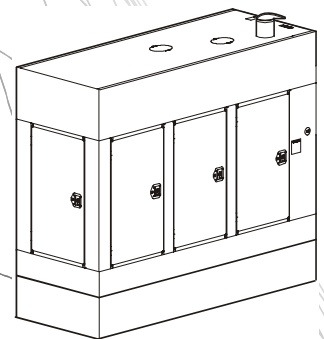


Generator Reference

InfraStruXure[™] Power Generation System

80, 125, and 200 kW
208/480 V Generators



About This Manual

Audience

This manual is intended for those customers using an APC-recommended InfraStruXure™ Power Generation System generator. It provides important safety warnings and instructions, an overview of generator components, general generator maintenance, and technical specifications.

Companion manuals

For additional information about your InfraStruXure generator and the entire InfraStruXure Power Generation System, refer to the following sheets/manuals. The initial part numbers are listed below. Be aware that some of the documentation may have undergone one or more revisions (A, B, etc.):

- *ATS Unpacking Sheet* (990-1842 for 250 A; 990-1847 for 400/800 A)
- *Electrical Installation Manual* (990-1844 for 250 A; 990-0595 for 400/800 A)
- *Operation Manual* (990-1845 for 250 A; 990-0598 for 400/800 A)
- *Network Management Interface User's Guide* (available on the APC Web site or the *Utility CD*) (990-1993)

Refer also to the following sheets and manuals, supplied with your generator, for engine-specific information and instructions:

- *Installation Manual*
- *Operator's Manual*
- *Operation and Maintenance Manual*
- *Parts Catalogs*
- *Battery Charger Instruction Sheet*

How to find updates to this manual

You can check for updates to this manual by clicking on the **User Manuals** link on the **Support** page of the APC Web site (www.apc.com). Choose **Power Generation** and then **InfraStruXure Power Generation**. From the list of **InfraStruXure Power Generation** manuals, look for the latest letter revision (A, B, etc.) of the initial part number appearing on the back cover of this manual (990-1846).

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Safety

Save these instructions

This manual contains important instructions that must be followed during installation, operation, and maintenance of the InfraStruXure Generator.

Safety symbols used in this manual



Indicates an electrical hazard, which, if not avoided, could result in injury or death.



Indicates a hazard, which, if not avoided, could result in severe personal injury or substantial damage to product or other property.



Indicates a potential hazard, which, if not avoided, could result in personal injury or damage to product or other property.



Indicates a heavy load that should not be lifted without assistance.



Indicates important information.

Cross-reference symbols used in this manual



Indicates that more information is available on the same subject in a different section of this manual.



See also

Indicates that more information is available on the same subject in a different manual.

Warnings



Note

Read these instructions

The components in the InfraStruXure Power Generation System can pose life-threatening danger when improperly installed, operated, or maintained. To prevent accidents, be aware of the dangers and act safely. Read and follow all of the safety instructions and warnings in this manual and in all of your component manuals.



Note

The InfraStruXure Power Generation System is an optional standby system

The Generator and Automatic Transfer Switch (ATS) that you purchased from APC is classified as an *Optional Standby System* because it provides backup or standby power to data centers in the event of a sustained power failure.

The InfraStruXure Power Generation System is not to be classified as an *Emergency System* that is essential for safety to human life (e.g., fire pumps, operating room and life-support equipment in hospitals) as legally required by municipal, state, federal, or other governmental codes.

The InfraStruXure Power Generation System is not to be classified as a *Legally Required Standby System*, as it is not supplying power to aid in fire fighting, rescue operations, control of health hazards (e.g., sewage) and similar operations as required by municipal, state, federal, or other governmental codes.

Emergency and *Legally Required Systems* are not allowed to rely on municipal fuel for operation, or municipal water for cooling. *Emergency* and *Legally Required Systems* specify dual-fuel systems, with one of them being a two-hour, on-site fuel supply.

Your InfraStruXure Power Generation System is not to be classified as an *Integrated Electrical System*, as an orderly shutdown is not required to prevent damage to the generator. The generator is not to be paralleled with another generator.

Your generator will operate at its rated load without being refueled for a minimum of six hours, and should be able to run with no load for a minimum of 12 hours.

Your generator can be without electrical power to the load terminals of the ATS for a maximum of 60 seconds, but will typically be without power for no more than 10 seconds.

**Fuel and fumes are flammable**

Fire, explosion, and personal injury or death can result from improper practices.

- DO NOT fill fuel tanks while the engine is running, unless tanks are outside the engine compartment. Fuel contact with a hot engine or exhaust is a potential fire hazard.
- DO NOT permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the generator or fuel tank.

**Exhaust gases are deadly**

- Ensure exhaust gases are properly discharged away from enclosed or sheltered areas, as well as areas where individuals are likely to congregate.
- Ensure that the unit is well ventilated.
- Engine exhaust and some of its constituents are known to cause cancer, birth defects, and other reproductive harm. Take care not to breathe, ingest, or come in contact with exhaust gases.

**Moving parts can cause severe personal injury or death**

- Keep your hands, clothing, and jewelry away from moving parts.
- Before starting work on the generator, disconnect the battery charger from its AC source, then disconnect the battery. Disconnect the battery's negative (–) cable first. This will prevent accidental starting.
- Make sure the fasteners on the generator are secure. Tighten supports and clamps, and keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing or jewelry in the vicinity of moving parts, or while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts.
- If an adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.



Do not operate in flammable and explosive environments

Flammable vapor can cause an engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury, or death. Do not operate a generator where a flammable vapor environment can be created by a fuel spill, leak, etc., unless the generator is equipped with an automatic safety device to block the air intake and stop the engine. The owners and operators of the generator are solely responsible for operating the generator safely.



Electrical shock can cause severe personal injury or death

- Switch off all electric power before removing protective shields or touching electrical equipment. Wear rubber boots when working on electrical equipment. Do not wear damp clothing (particularly wet shoes) or have damp skin when handling electrical equipment. Do not wear jewelry, which can short out electrical contacts and cause shock or burns.
- Use extreme caution when working on electrical components. High voltage can cause injury or death. DO NOT tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Lock out and tag open switches to avoid accidental closure.
- Hazardous voltages can flow from the generator into the utility line. This creates a potential for electrocution of service personnel or property damage. **DO NOT CONNECT THE GENERATOR DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. CONNECT ONLY TO THE AUTOMATIC TRANSFER SWITCH.**

**Note****General safety precautions**

- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running or remains hot. Allow the generator to cool, thereby decreasing the system pressure.
- Used engine oils are known to cause cancer and reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or make bodily contact with used oil.
- Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth; Class B fires involve combustible and flammable liquid fuels and gaseous fuels; Class C fires involve live electrical equipment (ref. NFPA No. 10).
- Make sure rags are not left on or near the engine.
- Make sure the generator is mounted in a manner that will prevent combustible materials from accumulating under its base.
- Remove all unnecessary grease and oil from the generator. Accumulated grease and oil can cause overheating and engine damage, and presents a potential fire hazard.
- Keep the generator and the surrounding area clean and free from obstructions. Remove any debris and keep the floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.
- Do not store any flammable liquids such as fuel, cleaners, oil, etc., near the generator. A fire or explosion could result.
- Wear hearing protection when going near an operating generator.
- To prevent serious burns, avoid contact with hot metal parts such as the radiator, turbo charger, and exhaust system.



