm buttons.

七 System installation method

7.1 Check external equipment

- Before installing the ignition control system, make sure that the engine body is working properly. Gas pressure and purity meet requirements.
- The engine body is reliably grounded. When the generator is working normally, there is no crosstalk AC voltage from the body casing to the negative electrode of the 24V power supply.
- Check the spark plug, high voltage wire and ignition coil to ensure that the above peripherals are normal. To use peripherals with uniform specifications, it is prohibited to mix peripherals with different specifications. Unqualified ignition coils, high-voltage wires, and spark plugs will cause the controller and engine to fail to work properly or cause damage to the controller and unnecessary personal injury!
- The parameters required for the ignition coil are: Disconnect the primary and secondary wires of the ignition coil, and measure with the multimeter ohm range.

primary: $0.6\Omega \pm 0.1\Omega$

Secondary: $11.0K\Omega +0.5K\Omega /-2.0K\Omega$



- power supply:

The power supply of the control system requires a 24V DC power supply with a current of not less than 10A. Adapt to 20V to 32V wide voltage to reduce line loss. Use a 24V to 32V DC power supply.

The power supply should be installed near the controller, so that the wiring from the power supply to the controller is as short as possible to avoid excessive losses on the line. Ensure that the power supply voltage measured by the controller is not less than 24V when the controller is working with a load. E.g:

If 24V battery is used for power supply, the length of the 2.5 square power supply line does not exceed 3 meters.

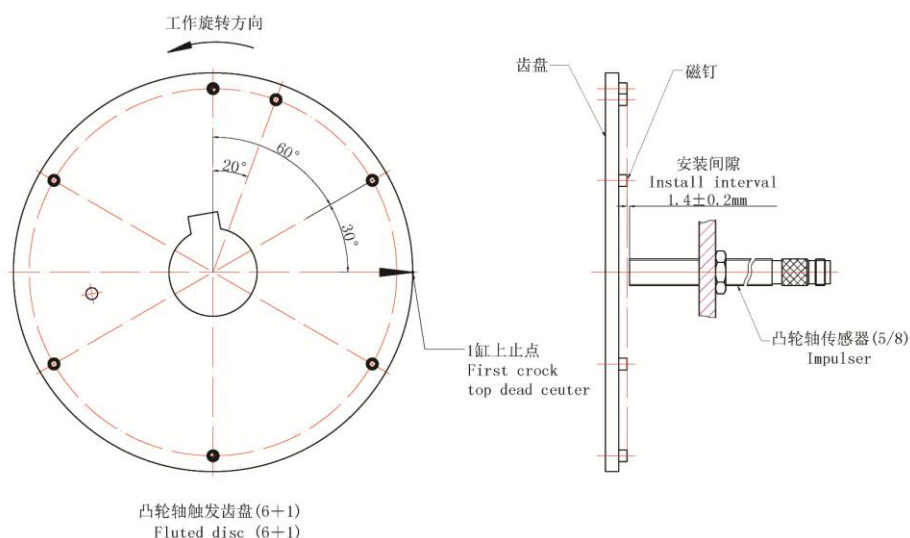
The wiring from the power supply to the controller must not go into the same wiring slot as the generator output cable! Do not run parallel to the cable! Keep as far away as possible from the generator output cable!

Check the power supply frequently to ensure a safe and standardized power supply system.

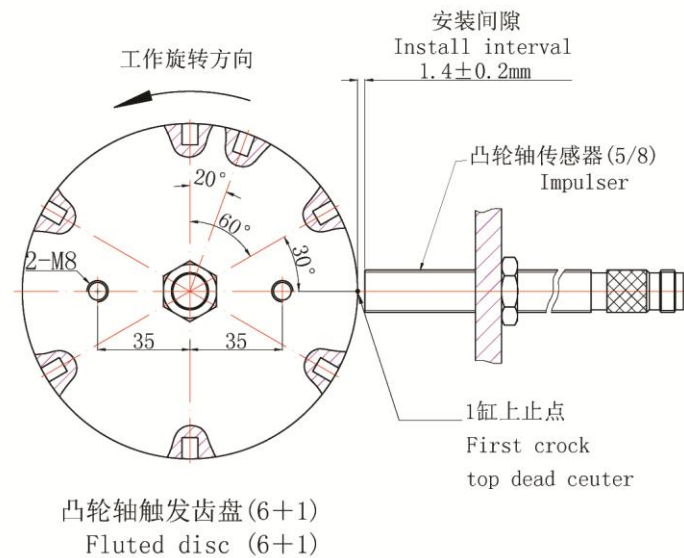
7.2 Install trigger chainring and sensor

According to engine type and application, GD12A is equipped with the following two camshaft trigger gears.

