Sunfind
solar products inc.
ENERGIZING THE WORLD

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Generators 2012

Sunfind Solar Products has extensive experience working with generators in off grid applications. This experience, coupled with the expertise and experience in designing solar energy systems, results in a very select number of generators we will recommend of off grid use. A high quality, industrial grade generator will be more cost effective and provide decades of worry free, reliable operation.

Sunfind Solar Products prides ourselves on providing cost effect, reliable solar PV systems. As such, we will only recommend generators that will maintain those high standards. For an overview of generator options, please review this guide. For more detailed information, such as purchase price, operational costs and technical specifications, please contact a SUNFIND Sales Representative.

SUNFIND SOLAR PRODUCTS IS COMMITTED TO BECOMING CANADA'S LEADING SOLAR ENERGY PROVIDER. WE WORK HARD TO EARN OUR CLIENTS AND ARE VERY PASSIONATE ABOUT WHAT WE DO! WE HOPE WHEN IT COMES TO MAKING YOUR SOLAR ENERGY PURCHASE, YOU WILL PROVIDE US THE CHANCE TO EARN THAT BUSINESS!

Prime Power Generators

When it comes to a reliable, cost effective generator solution, a 1800 RPM, liquid cooled, diesel generator will by far be the most cost effective over the system's life cycle. By following the installation manual and recommended maintenance schedule, these generators have proven, over and over, to operate up to 25,000 hours before any repairs need to be made. With this type of reliability and longevity, these generators will last as long as the PV system.

NORTHERN LIGHTS DIESEL GENERATORS

Northern Lights' unmatched reputation for durable and reliable power solutions began with the land-based line. From the extremes of the Arctic north slope to the deserts of the Middle East, Northern Lights industrial generator sets have proven their mettle for over four decades. With unmatched versatility and quality, Northern Lights industrials are engineered to keep the lights on with a emphasis on economic operation, but never at the expense of reliability. Whether your application is prime or stand by, Northern lights has a solution for you.

6 kW NL673L3

Is clean, small, and light. At less than 33 inches long, it will fit easily into your power shed or utility truck. And at 368 pounds, it can be moved between job sites without a trailer.

9 kW NL773LW3

Just add a battery and fuel, and you have power at the touch of a button. To ensure ease of maintenance, all the key service points are on a common side. With proper maintenance, Northern Lights generator sets have logged over 25,000 hours.

GSC300 Auto Start Control Panel

To ensure proper integration with the inverter system, it is important to ensure the GSC300 is utilized. Simply request the generator supplier to install the GSC300 control panel.

Accessories

Sounds enclosures, electric fuel pumps and more.

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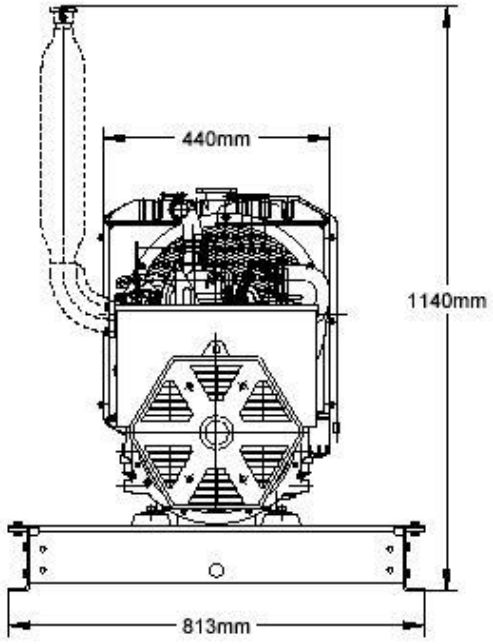
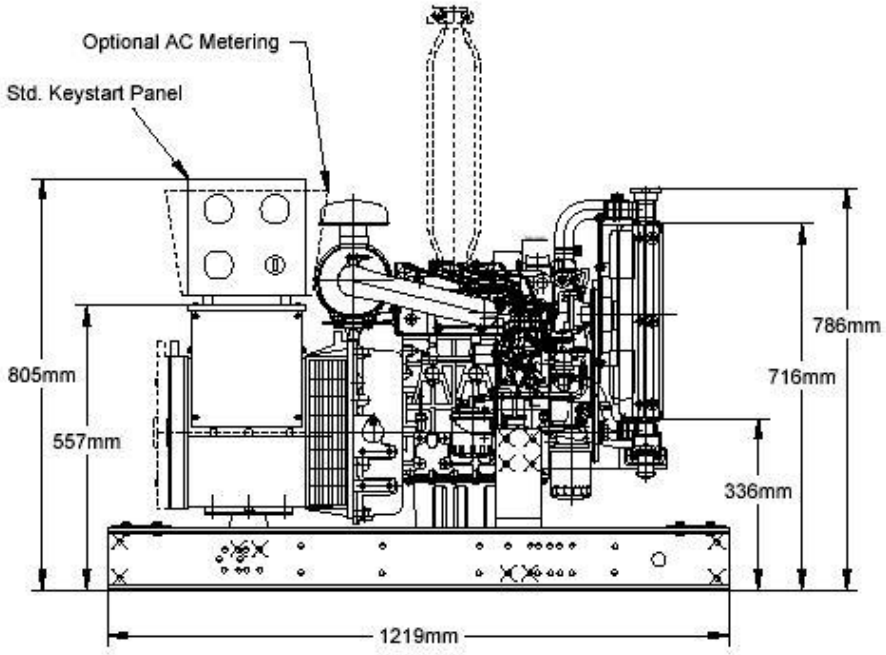
Prime Power Generators

