



UCM1-3.5

OWNERS MANUAL

Thank you for purchasing a new generator from Next Generation Power Engineering Inc.

We use brand name components such as Kubota engines, Sincro alternator ends and other high quality components so that our compact design will fit small spaces.

Please record your serial number here for future reference:

Kubota engine model number: _____

Kubota engine SERIAL number _____

Date of Purchase _____

****This manual is a general installation guide only****

If in doubt, it is always recommended to consult or hire an expert

General Safety Precautions

Caution

Unless your unit has been specifically ordered and built as an Ignition Protection Certified unit, this set must not be installed in gasoline powered vessels, or where any flammable or explosive gases are present. If your unit is IPC there will be a decal on the starter indicating that the unit is protected. If you have any doubt, please call Next Generation Power at 904-642-8555.

Please read the entire owners manual before attempting to install or run your generator set. Safe and proper operation can only be achieved by following the installation, operating and maintenance directions laid out for you in this manual.

~Electric shock can cause severe injury, burns or death. Always have a qualified electrical servicemen do any AC connection and service work to avoid any possible danger or electrical shock or damage to other electrical equipment on board. Never perform electrical work when the unit is running.

~Frequently inspect all power cables and wiring, initially for proper gauge and connection and later for signs of fraying or deterioration. Remember to use extra caution when handling any electrical equipment as neglect, misuse or deterioration can cause dangerous or deadly electrical shock or injury.

~Never operate the generator set with any guards or covers removed.

~Engine must be completely stopped and fully cooled down before any maintenance or service can be performed. Hot coolant in an engine is under pressure. Wear eye protection when performing work on cooling systems.

~Children and pets should be kept away from the generator set at all times. Loose parts falling into a running engine can be potentially dangerous.

~Never clean your generator set with running water, unit should only be cleaned when the unit is stopped with a damp rag on outside surfaces only.

~Disconnect battery from the generator set before performing maintenance and service procedures. Always wear eye and hand protection while working near or with batteries. Batteries contain acid and are known to explode.

~Inhalation of exhaust gas can cause personal injury and or death. Make sure adequate ventilation is provided when running any engine in a confined area.

~Fuel and fumes can be deadly. Do not smoke around fuel or while fueling. Always shut off engines while fueling the vessel.

~As well as following the directions given in this manual all installations should follow the recommendations of A.B.Y.C. American Boat and Yacht Council, N.F.P.A. National Fire Protection Association and US Coast Guard Regulations.

Do's and Dont's

Do's:

- **READ SAFETY INSTRUCTIONS AND ALL OTHER CHAPTERS IN THIS MANUAL**
- Allow 500 hours of exercise workload to break in the new engine. (60-85% load is recommended)
- Regular maintenance of fluids and filters. Oil & filters are cheap, engines are not.
- Keep fluids filled to their proper levels. Oil that is down 1/3 quart is too low!
- Periodic inspection of wires, hoses, and belts for abrasion or wear.
- Keep your gen-set clean from salt, dirt, oil, fuel and general debris
- Replace worn hoses and belts immediately. Do not wait for breakage.
- Use proper mix of anti-freeze coolant NOT to exceed 50% ethylene glycol.
- Keep a maintenance journal to record routine service intervals
- Ensure that fuel tanks on vessel remain at least 1/3 full to prevent air intake of the generator fuel system.
- Generally keep gen-set loads between 50-90% as much as possible
- Use the glow plug for 10 seconds before starting the engine.

Don't's:

- **DO NOT** start the generator under an electrical load. Turn OFF all air conditioners, stove top elements, microwaves etc.. before starting the set. You may resume appliance load after the engine is running.
- **DO NOT** overload the gen-set by turning on too many appliances at the same time. Calculate your appliance wattage consumption to stay within the generator output limits or budget between electric appliances back and forth if necessary. Heat loads are big users of power. Check your appliance labels for power requirement ratings.

- **DO NOT USE ETHER-YOU WILL RUIN THE ENGINE AND VOID THE WARRANTY.**
- **DO NOT immerse the generator in water, oil or cleaning materials**
- **DO NOT operate the gen-set without an air filter cartridge**
- **DO NOT use synthetic oil until at least 500 hours of engine break in under a good load is complete.**
- **DO NOT adjust throttle speed linkage. The frequency of the generator Hz is factory set to correspond with proper engine RPM and the pulley drive system. Lowering or raising the engine speed will cause drastic voltage output changes that can damage appliances.**
- **DO NOT attempt any repairs unless you are a qualified technician**
- **DO NOT allow any storage of containers, fuel, tools, etc.. around the generator set during operation.**
- **DO NOT leave genset in a state of dirty condition. Fuel and grease may cause premature wear of rubber engine mounts. Debris should be vacuumed or blown out with compressed air and periodically cleaned with a mild degreaser and very light water mist. (Avoid water in the generator windings)**
- **DO NOT hold the glow plug in for more than 10-15 seconds. If you hold it in longer, you will burn out the glow plug.**
- **DO NOT authorize any warranty repair work by third party repair facilities unless first obtaining consultation and approval by Next Generation Power Engineering Inc. Unauthorized repair bills will be denied.**

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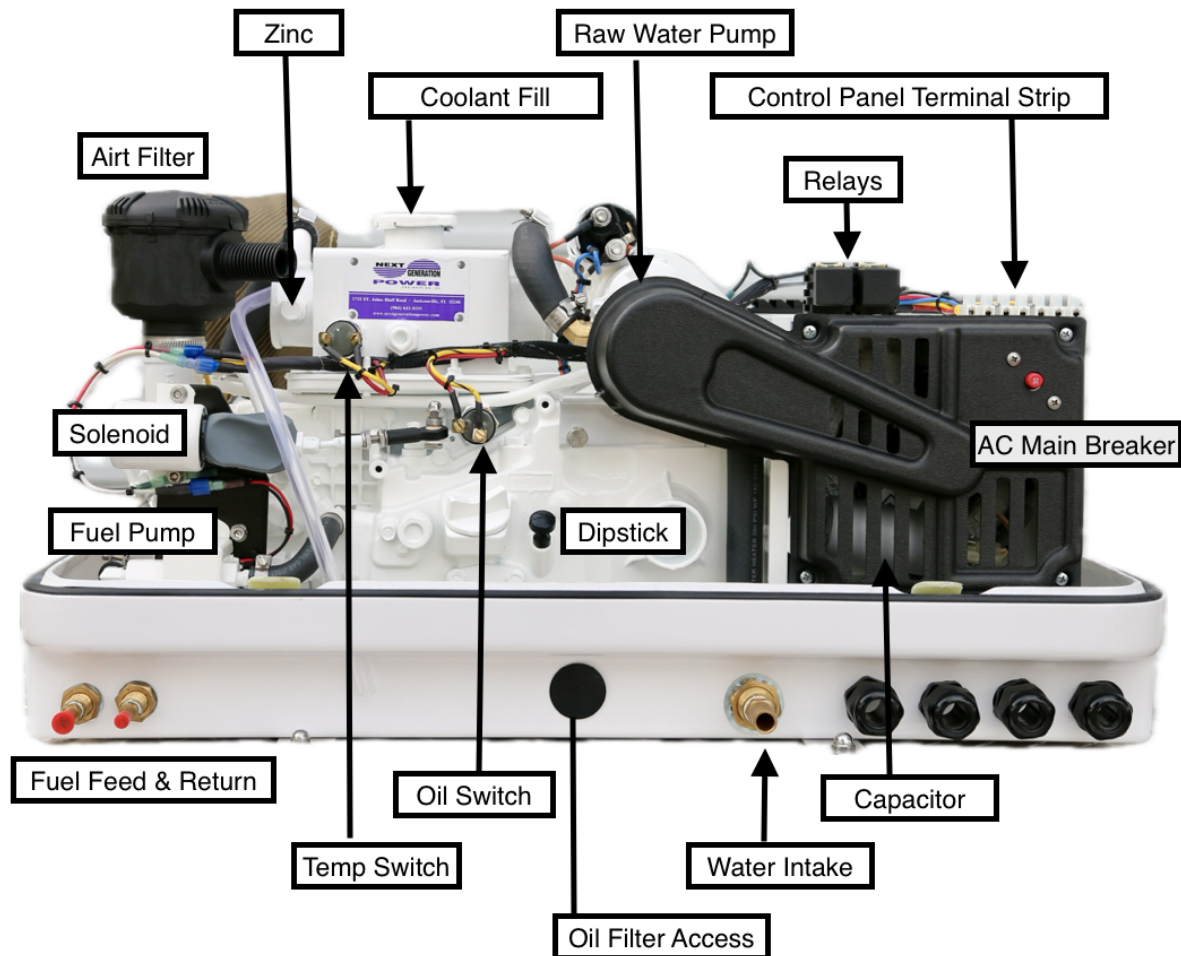
UCM1-3.5 Specifications

