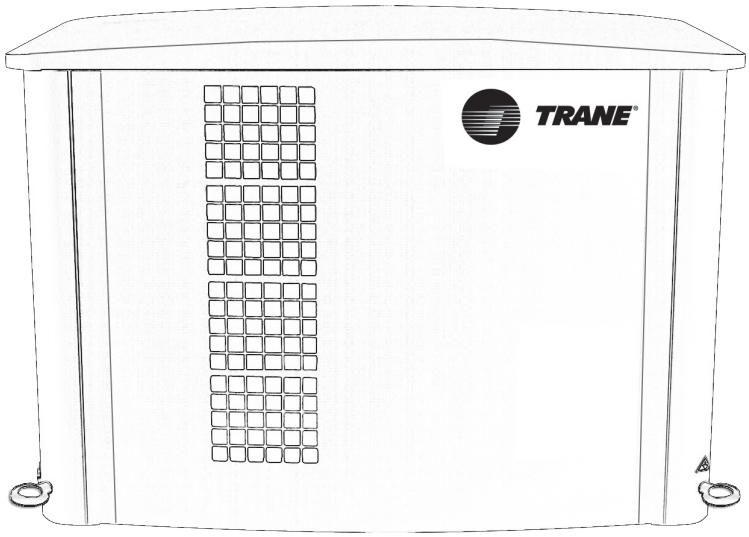
Operations Guide

Home Standby Generator

- ☐ TR15REG-DB (15Kw single-phase)
- ☐ TR20REG-DB (20Kw single-phase)
- ☐ TR20REG-DB-3 (20Kw three-phase)



Note: *"Graphics in this document are for representation only. Actual model may differ in appearance."*

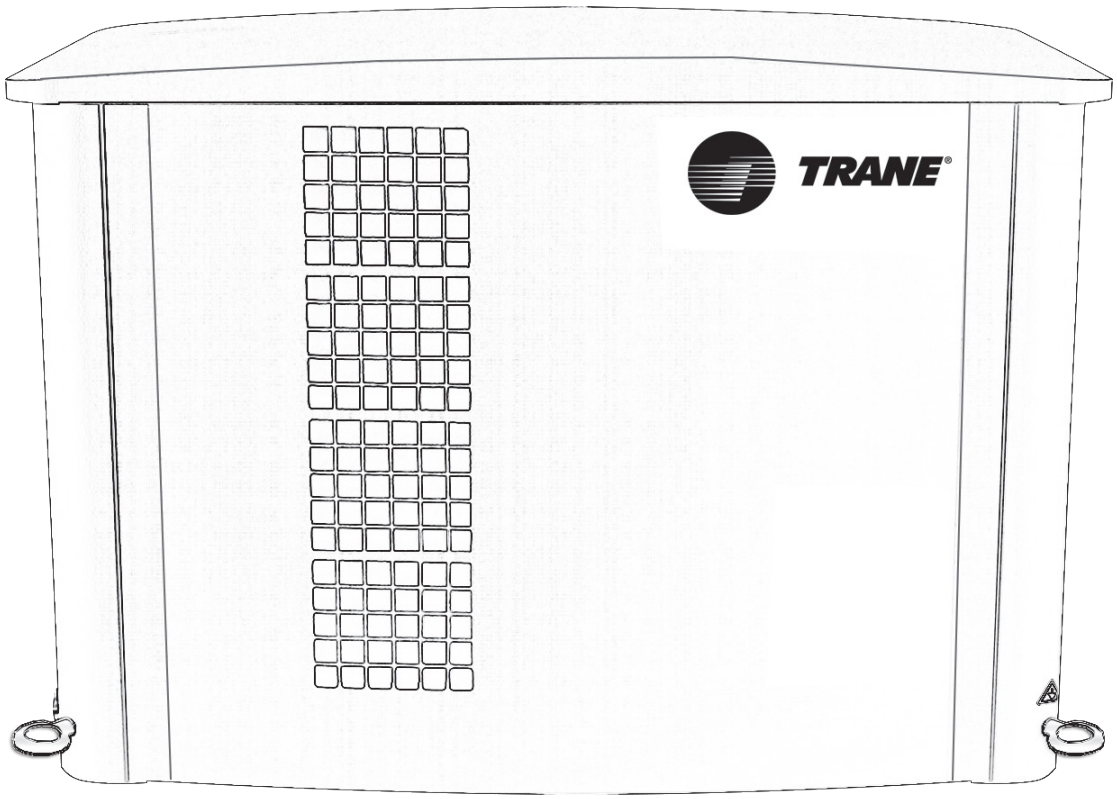
⚠ SAFETY INSTRUCTIONS

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of home standby generator equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

March 2017 032-5095-1A-EN

Operations Manual

For licensed authorized personnel only.



☐ TR15REG-DB ☐ TR20REG-DB ☐ TR20REG-DB-3

Read all instructions carefully before installation

WARNING: Only qualified technicians and contractors are to perform installation

NOT INTENDED FOR USE IN CRITICAL LIFE SUPPORT APPLICATIONS!

Save all instructions!

It is recommended that the Serial Number # be recorded for future warranty, parts and service needs. It can be located, inside the back-panel on the stamped ID plate or on the outside of original shipping carton. This system requires a password to unlock controller for operation and programming. Call 844-367-5660 for password.

Engine ID # _____

Controller Password _____

Table Of Contents

PREFACE

Thank you for purchasing this high performance, liquid-cooled, automobile engine-driven generator. This generator set is designed for use in stationary (permanent) applications where unreliable utility power may occur. Keep and read this manual carefully and follow all safety precautions and procedures in this manual to ensure proper equipment operation and to avoid bodily injury or property damage. Operating instructions presented in this manual assume that the standby electric and gas system has been installed by an authorized Service dealer or licensed and qualified contractor.

This is not a "Do-It-Yourself" (DIY) project!

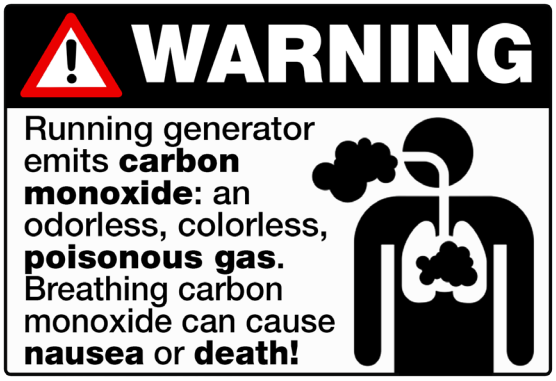
ATTENTION! Follow all safety precautions and instructions as outlined in this manual in its entirety. If any portion of this manual is not completely understood, please contact an authorized service dealer near you for installation, starting, operating and servicing procedures or, contact us at 844-367-5660. Common sense and strict compliance with these special instructions while performing service are essential to preventing accidents.

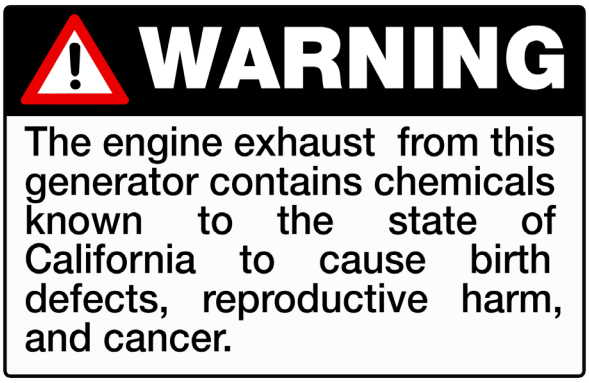
For professional advice on this product and its operating requirements, please contact a dealer near you or contact us directly at the information provided below. If you have any questions or suggestions, please contact us any time between 8:00am and 5:00pm CST.

"Customer satisfaction is our mission"

Phone: 844-367-5660

www.lifanpowerusa.com





Warning Announcements

Because this generator can be used as a single fuel or multi-fuel unit, pay close attention to factory settings. This unit can run on natural gas (NG) or propane (LPG). Please pay attention to all factory settings! Unit comes already preset to one fuel or the other.

Before starting generator:

- Read the user manual carefully and operate generator according to factory recommendations.
- If you do not operate according to the instructions, it can cause personal injury or loss of life.

Danger and Warning Labels

Danger and Warning labels are provided to indicate the possibility of damage and personal injury when using this generator. Pay attention to all labels closely. This information also indicates what kind of damage could be experienced.