Battery considerations

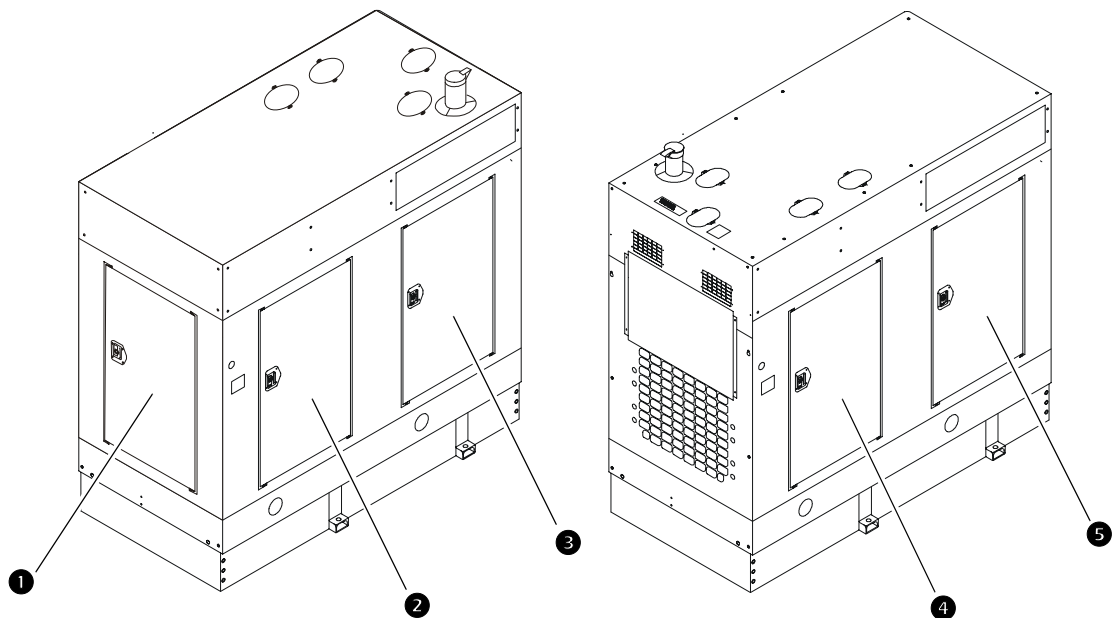
- Battery servicing must be performed or supervised by personnel knowledgeable about working with batteries and of the safety precautions that should be closely observed throughout the process. Keep unauthorized personnel away from the battery.
- When replacing the battery, use the same model number with these specifications:
 - 80 kW generators: 12 V, 225 Ah, 1000 cold-cranking amps, sealed lead acid
 - 125 kW and 200 kW generators: 12 V, 225 Ah, 1400 cold-cranking amps, sealed lead acid
- Do not dispose of a battery in a fire. It is capable of exploding.
- Do not open or mutilate a battery. Released electrolyte has been known to be harmful to the skin and eyes, and to be toxic.
- A battery presents a risk of high short-circuit current. The following precautions must be observed when working on batteries:
 - Remove watches, rings, or other metal objects.
 - Use tools with insulated handles.
 - Do not lay tools or metal parts on top of a battery.
- Electrolyte is a diluted sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following procedures should be observed:
 - Wear full eye protection and protective clothing.
 - If electrolyte contacts the skin, wash it off immediately with water.
 - If electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention.
 - Spilled electrolyte should be washed down with an acid neutralizing agent. Use a solution of one pound (500 grams) bicarbonate of soda to one gallon (4 liters) of water. Keep adding bicarbonate of soda solution until any evidence of a reaction (foaming) has ceased. The resulting liquid should then be flushed with water and the area dried.
- A lead-acid battery presents a risk of fire because it generates hydrogen gas. The following precautions must be observed:
 - DO NOT SMOKE near the battery.
 - DO NOT cause flame or spark in the battery area.
 - Discharge static electricity from your body before touching the battery by first touching a grounded metal surface.

InfraStruXure Generator Components

Overview

The generator's doors (the 80 kW model has five; the 125 and 200 kW have seven) provide access to various engine components that might be involved in operational or maintenance procedures. This section lists the main components found behind each door for the three generator models.

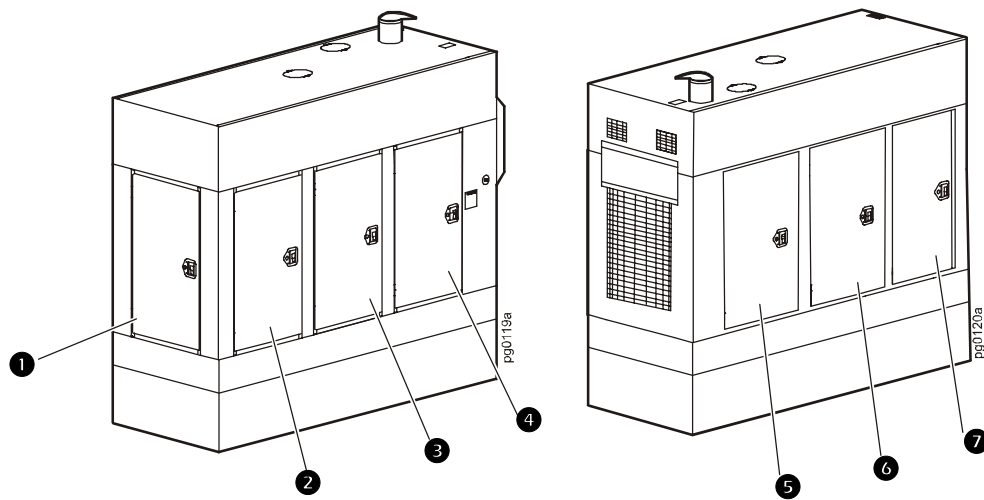
80 kW InfraStruXure generator



- ❶ Generator controller, battery charger
- ❷ This door is not used for engine access in this generator model
- ❸ Oil drain, oil fill point, oil level sensor, coolant drain, coolant overflow receptacle, air filter change indicator, block heater, battery, 120 VAC outlet box*
- ❹ Fuel sensor, visual fuel gauge, air filter, oil dipstick, oil filter, turbo charger, fuel filter, fuel pump
- ❺ Main output circuit breaker

* The 120 VAC outlet box also has two GFCI receptacles. These receptacles are for customer use only. The battery charger and the block heater should not be connected to them.

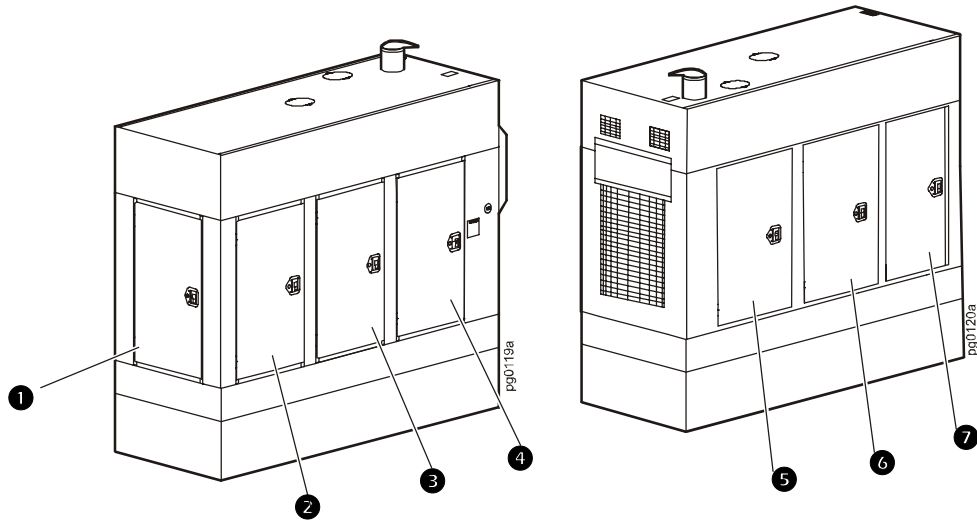
125 kW InfraStruXure generator



- ❶ Generator controller, battery charger
- ❷ This door is not used for engine access in this model generator
- ❸ Oil drain point, oil level sensor, block heater, air filter change indicator, battery, 120 VAC outlet box *
- ❹ Turbo charger, oil filter
- ❺ Coolant drain, coolant overflow receptacle, oil fill point, fuel pump
- ❻ Oil dipstick, fuel sensor, visual fuel gauge, air filter
- ❼ Main output circuit breaker

* The 120 VAC outlet box also has two GFCI receptacles. These receptacles are for customer use only. The battery charger and the block heater should not be connected to them.

