



**ECO POWER**  
EQUIPMENT

## Installation and User Instructions

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# CIPR-50W NG/LP Generator

**Mobile Gaseous Generator**



March 2023  
Version 1.0



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Eco Power Equipment Ltd.

8, 26004 TWP 544, Sturgeon County, AB, T8T 0B6, Phone: 1-888-483-4843



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## Product Modifications

Year	Type	Modifications
2019	1	CIPR-50W V1 Fixed
2021	1	CIPR-50W V2 Switchable

## Document Revisions

Date	Version Number	Document Changes
29/07/2021	V2	CIPR-50W V2 Switchable



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# 1. PREFACE

## 1.1 Description of the User

This manual is intended to support end users of the Eco Power Equipment CIPR mobile power generator. Our products are designed and intended to provide site power solutions for temporary and prime rated power on a variety of applications including construction job site, oil, and gas job sites, pipelines, events, security, and government or military operations.

The user will deploy and set up the CIPR and should be qualified and follow all instructions contained in this operating manual.

## 1.2 Conventions Used in This Manual

The following style conventions are used in this document:

### **Bold**

Names of product elements, commands, options, programs, processes, services, and utilities  
Names of interface elements (such windows, dialog boxes, buttons, fields, and menus)

Interface elements the user selects, clicks, presses, or types

### *Italic*

Publication titles referenced in text

Emphasis (for example a new term)

Variables

### `Courier`

System output, such as an error message or script

URLs, complete paths, filenames, prompts, and syntax

User input variables

< > Angle brackets surround user-supplied values

[ ] Square brackets surround optional items

| Vertical bar indicates alternate selections - the bar means "or"

### 1.3 Explanation of Safety Warnings

#### **⚠ DANGER**

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury

#### **⚠ WARNING**

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

#### **⚠ CAUTION**

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

#### **NOTICE**

Indicates information considered important, but not hazard-related.

### 1.4 Retaining Instructions

Read and understand this manual and its safety instructions before using this product. Failure to do so can result in serious injury or death.

Follow all the instructions. This will avoid fire, explosions, electric shocks or other hazards that may result in damage to property and/or severe or fatal injuries.

The product shall only be used by persons who have fully read and understand the contents of this user manual and understand the safe operation of the machine.

Ensure that each person who uses the product has read these warnings and instructions and follows them.

Keep all safety information and instructions for future reference and pass them on to subsequent users of the product.

The manufacturer is not liable for cases of material damage or personal injury caused by incorrect handling or non-compliance with the safety instructions. In such cases, the warranty will be voided.



## **1.5 Obtaining Documentation and Information**

### **1.5.1 Internet**

The latest version of the documentation is available at the following address:

<http://www.ecopowerequip.com>

### **1.5.2 Ordering Documentation**

Documentation, user instructions and technical information can be ordered by calling Eco Power Equipment Ltd. at 1-888-483-4843

### **1.5.3 Other languages**

This is the English user manual. Manuals in other languages are available upon request. Not all languages are covered.

### **1.5.4 Documentation Feedback**

If you are reading Eco Power Equipment Ltd. product documentation on the internet, any comments can be submitted on the support website. Comments can also be sent to [support@ecopowerequip.com](mailto:support@ecopowerequip.com)

We appreciate your comments.

### **1.5.5 Support and service**

For information about special tools and materials please contact:

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Web: [www.ecopowerequip.com](http://www.ecopowerequip.com)



## 2 Description of the product

### 2.1 Intended Use and Reasonably Foreseeable Misuse

The machine is a mobile, skid-mounted mobile generator. The Eco Power Equipment CIPR unit consists of a trailer or skid with a gaseous generator, a control panel, and a sheet metal enclosure. As the engine runs, the generator converts mechanical energy into electric power. Receptacles are present to power auxiliary loads. The operator uses the control panel to operate and monitor the machine, with the digital display showing all operating characteristics.

This machine is intended for prime rated power requirements and has been designed to operate 24/7. This machine is also intended for the purpose of supplying electrical power to connected loads. Refer to the product specifications for the output voltage and frequency of this unit, and for the maximum output power limit of the Generator.

This machine has been designed and built strictly for the intended use described above. Using the machine for any other purpose could permanently damage the machine or seriously injure the operator or other persons in the area. Machine damage caused by misuse is not covered under warranty.

The following are some examples of misuse:

Connecting a load that has voltage and frequency requirements that are incompatible with the machine output

Overloading the machine with a device that draws excessive power during either continuous running or start-up

Operating the machine in a manner that is inconsistent with all federal, provincial and local codes and regulations

Operating the machine outside of factory specifications

Operating the machine in a manner inconsistent with all warnings found on the machine and in the Operator's Manual

This machine has been designed and built in accordance with the latest Canadian safety standards. It has been engineered to eliminate hazards as far as practicable and to increase operator safety through protective guards and labeling. However, some risks may remain even after protective measures have been taken. They are called residual risks. On this machine, they may include exposure to:





Heat, noise, exhaust, and carbon monoxide from the engine

Multiple heat sources: Engine, alternator end, etc

Fire hazards from improper refueling techniques

Electric shock and arc flash

Gaseous Fuel and its fumes

To protect yourself and others, make sure you thoroughly read and understand the safety information presented in this manual before operating the machine

**Gasoline, natural gas and LPG are combustible!**

**Gases, and can be explosive if leaked and contained in a confined area. Keep cigarettes and all other flame sources away from these areas.**

If you can hear a fuel leak, shut off the fuel supply at the source immediately and fix the leak or have it serviced. Check the entire fuel supply line from the cylinder/tank to the engine for leaks with a soapy water bubble mixture anytime a cylinder/tank is changed or the fuel supply line is worked on. Fuel leaks should also be checked as part of the regular engine maintenance.

Depending on your engine and fuel system configuration, your engine is designed to run on natural gas and/or vapor LPG. The fuel requirements for each are discussed below. See the "SPECIFICATIONS" section for the required fuel supply pressures for each fuel.

### **Natural Gas**

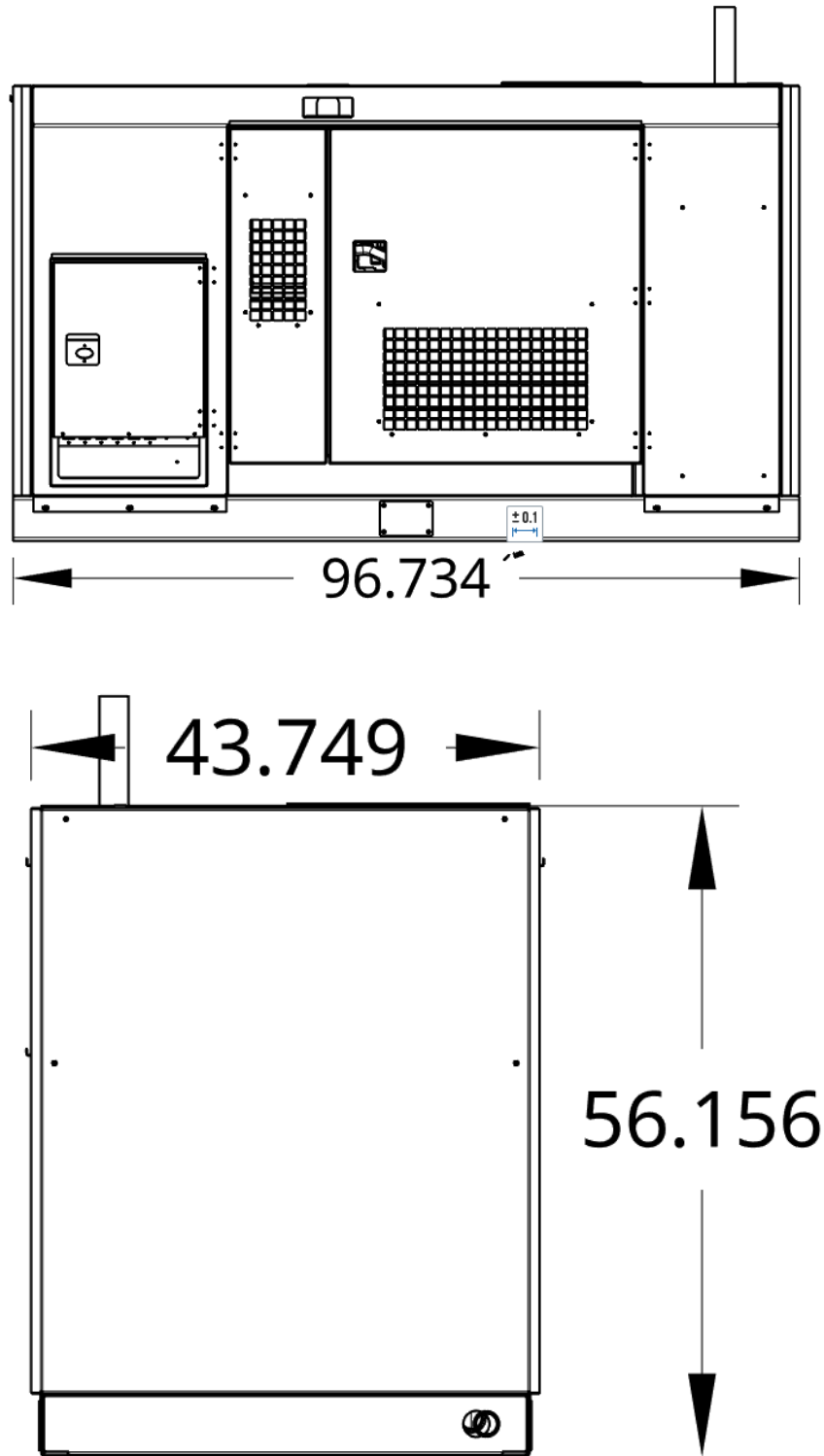
Your engine is certified to run on "pipeline-quality natural gas". EPA defines pipeline-quality natural gas as being supplied by a pipeline and being composed of at least 70% methane by volume or having a heating value of 950-1100 BTUs per cubic foot. If your natural gas supply does not meet these specifications, your engine is considered to be being operated as a non-certified engine. See "U.S. EPA Legal Requirements" at the front of this manual.