NOTE: If you don't follow the operational requirements, it could result in damage to the engine or related generator equipment.

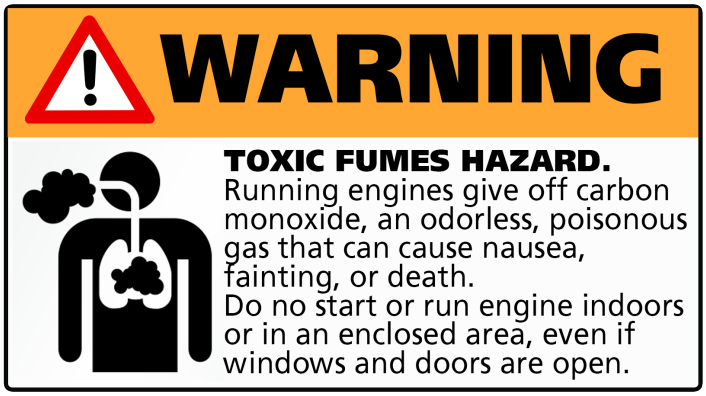
CAUTION: If you don't follow the instructions of the operating requirements, it could result in personal injury or death.

WARNING

If you don't adhere to all state and local codes or follow the instructions closely outlined in the operating requirements, it could result in fines along with serious injury or loss of life. Manufacturer not responsible for damage.

Users must operate in accordance with all state and local code requirements; otherwise it could damage the engine and genset.

This manual contains the following International ISO Graphical Symbols:



NOTE

Save These Instructions – The manufacturer suggests that these rules for safe operation be copied and posted in potential hazard areas. Safety should be stressed to all operators, potential operators and service technicians for this equipment.

NOTE

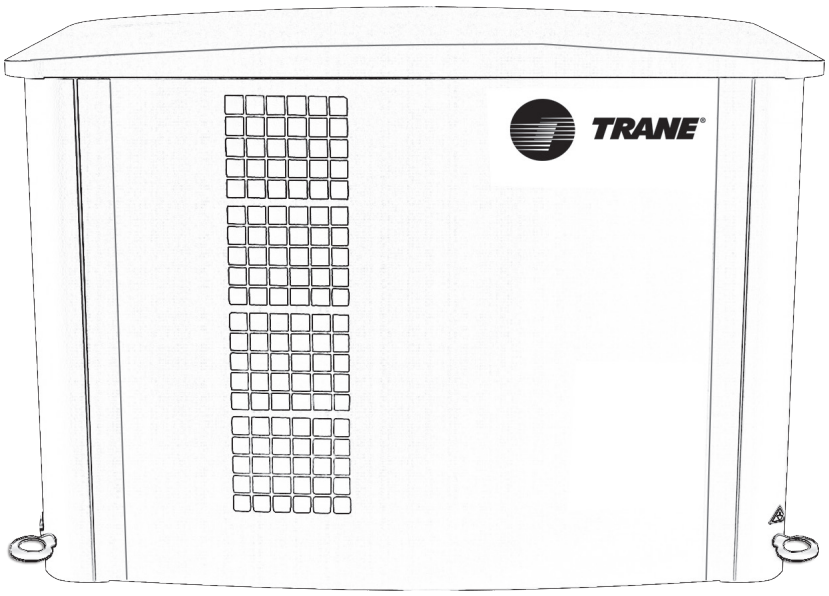
Save These Instructions – This manual contains important instructions that should be followed during installation and maintenance of the generator and battery.

How to Obtain Installation, Parts and Service

Contact us at

EQUIPSOURCE, LLC. D/B/A Lifan Power USA
2205 Industrial Park Road
Van Buren, Arkansas 72956
TEL: 844-367-5660
FAX:479-471-7466
www.lifanpowerusa.com

Chapter 1: Technical Features



I. Technical Features of the 15 and 20kW Single and Three-Phase, Dual-Fuel Generators
This gas generator is Dual-fuel and able to utilize both Natural Gas (NG) and Liquid Propane (LPG). It is a versatile multi-fuel engine. Based on our standards, we have designed this unit to operate in an environmentally safe and user friendly manner:

1. Speed Regulating System: This gas generator uses an internally designed electronic speed control system, allowing for quick and easy adjustments to the engine speed that can be set to specific speed ranges. This control system allows the engine to run more smoothly and respond quickly to sudden increases or decreases in required engine speed and electrical output.
2. Silent Air In-take System: Extra-large air intake cross-sections in the housing enclosure ensures ample air flow for the engine and air intake. This unique housing enclosure design leads to a significant reduction in operating noise.
3. Large Liquid Cooled Radiator and Reservoir: The use of an oversized radiator and coolant reservoir, like those used in automobile engines, allows for additional radiator coil surface and helps maintain a more ambient and stable engine temperature even in the hottest climates. Utilizing this liquid cooled system adds to the life and long term operating dependability of your liquid cooled gas generator investment.
4. Automatic Transfer Switch (ATS) and Function: Our Automatic Transfer Switches are specifically designed to work with our systems and have proprietary connections. The ATS is a critical component of any emergency or standby power system. They are used for transferring essential loads and electrical distribution from one power source to another automatically, without personal involvement.
5. Intelligent Hazard Control System and Function: The Intelligent Hazard Control System warns of dangerous conditions that exist to the engine or generator. This system continually checks and monitors the unit's operating conditions and will automatically shut down if a problem is detected, to help avoid costly damage. This system uses a visual control panel that can be preset according to the user's needs.

II. Specifications - for more detailed specifications see installation manual.

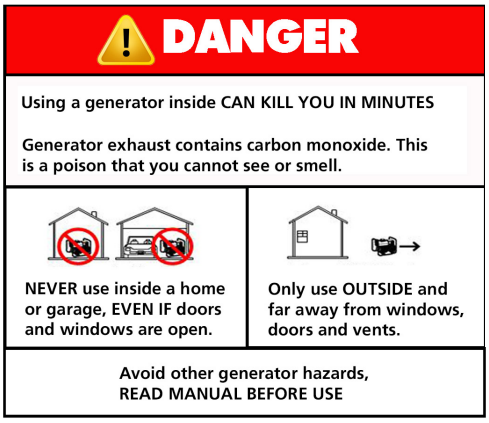
Item	Unit	TR15REG-DB	TR20REG-DB	TR20REG-DB-3
Rated Power (KW)	LPG	15	20	20
	NG	15	18	18
Frequency (Hz)	Hz	60	60	60
Speed (RPM)		3600	3600	3600
Rated Voltage (V)		120/240	120/240	120/208
Rated Current (A)	LPG	62.5	83.3	69.5
	NG	62.5	75	62.5
Phase		Single	Single	Three
Power Factor		1.0	1.0	.08
Protection Level		IP 23	IP 23	IP 23
Insulation		F	F	F
Pole		2	2	3

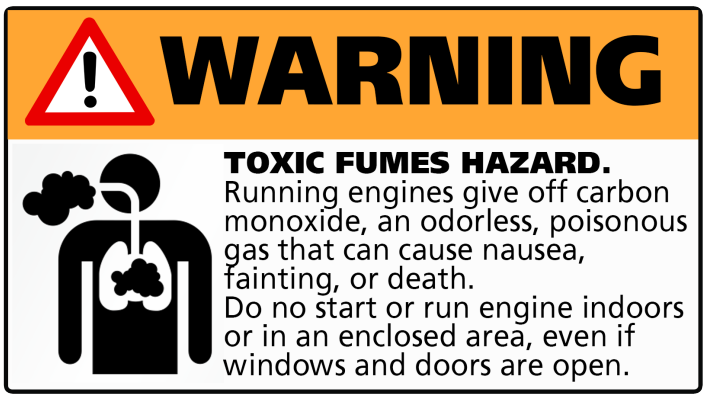
Chapter 2: Important Safety Instructions

SAVE THESE INSTRUCTIONS – This manual contains important instructions for the following models TR15REG-DB, TR20REG-DB / TR20REG-DB3 that should be followed completely during installation and maintenance of the generator and battery.

I. Technical Features of the 15 and 20kW Single and Three-Phase, Dual-Fuel Generators

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





2. **Fuel System** - Fuel Vapors are highly explosive and can cause severe injury or death. Use extreme care when handling and storing fuels. Store fuels in a well-ventilated area away from spark-producing equipment, gas hot water heaters and out of the reach of children. Never add fuel while the engine is running or hot, fuel spills may ignite on contact with hot parts and muffler. Do not operate under the influence of drugs and alcohol or smoke. when operating around sparks or open flames. Keep fuel lines and connections tight and in good working condition.

