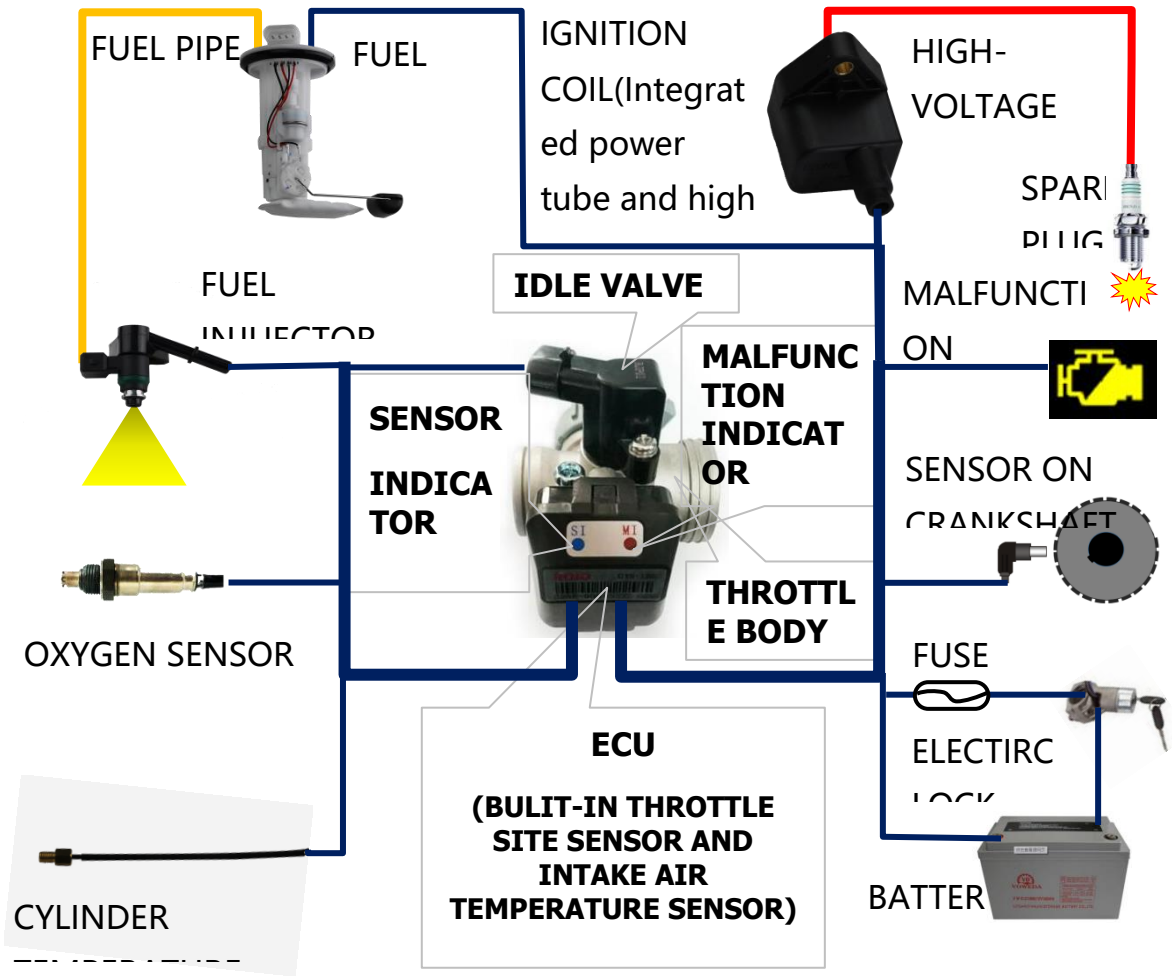
ZHEJIANG KAYO MOTOR CO., LTD

USER'S MANUAL
LARGE CALIBER EFI SYSTEM OF K6 EFI ENDURO

CONTENT

WORKING PRICIPLE



PIC.1: SCHEMATIC DIAGRAM OF EFI SYSTEM

The functions of EFI System include fuel injection and ignition management, which is achieved by the following mechanism:

