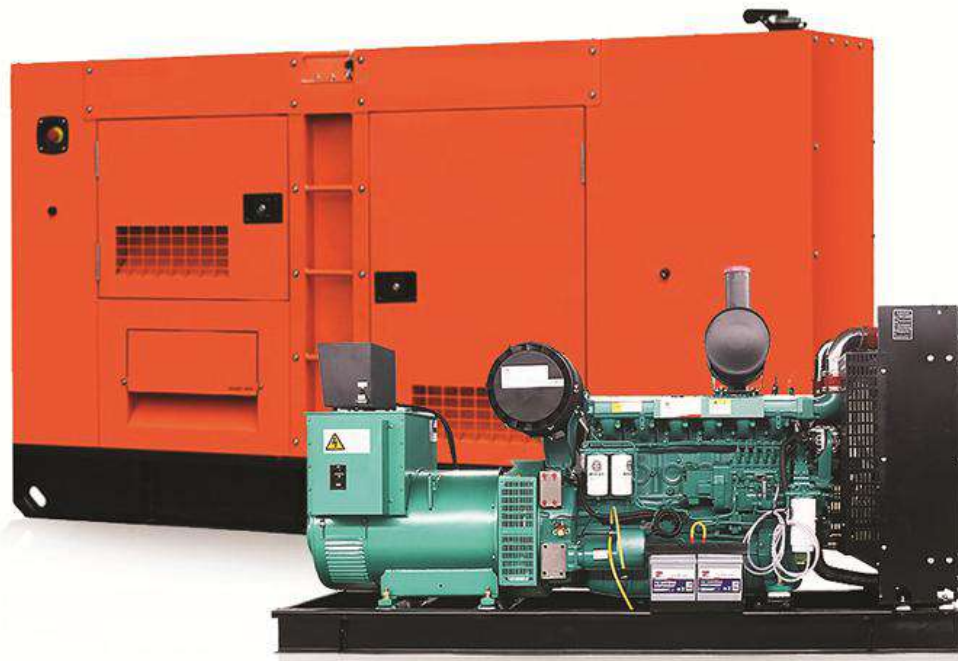


# **JUNWEI DIESEL GENERATOR**

**Operation, use and maintenance instructions**  
**Maintenance and warranty service manual**



**Weifang Junwei Machinery Co., Ltd**

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This manual guides the operation, use and maintenance of diesel generators in Weifang Junwei Machinery Co., Ltd.

If the user does not comply with this manual and the use of relevant random technical information, resulting in abnormal operation or even damage of the generator, our company will not assume quality responsibility.

In the operation, use and maintenance of the generator, if the user has any questions, please contact us, we will give a quick and detailed reply.

Weifang Junwei Machinery Co., Ltd. has the final right of interpretation of the contents of this manual.

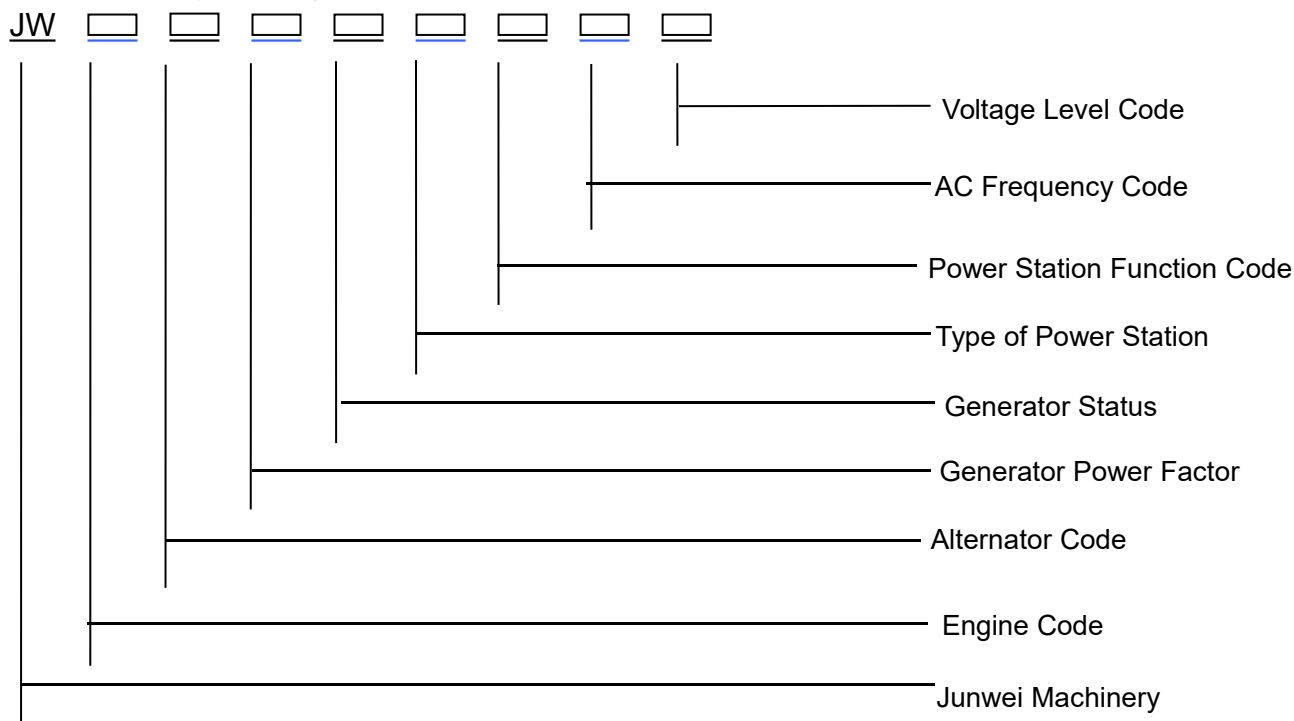
## Part 1: General Information on Generator

### ☆1. Overview of diesel generators

#### ☆1.1 Diesel generator description

Weifang Junwei Machinery Co., Ltd diesel generators have the mainly brands as follows: Ricardo、Weichai、Yuchai、Cummins and so on. If customers have special requirements, we can also configure other brands.

##### ☆1.1.1 Generator type designation:



\* For example: ZBF800PTFG1 means.6-6.6kV Voltage level, the alternating current frequency is 50Hz, the common power is 800kW, German Benz engine with Leroy-Somer alternator trailer-type anti-rain mobile power station.

- (1) Engine Code ----- It consists of 1 to 2 letters
- (2) Alternator Code ----- It consists of 1 to 2 letters
- (3) Generator Power ----- Power values are composed of Arabic numerals, not unit symbols
- (4) Generator Status ----- P—Prime Generator S—Standby Generator
- (5) Type of power station (The general generator is omitted here)

Code	Type	Code	Type
Q	Mobile Power Station	J	Container Power Station
T	Trailer Mobile Power Station	C	Marine Power Station

- (6) Function Code (Ordinary generator and marine generator are omitted here)

Code	Type
F	Rain Proof
J	Silent

- (7) AC Frequency Code ----- 50Hz is omitted here, 60Hz add letter H
- (8) Voltage Level Code ----- G1 means 6-6.6kV voltage level, G2 means 10-11kV voltage level, the new high voltage level code will be deduced from this, and the low voltage code will be omitted.

## ☆1.2 Standard atmospheric conditions for generator testing and operation

Standard atmospheric conditions for generator operation (According to the standard.GB/T 2820.1)

Environmental temperature  $T_r$ : 298K (25°C)

Absolute atmospheric pressure  $P_r$ : 100kPa (Elevation 100m)

Relative humidity of air  $\varphi_r$ : 30%

## ☆1.3 Description of generator power

According to the standard GB/T 2820.1, our company defines the power occupation of the generator as follows,

- (1) Prime Power (PRP) : It means that the generator can supply power to the load to the load for 12 hours under the predetermined service cycle and the predetermined environment, where there is an hour to operate at 100% rated power.
- (2) Standby Power (LTP) :It means that the generator operates according to the rated power indicated on the nameplate between the specified maintenance periods and under the specified environmental conditions. It is generally used in places with reliable mains supply. When the mains supply is cut off, it provides standby power and has no overload capacity. It allows one hour of full load operation every 12 hours on average, and does not exceed 500 hours of full load operation every year.

**☆1.4 Method for estimating generator current**

The formula for calculating the rated output current of generator is as follows,

$$I \approx \frac{1000}{\sqrt{3}U_{\text{线}} \cos \varphi} \times P$$

I is rated output current (A) ;  $U_{\text{线}}$  is the line voltage of the generator (V) ;  $\cos \varphi$  is the power factor of the generator, its value is 0.8; P is the power of the generator (W).

※ For example: For rated voltages of 400/230V, The output power is 880kW generator, the rated output current is calculated as follows.

$$I \approx (1000/\sqrt{3} \times 400 \times 0.8) \times 880 = 1587.5 \text{ (A)}$$

**☆1.5 Generator power correction****☆1.5.1 The importance of power correction**

① If the environmental temperature is higher than 25°C, the atmospheric pressure is below than 100kPa, relative humidity is higher than 30%, the rated power of the generator shall be corrected. If the load power of the generator is greater than the rated power, the diesel engine will smoke and overheat. Such a long time running diesel engine will produce major failure and damage, please take everything lightly.

② When the ambient temperature is too high, the air density decreases, the amount of oxygen in the diesel engine combustion decreases, and the combustion efficiency decreases, which will reduce the mechanical output power of the diesel engine. At the same time, cold air needs to cool the winding when the alternator is working. When the ambient temperature is too high, the internal temperature of the generator is rising, in order to ensure the winding temperature of the alternator, it must also be reduced within the allowable range of the output power of the generator.

③ As the altitude rises, the air density will also decrease, which also affects the output power of diesel engines and alternators.

④ When the diesel generator is used under low temperature conditions and in a high humidity area, although it does not cause a reduction in generator output power, it must also take into account the use of field conditions, and may affect the normal use of the generator factor.

⑤ Therefore, when the generator is used under non-standard environmental conditions, the user should modify it according to the conversion method of generator power. However, the influence of environmental conditions on the output power of different brands of generators is different, so the output power of different brands of generators changes with environmental conditions, and the revised parameters are different. The detailed correction factor can be consulted with the technical department of Weifang Junwei Machinery Co., Ltd.

## ☆1.5.2 Power correction calculation method

□ Corrected calculation of diesel engine output power:

$$N=N_e \times \alpha - N_f$$

Among: N-- Corrected power output of diesel engine under field conditions,kW

$N_e$ -- Diesel engine rated power,kW

$N_f$ -- The power consumption of diesel engine fan is generally 3% to 4% of the rated power of diesel engine

$\alpha$ -- Total correction factor of diesel engine

□ Corrected calculation of output power of alternator.:

$$P=P_e \times \beta$$

Among: P-- Alternator, corrected output power under field conditions,kW

$P_e$ -- Alternator rated power.,kW

$\beta$ -- Correction factor of alternator.

□ The power output of generator.:  $P_h$

The output power of the alternator is the product of the net output power of the diesel engine N and the mechanical efficiency of the alternator, and the smaller value is compared with the alternator power P.

They are: while  $N \times \eta > P$ ,  $P_h = P$ ;

while  $N \times \eta < P$  时,  $P_h = N \times \eta$ ;

Among:  $\eta$ --The mechanical efficiency of alternator

## ☆1.6 Diesel generator electrical performance

Form1.1

Parameters	Unit	Performance
Rated voltage	V	400/230
Wiring mode	—	3 phase 4 wire
Rated power	HZ	50
Rated power factor	—	0.8 (Lag.)
Steady state voltage regulation	%	$\leq \pm 1$
State voltage regulation	%	+20~-15
Steady state frequency regulation	%	$\leq 5$ (Adjustable in the range of 0 ~ 5)
Dynamic frequency regulation	%	+10~-7
Voltage fluctuation	%	$\leq 0.5$
Frequency volatility	%	$\leq 0.5$
Load mutation frequency stability time	s	$\leq 3$
Congrats on the sudden change in voltage the settling time	s	$\leq 2$
Waveform distortion	%	$\leq 5$

Suppress radio interference in accordance with VDE0875-N and GB2820.

## Part 2: Diesel Generator

### ☆2 Introduction of diesel generator

#### ☆2.1 The composition of the generator

A modern diesel generator is a rigid whole composed of a three-phase AC brushless synchronous diesel engine, a generator control box, a radiating water tank, an electrical appliance control box, a fuel tank, a silencer, a common base and other components. The control safe mailbox of the generator with larger output power is installed separately, and the other main components are installed in the public bottom welded by the section steel, which is more or less convenient for movement and installation. The axial direction of the diesel engine's flywheel and the AC generator is directly connected to the bump positioning into one, and the SAE standard's just-wheel connecting disk is used, and the electric drive is driven directly, the generator rotates. This connection mode is fixed together by screws, so that the two are connected into one, ensuring that the concentricity of the crankshaft of the diesel engine and the rotor of the AC generator is within the allowable range. In order to reduce the vibration of the generator, the main components such as diesel engine alternator water tank and electrical control box are usually equipped with shock absorbers or rubber shock absorbers at the connection with the public under-frame.

#### ☆2.2 Characteristics and uses of diesel generator

- ① Diesel generator is a type of AC power supply equipment for self-contained power station, which is a small and medium-sized independent power generation equipment. Compared with other power generation equipment, diesel generator has the advantages of compact structure, small footprint, high thermal efficiency, rapid start, flexible control and convenient fuel storage.
- ② The diesel generator is suitable for the city power grid, which can not be transmitted to the communication Bureau station, mining area, forest area, field work, national defense engineering and other occasions requiring independent power supply as the main power supply for power and lighting. For areas with mains supply and units with high requirements for power supply reliability, which do not allow power failure or require rapid power supply in a few seconds, it can be used as emergency standby power supply to provide stable AC power supply quickly once the mains supply fails.
- ③ The diesel generator is an important part of the communication power supply equipment. Its main



requirements are to be able to start at any time, supply power in time, operate safely and reliably, ensure the voltage and frequency of power supply to meet the requirements of communication equipment.

### ☆2.3 Classification of diesel generator

There are many kinds of diesel generators, which are classified according to different standards.

① According to its nature and use, it can be divided into common generator and standby generator. Generators in common use run all the year round and are generally located in areas far away from events or near industrial and mining enterprises to meet the construction, production and domestic power consumption of these places. The standby generator is in general, and electricity is supplied by the main supply of the city. When the city's electric power pull or other reason is interrupted, to ensure that the user basically produces life or for some important equipment emergency power supply generator.

② According to the structure form, control mode and protection function, it can be divided into:

A. Basic type generator — This type of generator is the most common, by the diesel engine, closed radiator, fuel tank, silencer, synchronous AC, generator control box, coupling and chassis components. The generator has the function of automatic regulation of voltage and speed, and can usually be used as main power supply or standby power supply.

B. Self-starting generator — This type of generator is based on the basic type of generator to increase the automatic control system, so that it has the function of automation. When the power supply is cut off suddenly, the generator can automatically start the function of automatic switching switch, automatic operation, automatic power transmission and automatic shutdown. When the oil pressure is too low, oil temperature or cooling water temperature is too high, it can automatically send out sound and light alarm signals. When the generator is over-speed, it can automatically shut down for emergency protection.

C. Microcomputer controlled automatic generator — The generator is composed of diesel engine with perfect performance, three-phase brushless synchronous generator, automatic fuel supply device and automatic control panel. The automatic control panel is controlled by programmable automatic controller or special micro-processing controller for diesel engine. It not only has the functions of self-starting, self-switching, self-running and self-stopping, but also is equipped with various fault alarms and automatic protection devices. In addition, he connects with the host computer through RS232 or RS485 communication interface for centralized monitoring, realizes remote control, remote signal and remote measurement, and achieves unattended.

## ☆2.4 Basic structure and working principle of diesel generator

### ☆2.4.1 Diesel engine overall structure

Diesel engine is a type of internal combustion engine, which is an energy conversion device that converts the heat energy released by fuel combustion into mechanical energy. Diesel engine is a power part of a generator, generally compensated by the crankshaft link mechanism and the body assembly gassing mechanism and the intake exhaust system, a diesel supply system lubrication system, a cooling system, and an electrical system. The overall structure of diesel engine generally includes the above several systems, but due to the number of cylinders, cylinder arrangement and cooling methods, there are slight differences in the structure of various models.

① Heat energy this must provide a certain amount of fuel into the combustion chamber, and the air is fully mixed and burned to produce heat, so there must be a fuel system. It includes diesel fuel tank, oil filter, fuel injection pump and nozzle and other parts.

② In order to convert the heat energy into mechanical energy, it needs to be completed by crankshaft connecting rod mechanism. This mechanism is mainly composed of cylinder block, crankcase, cylinder head, piston, piston pin, connecting rod, crankshaft and flywheel. When the fuel is ignited and combusted in the combustion chamber, pressure is generated at the top of the piston due to the expansion of the gas, which pushes the piston to do linear reciprocating motion. With the help of connecting rod conversion, the crankshaft rotates to drive the crankshaft to work and do work mechanically.

③ For a device to continuously realize the transformation of heat energy into mechanical energy, it must also be equipped with a set of gas distribution agencies to ensure regular intake of fresh air, exhaust after combustion. This mechanism is composed of intake valve, exhaust valve, camshaft and drive parts.

④ In order to reduce the friction loss of diesel engine and ensure the normal temperature of various parts, diesel engine must have lubrication system and cooling system. The lubricating system consists of oil pump, oil filter and lubricating oil duct. The cooling system consists of water pump, radiator, thermostat, fan and water jacket.

⑤ In order to make the diesel engine start quickly, it is necessary to configure the starting device to control the diesel engine starting. According to different starting methods, the components of the starting device are usually started by electric motor or pneumatic motor, and compressed air is used for high-power generator.

### ☆2.4.2 Common terms for internal combustion engine

① **Work Cycle:** The conversion of heat energy and mechanical energy in the internal combustion engine is completed by the four processes of the piston working in the cylinder, continuous intake compression, work and exhaust. The machine does not carry out such a process, which is called a

work cycle.

