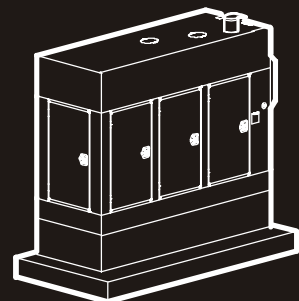




InfraStruXure Generator

InfraStruXure Power
Generation System

Reference Manual



About This Manual

Audience

This manual is intended for end-users of an InfraStruXure Power Generation System generator. It provides important safety warnings and instructions, an overview of generator components, technical specifications, and warranty information.

Companion manuals

For additional information about the generator and the InfraStruXure Power Generation System, see the following InfraStruXure Power Generation System manuals:

- ATS with Power Distribution Unpacking Sheet (990-1842)
- Electrical Installation Manual (990-1844)
- ATS with Power Distribution Operation Manual (990-1845)
- Network Management Interface User's Guide (available on the *Utility* CD) (990-1993)

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

- Installation Manual
- Operator's Manual
- Operation and Maintenance Manual
- Parts Catalogs
- Operator's Manual—12 and 24 V Battery Charger
- Installation and Service Manual—12 and 24 V Battery Charger

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). In the list of **InfraStruXure Power Generation** manuals, look for the latest letter revision (A, B, etc.) of the part number on the back cover of this manual.

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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

The components in the InfraStruXure Power Generation System and UPS power distribution 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.

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*—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's 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 and municipal water for cooling. *Emergency* and *Legally-Required Systems* require 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 re-fueled for a minimum of six hours, and should run for a minimum of 12 hours.

Fuel and fumes are flammable

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

- DO NOT fill fuel tanks while engine is running, unless tanks are outside the engine compartment. Fuel contact with 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 and areas where individuals are likely to congregate.
- Ensure that the unit is well ventilated.
- Engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

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 battery charger from its AC source, then disconnect starting batteries, negative (–) cable first. This will prevent accidental starting.
- Make sure that fasteners on the generator are secure. Tighten supports and clamps, 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 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 over speed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. Do not operate a generator where a flammable vapor environment can be created by 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.

Electric shock can cause severe personal injury or death

- Remove 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 allow skin surface to be damp when handling electrical equipment. Do not wear jewelry—jewelry 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 GENERATOR DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. CONNECT ONLY TO THE AUTOMATIC TRANSFER SWITCH.

General safety precautions

- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator heat exchanger pressure cap while the engine is running or hot. Allow the generator to cool and bleed the system pressure first.
- Used engine oils have been identified by some state and federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest oil, breathe the fumes, or contact used oil.
- Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth; Class B fires, combustible and flammable liquid fuels and gaseous fuels; Class C fires, live electrical equipment (ref. NFPA No. 10).
- Make sure that rags are not left on or near the engine.
- Make sure generator is mounted in a manner to prevent combustible materials from accumulating under the unit.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and engine damage which present a potential fire hazard.
- Keep the generator and the surrounding area clean and free from obstructions. Remove any debris from the set 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.
- Substances in exhaust gases have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Take care not to breathe, ingest, or come into contact with exhaust gases.

- 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 radiator, turbo charger, and exhaust system.

Caution—batteries

- Servicing of batteries is to be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from the batteries.
- When replacing batteries, use the same number and the following type of batteries: 12 V, 225 A, 1400 cold cranking amps, sealed lead acid.
- Do not dispose of batteries in a fire. The battery is capable of exploding.
- Do not open or mutilate the batteries. 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 are to 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 batteries.
- The electrolyte is a diluted sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following procedures are to be observed:
 - Wear full eye protection and protective clothing.
 - Where 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 is to be washed down with an acid neutralizing agent. A common practice is to use a solution of one pound (500 grams) bicarbonate of soda to one gallon (4 liters) of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.

Warnings

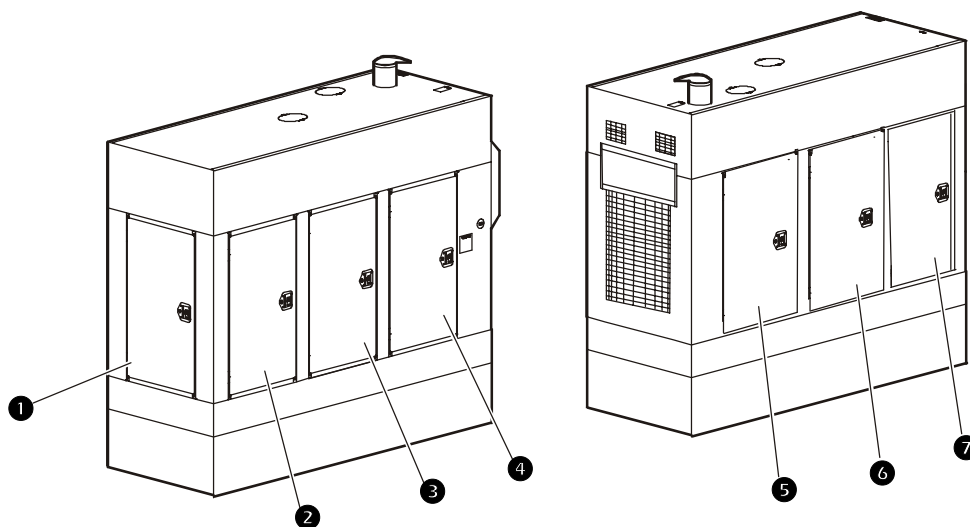
- Lead-acid batteries present a risk of fire because they generate hydrogen gas. The following precautions are to be followed:
 - DO NOT SMOKE near batteries.
 - DO NOT cause flame or spark in battery area.
 - Discharge static electricity from body before touching batteries by first touching a grounded metal surface.

