



USER MANUAL

A LEADING QUALITY POWER SOLUTIONS PROVIDER



AIPOWER, S. DE R.L. DE C.V.

Av. Mariano Escobedo 543, Interior 407, Colonia Rincón del
Bosque, Miguel Hidalgo, Ciudad de México, CP. 11580, México.
Teléfono: (52)-55-52-551-476
support@a-ipower.com
www.a-ipower.com

DIESEL GENERATOR SET MANUFACTURER

1.6 Genset Control Panel

Control panels will be configured in backpack or side-mounted mode, incorporating standard manual, automatic or remote control starters, to accommodate various functional requirements. Combinations of mounting and starter configurations are designed and manufactured to individual client specifications.

All control panels monitor the operating status of the Genset alternator parameters and incorporate an auto-stop function. The fundamental protection function (auto-stop) includes low oil pressure safety shutdown, high coolant temperature safety shutdown, over speed safety shutdown, emergency stop shutdown (by button or key). The monitored operating parameters include engine air pressure, coolant temperature, engine rotation speed (measured in operating hours). The alternator parameters include phase voltage, phase current and frequency. An intelligent engine control device is adopted as the core of the high-end control panel offering advanced monitoring, display, remote communication and protection functions and man-machine operating interface.

1.7 Air Breaker

In order to prevent damage from the alternator caused by current overload and other abnormal impacts, a set of electrical air breakers is fixed on the output port of the Genset. Standard installation is in an air breaker cover beside the alternator. For big power genset or parallel gensets, the breaker will be installed inside the output panel or parallel panel. The cables can be led from the bottom of the air breaker for outputting the power distribution.

1.8 Others

Additional accessories are available including starting battery, battery cables, muffler, ripple flex exhaust pipe, exhaust siphon, vibration absorber, fuel tank in base, daily fuel tank, and lubrication for first time operation of engine - as per the Specific Accessories inventory included with the engine documentation.

1.9 Safety & Warning

-  Read the hand Book carefully and thoroughly before operating or maintaining the engine.
-  Operators must be well trained. Only the authorized crew has the valid right for maintenance service. Operators and maintenance crew should have an in depth understanding about engine safeguards and the maintenance service program.
-  Start the engine only in safe circumstances, starting the engine regardless of an apparent anomaly can result in accidents and injury.
-  The engine must be stopped and the negative terminal must be disconnected when cleaning, maintenance, overhauling.
-  The exhaust gas released by the engine is harmful. All sets installed in room should be drained exhaust gas out of the engine room.
-  Where heat-insulating materials are required, exhaust siphons and mufflers should be kept away from combustible objects when fume-exhausting.
-  Ensure a clean, tidy and well-ventilated operating environment.
-  Combustible materials should be moved away from the vicinity of engine.
-  Smoking, electric spark, an open flame and the like are strictly forbidden around batteries and fuel tank to prevent an explosion caused by volatile gases.
-  BC or ABC extinguisher should be minimum standard equipment in a machine room, and must understand how to operate.
-  Any operation of the engine without a fan shield or other guard shields will likely have severe consequences. Hands should be kept away from the safety guard when performing maintenance.

1. General Information

1.1 General

Utilized as a main power or standby (emergency) power supplier, Genset can be extensively used in hospitals, military installations, highway construction sites, telecom facilities, mines, factories, and oil fields, etc.

Various configurations of Genset can be supplied according to customers' specific requirements, including Standard Model, Soundproof Model, Mobile Genset, Auto Starting Gensets, Remote Control & Intellectual Control Genset, Parallel Operating Genset, and Relative ATS control panel, Auto parallel connection panel etc.

1.2 Identification Plate

Diesel generating set has an identification plate and data on the identification plate comprises: Genset model, Serial number, Genset parameters and Manufacture date. The serial number is unique. The user must record the correct serial number and Genset model on the warranty card for validation. Presentation of a valid Warranty Card will be required to obtain technical support, maintenance and after-sales service.

1.3 Product Certification

Gensets attach documentation including a Certificate of Conformity produced by the supplier confirming certification of the unit to production and testing standards.

1.4 Diesel Engine

According power, class and every brand engine's features in special power arrange, Diesel Genset use different brand diesel engine, such as Sweden Volvo Penta, US Cummins, UK Perkins etc, China domestic good brands like SDEC, Yuchai, Weichai, Chongqing Googol, JDEC etc.

The Gensets chosen not only require first-class performance and high reliability engine, but also incorporate advanced features including reduced exhaust emission, economic fuel consumption and sophisticated noise-proofing technology, configurations and accessories. The engine comprises a water tank, fan, radiator, air filter, lube filter, fuel filter, Water-oil filter (selected models) and charging generator. An auto-speed governor system (optional mechanical or electric speed governor, intellectual electronic injection control system) controls the operating speed of the diesel engine accurately in order to ensure stable output frequency. In addition, each engine model and type (other than models of low output power) is equipped with a turbocharger to reduce the overall weight and increase horsepower output.

Details of model and technical specifications of engines are contained in the Genset User instruction book.

1.5 Alternator

The selected alternators for Gensets are all single bearing model brushless self-excited units, recognized worldwide as market leaders in their field. The technical characteristics as below:

Four-pole brushless self-excited system, IP22 protection and Class H insulation guarantee efficient operation of the generator in the harshest environment.

Skewed stator and 2/3 pitch windings minimize the risk of in-field heating and voltage distortion.

The rotor is dynamically balanced before mounting. The perfect damping winding keeps minimization of voltage deviation and overheating under an unstable load.

The exciter rotor output is led to the main rotor through a three-phase full wave bridge rectifier. A surge suppressor protects the rectifier against damage by short circuit or out-of-phase paralleling.

Automatic voltage regulation (AVR) provides the engine feature of protection of relief load. It allows application of full load to the generator in a single step, and the voltage regulation will be 1% (0.5% for special requirement). If the permanent magnet generator (PMG) excitation system is selected, the PMG system provides high motor starting capacity as well as immunity to waveform distortion on the main stator output created by non-linear loads e.g. silicon controllable DC motor, UPS.

The telephone influence factor (TIF) < 50, the telephone harmonic wave factor (THF) < 2%. The brushless apparatus and the high quality AVR ensure low levels of interference with radio transmissions.

2. Installation

2.1 General

Having determined the volume, weight, power and usage model of the engine, you have chosen the requisite Genset model. Now you can start planning your desired installation and implementation scheme in conformity with your location and usage requirements as well as the control and electricity distribution systems.

For the sake of convenient installation, this chapter gives a concise description of situation and installation requirements. Should you have any further queries regarding technical specifications, kindly consult the Genset instruction book or contact our technical service department.

2.2 Storage

It is suggested that the Genset should be tested directly it reaches the operating location so as to initiate the guarantee period in a timely manner as well as put it into use as soon as possible. A well-trained crew should be responsible for the daily operating and maintenance service of the Genset.

A lengthy period of storage without use may severely compromise the future performance of the engine and alternator. Should a lengthy storage period be required for any reason, feasibility schemes should be made out according to the length of the period. Long-term storage should be carefully planned and administered.

Preparation for storage of the Genset should be carried out one step at a time, including thorough cleaning of the engine, ventilation and drying out, lubrication replacement, draining all the coolant left in the water tank and anti-rust treatment.