Type.....	Horizontal, water-cooled 4 cycle engine
# Of Cylinders.....	1
Bore & Stroke (in.).....	3.031 x 2.756
Displacement (cu. In.).....	19.83
SAE net Intermittent (HP/rpm).....	7/2800
Combustion system.....	Spherical
Compression ratio.....	23:1
Fuel Injection Pump type.....	Bosch 'mini' type
Nozzle type.....	Bosch throttle type
Cooling System.....	Fresh Water Heat Exchanger
Lubricating system.....	Forced Lubricating by Trochoid pump
Fuel.....	ASTM #2 Diesel or equivalent
Lubricating Oil.....	Quality Better than API service CC class
Fresh Water Capacity.....	15W-40.....1.2 Quart
Lubricating Oil Capacity.....	1.0 U.S. Quart
Measurement (L x W x H).....	28" x 15" x 15"
Dry Weight (Lbs.).....	160 lbs.
Starting System.....	12 Volt Battery
Charging System.....	None
Fuel Line Diameter.....	5/16"
Fuel Return Line Diameter.....	1/4"
Raw Water Diameter.....	5/8"
Exhaust Diameter.....	1.5"
Output Voltage.....	120/240
Output Amps.....	30/15
Output Watts.....	3.5Kw or 3500

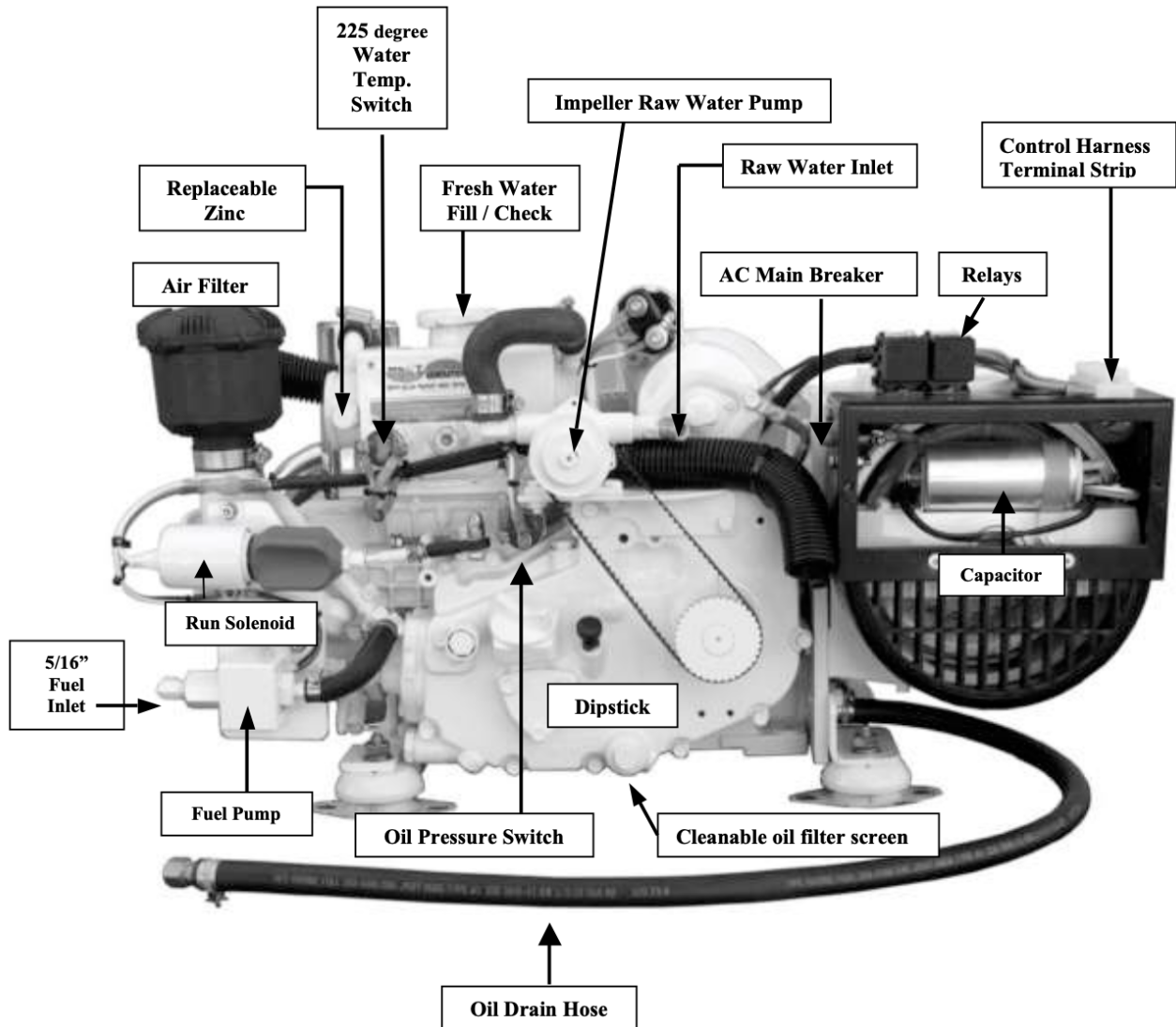
Specifications

60 Hz Rating.....	3.5 k.w. 3.5 KVA 1.0 P.F.
50 Hz Rating.....	3.5 k.w. 3.5 KVA 1.0 P.F.
Voltage Frequency Regulation.....	+ 5%
Recommended Battery Size.....	100 A.H. or Larger
Total Air Required.....	150 CFM
Fuel Pump Lift Maximum.....	3 Feet
Water Pump Lift Maximum.....	4 Feet
Cooling Water Flow.....	3.0 Gal. Per/Min
Fuel Consumption Maximum.....	.40 Gal/Hr.
Fuel Consumption Average.....	.20 Gal/Hr.