200 kW InfraStruXure generator

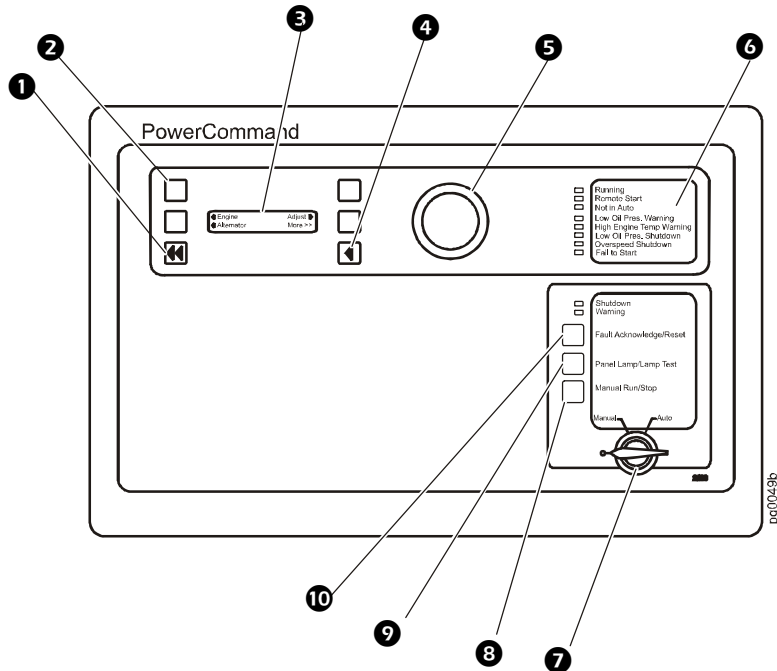


- ❶ Generator controller, battery charger
- ❷ This door is not used for engine access in this generator model
- ❸ Oil dipstick, battery, 120 VAC outlet box*
- ❹ Turbo charger, block heater, oil filter, coolant filter
- ❺ Fuel pump, oil drain point, coolant overflow receptacle
- ❻ Oil fill point, fuel sensor, visual fuel gauge, air filter
- ❼ Main output circuit breaker

* The 120 VAC outlet box also has two GFCI receptacles. These receptacles are for customer use only. The battery charger and the block heater should not be connected to them.

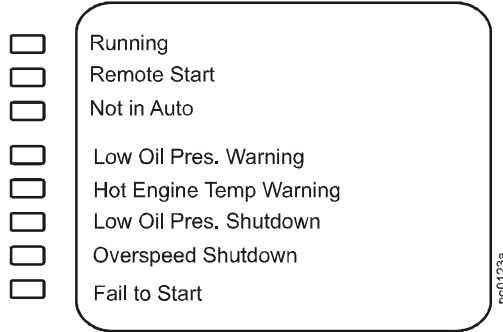
Generator Control Panel

The generator control panel connects to the ATS monitoring unit for communication purposes. The panel is used to clear alarms, perform an emergency stop of the system, clear a shutdown fault, and manually start the generator. The following illustration shows the generator control panel.



- 1 The **home** button returns you to the main menu screen from any other screen.
- 2 The **menu selection** button allows you to step through the various menu items and adjust parameters.
- 3 The **digital display** allows you to view menus, faults, and shutdown messages. An asterisk (*) before a listed fault indicates the fault is active.
- 4 The **previous main menu** button returns you to the previously viewed main menu.
- 5 The **E-stop** button allows you to perform an emergency shutdown of the generator (for more information, see “E-Stop Button” on page 24).
- 6 The **indicator lights** provide a visual indication of the generator status and any warnings present (for more information, see “Indicator lights” on page 11).
- 7 The **○/Manual/Auto** switch should be in the **Auto** position when the InfraStruXure Power Generation System is running in automatic operation. The switch should be in the **Manual** position when the generator needs to be started manually.
- 8 The **manual run/stop** button starts and stops the generator locally. The **○/Manual/Auto** switch must be in the **Manual** position to enable this button.
- 9 The **panel lamp and lamp test** button allows you to test all LEDs and to turn the control panel lamps ON or OFF.
- 10 The **fault acknowledge/reset** button allows you to clear faults once they have been corrected.

Indicator lights. The indicator lights on the generator control panel provide information about the status of the generator and any current generator faults.



Indicator Light	Color	Description
Running	Green	Indicates the generator is running.
Remote Start	Green	Indicates the generator is receiving a start signal remotely (from the ATS).
Not in Auto	Red	Flashes continuously when the ○/Manual/Auto switch is not in the Auto position.
Low Oil Pres. Warning	Yellow	Indicates the oil pressure is lower than the normal operating range.
High Engine Temp	Yellow	Indicates the engine temperature is higher than the normal operating range.
Low Oil Pres. Shutdown	Red	Indicates the engine has shut down due to low oil pressure.
Overspeed Shutdown	Red	Indicates the engine has shut down because of excessive speed.
Fail to Start	Red	Indicates the engine has failed to start.

How to clear a shutdown fault.



See “Clearing a Shutdown Fault” on page 26 for instructions.

How to manually start the generator.



See also

For detailed instructions about how to start the InfraStruXure Power Generation System manually, refer to the *Operation Manual*.

Special Features of Diesel Generators

Differences between diesel engines and gas engines

Before operating the generator, it is important to understand the differences between diesel engines and the more-familiar gasoline engines. Some of the most notable differences between the two are:

- **Diesel engines do not have spark plugs.** Unlike a gasoline engine, a diesel engine absorbs air, compresses it, and then injects fuel into the compressed air. The heat of the compressed air spontaneously lights the fuel.
- **You should never allow your diesel engine to run out of fuel.** A diesel engine may not restart when its tank is refilled after running out of fuel. To avoid this situation, ensure your generator's fuel never reaches below half a tank.
- **Diesel engines run more efficiently when supporting a significant load.** Always attempt to run the generator with a 30% load or higher. Diesel engines burn less fuel per watt generated if they are operating near their full potential.
- **Rather than regulating air intake, diesel engines regulate the amount of fuel injected into the cylinders.** Unlike gasoline engines, which have a fixed air/fuel ratio, diesel engines will add more fuel to the mix when they require more power.

Maintenance

Overview

Periodic health checks, testing, and other service-related procedures are keys to the continued reliability and longevity of your InfraStruXure generator. A well-planned preventive maintenance program should be viewed as an integral part of any extended runtime power system.

Manufacturers specify the need to perform certain procedures at regular intervals to ensure the dependability of generators employed in standby operation. The frequency of these procedures is typically broken down into Daily, Weekly, Monthly, Quarterly, Annually, and Bi-annually.

