
User Manual

GAZ 15

GAZ 23

Please read these instructions before operation

Please save these instruction

Preface

Thank you for purchasing this high performance, liquid-cooled, automobile engine-driven generator. The generator set is approved for use in stationary applications in locations served by a reliable utility power source. Read this manual and carefully follow all procedures and safety precautions to ensure proper equipment operation and to avoid bodily injury. Read and follow the Safety Precautions and Instructions section at the beginning of this manual. If any portion of this manual is not understood, contact the nearest Dealer for starting, operating and servicing procedures. For professional advice on generator set power requirements and conscientious service, please contact your nearest distributor or dealer. If you have any questions or suggestions, please contact us at any time.

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I. Technical Feature of the Single-Fuel Generator

This gas generator is multi-fuel drive uses an optimized dedicated multi-fuel engine. According to our standards, we have designed this unit in a simple and environmentally safe, and user-friendly means:

1. Speed Regulating System: The gas uses an internally designed electronic speed control system, allowing for quick and easy adjustments to the engine speed that can be stabilized to specific speed ranges. This control system allows the engine to run more smoothly and respond quickly to sudden increases or decreases in required engine speeds.

2. Silent Air In-take System: Extra-large air intake cross-sections in the housing enclosure ensure ample air flow and engine in-take. This unique housing enclosure structure leads to a significant reduction operating noise.

3. Large Liquid Coolant Radiator Reservoir: The use of and oversized liquid coolant radiator reservoir, like those used for larger automobile engines, allow for the use of more engine coolant and a larger radiator coil surface to utilize more liquid coolant to maintain a more ambient and stable engine temperature during even the hottest times of year and hottest climates. This function can add greatly to life and long-term operating dependability of your gas generator.

4. Automatic Transfer Switch Function: These units are Automatic Transfer Switch compatible which will automatically, without personal involvement, start the generator, and produce the required power needed up.

5. Intelligent Hazard Control System: the use of our Intelligent Hazard Control System function warns of hazardous engine or generator conditions. This system continually checks and monitors the unit's operating conditions and will automatically shut the unit down to help avoid hazardous and costly damage can happen. The system uses and visual control panel that can preset according to the user's needs.

II. Specification

Item	Unit	GAZ 15	GAZ 232
RATED POWER (KW)	LPG	16	22
	NG	15	20
	GASOLINE	17	23
FREQUENCY (HZ)		50	50

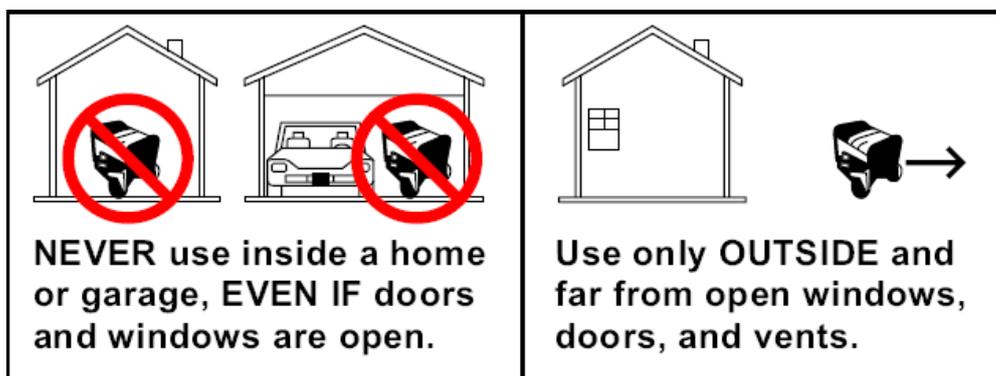
SPEED (RPM)		3000	3000
RATED VOLT (V)		230	230 / 400
RATED CURRENT (A)	LPG	69.5	32
	NG	65	29
	GASOLINE	73.9	33
PHASE		Single	Three
POWER FACTOR		1.0	0.8
PROTECTION LEVEL		IP23	IP23
INSULATION		F	F
POLE		2	2

Chapter two: Important Safety Instruction

SAVE THESE INSTRUCTIONS – This manual contains important instructions for Models GAZ-23 that should be followed during installation and maintenance of the generator and batteries.

I. Precautions

1. Generator set operation. Carbon monoxide can cause severe nausea, fainting, or death. Carbon monoxide is an odorless, colorless, tasteless, nonirritating gas that can cause death if inhaled for even a short time. Avoid breathing exhaust fumes when working on or near the generator set. Never operate the generator set inside a building. Never operate the generator set where exhaust gas could seep inside or be drawn into a potentially occupied building through windows, air intake vents, or other openings.