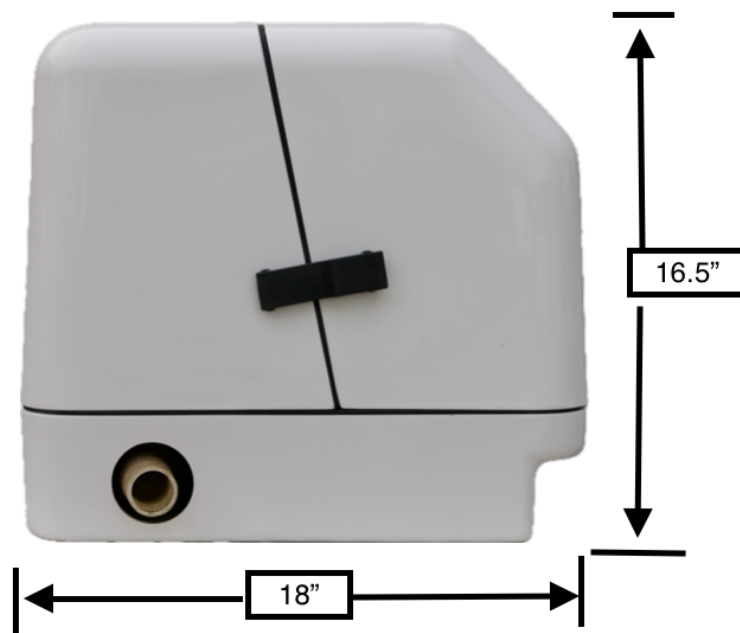
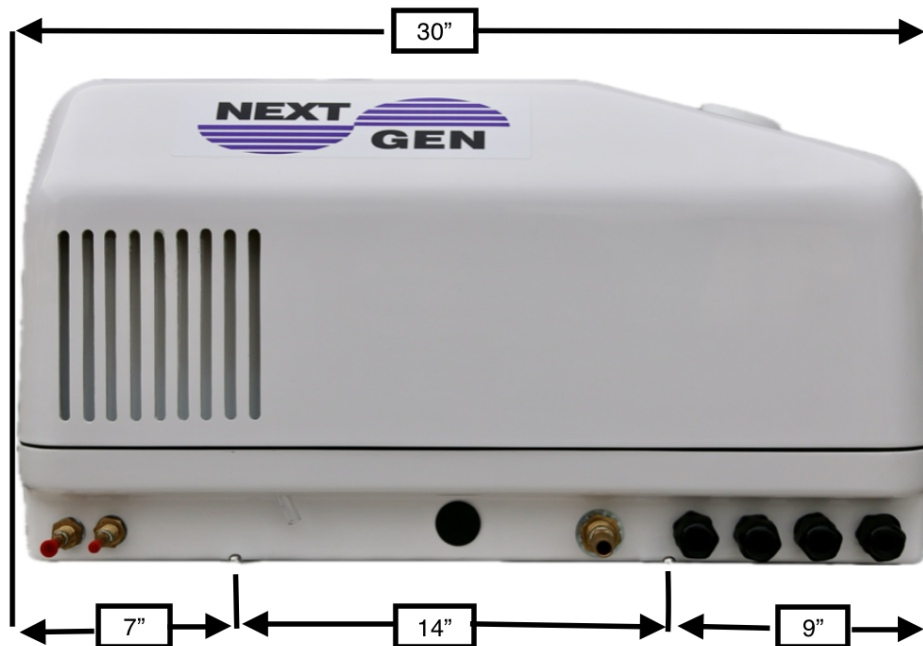
General Layout - Front View



General Layout



Dimensions



Selecting a Location

The following factors should be considered before selecting the location where your generator will be installed.

Proximity to Living Quarters

If several locations are available it is advisable to install the set furthest away from living and sleeping quarters to keep noise levels in these areas to a minimum.

Dryness of Location

Keep the generator from under outside hatches where water (especially salt water) may drip or splash.

If a location under a hatch is chosen, provisions should be made to divert and water away from the set.

REMEMBER WATER AND ELECTRICITY DO NOT MIX

Ventilation

Air must be available to the generator for both combustion and alternator cooling, therefore you should try to select a location that already has adequate air flow or where inlet and exhaust fans can be installed.

Plumbing

Consideration must be given to fuel, raw water, exhaust and electrical connections.

Servicing

Unit must be accessible for regular and long term maintenance.

Space

There must be enough space around all sides of the unit for movement on the isolation mounts. One or two inches on all sides with extra room on the front side for maintenance would be the minimum required.

All the above factors should be considered before deciding on the permanent location of your unit. Keep in mind while selecting your location that the easiest place to install the set may not be the best long term home for the unit. It is always better to spend more time routing the plumbing etc....initially than to select an easy spot where the unit can not be serviced later, or is under a leaky hatch where it will rust away. In most cases where space permits the engine room is usually the best place for a generator as it usually has adequate ventilation, access to plumbing, sound proofing etc.

Mounting

Due to wide variations in boat styles and designs, it is impossible to give a complete description of any one particular installation. Following are guidelines to which one may follow to achieve an acceptable and safe installation.

The UCM1-3.5 is a very rugged design incorporating roller main bearing and a pressurized oil delivery system. As such the set may be placed in any direction and position in the vessel as long as it will not be run at an angle of more than 30 degrees continuously.

No matter where the unit is placed it must be securely attached to a platform, rails or stringers. If a flat relatively level platform is not available one should be constructed out of a minimum 3/4" thick marine grade plywood or 1/4" aluminum plate. Base must be lagged, bolted or glassed securely to the stringers.

Through bolting is the best way to secure the unit to the base, 5/16" diameter stainless steel bolts with large washers should be used. If you have a wood base and do not have bottom access for through bolting, 5/16" diameter stainless steel lag screws with large washers may be used. If at all possible when lag bolting a unit in place, try to align as many mounting holes over the stringers as possible so that extra long 2" or 2.5" lags secure the mounts through the base to the stringers. A spot of silicone or marine caulking on the lag screws works well in sealing moisture out of the wood where lags penetrate.

If you wish to lift the unit with a rope or chain, a convenient lifting spot is the starter mounting plate. You will need to remove the starter.

Ventilation

As previously mentioned, the generator needs air for both combustion and for alternator winding cooling. By far alternator cooling requires the most air (approximately 125-150 CFM) and since it is not consumed it must be evacuated from around the unit.

If the generator is installed with the enclosure in a reasonably sized engine room with good natural air flow, then the supplied blower should be adequate. The blower should be removing the hot air from the enclosure and should evacuate the hot air from the generator environment. It is possible for excessive temperatures to be reached in the same engine room under various conditions, such as very hot climates, when the vessel is not in motion, or when main engines are running while the generator is running.

The only sure way to know if there is adequate air flow is to monitor the engine room temperature on a hot day under various operating conditions. Temperature should be checked near the black plastic air inlet of the alternator and should not exceed 140 degrees Fahrenheit.

If the unit is to be installed in a smaller separate enclosure or compartment, an opening of 25-35 square inches is needed to admit air in. This combined with a blower fan of 125-150 CFM or more to force air out is required.

Caution - If you are installing the generator in a gasoline powered vessel all electrical components must be Ignition Protection Certified.

Sound Proofing

For those wanting the ultimate in quiet performance, Next Generation Power offers an optional sound dampening fiberglass enclosure that offers excellent noise suppression.