In the event your generator is subjected to extreme operating conditions, the duration of time between service procedures should be reduced accordingly. Consider the following extreme conditions:

- Use of the generator for continuous duty (prime power)
- Extremes in ambient temperature
- Exposure to severe weather
- Exposure to salt water
- Exposure to dust, sand, or other airborne contaminants

Maintenance schedule

A schedule for performing manufacturer-recommended service procedures is outlined in this section. Be aware that this outline provides only the basics of generator maintenance. For full instructions, refer to the *Operation and Maintenance Manual* included with your generator.

The InfraStruXure Power Generation System automatically address all recommended Daily and Weekly generator procedures by closely monitoring the various functionalities relating to these procedures. If readings for these functionalities do not remain within acceptable parameters, the system will alert the operator or other designated parties via e-mail or the InfraStruXure Manager.

The system also monitors calendar dates and hours of operation for the purpose of notifying the operator when Monthly, Quarterly, Annual, or Bi-Annual procedures should be taking place.



Note

The ATS further presents notifications about upcoming maintenance procedures. The notifications can be set to occur at 100, 150, 250, 300, 400, or 500-hour intervals.

Generator run-hours can be viewed using the ATS display interface, the ATS Web interface, or the InfraStruXure Manager interface (go to the **Service** menu on the **Generator** screen). This information can also be viewed using the **Engine Hours** menu on the generator control panel.

Recommended DAILY maintenance procedures.

- Check the oil level
- Check the coolant level
- Check the fuel level
- Check the operational effectiveness of the coolant heater's block temperature
- Make sure the ATS and the generator are operating in Automatic mode

The InfraStruXure Power Generation System automatically conducts all daily checks on an *ongoing* basis. If any readings are detected outside of acceptable parameters, the system notifies the operator.

Recommended WEEKLY maintenance procedures.

- Check operation of the battery charger
- Check the battery's ability to start
- Perform a generator start test, and then run the generator for approximately 10 minutes.

The InfraStruXure Power Generation System automatically conducts all weekly checks on an *ongoing* basis, and automatically performs the prescribed start test procedure. If any readings are detected outside of acceptable parameters, the system notifies the operator.

Recommended MONTHLY maintenance procedure.

- Exercise the generator and the transfer switch by starting and then running the generator for 30 minutes at 30% rated load.



Note

Adhering to an appropriate generator and ATS test schedule improves starting reliability, keeps engine parts lubricated, prevents oxidation of electrical contacts, and contributes to the dependability of system performance.

The InfraStruXure Power Generation System can be configured to automatically test the generator and the ATS at customer-specified intervals. A test log is subsequently created and maintained within the ATS control module, and is viewable through the ATS display interface.



Note

Test logs are also viewable through the ATS Web and the InfraStruXure Manager.

Recommended QUARTERLY maintenance procedures.

- Check the governor linkage
- Check for drive belt tension
- Clean accumulated grease, oil, and dirt
- Check ATS wiring and breakers, and the transfer switch
- Check the electrical controls and alarms
- Drain the exhaust condensate trap
- Drain water and sediment from the fuel tank
- Check the antifreeze and the DCA concentration

APC's **Quarterly Inspection Program** addresses all of these procedures. Contact APC customer support (see the back cover of this manual) for details.

Recommended ANNUAL maintenance procedures.

- Change the crankcase oil and filter
- Clean/replace the crankcase breather element
- Change the fuel filter
- Change the air cleaner element
- Drain sediment from the fuel tank, and check the hoses for cuts and abrasions
- Check the radiator hoses for wear and cracks
- Check the fan hub, pulley, and water pump
- Torque the exhaust manifold and the turbocharger fasteners
- Torque the generator's mounting hardware
- Clean the power outlet and control boxes
- Grease the alternator bearings
- Adjust the valve lash
- Measure and record the generator's winding insulation resistances
- Check the main breaker's operational efficiency
- Check the main breaker's trip unit
- Simulate a power outage during a non-critical period

APC's Annual Full-Service Preventive Maintenance Program addresses all of these procedures. Contact APC customer support (see the back cover of this manual) for details. The following special service can also be provided as an addendum to this program.

**Note**

If your generator has supported no load or has only been used with light loads since its last load bank test, run the generator for three hours with a rated load. The manufacturer recommends exercising the generator monthly with no less than a 30% rated load.

Recommended BI-ANNUAL maintenance procedures.

- Change the starting battery
APC's Battery Replacement Service addresses this procedure. Contact APC customer support (see the back cover of this manual) for details.
- Change the belts and hoses
APC's Hose Replacement Service addresses this procedure. Contact APC customer support (see the back cover of this manual) for details.
- Change the coolant
APC's Coolant Replacement Service addresses this procedure. Contact APC customer support (see the back cover of this manual) for details.

Oil

Oil Type

Use a high-quality, 15W-40 multi-viscosity lubricating oil.

Oil capacity

The oil capacity for each generator model is as follows:

80 kW	125 kW	200 kW
11.6 quarts / 11.0 liters	28.0 quarts / 26.5 liters	28.0 quarts / 26.5 liters

Engine oil level

You can check the generator oil level either at the generator or through the ATS.



Do not check the oil level at the generator while the generator is running. Hot oil may be dispersed, possibly resulting in severe burns.

Checking the oil level at the ATS. For convenience, you can check the oil level using the ATS display interface. From the top-level menu screen, select **Generator** and then **Generator Status** and **Engine Parameters**.



See also

For more information about the **Generator** screen on the ATS display interface, refer to the *Operation Manual*.

Checking the oil level at the generator. Be sure to maintain an oil level that is as close to the high mark on the dipstick as possible without exceeding the mark. Do not operate the generator if the oil level is above the high mark or below the low mark on the dipstick.

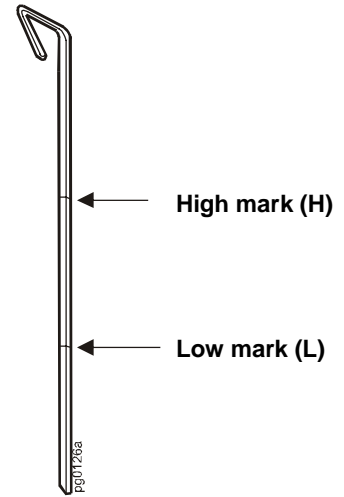


See “InfraStruXure Generator Components” on pages 7-9 for the location of the oil dipstick on your generator model.



Caution

Do not operate the generator if the oil level is too low or too high. Too much oil can cause foaming. Too little oil may cause loss of oil pressure.



Replacing the oil filter

The 80 kW generator has a four-cylinder engine. The 125 and 200 kW generators have six-cylinder engines. The following table specifies the type of replacement filter needed for your model:

Generator	Filter Type
80 kW	Fleetguard LF3349 or equivalent
125 kW / 200 kW	Fleetguard LF3000 or equivalent

When replacing your generator’s oil filter:

1. Fill the new filter with clean lubricating oil.
2. Apply a light film of oil to the gasket sealing surface of the filter.



Note

The LF3000 oil filter (used in 125 kW and 200 kW generators) has two gaskets. Be sure to lubricate both gaskets.

3. Install the filter on the generator according to the manufacturer’s instructions.

Changing the oil



Note

Handling and disposing of used oil is subject to federal, state, and local regulations. Use authorized waste disposal facilities. If in doubt, contact your local EPA authorities for guidance about the proper handling of used oil.



See also

For detailed instructions about changing your generator’s oil, refer to the *Operation and Maintenance Manual* included with your generator.

Coolant

Overview

The generator's diesel engine requires a balanced coolant mixture of water, antifreeze, and coolant additives. You can check the coolant level of your generator using the ATS display interface. From the top-level menu screen, select **Generator** and then **Generator Status** and **Engine Parameters**.