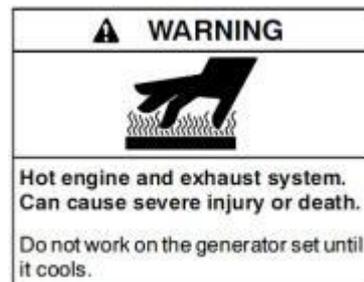


⚠️ WARNING



Toxic Fumes Hazard. Running engines give off carbon monoxide, an odourless poisonous gas that can cause nausea, fainting, or death. Do not start or run engine indoors or in an enclosed area, even if windows and doors are open.

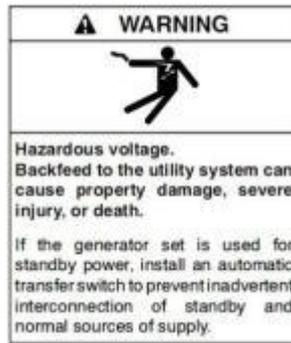
- The fuel system.** Explosive fuel vapors can cause severe injury or death. Vaporized fuels are highly explosive. Use extreme care when handling and storing fuels. Store fuels in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running because spilled fuel may ignite on contact with hot parts or from sparks. Do not smoke or permit flames or sparks to occur near sources of spilled fuel or fuel vapors. Keep the fuel lines and connections tight and in good condition.



- Servicing the exhaust system.** Hot parts can cause severe injury or death. Do not touch hot engine parts. The engine and exhaust system components become extremely hot during operation.
Servicing the engine heater. Hot parts can cause minor personal injury or property damage. Install the heater before connecting it to power. Operating the heater before installation can cause burns and component damage. Disconnect power to the heater and allow it to cool before servicing the heater or nearby parts. Keep the generator at least 2m (6ft) distance to the other device.

⚠️ DANGER

Hot surface - To reduce the risk of burns- Do not touch.



4. **Grounding electrical equipment** Hazardous voltage can cause severe injury or death. Electrocutation is possible whenever electricity is present. Ensure you comply with all applicable codes and standards. Electrically ground the generator set, transfer switch, and related equipment and electrical circuits. Turn off the main circuit breakers of all power sources before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution. When grounding of this output AC circuit is required, use terminal (identify terminal) for bonding this circuit to the enclosure. Ground the enclosure to a grounding electrode in accordance with local code requirements.
5. **Gas fuel leaks.** Explosive fuel vapors can cause severe injury or death. Fuel leakage can cause an explosion.
6. **Engine noise.** Hazardous noise can cause hearing loss. Generator sets not equipped with sound enclosures can produce noise levels greater than 105 dBa Prolonged exposure to noise levels greater than 85 dB can cause permanent hearing loss. Wear hearing protection when near an operating generator set
7. **Short circuits.** Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while adjusting or repairs. Remove all jewelry before servicing the equipment. Electrical back feed to the utility. Hazardous back feed voltage can cause severe injury or death. Install a transfer switch in standby power installations to prevent the connection of standby and other sources of power. Electrical back feed into a utility electrical system can cause severe injury or death to utility personnel working on power lines.
8. **Moving Parts.** When the generator set is operating, the cooling fan is rotating. Do not open the maintenance cover with generating running. Please shut down the engine before maintenance or operation. After starting, please close the cover as soon as possible.
9. CAUTION: FOR STANDBY SERVICE, CONNECT OUTPUT OF GENERATOR TO SUITABLY RATED TRANSFER SWITCH IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART I
10. THERE IS A PERMANENT CONDUCTOR BETWEEN THE GENERATOR (STATOR WINDING) AND THE FRAME
11. Lock the top cover with the key, please save the key, and not give any child or un

authorized personnel. If there is any problem of generating set, please contact retailer.



II. Operating System Functions and Definitions

Depending on the generator unit model, control button functions may vary significantly. Refer to the following functions:

1. Operating System



1. Control panel
2. Power switch
3. Fuel switch
4. Stop
5. Manual
6. Start
7. Data check
8. Data check

Power switch:

Function: The power switch controls the entire generator set control system. If this switch is placed in the OFF (O pushed in down mode) position, the internal electrical control circuit of the unit will not have any electrical power. When this switch is placed in the ON (I in the up mode) position, the control system can be started, tested and run.

Fuel switch:

Function: The fuel switch allows the fuel to flow to the engine when placed in the ON (I is in the up mode) position. Likewise, the switch turns the flow of fuel off to the engine when placed in the OFF (O pushed down) position.

Emergency stop switch:



Function: The photo above is of the Emergency Stop Switch and is located on the front face of the generator unit. When depressed, all generator control systems will immediately shut down, including the engine and generator head. This Emergency Stop Switch should be depressed should any unexpected emergencies occur. Depressing this button can help minimize dangerous occurrences to persons, pets, property, plants, or to the generator unit itself.