- Iron trigger gear: The trigger signal magnetic nail is located on the gear surface, and the sensor is installed perpendicular to the disk surface. The top dead center of a cylinder is shown in the figure:



- Aluminum trigger gear: The trigger signal magnetic steel is located on the side of the gear disk, and the sensor is installed on the side of the gear disk. The top dead center of a cylinder is shown in the figure:



Note: If the deviation between the installed sprocket and the actual advance angle is too large, it can be corrected by adjusting the position of the sprocket appropriately. !!!

Camshaft sensor:

Camshaft sensor adopts Hall effect sensor

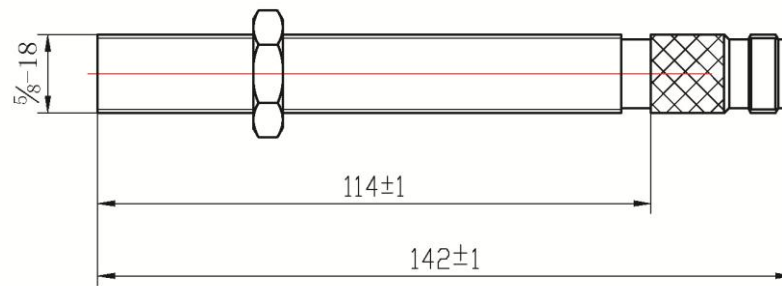
Thread specification: 5 / 8-18 UNF

Interface definition: A = signal B = DC5V-DC30V C = negative

Operating temperature: $-40\text{ }^{\circ}\text{C}$ -- $100\text{ }^{\circ}\text{C}$

Installation gap: 1.4mm from the highest point of the magnetic nail

Installation method: Turn the sensor to the highest point where it touches the magnetic nails, and then withdraw one turn in the opposite direction, then lock the positioning nut.



- The installation location of the camshaft sensor must have sufficient mechanical strength and must not exceed the specified temperature range. Sensors are used only for specific applications and the use of sensor signals for multiple purposes is not allowed. Make sure the mounting location is appropriate for calibrating the sensor.

- The clearance between the camshaft trigger gear and the cam sensor is 1.4mm. Fine adjustments are required depending on the engine. Make sure that the sensor and gear are installed firmly and reliably, and the gap is stable.

- The installation and wiring of the camshaft sensor and its signal wires must be kept away from high-voltage parts such as ignition coils and high-voltage wires, and the plug must be locked to ensure that the signal is not interfered by high voltage.

Note: The abnormality of the sensor signal acquisition will cause the ignition controller to not work properly! !!

Crankshaft sensor (optional):

Crankshaft sensor uses magnetoelectric effect sensor

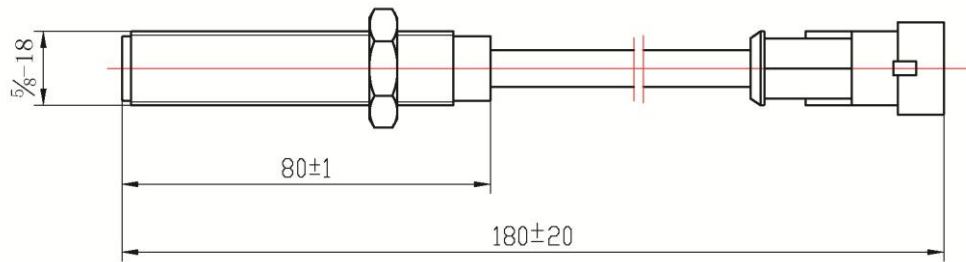
Thread specification: 5 / 8-18 UNF

Interface definition: 1 = signal 2 = negative

Operating temperature: -40 °C --70 °C

Installation clearance: 1mm clearance from the highest point of the gear plate

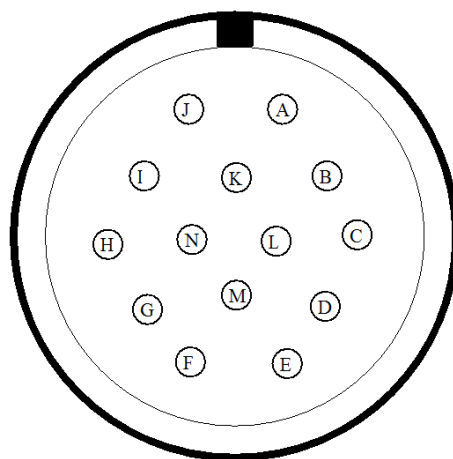
Installation method: Screw the sensor to the highest point where it contacts the toothed disc, and then withdraw 3/4 turn in the opposite direction, then lock the positioning nut.