## ② Top Stop Point and Bottom Stop Point:

Figure 2.1 shows the position diagram of a single cylinder four stroke internal combustion engine

When the piston moves in the cylinder, the piston crown is at the highest position in the cylinder, which is called top stop point. The lowest position of the piston crown in the dead cylinder is called the bottom stop point.

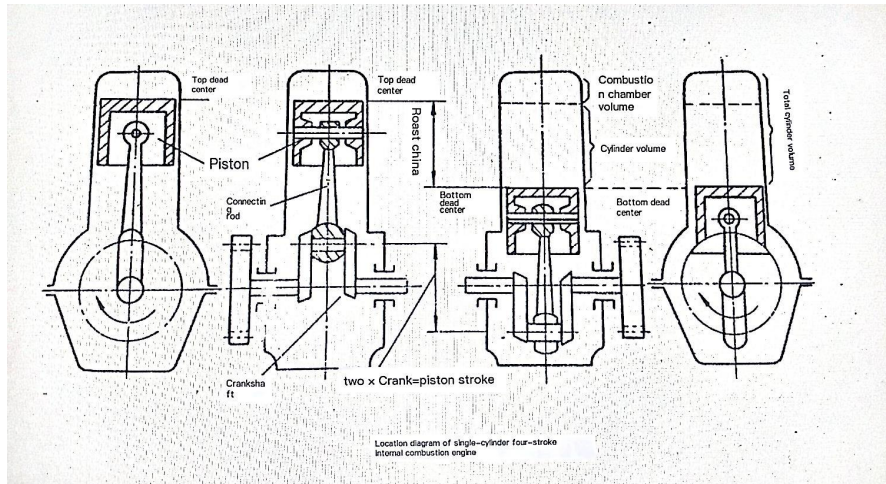


Figure 2.1. Position Diagram of single cylinder 4 stroke internal combustion engine

③ **Piston Stroke:** The minimum straight-line distance between the upper and lower stop point is called the piston stroke, is also called the stroke, usually represented by  $S$ . The minimum linear distance between the center of connection between the crankshaft and the big end of the connecting rod and the center of rotation of the crankshaft is called the radius of rotation of the crank.

④ **Working Volume:** Piston from top dead center to bottom dead center, the cylinder swept by the volume known as the working volume of the cylinder or piston displacement.

⑤ **Compression Ratio:** After fresh gas is inhaled into the cylinder, it fills the total volume of the whole cylinder system, while the total volume of the cylinder includes the volume of combustion chamber and the working volume of cylinder. The size of the compression ratio shows that the air or mixture in the cylinder is compressed, and the multiple of volume reduction also shows the degree of compression of the gas. The larger the compression ratio, the more compressed the gas is when the piston moves, the higher the temperature and pressure of the gas, and the higher the efficiency of the internal combustion engine.

## ☆2.4.3 The working principle of four-stroke diesel engine

In the thermodynamic process, only in the process of expansion can the working medium have the ability to do work, and we require the engine to continuously produce mechanical work, we must make the working medium repeatedly guarantee. Therefore, we must try to restore the metric system to its original state, and then expand it. Therefore, the diesel engine must return to the starting state after

electrical compression expansion exhaust, so that the diesel engine continuously produces mechanical work, so the above four thermal processes are called a working cycle. If the diesel engine piston goes through, four strokes complete a cycle of work, the machine is called a four-stroke diesel engine. If the piston goes through two strokes to complete a working cycle of the diesel engine, it is called a two-stroke diesel engine. At present, diesel generators are equipped with four-stroke diesel engines. The working process of the four regenerative diesel engines is illustrated in Figure 2.2.

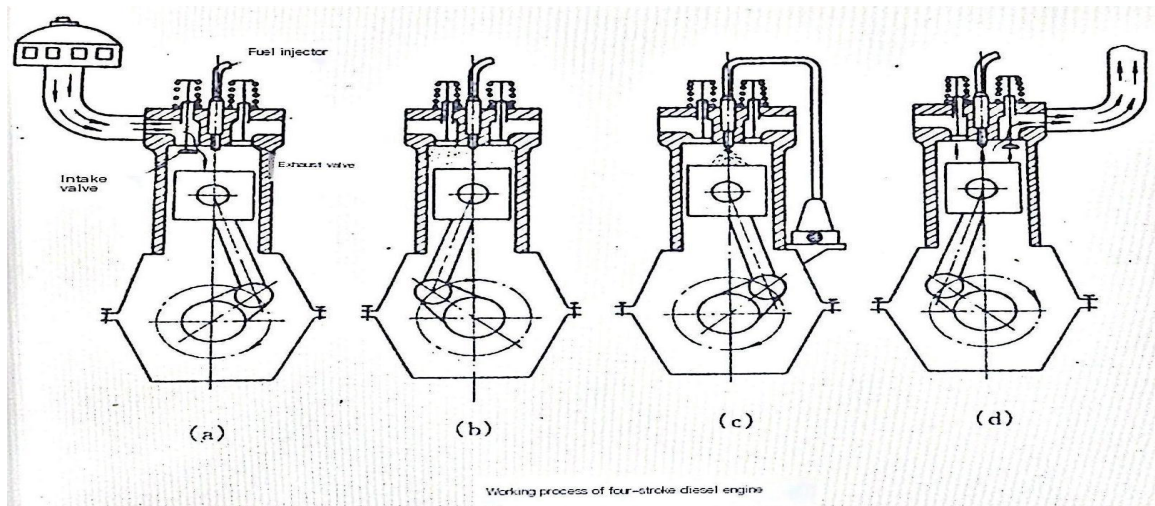


Fig 2. 2. Working process of 4-stroke diesel engine

① **Intake Stroke** : The purpose of the intake stroke is to draw in fresh air to prepare the fuel for combustion. In order to realize the pressure difference between the intake cylinder and the outside of the cylinder. Therefore, this stroke exhaust door is closed, the opening of the piston is down-stop, the volume of the cylinder above the moving piston is gradually expanded, and the gas pressure in the cylinder is lower than the atmospheric pressure, about 68 ~ 93 kPa. Under the action of atmospheric pressure, fresh air is sucked into the cylinder through the intake valve when the piston reaches the bottom stop point. The intake valve closes and the intake stroke ends.

② **Compression Stroke** .: The purpose of the compression stroke is to increase the pressure and temperature of the air in the cylinder to create conditions for fuel combustion. Because the keys and exhaust valves are closed, the air in the cylinder is compressed, and the pressure and temperature are easy to rise, and the degree of rise depends on the degree of compression. When the piston is close to the top stop point, the air pressure in the anus reaches 3000-500 kPa and the temperature reaches 500-700 C, which far exceeds the natural temperature of diesel fuel.

③ **Expansion Work Stroke** .: At the end of the piston lift, the injector begins to inject diesel fuel into the cylinder and mix it with air to form a combustible mixture which immediately ignites. At this time, the pressure in the cylinder rises rapidly to about 6000 ~ 9000 kPa, and the temperature is as high as 1800 ~ 2200 °C. Under the thrust of high temperature and high pressure gas, the piston moves

downward and drives the crankshaft to rotate to do work. As the gas expands and the piston descends, its pressure gradually decreases until the exhaust valve is opened.

④ **Exhaust Stroke.:** The purpose of the exhaust stroke is to remove the exhaust gas from the cylinder. At the end of the power stroke, the gas in the cylinder has become exhaust gas and the temperature drops to 800 ~ 900 °C and the pressure drops to 249 ~ 392 kPa. At this time, the exhaust valve opens, the valve closes the piston, moves from the bottom stop point up to the stop point, and the exhaust gas is discharged out of the cylinder under the road of residual pressure and piston push in the cylinder. The exhaust process ends when the piston reaches top stop point again. At the end of the exhaust process, the exhaust valve closes the key, the valve opens again, and repeats the next cycle, starting again and again, constantly doing work for the outside.

#### ☆2.4.4 Classification of governors

The function of governor is to automatically adjust the amount of fuel supply with the change of external load within the range of diesel engine speed, so as to maintain the basic stability of diesel engine speed. For a diesel engine, the fuel supply can be changed simply by turning the plunger of the fuel injection pump. With the increase of supply, the power and torque of the diesel engine increase accordingly, and vice versa.

The load of the diesel generator is often changed, which requires the power of the diesel output to change frequently, and the frequency of power supply is stable, which requires the speed of the diesel engine to maintain stability. Therefore, the diesel engine of the generator must be equipped with a commissioning mechanism. A governor generally consists of two parts: an inductor and an actuator. According to the different working principle of governor, it can be divided into mechanical governor, electronic governor and EFI speed control governor.

#### ① **Mechanical Governor**

The mechanical speed control system operates with a flying hammer rotating with the rotation speed corresponding to the diesel engine, the exit force generated when the hammer is rotated, can automatically adjust the amount of oil in the oil pump when the generator speed is changed, thereby reaching automatic Adjust the purpose of the generator speed. Fig. 2.3 is a schematic diagram of the principle of the centrifugal full speed governor. The position of the moving handle can change the

tension of the spring, so that the tension acts on the whiteboard is in the forefront position, while changing the position of the oil pump teeth, so that the diesel engine is adjusted to the required speed, and automatically stabilizes work under the speed.

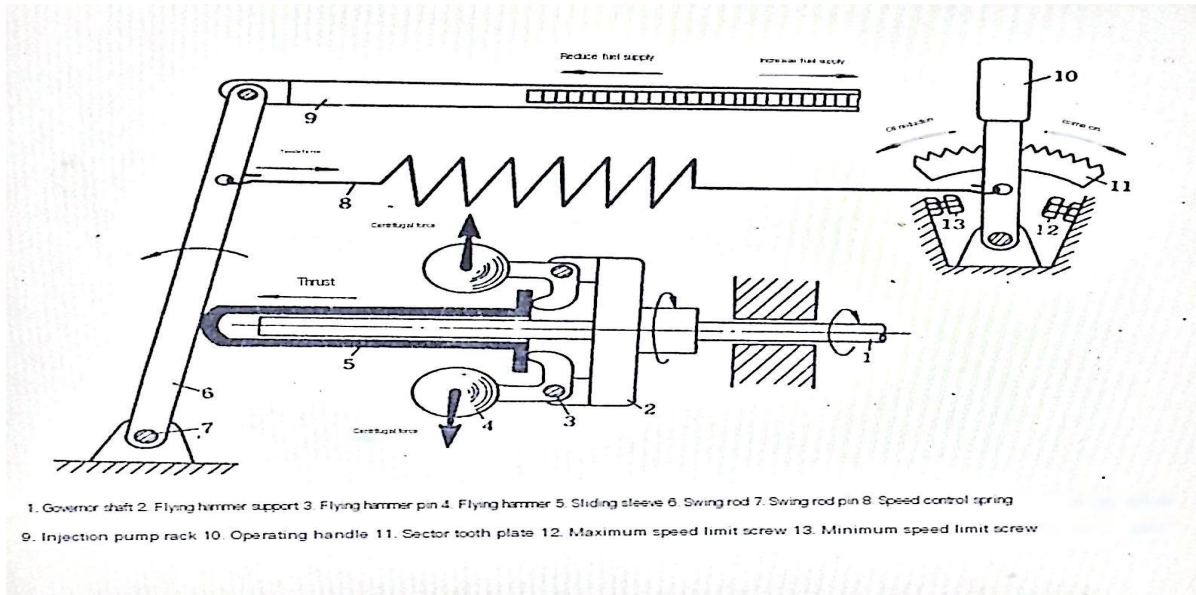


Figure 2.3 Centrifugal type the schematic diagram of the working principle of the full speed governor

Usually, the speed of diesel generator with mechanical speed control system will decrease slightly with the increase of load, and the automatic change range of speed is  $\pm 5\%$  . When the generator is under rated load, the speed of the generator is about 1500 rpm.

**② Electronic governor**

An electronic governor is a controller that controls the speed of the engine. Its main function is to make the engine idle speed can be set to maintain the speed, so that the working speed of the engine can be set to maintain the speed, not affected by load changes. The electronic governor is mainly composed of controller, speed sensor and actuator. Engine speed sensor is a variable reluctance electromagnet, which is installed in the flywheel housing, above the flywheel ring gear. When the teeth on the ring gear pass under the electromagnet, they will induce an alternating current. The electronic controller compares the input signal with a preset value and sends a correction signal or a sustain signal to the actuator. The controller can be adjusted in many ways, such as idle speed, running speed, sensitivity and stability of the controller, starting fuel quantity, engine speed and acceleration. The controller is an electromagnet, which converts the control signal from the controller into control force. Control signals from the controller to the actuator are transmitted to the fuel control rack of the fuel injection pump through a system of connecting rods.

③ **EFI speed regulation**

The electron-joining engine is an electronic control module (ECU) on a diesel engine that controls the injector, the detected diesel engine, various information detected by a series of sensors, and adjusts the fuel injection timing and injector. In the best working condition. The main advantages of EFI speed regulation.: The mechanical performance of diesel engine can be optimized by electronically controlling the fuel injection timing and injection pressure. By accurately controlling the amount of fuel injected by echo, the fuel consumption of diesel engine is reduced more economically in normal operation. It has lower emissions and meets the European off-road internal combustion engine emission standards. The data communication line can be connected and installed with the special diagnostic tool of the external instrument panel, which is easier to increase the detection of the fault point and is more convenient for troubleshooting. The composition of the electronic injection diesel engine management system is shown in Figure 2.4.

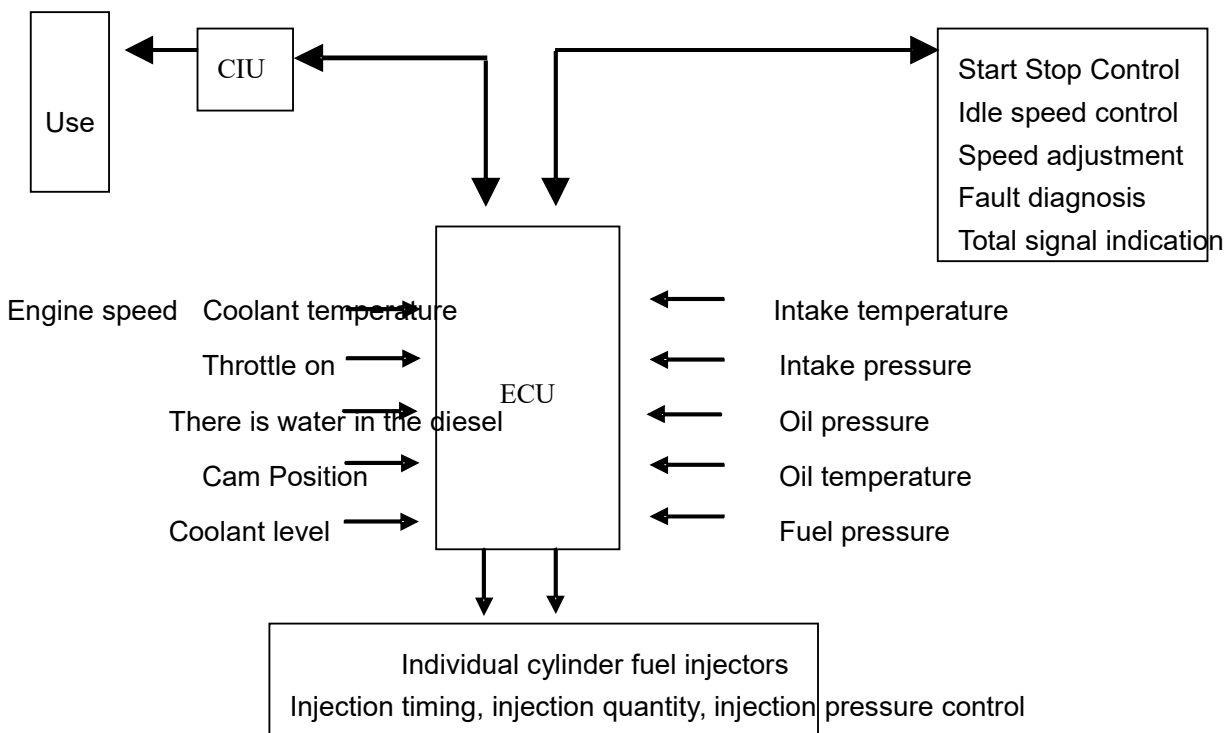


Fig. 2.4 Management system of electric diesel engine

Explanation: CIU refers to the control interface device, such as control panel; ECU means electronic control module, ECU is mounted on the diesel engine.

☆2.5 Alternator

☆2.5.1 The working principle of alternator

The alternator and the three-phase AC synchronous generator are mainly composed of main electronic main rotor duration electronic reverse time segment rotating rectifier and automatic voltage regulator. It is a device that converts mechanical energy into alternating current electrical energy. FFig. 2.5 Schematic diagram of a synchronous generator.

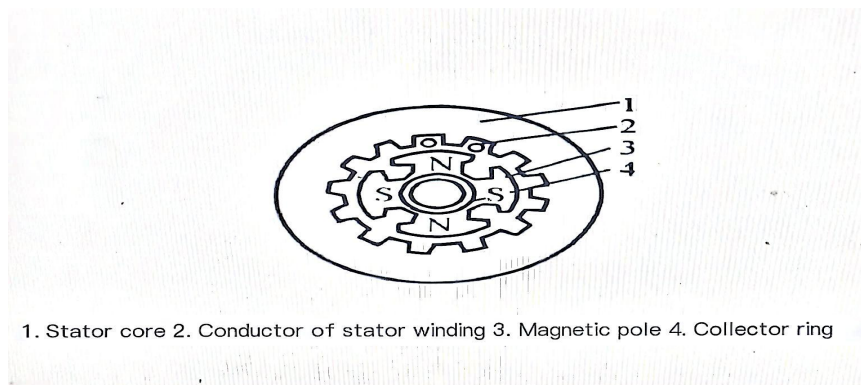


Fig. 2.5 Schematic diagram of a synchronous alternator

① Usually the stator of a three-phase synchronous alternator is the armature and the rotor is the. The whole process begins with the diesel engine landing to drive the internal components of the alternator. The principle of the brushless self-excited alternator is to use the testimony of the master and slave to produce a small AC voltage signal on the master stator. This small AC signal is sent to the automatic voltage regulator (AVR), AVR rectification into a DC signal, and it will be added to the excitation electronics.