Use: When an emergency occurs, immediately press the Emergency Stop Switch. The unit will immediately stop running. Once the switch has been depressed and the emergency has passed, to re-start the generator unit, rotate clockwise 90 ° to pop up into the normal operational position.

Circuit breaker:



Single Phase



Three Phase

Function: The circuit breaker controls the ON/OFF functions of the generators electrical power output. When this switch is in the up (ON) position, the electrical power output will be produced normally. When this switch is placed in the down (OFF) position, electrical power output will be broken, or turned off. However, as a safety function, when this switch is placed in the ON position, the production of a too large of an electrical load or a short circuit due to faulty operation, the switch will immediately and automatically switch to the OFF position in order to protect the generator from damage. Should this occur, turn off the generator unit and correct the cause before restarting and placing the circuit breaker in the ON position again.

Use: When starting manually, always start the generator before placing the circuit breaker in the ON position. Likewise, when operating manually, place the circuit breaker in the OFF position before shutting the generator down.

III. Prestart Preparation

All necessary installation and maintenance shall be conducted by authorized personnel.
Check all items in the following before running it for the first time.

1. Engine Oil. Fill, if necessary, with the recommended viscosity and grade of oil. Or it causes damage on engine. Use the following recommended or similar engine oil

Ambient temperature	Oil grade (optional)
-30°C~0°C	5W/30 10W/30
0°C~30°C	10W/30 15W/40
30°C above	15W/40

- Put the funnel at engine oil inlet, keep not leans
- When first time operate new unit need to add 4L oil
- Check the oil gauge, the oil level should keep at top center of two line



2. Coolant

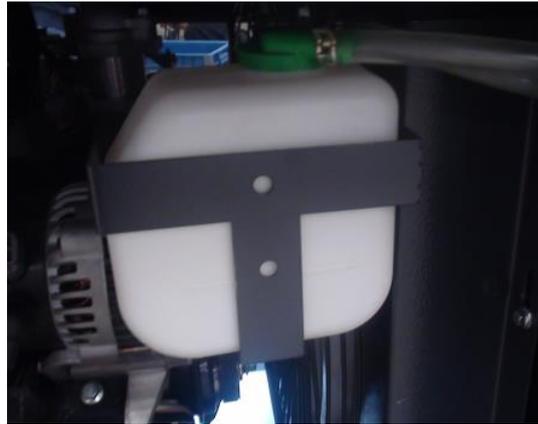
Only fill coolant into the radiator instead of other liquid (including distilled water).

The cooling water should be the clean soft water, such as rain and snow water. As for well water, spring and tap water, they must be boiled and deposited or processed with chemical method. It is necessary to do the water softening work well for some areas which contain a lot of salt and alkali. Otherwise, it will produce a lot of scale in the coolant cavity and influence the cooling effect and cause fault. If you don't use or maintain fuel, lubricant, coolant and relative systems of genset well, it must cause accelerate of fray and shorten the working life of machine or cause fault. So, the users must pay much attention to them.

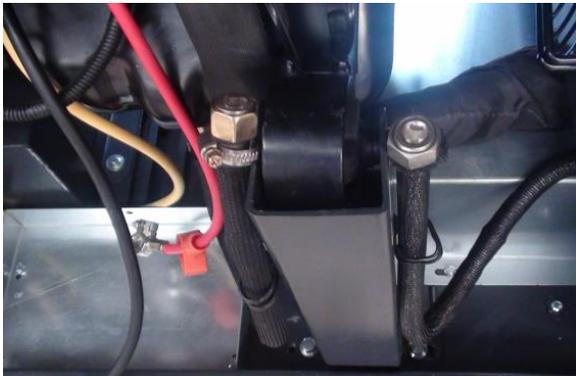
There's no coolant in engine when gensets are out of factory. Please fill radiator and reservoir with recommended coolant after installation of gensets.

Fill up radiator with the coolant, the unit ran around 5 minutes, pour coolant again into radiator.

Add some coolant to reservoir and make sure the level is in the middle of "LOW" and "FULL"

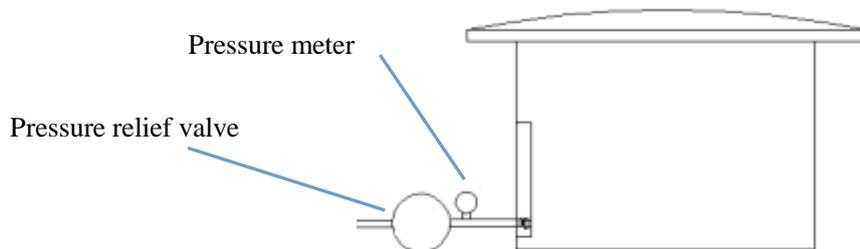


Loosen cap to drain oil as well as coolant.