### **LPG**

In order to maintain emissions compliance and the engine warranty, use commercial-grade HD-5 or better LPG, the unit is designed to run on vapor, do not connect liquid source.

## 2.2 Product Specifications

2.3





Enclosure	Unit
Gross Weight	1827 KG / 4020 LBS
Lifting Bail	Yes, Engineered and Rated, See Decal
Enclosure	Powder Coated Carbon Steel
Doors	6 Swing-Out Doors
Sound Attenuation	Aluminum Lined High-Temp Foam
Control	DEIF AGC 150

Generator End	Unit
Compliance	CSA
Voltage	Switchable Voltage: 347/600v, 120/208v, 120/240v, 277/480v
Main Circuit Breaker	175 Amp
Efficiencies @ 60HZ	90.5% @ 480V, Full Load
AVR	DSE A108 Digital AVR - Auto Switching AVR - Voltage Automatically set in each switch position
Pole	4
Overspeed (RPM)	2250
Protection Class	IP23
Altitude Rating	0-1000m
Power Distribution System	120/208v Power Distribution System: Note this system only functions with selectable switch in 120/208v switch position
Hard Wire Lugs	14-4/0 Rated - See Block Label

Engine	Unit
Engine Make/Model	PSI 4.5L NA Rich Burn, E Controls
Fuel System	STOICHIOMETRIC, RICH BURN
Configuration	Inline, 6 Cylinder
Compression Ratio / Fire Order	9.75:1 ; 1-5-3-6-2-4
Intake Valve Lash (Cold)	0.2 mm
Exhaust Valve Lash (Cold)	0.3 mm



Spark Plug Gap	0.35 mm
Radiator	Shroud, Pusher Fan, Guard
Governor	Electric
Temperature Range	-10 C to 40 C Rating, -40C Rating with Winter Front
Oil Capacity	12 Litres
Oil Type	Recommended oil is: Natural Gas Engines Oil (NGEO); CI-4 or above.

## 2.4 Engine Maintenance

Preventative Maintenance Schedule – Non-EST						
Event Number	Maintenance Event	Weekly	The first 50 hours	Interval (Hours)		Interval 6 months
				750	1500	
1	Check Engine Oil Level	X				
2	Check Engine Coolant Level	X				
3	Check Oil Pressure	X				
4	Check Overall Operating Condition (hose/clamp/pipe/belt/harness/connector)	X				
5	Change Oil and Oil Filter		X	X		
6	Adjust Valve Lash		X	X		
7	Spark Plugs (Check/Adjust/Replace)				X	
8	Check Air Filter (Inspect/Replace)			X		
9	Replace Breather Filter				X	
10	Belts, Pipes, Clamps and Hoses (Inspect/Replace)			X		
11	Check Ignition System (Plug Wires/Coils)			X		
12	Check Coolant Condition * (Sample)					X
13	Inspect Water Pump					X

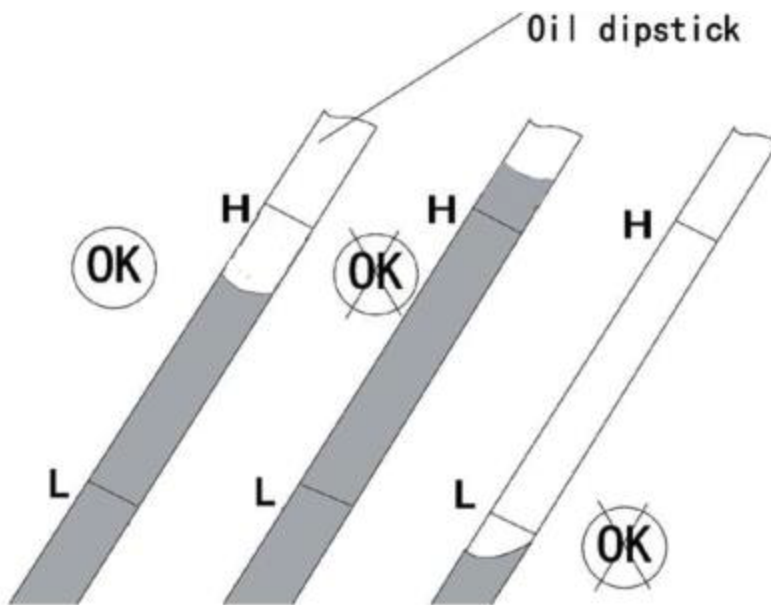


14	Test Batteries & Alternator					X
15	Replace Coolant					X

Preventative Maintenance Schedule – Non-EST							
Event Number	Maintenance Event	Weekly	The first 50 hours	Interval (Hours)			6 months
				1000	1500	2000	
1	Check Engine Oil Level	X					
2	Check Engine Coolant Level	X					
3	Check Oil Pressure	X					
4	Check Overall Operating Condition (hose/clamp/pipe/belt/harness/connector)	X					
5	Change Weichai and Amsoil Filters			X			
6	Change Oil					X	
7	Adjust Valve Lash		X	X			
8	Spark Plugs (Check/Adjust/Replace)				X		
9	Check Air Filter (Inspect/Replace)			X			
10	Replace Breather Filter				X		
11	Belts, Pipes, Clamps and Hoses (Inspect/Replace)			X			
12	Check Ignition System (Plug Wires/Coils)			X			
13	Check Coolant Condition * (Sample)					X	X
14	Inspect Water Pump					X	X
15	Test Batteries & Alternator					X	X
16	Replace Coolant					X	X

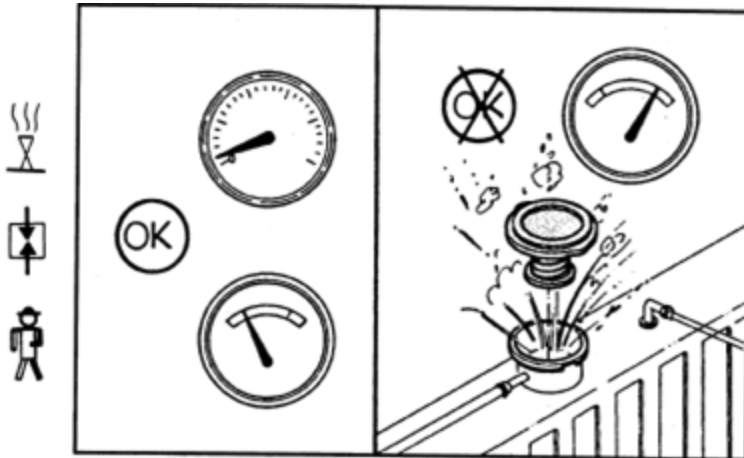
## 1. Check Engine Oil

- a. Ensure engine is level
- b. Pull dipstick after engine has stopped running, at least 5 minutes
- c. Ensure oil levels is between high and low marks



## 2. Check Coolant Level

**Caution:** Never remove radiator or top tank cap when coolant is hot! Burns and physical harm may occur.



- A. When coolant is room temperature or below, remove pressurized cap and inspect top tank or radiator for fluid level.
- B. If engine has a sight gauge or plastic top tank, a visual level check is adequate.
- C. If coolant level is low, determine reason for low fluid and top off with specified coolant.
- D. Test pressurized cap (replace if necessary or reinstall).

### 3. Check Oil Pressure

- A. When engine is running and at normal operating temperature, check oil pressure gauge on Deep Sea display
- B. Ensure oil pressure is in the range of the table below both at idle and rated speed and operating temperature.