② When this direct current is passed through the exciting stator, a magnetic field magnetic field is generated, and an alternating voltage is induced on the excitation rotor and is delivered to a rectifier that is rotatable with its synchronous rotation, and the AC voltage is converted to DC.

③ When this DC voltage appears in the main rotor, it produces a stronger magnetic field than the original instantaneous, so a higher AC voltage is induced on the main electron.

④ This higher AC voltage circulates through the entire system and induces a higher DC voltage back to the rotor. This is repeated until an approximate rated alternator output voltage is produced. At this point the automatic regulator begins to limit the voltage to the force, magnetic, and electronic, which in turn limits the total output voltage of the alternator. The whole accumulation process of voltage from no to the set value generally does not exceed one second, which is very short, so that users can be satisfied with the requirement of putting into use as soon as possible. Figure 2.6 is a schematic diagram of a self-contained AVR controlled alternator. The stator of the main machine provides



magnetic power for the exciter magnetic field through AVR. AVR makes feedback according to the voltage induction line number from the electronic winding of the main machine, and regulates the rectified output power of the exciter armature by controlling the low-power exciter magnetic field, so as to meet the requirements of controlling the main machine magnetic field current.

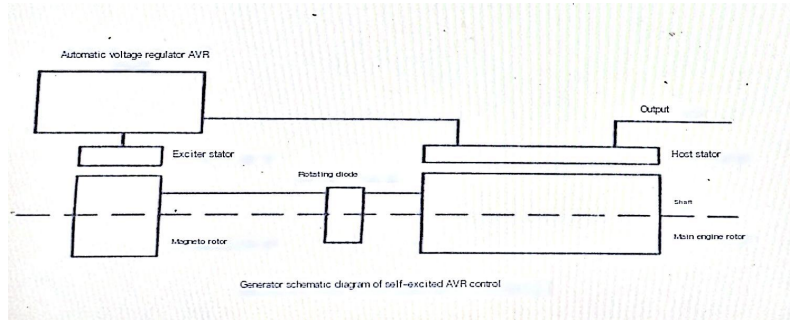


Figure 2.6 Intelligent AVR Controlled Alternator Schematic

Brushless provide a stable magnetic field through a separate exciter, and use the magnetic field to generate electrical signals. In this similar way, the voltage establishment time is shorter and the anti-interference ability is stronger. Figure 2.7 is a schematic diagram of an alternator with permanent magnet controlled excitation.

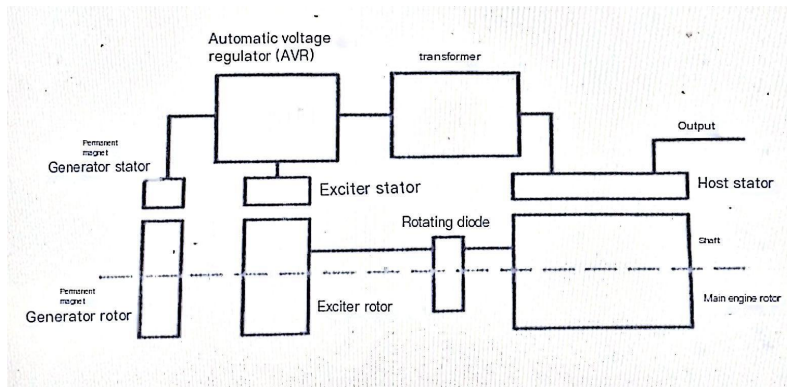


Fig. 2.7 schematic diagram of a permanent magnet controlled magnetic force alternator

**☆2.5.2 Automatic voltage stabilizer**

① Automatic voltage regulator (AVR) enables the main alternator to maintain a relatively stable voltage from no-load operation to full load operation. The host stator provides power for excitation and low magnetic field through AVR, and can automatically adjust the current of exciter magnetic field. The AVR item comes from the voltage sensing signal of the host stator winding makes feedback, and the rectified output power of the particle machine is adjusted by controlling the low power excitation machine magnetic field, thereby achieving the purpose of controlling the host magnetic field. The

output voltage of three-phase four-wire AC system of the main stator is proportional to the current of the main rotor winding.

② The AVR has a voltage-frequency proportional characteristic that correctly adjusts to reduce the output voltage of the main alternator when the speed of the generator is reduced. This proportional characteristic helps protect the diesel generator during sudden load increases.

## Part 3: Installation and commissioning of generator

### ☆3. Installation and commissioning of diesel generator

#### 3. Install

##### 3.1 Overview

The correct installation of the generator is the premise that the generator is used. The room of the generator must be designed to meet the expected use and maintenance operations, while the machine room design must comply with local government building regulations, fire protection and other applicable regulations.

In this chapter, in order to match the user installation, the use of the generator is simply described, and the user needs to learn more about the detailed technical information about the generator, refer to the random generator instructions or consult technical department of Weifang Junwei Machinery Co., Ltd.

##### 3.2 Transportation

The mechanical diesel generator of Weifang Junwei Machinery Co., Ltd should be protected when it is transported. In addition, the generator should be firmly fixed in the carriage, so as not to cause its parts to loosen or even damage due to turbulence and vibration. During the transportation of diesel generators, no one or object is allowed to be placed on the generator to avoid the generator being damaged by pressure. When loading and unloading a generator from a vehicle, use a forklift or lifting equipment to prevent the generator from toppling over or falling to the ground and causing damage.

The mechanical diesel generator of Weifang Junwei Machinery Co., Ltd is designed with lifting holes on the public base, and some optional box generators are specially designed with overhead lifting holes and special forklift holes. Users can carry out loading and unloading according to the marking instructions on the specific generator, and do not use diesel engine or alternator lugs to upgrade diesel generators.

##### 3.3 Foundation design

It is very important that the foundation for placing and fixing the diesel generator must meet the following requirements.

- Stiffness and stability of the foot to prevent deformation and affect the coaxiality of the diesel engine and the main alternator and accessories.
- The weight supporting the whole generator absorbs the dynamic impact load generated by the unbalanced force and the vibration generated by the generator during operation.
- Foundations must not be connected to the foundations of other buildings.
- The width and depth of the foundation shall meet the requirements.

- Ensure the level of the foundation and a certain degree of smoothness.
- Conditional users can reserve sewage tanks so that waste water and oil can flow away in time.; Reserve generator distribution output cable channel.

Generally, concrete installation foundation is a reliable and simple installation method, and it is recommended that users give priority to it. When pouring the concrete base, ensure that the surface of the concrete is flat and free from any damage. It is recommended that the user install the generator and its exhaust system in conjunction with a level or similar instrument.

The design of the foundation can refer to the following calculation formula.: (Enclosure.: Diagram of diesel generator foundation)

1. Generator length×Width:  $L1 \times W1$

2.Foundation length×Width:  $L2 \times W2$

$L2 = L1 + 400$  (mm)

$W2 = W1 + 400$ (mm)

3.  $B = 2 \times M \div (L2 \times W2 \times D)$

B: Foundation thickness M: Generator weight

L2: Foundation length W2: Foundation width

D: Concrete density. (If not, you can refer to 2322kg/m<sup>3</sup> )

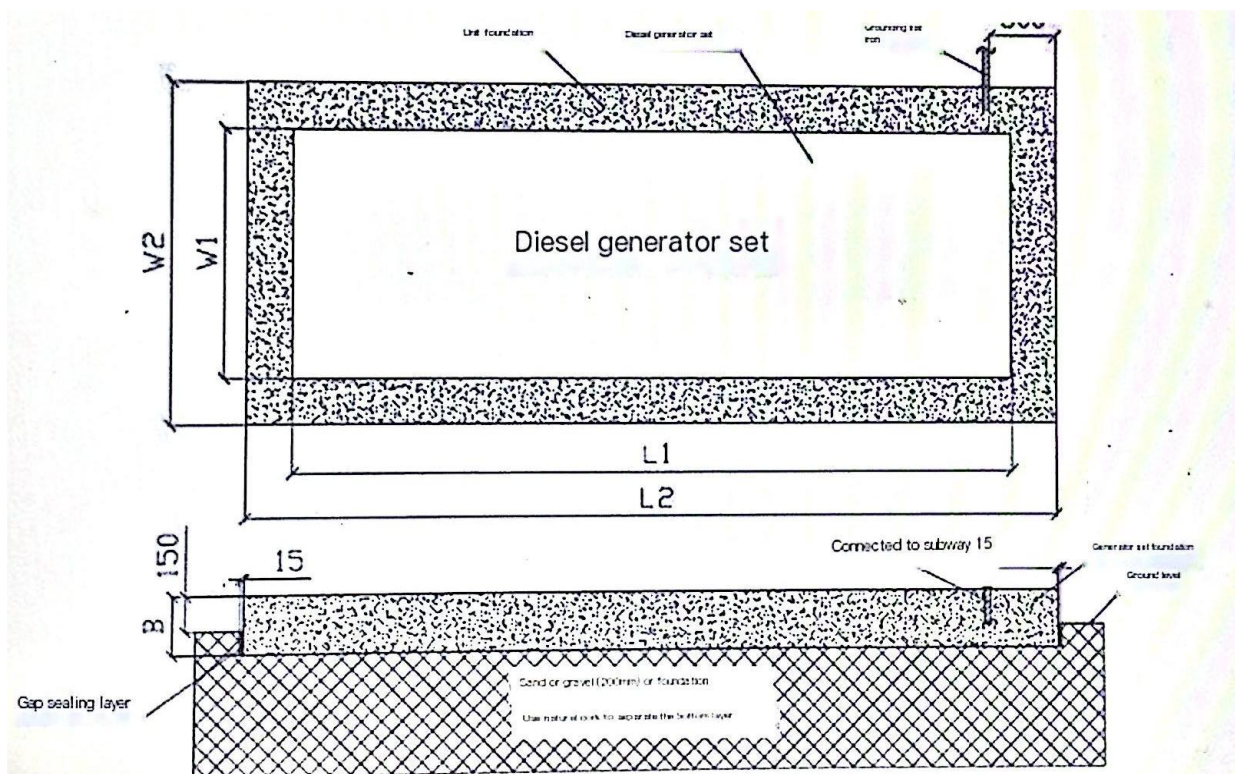


Diagram of diesel generator foundation

### 3.3 Generator Room Design

Generator installations must be designed to meet all anticipated operational and maintenance requirements. Complete installation must comply with local government building codes, fire codes and other applicable regulations. It is also very important to take into account the following aspects.

- Ensure that the diesel generator is protected from rain, sun and wind damage in the generator room.

- Ensure that the exhaust air near the generator room is smooth and has a large enough ventilation area, and at the same time, guide the hot air discharged from the radiator out of the generator room and prevent it from flowing back.

- Ensure that the exhaust gas generated by the generator is discharged out of the generator room, and minimize the impact on the surrounding environment. The silencer and exhaust pipe must be supported by a roof support bracket to allow expansion of the exhaust pipe. It is absolutely forbidden to install the exhaust system directly on the generator.

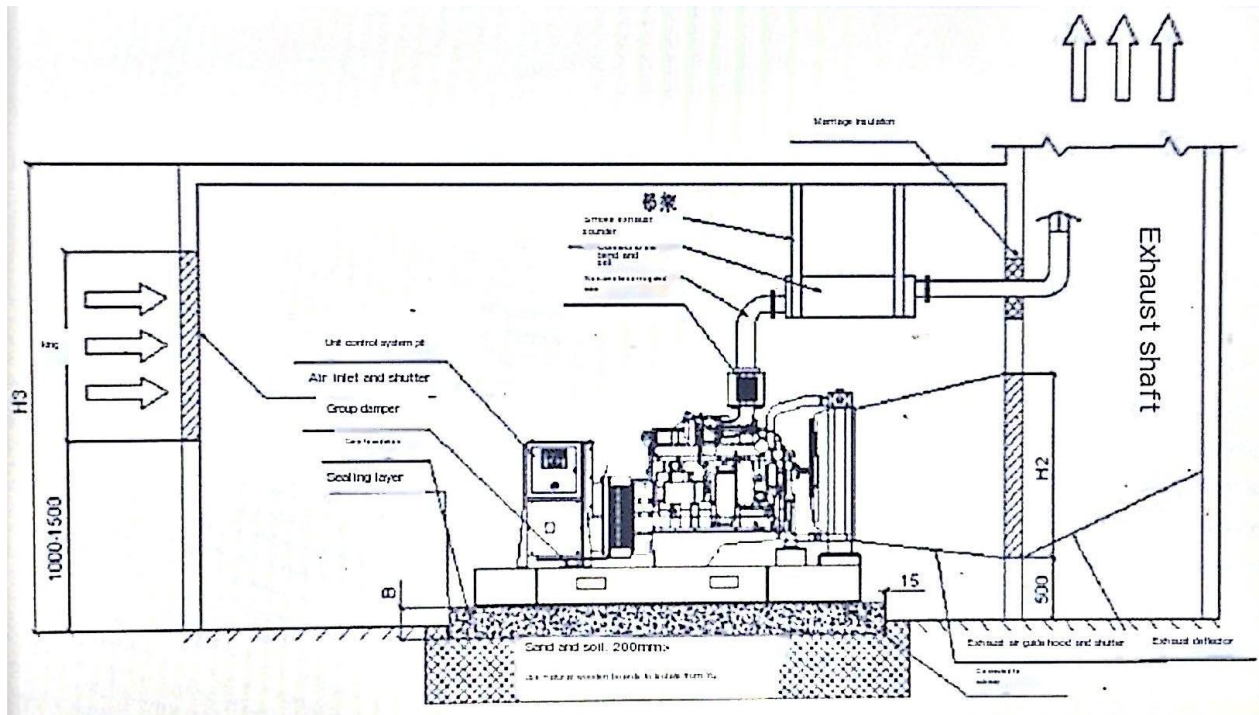
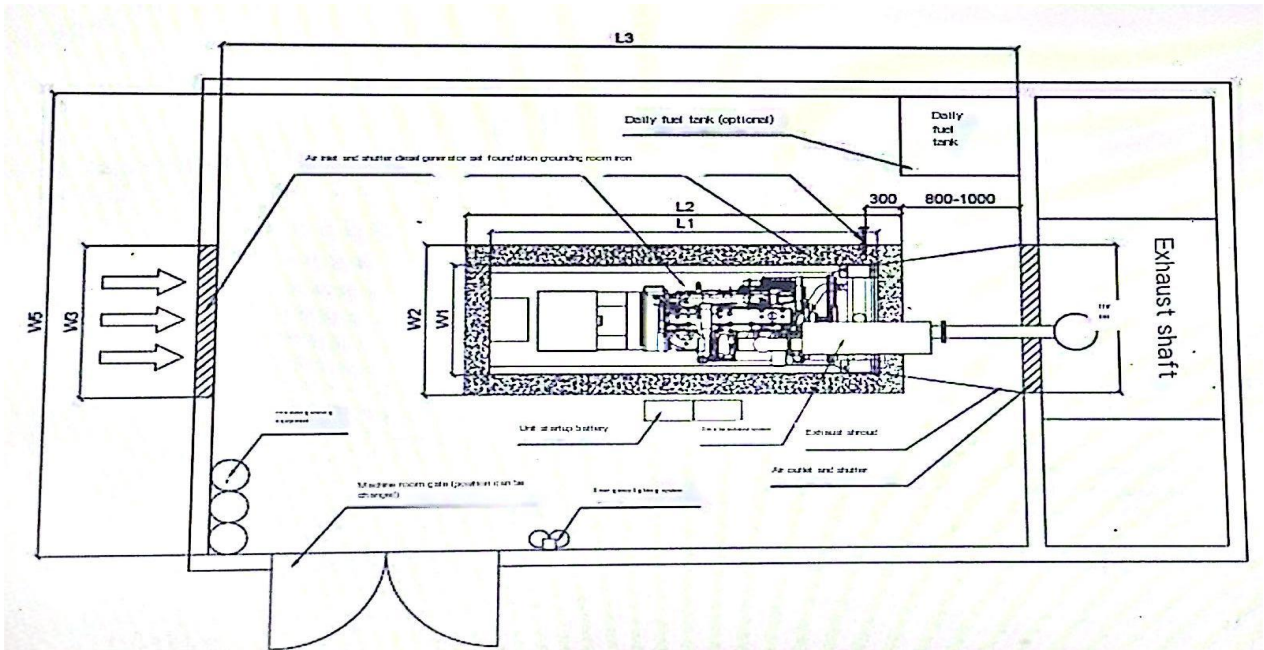
- There should be enough space around the diesel generator to facilitate the cooling operation and maintenance of the generator. Generally speaking, at least 1 to 1.5 meters around, 1.5 to 2 meters above, no other objects are allowed.

- The specified level of fire extinguishing equipment must be equipped in the generator room.

- The generator room must be equipped with corresponding emergency lighting measures for operation and maintenance.