3. Liquid propane (LP Vapor)

In engines set up to run on Liquid propane, please check the fuel supply pressure, lower or higher-pressure range will result in equipment failure. Inlet pressure 1.7kPa to 3.5kPa, and the gas pipe shall be no longer than 5m, the inner diameter shall not be less than 16mm.



It's strictly prohibiting to remove the high-pressure pipe when in maintenance. You must make sure there's no leakage before use. If there is no special equipment, you can use soap bubble to test the gas pipe joints. The observation time is not less than 1 minute.

According to the different gas source of users', there may be different gas pressure arrange. Make sure of the pressure first. And provide spare parts of pressure reducing valve

according to users' different needs. You need to use the pressure reducing valve if the pressure is excessively large. The tools such as pressure gauge are by the users to provide.

If you want to power the unit by gasoline, below is the fuel fill cap, connect power to check the fuel level.



4. Natural Gas

In engines set up to run on natural gas, please check the fuel pressure and flow, or purchase a pressure reducing valve if your fuel supply is with higher pressure.

CAUTION. After installation, users are not allowed to change the gas type. If users want to change the gas type (NG or LPG), please contact the retailer.



5. Electrical Connections

If the generator set is used for standby power, install an automatic transfer switch (ATS) which is provided by JAVAC to prevent inadvertent interconnection of standby and normal sources of supply. Shut down the generator set before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Ground the unit to earth before running



Plug in different load



Single Phase

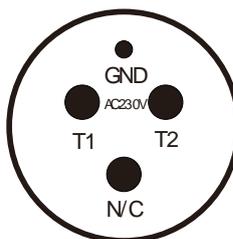


Three Phase

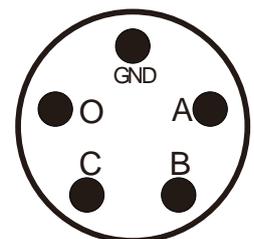
Main load receptacle



Single Phase



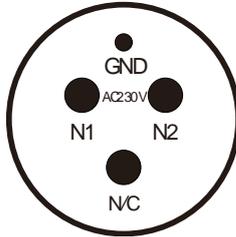
Three Phase



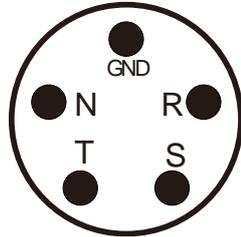
Connect utility power to the unit if you want to use inside ATS



Single Phase



Three Phase



The exhaust outlet has to be the same direction as wind blows.

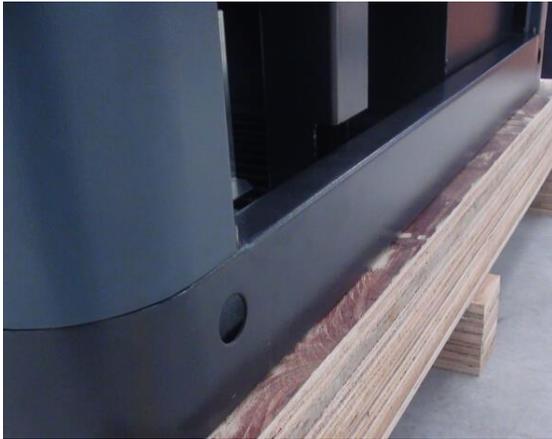


Lift the unit and lock the casters



Lift holes,

Iron rod go through the holes and use rope to lift the unit



6. Battery

Connect battery positive (+) and negative (-) to wire positive and negative side, connect negative (-) lead last when connecting the battery. The generator set will not start, and circuit board damage may occur if the battery is connected in reverse.

Before use the maintenances free batter, tested voltage $\geq 12.6V$ can be use directly; After the first time use or $< 12.6V$ should be re-charge then use.

For the first use, you should operate according to the steps bellow:

- Take off the red cap of battery positive.
- Use the multi-meter to check whether the voltage of battery is over 12.6V, charge the battery if the voltage is lower than this.
- Loose the positive battery clip. Put it onto the positive terminal fully and adjust the direction.
- Fasten the nut on the battery clip.
 - Cover it with the red battery clip rubber.



Servicing of battery is to be performed or supervised by personnel knowledgeable of battery and the required precautions. Keep unauthorized personnel away from battery. When replacing batteries, use the same number and the following type batteries: 12V, Lead-acid battery.

CAUTION – Do not dispose of battery or batteries in a fire. The battery can explode.

CAUTION – Do not open or mutilate the battery. Released electrolyte has been known to be harmful to the skin and eyes and to be toxic.