⚠ CAUTION

3. **Servicing the exhaust system.** Hot parts can cause severe injury. Do not touch hot engine parts. The engine and exhaust system components become extremely hot during operation.

4. **Servicing the engine.** Hot parts can cause personal injury or property damage. Keep the generator at least 2m (6ft) distance from other devices.

5. **Grounding electrical equipment.** Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Ensure you comply with all applicable state and local codes and standards. Electrically ground the generator set, transfer switch, and related equipment and electrical circuits. Turn off the main circuit breakers of all power sources before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution. It is highly recommended that a barrier exists between you and the ground surface at all times. We recommend using a wooden pallet with rubber mat on top to stand on while working or servicing the standby generator. Grounding is required of all AC circuits, use terminal (identify terminal) for bonding this circuit to the enclosure with a grounding rod (Not provided with unit). Ground the enclosure to a grounding electrode in accordance with state and local code requirements.

6. **Gas vapors and fuel leaks.** Explosive fuel vapors can cause severe injury or death. Fuel leaks can cause an explosion. Use digital gas leak detector on all gas connections for no less than 1 minuet per connection. Leak detector not included with generator. Contact Service provider.

7. **Engine noise.** Hazardous noise can cause hearing loss. Generator sets not equipped with sound enclosures can produce noise levels greater than 105dB. Prolonged exposure to noise levels greater than 85 dB can cause permanent hearing loss! Wear hearing protection at all times when working near an operating generator set.

8. **Short circuits.** Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not connect electrical contacts with tools or while wearing jewelry when making adjustments or repairs. Remove all jewelry before servicing the equipment. **Electrical back-feed through the utility power supply can cause severe injury or death.** You must install a manual or automatic transfer switch on all standby power applications and installations. This is to prevent the back feeding of electrical current through power lines causing fire, severe injury or death to utility personnel working on power lines.

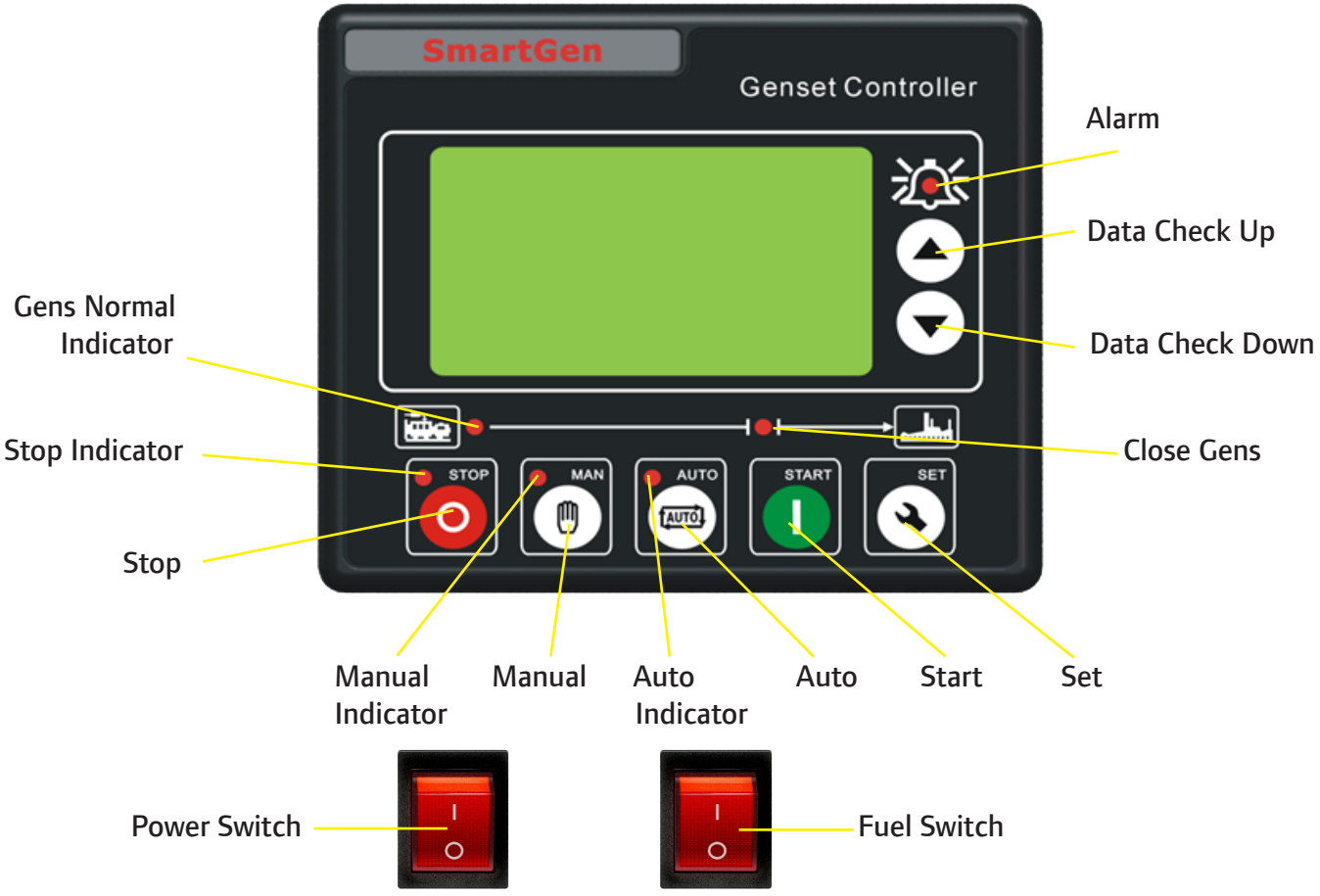
9. **Moving parts.** When the generator set is in operation, the cooling fan is rotating. Do not open the maintenance cover and make adjustment while generator is running. You must shut down the engine and turn electrical breaker to the off position before maintenance or operation. Before restarting, close all service panels.

10. **CAUTION.** FOR STANDBY ELECTRICAL OUTPUT, CONNECT GENERATOR TO SUITABLY RATED TRANSFER SWITCH IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE, PART I. **THIS UNIT REQUIRES A 200amp TRANSFER SWITCH**

11. THERE IS A PERMANENT CONDUCTOR BETWEEN THE GENERATOR (STATOR WINDING) AND THE FRAME.

12. Keep top cover locked at all times with provided key. Keep key stored in a safe place out of the reach of children. If key is lost please call 844-367-5660.

Operating System Functions and Definitions



Operating System Functions and Definitions

Power Switch: The power switch controls the entire generator set control system. If this switch is placed in the OFF (O push in down mode) position, the internal electrical control circuit of the unit will not have electrical power. When this switch is placed in the ON (I in the up mode) position, the control system can be manually or automatically started with ATS.

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

⚠ WARNING

Emergency stop switch: If an emergency situation occurs, immediately press the Emergency Stop Switch located on the right outside corner of the standby cabinet. The unit will automatically shut down. Once the switch has been depressed and the emergency situation has passed, to re-start the generator unit, rotate clockwise 15° to pop out into the normal operating position. When depressed, all generator control systems will immediately shut down, including the engine and generator head. The Emergency Stop Switch should be pressed immediately should any unexpected emergencies occur. Depressing this button will help minimize dangerous damage to persons, pets, property, plants, or to the generator unit itself.

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

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

Engine Prestart & Preparation

All necessary installation and annual maintenance must be conducted and performed by an authorized licensed TRANE® Standby specialist to prevent warranty violation. If end-user changes and maintains oil, air and coolant service, they must maintain log, receipts and take pictures of hour meter at the time of service for verification.

Before starting engine for the first time, engine oil and radiator coolant must be added. An initial fluid inspection and pre-check is recommended before starting genset for the first time or after unit has been in operation for over 50 hours. It can also be used as a quick review of all fluids. Check all of the following items before running system for the first time.

⚠ WARNING

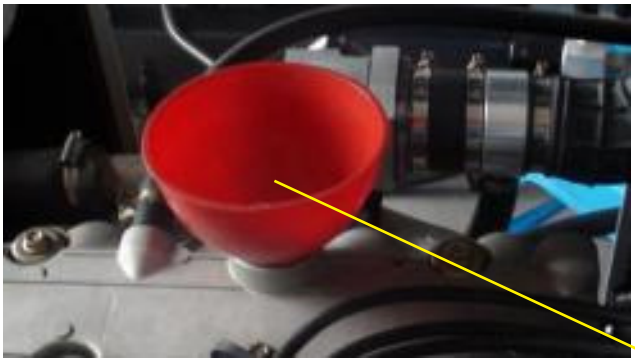
IMPORTANT NOTE! Unit is not shipped with engine oil or coolant from Factory!!