See also

For more information about the **Generator** screen on the ATS display interface, refer to the *Operation Manual*.

Coolant type

Use a low silicate antifreeze that meets ASTM 4985 test criteria.

An antifreeze with a 50-percent concentration level of ethylene glycol or propylene glycol is recommended in most climates. The following table specifies the recommended concentration of ethylene glycol and propylene glycol in extreme operating climates:

Ethylene Glycol	Propylene Glycol
40% = 9°F (-23°C)	40% = 6°F (-21°C)
50% = -35°F (-37°C)	50% = -27°F (-33°C)
60% = -65°F (-54°C)	60% = -56°F (-49°C)
68% = -96°F (-71°F)	68% = -81°F (-63°C)

Coolant capacity

The coolant capacity for each generator model is as follows:

80 kW	125 kW	200 kW
4.5 gallons / 17.0 liters	7.8 gallons / 29.5 liters	7.8 gallons / 29.5 liters

Draining, cleaning, flushing, and refilling the coolant system**Caution**

Adding coolant to a hot engine can damage the engine. Allow the engine to cool below 120°F (50°C) before adding coolant.

**Note**

Handling and disposing of used antifreeze is subject to federal, state, and local regulations. Use authorized waste disposal facilities. If in doubt, contact your local EPA authorities for guidance about the proper handling of used antifreeze.

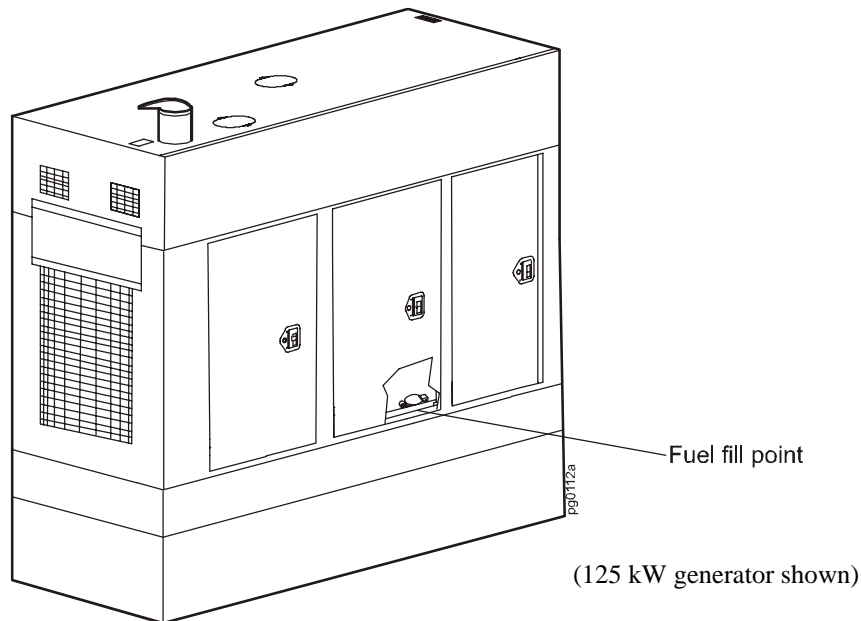
**See also**

For instructions about how to perform maintenance on the generator's cooling system, refer to the *Operation and Maintenance Manual* included with your generator.

Fuel

Overview

The InfraStruXure generator runs on diesel fuel. Fuel is one of the most critical components of your generator's reliability. Unlike on-road diesel engines, which continuously use up the fuel in their tanks, the fuel in a standby generator sits unused in the tank for extended periods of time. Diesel fuel that sits unused for an extended period can present problems. This section describes some of the problems that may occur and offers recommendations for preventing these problems. Adherence to the recommendations in this section increases the probability of reliable generator operation.



For complete fuel system maintenance instructions, refer to the *Operation and Maintenance Manual* included with your generator.

Problems with diesel fuel

The following issues may lead to problems with diesel fuel, especially in instances when it will be sitting in a standby state for extended periods of time.

1. **Temperature**—Diesel fuel contains paraffin wax, which is naturally dispersed throughout the fuel. In warm temperatures, this wax maintains a liquid state. However, when the temperature drops below 20° F (–7°C), the wax crystallizes and the fuel clouds up accordingly. The resulting wax crystals can clog your fuel filter and could prevent the generator from starting. They may also cause the generator to stall after it has started. In addition, if a Summer-blend fuel is used in the Winter, the paraffin wax can assume a jelly-like consistency (a process called “gelling”). Gelling can hinder the fuel pump’s ability to draw fuel, and prevent the generator from starting.

2. **Water**—Water can enter the fuel system in various ways. The fuel itself can be diluted, or there may be condensation from the moisture that resides in the air space above the fuel in the tank. Water in diesel fuel will take the form of either free or emulsified water. Free water settles to the bottom of the tank and is mostly harmless. However, emulsified water becomes suspended within the fuel in much the same way that oil and vinegar separate in salad dressing. This type of water can affect the fuel lines, the fuel pump, and the injectors. Emulsified water also freezes at low temperatures, and the resulting ice crystals can clog the fuel filter. This will prevent the generator from starting, or might cause it to stall after starting. Fortunately, the InfraStruXure generator is equipped with a fuel-water separator to help prevent this type of problem.
3. **Microbial contamination**—Microorganisms, primarily bacteria and fungi, exist harmlessly in moisture-free fuel. However, in the presence of water, these microorganisms can grow and reproduce at alarming rates. In turn, they can clog your fuel filter and prevent the generator from starting, or cause the generator to stall after it has started.
4. **Cetane number**—Cetane number is a measure of the starting and warm-up characteristics of a fuel. A minimum number of 40 is typically required for best results. However, when operating in cold temperatures, or in prolonged service with low loads, a cetane number of 45 is desirable. A cetane number that is too high can cause problems. For instance, fuel with a cetane number greater than 55 may cause an increase in torque peak smoke.
5. **Viscosity**—Viscosity is a measure of the fuel’s pumping and lubricating characteristics. Low viscosity causes rapid wear of the fuel pump and injectors. High viscosity causes hard starting, failures in the fuel injector train, and white smoke in cold temperatures.
6. **Fuel quality**—Using fuel that does not meet all of the fuel specifications may cause problems with the generator (see “Fuel specifications” on page 22).

Preventing potential problems with diesel fuel

The following suggestions should minimize or prevent diesel fuel problems from occurring, and increase the reliability of your generator.

1. Use only premium diesel fuel that is provided by a qualified diesel distributor.
2. If your generator is located in an environment with temperatures above 20°F (–7°C), only purchase ASTM D975 No. 2-D diesel fuel with a minimum cetane number of 40.
3. If your generator is located in an environment with temperatures below 20°F (–7°C), only purchase “Winter Blended” 50% ASTM D975 No. 1-D/ 30% No. 2-D diesel fuel with a minimum cetane number of 45.
4. If your generator is located in an environment with temperatures below –20°F (–29°C), use a fuel filter heater.



Note

ASTM D975 No. 1-D diesel fuel is less dense than ASTM No. 2-D diesel fuel, and has a lower paraffin wax content.

5. Keep the tank full to reduce the air space above the fuel, and have the generator’s fuel/water separator serviced annually.
6. Do not add new or used engine lubricating oil to the fuel. This could hinder performance.
7. Do not mix gasoline, gasohol, or alcohol with diesel fuel. This creates an extreme fire and explosive hazard.
8. Have the fuel tested for water content and microbial contamination at least annually, and whenever new fuel is added or your current fuel seems suspect.
 - If microbial contamination has occurred and been remedied, use Fleetguard’s Fleet-Tech™ Microbicide fuel additive to prevent the future growth of microorganisms.
 - If water in the fuel is a persistent problem, use Fleetguard’s Fleet-tech™ Winter Conditioner to prevent fuel line freeze-up.