CAUTION – A battery presents a risk of electrical shock and high short circuit current. The following precautions are to be observed when working on batteries:

- 1) Remove watches, rings, or other metal objects,

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- 2) Use tools with insulated handles,
 - 3) Wear rubber gloves and boots,
 - 4) Do not lay tools or metal parts on top of batteries,
 - 5) Disconnect

7. Grounding

Ground the generator set. Connect the grounding strap to the generator set ground terminal.

IV. Startup

1. Turn on the emergency stop switch
2. Turn on the power switch 2
3. Turn on the fuel switch 3
4. After 10s turn on the fuel switch, press the manual 5 on control panel
5. Press 6, unit enter start
6. Press 7 or 8, observe the frequency, voltage, speed and the 12V working voltage as well as the operation time.
7. After the unit started then can be automatically generation (match with ATS enter automatically mode)



The emergency stop switch, power switch and fuel switch must keep at open
The charger must keep in charging condition also.

V. inspection generator set when operating.

Inspect the following parts when operating.

1. Radiator (Coolant)

Let the engine cools down, and remove the radiator cap.

runs into the rubber hose after running with high temperature, please shut the generator down to resolve the problem.

Checklist:

- check for coolant leaks
- Inspect the inside and outside of the radiator to ensure no excessive dirty or dust.
- Check the cleanliness of the radiator and ensure no dust, dirty or foreign substance.
- Check the hose to ensure it is not blocked.

2. Fault indicator lamp

Red lamp occurs the operator to shut the generator down and do the trouble shooting.

If the generator will not start, press the emergency stop switch. Rotate clockwise to pop up. After waiting for 30 seconds, try to start again. If the generator cannot be started, check the generator carefully for loose wires, battery voltage, gas flow to the lines and generator, etc....

If after restarting the generator, the fault indicator light is red, the generator will shut down. If this happens, check the reason for the fault occurring. After correcting the fault, the generator can be re-started. If the fault indicator light remains off, then the generator is operating normally.

Confirm after starting that the normal electrical output range is not exceeded as this will damage the generator.

3.Exhaust color.

If the generator engine is running within the rated output range,

- a) The exhaust will be colorless.
- b) If the exhaust is dark grey or black when after running for 60 seconds or more, this is an indication of a problem. Shut the engine down until the problem is corrected.

4. Other problems requiring shutting down the generator

You should shut down the engine if the following circumstances happen.

- The engine speed is hunting (inconsistently speeding up and down)
- An abnormal noise is heard coming from the generator.
- The engine exhaust suddenly turns dark grey or black.
- The fault indicating light is illuminated.

VI. Shut the generator set down

Should a need occur to shut down the generator, shut down the electrical output first by turning the circuit breaker to the "OFF" position and depress the reset key. This will automatically shut the engine and generator down.

The generator doesn't need any close switch if connected with ATS system.

Chapter Three Storage of the Genset

I . Long time storage of the Genset

1. Remove all dirty of the genset, if it needs to storage for long time
2. Drain the coolant of the engine
3. Ensure engine is in good technical condition, keep the surface clean
4. Remove all the spark plugs, inlet about 30g engine oil, turn the crankshaft about 20 turns,

and then reinstall the spark plug.

5. Use dewatering Vaseline (heating 100-200°C) to wipe on the surface of the contactor and unpainted metal surfaces.
6. Add lubrication oil on each lubrication points.
7. Use protection materials (like Canvas. Waterproof cloth or Oil paper) cover the engine to keep it dust-free.
8. Keep the room clean, warm, shady and the temperature should better be 5-35°C, the best relative temperature should be better at 40-70%。
9. Check all the nuts and screws, fasten the loosen one and sealing the genset while shut down the general gas inlet valve, and push the emergency button.
10. Remove the battery positive pole connect line, and get out the battery, then keep the battery in dark and dry place. And recharge it slowly every three months.
11. Sealing it with the sealing rubber, to avoid the dust get in to the gas pipe
12. Cover the generator with the dustproof cover and keep it in the dry and clean place;
13. Keep it in well ventilated, dry, clean and rainproof, shady place and away from the inflammable and explosive materials

II. Start after long time's storage

1. Remove the dust-proof oil
2. Remove the spark plug, and inlet about 30g engine oil.
3. Add coolant.
4. Add engine oil.
5. Check the wires and pipes connection.
6. Check the leakage of the gas pipe.
7. Run the engine to check it is normal or not.
8. Add lubrication to all the necessary places.
9. Tighten the engine oil pump belt
10. Check the electrical parts working condition
11. Before starting the generator, check the whole generator, including the nuts and screws.