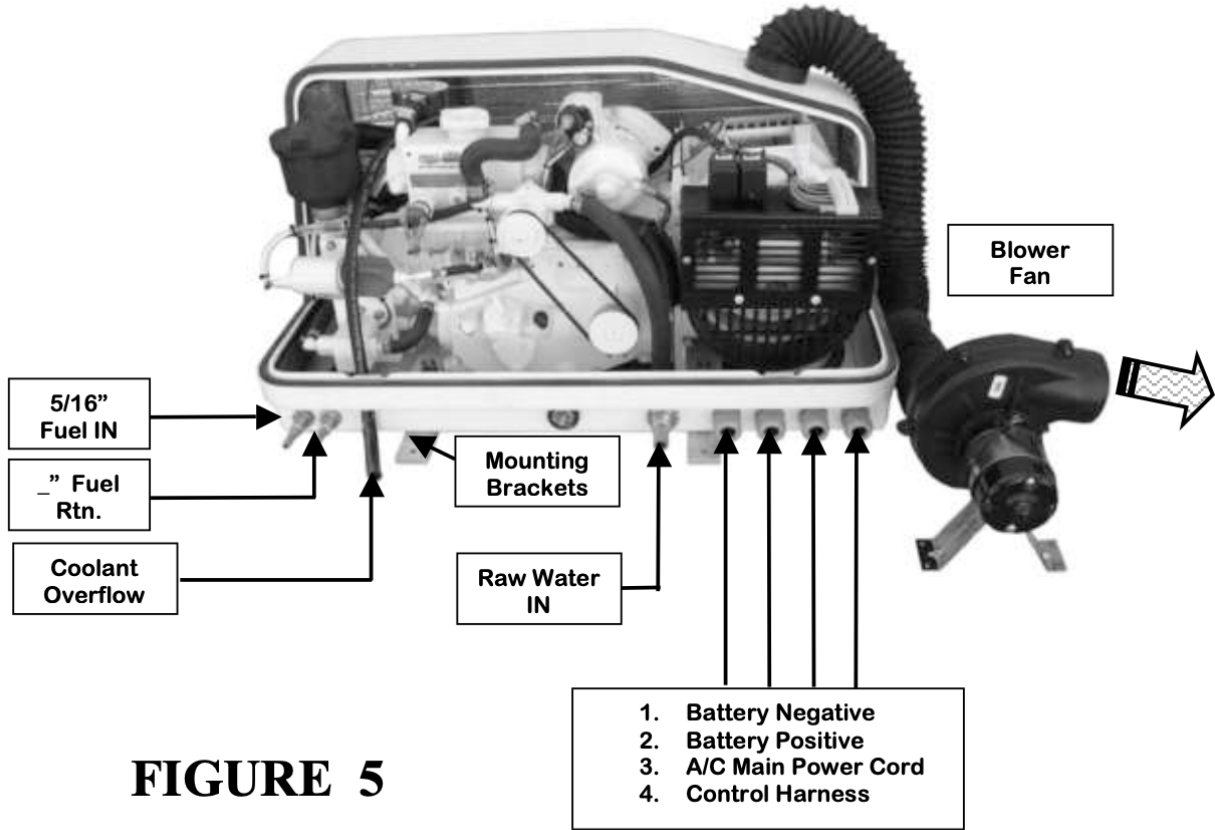
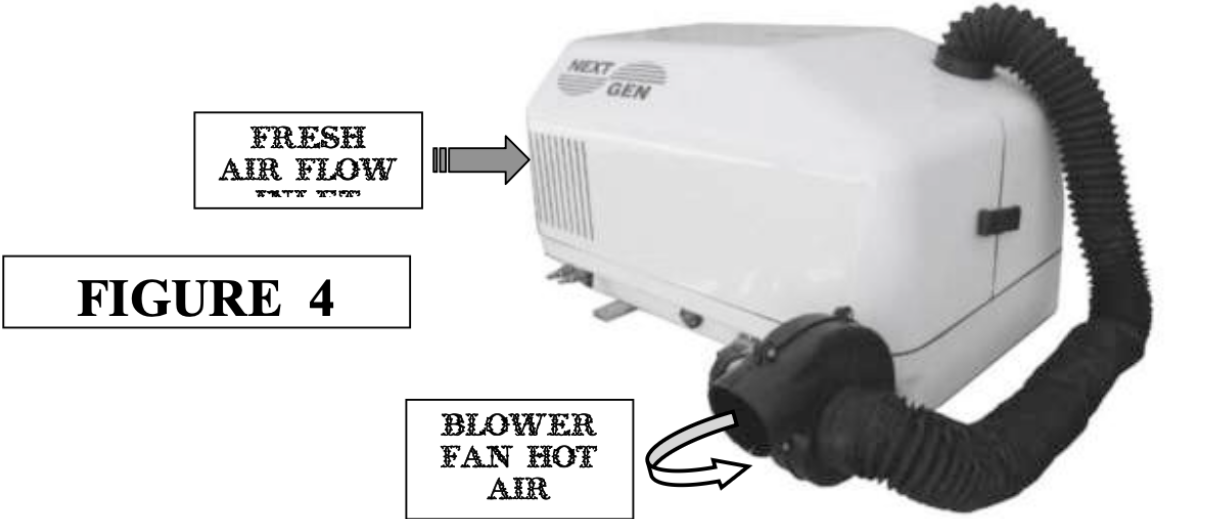
The enclosure also offers limited splash protection from liquids. This does not mean it is a water proof enclosure, since it was designed more for noise reduction. If space limitations allow for the added enclosure dimensions, you will find the sound enclosure a worthwhile investment.

Proper ducting is required to allow for air flow in and out of the enclosure to maintain proper cooling of the windings. The enclosure has clever design elements for the attachment of fuel hoses, raw water, exhaust hoses and cables.

In some vessels, critical space requirements may not allow for the addition of an enclosure, in this case consideration may be given to using sound dampening materials with appropriate venting and ducting to accomplish the task of reducing noise.

When the generator is placed near living quarters or under floorboards, a reduction in noise may be found by remote mounting an air intake silencer as far away as possible using flexible intake hose. Consult with NextGen for other recommendations if needed.

Enclosure Blower Installation



Fuel System

The fuel filter supplied is a fine 2 micron secondary filter and must be used in conjunction with a customer supplied 20 or 30 micron primary filter. All filters should be mounted in a spot that is easy to access for servicing. Make sure to leave enough room below the filter bowl for easy draining and changing of filters.

It is best to use a separate pick up and return at the fuel tank for the generator as well as a dedicated primary filter. This generally will eliminate fuel starvation problems due to suction created by other engines running off the same fuel supply.

When it is not feasible to run a separate fuel pickup then it may be possible to use a fuel manifold or a second fuel outlet on a main engine primary filter. If you do this, both the main engine and the generator should be carefully monitored after initial installation to determine that fuel starvation is not happening. Fuel starvation would show up as a loss of speed and frequency on the generator and would typically happen during high load conditions.

A minimum of 5/16" diameter marine diesel approved fuel line should be used from the primary filter to the secondary filter and to the engine.

1/4" diameter fuel line should be used for the return line. The return should run from the engine back to the fuel tank and not tied into the fuel system as air would be re-circulated and cause intermittent shut down.

Note: Most initial run problems and intermittent shut down situations are due to fuel supply leaks introducing air into the system, even small amounts of air will cause erratic running or immediate shut down. All fittings should be double checked for tightness, fuel pick ups should be inspected and hose clamps secured.

Always use hose clamps of the correct size, too large of a clamp reduced to a very small size will not remain completely round and air leaks will result.

Hint: When there is excessive lift or a long run from the fuel supply tank to the generator, there is a small possibility of fuel starvation and a greater chance of air entering the fuel system. If you have a situation such as this a secondary fuel pump mounted near the tank pushing fuel to the unit will help cure this situation

Cooling System

The UCM1-3.5 is a completely marinated, fresh water, heat exchanger cooled machine. The unique feature of this package is that the engine is designed to be cooled by natural convection circulation of the fresh water. This system is very simple and reliable eliminating several maintenance items such as the fresh water pump, drive belt, thermostat etc.

Fresh water anti-freeze mix is added to the engine through the cap at the top of the heat exchanger tank. Mixture should just cover the heat exchanger tubes leaving 1/4"-3/8" of space for expansion. In warm climates we recommend approximately 30% anti-freeze and 70% water mix. If you are operating in cold climates where you have a danger of freezing, up to 50% anti-freeze may be used. If more than 50% anti-freeze is used, overheating will almost always result.

Excess coolant may flow out of the overflow tube located below the pressure cap, this is normal and should only happen during the first warm up after filling. A coolant catch can be used to keep this excess coolant from getting into the bilge.

Because of the convection cooling design you can see operating temperatures of 170 to 210 degrees F. These engines are very thermally stable and can be run at temperatures up to 230 degrees F.

Raw water is circulated through the heat exchanger and out of the exhaust by a belt driven self priming pump located at the front top side of the unit. A clean constant supply of raw water must feed the pump, generally via a thru-hull, sea cock and sea strainer. Raw water supply fitting is 5/8" diameter so a thru-hull and strainer of 3/4" or larger is fine.

Scoop type water pickups should never be used as water will be forced through the pump and into the exhaust system while the vessel is in motion. This is very dangerous as the exhaust will eventually fill and raw water will back up into the engine through the exhaust valve.

Note: All raw water hose fittings and clamps should be of an approved marine grade with all connections double clamped. Any bad connections or loose clamps could cause flooding and sinking of the vessel.

If the bottom of the unit is mounted at or below water line there is a danger of water siphoning through the raw water pump into the exhaust. This must be corrected by installing an anti-siphon valve or siphon break into the raw water plumbing. The easiest place to install the siphon break is between the raw water discharge on the heat exchanger and the raw water inlet on the exhaust mixer. The factory hose is removed and the siphon break installed according to the manufacturer of the siphon break. Usually the siphon break is mounted 18-24" above the water line to be effective.

Exhaust System

The water cooled exhaust mixer is 1.5" OD and should be used in conjunction with a water lift muffler and 1/5" ID approved marine grade exhaust hose. All connections must be double clamped.

It is possible to run the UCM1-3.5 without a water lock providing the entire exhaust system runs downhill. Exhaust noise without a water lock muffler will be markedly higher as well. The best results as far as noise level is concerned are achieved by using a water lock muffler and running the exhaust system out through the transom 2-3 inches above the waterline.