InfraStruXure Generator Components

Overview

The seven doors of the generator provide access to the different engine components for service and maintenance. This section lists the parts found behind each door for the three different generator models.

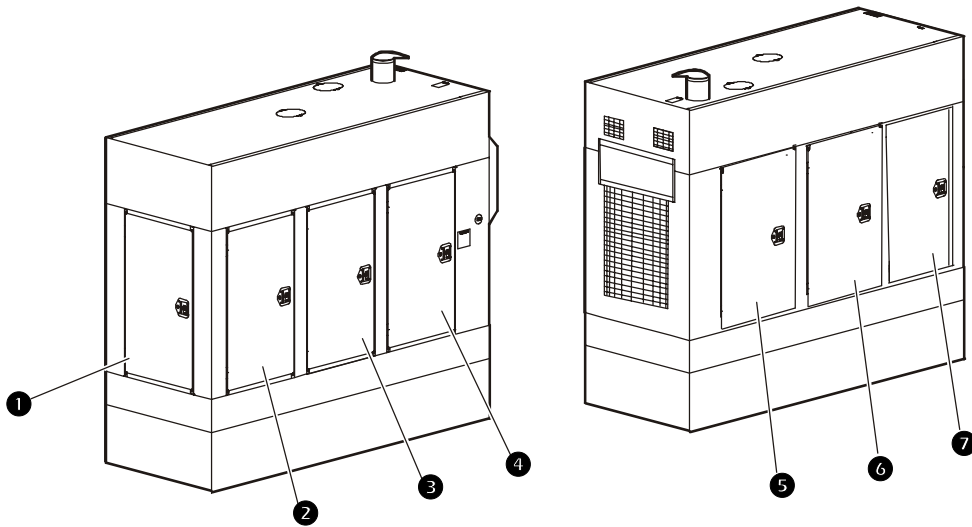
80kW InfraStruXure Generator



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

* The 120VAC outlet box also has two (2) GFCI receptacles. These receptacles are for customer use and should not have the battery charger or the block heater connected to them.

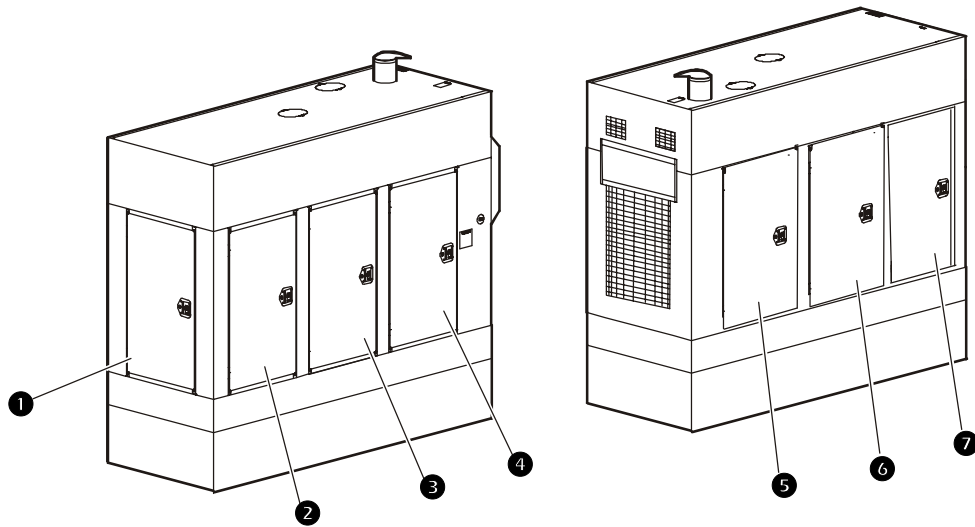
125kW InfraStruXure Generator



- ❶ Generator controller, battery charger
- ❷ Door not used for engine access in this model generator
- ❸ Oil drain point, oil level sensor, block heater, air filter change indicator, 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 120VAC outlet box also has two (2) GFCI receptacles. These receptacles are for customer use and should not have the battery charger or the block heater connected to them.