Chapter FOUR: Engine Fault and Troubleshooting

I . Common Faults and Repair Methods of Engine

Number	Fault	Fault judge and eliminate
1	Hard to start	<p>I .Electrical system fault</p> <ol style="list-style-type: none"> 1. Storage battery with not enough power; 2. Bonding of storage battery cannot connect well; 3. Starting dynamo fault; 4. Ignition system fault; 5. Spark plug carbon deposition and tarnish; 6. Improper clearance of spark plug; 7. Spark plug insulation burning out or electrode short circuit; 8. Ignition coil was burnout; 9. Solenoid valve damage. <p>Handling method:</p> <ol style="list-style-type: none"> 1. Check the starting dynamo to see whether it is blocked or not; 2. Check ignition, you can pull out the high-tension cable and put on a spark plug, put them on the engine, to see whether it sparks or not; 3. Check the voltage of storage battery to see the whether it is under 12.4v; 4. Replace or maintain spark plug; 5. Replace ignition coil, high pressure wire, solenoid valve; <p>II、 Gas supply system fault:</p> <ol style="list-style-type: none"> 1. Keep the hand valve of gas bomb at off mode; (open the valve) 2. Pressure reducer or solenoid valve damaged; (replace) 3. Supply voltage is too low, cannot open the pipe solenoid and solenoid of the pressure reducer; Dealing methods for Item 3: replace the battery or charge for the battery promptly; 4. Solenoid valve cannot connect well; (settle) 5. Fuel switch damaged or was not pulled to “on” position; 6. Blocking in the high-pressure pipe; Handling method: Use the spanner to open the joint softly, if it leaks that proof the parts of before are ok, use the same way to check one by one; 7. Low pressure pipe buckling; (settle) 8. Oil filter is too dirty; (clean) 9. Check LPG、 NG pressure to see whether it is normal or not;

2	Idling unstable	<ol style="list-style-type: none"> 1. Pressure reducer seals cannot fix well; (reseal) 2. Check the tightening screw of the mixer to see whether it is loosening or not, check all the connection of the gas inlet pipe and mixer to see whether it is leaking or not 3. Check the fixed bolt of speed motor to see whether it is loosening or not; 4. Check the LPG、NG pressure to see whether it is normal or not; 5. Check the screw of pressure regulating valve to see whether it is loosening or not; 6. Check the LPG tank surface to see whether it is frosted or not;
3	Engine cannot operate stably	<ol style="list-style-type: none"> 1. The top dead center signal of cylinder one is not correct; 2. Speed signal is not correct; Elimination method: check or replace the sensor 3. Temperature of pressure reducing is too low; 4. Pressure reducer cannot work normally, repair or replace; 5. Cylinder blow by; Elimination method: check the cylinder cap of the screw, when necessity replace the cylinder cap seal and check cylinder jacket ledge of the altitude difference compared with the surface of the unit

4	Engine with not enough power, power, tumbling, consumption of the NG increases	<ol style="list-style-type: none"> 1. Low pressure pipe buckled or too long; (settle) 2. Ignition system with not enough ignition power; 3. High tension line and FBT is not connected well; 4. High tension and spark plug is not connected well; 5. Some of the cylinders miss the ignition; <p style="margin-left: 20px;">Handling method of 3, 4, 5</p> <ol style="list-style-type: none"> 1) Pull out the spark plug, observe pole top to see whether it has burned trace, if there is, then replace the spark plug 2) Use the multimeter (XKΩ GEAR) test the resistance of the high-tension line, if its disconnection, then change the high-tension line <ol style="list-style-type: none"> 6. Under pressure of the cylinder; (check the adjust valve and check or replace the packing ring) 7. High pressure pipe blocked or out of shape; (sweep or clear up) 8. Dirtiness or leakage that changes the vacuum level; (overhauling or clean the air filter) 9. Mixer is not sealed well; (replace) 10. The joint part of mixer and throttle leaking; (settle) 11. Check gas pressure, flow to see whether it is under the right condition; 12. Check whether gas is up to standard; 13. Check the gas to see whether it is up to standard; 14. Pressure reducer cannot offer enough heat, check the inlet/outlet pipe connection, use the hands to touch the reducer shell, if the water cycle cannot work smoothly, it will be warm, or check the waterway to see whether it is blocked or not; 15. Air filter, exhaust system jam, (clean air filter and exhaust pipe) ; 16. Voltage output instability; (adjust or change)
5	Sudden Stop	<ol style="list-style-type: none"> 1. Safety slice was burnt out; (replace) 2. GND cannot connect well; (settle) 3. Pressure reducer water cycle emerges ice block; (Handling method: Clear the water cycle) 4. Pressure reducer low-pressure chamber leaks or diaphragm broken, repair or replace (settle or replace) 5. Air filter is too dirty or leak ; (check or clean) 6. Solenoid valve fault closed; 7. Fault of emergency stop switch;