#### Oil Pressure

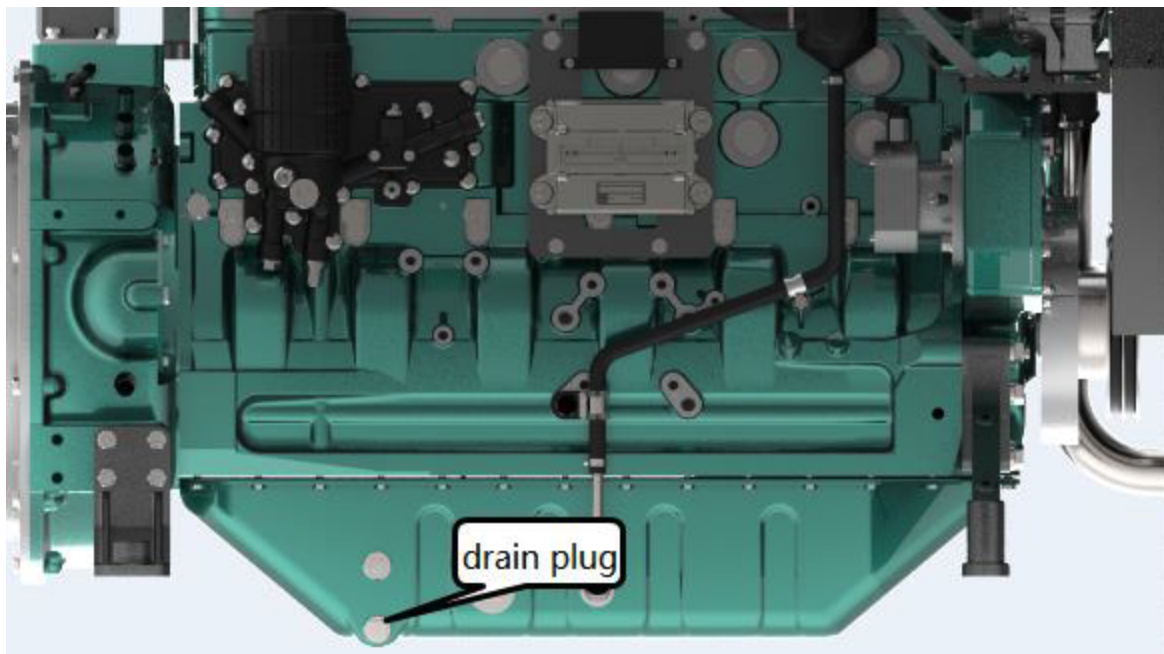
Idle	PSI	KPa
Min	17	120
<b>Rated Speed</b>		
Min	43	300
Max	87	600

## 5. Change Oil and Oil Filter

NOTE: Recommended oil is: Natural Gas Engines Oil (NGEO); CI-4 or above.

NOTE: For continuous operation in extreme temperatures or in excessively dusty, dirty environments, rely on oil analysis to determine maintenance intervals.

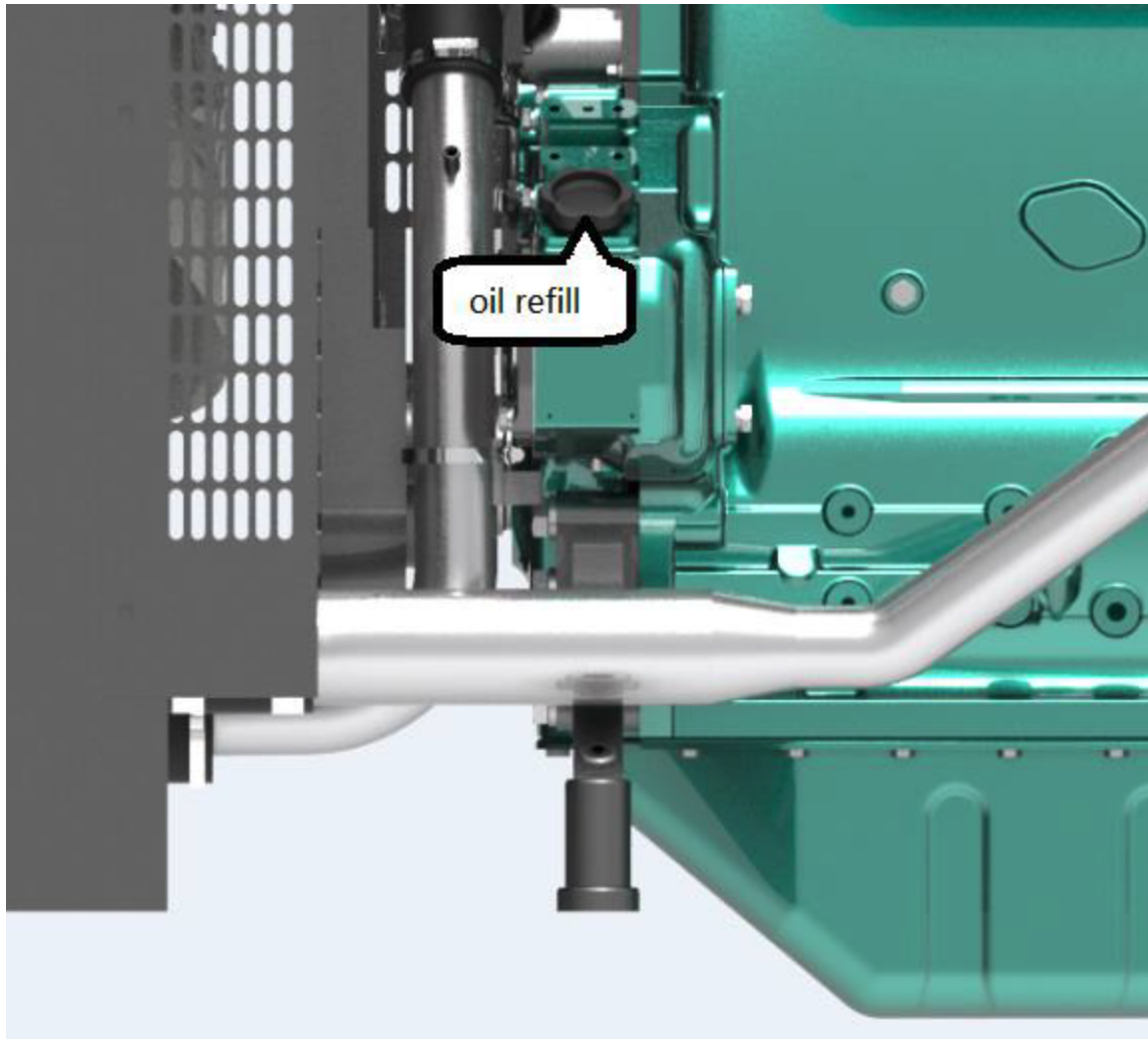
NOTE: For best results, change engine oil while engine is still warm from operation.



- A. Remove the oil pan drain plug and drain oil completely.
- B. Inspect drain plug gasket (replace if necessary) and clean plug seating surface.
- C. Inspect magnetic plug for iron and ferrous material. If this exists, consider an oil analysis to determine source of debris.
- D. Reinstall drain plug and tighten securely.
- E. Remove oil filter cover by turning 32 mm cover counter-clockwise. Remove oil filter(s). May need to wiggle back and forth in 4 directions to loosen o- ring.
- F. Wipe filter base clean. Then apply a thin coat of motor oil to o- ring on new oil filter(s).
- G. Install oil filter. Tighten filter cover by hand until gasket contacts base. Tighten to 40 nm.



H. Using the recommended grade of oil, fill crankcase with specified quantity.



I. Fill the grease cup of the signal generator with lithium grease (NLGI Gr. 2).

J. Operate engine for five (5) minutes. Check for leaks at filter base and oil pan drain plug during operation.

K. Shut down engine and wait five (5) minutes. Check engine oil level and adjust to proper level if necessary.

## 6. Engine Valve Lash Adjustment

**NOTE: Required every 500 hours (1000, 1500, etc.) on non-emergency.**

Confirm that #1 piston is on the compression stroke by turning both pushrods by hand to verify that both valves are closed. The valves are closed when the push rods are loose and can be turned easily.

Engine can be barred over by installing 8mm-1.25 bolts in the six empty holes around the crankshaft pulley and using a pry bar to turn the crankshaft.

1. A. Remove all valve covers.
2. B. Rotate the crankshaft until the number 1 piston is on the compression stroke and the timing pointer on the front cover is in-line with the "TDC" mark on the crankshaft damper. Some engines may have a permanent groove mark on the flywheel for "TDC".



Illustration 5

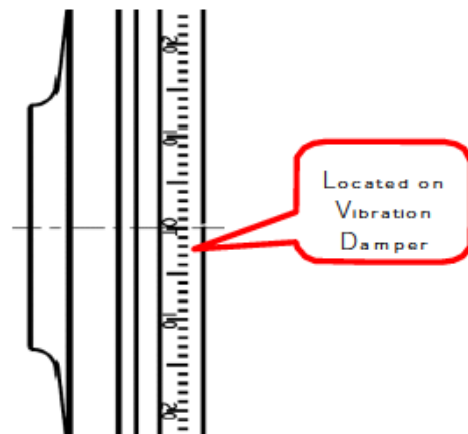


Illustration 6

C. Using Illustration 9, adjust the six (6) valves corresponding with cylinder 1 "TDC". Insert the correct feeler gauge between the rocker arm and valve stem tip. Loosen the locknut and turn the valve adjustment screw until the rocker arm and valve stem tip contact the feeler gauge.

D. Tighten the locknut once the valve is adjusted properly. Remove the feeler gauge. A very slight resistance should be felt when removing the feeler gauge.