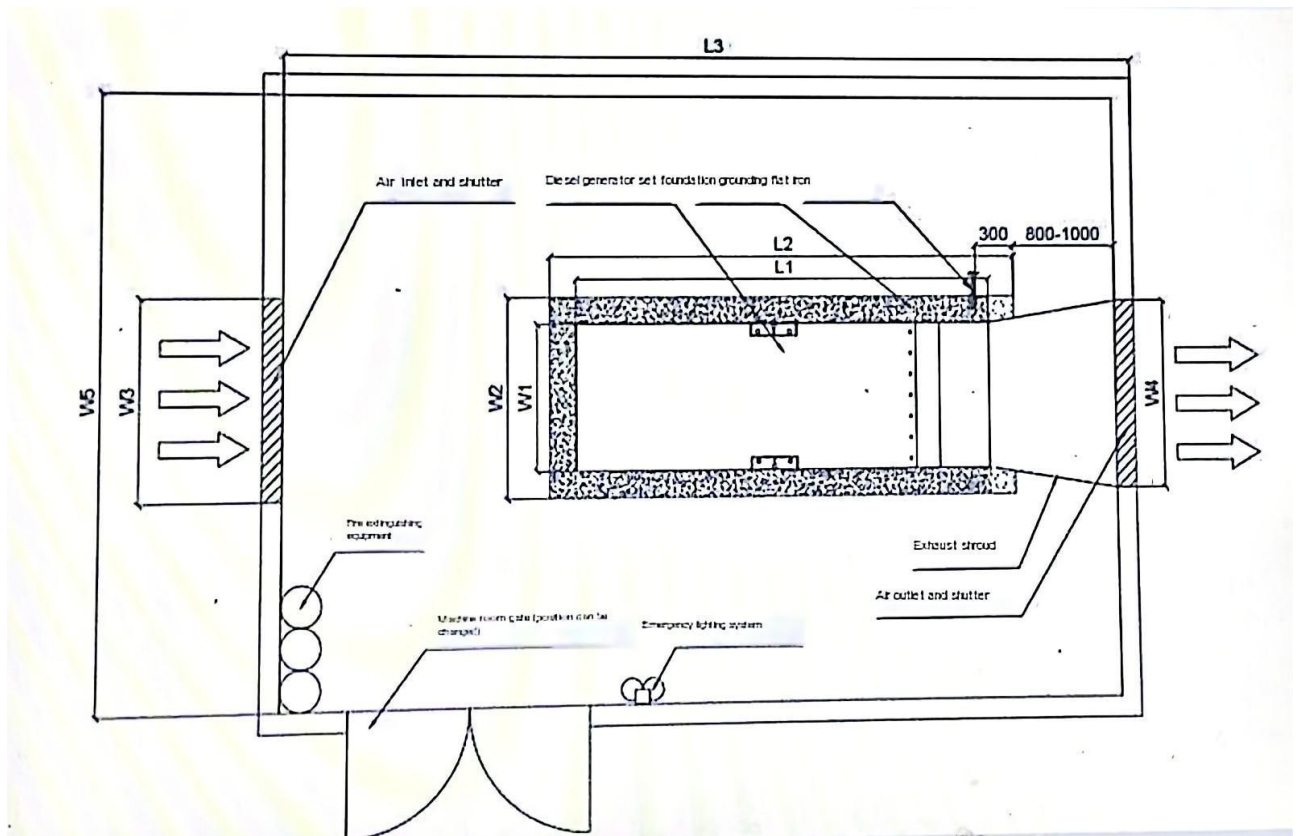
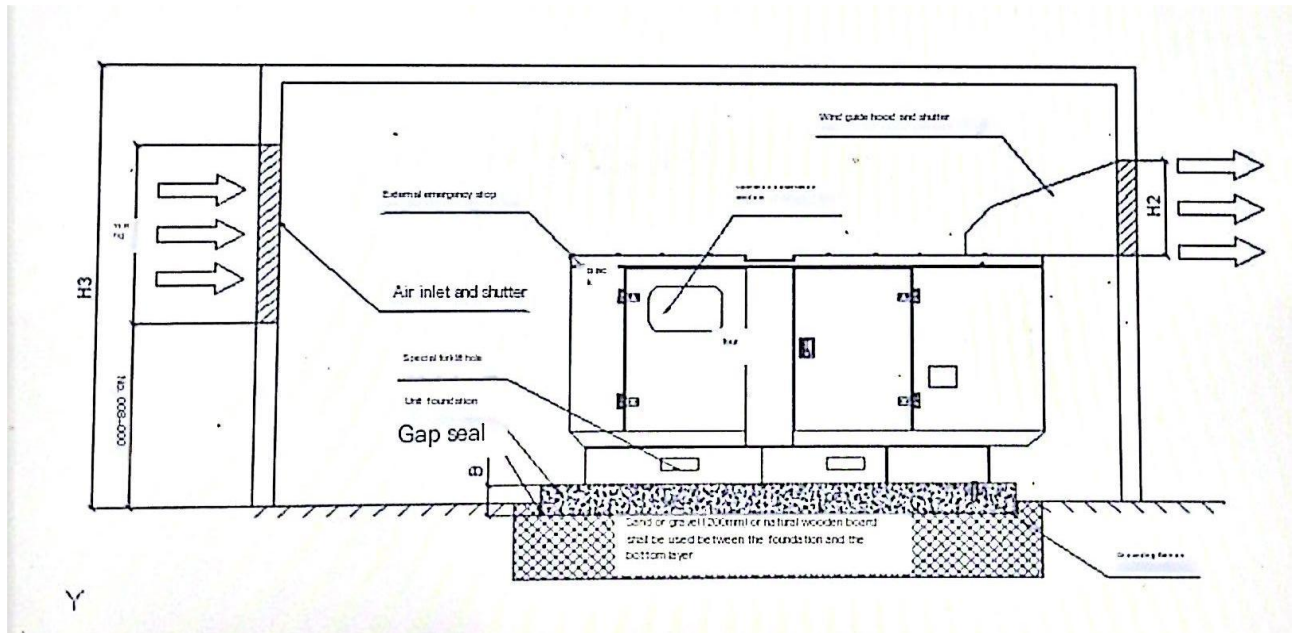
- No inflammable and explosive articles shall be stored in the generator room.

Attached: Schematic layout of open type generator room; Schematic diagram of silent generator room layout.



Schematic layout of open type generator room

Notice.: If the user needs Weifang Junwei Machinery Co., Ltd according to the specific requirements of users for users to customize the layout of the generator room and the specific installation size.



Schematic diagram of silent generator room layout

Remarks: The silent generator can be placed directly outdoors. If the user needs to be placed in the room, refer to the above figure to install, such as the Weifang Junwei Machinery Co., Ltd., can also customize the generator room according to the specific requirements of the user and specific installation sizes.

## 2.4 Generator installation

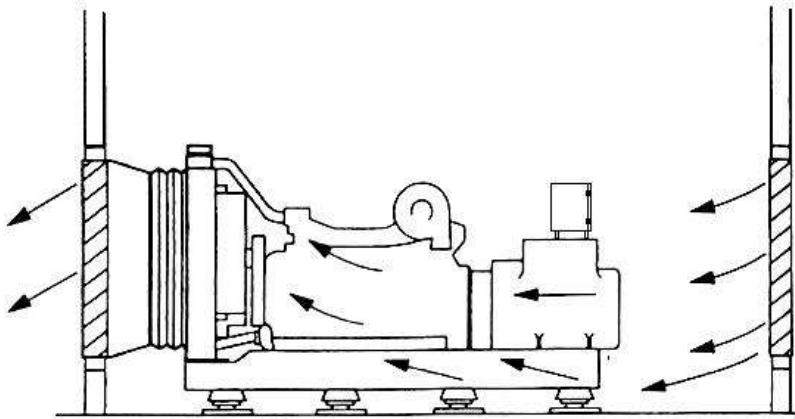
### 2.4.1 Generator in position

The diesel generator shock absorber is pre-installed on the generator (Except for very few models), user referring to the generator installation schematic, the generator is correctly applied to the installation holes on the generator base, and the generator is fastened to the concrete based on the mounting hole on the generator foundation. In the absence of special requirements, it is not recommended to make additional shock absorption treatment measures on the foundation.

All components on the generator shall be connected to the outside in a flexible manner. For example, the smoke exhaust pipe is connected through the corrugated shock absorber tube provided by the generator set. Typhoons to fuel intake and return pipes, distribution cables, etc must be connected flexibly, so as to minimize the vibration caused by generator operation to surrounding objects.

### 2.4.2 Ventilation

When a generator with an integral radiator is installed in the generator room, the most basic



principle is to discharge the hot air in the generator room and introduce the generator room to the generator room into the generator room and reduce the flow of hot air as much as possible.

The diagram shows the ideal position of the generator relative to the wall of the generator room.

The aim is to get cold air from the

lowest point possible, force it through the radiator chip, and then export it out of the generator room. The user can use a metal plate or canvas to make a wind guide cover. The connection between the wind guide cover and the radiator of the generator must adopt a flexible connection to isolate the generator. The transmission of vibration ensures that the hot air is completely discharged.

The effective flow area in the wind deflector should be 1.25 times larger than the front area of the radiator box, and the front wind deflector should have a smooth and less acute angle temperature to reduce the wind guide resistance. The effective flow area of the bronze statue to the air inlet should also be 1.5 times larger than the front area of the radiator box.

When the user is installed in the air outlet and the air opening, the user has a large corner, and its effective flow intercept is reduced, and the resistance will increase, so it is necessary to further increase the flow area.

In general, the amount of air discharged by the engine water tank fan is enough to meet the ventilation requirements of the generator room.

The intake air temperature of the engine should be below 30°C. If the temperature continues to be above this value in the near future, the output power of the engine will be reduced, so fresh air must be introduced from outside the generator room in time to provide intake air for the engine.

If the engine is equipped with a remote radiator, consideration must be given to a forced ventilation system for the generator room, preferably using two fans, one fan draws air into the

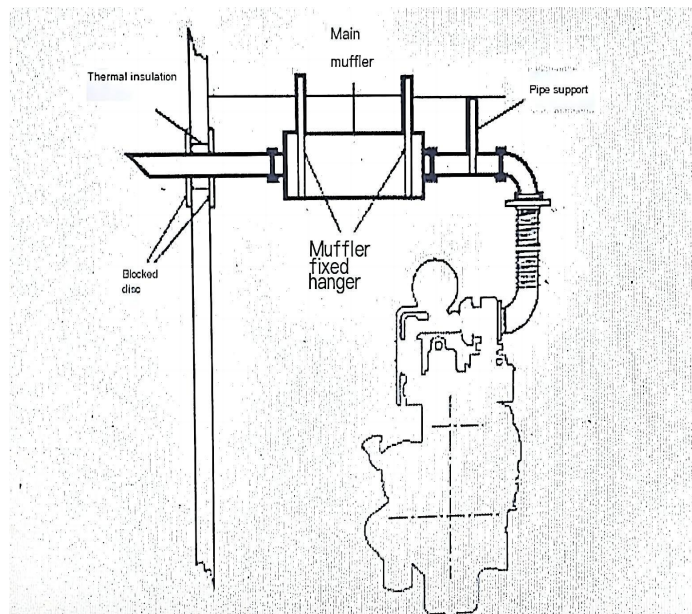
generator room and the other fan is an exhaust fan that draws hot air out of the generator room.

For an engine with a thrust fan, it is preferable to discharge the exhaust gas discharged from the crankcase with a separate tube, otherwise the crankcase exhaust is deposited on the heat sink, so that the heat sink is blocked, so it is lowered the heat capacity.

### 2.4.3 Smoke extraction

All of Weifang Junwei Machinery Co., Ltd diesel generators with mechanical standard configuration, and provide industrial heavy gas flexible bellows and safety pipes matched with generators. Users can use these accessories to design and install the smoke exhaust system of the computer room, and take into account the following aspects when designing and installing the smoke exhaust system.

- Make sure that the entire exhaust is not pressurized higher than the maximum allowable value specified by the engine. (Generally, the maximum exhaust smoke pressure of the generator is not more than 5Kpa)
- The fixed smoke exhaust system has made the smoke exhaust branch pipe and turbocharger free from longitudinal pressure and lateral stress.



A typical schematic diagram of generator smoke exhaust installation

- Allow room for expansion and contraction.
- Leave room for generator vibration.
- Low exhaust smoke noise.

The exhaust smoke of the engine was pressed through the assembly directly:

- Output power loss.
- Fuel economy deteriorated.
- The temperature is rising.

If more than one generator is installed, the exhaust gas of the generator should not be discharged from the same flue. If conditions do not allow the installation of independent smoke exhaust pipe, the branch smoke exhaust pipe shall be equipped with a movable baffle to prevent backflow when ensuring that the main smoke exhaust of the generator is not compressed.



The flexible corrugated pipe should be adopted in the smoke exhaust system, and the smoke exhaust pipe should be connected with the turbocharger of diesel engine, which has three functions.

- Isolate the vibration and the weight of the exhaust pipe from the diesel engine.
- Compensating for thermal expansion of the exhaust pipe.
- If the diesel generator is mounted on an earthquake-proof chassis, compensate for side plate movement when the generator starts and stops.

Remark.: 1.Rain or condensate entering the engine exhaust system can cause serious damage.Therefore, a drainage hole should be installed at the long smoke exhaust pipe, and its position should be as close as possible to the generator.

2.When the top of the smoke exhaust pipe is higher than the building, the user is required to do a good job of lightning protection.

#### 2.4.4 Reduce the noise

The diesel generator usually produces 90~110dB noise during operation, and with the increase of load, the noise also increases slightly. It is also extremely important to take measures to reduce the operation noise of diesel generators in order to meet the noise standard requirements of local environmental protection departments and not to cause noise pollution to the surrounding environment and affect the normal life of the surrounding residents. Noise reduction engineering is a comprehensive professional project. When designing and construction of generator noise reduction, the minimum entry and demand standard required to generate the normal operation of generators, and the discharge cannot exceed the reference value. Otherwise, it will seriously affect the power output of the generator, make the temperature rise of the generator body higher, make the generator fail frequently, and even shorten the service life of the diesel generator.

#### 2.5 Cooling system

Weifang Junwei Machinery Co., Ltd. Generator standard configuration is to install a fan cooling water tank of the terrain circulation water-cooled generator. Closed water-cooled engine drive, cooling pump circulation power, so that the cylinder block and cylinder head pipe coolant continuous circulation of heat.Engine cooling pumps, radiators or heat exchanger form a closed pressure circulation cooling system.

The most common cooling systems are radiators and engine-driven cooling fans. Alternatives are heat exchanger, remote-mounted radiators or telescopic cooling towers. If the installation position of the remote cooling fan is relatively high, a transitional water tank should be added to prevent the heat exchanger from being damaged due to excessive internal pressure.

There are also a variety of dirt on the radiator chip, which will greatly reduce the cooling performance of the radiator, so it is necessary to clean the radiator frequently in multi-layer environment.


##### 2.5.1 Coolant


The cooling system shall use a coolant capable of protecting the interior of the engine from corrosion and freezing, consisting of pure water and antifreeze or pure water and anti-rust. The pH of the water should be between 6 to 8, usually, distilled water, the specific mixing ratio requires the user according to the local climate environment, according to the anti-frozen liquid recommended by the engine, and refers to the antifreeze instruction manual, mix uniform in the stand-alone container After the addition of the water tank, the engine antifreeze ensures that it is not frozen at low temperatures. In areas where there is absolutely no danger of freezing, a mixture of anti-rust fluid and water can be


used as the coolant. The anti-rust fluid recommended by the engine manufacturer shall be mixed in a separate container according to its instructions, and then added to the water tank. After adding the anti-rust fluid for the first time, the generator shall be operated to the hot engine state to obtain the best corrosion protection.

The engine coolant has the following three functions,

- Provide sufficient heat transfer capacity.
- Prevent corrosion of all metal materials and sealing materials in the cooling system.
- Provide sufficient anti-freezing capacity.

 Select the qualified brand, the antifreeze recommended by the engine manufacturer, is the key to ensuring normal use of the engine, even if there is no frozen area, it is recommended to use antifreeze mixture antifreeze in the whole year, prevent the engine frozen The boiling point of the coolant is increased at high temperatures (The water tank is not easy to boil) .

 Do not mix any type of antifreeze with an additive such as a rust inhibitor, as this will produce a large amount of foam and reduce its cooling performance.

 The use of inferior engines, manufacturers do not recognize the anti-freezing fluid caused by generator failure(water leakage, corrosion, etc.), will not be guaranteed.

## 2.5.2 Coolant replacement

The effectiveness of antifreeze and anti-rust fluids decreases with age, so the coolant must be replaced periodically. The antifreeze mixture should be replaced every two years. The anti-rust mixture should be replaced at least once a year or, if equipped with a coolant filter, at least once every six months. Refer to the engine instruction manual in the random data for more specific replacement periods.

When the coolant is discharged, ensure that the generator is closed and the body is completely cooled, and then open the water tank filling cover. Then open the water tank drain plug and the drain plug on the engine fuselage to drain water. If the generator is equipped with a coolant filter (Some models), the filter should be removed and replaced.

## 2.5.3 Cleaning of cooling system

When changing the coolant, the engine cooling system needs to be cleaned, refer to the following steps for cleaning the cooling system,

- Blowdown cooling system.
- Flush the cooling system with water.
- Flush 15% to 20% concentrated coolant outside the cooling system, and then release it after one or two runs in time.
- After venting the cooling system, flush with a neutral mixture.
- If contamination is still present, repeat the cleaning until there is no contamination in the system.
- After the system is completely flushed, replace it with a new proportioned coolant.

Remark: If the cooling system is cleaned regularly, only a small amount of rinsing additives or only clean water can be used.

## 2.5.3 Coolant addition

- Before adding coolant to the coolant system, make sure that its water tank discharge valve and drain plug on the engine fuselage are tightly closed.
- Do not add coolant to the system too quickly to avoid an air lock forming in the system.
- The air is discharged through the filling port and the exhaust valve on the engine body.If the cooling


system is connected to a heater, the heater control valve needs to be opened, and the unit should be kept ventilated during injection. (Remark: The exhaust valve on the engine machine, generally by the engine waterway system or the thermostat water temperature sensor, or by filtering the water temperature sensor, seeing the coolant flow out and then selecting this method for exhaust.)


- When filling the cooling fluid, the liquid level should reach 5 cm below the welding surface of the water tank, or a coolant level indicator scale. Ensure that the generator is shut down and completely cooled before adding coolant, and do not start the generator until the system is fully charged with air. After the coolant is added, pay attention to start and preheat the generator, and check whether the coolant is needed. Please add coolant of the same specification of the same source cooling system into the water tank.

- Some generators equipped with coolant filters should open the filter valve before they are put into use.

## 2.6 Lubrication system

Lubrication system is mainly composed of oil pan, oil pump, oil pipe, oil cooler, oil filter, internal oil channel of engine and various lubricating components of relative motion. Its main function is to reduce friction and wear by providing a durable protective oil film between the running parts of the engine, Take away some of the heat absorbed by the part. Flushing the surface of the parts to improve the sealing effect. To prevent corrosion on the surface of each component.