1. ECU: Installed under the seat cushion, built-in intake air temperature sensor (THA), responsible for receiving sensor signals, formulating sensor strategies, and control signal transmission.
2. Fuel Injection:Be composed of fuel pump(with fuel filter at the inlet of oil pump),fuel pipe and fuel injector.The fuel pipe is installed in the fuel tank.
3. Ignition Device:Be composed of ignition coil, high voltage cable and spark plug. It is integrated power tube and high voltage coil in the Ignition Coil.
4. Throttle Body:Control the air intake of engine through using the Rotation Angle of throttle valve plate.
5. The idle speed air flow adjustment bolt, which is installed on the throttle body and manual control, is used to adjust the air intake in idle speed conditions.
6. Sensor: Including (1)oxygen sensor,installed on the exhaust pipe, used to detect oxygen concentration in exhaust gas; (2)Cylinder temperature sensor, installed on the engine cylinder head; (3)Crankshaft Position Sensor (also named trigger head), used to supply beacon signal, and provide time reference for fuel injection and ignition control; (4) Intake air temperature sensor, placed inside of ECU; (5) Throttle position sensor (TPS), used to measure the opening of the throttle valve plate.

Others: (1) Malfunction alarm indicator, installed on the ECU; (2)Battery, electric door lock switch, fuse; (3) Relevant component of EFI:rectifier.

Maintenance Points

1. Do not add too much oil (the amount of oil is 1.5L), otherwise it will cause blue smoke from the exhaust pipe, damage the oxygen sensor, and cause the engine power to drop.
2. It needs to remove the fuel pump and change the filter bag on the head of fuel pump after each 50 hours of driving, otherwise the fuel pump will be stuck or the fuel injector will be blocked.
3. Do not change the connection point of the ground wire at will, otherwise the EFI system will not work normally.
4. All connectors must be combined in place, and the power supply and grounding of the EFI system must be reliable to avoid loosening during use.
5. The bundling of wiring harness and tubing must comply with the specifications to avoid pulling and friction during use.
6. To replace the high-voltage cap or spark plug, you must use a resistance type (with R-shaped) resistance of about 5KΩ, otherwise it will interfere with the operation of the system.
7. The wiring harness should be as far away from the high-voltage line as possible, and the EFI wiring harness must not be bundled with the high-voltage line, otherwise it will interfere with the system work.
8. It must use a dedicated full-wave rectifier for EFI, otherwise the EFI system will not work stably.

TROUBLESHOOTING STEPS

1. Determine the fault through the flash code of the ECU malfunction indicator and the sensor indicator.
2. Determine the fault by reading the fault code and its explanation through the fault diagnosis instrument.
3. Determine the fault by fire test and oil test.
4. Determine the fault by replacing one by one.
5. Check the engine's own faults (such as low cylinder pressure).

DESCRITION OF ECU INDICATOR LIGHT

COLOR	NAME	NORMAL CONDITIONS	ABNORMAL CONDITION ADN REMARKS	TROUBLESHOOTING
BLUE	SENSOR INDICATOR (SI)	When stopping, the throttle is at the minimum or maximum opening, the blue light is always on.	No light indicates an error in throttle calibration.	Reference to six, relabel the throttle.
		When starting, Every time the crankshaft rotates, the blue light flashes once.	No light indicates that there is no beacon signal, or the signal is too weak	Check if the magneto gap is too large

		After a successful start, the indicator light would be off if the throttle opening is less than 2%.	After the steady light,if it flashes quickly (4 times per second), it means the idle air is too slow; if it flashes slowly (1 time per second), it means the idle gas is too fast.	Adjust the idle speed air flow adjustment bolt counterclockwise or clockwise respectively until the light goes out.
		After a successful start, on the condition that the throttle opening is greater than 2%, the light would be on if the oxygen sensor voltage is high, otherwise it would be off.	No light indicates no oxygen sensor signal is received.	Check the plug and replace the oxygen sensor.
RED	MALFUNCTION INDICATOR（MI）	After power on, it would be on for 2 seconds and then turns off if there is no fault; otherwise it would flashes,you can determine the corresponding fault according to the number of flashes.		

DESCRIPTION OF TROUBLE CODES

Most of faults such as the hardware open-circuit, short-circuit, and voltage out-of-range,can be diagnosed by the OBD system and sent out in the form of fault light flash code (continuous flashing times) or fault code (read out with a diagnostic instrument).

Flash Times	TROUBLE CODES - NAME	TROUBLE REASON
3	P2505-ECU Abnormal Reset	The general situation is that the ECU power supply circuit is poorly connected, such as electric door locks, fuses, power connectors, and ground connectors; Also there is no resistance in the spark plug (no "R"mark).
4	P0335-Crankshaft signal open-circuit	The crankshaft position sensor (trigger) connector is loose or the coil is open.
	P0336-Unreliable crankshaft signal	Generally, it confronts a electromagnetic interference (for example,the spark plug has no resistance, or the spark cap is loose).
5	P0563-High power voltage	Rectifier failure
6	P0131-Low voltage of Oxygen sensor 1	The oxygen sensor is aging or damaged.
	P0132-High voltage of Oxygen sensor 1	The plug of the heating type oxygen sensor drops in water and leaks electricity.