We have seen systems run up to 20 feet of 1.5" ID hose with no back pressure problems. There are many different brands and styles of water lock or water lift mufflers available that will work fine. At times your choice may be based on physical size or inlet/outlet arrangements.

We at Next Generation Power have had excellent results using the heavy-duty fiberglass units made by "Centek". Because of the low outlet on the UCM1-3.5, Centek model (1500018) works very well as it has a low side inlet with a top outlet. Top inlet with top outlet versions also available.

Most exhaust situations are shown in the following diagrams supplied by Centek. The most important consideration is that the exhaust run down hill into the water lock muffler so that exhaust flooding does not occur.

Vernalift Installation

FIG. 1 ENGINE INSTALLATION ABOVE WATERLINE

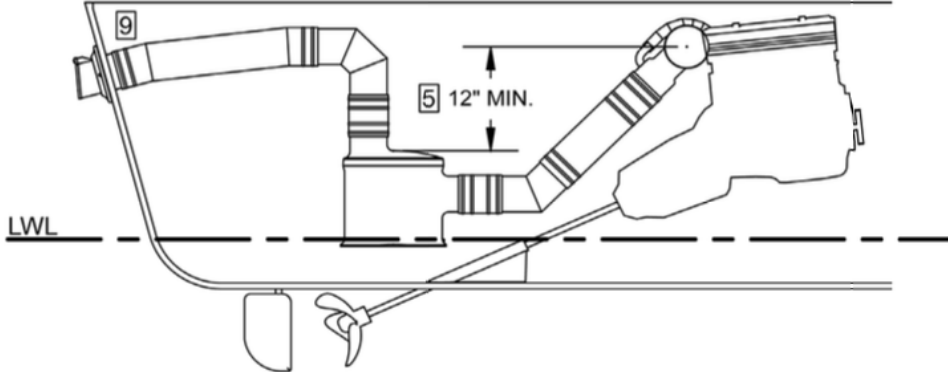


FIG. 2 ENGINE INSTALLATION BELOW WATERLINE WITH SPACE FOR MUFFLER BELOW ENGINE

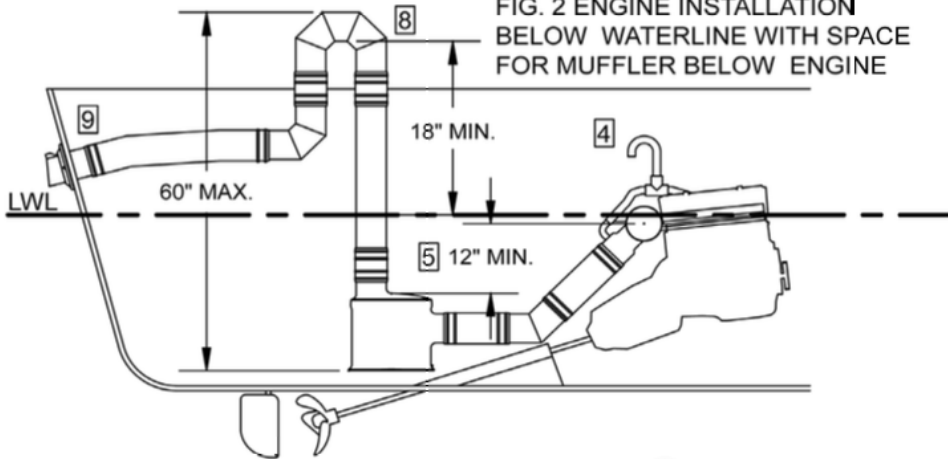
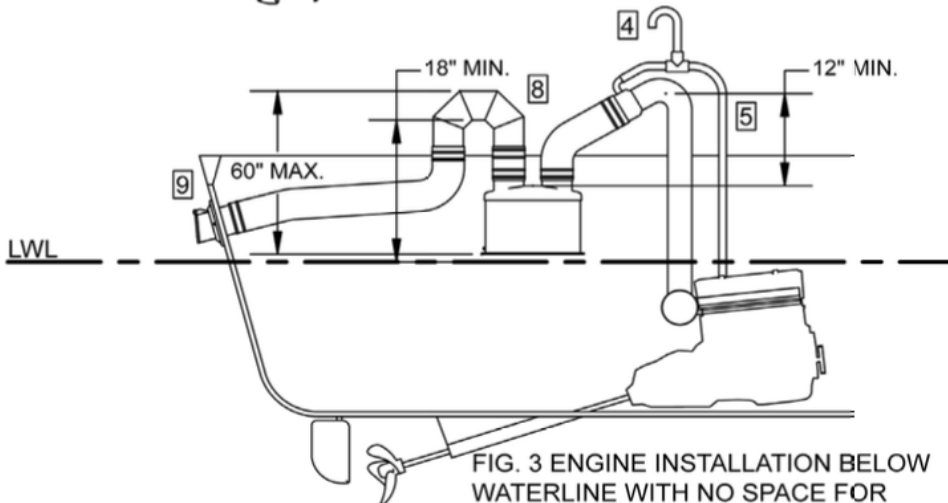


FIG. 3 ENGINE INSTALLATION BELOW WATERLINE WITH NO SPACE FOR MUFFLER BELOW ENGINE



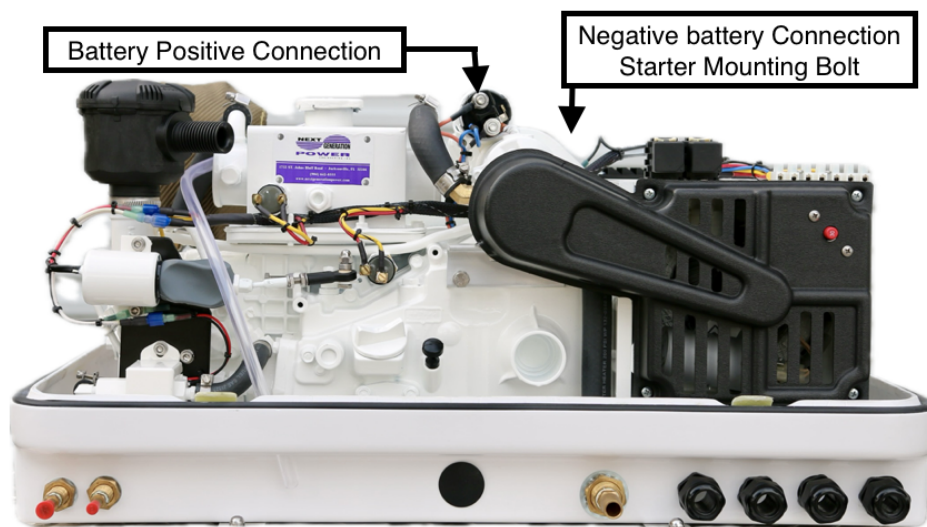
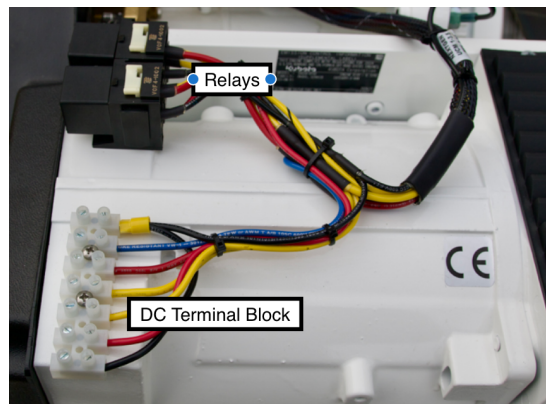
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D.C. Electrical