The storage location of the engine should be carefully chosen in order to avoid damage caused by impact or falling objects. An exclusive purpose storage area is recommended to ensure there are no combustible or explosive materials in the proximity of the engine, and ABC class extinguishers or similar should be readily available.

The insulation performance will be negatively affected if moisture enters the alternator windings so it is of primary importance to keep the Genset dry and ensure a low humidity storage environment.

Extreme temperatures and exposure to the elements should be avoided when storing the Genset.

The starting battery is lead-acid high power type. No electrolyte should be added before testing the engine. When connected, the batteries must be fully charged every five to eight weeks to avoid damage to the battery or a shortened life-span. When stored, the battery should be kept away from sunshine and rain.

The engine should be checked for any possible damage before bringing out of storage and putting into use once again such as oxygenation of some electronic components. No loose joints can be permitted. The windings in the alternator must be dry, and the surface of the engine needs to be cleaned. Corresponding counter measures should be taken when necessary.

The information listed above is also applicable to the installation requirement of the engine room, which is the basic requirement for an engine room.

2.3 Transportation

Essential safeguards should be taken during transportation. The Genset must be fixed fast in the container to avert any looseness or damage to its parts caused by vibration or impact. No person or other goods should be transported on or in proximity to the Genset.

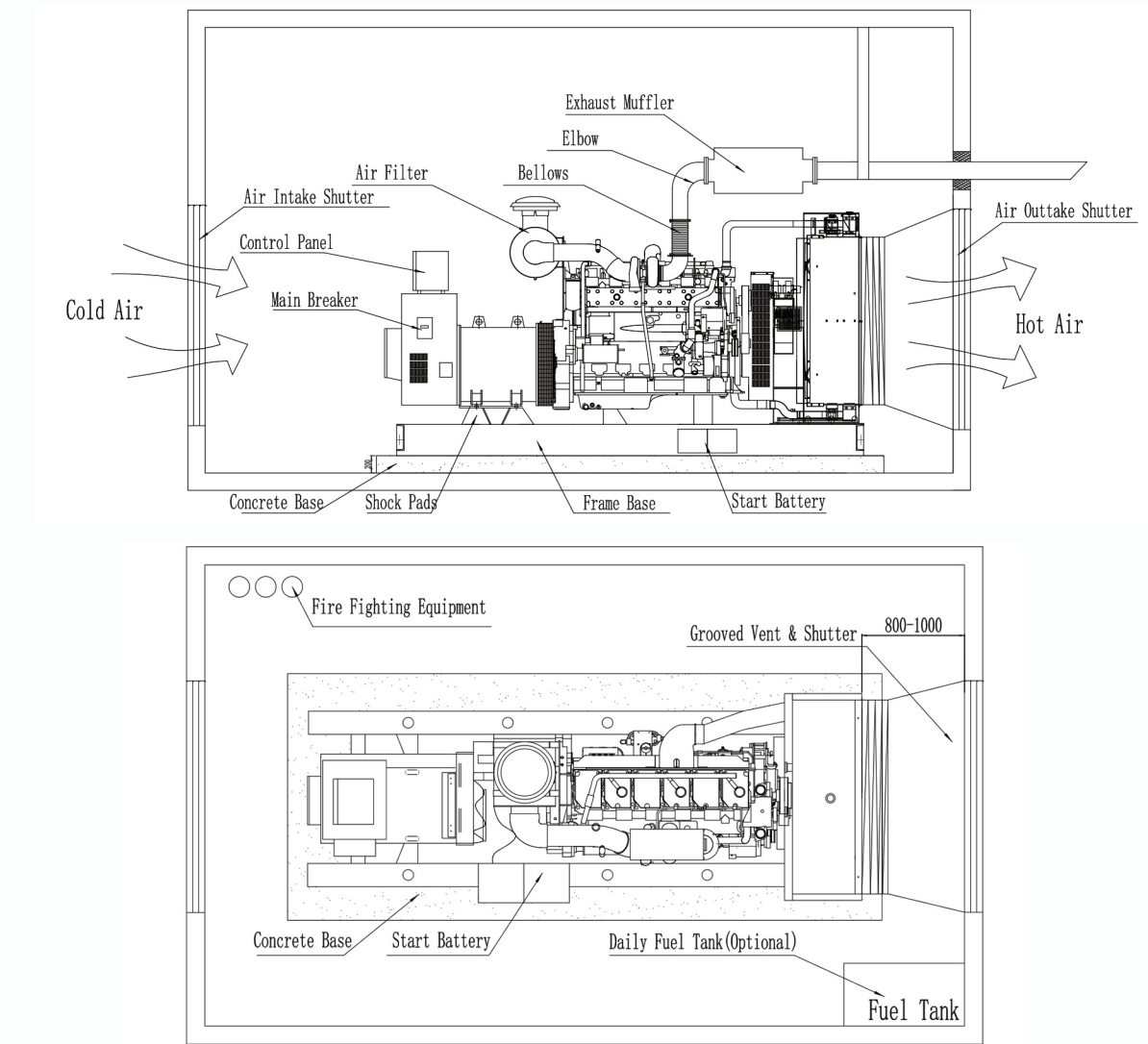
Forklift and crane equipment should be used when loading or unloading the Genset to avoid tilting or falling that will cause damage.

The user will be supplied with grooved steel for suspension and transportation of the Genset. Never use lugs on the engine or on the alternator to transport the Genset.

Some special use or purpose-built Gensets such as mobile power station and soundproof model can be easily to move, transport and suspend. The cover of those Gensets are designed purposefully to facilitate their transportation and installation, some even installed rubber dragging wheels. The cover can also offer better protection measures for many parts to be isolated from the moisture, sunshine, and impact as well as abrasion during transportation. Casual trouble caused by irrelevant personnel could also be prevented.

-  Limbs, long hair, jewelry, and loose clothing should be kept away from the belt wheel, the belt and any revolving parts.
-  Wear protective overalls, gloves, and hats when operating the engine.
-  Never open the radiator cap before the coolant cools down to prevent steam or hot coolant spray out.
-  Lubrication, fuel, coolant and electrolyte should never contact skin or be swallowed. If battery electrolyte comes into contact with skin, wash it off with plenty of water.
-  Hearing will be severely damaged if you operate the engine for a relatively long period without protective equipment.
-  Comply with all conditions, specifications and standards related with power distribution when wiring the Genset and use only suitably rated cable for power distribution.
-  Grounding is forbidden when welding for engine installation. The excessive weld current will damage electrical devices and bearings in the Genset.
-  Safe and reliable earthing should be presented for the Genset.

Sketch Map of installation for series:



2.4 Installation in Machine room

The first step to install the Genset is determining the installation location (the 2.2 item-store is the basic requirement for selection of engine room). The appropriate location is chosen by taking those factors such as the convenience of use, the economy of electricity power distribution, and the advantages of use and maintenance into consideration. Additionally the following factors should be given due consideration:

- Maintenance of adequate ventilation conditions, the hot air discharged by the radiator must be led out of the engine room expeditiously and prevent its refluece.
- Any noise and smoke generated during the course of the operation should be controlled so as to minimize the possibility of any contamination to the environment.
- Leaving enough space to the Genset for its efficient operation, cooling and maintenance. Normally, there should be no other objects within 1~1.5 meters and up 1.5~2 meters proximity of the unit.
- Elimination of extremes of temperature and exposure to the elements.
- Ensure there being no combustibile or explosive objects proximate to the Genset.