7	P0118-High voltage of Cylinder head Sensor	The cylinder temperature sensor connector is loose, or the cylinder temperature sensor is damaged.
	P0117-Low voltage of Cylinder head Sensor	The double-paralleled wire of Cylinder temperature sensor short circuit.
8	P0201-Fuel injector 1 is open-circuited.	The injector connector is loose, or the injector coil is open-circuited.
	P0262-Fuel injector 1 is short-circuited.	The internal-paralleled coil of the injector is short-circuited.
9	P0231-Fuel pump open-circuited.	The fuel pump connector is loose or the internal coil is open-circuited or damaged.
	P0232-The oil pump is shorted to the power supply	The internal-paralleled coils of the fuel pump is short-circuited.
10	P2300-Ignition 1 is open-circuited.	The Ignition Coil connector is loose, or the internal circuit is damaged.
11	P0122-Low voltage of Accelerator Sensor	The throttle position sensor on the throttle body is damaged.
	P0123-High voltage of Accelerator Sensor	
13	P0113-High voltage of intake temperature sensor	The intake air temperature circuit inside the ECU is damaged
	P0112-Low voltage of intake temperature sensor	
14	P0607-ECU Power tube is damaged	The internal power tube of the ECU is burned out. It must be eliminated that there is no short-circuit of the actuator before replacing the ECU.

THROTTLE CALIBRATION AND FACTORY RESET

To judge the throttle calibration is right or wrong, you can perform a throttle calibration. The steps are:
1. Pull the throttle to the maximum opening and hold still;
2. Turn on the electric door lock switch, and wait for the ECU red light to go out and then release the throttle to the minimum opening;
3. Turn off the electric door lock switch.

NOTE: The above process is also the process of restoring factory settings, including clearing historical fault codes.

FAILURES OF MAIN PARTS

NO	NAME	FAILURES	INSPECTION AND DETERMINATION
1	ECU	ECU internal circuit damaged	①The fault light does not turn on and the fuel pump does not work after starting up; ②The fault code P0113-13 (the following 13 is the fault light flashing code), P0112-13, P0122-11, P0607-14, are all ECU faults
2	FUEL INJECTION	Mechanical stuck, blocked, damaged coil	①Shows fault codes P0201-8, P0262-8, but the connectors are well connected; ②Pull out the injector and turn on the motor to see the spray. If the spray is long, it is a mechanical jam. If the atomization is not good (well also eliminated the fuel pump fault)) Is a blockage of the injector
3	FUEL PUMP	The fuel pump is stuck and the fuel pump filter is blocked	①Shows fault codes P0231-9, P0232-9, and meanwhile the connector failure is eliminated; ②After starting up, there is no sound of the fuel pump, which may due to the stuck fuel pump rotor or damaged electric brush; ③Test with an fuel pressure gauge, if the fuel pressure is lower than 250KPa, then It may be that the filter bag on the head of the fuel pump is blocked, or the filter bag needs to be cleaned or replaced.
4	CRANKSHAFT SENSOR	The gap of the magneto is too large and leads to no signal during start-up.(The reasonable gap is between 0.5-0.8mm) The internal coil of the sensor is open-circuited.	①Shows fault code P0305-4, if the connector error is eliminated, so it would belong to the internal coil open-circuit; ②Whether the sensor indicator (blue light) on the ECU flashes or not when the motor is started up.
5	IGNITION COIL	The main fault is IGBT burnt out and coil damage	①Shows fault code P2300-10, and the poor contact of the connector is eliminated; ② Pull out the high-voltage line, put it about 1 cm away from the cylinder head, start up the motor to observe the spark, if it shows the blue light on the ECU flashes, but the high-voltage line has no spark or the spark is weak, try to replace it.
6	SPARK PLUG	No resistance (no R mark); the ceramic surface is contaminated or chipped and leaked; the gap is too large or too small;	① First check whether the spark plug has the "R" mark or not; ② Observe the carbon condition on the ceramic surface of the spark plug; ③ Try to replace the spark plug and observe whether the fault is eliminated