 Users can use the environment and conditions according to their own decision to use the type of lubricating oil generator, hand lubricating oil is generally 100 hours of generator operation, then users must replace themselves.

 The key to the normal use of diesel generators is to use good quality, suitable and meet the requirements of engines, and regularly replace lubricants and filters. If you use the wrong type of inferior quality lubricating oil or do not replace the lubricating oil and filter for a long time, the generator will not get warranty service.

## 2.7 Fuel system

Weifang Junwei Machinery Co., Ltd. diesel generator required to enter is clean and free of air and water. There is a suitable pressure, and the diesel-containing sulfur amount must meet the national standard to use temperature level, meet the user's live environment. Temperature requirements. Generally, the fuel system of the diesel generator is composed of the fuel system of the engine itself and the external fuel system. We only need to install the external fuel system, which generally includes the connecting fuel pipe of the diesel tank.

### 2.7.1 Diesel tank

The generator produced by Weifang Junwei Machinery Co., Ltd. can provide the base type fuel tank for the user to use. For the generator with base type fuel tank, the user has been provided with a ready-made fuel tank fuel pipe fuel level gauge. The fuel system does not require additional installation by the user, and can be used only by injecting fuel into the fuel tank.

When the user makes the fuel tank, pay attention to the spare fuel tank, produce with stainless steel or steel plate, do not paint or galvanize in the fuel tank to prevent chemical reactions they may cause damage to the diesel, which may cause damage to generators and reduce impurities and decreases diesel quality, cleanliness and combustion efficiency.

In addition, the fuel tank should be equipped as follows,

- Fuel tank top snorkel.

- Fuel tank top manhole.
- Fuel level observation window.
- Bottom of fuel tank blowdown valve.
- Ground cable between filler and tank.
- The fuel supply and return areas of the fuel tank shall be equipped with perforated partitions to reduce heat exchange.
- The fuel tank supply line end should be positioned approximately 50 mm above the bottom of the tank to prevent sediment and water from being drawn into the supply line.
- The fuel pump of some generator fuel tank should be higher than the position of engine injector to prevent the injector from returning fuel and causing difficulty in starting.

## 2.7.2 Install the fuel tank

- The installation position of the fuel tank shall be such that the maximum fuel suction head shall not exceed 2 meters, and the rare head of the fuel drain pump shall be calculated from the bottom of the fuel tank.
- The installation position of the fuel tank shall be such that the return lift shall not exceed 1.5 meters, and the return lift shall be calculated from the top of the fuel tank.
- The direction of the diesel pipe should avoid the excessive influence of the fuel on the generator heat dissipation.
- The maximum allowable fuel temperature in front of the fuel injection pump is 600C;
- It is very important to make sure that there is no leakage of fuel or gas from the interline and return lines.
- The generator and the oil pipeline are connected by a hose. If the generator is installed flexibly (through the shock absorber), it must be equipped with a hose.
- When the engine inlet pipe is greater than 6 meters, and less than 10 meters, the inner diameter of the ship's tubing is at least 20% larger than that of the hose equipped with the engine. The return line should be connected back to the top line of the fuel tank and can't be directly connected to the feed line.

## 2.7.3 Use of fuel

Fuel ingredients have a very important impact on the work and use of diesel engines and emissions, in order to obtain predetermined power, fuel economy and regular emission standards, it should only use fuel to meet the national standards.

The low temperature characteristics, sulfur content, specific gravity, water content and impurities of fuel should be the first indicators for users to understand when choosing fuel quality. Different qualities will directly affect the performance of diesel generator, such as start-up, lubrication power, output emission, fuel filter and replacement cycle.

Specific fuel requirements for generators are detailed in the random operation manual.



When performing diesel, the diesel is downtown and will be turned on after a certain time after it is necessary to stop for a certain period of time, to prevent impurities in the fuel, causing the fuel filter



to block the lack of fuel supply, and the output power is serious decline.

The generator failure caused by the use of inferior fuel will not be guaranteed.

## 2.8 Control System

Weifang Junwei Machinery Co., Ltd. Is equipped with generator control screen, and all control screens have chosen imported intelligent instruments as the core control of generator.

- Intelligent control screen: The generator can be controlled manually, and also can be started and stopped remotely (controlled by external signal line). Users need to connect the signal control line to the control panel correctly. For more information, please see the control panel random information.
- ATS control panel (Optional Part): Control panel of automatic transfer switch for power generation and power supply. For more information, please see the control panel random information.


## 2.9 Battery


Weifang Junwei Machinery Co., Ltd. diesel generator, according to user demand configuration treatment generator supporting the use of batteries. According to the different requirements of users, our company has high-performance lead-acid batteries and batteries.

The use of maintenance-free screen, then only need to connect the cable can be used, such as the choice of lead-acid battery, but before the use of standard battery electrolytic stock solution. Loosen the battery grid cap and fill the pipe with electrolyte until it reaches the graduation line on the upper part of the inner plate, then take the label of the vent on the bottle cap and cover the cap, please do not use it immediately after clamping, let the battery rest for about 30 to 60 minutes. In the low temperature environment, the standing time is prolonged again. If necessary, it needs to be charged by battery charger, and see the battery instructions for details.


The user can use the level standard provided by the generator. The connecting wire is connected to the positive pole in red, to the negative pole in black or blue, and to the starting motor end of the generator correctly. Weifang Junwei Machinery Co., Ltd. Diesel generator most of the engine end of the connection line has been connected.


The storage capacity of the startup battery will determine if the diesel engine can smoothly start the diesel generator in the specified time, and its own self-charged generator is running, responsible for the starting battery, real-time power.

 Make sure that the positive and negative electrodes are connected correctly, once the connection is reversed, a failure will occur! (The generator must be damaged after the reverse charging.)

 When the generator is put into operation, the battery connection line shall not be disconnected.

## 2.10 Power Distribution System

 The diesel generator distribution output of Weifang Junwei Machinery Co., Ltd. adopts three-phase five-wire, that is, three-phase fire line, one central line and one safe grounding line. That is to say, the user who has no connection between the central line and the earth wire can choose the three-phase four-wire system power generation output according to his own power distribution requirements, that is, to connect the central line with the earth wire, so as to solve the illusion that the central line is sometimes charged.

 For diesel generator of Weifang Junwei Machinery Co., Ltd users are required to conduct safe grounding on the generator base. See the grounding mark of generator base for the grounding point.

## Part 4: Generator Operation

### ☆4. Operation of diesel generator

#### ☆4.1 Overall description

① Due to the main components and all accessories used by the Weifang Junwei Machinery Co., Ltd diesel generators from world famous manufacturers, plus OEM vendors with very rich experience, advanced production assembly technology and strict factory test processes, if users can All diesel generators can be used in accordance with this operating manual.

② Weifang Junwei Machinery Co Ltd diesel generator retrofitting equipment, has an advanced electrical control system, basically belongs to one of the following types: Deepsea 701 manual control system, Deepsea 5110 basic control system, Smartgen 6110 basic control system, Deepsea 5220 control system. These control systems allow the user to operate the diesel generator manually, automatically or in a monitored mode. They all have fault automatic alarm protection. When the running diesel generator fails, warning signals are automatically issued to ensure that generators work with normal working conditions and notification users, timely targeted processing. The following steps will detail the pre-boot inspection preparations, initial startup and shutdown, normal startup and shutdown, etc.

#### ☆4.2 Start the diesel generator

##### ☆4.2.1 Preparation before activation

###### ① Full inspection

I 、 Before checking, the control channel switch should be turned off, and care should be taken not to short-circuit the battery output electrode.

II 、 Re-clean and inspect the engine room to ensure that there are no inflammable and explosive items around the generator, and ensure that the engine room is smooth and unimpeded.

III、 Check thoroughly and ensure that the electrical control part is connected correctly, has good contact, is reliable and has no aging phenomenon.

IV、 Check the reliability of fasteners and throttle adjustment system, confirm the flexibility and reliability of each control mechanism, and check the early warning situation of water pump belt, charger belt and fan belt.

V 、 Clean the generator surface, especially the rotating part of the generator to ensure that there is no foreign body inspection, to ensure that there is no leakage of coolant, fuel and oil.

## ② Check the oil level

I、 Check to make sure that the oil level is between the highest and lowest marks and as close to the upper limit as possible without exceeding it.

## ③ Check the fuel level

I、 Under no circumstances should unfiltered fuel be injected into the diesel engine.

II、 Check the amount of fuel in the fuel tank and add suitable fuel if necessary.

III、 The generator starts or deactivated in the first time, before starting again, it should be checked first, ensure that there is no air in the fuel, such as the air sprinkler screw on the diesel filter, with a hand-moving fuel pump pump fuel passage Screws, spray fuel, discharge air in the fuel system, and tighten the discharge screws.

## ④ Check the fluid level

I、 Check that the coolant level is just right, preferably within 5 cm of the cover, to ensure that there is no blockage outside the radiator.

## ⑤ Check the air filter.

I、 Do not operate diesel engines without an air filter.

II、 Check the air filter obstruction indicator and replace the air filter if the indicator is red.

## ⑥ Check the battery level

I、 Close the power switch from the control panel to check the battery voltage, if less than 22 volts can not meet the start-up requirements, you need to charge the battery.

## ⑦ Governor fuel rate control

I、 For the generator with mechanical speed control, the mechanical governor and flow control handle should be placed in the throttle position of about 800r/min; The electronically controlled generator does not need to be adjusted.

### ☆4.2.2 Start the diesel generator

I、 Do not start the generator with load.

II、 **Press the start button, if the startup is unsuccessful, wait for 20 seconds and so try again. If it is unsuccessful for three consecutive starts, it should stop launching the fault factor such as a battery voltage or fuel path to start.** Note that continuous start-up in a non-functioning system will cause unburned gases to accumulate in the exhaust system with a potential explosion hazard.

III、 For the mechanical speed of the generator after starting, idle speed operation for about a minute, and then gradually increase the throttle to 1500r/min; The electronically controlled generator does not need to be adjusted.

IV、 Preparations must be made to start the generator in freezing conditions. The use of winter fuel at

local temperatures reduces the risk of wax deposits in the fuel injection system. In the case of very low ambient temperature, it is recommended to install a preheating system, such as water jacket preheating, oil heating, fuel heating, and ensure that the cooling system is filled with anti-freezing.

V、 The battery must be in good condition, low temperature will reduce the capacity of the battery, according to the actual situation, you may need to increase the capacity of the battery.

VI、 For the use of manual automatic remote control cabinet and ATS cabinet and parallel cabinet in non-standard generators, please refer to the corresponding random data.

#### **☆4.2.3 The generator is running**

I、 Check the oil pressure, water temperature and voltage frequency of the control module. If there is any abnormality, stop the generator immediately and start the generator again after troubleshooting.

II、 Check whether there is leakage in the oil circuit, water circuit, gas circuit and smoke exhaust system of the generator, check whether there is looseness and violent vibration in the connections of the generator, and check whether various protection and monitoring devices of the generator are normal.

III、 When the speed of the speed reaches 1500r/min and the non-load operation is stable, it can be connected to the load-powered generator, which is not allowed for more than half an hour or more, or less than 30% load operation. When the generator is running, it takes a special person to stay. Overload use is strictly prohibited.

IV、 Short circuit is strictly prohibited when the generator is running, otherwise it will cause serious damage to the equipment, and it is strictly prohibited to disassemble any parts of the generator when the generator is running !

V、 Do not reach below the fan cover or any other part of the fan that is in relative motion !

VI、 Do not attempt to touch high temperature surfaces such as generator exhaust pipes, impellers, superchargers and high temperature coolant heaters with your hands !

VII、 Check output voltage and frequency from control panel. The output voltage of the generator has been adjusted at the factory, so it should only be within the normal range. For mechanically adjustable generator frequency, it should be close to 52 Hz under no load ; For electronically or EFI regulated generators, the frequency is close to 50 Hz at no load.

VIII、 Keep the load of the generator not exceeding the rated value, power factor 0.8. When necessary, some models can run continuously for one hour at 110% rated power, but they must be operated for one hour before they can be running.

#### **☆4.2.4 Generator shutdown**



**① The generator shut down normally**

I 、 Shutdown: For the generator controlled by the automatic module, the normal shutdown can be realized by pressing the stop button by hand; For the manually controlled generator, the normal shutdown can be realized by turning the lock key to the "STOP" position.

**II 、 Before shutdown, the load connection must be unloaded first, and then shutdown without load. Generally, after unloading, the generator needs to operate with no load for 3 ~ 5 minutes before shutdown.**

III 、 When connecting or removing the load cable, it is necessary to shut down and remove the negative connection of the battery.

**② Generator emergency shutdown**

I 、 When the generator starts or sends out abnormal sound or odor during operation, it must be shut down immediately.

II 、 When the oil pressure of the generator suddenly drops to the limit or there is no oil pressure, the fault light is red, and the machine must be shut down immediately.

III 、 When the water temperature of the generator rises suddenly and exceeds the specified value, the generator must be shut down immediately when the fault light is red.

IV 、 When the generator output voltage exceeds the maximum reading on the meter.

V 、 In case of fire, electric leakage or other natural disasters that may endanger the safety of generator operators.

At this time, press the emergency stop button or quickly push the fuel injection pump stop control handle to the stop position, the generator will quickly cut off the load and immediately turn off the throttle, and at the same time, the red emergency stop indicator will light up. This button needs to be re-selected before the emergency stop signal can be removed. When the generator is running normally or is supplying power to the equipment, if no special emergency occurs, it is suggested that the user should not conduct emergency shutdown operation at will.

**③ After the shutdown**

I 、 Check the engine and generator room for leaks.

II 、 Close the fuel valve.

III 、 Turn off the main switch if the generator is out of service for a period of time.

IV 、 Fuel and cooling water should be put into the long-term shutdown, and the battery should be charged regularly according to the maintenance specifications.

V 、 When the ambient temperature is lower than 5 ℃, the generator after shutdown must do a good job of anti-freezing measures to avoid freezing cracking of the body and water tank.

## Part 5: Maintenance of generator

### ☆5 Maintenance of diesel generator

#### ☆5.1 Maintenance of diesel engine

##### ☆5.1.1 Introduction of the cooling system

A、The standard generator of Weifang Junwei Machinery Co., Ltd. Adopts the cooling mode of circulating liquid with fan wall. The cooling system circulation loop is basically composed of the following parts, Water pump. Water channel in engine block and cylinder head. Thermostat. Bypass pipe between thermostat body and water pump. Water tank radiator. Lines and hoses. Lubricating oil cooler.

B、Weifang Junwei Machinery Co., Ltd. Non-standard configuration generator, Such as split water tank type generator, The water tank heat sink should be replaced by a heat exchanger, and there is also a relatively high expansion tank and a long water tank, such as a long water tank mounting position, but also increases the excessive water tank to prevent heat exchanger from being damaged due to excessive internal pressure.

C、In addition, all Weifang Junwei Machinery Co., Ltd generators can be equipped with coolant filter devices separately at the request of users. The device has two functions, A: All impurities in the drawing coolant and prevent scale formation in the cooling system; B: Improve the anti-corrosion performance of the coolant.

D、There are various kinds of dirt on the radiator chip, which will greatly reduce the cooling performance of the radiator, so it is necessary to clean the radiator frequently in dusty environment.

#### ① Coolant

I、Generator coolant has the following three functions, A: Provide sufficient heat transfer capacity; B: Prevents corrosion of all metal materials in the cooling system; C: Provide adequate protection against freezing.

II、The coolant may be a mixture of water and anti-freeze or water and anti-rust. The PH value of water should be between 6.5 and 8, and pure water is usually recommended Do not use water alone as the coolant. In areas where there is a risk of freezing, the coolant should contain 40% to 60% antifreeze, and when the antifreeze content is 40%, its freezing point can be reduced to -25°C. When the content of antifreeze is 60%, it can be reduced to -56°C. It is suggested that users use 50% of the unit, the mixture of antifreeze and 50% of pure water, and it should be mixed evenly in an independent container before adding to the water tank. It is not recommended that users add more than 60%

antifreeze to the coolant, otherwise it will reduce the function of diesel generator antifreeze protection. Glycol is recommended as the antifreeze.

III、 In areas where there is no risk of freezing, anti-rust fluid should be used instead of antifreeze fluid. When the mixing ratio of anti-rust liquid and pure water is about 1:30, the anti-rust effect is better, and the cooling efficiency of the generator will not be reduced. After adding anti-rust fluid, the generator should be run to the heat engine state to obtain the best anti-corrosion protection. Glycol is recommended as generator anti-rust fluid.

IV、 Do not mix any type of antifreeze with an additive such as a rust inhibitor, as this will reduce the cooling effectiveness by creating a large amount of foam. Antifreeze and anti-rust fluids are dangerous. Do not use and avoid contact with skin and eyes. No alcohol in the cooling system.

### ② Coolant discharge

I、 When the ambient temperature is less than 5°C or long-term parking, the antifreeze approved by the engine manufacturer must be used. After proportional, the coolant is added or discharged, and the sequence of emissions is, water tank body → Circulating water pump → (Intercooler) → (Water jacket preheater). Different models have different drainage points.

### ③ Coolant replacement

I、 The coolant should be changed at least once every 6 months to avoid degradation of cooling performance due to deposits in the cooling system. Another reason to replace the coolant is to avoid the risk of generator corrosion, which can reduce the effectiveness of the additive and disable the water temperature sensor over time.

II、 When replacing the coolant, the system should be washed with clean water first, and the water must be very clean when cleaning.

III、 Make sure that the diesel engine is stopped and completely cooled before adding coolant. Except in emergencies, do not open the filler cap when the engine temperature is still very high, or steam or high temperature coolant may be discharged.

IV、 Note the following when adding coolant to the water tank,

A Before adding coolant to the cooling system, make sure that the discharge cap is tightly closed and that the discharge valve is in the correct position.

B Do not add coolant to the system too quickly to avoid the formation of air bubble faults in the system.

C The air is discharged through the vent or through the filling hole. If the cooling system is connected to a heater, the heater control valve must be opened and the unit must be ventilated during injection.