Fuel specifications

When adding diesel fuel to your generator, be sure it adheres to the following specifications:

Viscosity	1.3 to 5.8 centistrokes (1.3 to 5.8 mm per second) at 104°F (40°C)
Cetane number	40 minimum above 32°F (0°C); 45 minimum below 32°F (0°C)
Sulfur content	Not to exceed 0.5 mass-percent
Active sulfur	Copper strip corrosion not to exceed Number 2 rating after three hours at 122°F (50°C)
Water and sediment	Not to exceed 0.5 volume-percent
Carbon residue	Not to exceed 0.35 mass-percent on 10 volume-percent residuum
Density	0.816 to 0.876 grams per cubic centimeter (g/cc) at 60°F (15°C)
Cloud point	Temperature at which paraffin crystals form. This should be 10°F (6°C) below the lowest ambient temperature at which the generator is expected to operate.
Ash	Not to exceed 0.02 mass-percent
Distillation	90 volume-percent at 680°F (360°C)
Lubricity (SLBOCLE or HFRR)	Minimum of 3100 grams SLBOCLE or maximum of 0.45 mm wear scar diameter at 140°F (60°C) HFRR

Fuel tank size

The fuel tank size for each generator model is as follows:

80 kW	125 kW	200 kW
70 gallons / 265 liters	173 gallons / 655 liters	173 gallons / 655 liters

Fuel monitoring/runtime calculation

Fuel monitoring is a unique feature of the InfraStruXure Power Generation System. Fuel level is monitored at the generator (if purchased through APC) and load is measured at the ATS. These measurements are used to calculate runtime, as explained in the following paragraph:

Fuel is monitored by a level sensor in the generator fuel tank (calibrated to the bottom of the tank) that changes readings every 1/2-inch of fuel-level change. From these fixed-level points, the ATS counts the number of gallons of fuel used (based on load over time) and subtracts this amount from the fixed-level fuel amount to provide an accurate estimate of fuel level. Runtime is then calculated based on the fuel-usage rate at the current load and the remaining fuel in the tank. Once a new fuel-level point is reached, the value of the calculated fuel used is reset and consumption begins again.

The **Fuel Level** and **Runtime Estimate** are displayed on the **Generator Status** screen on the ATS display interface. In addition, the following **Fuel Alarm Limits** (for which corresponding values can be set) are displayed in the **Alarms** menu:

Percent Fill: If the amount of fuel as a percentage falls below this set value, an alarm condition exists.

Runtime: If the estimated runtime falls below this set value, an alarm condition exists.

Generator runtimes and fuel consumption

The following table provides the *estimated* runtime for each generator model, based on the load capacity when using a full tank of diesel fuel.

Load Capacity	80 kW	125 kW	200 kW
At full load	12.0 hours	15.2 hours	12.0 hours
At 3/4 load	12.7 hours	19.9 hours	12.7 hours
At 1/2 load	18.4 hours	29.8 hours	18.4 hours
At 1/4 load	33.3 hours	59.6 hours	36.0 hours

The following table provides the *estimated* fuel consumption rate for each generator model, based on the load capacity.

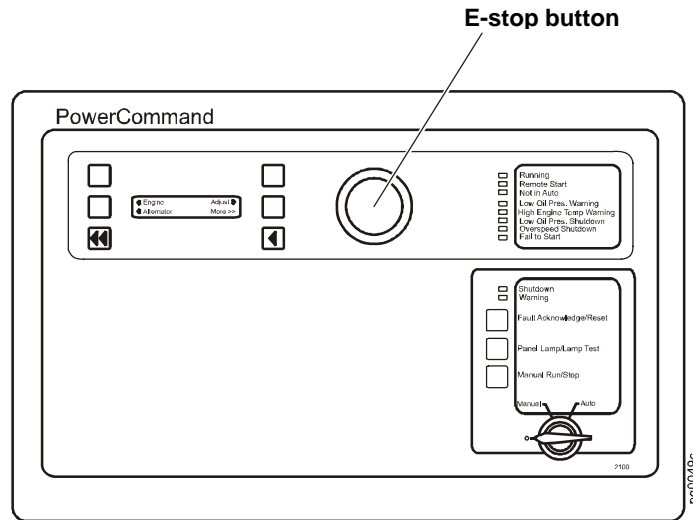
Load Capacity	80 kW	125 kW	200 kW
At full load	6.9 gal/hr	11.4 gal/hr	17.0 gal/hr
At 3/4 load	5.5 gal/hr	8.7 gal/hr	13.6 gal/hr
At 1/2 load	3.8 gal/hr	5.8 gal/hr	9.4 gal/hr
At 1/4 load	2.1 gal/hr	2.9 gal/hr	4.8 gal/hr

E-Stop Button

Overview

The E-stop button allows you to immediately stop generator operation in the event an emergency shutdown is required. After you have shut down the generator using the E-stop button, you cannot restart it — either at the generator or at the ATS — until you have reset the button.

The following illustration shows the location of the E-stop button on the generator control panel.



Note

When Emergency Power Off is performed at the ATS, the generator's E-stop button is automatically tripped. If this situation occurs, the E-stop button must be manually reset at the generator using the procedure described on the following page.

Stopping the generator using the E-stop button

Push the E-stop button to stop the generator.

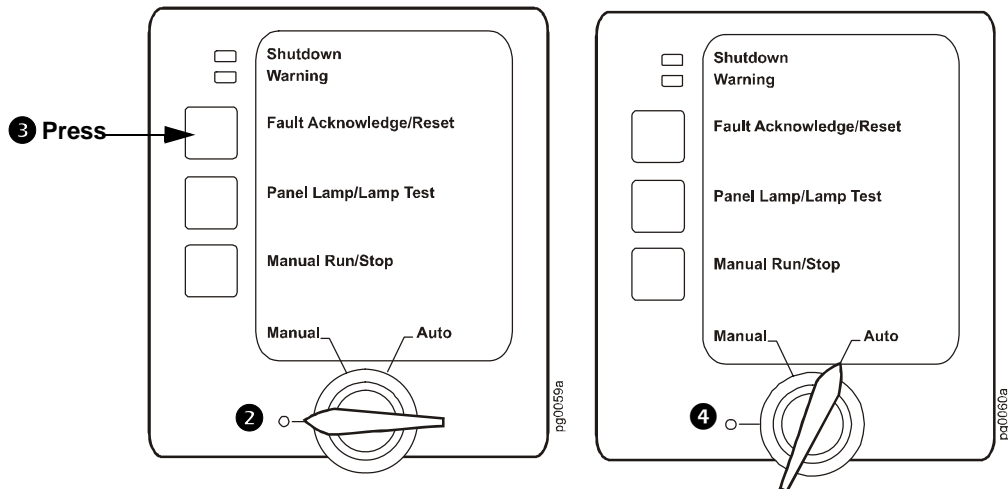
Resetting the E-stop button to return the generator to automatic operation



Note

After E-stop shutdown, the E-stop button can only be reset at the generator control panel. It cannot be reset at the ATS.

- ❶ Pull out the E-stop button.
- ❷ Turn the generator's **○/Manual/Auto** switch to the **○** position.
- ❸ Press the **Fault Acknowledge/Reset** button.
- ❹ Turn the **○/Manual/Auto** switch to the **Auto** position.



