

ROJO

Manual of EFI system



Zhejiang Langjie Electronic Co., Ltd.

www.chinaefi.com

I. Composition and working principle

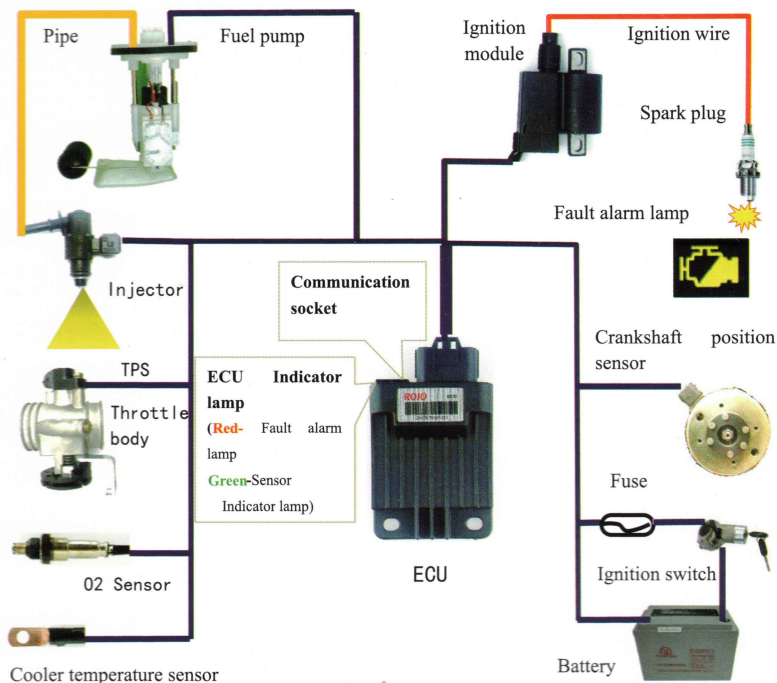


Fig. 1 Schematic diagram of EFI system

The functions of the EFI are fuel injection management and ignition management, that achieved by the following parts:

- 1、**ECU**(Electronic control unit), undertakes the task of receiving signals from sensors, making control strategies, and outputting the control signals.
- 2、**Fuel supply device**, composed of fuel pump, pipe and injector. The fuel pump is installed in the tank, it pressurizes the fuel to 2.5 bar. The injector is installed in the engine intake pipe, it performs fuel injection timing and amount.
- 3、**Ignition device**, composed of ignition module, ignition wire and spark plug. The ignition module contains DC capacitor igniter and ignition coil, it boosts the 12V battery voltage to more than 15,000 V, and transfers it to the spark plug to produce spark discharge.
- 4、**Sensors**, including:

- (1) O2 sensor, mounted on the exhaust pipe, its function is detecting the oxygen concentration in the exhaust gas and achieves closed-loop regulation of the fuel mixture concentration. It outputs alternating signal from 0 V to 0.9V when in closed- loop regulation state.
- (2) Cooler temperature sensor, is installed on the engine cylinder head, it is used to measure the engine temperature. It can affect added fuel injection amount in start-up conditions.
- (3) Crankshaft position sensor(TPS), is integrated in the magnetic motor, is used to measure crankshaft angle signal, which is the time base for injection and ignition timing control.
- (4) Throttle position sensor, which is used to measure the throttle valve rotation angle.

5、Others, including:

- (1) Throttle body, which controls the intake air amount through the throttle line.
- (2) Fault alarm lamp, installed on the dashboard, is used for fault alarm.
- (3) Battery, ignition switch and fuse, they undertake the task of power supply to the EFI system.

II. Precautions in maintain

- 1) Every 5,000 km running, you should take out of the fuel pump from the tank and replace the fuel filter on it, otherwise injector plug or the pump stuck might occur.
- 2) Don't arbitrarily change the connection location of the signal ground, or the EFI system will works abnormally.
- 3) All the electrical plug should be combined firmly, or they will separated in using.
- 4) Wire harness and pipes should be bundled by standard, or it will break in use, and resulting in short circuit or oil spills.
- 5) When the spark plug cap or spark plug is replaced, the replacement must be resistance type, the resistance value is between $4K\Omega \sim 8K\Omega$.
- 6) When the rectifier is replaced, the replacement must be qualified full-wave rectifier, otherwise it will make the EFI system working unsteadily. Simple judgment method: when the engine is running, move away the fuse above the battery, if the engine can still working normally , it is qualified.