7	SPARK CAP	The spark cap and the spark plug are loose; the spark cap is damaged	①Shows failure code P2505-3; ②Visually inspect the spark cap connection
8	THROTTLE BODY	Throttle position sensor circuit failure; throttle valve plate stuck	①Shows fault code P0122-11, P0123-11, indicating the malfunction on induced current of the throttle; ②Loose the throttle and observe whether the puller can be reset or not.
9	IDLE SPEED AIR FLOW ADJUSTMENT BOLT	Idle air flow is too fast or too slow.	①Refer to the instructions of the indicator. After the engine is warmed up, keep in idling, and observe the blue light flashes quickly (4 times per second) or slowly (1 time per second), which indicates the air flow too slow or too fast accordingly.
10	Oxygen Sensor	The failure is that the zirconium tube is broken and does not send out a signal; Aging and slow response; internal air leaks, which causes a low voltage	①Refer to the instruction of the indicator, step on the accelerator to get out of idle speed and observe it for more than 5 seconds to check if the sensor indicator (blue light) flashes or not.
11	WIRE HARNESS	the connector is loose; the parallel wire is short-circuited; the wire is broken.	①If there is no ECU power or abnormal reset fault P2505-3, it may be that the power supply and ground in the wiring harness are in poor contact; ②All open-circuit fault codes and cylinder temperature sensor fault codes P0117-7, the most likely is that the connector is loose.
12	RECTIFIER	Not charging, or the charging voltage is too high	①The battery is losing power; ②The fault code is P0563-5
13	FUSE	Loose or poor contact	①caused to no power of ECU, or shows fault code P2505-3 of abnormally reset.
14	ELECTRIC DOOR LOCK	Poor contact	The same as above
15	INTAKE PIPE	Intake pipe fastening screw loose or O-ring failure	①The blue light flashes quickly in idle mode (4 times per second), meanwhile the idle air flow adjustment blot has been adjusted to the end; ②Visually observe the connection state of the intake pipe and the cylinder head
16	AIR FILTER	Blockage	①Open the air filter and judge it by visually observe.
17	EXHAUSTED PIPE	The fastening screws of the exhaust pipe and the cylinder head	①It still exhausts and has abnormal noise when withdraw the throttle, which means a leakage on Exhausted Pipe; ②If the power drops or cannot be started, or the

		are loose and leak; the exhaust pipe is blocked	exhaust sound is dull, it may be that the exhaust pipe is blocked, you may replace the exhaust pipe.
18	VALVE CLEARANCE	The valve clearance is too small, causing the cylinder to leak and the pressure is too low (normal value above 900KPa)	①If it fails to start or stalls at idling speed, check the valve clearance; ②Use a cylinder pressure gauge to measure the cylinder pressure. If it is lower than 900KPa, check the valve clearance;
19	ENGINE OIL	The Excessive oil volume increases the friction loss of the engine on one hand, and on the other hand causes the oil to enter the cylinder and emit blue smoke, leading to the failure of the oxygen sensor.	① Let the engine stand for a while, and check the oil level with a dipstick; ② Blue smoke appears; ③ High fuel consumption and failure of the oxygen sensor
20	OIL QUALITY	Gasoline contains impurities such as methanol, which is corrosive, low calorific value, and poor volatility	Refill 92# and above gasoline at the regular station.

ECU SOCKET LINE INDICATION DIAGRAM

	信号地(蓝)	缸温(紫/白)	氧信号(灰)		信号地(蓝)	CANL(橙黑)	CANH(黑白)	故障灯(粉)	转速(橙)
	怠速阀(咖啡白)	喷油器(白)	+12V (红)	氧加热(天蓝)	+12V (红)	油泵(黄)	触发(蓝/白)	动力地(绿)	点火(红/白)

	SIGNAL INDICATOR (BLUE)	**CYLINDER TEMPERATURE (PURPLE/WHITE)**	**OXYGEN SIGNAL INDICATOR (GREY)**		**SIGNAL INDICATOR (DARK ORANGE)**	**CANL (DARK ORANGE)**	**CANH (BLACK AND WHITE)**	**MALFUNCTION SIGNAL (PINK)**	**REVOLUTION (ORANGE)**
	IDLE VALVE (COFFEE WHITE)	**FUEL INJECTION (WHITE)**	**+12V (RED)**	**OXYGEN HEAT INSTRUMENT (SKY BLUE)**	**+12V (RED)**	**FUEL PUMP (YELLOW)**	**TRIGGER (BLUE/WHITE)**	**POWER SIGNAL(GREEN)**	**IGNITION (RED/WHITE)**