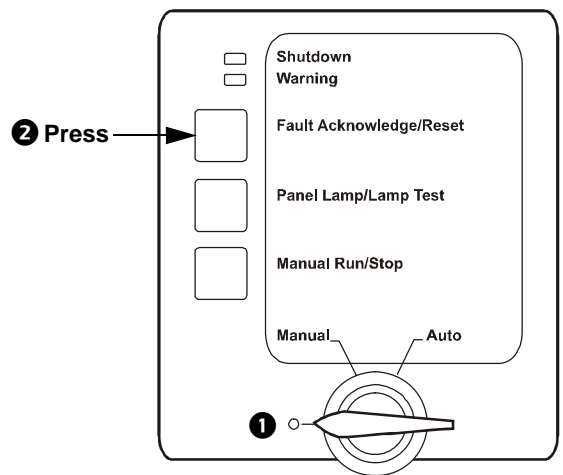
See also

To ensure your entire InfraStruXure Power Generation System is properly configured for automatic operation, refer to the “Operation” section of the *Operation Manual*. This section also explains how to start the generator locally, if necessary.

Clearing a Shutdown Fault

You cannot restart the generator when a shutdown fault lamp is lit, even if the fault has been cleared. Once you have corrected the fault, you must reset the shutdown indicators before the generator can restart. To reset the shutdown indicators:

- 1 Turn the **○/Manual/Auto** switch to the **○** position.
- 2 Press the **Fault Acknowledge/Reset** button.



With the exception of generator EPO and remote EPO shutdown faults, most shutdown faults, even if cleared, will occur again when the generator is restarted. For this reason, if a shutdown fault occurs, call APC customer support at a phone number listed on the back cover of this manual.

Battery



Caution

Battery servicing must be performed or supervised by personnel knowledgeable about working with batteries and of the safety precautions that must be closely observed throughout the process. Keep unauthorized personnel away from the battery.

Replacement battery



See “InfraStruXure Generator Components” on pages 7-9 for the location of the battery in your specific generator model.

When replacing the battery, use the same number and type of battery as the original. The 80 kW generators use a 12 V, 225 Ah, 1000 cold-cranking amps, sealed lead-acid battery. The 125 kW and 200 kW generators use a 12 V, 225 Ah, 1400 cold-cranking amps, sealed lead-acid battery.

Keeping the battery clean

You can prevent a buildup of dirt and corrosion by wiping the battery with a clean damp cloth. After you have finished cleaning, make sure the battery and its surrounding areas are dry.



Note

Use a solution consisting of 1/4 lb (0.11 kg) of baking soda with 1 quart (0.96 liters) of water to wipe the battery clean and neutralize any acid that is present.

Charging the battery

Your InfraStruXure generator is equipped with a battery charger that continuously charges the battery to ensure reliable operation.

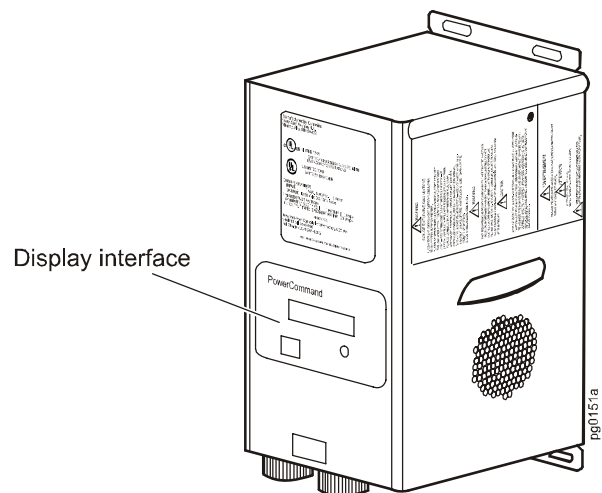


See “InfraStruXure Generator Components” on pages 7-9 for the location of the battery charger in your specific generator model.

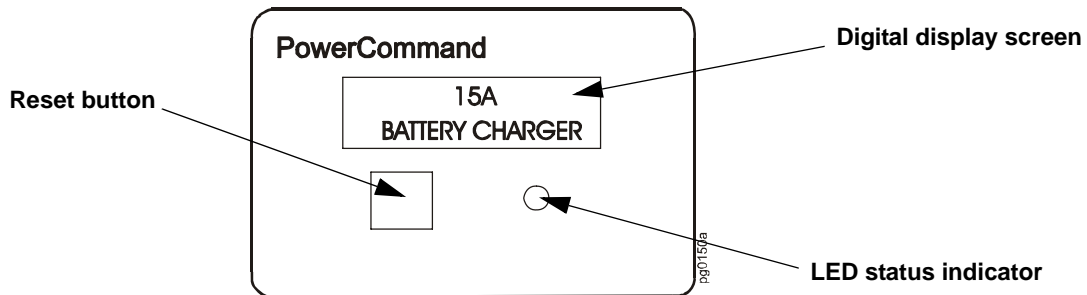


See also

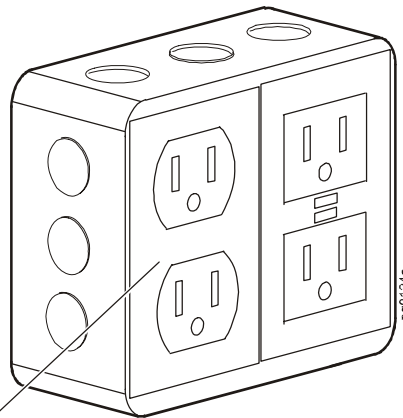
For more information about the battery charger, including installation instructions, refer to the *Battery Charger Kit Instruction Sheet* provided with your generator.



The battery charger's display interface provides a visual indication of whether the charger is operating properly. It also provides information about the status of your battery. The illustration at the bottom of the previous page shows the location of the display interface on the battery charger. The following illustration shows the display interface in greater detail.



If your battery charger is not operating properly, check to ensure the battery is connected and the charger is firmly plugged into one of the 120 VAC receptacles on the generator's outlet box (per the following illustration). If both of these connections are good but the charger still is not operating, call APC customer support at a number listed on the back cover of this manual.



Plug the battery charger into one of these two standard 120 V receptacles. Do not plug the charger into either of the GFCI receptacles.



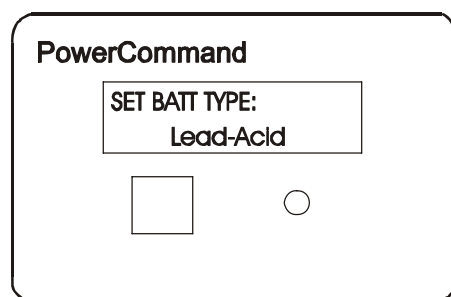
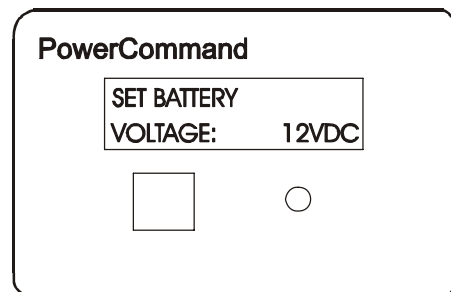
See "InfraStruXure Generator Components" on pages 7-9 for the location of the outlet box in your specific generator model.

Resetting the battery charger after disconnecting and reconnecting the battery

Whenever you reconnect the generator's battery after it has been disconnected, you must reset the battery charger through its display interface.