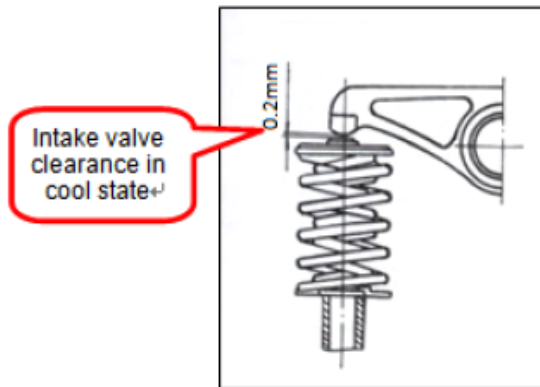


Illustration 7

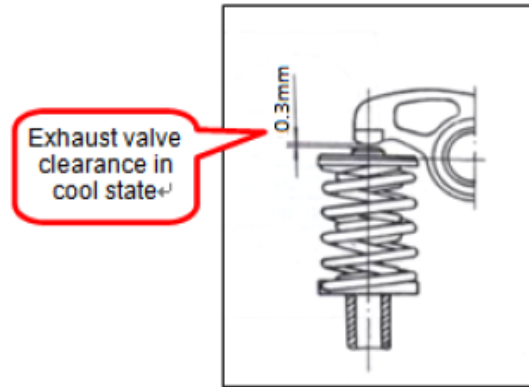


Illustration 8

E. Rotate the crankshaft (360°) until the number 6 piston is on the compression stroke and the timing pointer on the front cover is in line with the “TDC” mark on the vibration dampener.

F. Using Illustration 10, adjust the six (6) valves corresponding with the cylinder 6 “TDC”. Insert the correct feeler gauge between the rocker arm and valve stem tip. Loosen the locknut and turn the valve adjustment screw until the rocker are and valve stem tip contact the feeler gauge.

G. Tighten the locknut once the valve is adjusted properly. Remove the feeler gauge. A very slight resistance should be felt when removing the feeler gauge.

**NOTE**

**Ensure valve cover is completely seated and not resting on bolts or washers adjacent to the valve cover.**

H. Install gasket onto the valve cover and align the cover and gasket onto the cylinder head. Tighten the valve cover mounting bolts to 36 in/lbs. Ensure valve cover gasket is aligned before tightening.

With #1 piston at “TDC”, adjust these valves to: Exhaust 0.3mm/0.012” / Intake 0.2mm/0.008”

	INT	EXH	INT	EXT	INT	EXH
#1@TDC	1	1	2	3	4	5

Illustration 9



With #6 piston at “TDC” adjust these valves to Exhaust 0.3mm/0.012” / Intake 0.2mm/0.008”.

	EXH	INT	EXH	INT	EXH	INT
#6@TDC	2	3	4	5	6	6

Illustration 10

## 7. Inspect Spark Plugs

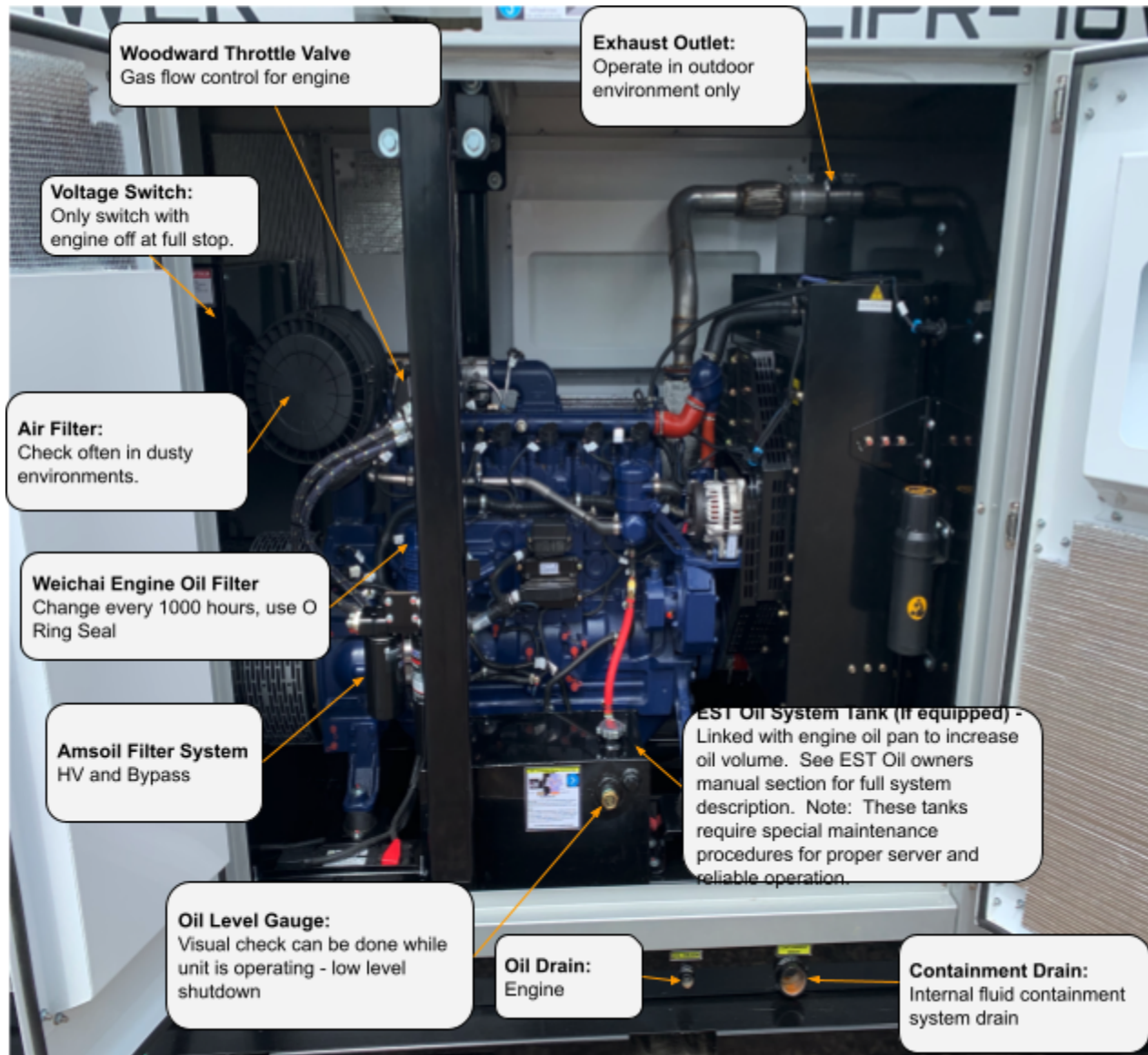
- A. Inspect high tension leads from coils for shorts, cracking and damage. (if used)
- B. Remove/blow out any debris from the cylinder head spark plug hole before removing the spark plug to prevent any debris falling into the combustion chamber.
- C. Remove wires or coil on plug (COP) from spark plugs.
- D. Remove the spark plug and inspect the electrode and threads for wear or debris.
- E. If the plugs do not show wear or debris or damage, re-gap and reinstall (WP06GNA: 0.014”/0.35mm gap, WP06GTA: 0.02”/0.5mm gap).
- F. If the plugs have debris or wear or damage, replace with new plug.

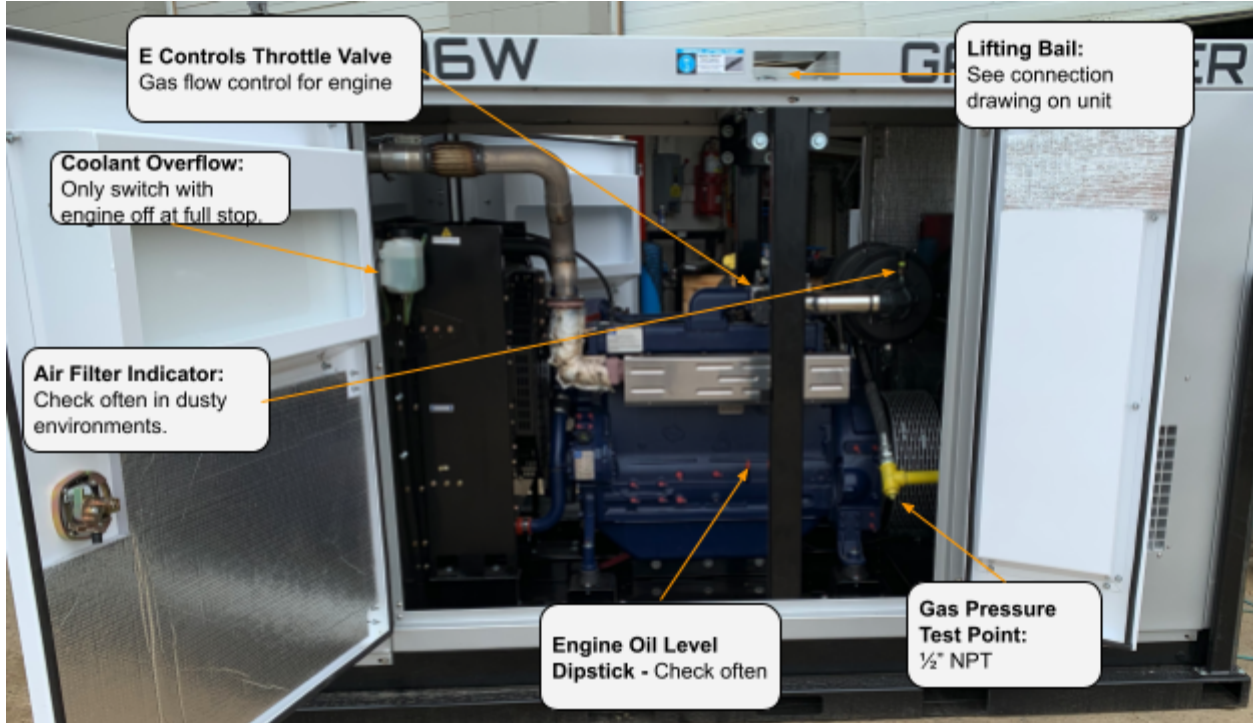
### CAUTION

**Before installing spark plug, ensure plug and cylinder threads are clean and undamaged. Torque spark plugs to specifications. Over-tightened can cause damage and removal of spark plug difficult. Under-tightened could cause the spark plug to overheat, resulting in pre-ignition and possible engine damage.**