200kW InfraStruXure Generator

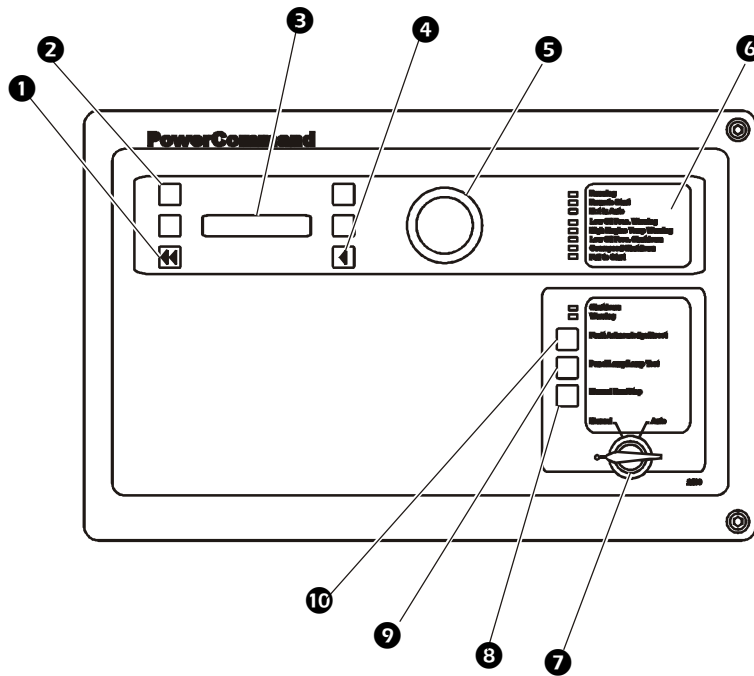


- ❶ Generator controller, battery charger
- ❷ Door not used for engine access in this model
- ❸ Oil dipstick, 120VAC outlet box *
- ❹ Turbo charger, block heater, oil filter, coolant filter
- ❺ Fuel pump, oil drain point, coolant overflow receptacle
- ❻ Oil fill point, fuel sensor, visual fuel gauge,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

* The 120VAC outlet box also has two (2) GFCI receptacles. These receptacles are for customer use and should not have the battery charger or the block heater connected to them.

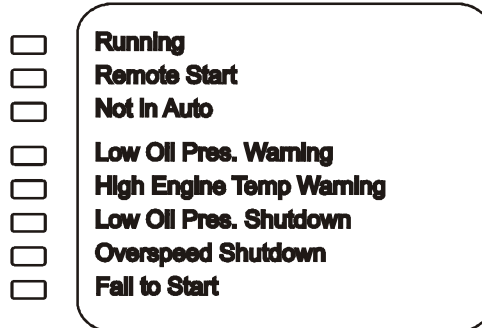
Generator Control Panel

The generator's control panel connects to the ATS monitoring unit for communication purposes. At the generator controller you can clear alarms, perform an emergency stop of the system, clear a shutdown fault, and manually start the generator. The following illustration shows the InfraStruXure Generator's control panel.



- ❶ The **home** button brings you back to the main menu screen from any other screen.
- ❷ The **menu selection** button allows you to step through the various menu items and adjust parameters.
- ❸ The **digital display** allows you to view menus, faults, and shutdown messages. An asterisk (*) before a listed fault indicates that it is an active fault.
- ❹ The **previous main menu** button brings you to the previously viewed main menu.
- ❺ The **E-stop** button allows you to perform an emergency shutdown of the generator set. For more information, refer to “E-Stop Button” on page 23.
- ❻ The generator's **indicator lights** provide a visual indication of the generator status and any warnings present. For more information, refer to “Indicator lights” on page 11.
- ❼ The generator's **○/Manual/Auto** switch should be in the **Auto** position when the InfraStruXure Power Generation System is running in automatic operation and should be in **Manual** when the generator must be started manually.
- ❽ The **manual run/stop** button starts and stops the generator set locally. The **○/Manual/Auto** switch must be in **Manual** to enable this button.
- ❾ The **panel lamp and lamp test** button allows you to test all panel LEDs and to turn the control panel lamps ON or OFF.
- ❿ The **fault acknowledge/reset** button allows you to clear faults once they have been corrected.

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



Indicator Light	Color	Description
Running	Green	Indicates that the generator is running.
Remote Start	Green	Indicates that 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 that oil pressure is lower than the normal range of operation.
High Engine Temp	Yellow	Indicates the engine temperature is higher than normal range of operation.
Low Oil Pres. Shutdown	Red	Indicates that the engine has shut down due to low oil pressure.
Overspeed Shutdown	Red	Indicates that the engine has shut down because of excessive speed.
Fail to Start	Red	Indicates that the engine has failed to start.

How to clear a shutdown fault.



See “Clearing a Shutdown Fault” on page 25 for instructions.

How to manually start the generator.



See also

For detailed directions on how to start the InfraStruXure Power Generation System manually, refer to the *ATS with Power Distribution Operation* manual (990-1845).

Special Features of Diesel Generators

Differences between diesel engines and gas engines

Before operating the generator it is important to be aware of the differences between diesel engines and gasoline engines. Some of the most notable differences between the two are:

- Diesel engines do not have spark plugs. Unlike a gas engine, a diesel engine takes in air, compresses it, and then injects the fuel into the compressed air. The heat of the compressed air spontaneously lights the fuel.
- Do not let your diesel engine run out of fuel. A diesel engine may not restart when refilled if it runs out of fuel. To avoid this situation, ensure that your generator's fuel never reaches below a half a tank.
- Diesel engines run more efficiently when they are loaded. Always attempt to run the generator with a 30% load or higher. Diesel engines burn less fuel per watt generated if they are generating near their full potential.
- Diesel engines do not regulate the intake air, but rather, they regulate the amount of fuel injected to the cylinders. Unlike gasoline engines which run best at a fixed air/fuel ratio, diesel engines run with essentially the same air, but add more fuel when they require more power.