2.4.1 Foundation

The foundation of Genset for installing and fixing is very important as it must:

- Support the static weight of the Genset and any dynamic loads due to imbalance force
- Be sufficiently rigid and stable so that distortion will not take place that would affect the alignment of the diesel engine, main alternating motor and accessories.
- Absorb vibrations originating from the operating Genset and prevent vibrations being transmitted to the foundations and walls etc.
- Be as flat and smooth as possible.
- Be spacious enough to accommodate drain guttering, and alternator cable grooves.

A concrete foundation is primarily recommended to the user as a simple and reliable installation mounting. The surface should be flat with no damage when casting. Gradienter and similar equipments are useful to assess that the installation is perpendicular and horizontal.

Generally speaking, the height of a concrete foundation for the Genset is suggested to be about 100mm to 200mm. The subsoil must have a bearing strength capable of supporting the weight of the complete set plus the concrete foundation on which it will stand.

See the “Sketch Map of installation for Genset” to understand the installation procedures for the Genset.

The temperature of the intake air to the engine should be below +40℃ , If intake air temperature is higher than that continuously, the engine output will be reduced. Therefore, the intake air should be ducted to the engine from a fresh air supply outside the engine compartment.

When a remote mounted radiator is fixed, compulsive ventilation should be adopted.

Fumes from the engine crankcase should ideally be ducted away from the engine room through a separate passage. This is of particular importance when the engine has a pushing fan otherwise the crankcase fumes are deposited on the radiator that subsequently becomes fouled with dirt causing it to clog up, thereby reducing cooling capacity.

2.4.4 Exhaust

The heavy industrial muffler, ripple flex pipe and exhaust siphon to the specifications of the standard Genset will be supplied. The user can plan the requisite exhaust system with those accessories. Several aspects should be taken into consideration when designing and installing the exhaust system:

- Ensure that the back pressure of the complete system is below the maximum limit laid down by the engine manufacturer (generally below 5Kpa for a standard design Genset)
- Keep weight off the engine manifold and turbocharger by supporting the system.
- Allow for thermal expansion and contraction
- Provide flexibility if the engine set is on an anti-vibration mount.
- Reduce exhaust noise

Typical installation sketch map for exhaust system

Excessive back pressure will lead to:

- Loss of power output
- Poor fuel economy
- High exhaust temperature

The heavy industrial muffler on our Genset is an absorptive type, utilizing the principle of absorbing noise by means of an absorbent lining inside the muffler and normally providing attenuation over a broad frequency range.

Adding the pressure losses through the muffler to loss through the pipe work will give the total back pressure incurred by the exhaust system.

In the situations of more than one Genset installation, each unit should have its own exclusive fume extraction passage.

The turbocharger should be connected with the exhaust siphon by ripple flex pipe. Flexible connections have three functions, to:

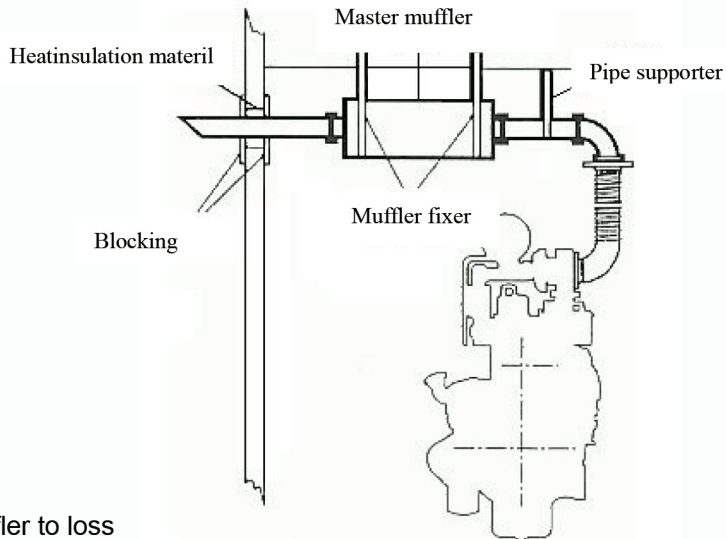
- Isolate vibrations and weight of exhaust piping from engine
- Compensate for thermal expansion of the exhaust piping.
- Compensate for lateral movement when the engine starts and stops if the engine is on anti-vibration mountings.

Rain and water condensation that enter the engine can cause severe damage. Long exhaust lines should therefore be fitted with a water drain, which should be located as close to the engine as possible.

2.4.5 Soundproofing

Noise about 90-110dB will generate during the operation. The level will gradually increase with higher augmented loads.

In order to meet noise-proofing requirements as may be required by local government regulations and alleviate the noise and exhaust pollution of the environment, thereby ensuring minimal disruption to the normal living conditions of the residents nearby, it is of great importance to reduce the engine noise by



Genset model	Conopy size	Rated Power(KW)	Phase	Weight(kg)
AP25DCE	2200mm×900mm×1250mm	20KW	Three Phase	920
AP37DCE	2200mm×900mm×1250mm	30KW	Three Phase	950
AP62DCE	2500mm×1000mm×1600mm	50KW	Three Phase	1330
AP80DCE	2500mm×1000mm×1600mm	70KW	Three Phase	1330
AP100DCE	2800mm×1150mm×1700mm	80KW	Three Phase	1650
AP187DCE	3300mm×1300mm×1800mm	150KW	Three Phase	187

P.s Above Genset Room Installation Size just for reference,Different brand Engine and Model will have different Installation Size.

2.4.2 Vibration damping

The Genset incorporates an efficient anti-vibration apparatus, an absorber has been mounted on the unit attached to the fuel tank in the base. By referring to the sketch map, the user can install the Genset on a plain and firm foundation through the installation hole on the base. The absorber can be fixed on the concrete foundation with expansion bolts. Consequently, the vibrations and strikes to the construction originating from the running engine will be reduced. Further anti-vibration measures may be suggested for purpose-built Gensets and in special circumstances.

Other parts on the machine should be connected flexibly with exterior objects except installation between Genset and foundation. For example, the exhaust siphon should be connected by ripple flex pipe. Cables, airflow gutter, suction pipes (fuel), return pipes (fuel) also require flexible connections to reduce potential damage by vibration.

2.4.3 Ventilation

When a set with an integrally mounted radiator is installed in an engine room, the basic principle is to extract hot air from the room, and induce air at the ambient temperature outside the engine room with minimum re-circulation.

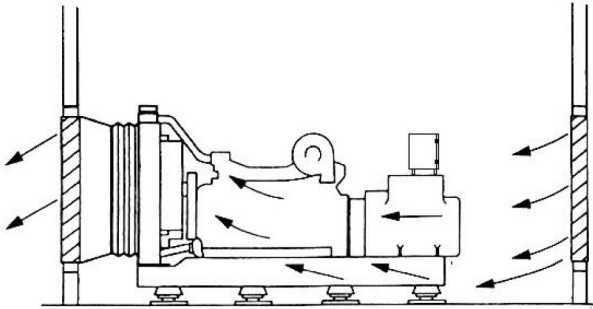
The drawing on the right illustrates the most suitable position of the engine in relation to the wall of the building. The object is to get cool air in at the lowest possible point, push it through the radiator matrix and then out of the building.