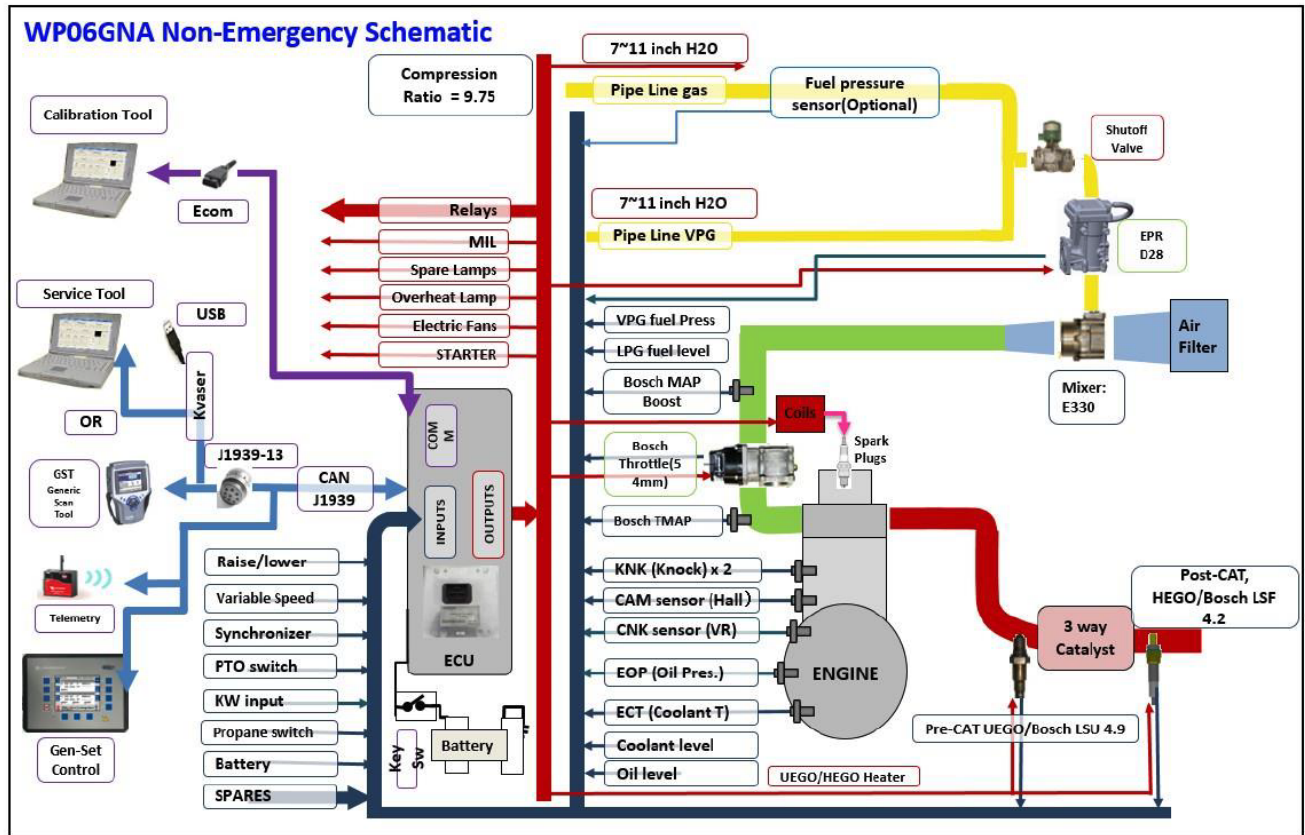
- A. Install new spark plug. Torque to 18 – 20 ft. lbs. (25 – 28N·m)
- B. Apply spark plug boot dielectric grease to inside of boot.
- C. Reconnect the spark plug wire or COP to the spark plug in the proper order.

## 2.5 Product Elements





## Fuel System:



## Bi-FUEL

The 4G Engine Controls System has full engine software control authority, therefore switching from Natural Gas (NG) to Propane (LPG/VPG) fuel is a software command from the operator console or a switch input into the 4G ECM. Weichai WP06GNA engine is capable of operating in bi-fuel mode starting from VPG/LPG and switching to NG after the NG pressure develops from operation. With the proper valve and sensor arrangement the fuel supply transition can be made while in operation, under full load, and automatically. NG/VPG is WP06GNA standard configuration. With added on option, WP06GNA can also support LPG, manual or automatic switching.

## TELEMATICS SUPPORT

Hardware and software capability exist in the full authority 4G control system to send and receive CAN communication files in a structured message format. The input and output file structure and variable content need to be defined by the customer and implemented by WEICHA. There will be an engineering change associated with setting up the file structures and debugging the communications with the telematics module. Equipment and technical support is available from Weichai.

## Diagnostic Messages

The 4G engine control system contains a highly configurable diagnostic list that can be tailored to each application's specific needs using the calibration spreadsheet. With each available P-code listed along with the short-name description. Note that not all DTCs necessarily apply to every application.

**ECM: Engine Control Module: 4G 90 pin**

The ECM is full authority, by this we mean it includes the ignition and air/fuel ratio control, contains all the I/O to interface the engine with the application and has a complete set of diagnostics. By implementing all functions in one box the overall system complexity is reduced as is the total system cost.

Some of features included in the ECMs are, lean burn or stoichiometric combustion control, continuous fuel injection control or standard digital injectors, ignition control electronic boost control for turbochargers – VGT or wastegate, drive-by-wire throttle control, oxygen sensor based closed-loop air/fuel ratio control (wide band (UEGOs) or switching (HEGOs)), adaptive spark and fuel control, EGR control, transmission / engine coordination, speed control/governing (idle, max speed, all-speed, cruise control) and vehicle network interface systems (CAN, J1708, J1850, Ford SCP).

**DEPR: Direct Acting Electronic Pressure Regulator**

Our fuel control device is referred to as a Direct Acting Electronic Pressure Regulator or D-EPR shown in Figure 2. Its benefits to our customers and the end customer are:



*Figure 2 - Direct Acting Electronic Pressure Regulator (DEPR)*

- It is a continuous fuel flow device. This allows the most homogeneous mixture of air and fuel to the engine yielding optimum combustion with minimum emissions and maximum fuel economy.
- It operates on low pressure fuel from 6 to 20 inches of water of inlet pressure, no pressure intensification system required.
- It does not wear in the case of dry fuels (NG) and it does not stick or clog due to heavy hydrocarbons or waxes found in LPG.



- It is fast and accurate, providing precise air/flow ratio control during transients (or load acceptance).

The DEPR is a single-stage microprocessor based electromechanical fuel pressure regulator that incorporates a high speed actuator. It communicates with the Engine Control Module (ECM) over a Controller Area Network (CAN) link, receiving fuel pressure commands and broadcasting DEPR operating parameters back to the ECM. The DEPR can regulate fuel pressure between +/- 17 inches of water column above the Mixer air inlet pressure, providing sufficient control authority to stall an engine either rich or lean. When the DEPR receives an output pressure command from the ECM, the valve is internally driven to attain targeted fuel pressure, the DEPR then closes the loop internally using a built in fuel pressure sensor to maintain target fuel pressure/fuel flow rate, until another external command from the ECM is received.



Figure 3 - E330 Mixer

### **MIXER: E330**

We utilize a variable venturi mixer (E330 shown in Figure 3) when the DEPR is applied to an engine. The basic principle of the product is to introduce air and fuel into engine. It also aids in introducing turbulence into the air and fuel assisting in its homogeneity. The mixer also acts to increase or decrease the fuel entering the engine proportional to the amount of air flowing in the engine on a volumetric basis.