Maintenance Overview

You should establish and follow a maintenance schedule that works with your particular application and its environment. APC recommends quarterly service visits for generator maintenance. If the InfraStruXure Power Generation System will be subjected to extreme operating conditions, reduce the service intervals accordingly. The following factors may affect the maintenance schedule:

- 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



Note

This manual outlines the basics of generator maintenance. In most cases, the required maintenance will be covered by a service contract purchased with your InfraStruXure generator. For full instructions on how to perform the procedures outlined in this manual, refer to the Cummins Engine *Operation and Maintenance Manual* included with your generator.

Maintenance Checkpoints

The following maintenance items should be completed during your scheduled maintenance visit:

- Check coolant heater
- Check coolant level
- Check oil level
- Check fuel level
- Check charge air piping
- Check air cleaner (clean, if required)
- Check battery charging system
- Drain water and sediment from fuel tank
- Drain exhaust condensate trap
- Change air cleaner element
- Check radiator hoses for water and cracks
- Drain fuel filters
- Check anti-freeze and DCA concentration
- Check crankcase oil and filter
- Check drive belt tension
- Change coolant filter
- Change fuel filters
- Clean cooling system
- Adjust valve lash
- Check starting batteries

Oil

Oil Type

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

Oil capacity

The oil capacity of the generator is as follows:

80kW and 125kW generators

17.3 quarts (16.4 liters)

200kW generators

25.2 quarts (24 liters)

Engine oil level



Do not check the oil level at the generator while it is running as it may cause oil to be dispersed and could cause severe burns.

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

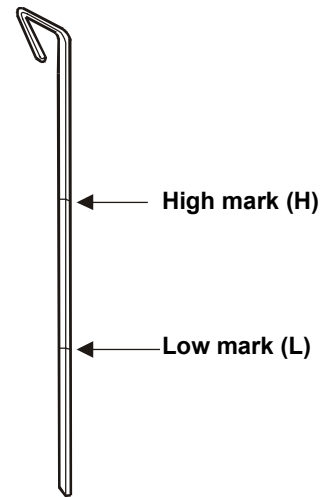
Checking the oil level at the ATS. For convenience, you can check the oil level through the ATS display interface. To check the oil using this method, select **Generator Status** and then **Engine Parameters** from the **Generator** screen.



See also

For more information about the Generator screen on the ATS, see “Generator” under the “Display Interface” chapter of the *ATS with Power Distribution Operation* manual.

Checking the oil level at the generator. If checking the oil level at the generator, make sure that the oil level is as close to the high mark on the dipstick as possible without exceeding it. Do not operate the generator if the oil level is above the high mark on the dipstick or below the low mark. Refer to “InfraStruXure Generator Components” on page 7 for the location of the oil dipstick for your specific generator model.



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

Replacing the oil filter

Your InfraStruXure Power Generation System’s generator has a six cylinder engine. Refer to the following table for the type of replacement filter that you will need for your particular application:

Type of application	Type of filter
80kW or 125kW generator	Fleetguard LF3349 or equivalent
200kW generator	Fleetguard LF3000 or equivalent

To replace the generator’s oil filter:

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



The LF3000 oil filter has two gaskets. Lubricate both of the gaskets.

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

Changing the oil



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 as to proper handling of used oil.



For detailed instructions on changing your generator’s oil, refer to the Cummins Engine *Operation and Maintenance* manual included with your generator.

Coolant

Overview

The diesel engine of the generator requires a balanced coolant mixture of water, antifreeze, and coolant additives. You can check the coolant level of your generator through the ATS display interface. To check the coolant level using this method, select **Generator Status** and then **Engine Parameters** from the **Generator** screen.



See also

For more information about the Generator screen on the ATS, see “Generator” under the “Display Interface” chapter of the *ATS with Power Distribution Operation* manual.

Coolant type

Use a low silicate antifreeze that meets ASTM4985 test criteria.

It is recommended that you use an antifreeze with a 50-percent concentration level of ethylene glycol or propylene glycol in most climates. The following table provides specifications for the antifreeze protection that you need according to the climate that your generator is operating in:

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 the generator is as follows:

80kW = 6.5 gallons (24.6 liters)

125kW = 8.2 gallons (31.0 liters)

200kW = 6.8 gallons (25.7 liters)

Draining, cleaning, flushing, and refilling the coolant system



Caution

Do not add cold coolant to a hot engine. To prevent damage, allow the engine to cool to 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 as to proper handling of used antifreeze.