D When filling the cooling fluid, the liquid level should reach 5 cm below the plug welding surface.

E After adding coolant, pay attention to start and preheat the generator, check the coolant at the same

time, and fill it up if necessary.

F The same coolant contained in the same source cooling system shall be added to the water tank.

#### ④ Clean the radiator outer body

I 、 Remove the radiator cover, clean the radiator with clean water and neutral cleaning agent, and clean it with soft brush. Be careful not to damage the heat sink and do not clean it with a high-pressure gun.

#### ☆5.1.2 Lubrication system

##### ① Introduction of lubricating oil

I 、 The main function of lubricating oil is to reduce friction and wear by providing a durable protective oil film between the moving parts of the diesel engine, and it can also prevent corrosion on the surface of the parts. High temperature cylinders and bearings are highly dependent on the lubricating oil film. Lubricating oil also has a very important cooling effect on many parts of the generator.

II 、 Diesel engine lubricating oil please use the following table described in the various types of specifications, the details refer to the diesel engine random information. The brand recommended by Weifang Junwei Machinery Co., Ltd. is BP, Shell, Mobile. See Form 5.1 for the viscosity level and quality level of engine oil recommended by Weifang Junwei Machinery Co., Ltd. SAE is the society of automotive engineers annual temperature indicator, For example 15W/40. API stands for American Petroleum Institute Lubricant Quality System.

Form 5.1

Generator \ Level	Annual level	Quality level
MTU	SAE 15W-40	APICG above the level
Perkins	SAE 15W-40	APICG above the level
Cummins	SAE 15W-40	APICF above the level
VOLVO	SAE 15W-40	APICG above the level

##### ② Matters needing attention of lubricating oil

I 、 Do not start or operate the diesel engine when the lube lick dog is open in order to prevent the lube from spraying out.

II 、 The use of lubricants that do not meet these specifications will result in operational wear and tear and poor reliability.

III、 If the diesel engine uses the wrong type or quality grade of lubricating oil, its warranty service will be invalid, should avoid different specifications of different brands of lubricating oil mixed use.

##### ③ Change Lubricating oil and lube oil filter

I 、 Hot lubricating oil is easy to cause burns. Please avoid contact between hot oil and skin. Add

lubricating oil. Make sure that the lubricating oil level is between the maximum and minimum oil level marks. Be sure to follow the recommended lubricating oil. While replacing the lubricating oil, the user must replace the lubricating oil filter.

**II、Replacement step**

A Remove the bottom bolt, put in the lubricating oil, install the bottom screw plug and remove the filter.

B Wipe the filter clean before installation to prevent dirt from entering the engine.

C Let the engine run to the working temperature and then stop.

D Fill the pilot filter with oil, apply some oil to the seal gasket, screw the filter onto the engine by hand until the second seal contacts the seat, and then tighten.

E Add the oil to the proper level.

F Start the generator to see if the lubricating oil pressure is normal, and check if there is any leakage around the filter.

**☆5.1.3 Fuel system**

The fuel system of a standard generator consists of the main components of fuel tank, fuel feed pump, fuel filter, hand fuel pump, fuel injection pump, injector and associated tubing.

Only use the fuel who meet the following quality standards. When refueling and checking the fuel system operation, it must be strictly kept clean. When working on the fuel system, make sure the engine is cooled down. Fuel spilled on pharmaceutical surfaces or electrical components may cause a fire.

**① Fuel specification**

The composition of diesel oil has a very important impact on the operation and use instructions of diesel engines and the composition of emissions. In order to obtain the required power, fuel economy and meet the emission standards stipulated by the local environmental protection department, only clean fuel that meets the international and national standards should be used. The diesel is suitable for fuel and light fuel products in high-speed diesel engines with a speed of more than 1000 rpm, and the current standard is GB252-2000 light diesel oil standard.1000r/min. The diesel number division basis is the diesel solidification point, the customer should select the appropriate diesel number according to the working place temperature. (See Form 5.2)

Form 5.2

Ambient Minimum Temperature(°C)	Light Fuel Grade	Ambient Minimum Temperature(°C)	Light Fuel Grade
> 4	0 grade	-14~-29	-35 grade
> -5	-10 grade	-29~-44	-50 grade
-5~-14	-20 grade		

## ② Do's and don'ts.

I 、 The fuel recommended in the operating manual must be used. For diesel engines, low quality fuel can cause control rods and engine speed rotation to cause damage to generator, and even serious personal injury, inferior fuel will shorten the maintenance cycle, increase maintenance cost, reduce the normal use instructions for generator.

II 、 When adding fuel, there is usually a risk of fire and explosion, and smoking is prohibited when refueling.

III、 Can not make fuel spill out of the tank, tank cover to be safe points.

IV、 Water in the fuel can cause corrosion of metal components in the fuel system, and it is easy for fungi and microorganisms to grow in the tank, thus blocking the filter. It is recommended that users install oil-water separators for generators in common use or when the water content of fuel oil is relatively large. Make sure that there is no water or other impurities in the fuel entering the engine block. All the models of the Generators of Weifang Junwei Machinery Co., Ltd can be installed by the user, and the oil-water separator is not a standard configuration when the generator is shipped. The user needs to be ordered.

## ③ Replace the fuel filter

I 、 Keep clean and do not allow any dirt to enter the fuel system.

II 、 In order to avoid fuel splashing on the heating surface and causing fire, the fuel filter must be replaced in the cold state.

III、 Remove the filter and lightly lubricate the sealing gasket of the new filter., Screw on the filter by hand so that the seal is in contact with me, and then tighten it again, not to drain air from the gas system.

IV、 Start the generator and check for leaks.

## ④ Fuel injection pump

I 、 The fuel injection pump is driven by the internal fixed gear transmission mechanism of the diesel engine. The setting of the pump is measured by the riser gauge when the base circle of a particular crankshaft angle is raised.

II 、 Weifang Junwei Machinery Co., Ltd. diesel generator used by the fuel injection pump are superior quality, reliable performance, to ensure the normal use of long-term users.

## ⑤ Fuel injection nozzle

I 、 The fuel oil is evenly distributed so that it can be reliably ignited and burned.

II 、 Direct injection of fuel oil into the combustion chamber should provide the best mixture of fuel oil and air injection pressure, which can be adjusted in advance by the spring.

**⑥ Exhaust system**

I 、 If there is gas in the fuel system, it may affect the normal start and operation of the generator. The venting of the fuel system may be carried out as follows.

**A** Check to make sure the fuel line connection is not loose. Loosen the exhaust screw on the fuel filter, press the manual fuel pump until there are no bubbles in the spilled fuel and tighten the exhaust screw. Continue to pump fuel 15 to 20 times to check for leaks.

**B** Generally, the generator can be started after the exhaust air of the low pressure oil circuit. If it is still necessary to remove the air in the high pressure oil pipe, loosen the high pressure oil pipe and press the manual oil pump on the nut at one end of the fuel injector until there is no air tank in the overflowing fuel, and then proceed cylinder by cylinder to fill the fuel injector of each cylinder with fuel.

**C** Protect your fingers when probing for fuel leaks. fuel seeping under high pressure can embed itself in your skin.。

**D** If the charging alternator is located under the filter, make sure it covers. Any loose oil could damage it.

**☆5.1.4 Intake system**

I 、 The air intake system is mainly composed of air intake pipeline and air filter.

II 、 Weifang Junwei Machinery Co., Ltd. the air filter configured by the diesel generator is a dry paper air filter with filter, which comes with a resistance indicator for indicating the blocker of the filter element, and the generator is started. This resistance indicator should be checked before running When the red flag can be seen from the window, the air filter should be replaced immediately. The replacement of the air filter should be scrapped, can not be reused, when replacing the air filter should be particularly careful to prevent dust from entering the intake system.

**☆5.1.5 Exhaust system**

Weifang Junwei Machinery Co., Ltd. diesel generator with industrial heavy silencer is a absorbent silencer. The working principle of such silencers is to absorb noise and reduce the frequency range of noise and reducing noise in the muffler. The exhaust back pressure value of the whole system can be obtained by adding the exhaust back pressure value of the muffler and the exhaust pipe.

**☆5.2 Maintenance of alternator****☆5.2.1 Check before running**

I 、 **Grounding** : The alternator is not grounded when it leaves the factory, it must be grounded correctly according to the site regulations, incorrect grounding and incorrect protection will lead to

damage to the generator, and even casualties.

**II 、 Reconnect:** Most alternators can be rewired to accommodate a different output voltage, and components such as disconnect switches, current transformers, cables, and ammeters and voltmeters must be checked for suitability for the new voltage before the voltage is changed.

### **III、 Insulation check**

After installing the alternator, first check the resistance of the coil. At this time, the automatic voltage regulator should be disconnected, the rotating diode can be temporarily shorted or disconnected first, and all the control lines should be disconnected. Disconnect the wire from the midpoint to ground and measure the resistance from the terminal to ground using a 500V megohmmeter or other similar instrument. The insulation impedance of the machine to the ground shall exceed 2MΩ. If the insulation impedance is less than 2MΩ, the coil must be dried.

### **☆5.2.2 Maintenance precautions**

**I 、** It is recommended that the main alternator and all its accessories be inspected and cleaned regularly by the user.。

**II 、** According to the random communication, the alternator data is tested before the insulation performance of the coil before the first use, and if the generator shutdown is the humidity of the storage location, the winding coil insulation is detected every 3 to 6 months. In a high humidity area, when the machine is not in use, it is recommended that the user installs the heater in an alternator to keep it dry, which will help reduce the fault incidence of the alternator and ensure its normal service life.

**III、** The alternator should be cleaned regularly both inside and outside, and the frequency of cleaning depends on the environment where the machine is located. When cleaning is required, the following steps can be followed, Disconnect all power supplies and wipe off all dust, dirt, oil, water, and any liquids from the outside, as well as clean the screen, because these substances can overheat the coil or damage the insulation when they enter the coil. Dust and dirt had better be sucked up with vacuum cleaner, do not use blow or high-pressure water spray to clean.

**IV、** Improper installation, operation, maintenance, or replacement of parts can result in serious injury or damage to the equipment. Service personnel must have electrical and mechanical service qualifications. Electric shock can cause serious personal injury and even death, when users connect electrical appliances, they should avoid direct connection between ground wire and alternator neutral wire to wrong operation.



### ☆5.3 Description and maintenance of the battery

#### ☆5.3.1 Precautions for the battery

I 、 There is a danger of fire and explosion, and no open flame or electric spark should be allowed near the battery.

II 、 Never confuse the positive and negative terminals of the battery, or sparks and explosions will occur.

III、 The battery electrolyte contains strongly corrosive sulfuric acid, which should be contained in an anti-acid apron and bringing an upper mask or goggles when maintaining a maintenance battery. When the electrolyte is added to the battery, it should be carefully added and prevents liquid splash. Once the electrolyte is accidentally splashed on the skin or clothing, it should be washed with a large amount of clean water immediately.

#### ☆5.3.2 Connecting and disconnecting the battery

I 、 First connect the red wire (+) to the battery (+) and then connect the black wire (-) to the battery negative (-) .

II 、 When disconnecting the battery, remove the (-) black wire first, then the (+) red wire.

#### ☆5.3.3 Battery cleaning

Keep the battery dry and clean. Oxide nucleic acids on batteries and battery terminals can cause short circuit voltage drops and discharges, especially in wet weather. Clean the battery terminals and cables with a paint-resistant brush. Remove the oxide. Tighten the cable connector and apply protective paint or Vaseline to the connector.

#### ☆5.3.4 Introduction to battery charging

I 、 This is the case when the battery is first delivered to the user at random, so an electrolyte of the correct specific gravity ( $>1.5$ ) should be added before use. Unscrew the top cover of the battery cell and slowly fill in the electrolyte until it is between the two graduation lines on the upper part of the metal sheet and as close as possible to the upper graduation line. Please do not use it immediately after adding it, let the battery park for about 15 minutes first, and the user who has the condition can also connect the charger to charge it to the vector.

II 、 When charging the battery for the first time, attention should be paid to the continuous charging time should not exceed 4 hours, charging time is too long will cause damage to the service life of the battery.

III 、 When one of the following conditions occurs, the charging time is allowed to be extended appropriately,

**A** The battery can be stored for more than three months, and the charging time can be 8 hours.

**B** If the ambient temperature continues to exceed 30°C or the relative humidity continues to be higher than 80%, the charging time can be 8 hours

**C** If the battery is stored for more than one year, the charging time can be 12 hours.

**D** If the charger current output is insufficient, then the lower the current is also okay, the longer the charging time should be proportionally.

IV、At the end of the charging period, the game of the electrolyte should be checked for adequacy, and the correct proportion of standard electrolyte should be added if necessary.

V、Attention should be paid to the size of charging current and the length of charging time, as well as the new and old situation of the battery and the amount of power the battery has. When charging the battery, the green code or vent cover should be opened first, and the electrolyte level should be adjusted by distilled water.

VI、Normal operation and charging will cause some water to evaporate, which requires replenishment of batteries at any time. First, clean the battery surface, especially around the filling port, to avoid dirt entering the battery box, and then remove the plug and add distilled water until the appropriate liquid level.

VII、In order to prevent long-term closure to make the battery shell in the battery shell, it cannot be discharged in time, that is, the water beads are condensed on the top wall of the cell, and should be noted to open the special vent hole to facilitate air to flow properly. Make sure the battery is charged in a well-ventilated environment. Do not charge in the environment that can not block the wind and snow, and the charger should not close to the water.

### ☆5.3.5 The manner in which a battery is charged

I、There are three kinds of power sources for charging batteries, A Self-equipped charger、B battery floating charging device arranged in the starting control panel、C The generator comes with a battery charger. Before operating the diesel generator, make sure that the above battery charger is disconnected. These three charging devices have different conditions of use, which are briefly introduced below,

**A** When the generator is configured for pure manual start-up control screen, since there is no battery floating charging device in the control screen, if the generator is unused, the user should charge another electric machine to charge the battery separately.

**B** For generators start the control screen, the screen is equipped with a corresponding battery charging voltage and other floating device. The power source of the floating device is a standard voltage of one phase (AC220V), which is most important to prevent the battery when the generator is stopped. Excessive discharge, resulting in battery damage and affecting the power generation

strikes. For generators with this configuration, users only need to connect the AC 220V single-phase mains power to the control panel correctly to the corresponding wiring terminals as required, without additional battery charger. The characteristics of the battery floating charging device determine that it is suitable for charging the battery for 24 hours, and its advantage is that the user only needs to connect the power supply correctly, so there is no need to carry out additional maintenance work on the battery. Moreover, due to its unique charging mode and comprehensive protection of over-voltage and over-current, the charging process will not cause any damage to the battery under the charging condition of standard AC220V power supply. When the generator starts running, the electronic control part will automatically disconnect the floating circuit, which plays a better protection role for the charger and battery at the same time.

**C** When the diesel generator is in operation, the electrical wiring of the generator can ensure that the float charging device is automatically isolated from the battery, while the generator has its own battery, and the charger will continue to charge the battery until the operation of the generator is over, and then the float charging device will automatically charge the battery again.

**D** High temperature is also necrotic, battery damage in the charging process to be careful, especially in hot climate environment, battery temperature must not be higher than 48°C.

## ☆5.4 Heater (Optional part)

### ☆5.4.1 Type of generator heater

**I 、Water jacket heater:** When the generator is in standby state, when the mains voltage is connected correctly, it is used to heat the generator coolant automatically. When the temperature rises to about 45°C (it can be set) , the heating will be stopped automatically Water jacket heaters are suitable for generators in areas where freezing is possible. The power supply of the water jacket heater is AC220V. Be sure to stop the water jacket heater when the generator is running, otherwise it may burn out the heater. Weifang Junwei Machinery Co., Ltd. has installed matching heaters, designed corresponding control functions in the control circuit, and automatically cut off the power supply of heaters when starting.

**II 、Anti-condensation heater:** When the environment humidity of the generator is large, it should be equipped with anti-condensation heater and power supply, generally for the generator start-up battery.

**III 、Air Preheater:** Its function is to heat the air entering the combustion chamber when the generator is started in order to increase the success rate of starting. When the generator runs normally and the starting motor has been withdrawn, the air preheater will automatically stop working. The power supply of air preheater is generally generator starting battery.

## Part 6: Generator Maintenance Plan

Correct maintenance is necessary to ensure long-term trouble-free operation of diesel generator and normal power supply. Therefore, all users shall carry out normal maintenance of generator according to the following steps and contents. The maintenance contents of different types of generators may be slightly different, the contents of this chapter are for reference only, and the detailed information should refer to the random information of engine and alternator.

### ☆6. Generator maintenance plan

!!! Note that the standby generator should be started and checked at least 2-3 times per month, more than 20 minutes each time, and it is recommended to run with more than 30% of the load !!!

#### ☆6.1 Maintenance steps

##### ☆6.1.1 Maintenance before each start

- I 、 Clean the surface of generator.
- II 、 Check the water tank coolant level. The liquid level should be as close as possible to 5 cm below the welding surface, and it is recommended not to exceed it.
- III、 Check that the radiator core of the water tank and the outside of the inter-cooler are not blocked by foreign bodies.
- IV 、 Check the air filter for clogging. If the clogging indicator is in the red zone, replace the filter immediately after the generator is shut down. Reuse is not allowed.
- V 、 Check the diesel engine oil level to ensure that the oil level is between the maximum and minimum values of the dipstick scale.
- VI、 Check whether the electrical connection of the control system is loose.

##### ☆6.1.2 Maintenance after the end of a run

- I 、 Focus on checking and solidifying the bolts of rotating parts, especially the connecting bolts of fuel injection pump, water pump, belt, wheel fan, etc while tightening the anchor bolts.
- II 、 Check for oil leak, water leak, air leak phenomena and clean up if necessary.
- III、 Eliminate the simple faults and abnormal phenomena found in the operation.
- IV、 Clean the dust on the air filter element.
- V 、 Check the oil level and fuel injection pump oil level, if necessary, add quality can meet the technical requirements of the oil.
- VI、 Check the cooling water level of the water tank and add soft purified water if necessary.
- VII、 Check whether the electrical connection of the control system is loose.