6	Abnormal sound when the engine is operating	<p>1. Ignition time is too early which causes detonation; 2. Ignition time is too late which causes exhaust pipe blasting or mixer tempering ; Dealing methods for Item 1 and 2: adjust the ignition time of the distributor</p> <p>3. Gap between the piston and cylinder is too much, it knocks when start the engine, and lighten as heat of the engine; 4. The gap between piston pin and pin hole is too big, sound is light but tine, especially clearer when idling; 5. The gap between main bearing and connecting rod bearing is too big, can hear the spare parts knocks when the engine speed lower down, it sounds heavy and strong 6. The crankshaft end play is too big, can hear the crashes when idling 7. Valve spring break off, valve clearance excessive gap, that can hear the litter sound or rhythm knocking around the cylinder cap Dealing methods for Item 3, 4, 5, 6 and 7: replace the parts, insure the regulation gap</p> <p>8. When the piston hits the cylinder, that can hear the knocks of metal crashes around the cylinder cap Eliminate method: check the piston and valve to see whether they are hits or not, then check distribution gear mark</p> <p>9. When the speed lower down because of too large of abrade gear gap, that can hear the knocks in the gear room Dealing methods for Item 8 and 9: replace the gear</p>
7	Temperature of the engine oil is too high	<p>1. Check around to see whether it is ventilating or not 2. Too much of the engine load 3. Engine oil is not enough or too much 4. Down exhaust is too much Dealing methods for Item 4: replace the packing ring or the cylinder liner</p> <p>5. Blocking in the oil cooler, oil temperature controller valve opened, the temperature is not right, Shell is blocked by the dirt 6. Oil mark is not correct (oil viscosity is too high)</p>
8	Pressure of engine oil is not enough	<p>1. Not enough oil in the oil pan Dealing method: add oil to the selected level</p> <p>2. Damage of oil pump gear Dealing method: replace the oil pump</p> <p>3. Blocking in the oil strainer or the oil filter 4. Damage or blocking in the relief valve or the pressure stabilizer spring 5. Blocking or leakage in the oil pipe Dealing methods for Item 3, 4 and 5: replace the spare parts</p>

9	The temperature of cooling water is too high	<ol style="list-style-type: none"> 1. Water thermometer or sensor plug not work Remove method: check and replace 2. Water shortage (add water) 3. Engine load if too much 4. Check around to see whether it is ventilating or not
10	Starter fault	<ol style="list-style-type: none"> 1. Starter do not run 2. The starter idling starting weak 3. It's hard for the gear to return <p>Prevention method: Check the lines of the battery voltage and make sure whether it been changed</p>
11	Muffler with black smoke	<ol style="list-style-type: none"> 1、 Check the air filter to see whether it blocked or unobstructed 2、 Pressure regulating valve cannot work normally <p>Prevention method: Adjust the screw of the valve</p> <ol style="list-style-type: none"> 3、 Ignition time too early, adjust ignition timing 4、 The spark plug cannot work normally 5、 High-tension line cannot work normally 6、 High pressure cannot work normally <p>Project4、 5、 6 handling method: replace the related accessories</p>
12	Muffler with blue smoke	<ol style="list-style-type: none"> 1、 Check the engine oil, whether it too much, pour out excess oil 2、 Replace or clean the packing ring 3、 Overhaul or replace piston and cylinder block
13	Muffler with white smoke	<ol style="list-style-type: none"> 1、 Engine preheating is not enough 2、 Water in the cylinder, overhaul the engine cylinder
14	Muffler with flare up and explosive sound	<ol style="list-style-type: none"> 1、 Carburetor floater oil level is too high, adjust the floater 2、 Exhaust valve is not totally sealing, polish the valve 3、 Ignite too late, adjust the ignition timing
15	Load speed drops too much	<ol style="list-style-type: none"> 1、 Gas pipe jammed; (check and clean the pipe) 2、 Dirty air filter; (clean the air filter core) 3、 Improper valve clearance; (repair and adjust)

II. Common Faults and Repair Methods of Generator

Number	Fault Symptoms	Reason & Troubleshooting
1	Generator without power indication	<ol style="list-style-type: none"> 1. Check whether battery is damaged; 2. Fuse broken; (Check, replace)
2	Generator has power indication but no power	<ol style="list-style-type: none"> 1. Breaker not open; 2. AC output is poorly connected; (Check, fix up) 3. Check AVR and its fuse;

	output	4. Check carbon brush;
3	Generator overheating	<ol style="list-style-type: none"> 1. Lack of coolant or pipe blocked; (Add coolant or clean up pipe) 2. Thermostat closed or damaged; 3. Water pump worn out or damaged; (Clean or replace pump) 4. Too much engine oil; (Remove the unnecessary engine oil) 5. Damage of rotor bearing; (Replace bearing) 6. Radiator blocked or damaged; (Clean or replace radiator) 7. Short circuit of stator winding; (Check wiring) 8. Rubbing of stator and rotor (Check, adjust gap)
4	Insufficient power output	<ol style="list-style-type: none"> 1. Abnormal gas pressure; (adjust pressure) 2. Engine throttle worn out; 3. Air filter blocked; 4. Some spark or cylinder wire is damaged; 5. Too much oil; 6. Piston ring worn out;