A sheet metal or plastic duct is fixed to the opening frame using a flexible connection to the radiator duct flange in order to prevent the transfer of vibration, meanwhile ensuring the thorough ejection of the hot air.

The free flow area of the duct should be at least 25% larger than the radiator matrix. The duct needs to be smooth to reduce resistance. The inlet air opening should have a free flow area at least 25% larger than the radiator matrix.

The inlet and outlet openings will usually be fitted with a mesh grill, louvers, and noise attenuating panels or inside and outside ducting. Any such fitting will reduce the free flow area and promote resistance to air flow and it may be necessary to further increase the opening area.

The large quantity of air moved by the radiator fan on the water tank of the engine is usually sufficient to adequately ventilate the engine room.



2.5.2 Coolant replacement

The coolant should be replaced every other year in order to avoid the decline of cooling performance incurred by deposits in the cooling system. Another reason for the replacement of coolant is to avoid the risk of corrosion. Rust will reduce the performance of the coolant and the water temperature sensor will lose its effectiveness.

During the replacement of the coolant, the system should be washed by water in advance. The procedure should only be completed when the water is very clean.

During the drain of coolant, the Genset must be closed and cooled down, then open the water tank cover, finally open the drain cover or plug. For models equipped with a coolant filter, take off the filter and replace it.

2.5.3 Coolant adding

- Before adding the coolant into the cooling system, the drain cap nut must be closed and the drain plug correctly positioned.
- Add the coolant slowly, avoiding bubbles developing in the system.
- The air should be ejected through the exhaust valve and injection opening. The heater-controlling valve should be open if the cooling system is connected with a heater. Ventilation should be ensured when injecting (note: the exhaust valve locates at the highest point of the circuit of the cooling system or beside the temperature saving device and water temperature sensor, the exhausting operation can also be finished by loosening the water temperature sensor slightly and re-fastening it after some coolant flow from this position).
- When adding the coolant, the level should be 5cm below the weld level of the plug (or in conformity with the coolant indicator horizon). The coolant can be added when the engine has been stopped and totally cooled down. Any attempt to start the engine before ventilation and sufficient coolant added should be forbidden. The engine requires heating in advance and the coolant level needs checking after the filling with the coolant. Top it up if necessary. The coolant added into the water tank should be compatible with the cooling system.
- On some models equipped with a coolant filter, the filter valve should be open (the handle in the vertical position) before putting into operation.

2.6 Lubrication System

The main function of engine oil is to reduce friction and also abrasion by providing a protective and durable film between the moving parts of the engine. High temperature in cylinders and bearings make particularly severe demands on the oil film. The lubrication film is critical to cylinders and bearings exposed to high temperatures. The cooling characteristics of lubrication are also very important to many engine parts.



Lube filters and lubrication should be replaced periodically according to the usage frequency. Filters and lubrication should be replaced at the same time to avoid pollution of new lubrication by an old filter. Filters may also be replaced more frequently than lubrication if so desired.

2.6.1 Lubrication oil

Lubrication models may be selected according to actual operating conditions and environment. For a new Genset, lubrication must be replaced within 100 hours of initial engine use (see maintenance instruction for engine).

The user should determine whether the lube will be filled or not in accordance with the lube point, the lube level needs to be checked every 6-8 hours during a long period of operation.



It is of great importance to use only high-quality and suitable density lube and to replace the lubrication periodically within the recommended time parameters. After-sales service will not be available where damage or faults are caused by using inferior lubrication.

2.7 Fuel System

Fuel delivery to the fuel injection components should be clean, free from air and water, and at the correct pressure. Sulphur content in the fuel should meet the national standard, and the temperature level should meet the requirement raised from the practical ambient temperature.

appropriate measures.

Various factors such as the minimum air flow capacity for smooth operation and the back pressure (must be below the reference value) should be taken into consideration carefully when designing and implementing the soundproof scheme. Failure to address such factors may have severe consequences including frequent unit faults, reduced output power, high engine temperature and shortened engine life-span.

Integral low noise diesel generating set can be provided to user.

2.5 Cooling System

Diesel engine adopts the enclosed liquid cooling (with fan) mode, its cooling re-circulation loop contains:

- Water pump;
- Water gutter in the engine cylinders;
- Thermostat;
- Bypass pipe between thermostat and water pump;
- Water tank and radiator;
- Hose and piping;
- Oil cooler;
- Coolant filter (selected models)

For a non-standard generating set (e.g. Genset with separate water tank), its water tank radiator should be replaced by a heat exchanger in addition to the supplying water tank and remote cooling fan. If the position of the remote cooling fan is relatively higher, one transition water tank should be equipped to avoid damaging the heat exchanger with high inner pressure.

The cooling function of the radiator will become weaker if any external subjects are stuck on the radiator flange. It is necessary to clean the radiator regularly in a dust-filled environment.

2.5.1 Coolant

The coolant has three different functions:

- Provide adequate heat transfer
- Protect all metals in the cooling system from erosion
- Provide adequate anti-freeze protection

The coolant shall contain a mixture of water and either anti-freeze additive or anti-corrosion additive. The water should have a PH value of 6-8 (pure water or treated water is suggested)



The coolant should be mixed with anti-freeze additive when it is used in a location which has a freezing risk. The anti-freeze capacity should accommodate the lowest temperature. The mixture should be mixed in a separate container and added into the water tank when mixed evenly (refer to the coolant usage specification for details)

It is of great importance to select only a recognized coolant brand for your engine. The coolant should not only avoid engine freezing but also be resistant to boiling at high temperature (water in the water tank is susceptible to boiling during operation in conditions of high temperature)

In areas with no freezing risk, anti-corrosion additive can be used instead of anti-freezing additive. Satisfactory anti-corrosion effect can be obtained without any decline of the Genset performance. After filling the additive the engine should be warmed to get the best corrosion protection.



Do not mix anti-freeze additive and anti-corrosion additive together no matter what type they are. Bubble generation resulting from mixing can negatively impact the intended performance of both additives.



After-sales service will not be available in situations where faults such as water leakage and/or corrosion are caused by using inferior coolants or mixed additives.

- Automatic starting control panel: the Genset can be controlled manually on site, it can also be controlled remotely (controlled by an outside signal), the signal control line should be connected with this control panel correctly by user. (See the attached working instruction of control panel).
- 3-remote and communication full-auto control panel: expect automatic starting function, the control panel has its communication, the detailed communication and protocol is shown in attached documents.
- “ATS” control panel (optional): control panel with automatic switch for generating/civil power.
- Parallel connection panel (optional): two or more automatic (manual) parallel connection control panel (see the attached documents of control panel).

2.9 Battery

The starting battery is contained in the standard Genset configuration. The user can use the supplied connective wires with the Genset. First connect the red battery lead to the battery positive terminal. Then connect the black (or blue) battery lead to the battery negative terminal, finally connect with the starting motor correctly. Any attempt to connect the negative lead with the Genset hull directly is strictly forbidden in most models.