III. Common troubleshooting methods

1、Startup failed

- 1) If the Fault alarm lamp lights, you can pull the throttle twice in one second to make the system into flashing code mode. Determine the faults referring to Annex 1 "Flash code description of Fault alarm light".
- 2) You can also determine the faults referring to Annex 2 "ECU indicator light".
- 3) If the problem remains, pull out the ignition wire end that connected to the spark plug, keep about 1 cm out of the engine body or motorcycle frame, start the motor, if no spark, or weak spark occurs, exclude and deal with the following failures by these steps till the spark becomes normal: Ignition module connector failure, ignition module failure, the gap between the crankshaft position sensor and the magnet motor (normal gap is between 0.3 ~ 0.8mm)
- 4) If the spark is normal, but startup is still failure, remove the injector from the intake pipe (note: keep the pipe connected to it), start the motor, observe the fuel spray and the atomization quality, if

abnormalities, exclude injector or pump failure by replacement method, you can also measuring pipe pressure by a pressure gauge, the normal pressure is more than 2.4 bar.

Note: When testing spark, make sure there is no gasoline around the spark, and keep away from the spark plug mounting hole, otherwise fire may occur.

2. Misfire

- 1) Exclude the following factors firstly: Whether the spark plug or spark plug cap was replaced by non-resistive type? Whether the rectifier was replaced by semi-wave type? Whether the connection location of the signal ground was changed? If the above errors exist, correct them firstly.
- 2) If the problem still exists, you can then exclude the possibility that idling intake air is too low. Do idle intake air adjustment according to Annex 3.
- 3) If the problem still exists, try replacing the spark plug.
- 4) If the problem still exists, check the fuel pressure by a pressure gauge(normal pressure is more than 2.4 bar). You can also try replacing the pump.
- 5) If the problem still exists, try changing the ignition module.
- 6) If the problem still exists, try changing the injector.

3. Low power output or exhaust pipe blasting

- 1) Try to do a fast self-learning referring to Annex 3;
- 2) Check the supply pressure of the fuel pump by pressure gauge or try replacing it.
- 3) If the problem still exists, try replacing the injector.

Annex 1 Description of the flashing code

If the Fault alarm lamp light, you can pull the throttle twice in one second to make the system into flashing code mode. The code is described in the following table

flashing code	Fault source	Fault information	Troubleshooting
2	Idle valve(Note: Applies only to types with idle valves installed)	Open or short circuit	Check the connector, measure the resistance between the idle valve electrodes, If circuit open or shot fault occurs, replace the idle valve.
3	Electromagnetic interference	The ECU is reset by interference	Check according these steps: Whether the spark plug or spark plug cap is with resistance? Whether the connection location of signal ground has been changed? whether the rectifier is failed?
4	Crankshaft position sensor	Open circuit error, or the signal is disturbed	Is the connector is well connected? Is the distance between the wiring harness and the ignition wire is more than 2 cm? Is the spark plug and spark plug cap with resistance?
5	Battery voltage	Voltage is more than	Replace the rectifier (Note: It must be full

		15.6V	wave type)
6	O2 Sensor	Oxygen heating circuit is open or short; Oxygen signal is abnormal	Check the O2 sensor connector. If the problem cannot be resolved, try replacing the sensor
7	Cooler temperature sensor	The signal is over reasonable range	Check the connector, or replace the sensor
8	Injector	Open or short circuit	Check the connector, try replacing the injector
9	Pump	Open or short circuit	Check the connector, try replacing the fuel pump
10	Ignition output	Open circuit	Check the connector, try replacing the ignition module
11	Throttle position sensor	Throttle calibration error, or TPS output is over reasonable range	Turn on the key switch, re-calibration throttle: Quickly pull the throttle to maximum opening and then release, repeat more than two times. If the problem is not resolved, try replacing the TPS.
12	ECU	Software failure	Firstly eliminate interference factors just as indicated by code 3, then replace the ECU
13	Intake air temperature	The signal is over reasonable range	Replace ECU

Annex 2 Description of the ECU indicator lamp

ECU indicator lamp, located on the ECU, as shown in Figure 1

Color	Name	Normal Performance	Abnormal Performance and Notice	Troubleshooting method
Green	sensor indicator lamp	In stop condition, it indicates throttle position. The lamp lights when the throttle is in the maximum or minimum position	If the lamp can't light in the two limit position, throttle calibration error occurs	Re-calibration throttle opening by quickly pull the throttle to maximum opening and then release, repeat more than two times. If fault remains, replace TPS
		In start condition, it indicates crankshaft position signal	Keep off when start the motor	Check the corresponding connectors, wiring harness and the gap between the sensor and the magneto motor