VIII、 Completely clean the surface of generator.

**☆6.1.3 Maintenance every 50 hours**

In addition to the completion of the above maintenance items, the following work should be added,

I 、 Check the battery, measure the battery voltage and charge it if necessary. Bring protective goggles when handling batteries, which contain explosive gases and corrosive sulfuric acid. Ignition near the battery may cause an explosion.

II 、 Check whether there is any leakage of diesel, oil and antifreeze.

III、 Check that the filter system is in good condition and replace it if necessary.

IV、 Check and adjust fan belt tightness.

V 、 If necessary, add or replace the cooling water in the water tank and the engine block.

VI、 Check the generator and control part of the wiring head is solid.

VII、 Generators with oil-water separators should be drained and cleaned or replaced regularly every 50 hours.

VIII、 All oil and oil filter elements should be replaced after 50 hours of initial operation of the new generator. .

**☆6.1.4 Maintenance every 250 hours**

I 、 Exhaust the oil when the user change the engine oil. The normal replacement time of oil and oil filter is every 250 hours, and the replacement period of oil and oil filter is 100 hours when used under bad conditions. Pay attention to safety when replacing, hot oil can cause scald.

II 、 Change the oil filter and bypass filter. Remove the filter with a special tool, making sure that the new filter is filled with gasoline to drain the air, and then touch the seal with your hands for 1/2 turn. Start the generator and check for oil leakage.

III、 Replace the diesel filter. Remove the diesel oil filter with a special tool to lubricate the gasket, and screw on a new filter filled with clean diesel oil by hand, and then screw half a turn after touching the gasket. Take care that no dust gets into the fuel system. It can be replaced only after the generator is completely cooled to avoid a fire caused by diesel oil splashing on the exhaust pipe.

IV、 The replacement time of diesel filter element is every 300 hours.

**☆6.1.5 Maintenance every 400 hours**

I 、 Check all water pump overflow holes.

II 、Air filter element replacement time is every 400 hours air filter replacement, should be based on the power indicator to do the air rate indicator into the red area, the user need to replace the air filter.

**☆6.1.6 Maintenance every 800 hours**

I 、 If possible, thoroughly remove any sludge that may have accumulated in the fuel taps.

- II、 Check the oil line of the leach turbocharger for leaks.
- III、 Check the air valve and its interface for air leakage.
- IV、 Check all air valves for damage, replace them if necessary, and re-tighten all fixed screws after replacement.
- V、 Clean fuel tank and piping.
- VI、 Clean the oil pan and oil filter.
- VII、 Check and tighten connecting rod bolts, main bearings bolts, cylinder head bolts.
- VIII、 Check the specific gravity of the battery electrolyte and replenish it if necessary.
- IX、 Check and calibrate the instrument.
- X、 Check and adjust the excitation circuit.

**☆6.1.7 Maintenance every 1200 hours**

- I、 Complete all work for every 800 hours of inspection.
- II、 Check the valve clearance and require that it be carried out by a trained and qualified engineering technician. Stop the generator when checking.

**☆6.1.8 Maintenance every 2400 hours**

- I、 Complete all inspections every 1200 hours.
- II、 The turbocharger condition is inspected by professional technicians, and the diesel engine part and its accessories are comprehensively inspected.

**☆6.1.9 Maintenance every 6 months**

- I、 Replace coolant, filter close cooling faucet remove cap filter with special tool, reinstall a new one, and finally open faucet.

**☆6.1.10 Maintenance every 12 months**

- I、 Complete all inspections every 6 months.
- II、 If the generator is equipped with an air compressor, replace the air filter on the air compressor. The method is to open the valve fastening device, remove the filter, destroy and install a new filter, and tighten the fastening screw.
- III、 Clean cooling system or replace coolant. (Only for generators with coolant filters)
- IV、 Check for leaks.

**☆6.1.11 Maintenance every 24 months**

- I、 Clean cooling system or replace coolant. (Only for generators with coolant filters)
- II、 Check for leaks. High coolant temperature can be caused by a failure of the coolant drop level throttle valve, a failure of the exhaust fan, or a blockage of the inter-cooler radiator or other parts of the cooling system.

## Part 7: Generator Fault Search and Troubleshooting

### ☆7. Generator fault search and troubleshooting

#### ☆7.1 Troubleshooting part of diesel engine

##### (1) Cannot turn the engine or the turning speed is too low

Cause	Processing Method
A) The battery is not charged enough or the battery is broken	A) Check the electrolyte level, recharge the battery if necessary, and replace the battery if necessary.
B) The system is powered down	C) Close the power switch
D) The safety tube in the control box is broken	C) Replace the safety pipe
D) Poor contact or the line is broken	D) Eliminate any open circuit or poor contact fault, check whether the connector is oxidized, and clean it if necessary
E) Starting relay failure	E) Replace the starting relay
F) Starter motor failure	F) Contact Weifang Junwei Machinery Co., Ltd
G) Any startup line failure	G) Check all other starting lines
H) Lubricating oil temperature is low	H) Install oil pan oil heater
I) Use the wrong type of oil	I) Change the oil and filter / Be sure to use the correct type of lubricant.
J) Other internal and external causes affecting engine rotation	J) Check whether the crankshaft can move flexibly.

##### (2) The engine starts with difficulty or does not start, but the exhaust pipe is smoking

Cause	Processing Method
A) Starting motor drive engine speed is too low	A) See "Can not bounce the engine or bounce the car speed is too low"
B)The driving device of the engine is engaged with the engine.	B) Open the engine drive

B) Incorrect use of cold start device	C) Check the user's manual for instructions on how to operate a cold start system
D) Insufficient preheating	D) Contact Weifang Junwei Machinery Co., Ltd
D) The fuel filter is clogged	E) Replace the fuel filter
F) There is air in the fuel system	G) Drain the air from the fuel system with a manual pressurizer
G) The oil suction line is blocked	G) Clean up the line
H) The intake system is blocked	H) Clear the intake line
I) There is water in the fuel	I) Replace the fuel and install the fuel water separator
J) Use the wrong type or grade of fuel	J) Start the engine with a temporary diesel tank to determine
K) Injector failure or wrong model of injector	K) Contact Weifang Junwei Machinery Co., Ltd
L) Injector inlet and return line connection loose	L) Tighten the couplings
M) feed pump failure	M) Contact Weifang Junwei Machinery Co., Ltd
N) Fuel injection pump failure	N) Have the fuel injection pump checked by the fuel injection pump agent
O) The fuel supply is not timed properly	O) Contact Weifang Junwei Machinery Co., Ltd
P) The valve timing is wrong	P) Contact Weifang Junwei Machinery Co., Ltd
Q) Low compression pressure	Q) Contact Weifang Junwei Machinery Co., Ltd
R) The fuel shut-off valve is blocked	R) See "Possible failure of fuel shutoff valve"
S) The exhaust pipe is blocked	S) Check whether the exhaust pipe is blocked
T) Inter-cooler is dirty	U) Replace the inter-cooler
V) The battery is low	U) Check whether the motor is electrified, whether the galvanized sheet is blackened, if so, change the battery
W) The ambient temperature is too low	V) Use the appropriate preheating device



### (3) The engine can be sprung, but the exhaust pipe can not be started without smoke

Cause	Processing Method
A) There is no fuel in the fuel tank	A) Fill the fuel
B) Parking electromagnet failure	B) Check parking electromagnet and replace if necessary
C) Fuel shutoff valve failure	C) See "Possible failure of fuel shutoff valve"
D) The fuel injector has no fuel injection	D) Loosen the fuel line from the fuel injection pump to the cylinder head and start the engine to check for fuel spillage
D) Feed pump suction pipe connection loose	E) Tighten all filter couplings between the fuel tank and the fuel pump
E) The fuel filter is blocked or the suction line is blocked	F) Replace the fuel filter and check the fuel hose for blockage
G) There is no fuel in the fuel injection pump	G) Pump fuel to the fuel injection pump
H) The intake or exhaust system is blocked	H) Check intake and exhaust systems for obstructions
I) The fuel pump drive shaft is broken	I) Contact the agent
J) Gear pump strain or gear wear	J) Contact the agent
K) Feed pump failure	K) Contact the agent
L) The injector orifice is blocked	L) Check and repair the feed pump and replace it if necessary

### (4) The engine can start, but can't keep running

Cause	Processing Method
<b>A)</b> There is air in the fuel system	<b>A)</b> Drain air from the fuel and tighten the fuel line connection and the filter
B) The fuel system is leaking or blocked	C) Check the fuel tank standpipe
D) The engine driving device is nickel-matched with the engine	B) Disengage the engine drive
C) The fuel filter is blocked or the fuel freezes because of the low temperature	D) Replace the fuel filter and install the fuel heater

E) The fuel suction line is blocked	F) Clean up the line
G) Use the wrong type or grade of fuel.	E) Start the engine with a temporary diesel tank to determine
F) There is water in the fuel	G) Replace the fuel and install the fuel-water separator
H) Insufficient preheating	H) Check the user's manual and check the safety pipe. Press the reset button if necessary. Check the wiring, interlock button and preheat relay. If the preheating element needs to be replaced, Contact Weifang Junwei Machinery Co., Ltd
I) The intake system is blocked.	J) Clear the intake line
K) Pressure pipe damaged	K) Install new pressure pipe

### (5) Black smoke

Cause	Processing Method
A) The intake system is blocked	A) Check the intake system for blockage
B) Fuel injector failure	B) Contact Weifang Junwei Machinery Co., Ltd
C) Cold start system failure	D) Install the cold start device, check and repair, and replace it early if necessary
E) Use the wrong type or grade of fuel	D) Start the engine with a temporary diesel tank to determine
F) The exhaust pipe is blocked	G) Check that the exhaust pipe is not blocked and that the dimensions are correct
H) The engine temperature is too low	I) See "Coolant temperature below normal"
J) The valve clearance is wrong	K) Adjust valve clearance
L) The intake pipe between turbocharger and cylinder head is leaking	M) Check the intake pipe for air leakage
N) The return line is blocked	O) Inspect the return line for blockage, distortion, or protrusion
P) Excessive temperature or altitude causes thin air	Q) Correct according to the correction method in the engine sales manual
R) The fuel supply is not timed properly	K) Contact Weifang Junwei Machinery Co., Ltd

**(6) Blue smoke or white smoke**

<b>Cause</b>	<b>Processing Method</b>
A) Use the wrong type of oil	A) Change the oil and filter to ensure that the correct type of oil is used
B) Cooling start system failure	B) Install cold start device, check and repair, and replace if necessary
C) The engine temperature is too low	C) See "Coolant temperature below normal"
D) There is too much oil in the engine	D) Check the lubricating oil level
E) Turbocharger seal ring and bearing wear	E) Contact Weifang Junwei Machinery Co., Ltd
F) Use the wrong type or grade of fuel	F) Start the engine with a temporary diesel tank to judge
G) The engine is due for a major overhaul	G) Overhaul the engine
H) The cylinder head is leaking	H) Check the cylinder head and gasket and replace them if necessary
I) There is water in the diesel	I) Switch to standard diesel fuel

**(7) The engine can't reach the rated speed**

<b>Cause</b>	<b>Processing Method</b>
A) There's something wrong with the tachometer	A) Check with hand-held tachometer or digital tachometer
B) The throttle control lever is not adjusted properly	B) Check throttle stroke
C) Suction tube is blocked	C) Check the suction line for blockage and replace it if necessary
D) Governor failure or improper setting	D) Check and adjust the governor
E) Governor maximum line speed is set too low	E) Check and adjust the governor
F) There is water in the fuel	F) Replace the fuel and install the fuel-water separator

G) Check the fuel filter element for blockage	G) If it is blocked, replace it
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### (8) The engine can't be stopped

Cause	Processing Method
A) One of the safety tubes in the junction box has come off	A) Press the button on the safety tube to reset it
B) Poor contact or open circuit	B) Eliminate any open circuit or poor contact faults check the connector for oxidation and clean it if necessary
C) Stop button failure	C) Replace the stop button
D) Stop electromagnet failure	D) Check or replace the stop electromagnet
E) Fuel shutoff valve failure	E) See "Possible failure of fuel shutoff valve"
F) The return line is blocked	F) Inspect the return line for blockage distortion or presence

### (9) Insufficient engine output / The generator won't work

Cause	Processing Method
A) Excessive engine load relative to rated power	A) Reduce the load
B) Too high altitude causes insufficient power	B) If the altitude exceeds 1000m the engine needs to be corrected
C) The fuel line is blocked	C) Check the fuel circuit for blockage
D) The lubricating oil level is too high	D) Check oil gauge scale and oil pan volume
E) The throttle lever is blocked	E) Check throttle all the way to the lever position
F) Blocked intake or exhaust system	F) Check intake and exhaust systems for obstructions
G) There is air in the fuel	G) The air in the drained fuel condenses the fuel line connection and the filter
H) The return fuel pipeline is blocked or the ventilation of the diesel tank is not smooth	H) Check the fuel return system for blockage or distortion. Removal cleaning or replacement etc
I) The valve clearance is wrong	I) Contact Weifang Junwei Machinery Co., Ltd
J) Use the wrong type or grade of fuel	J) Start the engine with a temporary fuel tank containing suitable fuel

K) The intake temperature is too high (Above 40 °C)	K) When the temperature is high air is introduced from outside to the turbocharger
L) The intake temperature is too low (Below 0 °C)	L) When the temperature is low the air under the hood is introduced into the engine
M) Fuel temperature is too high (Above 70 °C)	M) Fill the fuel tank and turn off the fuel heater, the maximum fuel temperature is 70 °C
N) Fuel injector failure	N) Contact Weifang Junwei Machinery Co., Ltd
O) Feed pump failure	O) Contact Weifang Junwei Machinery Co., Ltd
P) Fuel filter is dirty	P) Replace the fuel filter
Q) Governor resistance is too high faulty or set incorrectly	Q) Contact Weifang Junwei Machinery Co., Ltd
R) The pressure regulator is faulty or set incorrectly	R) Contact Weifang Junwei Machinery Co., Ltd
S) Governor maximum line speed is set too low	S) Check and adjust the governor
T) Fuel injection pump failure	T) Ask the agent to check the fuel injection pump
U) The fuel supply is not timed properly	U) Contact Weifang Junwei Machinery Co., Ltd
V) Low compression pressure	V) Contact Weifang Junwei Machinery Co., Ltd
W) The impeller of the turbocharger is damaged or dirty	W) Contact Weifang Junwei Machinery Co., Ltd
X) The waste gas valve is not working properly (If installed)	X) Find out the cause clean repair or replace the exhaust valve
Y) Fuel and water separator is blocked	Y) Clean the fuel water separator

### (10) Lubricating oil pressure is too low

Cause	Processing Method
A) The lubricating oil level is not suitable	A) Check for lubricating oil level
B) There is a problem with the lubricating oil pressure gauge	B) Check oil pressure gauge
C) Lubricating oil is diluted by fuel	C) Change the oil. If the oil is diluted again contact an authorized

	repair facility
D) The grade of lubricating oil is not right	D) Change the lubricating oil and check the lubricating oil grade
E) Lubricating oil temperature exceeds normal value (120 °C)	E) Check clean or replace the oil cooler
F) The lubricating oil filter is dirty	F) Replace the oil filter
G) Crankshaft bearing worn or damaged	G) Contact Weifang Junwei Machinery Co., Ltd
H) Lubricating oil pump wear	H) Contact Weifang Junwei Machinery Co., Ltd
I) The pressure relief valve is not closed	I) Contact Weifang Junwei Machinery Co., Ltd
J) Pressure relief valve damaged	J) Contact Weifang Junwei Machinery Co., Ltd
K) Lubricating oil pump suction pipe failure	K) Contact Weifang Junwei Machinery Co., Ltd
L) The oil pan suction filter is blocked	L) Contact Weifang Junwei Machinery Co., Ltd

### (11) The lubricating oil pressure is too high

Cause	Processing Method
A) The pressure relief valve is not open	A) Contact Weifang Junwei Machinery Co., Ltd

### (12) Coolant temperature below normal

Cause	Processing Method
A) Coolant level too low	A) Add coolant
B) The radiator is blocked or damaged	B) Clean according to the instructions in the user's manual and repair if necessary
C) The radiator hose is present or blocked	C) Check hose and replace if necessary
D) The fan drive belt is loose	D) Check the tension of the fan belt and turn it into the tension
E) Lubricating oil level is not suitable	E) Add or drain lubricating oil and check the oil gauge
F) The cooling fan housing is	F) Check the fan housing for repair replacement or re-installation

damaged or missing	
G) There is a problem with the radiator pressure cap or the wrong model	G) Check radiator pressure cover and replace if necessary
H) There is something wrong with the thermometer	H) Check and repair the thermometer and replace it if necessary
I) The radiator shutter is not fully open	I) Check and repair the shutters and replace them if necessary
J) The air filter is clogged or the wrong model	J) Check or replace the air filter
K) Injector failure or wrong model of injector	K) Check adjust or replace the fuel injectors
L) The exhaust pipe is blocked	L) Check whether the exhaust pipe is blocked and check whether the size is appropriate
M) The fan is damaged	M) Change the fan
N) The radiator air circuit or water circuit is blocked	N) Check and clean up
O) Insufficient coolant in the system	O) Add coolant
P) There's air in the cooling system	P) Exhaust air from the cooling system
Q) Water pump failure	Q) Check repair or replace the water pump
R) Thermostat failure or wrong model	R) Check and replace thermostat
S) There is air in the cooling system	S) Check the hose clip on the suction side for leaks and check the cylinder head for leaks
T) Fuel injection pump failure	T) Have the fuel injection pump checked by the fuel pump agent
U) The timing of the fuel supply is irregular	U) Check fuel injection pump data and adjust
V) The valve timing is wrong	V) Adjust to the specified data
W) The cylinder head gasket is leaking	W) Check the cylinder head gasket
X) Piston damaged	X) Replace the cylinder liner and Piston and find out the cause of the damage