The energy volume stored in the starting motor will determine if the Genset can start up smoothly in the specified period.

The starting battery should be charged continuously by a charger generator during the operation of the diesel genset

 It is critical to correctly identify and connect the battery positive and negative terminals (In the event of incorrect connection the charge generator will be damaged or destroyed)

 The connect wire cannot be removed when operating the engine!

2.10 Power Distribution System

The electric power output of Genset is distributed from a mould case air breaker on the side of unit appropriate to the unit capacity. This breaker is installed in a hood on the side of the unit with a handle for open/close operation. The breaker is used to protect the alternator from over-load current or other abnormal impact. The breaker has a higher disjunction ability and auto-tripping function in case of failure. User can connect the power cable under the breaker for direct loading.

A mould case air breaker is not installed in the hood of leading panel or parallel panel of heavy power Genset or parallel Genset, The protection of generating output control is carried by a master breaker in the above panels.

User should select a cable which complies with safety requirements for leading panel or parallel panel, with particular attention to correct generating output phase.

 The distribution output for diesel generating set adopts a three-phase five-wire system, that is three live wire, one center wire and one ground wire, the center wire is not connected with the ground wire. User can select three-phase four-wire according to distribution requirements, connecting the center wire with the ground (base) wire to avoid a possibility that the center wire is powered.

 User must ground the Genset base when using diesel generating set. The grounding points are shown on the Genset base with a grounding mark.

2.11 Genset pre-heater

We can provide two type of pre-heater for our users. The pre-heater guarantees that the Genset will start up promptly in extremely cold or emergent conditions.

Alternate current and direct current fuel pre-heater are available as your alternatives. They can heat the coolant to warm the engine. The former adopts the AC as its energy, and later adopts the fuel (diesel) as its heating energy. The user can select the required heater according to operating environment and conditions.

The pre-heater on the Genset has been tested in the factory. It can be used simply after connecting with the correct power supply (fuel).

2.7.1 Fuel Tank

Our company offer standard fuel tank as optional parts for user, if user build it by himself, the fuel tank should ideally be constructed of stainless steel, aluminum or steel plate, alternatively. To obviate the risk of any chemical reaction with diesel, subsequently inducing a decrease of diesel quality, purity and combustion efficiency, the tank must not be painted internally nor zinc coated or galvanized.

The fuel tank should be equipped with a

- Vent pipe on the tank top.
- Sight glass.
- Drain cock in the bottom of tank to drain sludge and water.
- Earth cable between filter point and tank to earth.
- Baffle plate with apertures to separate the fuel supply district from the fuel return district to decrease the heat exchange.
- Engine fuel suction line positioned 15mm above the button of the tank to prevent sludge and water being drawn into the fuel supply.
- Fuel level on selected models higher than the position of engine injector in order to prevent fuel return and starting difficulty.

2.7.2 Fuel Tube

- The fuel lines should be routed so that the fuel is not excessively heated by the heat radiation from the engine.
- Maximum permissible fuel temperature before introduction to the injection pump is 60℃.
- It is important that there are no fuel leakages either on the suction or return line.

It is recommended to use flexible fuel hoses between engine and fuel lines. They should always be used if the engine is rubber-mounted.

For a fuel line of length up to 6m, the inner diameter of the fuel line should be 20% bigger than the pipe equipped with the engine. The fuel return line is piped back to the top of the fuel tank and must not be connected to the suction line.

Models that are supplied with fuel tanks in the base are equipped with appropriate fuel lines and gauges.

2.7.3 Fuel

The composition of the fuel plays an important role in the function and life of diesel engines and in emission structure. In order to achieve a specified performance regarding power and fuel economy and to fulfill the emission requirements set by the authorities, only fuel meeting the international and national standards should be used. The standards represent minimum requirements for market fuels and are often compiled in cooperation between the oil companies and the automobile industry.

Characteristics of the fuel such as cold weather properties, sulphur content, density, and water content are the most important indices when choosing the fuel for your engine. Different fuel qualities will exert different influences on the performance such as starting, lubricating, output power, emission, and the replacement cycle of oil filters of the Genset.

Specific fuel requirements for selected Genset models can be referenced in the instruction book for the engine.

 Fuel can be added only when the Genset is stopped and cooled to avoid drawing impurities into the fuel line. Impurities in fuel will lead to filter blocks and insufficient fuel supply for engine. The output power of the engine will decline seriously in such condition.

 After-sales service will not be available where damage or faults are caused by using inferior fuel.

2.8 Control System

A control panel is standard equipment for all diesel generating sets. Individual customer requirements will be met with:

- Standard control panel: that is manual control panel, user can control the Genset on site only after connecting the starting battery.

3.2.2 Pre-heating

The user can determine whether the pre-heating Genset procedures are necessary in accordance with the ambient temperature. Control panel attached with pre-heating buttons controls and monitors the starting heater.

3.2.3 Switch on

Turn the control panel key from position “OFF” to position “ON”. The background indicator lamp on the panel will light, the fuel valve will open, the electronic injection controller type or electronic speed governor will commence operation.

3.2.4 Starting

Selected Gensets are equipped with idle/full speed conversion switches, users can select either option based on the practical situation. Idle speed should not be used for longer than five minutes and any lengthy period of operation at idle speed should be strictly forbidden.

Press the starting button for less than 30 seconds, then when the engine is driven by the starting motor, release the starting button, the Genset is operational.

Suggestion: In order to prolong the life span of the starting motor and batteries, the engine starting period is recommended to be confined to 5-10 seconds. If start-up fails, a short period should be allowed to elapse before retrying the procedure.

Parameters such as pre-heating, starting cycle and starting times have been established by programs in those control panels with self-starting (communication) meters. Users can reset or adapt these parameters under the guidance of Genset specifications.

Defective control panels should be overhauled in time before operating the engine.



Severe damage may be caused by operating the engine imprudently regardless of control panel faults and in such circumstances maintenance service will not be available.

3.2.5 Operation

As the engine reaches full operational speed, the alternator voltage/frequency reading will stabilize and the operator should then close the air breaker.

Check the instruments at regular intervals while operating the engine. You should ensure the indicators on the control panel are in the correct position, and there are no warning signals on the control panel. Operational parameters, for instance, the fuel tank level should be carefully monitored. The operating parameters should be recorded regularly (see example).

3.2.6 Emergency Stop

Once severe faults or electricity distribution faults are detected, press emergency stop button to stop the engine. The emergency stop function cannot be abused recklessly in ordinary use.

3.2.7 Normal stop

Before stopping the engine, the loads must be disengaged firstly, and then the Genset needs a short period (3-5mins) to run under nil load in order that the engine can cool down gradually. (Cooling down can be operated in idle speed)

Selected models are equipped with stopping valves. It's invalid to stop the engine by turn off the switch key of the control panel. Pressing the stop button when the control panel is still on power is the only valid method to stop the engine.

The ordinary manual control panel serves as the example in this chart to illustrate the operation procedure of the engine. Various configurations can be chosen as alternatives: Auto starting control, Auto parallel connection panel, 3-remote and communication full-auto control panel. But the operation and control programs are virtually similar. For detailed operation of each control panel, the user should refer to the attached documents: “working instruction of control panel”.