		Indicates the O2 sensor signal when the engine is in closed-loop adjustment, it lights 1-3 times per second after the engine is warming up.	keep off, indicating no O2 signal received	Check the sensor connector, wiring harness, if the fault remains, try replacing the O2 sensor
Red	Fault alarm lamp	Same with the fault alarm lamp on the dash board.	If it is always on, pull the throttle twice in one second to make the system into flashing mode.	Refer to Annex 1 "Description of the flashing code"
			If unstable light and dark during engine operation, ECU is likely to get interfered	Eliminate the interference factors referring to flashing code 3 in the Annex 1

Annex 3 Adjustment of idle intake air & fast self-learning

The purpose this function is to quickly eliminate the engine dispersion, and make it into the best state, the steps are as follows:

(1) Pull the throttle to the maximum opening, and then turn on the key switch, release it in 1 second, if the fault alarm lamp is on, it indicates that the system has been in the "fast self-learning mode";

(2) Start the engine, pull the throttle to make the engine warm up quickly, loose the throttle, observe the fault alarm lamp (or ECU red lamp) after the steady idle. If the idle intake air is suitable, the fault alarm lamp will quench after the idle note completes self-learning. But if quick flashing occurs, it means that the idle intake air is too less, You need to adjust the "idle adjustment screw" counterclockwise (shown in Figure 2), else if slow flashing occurs, it means excessive intake air, you need to adjust clockwise.

(3) There are 5 self-learning nodes, the corresponding throttle opening are: 0% (idle opening), 8%, 25%, 50%, 100%;

(4) When the throttle close to the above nodes, the fault alarm lamp will light, stay in the node till the self-learning process of this node finishes and the lamp is off, pull the throttle to the next self-learning node;

(5) When all the nodes have completed self-learning, the engine will automatically stop running. If the engine is still running, it means there is still uncomplete node, pull the throttle to find the node

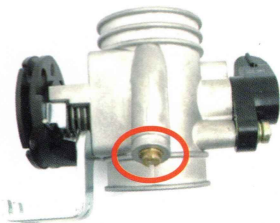


Fig. 2 idle adjustment screw

that the lamp lights, stay till the lamp is off, then turn off the key switch to finish the self-learning process.

Performance Testing

- (1) Start again, pull the throttle observe: weather the power output is strong? Weather the maximum speed can be reach? relax the throttle quickly and observe: Is there any exhaust pipe blasting or flameout phenomenon occurs?
- (2) After the engine is completely cooled, observe whether the cold start is well;
- (3) If all is successful, self-learning process can be finished, otherwise, do the above process again.

Annex 4 Description of the wiring harness

The diagram of wiring harness is shown in Figure 3.

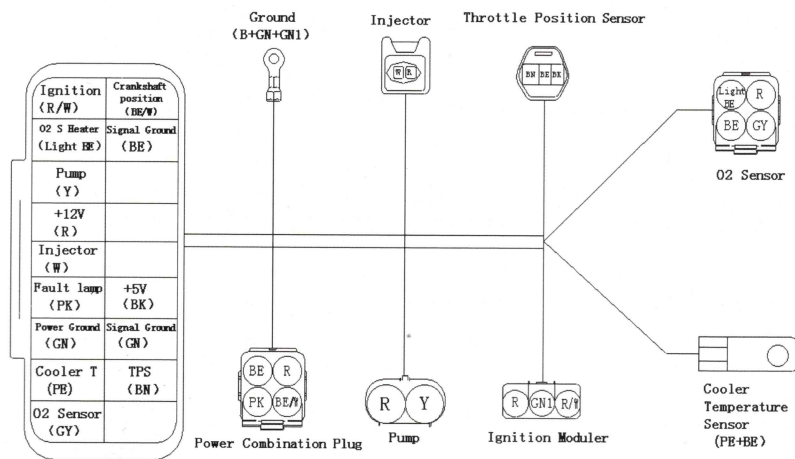


Fig. 3 Wiring harness diagram

WeChat: rojo0576



Website: www.chinaefi.com

Customer service QQ: 1181717138

Customer service TEL: 086 0576 85165756