7.3 Install the wiring harness

After the sprocket and sensor are installed, install the wiring harness for the controller.

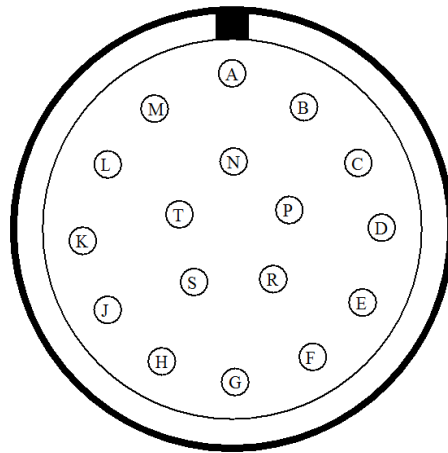
Divided into input wiring harness and output wiring harness, the pins are defined as follows:



控制器输入端

- H power supply positive
- G power supply negative
- J camshaft sensor positive
- I camshaft sensor negative
- K camshaft sensor signal
- N camshaft sensor shield
- E crankshaft sensor negative
- L crankshaft sensor signal
- M crankshaft sensor shield

- The input wiring harness is connected to the power supply, the camshaft sensor and the crankshaft sensor (optional).



控制器输出端

-A ~ M 12-way ignition output signal. The specific configuration should be determined according to the actual engine ignition sequence.

-T ignition output ground.

- The output wiring harness is used to connect to the high-voltage coil primary terminal of each cylinder of the engine to control the output of each cylinder.

note:

- When wiring input and output wiring, keep it as far as possible from the high voltage coil secondary, high voltage wire, spark plug, etc.

Keep the output cables away from the generator to reduce the interference of high voltage on the control system. Severe high-voltage interference will cause the controller to malfunction!

- Avoid contacting the wiring harness with high temperature parts of the engine block to prevent damage to the wiring harness and cause abnormal input and output signals.

- The working environment near the engine is harsh. In order to ensure reliability, bare terminal blocks should be protected by protective sleeves to avoid oil and rust.

7.4 Installation of the ignition controller

The GD12A ignition controller is installed on a solid fixed bracket to ensure good ventilation and heat dissipation, such as on a wall near the engine. The supplied shock absorber and ground strap must be installed. When selecting the controller installation location, you must ensure that the distance between the ignition controller and the sensors installed on the engine enables reliable signal transmission, while ensuring that sufficient space is left for maintenance and repair work. The ground strap is used as the ignition controller ground and must be used properly. For this reason, it must be ensured that the connection is free from defects. (Regardless of the installation method, the controller casing and the engine casing must be reliably connected. If they cannot be directly connected, they should be reliably connected through a grounding wire of 6 square meters or more)

installation steps:

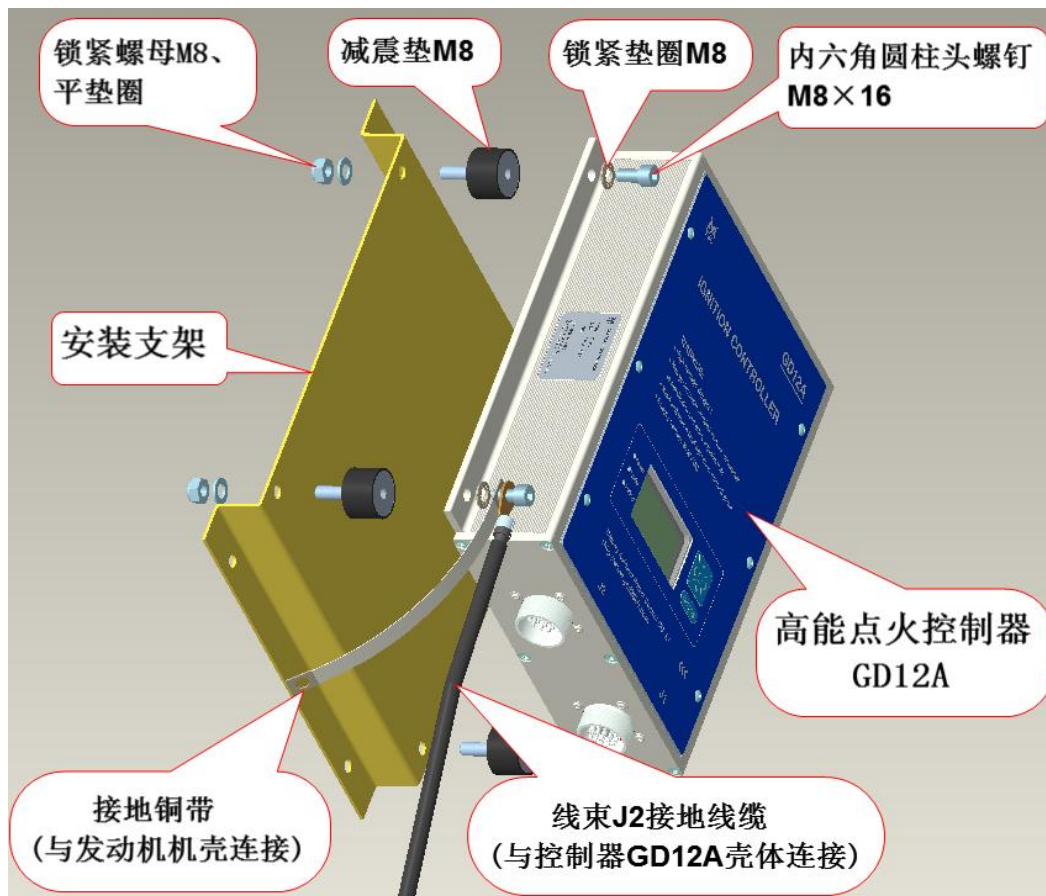
- Fasten 4 damping pads to the four mounting holes of GD12A. Use 4 M8x16 screws and 4 M8 lock washers.

- Fasten the GD12A to the selected mounting position using a vibration damping pad. Use 4 M8 flat washers and 4 M8 polyester lock nuts.

- Fasten the ground copper strap to the GD12A ground pin. Connect the ground copper strap to the side suitable for grounding.

- Install the controller wiring harness to the corresponding plug, and the ground terminal on the input wiring harness should be connected to the mounting bolts nearby, making good contact with the controller housing.

The installation is shown below:



note:

- The installation must use damping pads, the equipment must not be directly installed on the engine, otherwise vibration and heat will damage the electronic components.

- The specific form of the mounting bracket needs to be customized according to the actual installation environment on the site, ensuring more than 10 cm of cooling space on the back of the controller. It is best to have a position for active cooling.

- The ground terminal on the input wiring harness must be reliably connected to the controller housing.

- The grounding copper strip can be connected to any one of the four mounting holes of the controller according to the actual installation situation to ensure that the screws are tight.

The controller housing and the engine block are reliably connected.

- The installation location must not be subject to strong vibration or extreme ambient temperature and humidity, otherwise it may cause the controller to malfunction.

八 Ignition system adjustment

Note: The controller should be installed and connected to the input and output wiring harnesses reliably according to the installation method described above.

8.1 power ups

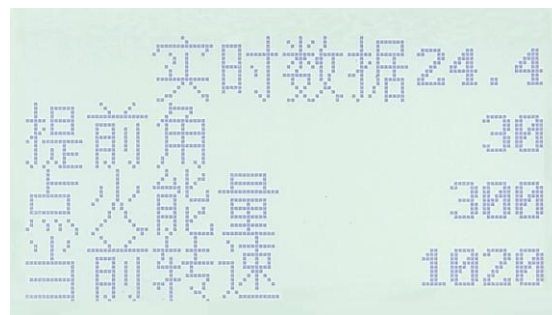
First power on the controller, but do not start the engine. The status of the controller panel is as follows:

-Indicator status: Power indicator, green.

Ignition light, off.