3. Operation

3.1 Check before operation

Genset can be put into operation immediately after installation. The following items must be checked just before running the engine:

- Sundries or obstacles near around the engine surface or not ;
- Inlet and exhaust approaches are expedited in the machine room or not;
- Coolant level in water tank (normal or abnormal);
- Indicator of air filter (normal or abnormal);
- Lubrication level in normal range or not;
- Fuel valve opened or not, Fuel supply normal or not;
- Battery cables connected correctly or not;
- Load equipment is ready or not. In case the alternator is connected with loads, make sure to cut off the air breaker.



A good operation (maintenance) procedure should be created for each operator, it is a basic requirement for reliable, durable operation of the Genset.

3.2 Operation

3.2.1 Types of Genset control system

a, Meters Type Control System

Meters type control system is combined by Engine meters, Main Switch, Current/Voltage Switch, Current meter, Voltage meter and Frequency meter. Key and Button are used to Start, Stop engine and protect against faults and alarms. Main Switch have function of short circuit, Current/Voltage Switch, Current meter, Voltage meter and Frequency meter are used for observe Genset's Phase current, Voltage and Frequency.

b, Four Protection Control System

This control system use LED show digital controller, contains Active power, Reactive Power, 3Phase Voltage, Frequency, 3Phase current, KWH, Power Factor, Oil Pressure, Oil Temperature, Coolant Temperature, Engine Speed, Running Hours, Battery Voltage etc.

It have protection and alarm of Overspeed, Low oil pressure, High water temperature, Over Voltage, Low Voltage, High frequency, Short Circuit, and IDMT over current.

c, Self-Start Control System

This control system use LED show digital controller, contains Active power, Reactive Power, 3Phase Voltage, Frequency, 3Phase current, KWH, Power Factor, Oil Pressure, Oil Temperature, Coolant Temperature, Engine Speed, Running Hours, Battery Voltage etc.

It have protection and alarm of Overspeed, Low oil pressure, High water temperature, Over Voltage, Low Voltage, High frequency, Short Circuit, and IDMT over current.

This system have function of self start and self stop (Time 15s-60s adjustable).

d, Automatic Control System

This control system use LED show digital controller, contains Active power, Reactive Power, 3Phase Voltage, Frequency, 3Phase current, KWH, Power Factor, Oil Pressure, Oil Temperature, Coolant Temperature, Engine Speed, Running Hours, Battery Voltage etc.

It have protection and alarm of Overspeed, Low oil pressure, High water temperature, Over Voltage, Low Voltage, High frequency, Short Circuit, and IDMT over current.

This system have function of self start and self stop (Time 15s-60s adjustable).



The same type of coolant as is being used in the cooling system must be used to top up.
When opening the lid, be careful of the high temperature. Steam or the hot coolant may spray out.



Beware of scalding danger when draining the lubrication.



The injection pump or nozzles will break down if inferior fuel that cannot meet the national standard is used.



For a Genset with turbocharger engine, impact loading over 50% is not recommended to be borne by the Genset, otherwise, speed-loosening will happen on the Genset, User should take some measures (voltage declining, frequency conversion) to control Genset starting when the unit is used for heavy loads, such precautions will reduce negative impact to Genset.



Gensets in storage or utilized as standby power should be run at least once a month, or run with full loads for more than 4 hours a year to get rid of the carbon deposits in the exhaust system.



For the manual parallel control panel, the brake can only be closed when synchronization of the frequency, phase sequence, phase, and voltage is ensured.

3.3 After the operation

The following operations should be taken after the Genset stops:

- Inspect the Genset for any leakage (oil leakage, fuel leakage and coolant leakage).
- Shut off the fuel valve.
- Shut off the inlet and exhaust equipment in the engine room (if necessary).
- Shut off the alternator output air breaker..
- Turn off the key switch of the control panel, pull the key out, and store it carefully.
- Disconnect the cable on the battery lead (negative), drain the fuel and coolant when storage or maintenance service required.

Items listed above are not applicable for automatic-starting Diesel generating sets.

3.4 Operation Record

Every time when Genset operating,user should make good record,Record have different types , standard contents should include:Running hours this time,History running hours,Oil pressure and temperature parameters,Genset Voltage,Frequency,Max Power(Current) etc,Genset operating situation,Genset faults and alarms etc.



Correct and Complete Operation record,user can get correct and perfect after sales service.

Sample:Operation Record Table:

Time		Engine Parameters		Generating and Parameters				Fault Record (Y/N)	Operator	P.s
Start/St op Hours	History run Hours	Oil Pressure (Bar)	Water Temperature(℃)	Voltage (V)	Current(A)	Frequency (HZ)	Power (KW)			

3.5 Attention



In conditions of low temperature, please prolong the running time in idle speed accordingly. But when the engine begins to warm up, the Genset cannot be operated in idle speed for a long period, and also cannot run continuously with nil or low load, otherwise severe carbon deposits and oil leakage will appear in the Turbocharger and exhaust system.



The Gen set cannot be operated with excessive loads for a long time, which can induce engine fault and shorten engine life.



Never take the Genset apart or replace its parts when still running.

- Radiator, Checking and cleaning.
- Fuel tank (Sludge collector), Drain

Every 800 hours

- Turbocharger, Leakage checks.
- Air lines, Leakage check

Every 1200 hours

- Valve gap, cleaning;

Every 2000 hours or at least 24 months

- Air filter, Replace (replacement earlier may be advantageous according to quality of air);
- Coolant and filter, Replace (for selected models);
- Water tank, Radiator and water lines, clear thoroughly;

Every 2400 hours

- Injector, check;
- Turbocharger, General check and cleaning;
- Engine and Equipments, General check;

4.3 Alternator

Inside and outside should be cleaned periodically. Variable cleaning intervals depend on the environment in which the alternator works. When cleaning is needed, the procedure is listed as follows: 1. Cut off the power. 2. Wipe off the dust, filth, oil spots, water and any other liquids. 3. Clean the ventilation netting. Severe damage arising from winding overheating or insulation problems will occur if there are impurities in the windings. The dust and filth should be removed by cleaner instead of warm air from fan heater or high-pressure water pump.

Insulation resistance value will drop on account of moisture. Drying out must be actioned. Drying process or maintenance service can be referred to in the “Usage and maintenance specification for alternator” in detail.

4.4 Control panel

The surface of the control panel can be kept clean by careful daily maintenance. Gauge displays must be definite and straightforward with the buttons flexible and reliable.

Indicators will deviate from zero position and fastened parts will loosen by vibration when operating the Genset. It is essential to regularly adjust the gauges of the control panel, fasten the joints and the connective wires.

Any maintenance of the control panel should only be carried out after gaining thorough knowledge of its principles of operation.

4.5 Starting Battery

The battery has been stored for a long period must be charged before putting into use to ensure its normal capacity, which can be calculated by density meter.

Some water in the battery may be evaporated when charged or in normal operation. So the electrolyte must be added regularly. Before filling, any dirt around the water inlet needs to be cleaned to prevent it dropping into the battery grids, then open the water inlet and add pure water or distilled water into the battery. During the charge/ discharge period, the electrolyte in the battery may spring out from the aperture on the water inlet and corrode the objects in the vicinity if the water level in the battery is too high.