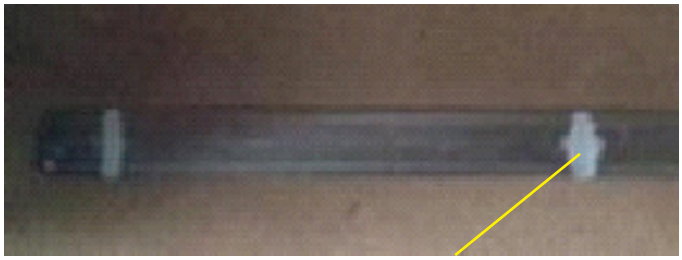
After installment of generator, fill engine with recommended oil weight based on ambient temperature shown below and add radiator coolant. Prior to initial startup, replace all service panels and close lid. Start engine and allow 10 minutes for system to warmup. After this has been performed, remove service panels, lift the lid, and check for any leaks or drips. If found, tighten lose hoses, clamps or plugs. Recheck all fluid levels and top off as necessary.

1. Engine Oil. The unit is not shipped with oil from factory! Use high-quality synthetic motor oil "Classified for Service with SAE viscosity ratings. Fill with the recommended amount of oil as specified. Overfilling or under filling can cause damage to the engine. Only use the following recommended engine oil.

Temperature	Mobil 1 Synthetic Oil or equivalent recommended
Below 32° F (0° C)	SAE 0W-40
32° to 80° F (-1° to 27° C)	SAE 10W-40
Above 80° F (27° C)	SAE 15W-50

- Place funnel in engine oil inlet.
- First time operation will require 4 liters or (4.25qts) of oil
- Check oil gauge dipstick regularly, oil level should be kept between top and bottom lines, at all times. It is preferred to be at the top mark but not over.





2. Cooling System

WARNING

Use only automotive grade antifreeze and distilled water in cooling system. Do not use water that contains salt or alkalis (Tap Water)! Using non-distilled water creates scale in the radiator, causing corrosion and premature wear.

You must check and maintain all fuel, lubricant and coolant levels. Not doing so will accelerate and shorten the life of the standby system. Attention must be paid to all fluid systems and annually serviced by an authorized service provider or call 844-367-5660 for assistance.

Converting from Natural Gas (NG) to Liquid Propane Gas (LPG)

Most generators are configured for natural gas operation at the factory. Switching over to LP Vapor is a simple procedure.

3. Fuel Conversion

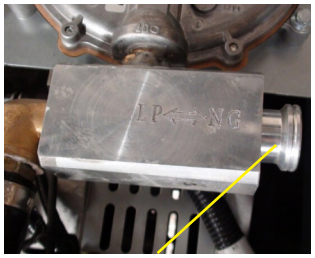
DANGER

Do not touch hot engine parts. The engine and exhaust system components become extremely hot during operation.

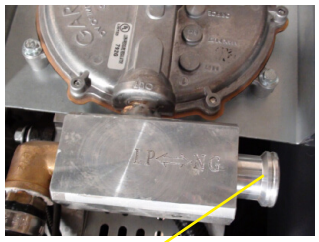
Two fuel connections on the fuel block allow field conversion between natural gas (NG) and Liquid Propane (LPG). The fuel metering valves are factory-set and sealed to provide the best possible hot and cold starting.

Use the following procedure to convert fuel from type to another.
Natural Gas (NG) and Liquid Propane (LPG) Conversion.

- Use a pressure reducing valve to reduce LP pressure supply as needed.
- Push or pull the pin located above Regulator as pictured below, for desired fuel type.



LPG



NG

A. Liquid propane (LPG)

For engines set up to run on Liquid propane, please check the fuel supply pressure, lower or higher pressure range will result in equipment failure. Inlet pressure 1.7kPa to 3.5kPa, and gas line should be no longer than 16 feet or 5 meters, the inner diameter shall not be less than (0.63”) or 16mm.

DANGER

It is strictly prohibited to remove high pressure gas lines during operation, service and repair. Contact your service provider. You must check and test for gas leaks using a gas leak detector before use. The observation time is not less than 1 minute per connection. Based on different gas sources that are available, there may be different gas pressures present. Make sure pressure is known before installation. A pressure reducing valve may be required to obtain optimal requirements. You will need to use a pressure reducing valve if the pressure is excessively high. Additional parts and tools such as leak detectors and pressure gauges are not included with this purchase.

B. Natural Gas (NG)

If the engine is set at the factory to run on natural gas, please check the fuel pressure and flow. The purchase of a pressure reducing valve might be required, and it is not included with this unit.

DANGER

After installation please contact a service provider if user wants to switch fuel types from Natural Gas (NG) to Liquid Propane Gas (LPG) or vice versa. Please contact the seller, installer or manufacturer at 844-367-5660.

4. Electrical Connections

If the generator set is used for standby power, install properly sized automatic transfer switch (ATS) provided by manufacture. This will prevent inadvertent interruptions of standby power and normal sources of supply. Always shut down generator before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrical shock.

5. Battery

Connect positive lead wire first (+) and then negative lead wire (-) to matching positive (+) and negative (-) terminals on battery. **Connect negative (-) lead last!**

WARNING

IMPORTANT! The generator will not start and circuit board damage can occur if battery is connected in reverse.

(Before initial use the maintenance free battery should be tested for voltage, if >12.6V, it can be installed and used immediately; After first time use or <12.6V it should be re-charge before use.)

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

- Installing battery - take off red cap on positive battery terminal.
- Use a multi-meter to check voltage of battery before installing and starting. If reading is below 12.6V, recharge battery.
- Connect positive terminal lead fully. Tighten terminal nut on battery lead and place red rubber cover over terminal.
- Follow the same steps for negative or black battery lead, then place rubber cover over terminal.

The battery represents a risk of high short circuit current. When working on the battery, always remove watches, rings or other metal objects, and only use tools that have insulated handles!

Installing, Servicing or Exchanging the Battery should be performed or supervised by knowledgeable personnel. Battery connection or exchange requires precautions and protective gear. Always wear face and eye protection with electrical rubber gloves, boots and battery apron. Keep unauthorized personnel away from battery. When replacing battery, always use the same size battery and number type: 12V, Lead-acid battery.

CAUTION – Do not dispose of battery or batteries in a fire. Batteries are capable of exploding.

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

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

1. Remove watches, rings, or other metal objects.
2. Use tools with insulated handles.
3. Wear rubber gloves, apron, eye protection and boots.
4. Do not lay tools or metal parts on top of batteries.

Make sure the generator set is grounded. Check grounding strap to make sure the generator set ground terminal is securely grounded to a grounding rod.

6. Starting Generator

A. Turn on the power switch (on the left beneath the digital display).
B. Turn on the fuel switch (on the right beneath the digital display).
C. After 10 seconds, press the Manual Start button on the control panel.
D. Press the Auto Start button to initiate system start.
E. Press the Data Check Up and Data Check Down buttons to observe frequency, voltage, speed and the 12V working voltage and operation time.

7. After the unit has started it will automatically sync with the ATS and enter into automatic mode. The emergency stop switch, power switch and fuel switch must be kept in the ON position for automatic startup.

8. Inspection of generator set when operating.

Inspect the following systems when operating.

1. **Radiator and Coolant level.** After warmup, check the coolant flow in system by raising lid to make sure coolant is circulating. If no coolant is visible flowing through hose to coolant reservoir, shut down the engine. Allow engine to cool down, and remove the radiator cap.

Checklist:

- Check for fluid and coolant leaks
- Inspect inside and out of the radiator to ensure no excessive dirt is present.
- Check the radiator coils and ensure no dust, dirt or foreign debris exists.
- Check hoses to ensure they are not blocked.

Add additional coolant to recommended levels.

9. Fault indicator lamp

When red lamp indicator is illuminated, operator must shut the generator down and follow trouble shooting guide and steps.

If the generator still won't start, press the emergency stop switch. Rotate clockwise to pop up position. After waiting for 30 seconds, try starting again. If generator still cannot be started, check the generator carefully for loose wires, battery terminals and voltage output, gas flow to the lines and generator.