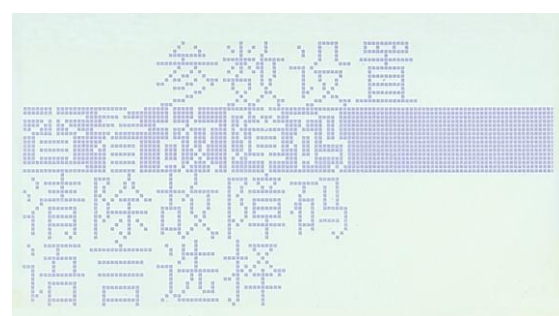
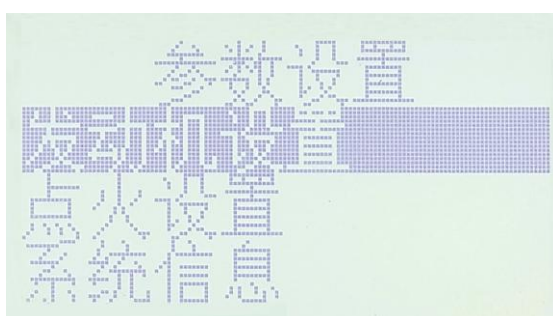
Error indicator, off.

-LCD display information is as follows:



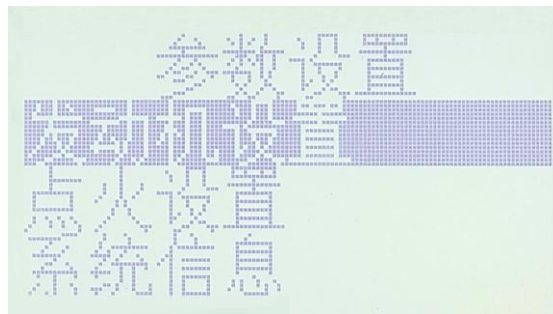
Under the current state (only the power is on but the engine is not started), the following settings are made:

- The interface consists of two parts: real-time data and parameter setting. The real-time data is the default interface. The parameters are only displayed and cannot be operated. Press the OK key in the real-time data interface to enter the parameter setting interface. Press the > and < keys to turn the page. Press ESC to return to the real-time data interface;

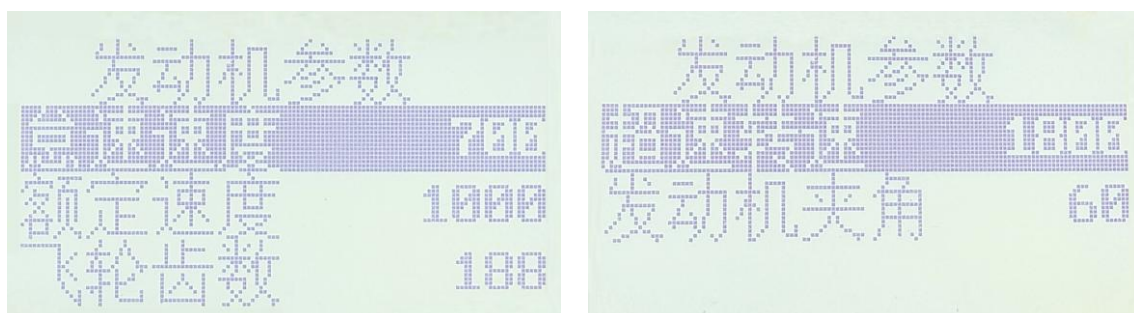


- The parameter setting interface consists of engine settings, ignition settings, system information, viewing fault codes, clearing fault codes, and language selection; ^ and v keys select the setting bar, the color of the selected bar is reversed, and the OK key enters the corresponding setting bar ESC returns to the previous menu.

8.2 Engine settings

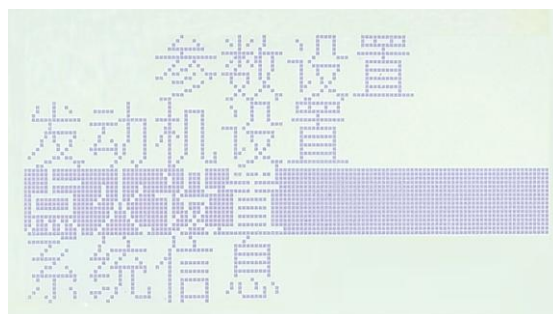


- Enter the engine setting, the idle speed is reversed by the selected color, press ^, v to switch the selected column. When you press OK, only the color of the number is reversed, which means that you can modify the number. Press ^ to add the number. v Digital subtraction operation, step 1; press >, < step 10 for numbers, after setting, press OK to save the corresponding parameters to the system, press ESC to not save the parameters, as shown in the figure:

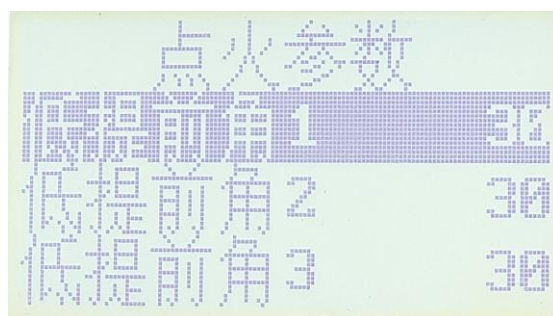
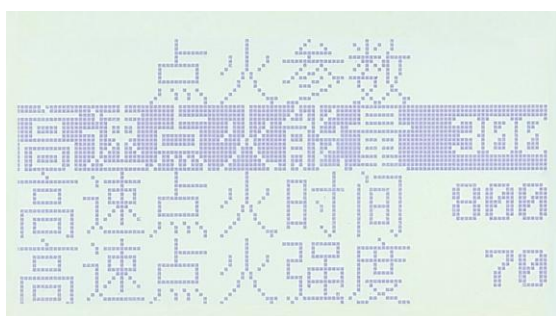


- In engine settings, the following engine related parameters can be set: idle speed, rated speed, flywheel teeth, overspeed speed, and engine angle are set according to the actual parameters of the matched engine.

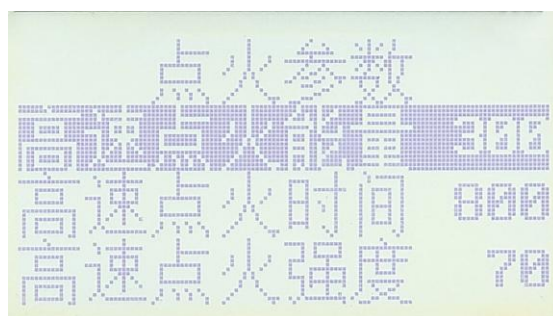
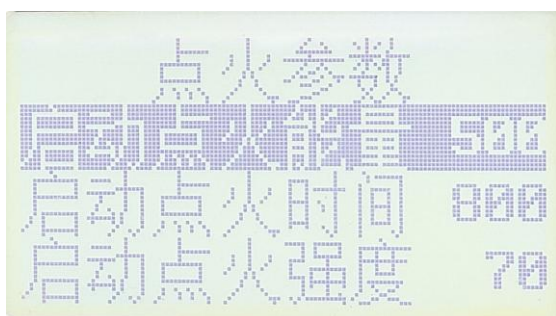
8.3 Ignition setting



- The controller can set the high-speed advance angle and low-speed advance angle of each cylinder separately. The advance angle parameter needs to be actually adjusted according to the matching engine. (The actual measurement angle and the controller setting angle will have an error of 3 to 5 degrees).

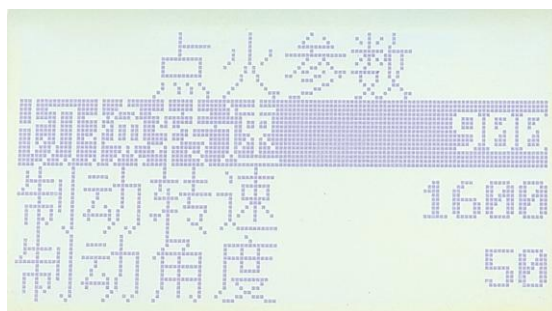


- The controller can set the starting and high-speed ignition energy separately. The optimal parameters have been set before leaving the factory without adjustment.

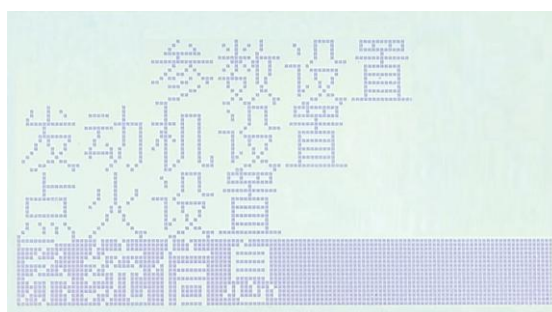


Note: The factory default parameters are not allowed to be modified arbitrarily, otherwise it will cause the controller to work abnormally and damage the controller and engine. (If you need to change the controller configuration parameters, please contact our company !!!)