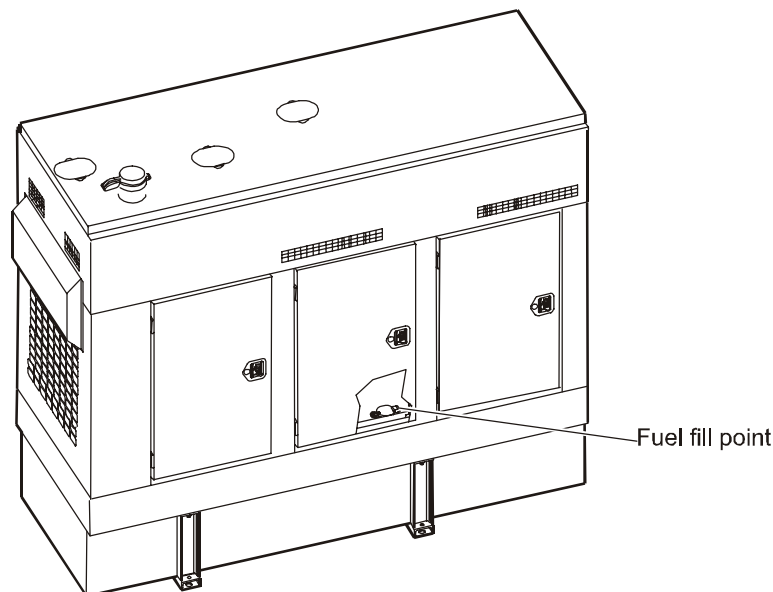
See also

For instructions on how to perform maintenance on the generator's cooling system, including changing or refilling the generator's coolant, refer to the Cummins Engine *Operation and Maintenance* manual included with your generator.

Fuel

Overview

The InfraStruXure generator runs on diesel fuel. The 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 in the tank for an extended period of time. Diesel fuel that sits unused for a period of time can present problems. This section describes some of the problems that may occur and offers recommendations for preventing these problems. Adhere to the recommendations provided in this section to increase the probability of reliable operation for your generator.



See also

Refer to the Cummins Engine *Operation and Maintenance* manual for complete fuel system maintenance instructions.

Problems with diesel fuel

The following list addresses some issues that can lead to problems with diesel fuel especially when it will be sitting in a standby state for an extended period of time.

1. **Temperature**—Diesel fuel naturally contains paraffin wax. In warm temperatures this wax is in a liquid state and is suspended throughout the fuel. When the temperature drops below 20° F (–7°C), the wax crystallizes causing the fuel to cloud up. These wax crystals can clog your fuel filter and can prevent the generator from starting, or 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 gel, turning the fuel into the consistency of jelly. If this occurs, the fuel pump will not be able to draw the fuel, and the generator will not start.

2. **Water**—Water can enter the fuel system through either the fuel itself or through condensation of the moisture normally in the air above the fuel. Water in diesel fuel is normally present as both free and emulsified water. Free water settles to the bottom of the fuel tank. Emulsified water stays suspended in the fuel, the way that oil and vinegar separate in salad dressing, and can enter the fuel lines, fuel pump, and injectors. From there it can cause corrosion and failure of the fuel pump and injectors. In addition, emulsified water can freeze at low temperatures and the resulting ice crystals can clog the fuel filter. This clog can prevent the generator from starting or cause the generator to stall after it has started.
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. 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 required. In cold weather, or in service with prolonged low loads, a cetane number of 45 is desired. Fuel with a cetane number greater than 55 may cause increased 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, white smoke when cold, and failures of the fuel injector train.
6. **Fuel quality**—Use of fuel that does not meet all of the fuel specifications may cause problems with the generator. See “Fuel specifications” on page 21 for generator-specific specifications.

Preventing potential problems with diesel fuel

Follow these suggestions to help prevent any of the potential diesel fuel problems and help ensure your generator’s reliability.

1. Only purchase premium diesel fuel from a qualified diesel distributor.
2. If the generator is located in an environment with temperatures 20°F (–7°C) and above, only purchase ASTM D975 No. 2-D diesel fuel with a minimum cetane number of 40.
3. If the 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 with a minimum cetane number of 45.
4. If the generator is located in an environment with temperatures below –20°F (–29°C), a fuel filter heater is required.



Note

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

5. Fuel must be dry. Keep the fuel tank full to reduce the air space above the fuel in the tank. Have the generator's fuel filter/water separator serviced annually.
6. Do not add new or used engine lubricating oil to the fuel as it could reduce engine performance.
7. Do not mix gasoline, gasohol, or alcohol with diesel fuel as it creates an extreme fire and explosive hazard.
8. Have the fuel tested for water content and microbial contamination, at least annually, or when new fuel is added or fuel is suspect.
 - If microbial contamination has occurred, after it has 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, Fleetguard's Fleet-tech™ Winter Conditioner can be used to prevent fuel line freeze-up.

Fuel specifications

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

Viscosity	1.3 to 5.8 centistrokes (1.3 to 5.8mm 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 3 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. Should be 10°F (6°C) below 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 0.45mm wear scar diameter at 140°F (60°C) HFRR

Fuel tank size

For the 80kW and 125kW generator, the fuel tank size is 109 gallons (413 liters). For the 200kW generator, the fuel tank size is 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 fuel tank) that changes readings every 1/2-inch of fuel level change. From these fixed level points, the ATS counts the number of gallons or liters of fuel used (based on load over time) and subtracts this from the fixed level fuel amount to give an accurate estimate of fuel level. The remaining 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 the consumption begins again.

The **Fuel Level** and **Runtime Estimate** are displayed on the **Generator Status** screen on the ATS display interface, and you can set the following **Fuel Alarm Limits** in the **Alarms** menu of the display interface:

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

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

Generator runtimes and fuel consumption

The following table provides the estimated runtime of the generator based on the load capacity when there is a full tank of diesel fuel.