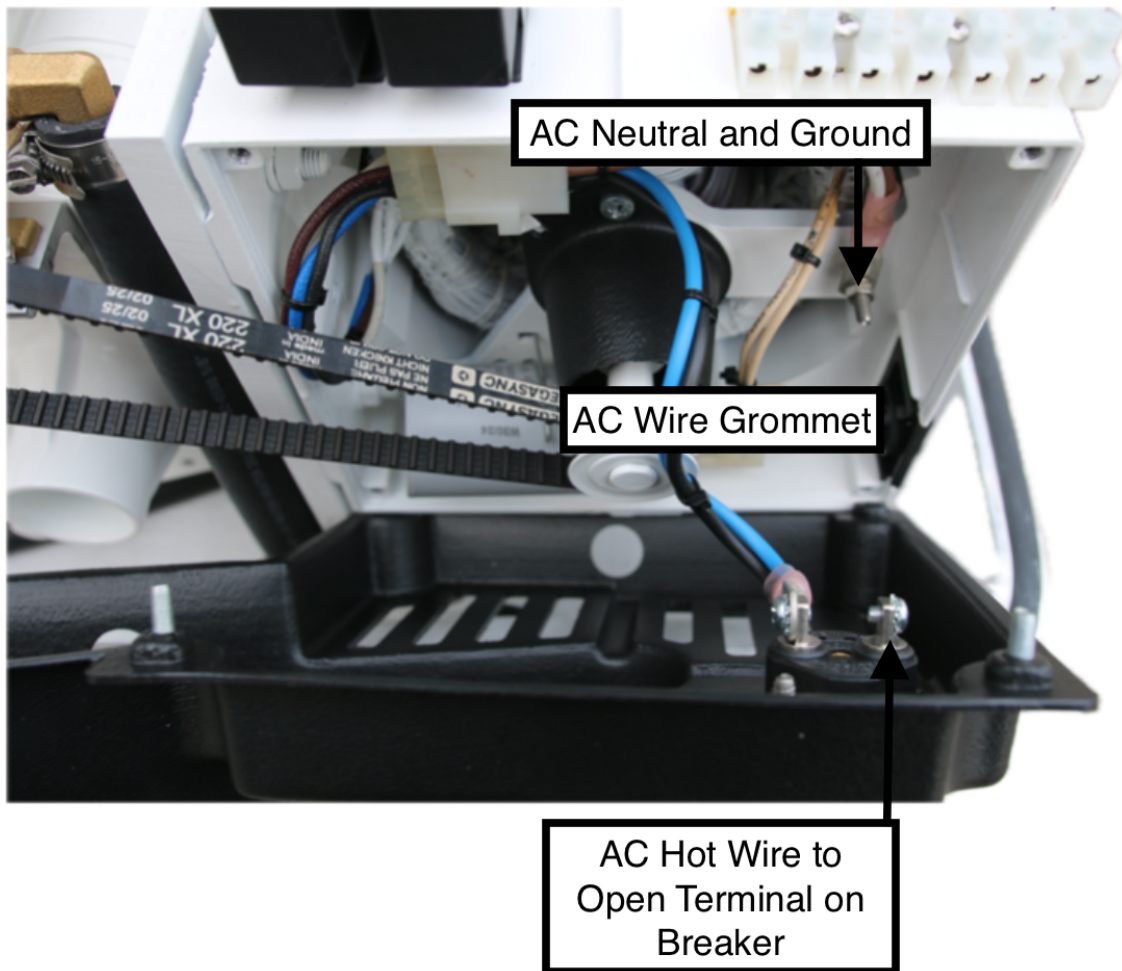
The UCM1-3.5 uses a very simple 12 volt DC system for starting, running and shutdown systems. Consideration must be given to battery charging as the set does not have any battery charging capacity at all. Most installations simply use a house or main engine battery for starting. When the generator is running an AC battery charger is used. While the generator is running it used 13-15 amps of 12 volt DC current (with exhaust blower) to operate the fuel solenoid and fuel pump.

Battery cable size should be determined by length of run, usually 4 gauge is adequate. Battery positive is connected to the top lug on the starter solenoid. Battery negative should be connected to a starter mounting bolt.

The remote panel wiring harness is color and size coded and should be connected to the DC terminal strip.



AC Electrical Connection



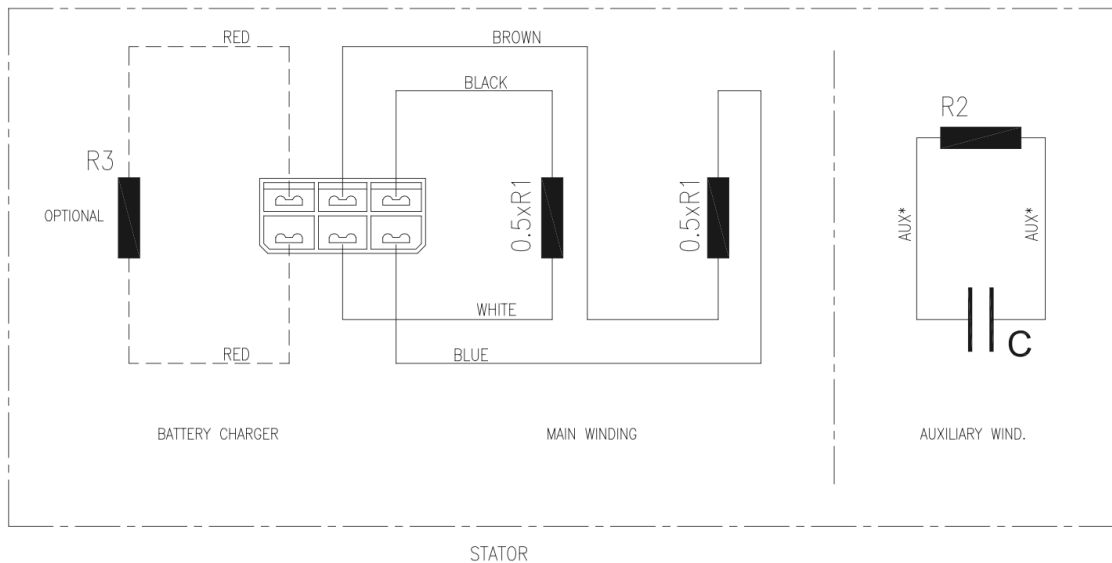
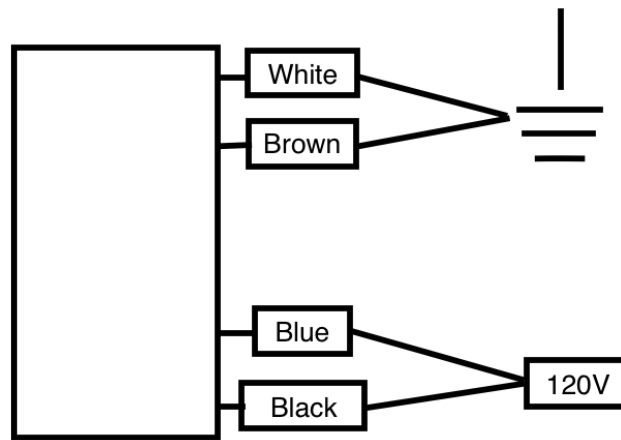
AC Electrical Wiring

All AC electrical connections should be made by a licensed and qualified marine electrician.

Standard 120 Volt 60Hz

The “Hot” leg (usually the black wire) of the vessel should be connected to the unused output terminal of the breaker. Ground and neutral wires (usually green and white) should be connected to the neutral/ground stud.

Caution - Many vessels are either built or have had changes made to the wiring where standard colors are not used and do not match the colors mentioned above. If this is the case a licensed marine electrician must be consulted to determine proper connection of wires.

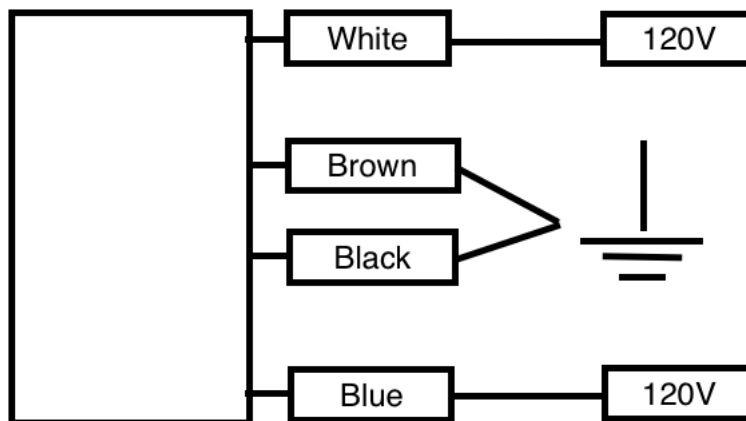


Rewire to 120/240 Volt 60Hz

The UCM1-3.5 may be rewired for 120 / 240 volt use with the addition of an external customer supplied 2-pole 15amp circuit breaker.