E330 MIXER provide the following benefits to the market:

- Superior fuel/air ( $\phi$ ) ratio accuracy, improving overall operation of the engine
- Reduced part to part fuel/air ratio repeatability improving overall operation of the engine
- Extended diaphragm life through material selection and design
- Performance over the -40 to +125C temperature range
- Eliminate LPG fuel contamination Issues
- Superior low flow resolution and repeatability, eliminates idle adjustment
- Backfire resistant through design enhancements

### **INTAKE AIR SYSTEM**

The intake system should be sealed between the mixer inlet and the filter. Proper clamps should be used to ensure unfiltered air is not drawn into the system. Use piping with minimum diameter equal to mixer

inlet. When in an enclosure it can sometimes be necessary to use an externally mounted filter. It can be beneficial to engine life and performance to draw in air from the coolest location possible

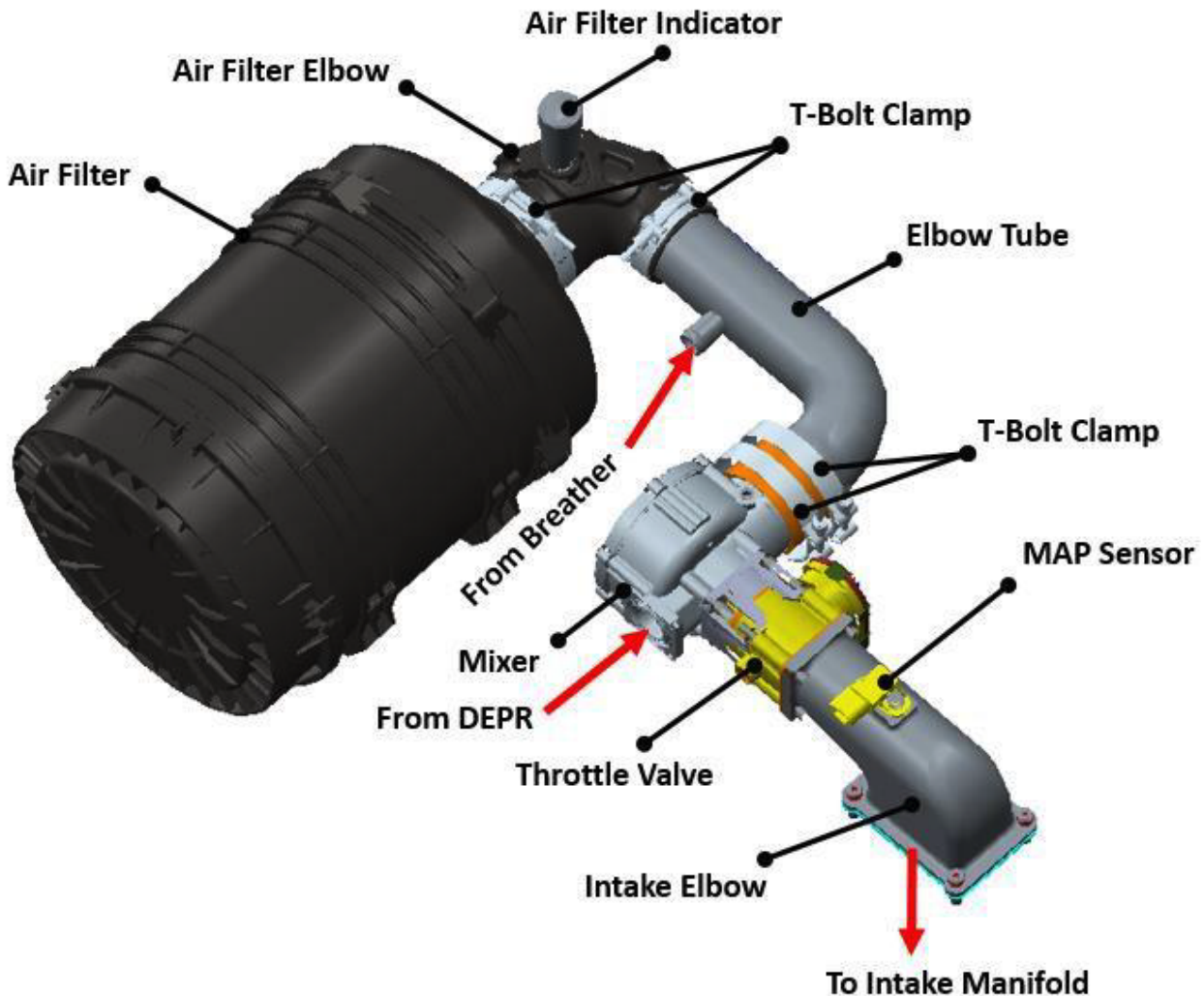


Figure 9 Intake Air System

#### NATURAL GAS/WELLHEAD GAS FUEL SYSTEM

The fuel first passes the fuel shut off when the engine starts cranking. Then it goes through the DEPR and comes into the mixer to be mixed with the air from the air filter as shown in Figure 11

Weichai WP06GNA are capable of running the NG or wellhead gas with energy content from 700 to 1800 BTU per cubic foot. Weichai recommends fuel analysis for any gas other than pipeline quality NG from customer to make sure the engine fuel and control system are calibrated to run the fuel. WEICHAH recommends a natural gas fuel filter at the inlet. Maximum allowable H<sub>2</sub>S is 55ppm.

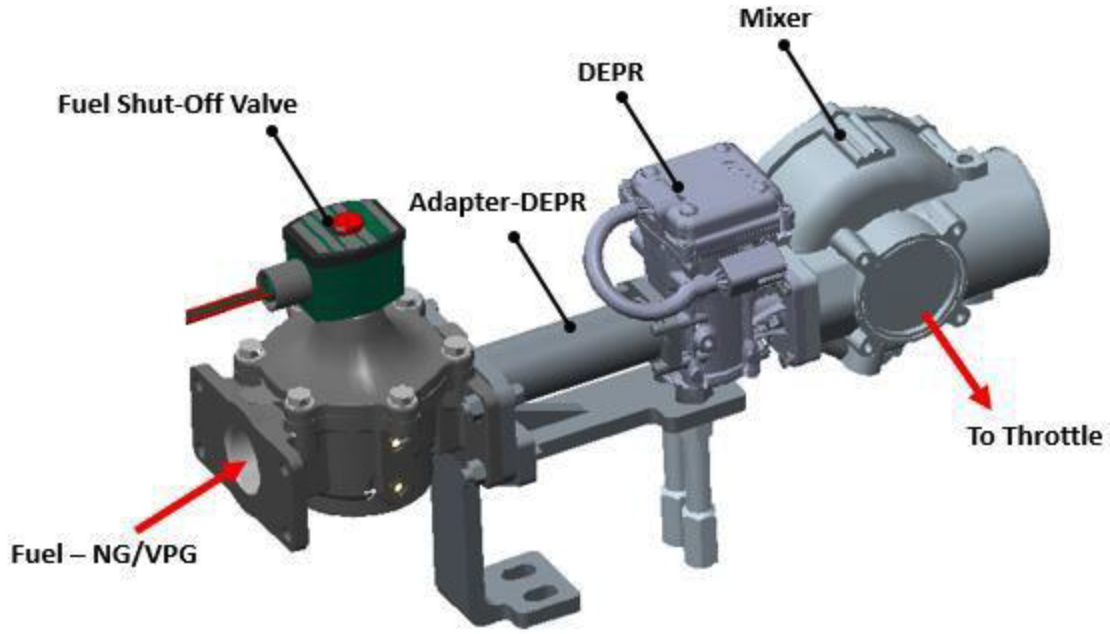


Figure 11 Natural Gas/Wellhead Gas Fuel System

**PRE-CATALYST OXYGEN SENSOR**

Apply an adequate amount of anti-seize compound to the threads of the oxygen sensor and install the sensor in the O2 sensor port located on the exhaust manifold elbow pipe. Tighten the sensor to the specified torque 29.5ft-lb ~44ft-lb (40Nm~60Nm). Anti-seize on thread only, don't put on the sensor.

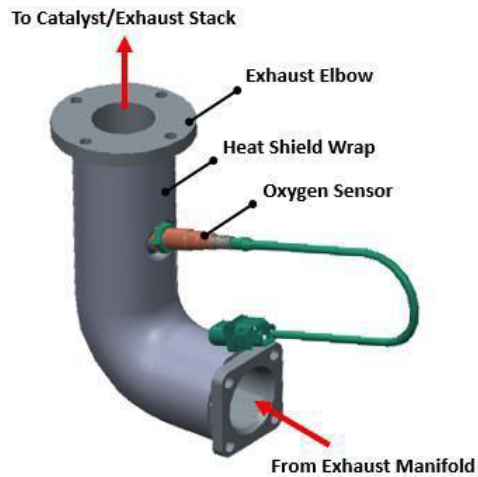


Figure 16 UEGO Sensor Installation

**POST-CATALYST OXYGEN SENSOR**

In general, the sensor installation point must be tested sufficiently by the customer for function and durability. There shall be no possibility of exhaust leaks upstream of the sensor as exhaust pulsations can draw in ambient air, leading to erroneous measurements.

Installation in the exhaust line must be at a point guaranteeing representative exhaust gas composition whilst also satisfying the specified temperature limits. The active sensor ceramic element is heated up quickly. This means that the sensor installation location must be selected to minimize exhaust-side stressing with condensation water in order to prevent ceramic element crack. This is helped by locating the sensor on the outlet of the catalyst assembly.

**Design measures:**

- – Locate sensor as close to the catalytic converter outlet as possible, without exceeding max.

Allowed temperature range

- – Attempt to achieve rapid heating-up of the exhaust pipes in the area in front of the sensor.

- – The exhaust pipe in front of the sensor should not contain any pockets, projections, protruding or edges etc. to avoid accumulation of condensation water. A downside slope of the pipe is recommended.

-

The use of a sensor type with double protection tube can give a better protection of the sensor ceramic against condensation water drops. In this case make sure, that the front hole of the double protection tube does not point against exhaust gas stream

**System measures:**

- – Never switch on sensor heating before engine starting

- – Delayed switch-on or power control of the sensor heater (e.g. as a function of engine and ambient temperature), so that the max. allowed ceramic temperature is not exceeded when there is condensation water present

Installation angle should be inclined at least 10° towards horizontal (electrical connection upwards), thus preventing the collection of liquids between sensor housing and sensor element during the cold start phase. Other installation angles must be inspected and tested individually.