Complete the following steps to reset your battery charger:

1. After reconnecting the battery, the charger will prompt you to select the proper voltage. Using the **Reset** button on the display interface, toggle between the voltages to make the proper selection for your battery. Select **12 VDC**, and then press and hold the **Reset** button for two seconds to lock in your selection.
2. You will then be prompted for the battery type. Select **Lead-Acid**, and then press and hold the **Reset** button for two seconds to lock in your selection.
3. After making the above selection, the **Low Battery Voltage** indicator may flash momentarily. This is not an issue. Shortly thereafter, the indicator should change to “charge” mode.



Upon completion of these steps, the battery charger will return to its functional state.

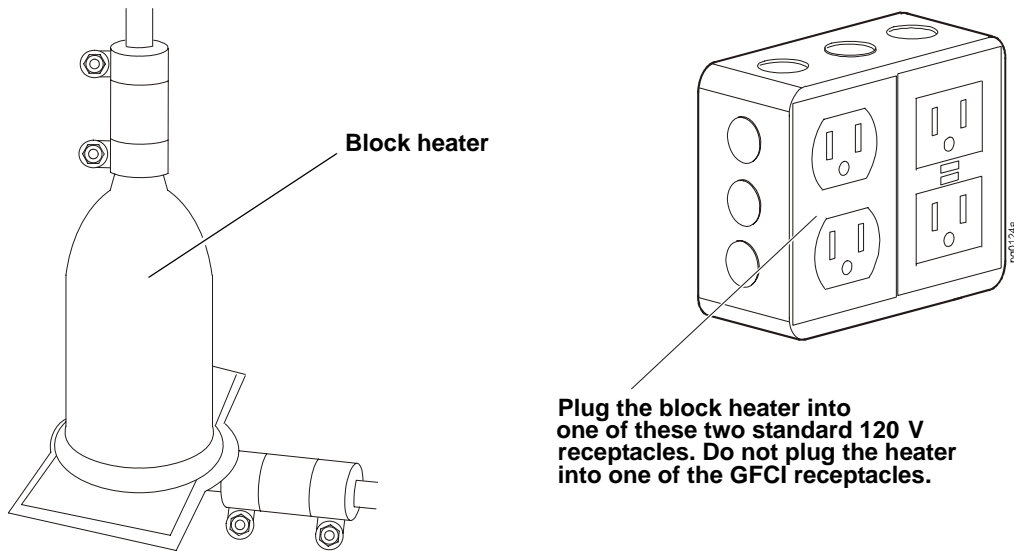
Block Heater

Checking the block heater

The block heater reduces wear on the generator's motor. This component should be plugged in at all times. Check the operation of the block heater by verifying that it is warming the coolant.

You can check the coolant's temperature at the ATS display interface by selecting **Engine Parameters** from the **Generator Status** menu on the **Generator** screen. The temperature should read about 100°F (38°C). If the temperature is too low, this will cause an alarm on the ATS.

You can also verify that the block heater is operating properly at the generator. The block heater should be warm to the touch. If the block heater is cool, check to ensure that it is properly plugged into one of the 120 VAC receptacles on the generator's outlet box (per the right-side illustration).



See "InfraStruXure Generator Components" on pages 7-9 for the location of the block heater and outlet box on your specific generator model.

Specifications

Electrical	80 kW	125 kW	200 kW
Output Power (kW/kVA)	80/100	125/156	200/250
Power Factor	1.0/0.8	1.0/0.8	1.0/0.8
Alternator	Brushless 4-pole drip proof revolving field, 12 lead with separately excited PMG		
Alternator Temperature Rise	257°F (125°C)	257°F (125°C)	221°F (105°C)
Alternator Insulation Class	Class H	Class H	Class H
Voltage (V)	120/208	120/208 or 277/480	120/208 or 277/480
Output Type	4W + G	3W + G or 4W + G	3W + G or 4W + G
Frequency	60 Hz	60 Hz	60 Hz
Battery Charger Output	15 A at 12 V	15 A at 12 V	15 A at 12 V
Battery Charger Input	120 V at 200 W	120 V at 200 W	120 V at 200 W
Coolant Heater	120 V at 1125/1500 W	120 V at 1125/1500 W	120 V at 1125/1500 W

Physical	80 kW	125 kW	200 kW
Dimensions			
Height	83.9 in/2131 mm	98.4 in/2499 mm	98.4 in/2499 mm
Width	40.0 in/1016 mm	40.0 in/1016 mm	40.0 in/1016 mm
Length	82.8 in/2103 mm	108.0 in/2743 mm	108.0 in/2743 mm
Shipping Dimensions			
Height	89.0 in/2261 mm	103.5 in/2629 mm	103.5 in/2629 mm
Width	46.0 in/1168 mm	46.0 in/1168 mm	46.0 in/1168 mm
Length	93.0 in/2362 mm	118.0 in/2997 mm	118.0 in/2997 mm
Weight			
Generator	3294 lb/1494 kg	5109 lb/2317 kg	5311 lb/2409 kg
Maximum Shipping	3384 lb/1535 kg	5624 lb/2551 kg	5726 lb/2597 kg

Environmental	80 kW	125 kW	200 kW
Operating Temperature	-22 to +104°F (-30 to +40°C)	-22 to +104°F (-30 to +40°C)	-22 to +104°F (-30 to +40°C)
Operating Relative Humidity	5 to 100% RH	5 to 100% RH	5 to 100% RH
Operating Elevation	12,800 ft/3900 m	12,800 ft/3900 m	12,800 ft/3900 m
Thermal Dissipation (full load)	3350 BTU/min	5603 BTU/min	5603 BTU/min
Average Audible Noise Emission	75 dbA at 7 m	75 dbA at 7 m	75 dbA at 7 m

Mechanical	80 kW	125 kW	200 kW
Enclosure	Outdoor weather, lockable (all models)		
Max Audible Noise Emission	86.3 dbA @ 7 m	88.9 dbA @ 7 m	88.9 dbA @ 7 m
Tank Type	Double wall steel base tank with leak detection (all models)		
Fuel Type	Diesel	Diesel	Diesel
Tank Size	70 gal/265 L	173 gal/655 L	173 gal/655 L
Engine Output	145 bhp	364 bhp	364 bhp
Engine Type	4-cycle industrial diesel, turbocharged, QSB5-G3NR3	4-cycle industrial diesel, turbocharged & aftercooled, QSL9-G2	4-cycle industrial diesel, turbocharged & charged-air cooled, QSL9-G2
Engine Lube Oil Capacity	11.6 qt/11.0 L	28.0 qt/26.5 L	28.0 qt/26.5 L
Combustion Air	320 scfm	725 scfm	725 scfm
Engine Cooling	Water 50%/Glycol 50%	Water 50%/Glycol 50%	Water 50%/Glycol 50%
Coolant Capacity	4.5 gal/17.0 L	7.8 gal/29.5 L	7.8 gal/29.5 L
Generator Cooling	Forced Air	Forced Air	Forced Air
Radiator Cooling Air	6675 scfm	9187 scfm	9187 scfm
Max Static Cooling Air Restriction	0.5 H ₂ O	0.5 H ₂ O	0.5 H ₂ O
Expected Life	25 year / 4,000-6,000 hours operation (all models)		
Compliance			
Approvals	UL, cUL 2200, Tier 3 EPA Emissions certified		



Note

Monthly **Load** tests will begin following the first occurrence of the **Gen Start** test.

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APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to access documents in the APC Knowledge Base and to submit customer support requests.
 - **www.apc.com** (Corporate Headquarters)
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - **www.apc.com/support/**
Global support searching APC Knowledge Base and using e-support.
- Contact an APC Customer Support center by telephone or e-mail.
 - Regional centers

Direct InfraStruXure Customer Support Line	(1)(877)537-0607 (toll free)
APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702000 (Ireland)
Japan	(0) 35434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

- Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

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