Load Capacity	80kW	125kW	200kW
At full load	12 hours	12 hours	12 hours
At 3/4 load	22.7 hours	14.5 hours	17.3 hours
At 1/2 load	31.1 hours	19.8 hours	23.7 hours
At 1/4 load	47.4 hours	33.0 hours	37.6 hours

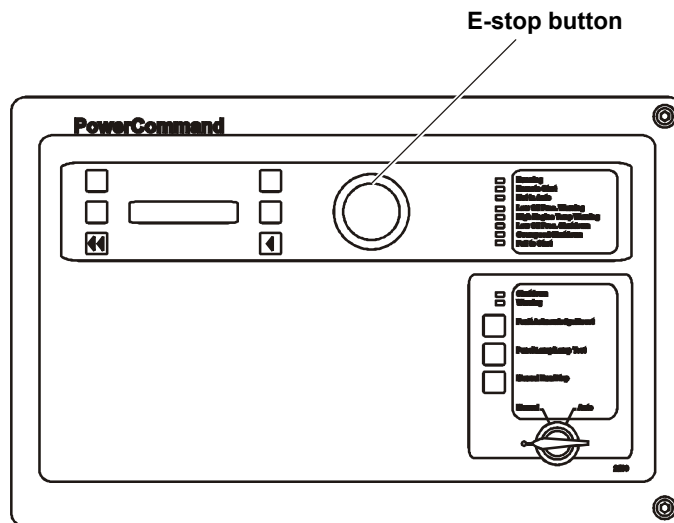
The following table provides the fuel consumption of the generator based on the load capacity.

Load Capacity	80kW	125kW	200kW
At full load	6.1 gal/hr	9.5 gal/hr	17.3 gal/hr
At 3/4 load	4.8 gal/hr	7.5 gal/hr	11.8 gal/hr
At 1/2 load	3.5 gal/hr	5.5 gal/hr	7.8 gal/hr
At 1/4 load	2.3 gal/hr	3.3 gal/hr	4.3 gal/hr

E-Stop Button

Overview

The E-stop button allows you to immediately stop the generator in the event that it requires an emergency shutdown. After the generator is shut down using the E-stop button, it cannot be started either at the generator or at the ATS until the button has been reset. The following illustration shows the location of the E-stop button located on the generator controller.



If an emergency power off is performed at the ATS, it will automatically trip the E-stop button of the generator. 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

To stop the generator using the E-stop button, push it in.

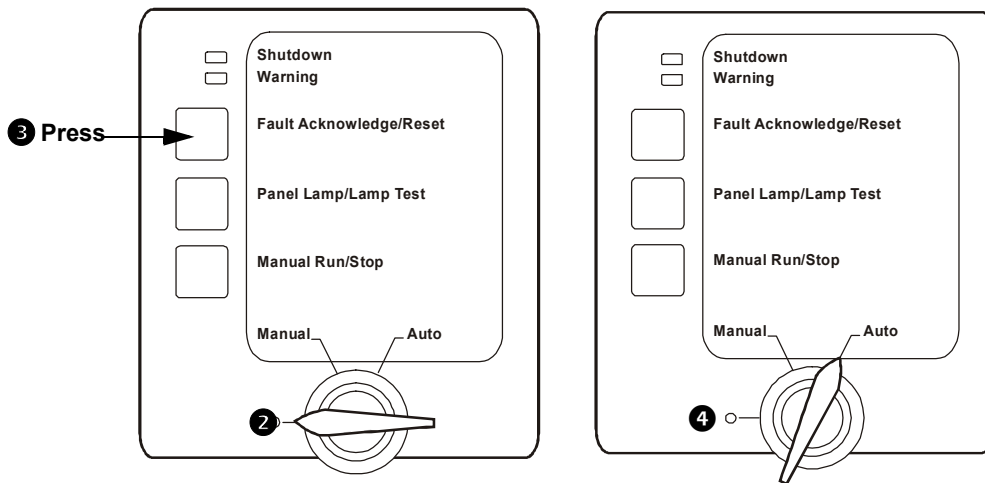
Resetting the E-stop button to return the generator to automatic operation



Note

E-stop shutdown status can only be reset at the generator control panel.

- 1 Pull the emergency stop button out.
- 2 Turn the generator's **Manual/Auto** switch to **Manual**.
- 3 Press the front panel **Fault Acknowledge/Reset** button.
- 4 Place the **Manual/Auto** switch on the generator controller to the **Auto** position.



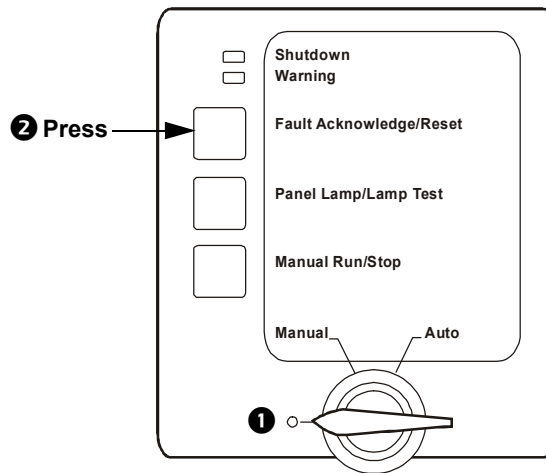
See also

To ensure that your entire InfraStruXure Power Generation System is configured correctly to run in automatic operation, see the “Operation” section of the *ATS with Power Distribution Operation* manual. This section also provides instructions on how to start the generator locally in the event that it is 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 customer service at a phone number listed on the back of this manual for assistance.