If, after restarting the generator, the fault indicator light is still red, the generator will automatically shut down. Retrace steps in trouble shooting guide and procedures again. After correcting the fault, the generator is able to be re-started. If the fault indicator light remains off, then the generator is operating normally. If not contact your local service provider or contact us by calling 844-367-5660.

It is important to confirm after starting that the normal electrical output range is not exceeded as this will damage the generator.

10. Exhaust color

As long as the generator engine is running within the rated output range,

A. The exhaust will be colorless.

B. If the exhaust is dark grey or black after running for 60 seconds or more, this is an indication of an engine problem. Shut the engine down and contact your local service provider or contact us at 844-367-5660.

11. Other problems requiring shutting down of the generator

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

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

12. Shutting down the generator

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

The power switch (below the controller on the left) needs to be in the open or on position if connected to the ATS system in order for the unit to start automatically.

Chapter 3: Long Term Care & Storage of Generator

Long term storage and care

1. Remove battery positive lead first and then negative lead. Remove battery and store in dark dry place. It is recommended to recharge it slowly every three months.
2. Turn Gas line to generator in off position and disconnect. Plug gas line with rubber plug to prevent dirt from getting into gas line.
3. Remove all dirt from the generator if long time storage is needed.
4. Drain coolant from engine. Place drain pan under pre-plumed coolant line and open valve allowing all coolant to drain (See page 26).
5. Drain oil from engine. Place drain pan under pre-plumed oil line and open valve allowing all oil to drain (See page 26).
6. Ensure engine is in good technical condition, keep all surfaces clean.
7. Remove all spark plugs, pour 1oz or 30grams of engine oil in each sparkplug opening, turn crankshaft 20 turns slowly to allow oil to coat inside of cylinders and pistons, and then reinstall spark plugs.
8. Use dewatering Vaseline (heat range 100°-200°F) wipe on the surface of contacts.
9. Add light amount of penetrant oil to all, hinges, bolts and moving parts.
10. Use clean canvas or cloth to cover the engine and keep it dust-free.
11. Store and cover in a warm clean room with temperatures above (5°C, 41°F) relative humidity should be kept between 40-70%.
12. Check for loose nuts, bolts and screws.
13. Seal gas line inlet valve with rubber plug to keep gas line free of dust.
14. Push the emergency stop button.
15. Cover the generator with the dustproof cover, and keep it in the dry and clean place;
16. Keep it in well ventilated, dry rainproof area and away from flammable and explosive materials

Starting after long periods of storage

1. Wipe and remove protective lubricants from all contacts
2. Remove spark plugs one at a time to remove 1oz or 30grams of engine oil from cylinders. Use clean rag and place it in each spark plug opening and turn engine over slowly allowing oil to soak into clean rag. Repeat this process for each cylender
3. Add light penetrant oil to all hinges.
4. Add coolant.
5. Add engine oil.
6. Check all wires and hose connections.
7. Install battery connecting positive lead first and then negative lead
8. Reconnect gas line and check for leaks using a digital gas detector.
9. Start engine to make sure operation is normal.
10. If belts are making noise, shut down generator, allow to cool down and then tighten belts as needed
11. Check all electrical parts and digital display for normal working conditions.
12. If red indicator light on display panel is illuminated, perform trouble shooting procedures. See trouble shooting guide.

Chapter 4: Maintenance of Generator

Regular maintenance is an important part of your investment and provides longevity of the complete generator system. Keep it in good working condition according to the specifications outlined and it will provide many years of dependable service.

The following generator maintenance specifications are based on a good working environment. If working conditions are less than desirable (such as excessive dust, dirt and humidity, etc.) the maintenance interval periods should be shortened.

⚠ CAUTION

When maintaining the generator set, you should operate in strict accordance with the following requirements. Improper use and operation can cause premature failure.

Breaking-in period of New Engine

The life of the engine is greatly determined by the state of the first cycle of use. It is recommended that the oil be replaced after only 30 hours of use on the first cycle. The new engine should be operated as required. Abnormal engine wear will directly affect the life of generator engine.

Maintenance of the Fuel System

The genset is multi-fuel and comes preset from the factory to ether Natural Gas (NG) or Liquid Propane (LPG), Maintenance will vary according to the fuel used.

⚠ WARNING

Fuel is flammable and an explosive material. Smoking is prohibited while working or servicing generator.

When using Natural Gas (NG) or Liquid Propane (LPG)

- Before each operation, you should check all components for loose connections. Check for fluid leaks around cylinders, pipes and hoses. Tighten as needed.
- Periodically check the gas pressure reducer and the solenoid valve sealing pad for deformities.
- Periodically check the low-pressure gas line to see if it has weathered or aged (soapy water can be used to detect leaks).
- When maintenance of the gas line is required, gas valve must be closed before any maintenance or repairs are carried out.

Maintenance of the Lubricating System

1. Engine oil

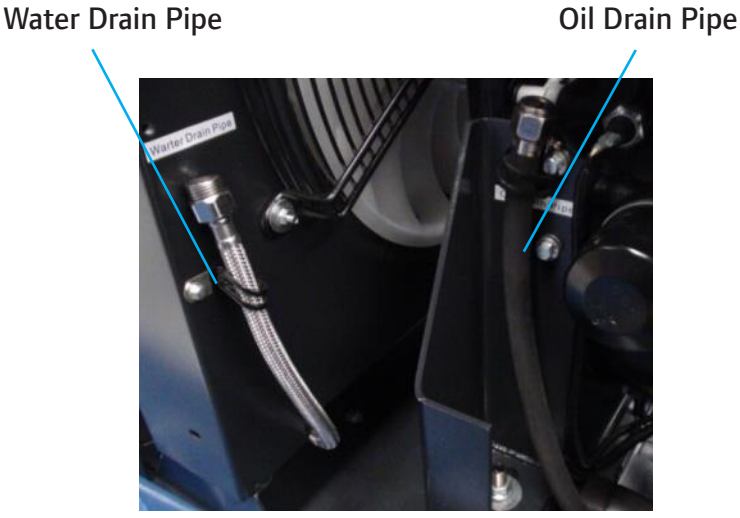
Oil viscosity: Select the viscosity according to your ambient temperature.
Oil quality level (according to standards set by the American Petroleum Institute): SE or higher-level oil.
After 30 hours of running new engine, preform first oil change. Maintain and replace the amount of oil according to the requirements (4qrts), this will ensure long dependable engine life. Only use full synthetic motor oils, Mobil 1, 0W-40 is highly recommended or equivalent.

⚠ **Do not mix different grades and detergents of oil.**

2. Replacement of old engine oil

Replacing engine oil: This unit comes with drain hoses already installed from the factory for ease of service.

- Start the engine for 10 minutes to increase the temperature of the engine oil and allow better flow, then stop the engine.
- Remove front panel on generator and place pan under the oil drain hose. Open oil drain valve to drain out all engine oil. Use 10mm allan wrench included.
- Close oil drain valve and replace with recommended oil amount.
- Start engine and allow new oil to circulate and fill oil filter for three minutes. Make sure there are no visible oil leaks!
- Shut down unit and top off oil as needed. Oil level should be between A and B marks on the dipstick, it is preferred that the level be close to B mark but not over!

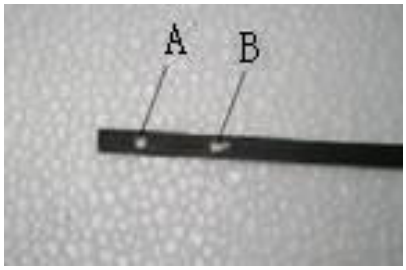


3. Replacement of used oil filter with new oil filter

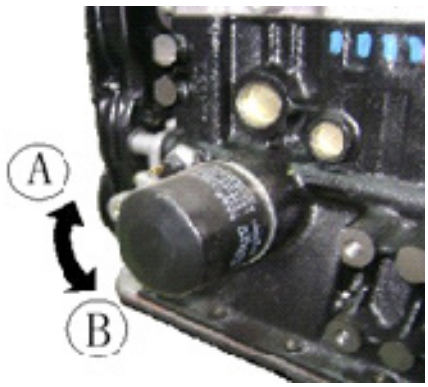
Replace old oil filter after the engine has cooled. The replacement cycle should be followed according to the maintenance cycle schedule.

Steps for replacement:

- Use oil filter wrench to remove old oil filter. Turn to the left to loosen.
- Before installing new oil filter coat, gasket surface with a thin layer of oil before installation.
- Twist new filter to the right to tighten into place with a firm hand. Do not over or under tighten filter
- Start generator and run for several minutes. Check for leaks. Shut down unit and check oil level using dipstick. Oil level should read between point A and point B on dipstick. If needed add additional oil. Do not over fill.