To rewire you must pair the brown and black and attach to the ground stud. The white and blue become your hot legs. The two hot legs should now be run to a remote two pole 15 amp 240 volt circuit breaker. The factory 30 amp single pole breaker is not used in this configuration.

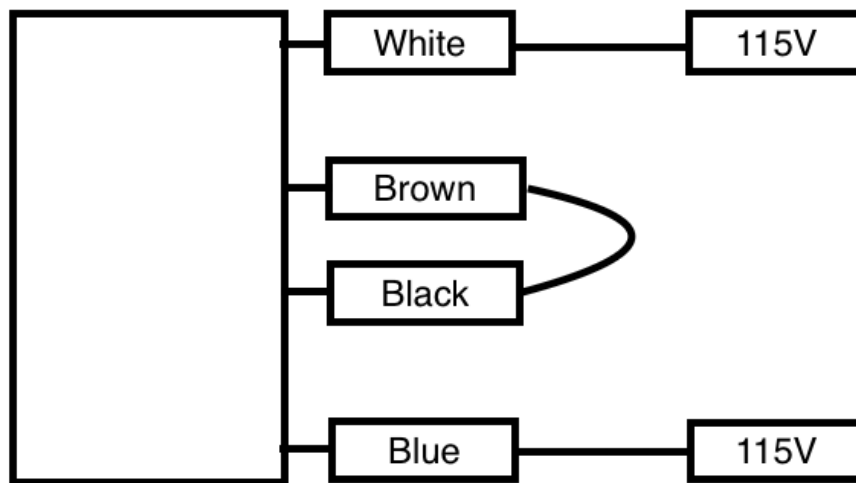
*** If the generator is to be installed in a gas powered vessel the unit must be an Ignition Protection Certified unit and the circuit breaker used must also be Ignition Protection Certified.**



Optional 50Hz 230 Volt Output

If your UCM1-3.5 was ordered as a 50Hz unit it will be wired as per the following diagram.

* For single hot wire connect the blue wire to the neutral stud.



Initial Start Up Procedure

Initial checks and operations

Check oil and coolant levels

Double check all electrical connections to make sure they are correctly positioned and secured.

Rock the generator back and forth on its mounts one final time to make sure the unit is not hitting anything and to be sure that all hoses and lines will have adequate slack to allow the unit to move.

Turn off the main and auxiliary breakers on the vessels panel.

Open generator sea-cock and fuel shutoff valves.

Priming the fuel system

The fuel pump can be energized by jumping the red 12awg to the yellow 14awg on the DC terminal strip. You should hear the fuel pump working and fuel will flow back to the return on the tank. Run the fuel pump for 2-3 minutes allowing time for the fuel system to completely fill with fuel.

Starting

Preheat the glow plugs for 10-15 seconds at the remote panel and then crank the unit. Generator should start within 5-10 seconds. If not, stop for a minute and try again. Often on initial cold starts the set will run for a few seconds and then stop. This is normal as the oil pressure has not yet built up to override the oil pressure shutdown switch. If the set starts and runs for a bit or stumbles and runs slowly, you will have to re-prime the system, as air in the fuel lines is likely to be the problem.

Caution

If the unit does not start after several cranking attempts or one minute of cranking, there is a danger of filling the exhaust system with seawater. This may lead to serious engine damage. Close seacock or remove water pump drive belt to prevent further water from being pumped into the exhaust and proceed to trouble shooting section.

As soon as the set is running, check for water exiting the exhaust thru hull indicating the raw water pump is working and that the engine is actually getting the cooling water. If you do not see water shut the unit down immediately.

Inspect the machine for signs of fuel, water or exhaust leaks as well as unusual noises or smells. If any problems are noted, the unit should be shut down immediately until the problem is corrected.

Maintenance

All generators or engines should be visually checked frequently during their first 5-10 hours of operation for leaks, loose wires and fittings.

Following is a chart showing the various maintenance items and intervals that should be attended to in order to keep your machine running at peak performance for the longest possible time.

	Daily	Monthly or 100 Hrs.	6 Months 250 Hrs.	Yearly 750 Hrs.
Inspect the Set	X			
Check Oil Level	X			
Check Coolant Level	X			
Check Fuel Level	X			
*Change Oil and Filter		X		
Check Zinc Anode		X		
Check Air Filter			X	
Change Fuel Filter			X	
Change Air Filter Element				X
Change Pump/Alternator Belt				X

Initial oil change should be done after the first 30 hours of run time.

Inspect the set

Visually inspect the machine for leaks, loose connections, loose clamps, frayed wires

Check oil level

Remove the dipstick and make sure that the level is at or near the top mark

Check coolant level

Remove the heat exchanger fill cap and make sure the level of coolant is just above the cooling tubes. Add coolant mixture if needed.

Check fuel level

Make sure main or auxiliary tank has enough fuel for the intended run time. Running to of fuel will require bleeding of the fuel system.

Change oil / Clean filter

Oil should be drained by removing the cap off the drain hose located under the generator or using a pump in the dip stick hole. Remove the access plug in the front of the base of the enclosure. The cleanable oil filter can be removed by unscrewing the nut on the filter. The screen type filter may be cleaned in fuel or degreasing cleaner. Oil the filter and threads and the re-install. Fill crankcase to the full level on the dipstick with approved diesel grade oil.

Maintenance

Drain sediment from fuel filter

Water and sediment should be drained from the filter bowl by unscrewing the drain valve located at the bottom of the bowl.

Check zinc anode

Use a wrench to unscrew the zinc to determine rate of degradation. Zinc should be replaced if it is less than 1/3 of its original size. Rate of decomposition varies from vessel to vessel, after several inspections rate may easily be determined.

Check air filter

Air cleaner element may be inspected by unscrewing the top of the filter canister lid. Visually check the element for blockage, rips, tears or excessive moisture of the element material. Replace if needed.

Change fuel filter

Change the filter as per Racor instructions.

Check water pump drive belt

Visually check the belt for signs of cracking or fraying, change if needed. Check the belt tension by pressing lightly in the middle of the belt span. It should not deflect more than 1/4" under pressure. Tighten if needed by loosening the two pump hold down bolts and sliding the pump slightly forward.

Change the pump drive belt

Remove the old belt by sliding the belt off the pulley on the pump and then lifting off the bottom pulley. Install the new belt by wrapping around the bottom pulley first and then sliding it around the pump pulley. Using this procedure it may not be necessary to tension the belt.