Never start the generating set when the battery is in an abnormally low ambient temperature. Batteries may become defective after a long storage period (blast or explode).



A charge generator is recommended for standby Gensets.

4. Repair & Maintenance

4.1 General



Each Genset should be maintained in accordance with that model's working instructions.



To achieve maximum operating safety and service life, it is vital that the engine is regularly serviced. By following the service recommendation, engine quality is maintained and unnecessary environmental damage avoided.



Correct identification of and strict abidance with the signs (designs, characteristics, warning items) on the Genset will greatly benefit the operating safety and maintenance service validity.



To prevent the likelihood of self-starting, the engine must be stopped and the cable on the starting battery lead (negative) must be disconnected when maintaining the Genset.

4.2 Engine

Daily before starting for first time

- Engine oil level checks.
- Coolant level checks
- Air Filter resistance indicator checks
- Radiator, External ventilation check
- Engine drive belts sets checks
- Fuel supply condition checks.

Check once every 6-8 hours for daily use of the unit. Check again after stopping for standby use.

The maintenance for a new Genset should be carried according to its operating status, after the first 200-300 operating hours

- Valve clearance, Check.
- Injector, Check

Every 50 hours

- Fuel pre-filter, Drain water
- Battery, Check electrolyte level.

Every 50-600 hours or at least every 12 months

- Replace lubrication and filter



At variable replacement intervals depending on oil quality, fuel, sulphur content and lubrication consumption, the filter should be replaced when replacing lubrication.

- Replace filter, wash or replace filter element, element of Oily Water Separator (for selected models), check and clean fuel pipe.



The replacement cycle for above filter (element) is determined by quality of fuel (impurity content), oil-adding method and whether the fuel tank is cleaned (drained) periodically.



The fuel system should be checked firstly if the color of exhausted smoke from engine is bad or the output power is declining.

Every 400 hours

- Drive belts, Checking and adjusting, replacing if necessary.

5. Fault Tracing

5.1 General

Faults of the diesel generating set can be caused by many factors and these faults are relative to varying conditions. Typical faults may happen on diesel generating set are collated and listed in this section, they are exhaustive but are useful as reference when the user detects a fault (especially for a new user).

⚠ What should be emphasized is that most faults are caused by incorrect installation, operation and maintenance by the user. The user has a right to suspect that the fault is inherent in the unit, but the conclusion must only be drawn based on correct **installation, operation and periodic maintenance** carried out by the user. Otherwise normal operation of Genset and good after-sales service will not be guaranteed.

5.2 Fault Tracing List:

Symptoms	Possible Causes	Counter Measures
Genset can't start	Insufficient Genset starting battery capacity	Maintain the battery (charge, complementing), replace the battery when necessary
	No electricity power on Control Panel	Check the fuse on the control panel
	Start too fast for some model (electric injection) and the electric injection controller has not passed self-inspection	Resetting on the control panel then restart (stop 3~4S)
	Defective start relay	Replace this relay
	Defective starter motor	Analyse the cause, replace it when necessary
	Genset jam, unable to manual start	Check thoroughly to find the cause
Start difficulty or starting too long	Insufficient Genset starting battery capacity	Maintain the battery (charge, complementing), replace the battery when necessary
	Preheating insufficient	Check the pre-heater components
	The range of starting accelerator potentiometer for some Genset is too small.	Refer to the ESD specification, properly augment the range of potentiometer.
	Low temperature	Heat engine with pre-heater
	High altitude (lack of air)	Unable to start at full speed immediately, Run at full speed after idle operation for a certain period
	Wrong Fuel brand or type	Replace
	Water in the Fuel	Replace the fuel, Water-Fuel separator is suggested
	Air or no Fuel in Fuel System	Eliminate the air, let the fuel stream out from return pipe by manual fuel pump
	Severe jam (Fuel Filter system)	Replace the fuel filter periodically
	Severe jam (air-inlet system)	Replace the air filter periodically
	Defective Injection pump or injector nozzles (jam)	Check the fuel pump and analyse the cause by authorized personnel, the most logical explanation is using inferior fuel for a long period.
	Defective Fuel pump	Check and repair, replace when necessary
	Defective electromagnetic valve	Check and repair, replace when necessary
Genset cannot keep running	Severe jam (exhaust system)	Check then eliminate the fault
	Defective ESD	Check the power, replace when necessary
	Water in the Fuel	Replace the fuel, Water-Fuel separator is suggested
	Air or no Fuel in Fuel System	Eliminate the air, let the fuel stream out from return pipe by manual fuel pump
	Jam (Fuel Filter or Air Filter)	Kindly replace Air/Fuel/Oil filters periodically
	Insufficient time for idle running	Prolong the idling operation period, warm the engine
	Wrong Fuel brand or type	Replace the fuel if necessary

4.6 Record of maintenance

A complete record should be taken after each maintenance service.



A complete maintenance record is a necessary condition of obtaining after-sales service

Example: maintenance record

Genset Model		Engine Model:		Alternator Model:	
Serial Number		Engine Identification:		Alternator Identification:	
Running Hours(Accumulative total)				Maintenance Period	
Maintenance Cause (periodical Maintenance or fault Maintenance)					
Parts (Replace)	Check & Overhaul	Check and Adjustment	Cleansing and Maintenance	Others	
Conclusion					
Signature (Maintenance Crew):					

Genset runs unevenly with vibration	High back pressure, exhaust pipe blocked	Reduce the back pressure, ensure an expeditious exhaust system
	Defective fuel injection system	Repair by authorized personnel
	Incorrect damper clearance	Check and adjust the damper clearance
	Cooling fan damage	Check and repair, replace when necessary
	Uneven engine foundation, wrong absorber installation position	Check and adjust the position
	Bad use condition, needs overhauling	Overhaul the engine
Low oil pressure	Incorrect lube level	Check the lube level, then add or drain
	Incorrect lube brand	Use correct brand lube
	Lube has not been replaced for a long time	Replace the lube periodically
	Blocked lube filter	Replace the filters periodically
	Excessive high lube temperature	Check and replace, then locate the cause
	Crank bearing abrasion or damage	Check and replace, then locate the cause
	Decompression valve damage	Replace the decompression valve
	blocked Oil suction filter	Check and replace the suction pipe and clean the suction fuel filter
	Lube warning switch (sensor) or meter damage	Check or replace the control panel, gauges, engine sensors to get rid of the faults
High Coolant temperature	Deficient coolant	Add the coolant
	Blocked radiator	Wash the radiator, find the solution
	Insufficient radiator ventilation	Increase the free ventilation area according to the installation requirement, ensure an expeditious ventilation
	Abnormal cooling fan running	Check the tension of fan belts, replace when necessary
	Fan damage	Check and replace
	Water pump damage	Check and replace
	Defective thermostat	Replace
	Defective fuel pump	Check and replace by authorized personnel
	Incorrect fuel injection timing	Check the fuel pump datum, repair by authorized personnel
	Excessive high inlet air temperature	Keep the ventilation of the engine room, decrease the temperature accordingly
	Genset overloaded severely	Control the load,, long-term operation with over load is forbidden.
	Lube warning sensor damage	Check the control panel, gauges, engine sensors, replace and repair to get rid of the faults
Excessive Fuel Consumption	Outer or inner fuel leakage	Check and eliminate the leakage
	Air filter jam	Replace it periodically
	Thin air, high altitude	Run in reduced output power.
	Extremely low engine temperature	Locate the cause
	Genset overloaded severely	Control the load, long-term operation with overload is forbidden.
	High back pressure, jam in exhaust pipe	Check the exhaust pipes, control the back pressure
	Incorrect fuel injection timing	Check the fuel pump datum, repair by authorized personnel
	Incorrect damper clearance	Check and adjust the damper clearance