⚠ **Note:** Use oil filter wrench if needed but don't over tighten, the recommended torque is between 15N.M-20N.M. Dispose of used oil and filter properly: do not pour down drain or on ground.



Direction A: Tighten Direction B: Loosen

Maintenance of the cooling system

When the engine is operating, there must be enough antifreeze and distilled water in the radiator system to insure proper engine cooling. It is suggested to check it regularly before use, if there is not enough antifreeze or distilled water add as needed. Do not use mineral, hard water or poor quality antifreeze. We suggest Prestone, Shell, Texaco or similar brand.

1. Replace antifreeze and distilled water as outlined in the service guide or if discolored to a brown watery mix. Combine antifreeze and distilled water only to manufactures suggested guidelines.

⚠ CAUTION

Do not replace cooling liquid when the engine is hot.

After prolonged use or time, the coolant can go bad and discolor. Follow the recommended steps as outlined below;

- Place pan under pre-plumed coolant or water line pipe. See photo above.
- Open coolant or water line pipe valve and allow it to drain completely.
- Remove or wipe any old excess water.
- Close coolant or water drain pipe line valve.
- Refill radiator cooling system and reservoir until full.
- Start the generator without load for a few minutes. Allow for air pockets in the system to settle. Shut down generator and add additional coolant as needed until the level remains steady.
- Shut down generator again and add coolant to the "FULL" level mark
- Make sure the expansion tank is filled half way between low and full mark.
- Install radiator cap and expansion tank cover. Inspect system carefully to make sure there are no leaks.

⚠ CAUTION

Hard water, mineral water and saline water is harmful to the engine and cooling system. Do Not Use!

1. Routine Radiator Maintenance tips

- Regularly check radiator hoses. Inspect clamps and make sure they are secure.
- If hoses become deformed, develop bulges, hardening or cracking is visible, they need to be changed immediately!
- Inspect and clean the cooling fins on the radiator regularly, use compressed air to blow out excess dust and dirt. Important! Blow compressed air from the inside out. Debris can build over time and affect the cooling system.

2. Routine Belt inspection tips

Adjust and replace timing belt and water pump belt as needed. Inspect them regularly for cracking or missing pieces of rubber. Timing belt needs replacement every 1,000 hours of use! Water pump belt is extremely important. It drives the water pump that cools the engine and entire system.

⚠ **Note:** Listen for sounds coming from the belts. If you hear the belts squealing when the generator starts up, this is a sign that the belts are loose or worn and the system will run hot! If belts show signs of cracks or pieces of belt are missing, contact service provider.

⚠ CAUTION

Important! To check to see if the belt is too tight make sure the main power switch is in the off position.

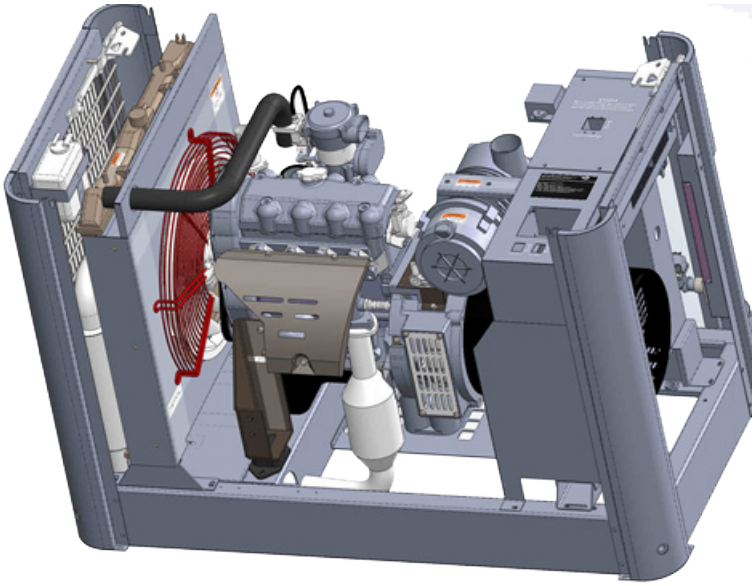
Perform the following inspections and adjust or replace belt as needed.

Deflection check of the belt:

7~10mm (0.28-0.35in)／100N {10.01kgf (22.1 lbs.)

Adjust the deflected belt:

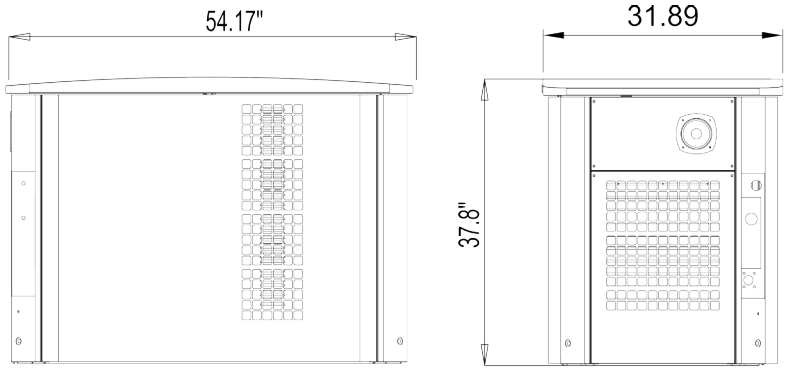
- Stop the engine.
- Use thumb to press on the belt between pulley wheels.
- If the tightness is not correct, adjust it by relaxing the tension wheel to the acceptable degree.
- Replace the water pump belt when it is cracked, missing pieces of rubber or singes of considerable wear.



Chapter 5: Specifications

TRANE 15kW, 20kW and 20kW-3-phase standby generators

- Basic Dimensions
- Control Features
- Liquid Propane - LPG/ Natural Gas – NG
- Low Noise Level
- High-performance lubrication system
- Optional Items sold separately:
  Cold and Extreme Cold Weather Kits
- Certifications – US EPA phase 3,
  UL2200 standard, ETL compliant.
- Warranty – 5 year / 1000 hour limited warranty



Model	Phase	Voltage (V)	Frequency (Hz)	Rated amps (NG/LPG fuel)	Circuit Breaker (amps)
TR15REG-DB	1	120 / 240	60		
TR20REG-DB	1	120 / 240	60	75.0 / 83.3	84
TR20REG-DB-3	3	120 / 240	60	62.5 / 69.5	70

Derating guidelines: Engine power available up to 1005m (3300 ft.) at ambient temperatures up to 40°C (104°F).
Above these elevations, de-rate at 4% per 350m (1000 ft.) and 2% per 10°C above 40°C (104°F).

Generator Specifications

Rated Power (NG/LPG)	Single-Phase	18KW / 20KW
	Three-Phase	22.5KVA / 25KVA
Max Power (NG/LPG)	Single-Phase	19.8KW/22KW
	Three-Phase	24.7KVA/27.5KVA
Power Factor	Single-Phase	1.0
	Three-Phase	0.8
Rated Frequency (Hz)		60
Rated Speed (rpm)		3600

Alternator Specifications

Rated Power	20KW
Alternator Type	Synchronous, revolving field
Pole	2 pole
Rotor Insulation Class	F
Stator Insulation Class	F
Protection Level	IP23
Winding Material	Copper
Sea Level	≤3280 ft.
Coupling	Direct coupling

Engine Specifications

Manufacturer / Model	Panda / PD465QR
Engine Type	4 cylinders, 4 strokes
Displacement	0.998 liters (60.9 in.^{3})
Bore	65.5mm (2.52 in.)
Stroke	74mm (2.91 in.)
Compression Ratio	9.5:1
Ignition System	ECM
Intake Air System	Naturally Aspirated
Starter motor rated voltage	DC12V/0.8KW Electrical start)
Battery charging alternator	DC14V/70A
Oil capacity	4.0 liters (244.1 in.^{3})
Air cleaner type	Dry
Recommended cold cranking amps (CCA) rating for -18°C (0°F)	550

Nominal fuel rating:
Natural gas: 37 MJ/m^3 (1000 BTU/ft.^{3})
LPG conversion factors: 8.58 ft.^{3} = 1 lb.
0.535m^3 = 1kg
36.39 ft.^{3} = 1 gal.