Avoid inadmissible heating up of the sensor cable grommet, particularly when the engine has been switched off after running under max. Load conditions. The use of cleaning/greasing fluids or evaporating solids at the sensor plug connection is not permitted. Assemble with high temperature resistant grease on the screw-in thread. Tightening torque: 29.5ft-lb ~44ft-lb (40Nm~60Nm). material characteristics and strength of the thread must be appropriate. Recommended material for the thread boss in the exhaust pipe is Temperature resistant stainless ferritic steel, e.g. X 5 CrNi 18 9, DIN 17440 1.4301 or 1.4303 or SAE 30304 or SAE 30305 (US standard)

The sensor's protection tube must protrude completely into the exhaust-gas flow.



*Figure 17 TWC and Post HEGO Sensor Installation*

There is to be no possibility of the sensor protection tube contacting the opposite side of the exhaust pipe. A waterproof electrical connector's version is required.

The sensor must be covered when underseal (wax, tar, paint etc.) or spray oil is applied to the vehicle. The influence of contamination which enters the exhaust gas through the intake air or as a result of fuel, oil, sealing materials etc., and thus reaches the sensor is application specific and must be determined by customer tests.

The sensor must not be exposed to strong mechanical shocks (e.g. while the sensor is installed).

Otherwise the sensor element may crack without visible damage at the sensor housing.

For physical reasons the sensor needs ambient air at its reference gas side. Replacement of the air volume inside the sensor must be guaranteed by a sufficient air permeability of the wires and the connectors between sensor and ECU. The breathability should be higher than 1 ml/minute at a test pressure of 100mbar.

Underfloor installation of the sensor remote from the engine requires an additional check of the following points

- positioning of the sensor with respect to stone impact hazard
- positioning and fixing of cable and connector with respect to mechanical damage, cable bending stress and thermal stress.

The sensor cable must be routed so that it is free of bends, mechanical tension, and chafing points considering the movement of the exhaust system in relation to the vehicle body. The cable and connector should not be subjected to excessive temperatures that could cause damage.

**Additional instructions for the installation downstream the catalytic converter**

- Between catalyst and sensor location absolute gas tightness of the exhaust system must be ensured.
- When the sensor is installed in the exhaust pipe there should be no detachable connections between catalytic converter and sensor (e.g. flange, clamp-screw joint).



## **CATALYTIC CONVERTER**

A very important component in a low emission engine is the catalytic converter. Weichai Engines use a TWC converter. For this type of catalytic converter to work properly, the following two criteria must be met:

- The air-to-fuel ratio must oscillate between rich and lean.
- The catalyst substrate (also known as a “brick,” located inside the converter shell) must be kept hot.

Strict compliance with these provisions, conditions, and operating limits for catalytic converters must be maintained. If these parameters cannot be met or are not known, additional engineering and validation are required.

### **Operation**

- The continuous operating exhaust gas temperature must be between 1112degF (600°C) and 1562degF (850°C).
- The Product installer shall take necessary precautions to accommodate shell skin temperatures
  - up to 1202degF (650°C).
  - System backpressure must remain with +/- 5% of nominal conditions.
  - Engine misfires and exhaust stream containments are not permissible.

### **Vibration**

- Vibration isolation must be provided between the engine and the TWC
- Vibration isolation must be provided between the Product and the chassis.
- Vibration acceleration loads shall not exceed 10g.

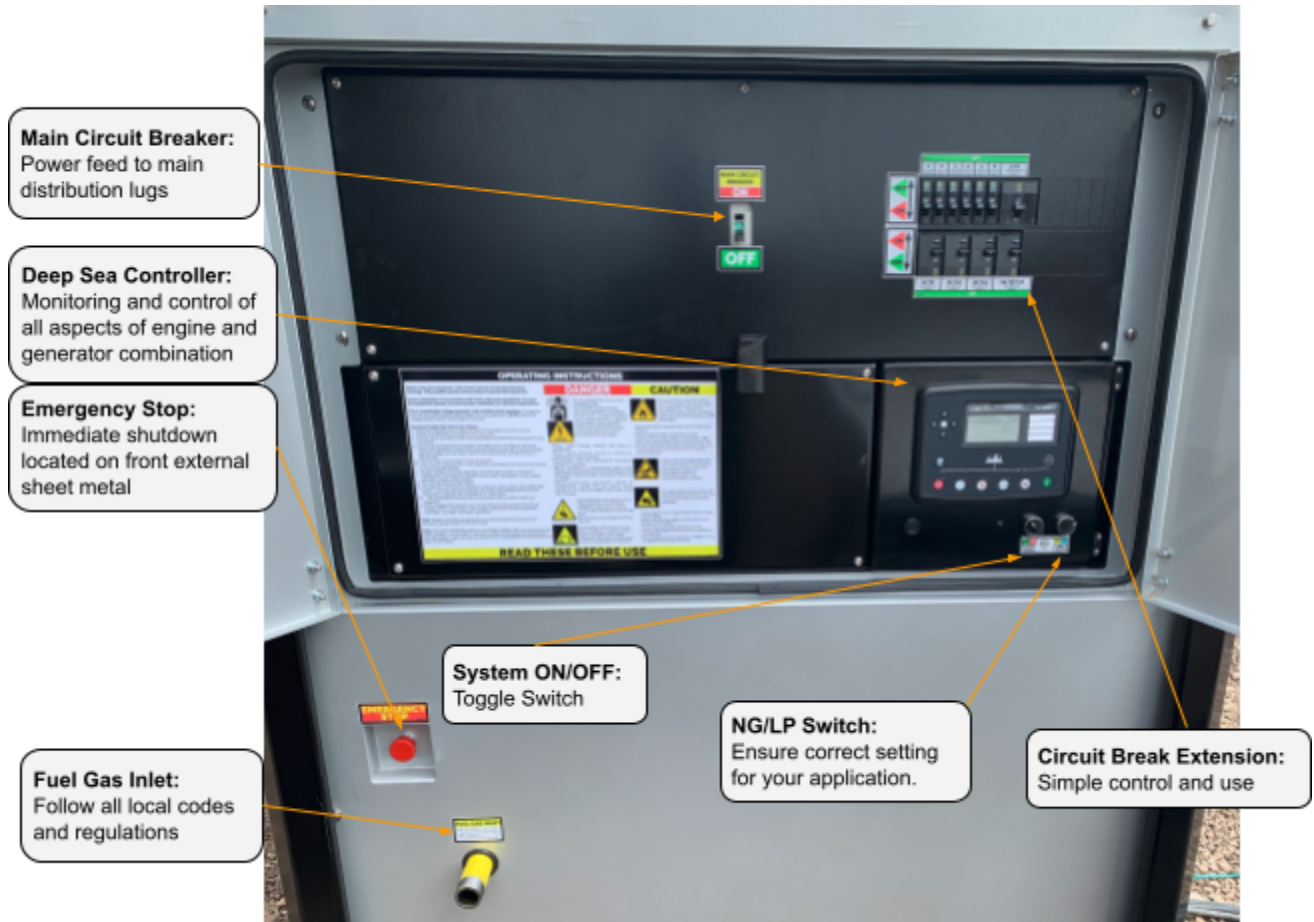
### **Installation**

- Product shall not support mounting loads from adjacent components.
- Product must be mounted within +/- 10° of horizontal. Any other orientation must be approved by the manufacturer.
- Product must be supported at a minimum of two mounting locations.
- Installer shall ensure mounting hardware, such as fasteners, is sufficient for the application.
- Manufacturer recommends use of graphite gaskets for flanged joints.
- Heat shields must be reviewed by the manufacturer.
- Product cannot be used in corrosive environments (i.e. salt water).

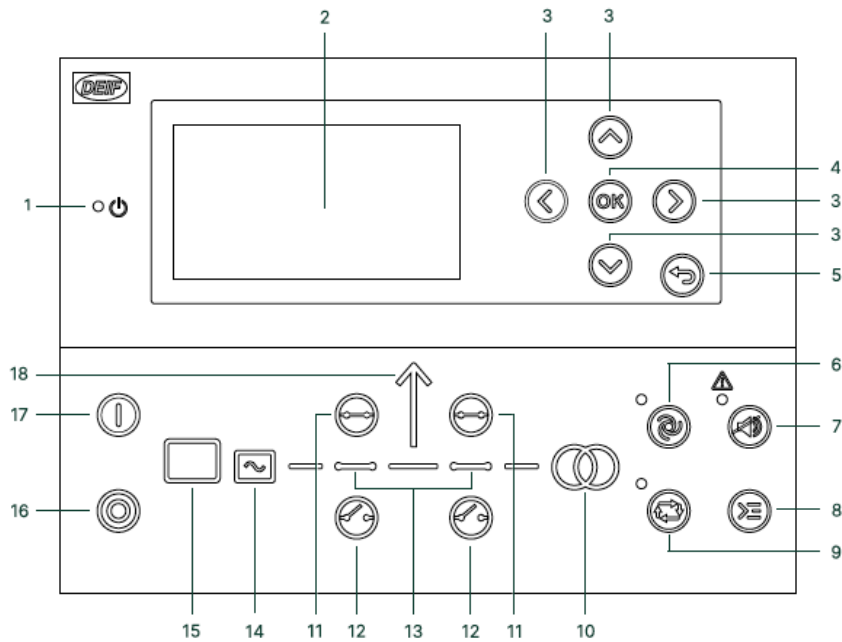
Mounting the catalytic converter in the proper location will control the substrate temperature. To quickly heat up the catalyst and to ensure an effective operating temperature, the center of the substrate must be located a minimum of 30 inches (762mm) downstream of the exhaust manifold flange. This measurement is made along the length of the exhaust pipe and must take all bends and curves into consideration. The Max distance allowed downstream of the exhaust manifold flange is 36inches (914mm).