Y) The intake and exhaust valves are worn and leaking	Y) Replace
Z) Supercharger failure	Z) Replace

### (13) The fuel consumption rate exceeded the normal level

Cause	Processing Method
A) The air filter is clogged or the wrong model	A) Identify the cause and replace if necessary
B) Injector failure or wrong model of injector	B) Check or adjust or replace fuel injectors
C) The engine temperature is too low	C) See "Coolant temperature below normal"
D) The valve clearance is wrong	D) Adjust or check valve clearance
E) The pressure regulator is faulty or improperly set	E) To repair or readjust
F) The timing of the fuel supply is irregular	F) Check fuel injection pump data and adjust
G) The throttle lever can't be adjusted	G) Check the full throttle stroke
H) Excessive temperature or altitude causes air cells	H) Correct according to the correction method in the engine sales manual
I) Engine overload	I) Check the maximum load and reduce the load if necessary
J) External or internal fuel leak	J) Rule out leaks
K) The fuel tank is blocked	K) Cleaning or adding a snorkel
L) The exhaust pipe is blocked	L) Check whether the exhaust pipe is blocked and check whether the size is appropriate
M) Cold start system failure	M) Install cold start device check and repair and replace if necessary
N) Valve stuck	N) Clean or replace or regrind the valve
O) Low compression pressure	O) See "Low compression pressure"



### (14) Knock cylinder on the engine

Cause	Processing Method
A) Feed pump failure	A) Check or repair the fuel delivery pump and replace it if necessary
B) Injector failure or wrong model of injector	B) Check or replace fuel injectors
C) Cold start system failure	C) Install cold start device check and repair and replace if necessary
D) Use the wrong type or grade of fuel	D) Use high quality diesel with low sulphur content. Recommend a maximum fuel content of 0.5%
E) The throttle lever can't be adjusted	E) Check throttle stroke
F) Engine temperature is too high	F) See "The engine temperature is above normal"
G) The valve clearance is wrong	G) Adjust and check valve clearance
H) Too much oil or use the wrong oil specification	H) Check the user's manual for the correct oil capacity and specification
I) Oil Suction Pipe Leak	I) Check for leaks and replace faulty parts
J) The fuel supply is not timed properly	J) Check fuel injection pump setting data and adjust
K) Valve stuck	K) Clean or replace or regrind the valve
L) Low compression pressure	L) See "Low compression pressure"
M) Crankshaft bearing worn or damaged	M) Replace the crankshaft bearings and check the oil change cycle
N) The valve spring is broken	N) Replace the valve spring

### (15) Excessive lubricating oil consumption rate

Cause	Processing Method
A) Turbocharger seal ring and bearing wear	A) Repair or replace the turbocharger and check the oil
B) Piston rings worn or broken	B) See "Piston Piston Ring bearing and shaft diameter wear" Change Cycle
C) Cylinder liner and piston worn or strained	C) See "Piston Piston Ring bearing and shaft diameter wear"

D) The grade of lubricating oil is not right	D) Change the oil or filter to ensure the correct oil is used
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### (16) The engine ran unsteadily

Cause	Processing Method
A) The fuel line is blocked	A) Check and replace fuel line
B) Feed pump failure	B) Check and repair the feed pump and replace it if necessary
C) Fuel filter is dirty	C) Change the fuel filter
D) The governor spring is not adjusted or assembled correctly	D) Adjust or replace the governor spring
E) Injector failure or wrong model of injector	E) Check adjust or replace the fuel injectors
F) The fuel tank is blocked	F) Cleaning or adding a snorkel
G) There's air in the fuel system	G) Exhaust air from the fuel
H) The air filter is clogged or the wrong model	H) Replace the air filter and ensure that the correct model of air filter is installed
I) Engine speed control system moving parts clamping system	I) Check and clean
J) Engine temperature is too high	J) See Coolant temperature is above normal
K) Incorrect valve clearance	K) Check and adjust valve clearance
L) Too much lubricating oil or the use of the wrong type of lubricating oil grade	L) Check and adjust the oil quantity or change the type and grade of lubricating oil
M) The cold start system is faulty	M) Install cold start aid. Check and repair the cold start device and replace it if necessary
N) The exhaust pipe is blocked	N) Check and remove the blockage. Check that the exhaust pipe is correctly sized
O) Fuel injection pump failure	O) Contact Weifang Junwei Machinery Co., Ltd
P) Low compression pressure	P) See "Low compression pressure"
Q) Valve stuck	Q) Clean valve stem and guide bore
R) The high pressure tubing is used or installed incorrectly	R) Correct or replace
S) The valve spring is broken	S) Replace the valve spring

T) The speed control plate is not adjusted or damaged	T) Replace the speed plate or reset it
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### (17) Engine vibration

Cause	Processing Method
A) Injector failure or wrong model of injector	A) Check adjust or repair the fuel injectors or replace them with the correct model
B) The speed control system is stuck	B) Inspection and cleaning
C) Engine temperature is too high	C) Check makeup coolant check fan thermostat check for leaks
D) Cooling fan damaged	D) Repair the fan
E) Engine assembly failure	E) Contact an authorized repair person
F) Fuel pump failure	F) Fuel pump failure
G) Low compression pressure	G) See "Low compression pressure"
H) The high pressure tubing is used or installed incorrectly	H) Replace or correct
I) Flywheel housing, flywheel coaxiality does not meet the requirements	I) Contact the agent

### (18) Engine lost control

Cause	Processing Method
A) Throttle lever	A) Check whether the gap between the tie rod connection points is too large, adjust it to the correct gap, and replace the parts if necessary
B) There is gas in the intake line	B) Check for leaks and replace damaged parts
C) The governor is fast and the movement is stuck	C) The governor was repaired so quickly that it had to be replaced

### (19) Piston, piston ring, bearing and shaft diameter wear, cylinder liner wear

Cause	Processing Method
A) There is a leak between the air cleaner and the turbocharger	A) If necessary, replace parts to ensure that there is no leakage between the air cleaner and the turbocharger
B) The fuel contains too much sulphur	B) Check the fuel specifications or contact the fuel supplier. Recommended maximum sulfur content: 0.5%

### (20) Crankcase box pressure is too high

Cause	Processing Method
A) The air pipe is blocked	A) Check whether the snorkel is blocked
B) Cylinder liner wear	B) See "Piston, Piston Ring, bearing and shaft diameter wear"
C) Piston rings are stuck, worn, or broken	C) See "Piston, Piston Ring, bearing and shaft diameter wear"
D) Valve stem and / or valve guide worn	D) Replace Valve and / or valve guide
E) Piston damaged	E) See "Piston, Piston Ring, bearing and shaft diameter wear"

### (21) Low compression pressure

Cause	Processing Method
A) Air Cleaner or air intake system is blocked	A) Clean the electrical system or replace the air filter
B) The valve clearance is wrong	B) Check and adjust valve clearance
C) The valve timing is wrong	C) Adjust to the specified data
D) The cylinder head gasket is leaking	D) Check the service manual for how to measure flatness and replace the cylinder head gasket
E) The valve is inflexible	E) Clean, replace or regrind the valve
G) There is a leak between the valve and the valve seat	G) Replace or regrind the valve
H) Piston rings are stuck, worn or broken	H) Replace Piston Ring
I) Wear of valve stem or/and valve guide	I) Replace Valve and valve guide
J) The valve spring is broken	J) Replace the valve spring

**☆7.2 Troubleshooting of alternator part****① There is no voltage output when the alternator is running**

- A. Check that the AVR wiring is correct and secure.
- B. Check the speed of the diesel generator.
- C. Check the remanence voltage of the alternator and magnetize if necessary.;
- D. Check the alternator and AVR according to the procedure of the separate excitation test method.
- E. Rotating diode damaged.

**② The output voltage of the generator is unstable**

- A. Check whether the speed of the alternator is stable.
- B. Check that the stability settings are correct.

**③ Output voltage is too high**

- A. Check whether the speed of the generator is too high.
- B. Check whether the load carried by the generator is capacitive load. (Power factor lead)

**④ Low voltage at no load**

- A. Check whether the speed of the generator is too low.
- B. Check whether the AVR K<sub>1</sub>-K<sub>2</sub> wiring or external manual fine-tuning is well connected.

**⑤ The voltage is too low under load**

- A. Check whether the speed of the generator is normal.
- B. Force magnetic separation test method steps, check the alternator AVR is normal.
- C. Rotating diode damaged.

**☆7.3 Electrical control part failure****① For the manual control generator, when the key turns to “START”, the generator does not start or the LCD module controls the generator to press the generator start button to start, the motor does not start.**

- A. Check that the key switch is working properly or that the module boot port has an output.
- B. Check whether the fault indication is necessary to repair the fault, and reset the corresponding fault

information.

C. Checking the battery voltage is too low, you need to recharge the battery to full, such as the voltage value, the user need to step by step by drawing whether the voltage signal is properly sent to all control links, such as the throttle solenoid valve and start motor.

D. Check that the emergency stop button is relaxed.

E. Is the starting relay in good condition.

## ② **The starter motor is running, but the generator is not running**

A. Check the fuel level and ensure that the fuel line is connected correctly.

B. Check that the throttle electromagnet is engaged correctly for the mechanical governor generator.

C. Check whether the power supply of EPG is correct, and whether the access and voltage are normal for the generator of electronic speed control system.

D. Is there a correct AC voltage signal for the MPU measured by the ammeter when the generator of the electronic speed control system starts the motor to rotate.

E. Check whether the generator speed has reached or exceeded the set starting normal speed.

F. Check whether the fuel delivery system is blocked.

G. Check whether the air filter is blocked.

H. Generators in cold regions should be preheated before starting.

## ③ **High water temperature fault alarm or shutdown**

A. Check whether the generator is overloaded.

B. Check the tightness of the fan belt.

C. Check the water level of the cooling water after the generator is completely cooled.

D. Check the water temperature sensor for damage.

E. Check whether the water temperature sensor switch alarm is correct.

F. Check that the thermostat opens correctly.

G. Check that the gap between the water pump and the water tank is correct.

H. Confirm that the temperature in the generator room is not high than 40°C.

## ④ **Low oil pressure fault alarm or shutdown**

A. Check the oil level.

B. Check oil quality and viscosity.

C. Check oil temperature.

D. Check the oil pressure sensor for damage

- E. Check whether the oil filter and oil circuit are blocked.
- F. Check whether the oil pressure sensor switch alarm is correct

⑤ **Over-speed fault shutdown**

- A. Check the speed indicator for any abnormality.
- B. Check whether the throttle pull rod is flexible for the mechanical speed governing mechanism and ensure correct adjustment.
- C. Check whether the throttle pull rod is flexible for the electronic speed control system and whether the executing agency acts correctly.
- D. Recalibrate and adjust the over-speed protection limit.
- E. Check whether the installation of the speed sensor is reasonable.
- F. Reset the alarm signal on the control panel after troubleshooting.

⑥ **High voltage alarm**

- A. Measure the actual value of the generator output voltage.
- B. Confirm that there is no deviation in the display instrument.
- C. If the voltage is actually on the high side, the AVR can be detected and readjusted according to the detailed steps
- D. Verify that the load property is insoluble and that the power factor is not in advance.
- E. Confirm that the generator speed and frequency are normal.
- F. If the voltage straight normal, can check the voltage display circuit part is correct.
- G. Check whether the set limit of high voltage alarm is correct and reasonable.

⑦ **Low voltage alarm**

- A. Measure the actual value of the generator output voltage
- B. Confirm that there is no deviation in the display instrument.
- C. If the voltage is actually too low, it can be carefully checked and readjusted to AVR according to the procedure.
- D. Let the generator speed and frequency be normal.
- E. If the voltage straight normal, can check the voltage display circuit part is correct.
- F. Focus on checking whether the three fuses on the rear wall of the generator terminal box are normal and firmly connected.
- G. Confirm that there is no large deviation in the three-phase voltage value.

- H. Confirm that there are no missing phases.
- I. Confirm that the range of load change is not large when an alarm occurs.
- J. Make sure the generator is not overloaded.
- K. Check whether the setting limit of voltage high and low alarm is correct and reasonable.

⑧ **The generator can't take the load**

- A. Check whether the voltage is normal.
- B. Check the nature of the load to confirm that there is no overload and power factor leading phenomenon.
- C. Confirm whether the switch is closed and the settings are correct and reasonable.
- D. The ATS and related parts should be checked for the generator who are equipped with ATS.
- E. Check all wiring for the ATS control conversion and make sure it is correct.
- F. Verify that the ATS transfer control switch is not in the "MAINS" position.
- G. When the ATS changeover control switch is in "AUTO" position, verify that there is no normal voltage on the incoming mains power.
- H. Verify that the generator power is correct and connect to the generator side of the ATS.
- I. Confirm ATS main AC contactor, flexible operation and no stuck phenomenon.

⑨ **It can not be stopped manually**

- A. Check that the position of the key switch and control switch is correct.
- B. Confirm that all the electrical control parts are normal.
- C. Check that the fuel solenoid valve is working properly and replace it if necessary.
- D. Confirm that all the settings of EPG are correct and reasonable for the generator of electronic speed control system.
- E. Confirm that the fuel quantity of the fuel injection pump is set correctly.
- F. Verify that the generator is running in manual mode.

⑩ **In automatic mode, the generator can not be automatically shut down**

- A. Confirm that the electricity is completely back to normal.
- B. Confirm that the sensor has been actuated.
- C. Confirm that the automatic shutdown delay of the generator has been recorded.
- D. Check that the fuel solenoid valve is working properly and replace it if necessary.
- E. Confirm that all the settings of EPG are correct and reasonable for the generator of electronic speed



control system.

F. Confirm that the fuel quantity of the fuel injection pump is set correctly.

**⑪ Remote monitoring can not be achieved**

A. Verify that the monitoring software is properly installed on the remote PC.

B. Confirm that the setting of communication parameters in the monitoring interface corresponds to the actual connection form.

C. Confirm that the communication line is correct and reliable, and no line is busy.

D. Verify that the generator port and the communication port are connected to the communication module correctly.

**⑫ Remote emergency shutdown cannot be achieved**

A. Confirm that the remote communication of the generator has been realized normally.

B. Confirm that the relevant wiring is correct.

C. Confirm that the generator is in automatic standby mode.

D. Make sure the remote control code is entered correctly.

**Remark:** For more detailed failure analysis and troubleshooting of the control module, please refer to the random data of the control box.

## Part 8: Handbook of Warranty Service of Junwei Machinery

### Notice to users

Thank you for choosing Weifang Junwei Machinery Co., Ltd.

A good machine must have good maintenance, correct use and maintenance is your obligation. Please carefully read this manual and the above articles on the use and maintenance instructions before using Junwei Machinery series of products, according to the requirements of the correct use and maintenance.

8-1-1.If you have any questions in the use process, you can use this manual, or directly contact Weifang Junwei Machinery Co., Ltd. For consultation.This manual is a record text of Weifang Junwei Machinery Co., Ltd., other companies or individuals must not fill in or altered it, once found that we no longer provides warranty.

8-1-2.In case of any product quality problem, please make a record and the number of the engine supporting manufacturer in time and report it to our company, so as to facilitate our technicians to have a preliminary understanding of the product condition and deal with the problem in time.

8-1-3.Due to the inevitable changes in the telephone number of service outlets, please contact Weifang Junwei Machinery Co Ltd. In time +86-15169542396 , or visit our website <https://www.alexerpower.com>.

8-1-4.Each copy of this manual will be distributed randomly. No company or individual has the right to intercept it. Please take it with you at random and keep it carefully.

**Product Quality Warranty Provisions**

8-3-1. Range

Applicable to Weifang Junwei Machinery Co., Ltd. in complete sets of international sales use of product quality warranty services.

8-3-2. Quality Assurance

In the specified conditions of use and the specified time, the equipment cannot be properly used or defective due to product design, manufacturing equipment and material, and the equipment cannot be used normally or damaged, responsible for accompanying fault parts and related parts repair guarantee product to use normally .

8-3-3. No warranty

Do not use as required or overload high water temperature inferior oil beyond the warranty period is not warranty.

8-3-4. Quality Warranty period and time limit

Uses	Type	Warranty period
Land Generators	—	12 months or 1000 hours
Diesel water pumps and machinery engines.	—	6 months or 1000 hours

8-3-5. The scope of non-warranty.

- (1) Deployment of product quality defects.
- (2) Warranty certificate or no valid sales certificate.
- (3) Not in accordance with the provisions or operating instructions for maintenance.
- (4) Users should use and maintain the damage caused by improper maintenance.
- (5) Weifang Junwei Machinery Co., Ltd. Is not authorized to repair and replace parts or self-disassembly and inspection and modification, resulting in damage or failure of parts, the site is destroyed, unable to identify.
- (6) When abnormal conditions occur in operation (Such as abnormal noise, oil pressure, water temperature is not normal), it continues to force operation without timely shutdown inspection and troubleshooting, resulting in damage and expansion.
- (7) Failure to use the accessories provided by Weifang Junwei Machinery Co., Ltd.
- (8) Damage caused by using lubricating oil provided by Weifang Junwei Machinery Co., Ltd.
- (9) Damage caused by force majeure.

**Warranty Certificate**  
(Distributor fills in and seals the approval)

Sales Company: _____ Phone: _____ Fax: _____	
Product Information	Product Name: _____ Specification / Model: _____ Product number: _____ Factory date:      Year      Month
	Type( √ ):      ( ) Generator      ( ) Diesel water pump      ( ) Mobile Power Station ( ) Silent Generator      ( ) Other
	Engine brand:      _____      Alternator brand:      _____
	Date of purchase.:      Year      Month      Date
User Information	User name: _____ Nature of use: _____
	Contact address:      _____ Country      _____ Province / State      _____ District _____
	Contact number:      _____
Name of distribution Company:	Seal of the distribution company:   Year      Month      Date
Remark:	

## Junwei Machinery

### Weifang Junwei Machinery Co.,. Ltd.

Address: Xuanwu East Street, Kuiwen District, Weifang City, Shandong Province, China

WhatsApp / Wechat / Phone.: 86-15169542396

Website.: <https://www.alexerpower.com>