Governor regulation class	ISO8528 Part 1 Class G2
Governor type	Electronic
Voltage regulation	±1.0%
Random voltage variation	±1.0%
Frequency regulation	Isochronous
Frequency regulation, steady state	±0.5% @ 60 Hz

Engine Cooling System

Cooling System	Closed Liquid Cooled
Coolant Capacity	5L
Coolant Temp Range	-25°C ~ 106°C
Radiator Fan	7 Blade Φ 380

Fuel

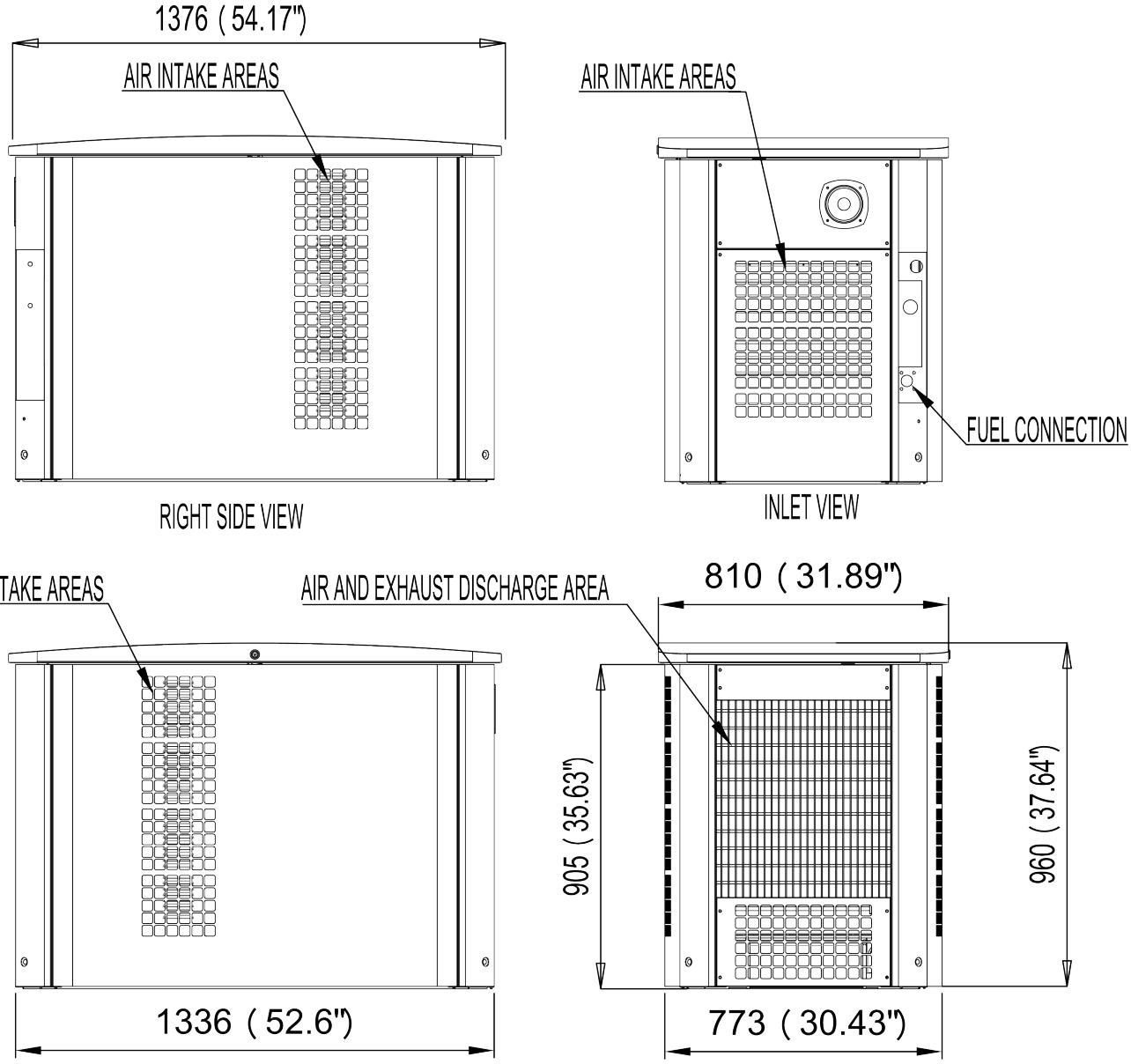
Fuel Type	Natual Gas or LPG
Fuel Supply Pressure kPa (in H_2O)	NG: 1.2-3.5 (5-14) LPG: 1.7-3.5 (7-14)
Fuel Pipe Size	G 3/4 pipe
Fuel Pipe Length	< 33 ft.
Fuel Consumption @ 50% (NG)	178 ft.^{3}/h
Fuel Consumption @ 100% (NG)	286 ft.^{3}/h
Fuel Consumption @ 50% (LPG)	92.6 ft.^{3}/h
Fuel Consumption @ 100% (LPG)	147 ft.^{3}/h

Unit Weight (lbs.)	772
Gross Weight (lbs.)	849
Unit Size (in.)	54.17 x 31.89 x 37.8
Packing Size (in.)	57.87 x 35.4 x 43.3
Packing	Carton + Metal Crate
20/40 Container Loading	14/30

DB and Noise Ratings

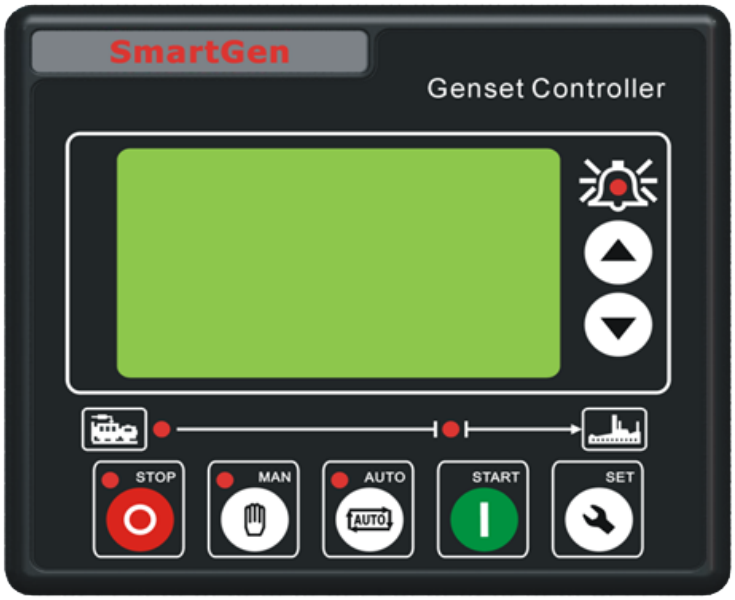
Sound output in dB(A) at 23 ft. (7m) with generator in exercise mode*	64
Sound output in dB(A) at 23 ft. (7m) with generator at normal operation*	72