## 2.6 Understanding the user interface and control panel

The main user interface is within the main control panel door. The control panel consists of a series of toggle switches and a graphical user interface to provide control of all operating system - and provide the user with operating parameters.



### 3.1 Display, buttons and LEDs



No.	Name	Function
1	Power	Green: The controller power is ON. OFF: The controller power is OFF.
2	Display screen	Resolution: 240 x 128 px. Viewing area: 88.50 x 51.40 mm. Six lines, each with 25 characters.
3	Navigation	Move the selector up, down, left and right on the screen.
4	OK	Go to the Menu system. Confirm the selection on the screen.
5	Back	Go to the previous page.
6	AUTO mode	For generator controllers, the controller automatically starts and stops (and connects and disconnects) gensets. No operator actions are needed. The controllers use the power management configuration to automatically select the power management action.
7	Silence horn	Stops an alarm horn (if configured) and enters the Alarm menu.
8	Shortcut menu	Access the Jump menu, Mode selection, Test, Lamp test.
9	SEMI-AUTO mode	The operator or an external signal can start, stop, connect or disconnect the genset. The generator controller cannot automatically start, stop, connect or disconnect the genset. The controller automatically synchronises before closing a breaker, and automatically deloads before opening a breaker.
10	Mains symbol	Green: Mains voltage and frequency are OK. The controller can synchronise and close the breaker. Red: Mains failure.
11	Close breaker	Push to close the breaker.
12	Open breaker	Push to open the breaker.



No.	Name	Function
13	Breaker symbols	Green: Breaker is closed. Green flashing: Synchronising or deloading. Red: Breaker failure.
16	Stop	Stops the plant.
17	Start	Starts the plant.
18	Load symbol	OFF: Power management application. Green: The supply voltage and frequency are OK. Red: Supply voltage/frequency failure.

See DEIF manuals for complete details.



## 2.7 Setup Process

The setup and deployment process involved for the CIPR generator involves locating the machine on a level, suitable terrain, connecting earth ground and fuel source, and connecting electrical distribution.

**Before using the unit, be sure to read and understand all of the instructions. This equipment was designed for specific applications; DO NOT modify or use this equipment for any application other than which it was designed for. Equipment operated improperly or by untrained personnel can be dangerous.**

**Before starting visually inspect the unit for leaks or damage. A complete visual inspection of all engine, generator, and power distribution connections**

### Quick Setup Guide:

1. Initial Engine Inspection: Carefully inspect the engine, intake, exhaust, and cooling system. Ensure that the engine is fully assembled and not undergoing any service procedures.
2. Engine Rotation: Verify that the engine can rotate freely without any obstructions.
3. Safety Guards: Check to ensure all safety guards are securely positioned as per the design.
4. Coolant Level: The coolant level in the radiator overflow bottle should be between the "Add" and "Full" markers.
5. Oil Level: Verify that the oil level on the dipstick is within the "Add" and "Full" indicators.
6. Fuel Supply: Confirm the fuel supply is connected properly. Make sure all shut-off valves are open, and there are no fuel leaks. Ensure the fuel select switch is in the proper position based on your fuel type.
  - a. LPG Fuel System: If you're using an LPG fuel system, ensure the fuel cylinder/tank contains adequate fuel and system pressure is within the required parameters.
  - b. Natural Gas Fuel System: If a natural gas fuel system is utilized, validate that the fuel supply pressure aligns with the system and engine requirements. Remember to check pressures at each stage for a stable fuel supply.
7. Engine Fuel Inlet Pressure: This should be 10" WC, 2.5 kPa, or 25 mBAR
8. Safety Guidelines: Familiarize yourself with ALL safety sections in the manual and machine decals.
9. Maintenance Status: Confirm that all maintenance procedures have been carried out and are up-to-date.
10. Generator Setup: Set up the unit on firm, level ground, maintaining a clean surrounding area.
11. Grounding: Adhere to local grounding requirements by connecting the ground lug to the distribution panel. Look for the IEC 60417, No 5019 ground symbol if equipped.
12. Fuel Source Connection: Ensure the connection complies with local safety requirements and guidelines. Check fuel pressure during startup and site commissioning, ensuring regulators are set correctly. Refer to the manual for detailed requirements and fuel quality necessities.



13. Electrical Connections: Inspect all electrical connections and repair or replace damaged or worn ones. Follow local guidelines for safe electrical practices and compliance. Ensure to check the torque on electrical connections during each deployment
14. Battery Connections: Verify all battery connections are secure.
15. Engine Fan Belt: Check the tension and condition of the engine fan belt. Refer to the engine manual for specific tension requirements.
16. Load Connections: Establish the required electrical load connections for your application. Ensure the main circuit breaker is in the off position during the initial start and verification.
17. Warning: Notify all personnel on-site about the impending startup.
18. Battery Disconnect Switch: Switch ON the battery disconnect switch. (if equipped)
19. Control Power Switch: Activate the Control Power switch.
20. Engine Start: Press the STOP button (16), then the Semi-Auto mode button (9), and finally the Start Button (16). The controller will initiate a diagnostic process; engine start may take 30 seconds to 2 minutes, depending on the engine's current condition.
21. Power Generation Initiation: After the engine starts, follow the ensuing steps to begin power generation.
22. If the generator is set up as a synchronizing or paralleling unit, do the following steps. Otherwise, the unit will start and produce voltage:
  - a. Indicator Light: Wait for light (14) to illuminate.
  - b. Breaker Engagement: Press the close breaker button (11). Power will be available once the central panel light is lit.
23. Secondary Circuit Breakers: Activate secondary circuit breakers as needed. However, if not using the secondary distribution, it is recommended to keep these breakers off during normal operation. Note many switchable units only have active power distribution in the 120/208V switch position
24. Engine Warm-Up: Allow the engine to warm up for a few minutes after starting. This helps in stabilizing the oil temperature and ensuring the engine runs smoothly.
25. Output Voltage Check: Confirm that the generator output voltage matches the required voltage for your application. Fine tuning may be required.
26. Generator Load: Gradually apply the load to the generator. Overloading it all at once can cause severe damage.
27. Monitoring: Once the generator is running, monitor the engine parameters such as oil pressure, coolant temperature, and RPM.
28. Noise and Vibration: Monitor for any unusual noise or vibration. Any such occurrences could indicate an issue that needs immediate attention.
29. Continual Inspection: Regularly inspect the engine, electrical connections, fuel supply, and other critical components for any signs of wear or issues during operation.
30. Emergency Shut-Off: Familiarize yourself with the emergency shut-off procedure. In case of any serious anomalies or emergencies, promptly shut off the generator to prevent any damage or accidents.
31. Maintenance Records: Keep track of all maintenance activities and inspections carried out on the generator. This log will be helpful for any future troubleshooting and ensuring regular upkeep.



32. Manual Shut-Off: When turning off the generator, ensure that the load is removed first before shutting off the generator. Abruptly shutting off a loaded generator can cause damage.
33. Cool-Down Period: After shutting down the generator, allow it to cool down before conducting any maintenance or inspection.

**WARNING:**

It is the operator's responsibility to ensure that the generator is properly and safely positioned at the location. This includes setting unit selectable voltage for your application.

**DANGER:**

Entering the electrical compartment while equipment is in operation can result in death or serious injury.

Safety Instructions

**⚠ WARNING**

**Read and understand this manual and its safety instructions before using this product. Failure to do so can result in serious injury or death.**



## **2.8 How to Use the Product Safely**

### **2.8.1 Safety information**

- The engine is rotating machinery and should be respected at all times
- High voltage is present in the system while on, never attempt to service the electrical system while the engine is on, or the system is on - qualified technicians should only setup this equipment
- Do not operate the generator if there are signs of wear or damage
- Never permit anyone to operate the machine without proper training
- Never modify equipment without the written consent of Eco Power Equipment
- Never transport or move the generator while running
- Explosion Hazard: Flammable gaseous fuel and combustible gases can be present in the generator
- Never charge a frozen 12V battery

### **2.8.2 Technical life span**

- Gaseous Engine: 20,000+ hours
- Eco Power recommends that our customers implement an inspection process regularly on equipment to ensure long life and successful operation
- This product is designed to run on pipeline quality natural gas, or propane gas (HD5 or better)

### **2.8.3 Personal Protective Equipment**

- Always wear personal protective equipment, including appropriate head protection, clothing, gloves, steel-toed boots, eye and hearing protection as required by the task at hand when operating the generator



## 2.9 Inspection Tasks

### 2.9.1 Daily inspection tasks

Task	Action
Visual inspection of the engine	Visual check for leaks
Check engine oil level	Check coolant level
Inspect generator end and power wiring	Monitor oil pressure, voltage
	Be awesome

### 2.9.2 Semi-Annual Inspection tasks

Task	Action
Inspect generator bearing	Remove end plate and inspect, check L dims
Load Test	Load Test Gaseous Engine (more in light load operating conditions)