IV. Troubleshooting

1. Simple check

- Battery voltage, working voltage.
- Sufficient gas storage, solenoid valve of gas bottle open or not.
- Entrance and pressure reducer gas solenoid valve properly open or not.
- High voltage normal or not (spark plug) .
- Speed sensor signal normal or not.
- Observe exhaust gas (smell, color, sound, feel).
- A comprehensive check and the focus on one part or one target.

2. Parts replacing inspect

- Replace the suspected parts with a new and same one, then observe operation.
- If the fault disappeared, place back the suspected parts, then start the engine and observe it.
- If the fault appears again, verify the damaged parts, use the new and same part to replace it.
- If faced with a comprehensive fault, please shrink the sinking scope, and then use the replacement method to check.

V. Main Common Faults and Remove Methods of Genset

Cannot start the genset:

When the generator sets cannot start, the engine is not working normally. Please check one by one as the following methods:

1. Basic checking:

- Check whether the unit filled with engine oil or not.
- Check whether the unit filled with enough coolant or not.

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- Check whether the gas valve open or not, whether with the suitable gas input.
 - Check whether the battery is sufficiently charged or not.
 - Check the mains input when starting the unit automatically.
 - Check the power indicator lights up or not.

2. Checking method:

- Gas flow checking: when the gas flow is too much, bend the gas pipe, so that the gas flow is reduced.
Or turn the transition nut to adjust the pipe area.
- Battery voltage test: use a multimeter to test the battery voltage, the voltage is 12.6 V, which means the battery with has power; if the voltage is below 12.6V, the battery cannot drive the starting motor.
- Cylinder wire checking: check it as the picture below, the gap between the conductor and engine is 3-5mm, start the start motor, then there will be spark if ignited.



- Spark plug checking: Connect the spark plug with land, start the start motor, observe whether the spark plug discharging to the ground or not, if there is spark, then the spark plugs damaged.



- Igniter checking: use a multimeter to test the socket voltage, which should be 12V

Test the first two corresponding positions



- Checking the speed motor: when the generator starts working, the main shaft of the speed motor should rotate substantially to open the throttle.

3. Solving method:

According to the checking method above, repair or replace the suspected item. If the problem is still unsolved, please contact our local agency.

Generator hunting elimination:

After starting the generator, there is too much regular pattern vibration, main shaft of speed motor rotating obviously, which means generator hunting (frequency fluctuation $>2\text{Hz}$). The power output produced while hunting will not influence the use of electricity (except the high precision equipment which needs high quality of electricity frequency). Still, it should be adjusted and repaired promptly.

1. General checking:

- Check whether the gas pressure normal or not.
- Check whether the fuel pipe extruded or blocked.
- Check whether the speed sensor loosened or damaged.
- Check whether the speed motor blocked or not.

2. Measuring method:

- Connect a pressure meter in the inlet pipe, open the gas valve, observe the data on pressure gage.
- Observe whether the gas valve extruded or not.
- Open the fuel switch, see if there's a voice "da" from the solenoid valve.
- Use the multimeter Ohm level, measure the two joints of the speed sensor, there should be resistance.
- Check whether the electrical speed regulation has 12v DC power input.

Trouble shooting of no power output

After starting the generator, there is no power output under the right speed and frequency, please do as following steps to check and solve problems:

1. Basic checking:

- Check whether the battery has enough voltage (Voltage $>12\text{V}$).
- Check whether the voltage input and output wire faced with short circuit.
- Connect the voltage regulator and battery, check whether the regulator and the battery has the same voltage input.
- When the generator operates normally, the carbon brush should have about 70V voltage.

2. Measuring method

- Use the multimeter 20V DC to measure the voltage of battery, voltage regulator input, and carbon brush.
- Use the multimeter 200V DC to measure the voltage of the carbon brush.

3. Solving method:

- when the voltage regulator has input but no output, there may be three possible protections (output short circuit protection, sampling losing protection, secondary winding protection). We should cut the positive power, connect the regulator again when the regulator discharges. The common protection time is 90 seconds, but under abnormal condition it will need about 1 hour.