Load Testing

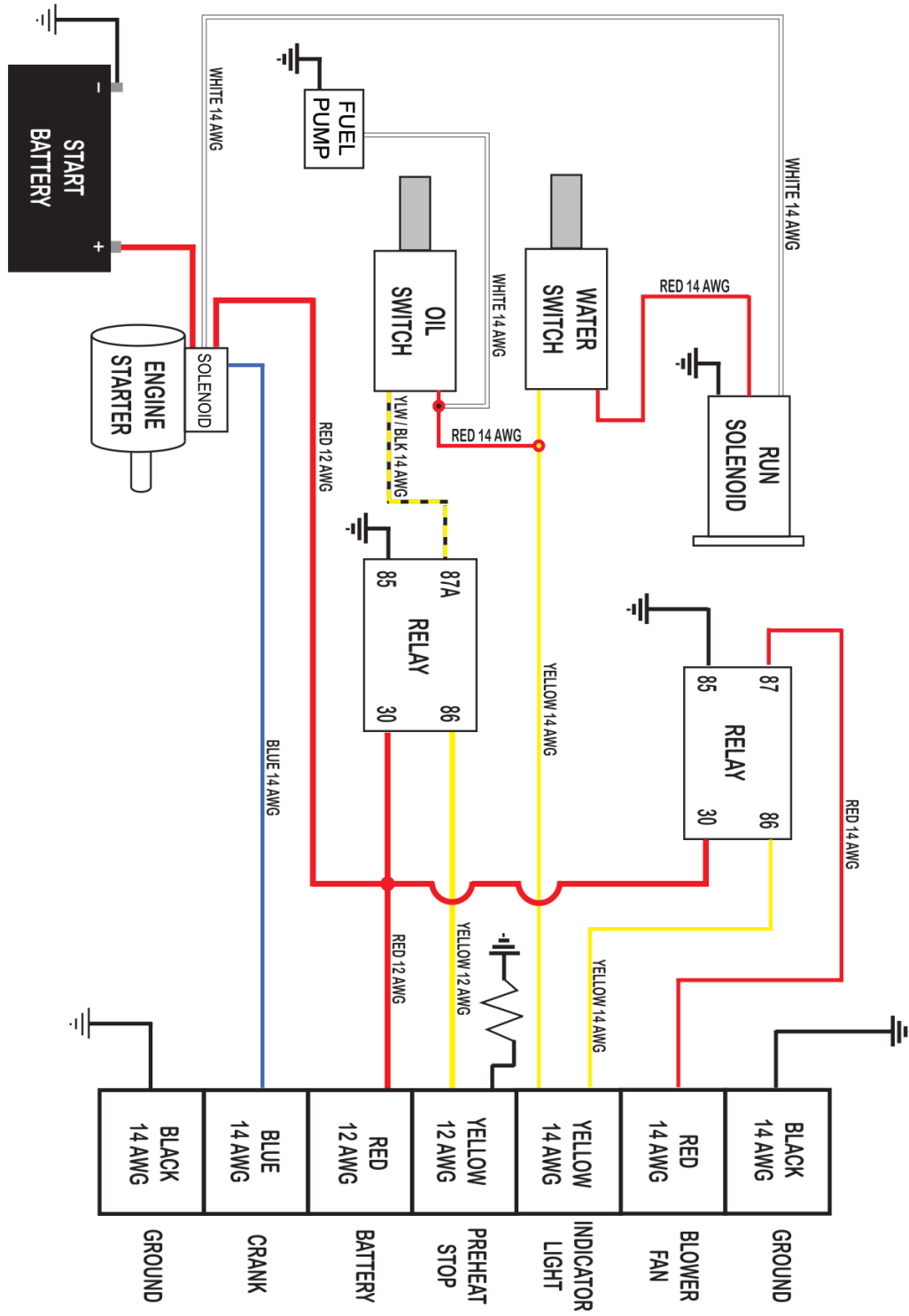
Once the generator is running with no leaks or problems, you should determine that the output voltage is correct, either by gauges on the vessel or by a hand held meter. If using a hand held meter you can test voltage at a convenient receptacle after turning the appropriate breaker on.

If the voltage is in the acceptable range, you may begin to test load. Start by turning on one breaker at a time on the vessels panel beginning with non-critical loads such as a toaster, stove element etc... All devices should be checked one at a time at first for correct function and then in groups to determine what may be run together without an overload.

The UCM1-3.5 will provide 29 amps at 120 volts. If this is exceeded, overload will result and the unit will lose speed, frequency and voltage. A sure sign of overload is black smoke coming out of the exhaust.

Typically the UCM1-3.5 will carry an air conditioner up to 16,000 BTU's along with a typical battery charger, some lights, t.v and have 1-1.5 kw's left over for another appliance such as a microwave, stove element etc...

DC Wiring Diagram



Troubleshooting

UNIT DOES NOT CRANK

POSSIBLE CAUSE

DIAGNOSIS OR REMEDY

Bad battery or low voltage

Make sure battery is in good condition and is fully charged. Charge or replace as required.

Bad Battery cables or faulty wiring between Gen-set and remote panel

Check all wiring and connectors with a multi-meter. Repair wire or cable as req'd.

Bad Rocker switch

Test switch with a multimeter for proper operation. Replace if needed.

Bad starter

Feed 12 volts + directly to the cranking spade connection on starter (blue wire). Set should crank, if not, remove starter and have tested by a qualified technician. Replace starter if required.

UNIT CRANKS BUT DOES NOT START

Air in fuel system

Bleed air as instructed under initial start up procedures.

No preheat

Unit must be preheated for 10-20 seconds before every cold start.

Faulty wire or connections from remote switch. Test to be sure 12 volt + is getting to glow plug.

Glow plug itself may be faulty, remove from engine and test with 12V + and replace if needed.

Run solenoid not pulling in

The run solenoid must pull in or the unit will not start. While cranking gently push the solenoid linkage in. If the linkage pulls in and holds you may have a weak battery or bent and binding linkage. Charge battery and retest or check for sticky or binding linkage.

UNIT CRANKS BUT DOES NOT START

POSSIBLE CAUSE

DIAGNOSIS OR REMEDY

Run solenoid not pulling in (Con't)

Make sure 12 volt + is getting to the white wire on the solenoid while cranking. If not troubleshoot as required.

If 12 volt + is getting to the white wire on the solenoid and the solenoid does have a good ground assume the solenoid is faulty and replace.

Clogged air intake

Unit must have air to run, if the machine has a plugged air intake, unit will not run.

Clogged Exhaust System

Unit will not run with a clogged or collapsed exhaust system. Typical symptoms will be popping back through intake system.

UNIT STARTS BUT IMMEDIATELY STOPS

Solenoid NOT holding in

If the solenoid drops out as soon as you quit cranking, the unit will stop. Test the solenoid by feeding 12 volt + to the red hold wire while pushing the solenoid plunger into the fully retracted position. Solenoid should remain in the retracted position even after manually releasing the plunger.

If the solenoid drops out after 12 volt is applied and manual tension is released, we assume that it is bad and replace.

If the solenoid is o.k., we assume that 12 volts is not getting to the solenoid. First, make sure that the engine does have oil and that it is not overheating.

If oil and water are o.k., we assume that 12 volts is not getting through the oil or water switches. These switches should be tested one at a time by jumping across the switches terminals while attempting to start the machine. If the unit remains running while a switch is jumped and it quits when not jumped we have found the bad switch.

Do not rule out the possibility of two bad switches or faulty wiring and connections feeding the run circuit.

UNIT RUNS BUT SHUTS DOWN INTERMITTENTLY

POSSIBLE CAUSE

DIAGNOSIS OR REMEDY

Air in fuel system

The number one reason why the set would shut down is air in the fuel system.

All fittings, hoses, clamps, filters, pick-up tubes etc. should be double checked to make sure absolutely no air is entering the system. When in doubt disconnect the entire fuel system and run the machine out of a small fuel supply with short hoses for a period of time to determine if the vessel's fuel system is at fault.

Bad oil or water switch

Jump switches as previously discussed under "solenoid not holding" in but you may have to leave the switches jumped for longer periods of time to determine if you have an intermittently bad switch.

Faulty wiring

Inspect all wiring carefully for loose terminals or loose screws that may vibrate and cause intermittent shut down. Correct as required.

UNIT WILL NOT SHUT OFF

Solenoid stuck in

Check for jammed solenoid or linkage. Free up or replace as required.

Throttle misadjusted

If the unit almost stops but chugs along slowly the throttle stop screw may have to be turned in slightly.

Bad shutdown relay

If the shutdown relay does not energize the run circuit when stop position is activated, the relay is most likely at fault.

NO OUTPUT VOLTAGE

Breaker tripped

The circuit breaker will trip if the unit is overloaded or short-circuited. The breaker may also trip if the Gen-set is working to capacity in a very hot environment. In any case with a breaker tripping, it is advisable to determine the cause before restarting.

Faulty capacitor

It is possible to have a faulty capacitor causing loss of output voltage but this can only be tested by replacing the capacitor and restarting.

WRONG OUTPUT VOLTAGE

Generator output voltage may be changed slightly by adjusting the engine speed up or down. This is done at the speed linkage shown on Fig. (shortening linkage increases the speed)

Engine speed problems

Speed is factory set and tested. We do not recommend changing the speed unless you have an A.C. frequency meter to determine how much you have changed output frequency.