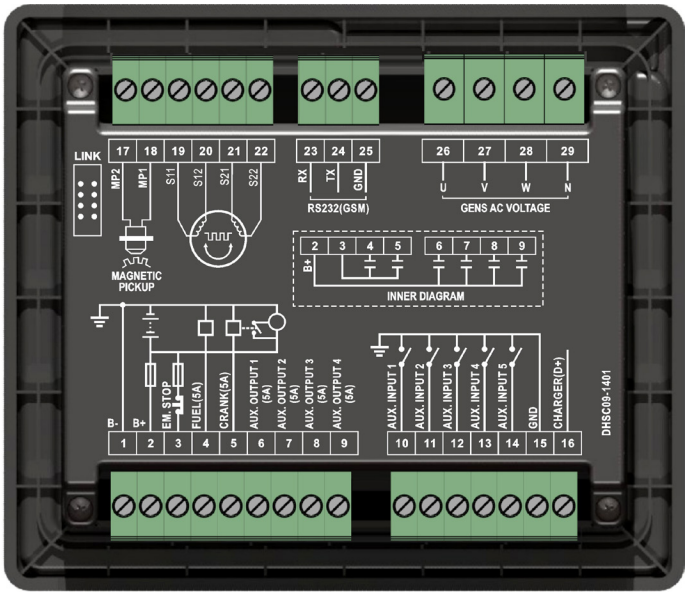
Basic Dimensions



Control Features

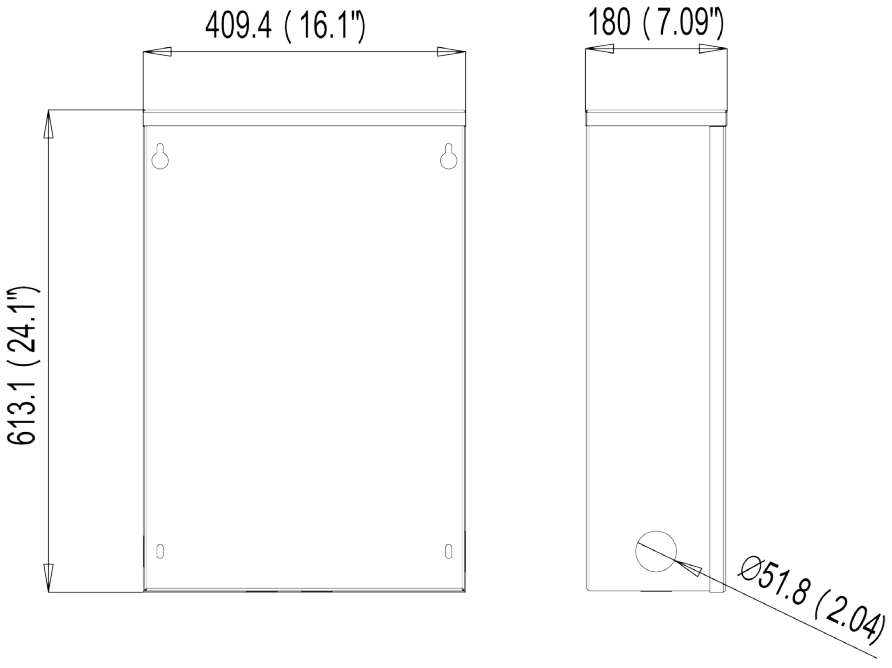
- LCD display, easy to operate
- System voltage/frequency selection and engine configuration
- Maintain steady-state speed (stepping alternator)
- High engine temperature
- Low oil pressure
- Over speed/Under speed
- Crank cycle status
- Over voltage/Under voltage
- Charging system





Single-Phase Automatic Transfer Switch

Pole	2
Rated Current	200A
Rated Volt	250VAC
Max Volt	300VAC
ATS Making Volt	170V
ATS Breaking Volt	150V
Withstand Rating	10000A
Dimensions (in.)	19.37 x 14.72 x 7.09
Operating Temp	-20*C to 70*C (-4*F to 158*F)
Storage Temp	-40*C to 85*C (-40*F to 185*F)
Weight	17.5kg



Note

The outline drawing is provided for general reference only and is not intended for use in design or installation. For more information, see Operators and Installation manuals or contact your distributor or dealer for assistance.

Nominal fuel rating: Natural gas: 37 MJ/m³ (1000 Btu/ft³)
LPG: 93 MJ/m³(2500 Btu/ft³)
LPG conversion factors: 8.58 ft³ = 1 lb.
0.535 m³ = 1 kg
36.39 ft³ = 1 gal

Optional Items Sold Separately

- Battery
- Battery Charger
- Battery Heater (Cold weather package sold separately)
- Oil Heater (Cold weather package sold separately)
- GSM-3 GSM Modem (Upload status of running to mobile and computer)

Emission System and Maintenance

1. The emission system and its running condition is a vital part of the generator and its overall performance. If this system is maintained and checked on a regular basis, the standby generator will provide decades of dependable service. It is extremely important to listen and visually inspect the generator from time to time during regular operation or during routine exercise mode. If smoke or unusual smells or sounds are experienced, push the emergency stop switch and do not run the devices until full inspection has been performed by authorized service provider. The following parts are available by the manufacturer through EquipSource LLC d/b/a Lifan Power USA. Any non-original equipment (O.E) or non-approved part will void warranty and could alter emission control requirements.

Part Name	Part Number	Qty. per unit
Air filter	025A0120	1
Muffler	020B0050	1
Igniter	025A0121	1
Spark plug	025A0122	4
Mixer	015A0106	1
Sensors		
Speed sensor	015A0418	1
Crankshaft position sensor	020A0123	1
Water temp sensor	015A0405	1
Oil sensor	020A0124	1
Intake pressure sensor	020A0999	1
Camshaft position sensor	020A0126	1
Oxygen sensor	020A0127	1
Electrical control components		
ECU	020A0128	1
Actuator	020A0129	1
Engine		
PD465QR	020A0009	1
Mechanical components		
Catalytic Converter	020A0104	1
Fuel switch valve	020A5250	1
Regulator	020A0006	1

2. Maintenance

The maintenance of emission control device or system is as follows.

Maintenance item	Checking points	Corrective action
Air filter	1. Check the air filter element to verify if it is blocked or turns black 2. Verify the damage on the surface of the air filter	replacement
Muffler	Start device any abnormal sounds or air leakage	replacement
Igniter	Device cannot be started or hunting or igniter keeps firing the engine	replace
Spark plug	1. Device runs with hunting or without ignition 2. Burned Spark plugs	replace
Mixer	The air intake holes been blocked	Clean
Speed sensor	Review the speed on controller, if it is 3600 RPM	replacement
Crankshaft position sensor	If generator runs steadily	replacement
Water temp sensor	Review the water temp on controller	replacement
Oil sensor	If generator runs steadily	replacement
Intake pressure sensor	If generator runs steadily	replacement
Camshaft position sensor	If generator runs steadily	replacement
Oxygen sensor	If it is with normal exhaust emission	replacement
ECU	Generator can be started and run steadily	replacement
Actuator	If the speed is 3600 RPM and frequency display 60HZ range	replacement
Engine PD465QR	1. Check the oil 2. Any oil leakage, runs steadily 3. Any abnormal noise exists	Maintenance
Ternary catalytic	Any foreign article in exhaust or with pungent smell	replacement
Fuel switch valve	Device can be stated with enough output	replacement
Regulator	If Generator can be started	replacement

3. Emission control system limited warranty

The U.S. EPA and Chongqing Panda Machinery Co., Ltd. are pleased to explain the emission control system limited warranty on your 2013 and later model year engine/equipment. Chongqing Panda Machinery Co., Ltd. must warrant to the ultimate purchaser and each subsequent purchaser that the new engine, including all parts of its emission control system, is designed, built, and equipped so it conforms at the time of sale to the ultimate purchaser with the U.S. EPA regulations for non-road stationary emergency engines, and is free from defects in materials and workmanship that may keep it from meeting those requirements.

WARRANTY PERIOD

The limited warranty coverage for this product shall be five years or 1,000 hours subject to provisions set forth below, starts from the date of ultimate purchase, whichever occurs first. If any emission-related part on your product is defective, the part will be repaired or replaced by Chongqing Panda Machinery Co., Ltd.

OWNER'S WARRANTY RESPONSIBILITIES:

The owner will be responsible for the following:

- Installing, operating, commissioning and maintaining the product in accordance with TRANE and EquipSource LLC published policies and guidelines.
- Notifying EquipSource within 30 days of the discovery of failure.
- Providing evidence for date of purchase.
- Providing sufficient access to and reasonable ability to remove the product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generator sets used to replace the product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- Labor and travel after the base warranty period expires.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

If you have any questions regarding your warranty rights and responsibilities, you should contact a service representative at EquipSource, LLC at 866-471-7464 2205 Industrial Park Road Van Buren, Arkansas 72956

EquipSource LLC, RESPONSIBILITIES:

In the event of a failure of the product during the limited warranty period due to defects in material or workmanship, EquipSource LLC d/b/a Lifan Power USA will only be responsible for the following costs:

- All parts and labor required to repair the product.
- Reasonable travel expenses to and from the product site location.

LIMITATIONS:

This limited warranty does not cover product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Non-conformance to applicable industry standards for installation
- Normal wear and tear.

- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any published guideline or policy for the product.
- Improper storage before and after commissioning.
- Owner's delay in making product available after notification of potential product problem.
- Use of steel enclosures within 60 miles of the coast of salt water when aluminum or an alternate non-corrosive material enclosure option is available.
- Replacement parts and accessories not authorized by Chongqing Panda Machinery Co., Ltd.
- Owner or operator abuse or neglect such as: late servicing and maintenance and improper storage.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the transfer switch or paralleling system.

This limited extended warranty does not cover costs resulting from:
- Difficulty in gaining access to the product.
- Repair of cosmetic damage to enclosures.

COMPONENTS COVERED:
The emission-related warranty covers all components whose failure would increase an engine's emissions of any regulated pollutant, including components listed in 40 CFR part 1068, Appendix I, and components from any other system you develop to control emissions. The emission-related warranty covers these components even if another company produces the component. Your emission-related warranty does not cover components whose failure would not increase an engine's emissions of any regulated pollutant.

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