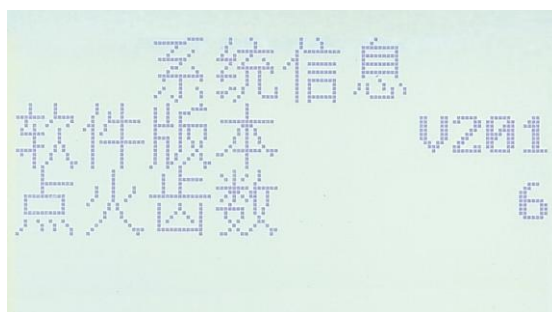
- The controller can set the high and low speed switching points, braking speed and braking angle. The optimal parameters have been set before leaving the factory without adjustment.



8.4 system message

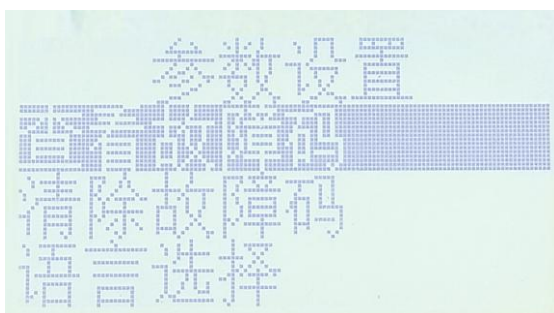


- The controller can display the following system information

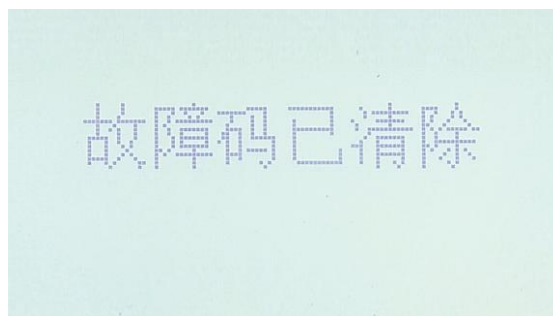
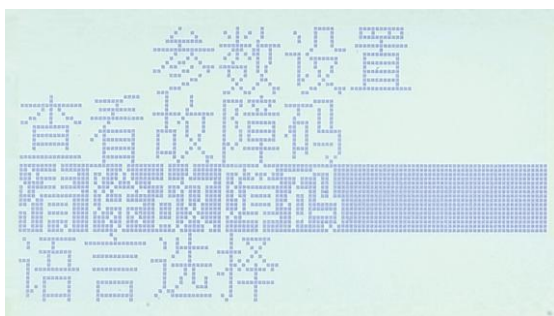


8.5 Viewing and clearing fault codes

- When the controller detects an abnormal signal and an abnormal fault occurs during operation, it will display a fault code and the Error indicator will flash red. To view the fault code, you need to enter the following interface to view the corresponding fault code.



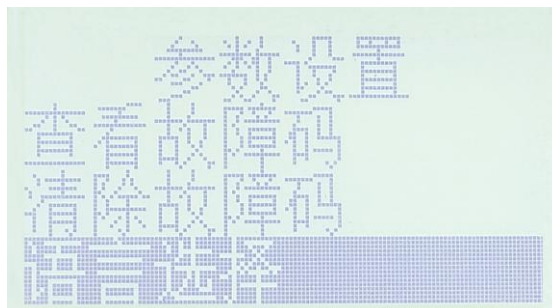
- After removing the fault, you need to manually clear the fault code, otherwise the fault code will always exist and the red light will keep flashing.



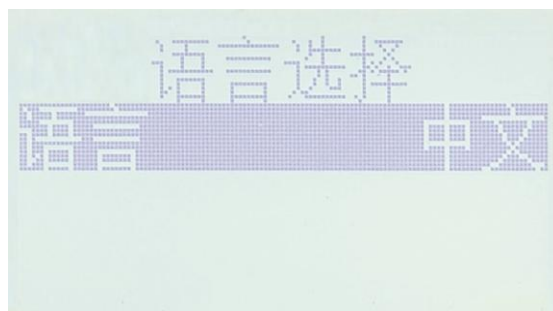
The meaning of the fault code is as follows:

error code	Description
E04-Cylinder block misfire	Misfire detected in cylinder block; please check ignition coil, spark plug, wiring harness, etc.
E05-Camshaft interference	The camshaft signal can be detected, but the signal is continuously disturbed and cannot meet the conditions of judging the cylinder; please check the sensor clearance, wiring or grounding reliability.
E06-Camshaft failure	The camshaft signal cannot be detected, there is a short circuit or an open circuit; check the sensor or wiring.
E07-Calculation abnormal	The ignition angle setting exceeds the preset range and cannot meet the ignition output; please check the settings of "Ignition Angle" and "Engine Angle" parameters.
E08-Interrupt exception	Fatal error, please contact the manufacturer.
E09-Overspeed protection	The speed of the camshaft exceeds the set overspeed value; check the engine operating conditions or the "overspeed speed" parameter setting.
E12- crankshaft interference	The crankshaft speed signal is disturbed and cannot be synchronized with the camshaft signal; please check the sensor clearance, wiring or grounding reliability.
E13- crankshaft failure	Unable to detect crank signal, short circuit or open circuit; please check sensor or wiring.

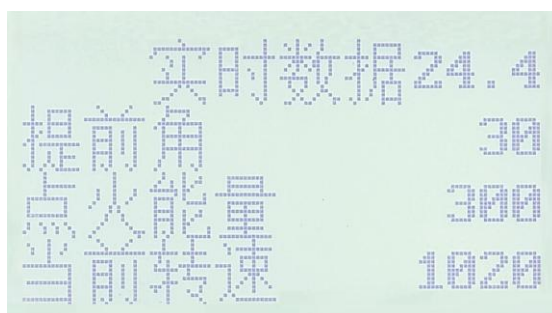
8.6 language selection



- The controller can switch the language of the display interface, provide Chinese and English interfaces, and modify it in this option.



- After setting the controller, return to the real-time data main interface.



- Then you can start the engine

九 Common anomalies and treatment

If the controller does not work properly, please refer to the following:

unusual phenomenon	Cause Analysis	Processing method
No speed signal	Trigger gear not matched .	Replace the gear of the specified model with the engine.
	The sensor is damaged.	Replace the specified model sensor.
Speed signal is unstable	Trigger gear installation is unreliable, swinging .	Re-install the trigger gear to eliminate wobble.
	The gap between the sensor and the chainring is not appropriate.	Adjust the gap between the sensor and the gear to the correct range.
	Dirt on the sensor head.	Thoroughly clean the sensor and reinstall it.
	Eccentric sprocket is triggered.	Re-install or replace the new gear to eliminate eccentricity.
	Defective individual magnetic steels of the trigger gear.	Replace qualified new gear.
	Damaged sensor wiring.	Replace the wiring harness again.
	Defective sensor connection.	Replace the wiring harness again.
Setting parameters are missing	Set during engine operation.	Setting parameters needs to be performed when the power is on but the engine is not running.
Ignition controller stops output	The peripheral is abnormal.	Check the ignition coil cable for short circuit and replace the qualified ignition coil cable .
	Operating at temperatures exceeding the maximum allowed by the equipment.	Control the ambient temperature to ensure heat dissipation and ventilation within the operating range allowed by the controller.
	Condensation on the controller surface.	Control the ambient humidity within the working range allowed by the controller to ensure dry ventilation
	Speeding. The speed exceeds the set misfire speed.	Turn off the power, and then turn on the system after troubleshooting the engine.
	Controller power supply is abnormal.	Check the power supply to make sure that the power supply is within the allowed operating range of the controller. Meet the voltage and current required by the controller.
Low ignition energy	Ignition coil failed.	The internal resistance of the ignition coil exceeds the normal resistance value. Replace with a new qualified ignition coil.
	The power supply is abnormal.	The power supply voltage is less than 24V, the power supply line is too long, the line loss is large, and the power supply is damaged. All the factors that cause the power supply abnormality can cause the controller to stop working or lack energy.
Engine without cylinder	Engine control is abnormal.	Eliminate engine abnormalities, abnormal speed control and abnormal air-fuel ratio control.
	Harness is abnormal.	Check the wiring harness for broken wires or virtual connections, resulting in no output signal on individual ignition coils.
	Ignition coil is abnormal.	Replace the qualified ignition coil.
	The spark plug high-voltage line is abnormal.	Replace qualified spark plugs and ignition coil cable



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