Easy to over speed when starting	Incorrect ESD Genset starting throttle adjustment and incorrect speed ramping adjustment	Refer to the ECC specification, adjust the accelerator throttle and the ramping speed potentiometer.
	Too small settings for over speed protection	Adjust the over speed protection settings (no more than 17%)
	To mechanical speed regulation structure	Check the agility of the throttle stick, ensure correct adjustment
	Defective fuel injection pump	Check and repair by authorized personnel
Black exhaust smoke when starting	Air Inlet system blocked	Replace Air/Fuel/Oil filters periodically
	Incorrect brand or type fuel	Must replace the fuel
	Extremely low engine temperature	Further observation after the engine reached normal speed
	High altitude area, thin air	the Genset should operate with reduced power
	Too high inlet air temperature	The inlet air temperature should be no more than 40℃
	Blocked fuel return pipe	Clean fuel pipe, replace fuel filter and filter element.
	Severe Turbocharger abrasion	Repair, replace when necessary
	Incorrect damper clearance	Check and adjust the damper clearance
	Incorrect fuel injection timing	Check the fuel pump data, check by authorized personnel
Blue exhaust smoke or white exhaust smoke	Excessive lube consumption	Check the lube level
	Incorrect type or brand lube	Change the lube and lube filter, ensure correct brand of lube are being used
	Incorrect type or brand fuel	Change the fuel, ensure correct brand of fuel are being used
	Water leakage in the cylinder heads	Check the cylinder head and the cylinder liner, replace them when necessary
Genset unable to reach rating speed	Engine already in overhauling period	Overhaul the engine
	Engine overloaded	Ensure the load below the rated load limit
	Incorrect potentiometer operating speed settings	Refer to the ECC specification and give correct settings or replacement
	Defective ESD	Check and replace
	Incorrect mechanical speed governor throttle control adjustment (or loose)	Check and adjust
	Fuel pipes jam (or too thin)	Check and replace
	Water in fuel	Replace the fuel, Water-Fuel separator is suggested
	Air/oil/fuel filter replacement delay	Replace the filters periodically
	Defective frequency (speed) gauge	Replace
Genset runs unevenly	Loose throttle stick in mechanical speed regulation structure	Check and adjust it to the very position
	Incorrect electrical speed governor adjustment	Refer to the ECC specification, the “gain” and “stability” potentiometer should be set correctly.
	Speed governor out of control	Repair by authorized personnel
	Water or air in fuel	Check and eliminate it or replace the fuel
	Load fluctuates intensively and frequently	Control the load as possible
Genset runs unevenly with vibration	Water or air in fuel system	Check and eliminate it or replace the fuel
	Jam in air filter	Replace the filters periodically
	Excessive lube or wrong lube type	Check the lube level, change the lube and lube filter, ensure correct brand of lube is being used
	Too high inlet air temperature	The inlet air temperature should be no more than 40℃

Defective Control Panel	Genset stops with warning	Defective Genset stopped by control panel, check, reset and restart.
	Defective civil electricity, Genset does not start.	Lack of "Start" signal, check and solve the problem
		The automatic starting meter should be powered on and operates in automatic mode.
		Incorrect control circuit connection, check and correct it
	Genset unable to stop, normal civil electricity	Defective gauges on auto start engine, repair or replace
		In the course of cooling operation (3-5 minutes)
		ATS "Starting" signal lingers, check ATS faults
	Unable to remote control and remote monitoring	Incorrect fuel route electromagnetic valve settings
		Check the configuration of the Genset
		Check the connection of communication circuit
		Whether the communication software has been correctly installed on the computer
		Whether the cipher for monitoring the correspondence is correctly set
		Defective engine gauges, check or replace

	Entered overhauling period	Overhaul the Gen set
Excessive Oil	Lube leakage	Check and get rid of the leakage
	Wrong lube type or brand	Replace the lube and the filter, use the correct lube
Consumption	Turbocharger seal rings and bearings abrasion	Check and replace
	Severe crankcase, piston, cylinder block abrasion	Check the cause, if entered the overhauling period
Inadequate output power	Engine overloaded	Run in decreased load
	High altitude, insufficient power	Adjust the output power over 1000 meters above sea level
	Too thin fuel pipe or blocked fuel pipe	Check and increase the fuel pipe caliber, reduce the resistance, replace fuel filter.
	Incorrect fuel type or brand	Replace the fuel and the fuel filter, use the correct fuel
	Fuel return pipe jam or fuel tank exhaust aperture jam	Check and eliminate the fault
	High back pressure	Check the exhaust pipe, reduce the back pressure
	Air filter jam, insufficient inlet air	Replace the filters periodically
Inadequate output power	Too high inlet air temperature (engine room)	Keep the engine room ventilated, decrease the inlet air temperature
	High fuel temperature	Keep the temperature of input fuel below 70℃
	Defective fuel pump or speed regulation system	Check and replace by authorized personnel
	Turbocharger impeller damage	Check and replace
	Incorrect damper clearance	Check and adjust the damper clearance
	Faulty injection timing	Check injection pump data and maintain it by authorized personnel.
	Entered overhauling period	Overhaul the Gen set
Unable to stop	Genset start automatically, the engine is still running when ATS signals are cut off	Nothing abnormal, stop the engine after entering the cool operation
	Electromagnetic valve for stopping engine out of control	Check the connection, change the electromagnetic valve if necessary
	Defective ESD or mechanical speed governor	Check by authorized personnel
	Turn off the control panel key switch, then press the stopping button	Invalid operation, must press stopping button then turn off key switch
	Defective engine control gauge	Check and replace
	No fuel, water or air in the fuel	Check and eliminate the fault, Water-Fuel separator is suggested,
	Blocked fuel filter and air filter	Check, replace filter periodically
	ESD fault	Check by authorized personnel
	Stopping electromagnetic valve protective functions	Check the warning content (code), eliminate the fault
	Defective Genset control panel	Check the control panel according to the specification
Defective electricity distribution air breaker	Air breaker brake detaches automatically	Shunt tripping caused by overload (short circuit)
		Electric parallel connection control brake detaches
		Defective electricity distribution air breaker, maintain or replace
	Air breaker brake cannot be closed	Shunt tripping caused by overload (short circuit), close the air breaker again
		In parallel connection control mode, needs synchronization
		Defective air breaker, replace



AIPOWER, S. DE R.L. DE C.V.

**Av. Mariano Escobedo 543, Interior 407, Colonia Rincón del
Bosque, Miguel Hidalgo, Ciudad de México, CP. 11580, México.**

Teléfono: (52)-55-52-551-476

support@a-ipower.com

www.a-ipower.com