Batteries



See also

For more information on charging and replacing the generator's batteries, refer to the *Battery Charger Operator's Manual* that came with your generator.



Caution

Servicing of batteries must be performed or supervised by a person knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from the batteries.

Replacement battery type

When replacing generator batteries, be sure to use the same number and type of battery as the original. The generator uses 12V, 225A, 1400 cold cranking amps, sealed lead acid batteries.

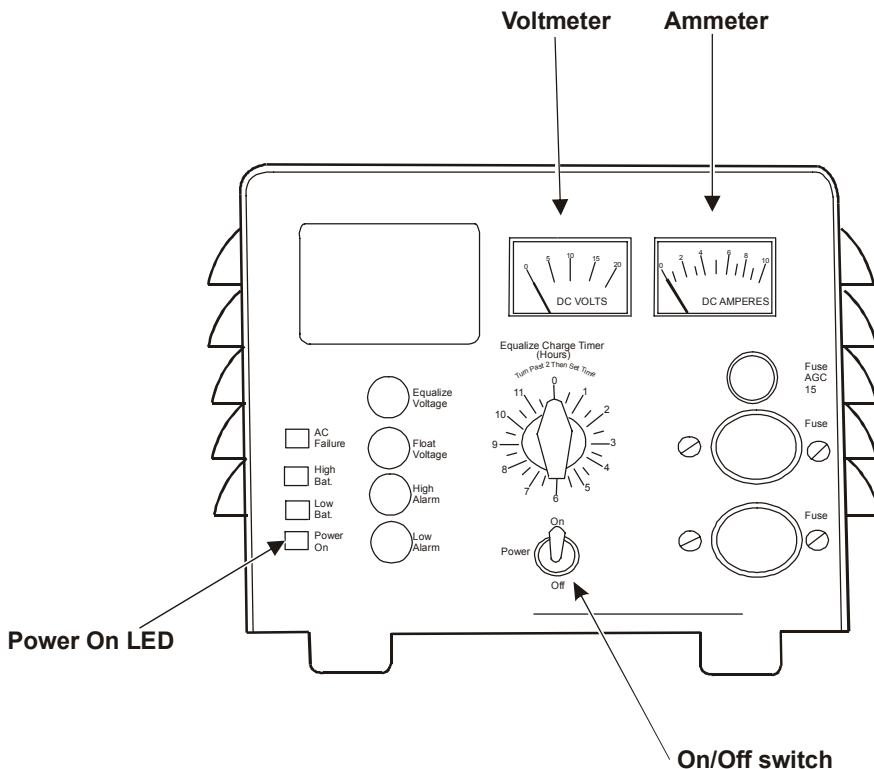
Keeping the batteries clean

Ensure that the batteries remain clean by wiping them with a damp cloth whenever dirt appears excessive.

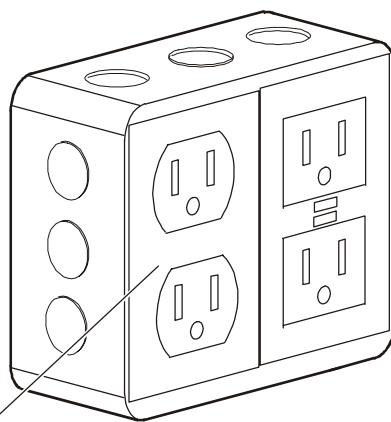
Charging the batteries

The InfraStruXure generator is equipped with a battery charger to continuously charge the batteries and ensure reliable operation. Refer to "InfraStruXure Generator Components" on page 7 for the location of the battery charger on your InfraStruXure generator model. You can tell if your generator's batteries are charging by looking at the battery charger. If the battery charger is charging the batteries correctly, the green **Power On** LED will be lit. In addition, the voltmeter will indicate the voltage at the battery and the DC ammeter will show the charger output current, which should be between 0 and 2 amperes when the battery is at its float voltage. The illustration on the following page shows battery charger and the location of these items.

For proper operation, the **On/Off** switch of the battery charger should always be in the **On** position, unless you are installing or replacing the batteries. If you are installing or replacing the batteries, ensure that the battery charger's **On/Off** switch is in the **Off** position. The illustration on the following page shows the location of the **On/Off** switch on the generator's battery charger.



Ensure that the battery charger is plugged in to one of the 120 VAC receptacles on the generator. If the **On/Off** switch is in the **On** position, but the batteries are not charging, check that the charger is plugged into the correct receptacle. The following illustration shows the proper receptacle for the battery charger. If the charger is plugged in to the correct outlet and the **On/Off** switch is switched to **On**, but the batteries are still not charging, call customer service at a number listed on the back of this manual.



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

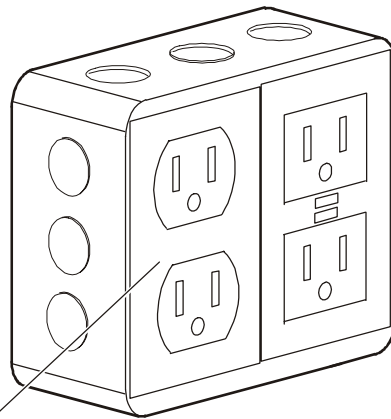


For more information on the location of the outlet box, see “InfraStruXure Generator Components” on page 7.

Block Heater

Checking the block heater

The block heater reduces wear of the generator's motor and should be plugged in at all times. Check the operation of the block heater by verifying that it is warming the coolant. If the block heater is not working, it will cause an alarm on the ATS indicating that the engine temperature is too low. If this alarm occurs, check that the block heater is operating correctly. At the generator, feel the block heater with your hand. If it is warm to the touch then it is operational. If the block heater is cool to the touch and should be running, check to ensure that it is properly plugged in to one of the 120VAC receptacles on the generator's outlet box.



Plug the block heater into one of these two standard 120V receptacles. Do not plug the heater into one of the GFCI receptacles.



Refer to “InfraStruXure Generator Components” on page 7 for the location of your generator's block heater and outlet box.

Specifications

Electrical	80kW	125kW	200kW
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	120V/208V	120V/208V or 277V/480V	120V/208V or 277V/480V
Output Type	4W + G	4W + G (208V) 3W + G or 4W + G (480V)	4W + G (208V) 3W + G or 4W + G (480V)
Frequency	60Hz	60Hz	60Hz
Battery Charger Output	10A at 12V	10A at 12V	10A at 12V
Battery Charger Input	120V at 200W	120V at 200W	120V at 200W
Coolant Heater	120V at 1125/1500W	120V at 1125/1500W	120V at 1125/1500W

Physical	80kW	125kW	200kW
Dimensions (H × W × D)			
Generator	93.2 × 40.0 × 108 in (2367 × 1016 × 2743 mm)		98.4 × 40 × 108 in (2499 × 1016 × 2743 mm)
Shipping	98 × 46 × 118 in (2489 × 1168 × 2997 mm)		103.5 × 46 × 118 in (2629 × 1168 × 2997 mm)
Weight			
Generator	4210lb (1914kg)	4160lb (1891kg)	5259lb (2390kg)
Shipping	4300lb (1955kg)	4500lb (2045kg)	5675lb (2580kg)

Environmental	80kW	125kW	200kW
Operating Temperature	-22 to -40° 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 (3900m)	12,800 ft (3900m)	12,800 ft (3900m)
Thermal Dissipation (full load)	1386BTU/min	1330BTU/min	2680BTU/min
Audible Noise Emission	75 dbA at 7m	75 dbA at 7m	75 dbA at 7m

Compliance

Approvals	UL, cUL 2200, Tier 2 EPA Emissions certified
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Warranty

APC warrants that all components of the InfraStruXure system will be free from defect in material and workmanship for a period of two years from the date of start up when start up has been performed by APC authorized service personnel*. If assembly services are included in the original purchase and are also performed by APC authorized service personnel, APC offers an additional year of parts warranty and the first year of on site coverage at no additional charge. In the event that the system fails to meet the forgoing warranty, APC shall repair or replace, at its sole discretion, any such defective parts. Under this warranty, APC will ship all parts to your site at no cost to be available for you the next business day after APC is notified of this requirement. If you choose to upgrade the system to include an on site contract, APC offers modular service packages to match your needs.

Each point product incorporated into the system has a separate factory warranty that is applied when sold as a standalone unit. When incorporated into an InfraStruXure solution, the unit will be covered by the InfraStruXure warranty. In cases where one warranty favors the customer over the other, the stronger of the two warranties will take precedence. The InfraStruXure factory warranty covers only those parts appearing on the bill of materials for that solution. Megawatt UPS systems are not covered under the InfraStruXure factory warranty.

Battery functionality is typically impacted by age and environmental conditions, and therefore certain requirements must be met by the end-user. Failure to adhere to these requirements may put the battery warranty at risk. APC-supplied batteries must always be kept (whether stored or installed) in a climate-controlled environment, and should be re-charged at a minimum of every three (3) months. The battery environment must be free of excessive moisture, construction dirt, corrosive elements, or other contaminants. The temperature range must be maintained at 41 to 95° F (5 to 35° C).

*All warranties are null and void unless startup is performed by authorized an APC Global Services service center.

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- a. The UPS system will be configured in a manner that will provide N+1 power redundancy to the critical load,
- b. The end-user customer assumes all risks and signs the *APC System Configuration and Use Form*, and
- c. The customer and operators of the APC UPS system agree to indemnify and hold APC and its affiliates and subsidiaries harmless for any and all claims arising out of the systems use in such applications.

The term *life-support device* includes but is not limited to neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators (for adults and infants), anesthesia ventilators, infusion pumps, and any other devices designated as “critical” by the U.S. FDA.

Hospital-grade wiring devices and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with these modifications are certified or listed as hospital-grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

Service

How to contact APC

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) 3 5434-2021
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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 - **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) 3 5434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

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