KUBOTA POWERLINE DIESEL GENERATORS

Kubota Powerline generators offer excellent value in a compact layout. With the trusted Kubota name, these generators will offer 20,000+ hours of service when the maintenance requirements are followed. These units are fully load test and ran as part of the assembly process. These units are supplied with a battery, so simply add a fuel supply and they are ready to run.





<u>Northern Lights vs. Kubota: What are the differences?</u>

- Northern Lights offers a more intelligent layout with better fit 'n' finish
- Northern Lights offers slightly tighter tolerances when it comes to voltage and frequency regulation.
- The control system on the Northern Lights generator is more advanced.
- The Northern Lights generators offer slightly quieter operation.

Overall, the build quality of the Northern Lights is better. However, when it comes down to basic reliability, both units will provide 20,000+ hrs of operation.

For most off grid applications, the Kubota Powerline will offer the best value and will provide the lowest cost of ownership.

For more information and pricing on either the Northern Lights or Kubota Powerline generators, please contact a SUNFIND Sales Representative.

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Light Duty Generators

Light Duty generators will provide a fraction of the longevity as a Prime Power Generators. They come in both diesel and gas (gasoline / propane / natural gas). These generators utilize a 3600 RPM Engine and two pole generator. While these generators have a lower initial cost, in most PV systems, multiple units will be required over the life of the PV System (40 years).

NOTE: Sunfind Solar Products does not recommend light duty generators. This information is provided for informational purposes only.

Kubota GL Diesel Generators

If a 3600 RPM generator is required, a Kubota diesel will be the best option. With the recommended maintenance, this generator will provide up to 5,000 hrs of run time before repairs need to be made.

Pros:

1. Lower initial cost: $6,500
2. Can be purchase at most Kubota AG centers across Canada

Cons:

1. 5,000 hours of service: significantly less than a prime power unit
2. Difficult to automate with Inverter Systems. May have to manually start generator.

Stand By Generators: 3600 RPM, Air Cooled, Two Pole Generator

These type of generators offer the least reliability and longevity. These units also have NO WARRANTY when used off grid.

Cost: $2,500-$5,550 Expected Life: 500-2,0000 hours.

Manufacturers:

- Generac: *least reliable*
- Briggs and Stratton
- Onan (Cummins Onan): *Most reliable*
- Kohler

Contact Info

KOHLER

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Delta, BC Tel: 877-946-5531
www.frontierpower.com

Frontier Power Products Ltd.
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Frontier Power Products Ltd.
Winnipeg, MB Tel: 877-949-1526
www.frontierpower.com

Frontier Power Products Ltd.
Edmonton, AB Tel: 877-455-2260
www.frontierpower.com

ONAN

Cummins Western Canada
Edmonton, AB Tel: 780-455-2151
www.westerncanada.cummins.com

Cummins Western Canada
Calgary, AB Tel: 403-569-1122
www.westerncanada.cummins.com

Cummins Western Canada
Saskatoon, SK Tel: 306-933-4022
www.westerncanada.cummins.com

Cummins Western Canada
Surrey, BC Tel: 604-882-5000
www.westerncanada.cummins.com

NORTHERN LIGHTS

Cullen Diesel Power Ltd
Campbell River, BC Tel: 250-286-0636
www.renownindustries.com

Marine Systems & Coastal Engine
Vancouver, BC Tel: 604-985-5326
www.marinesystems.ca

Renown Industries
Edmonton, AB Tel: 780-435-3447
www.renownindustries.com

Eco Diesel Solutions
Lethbridge, AB Tel: 403-329-4368
www.ecodieselcanada.com

Generators

GENERATOR RUN TIME

A back-up generator is required due to the amount of light we receive during seasonal changes. During the spring, summer and fall months, a solar system will typically generator enough power to meet the load's requirements. However, as winter approaches, generator run time will quickly increase.

Most applications that utilize a 2kW array will consume roughly 7kW per day during the summer months and roughly 14kW per day during winter months, with December typically be the highest generator run time month. During the winter, energy consumption will typically double due to the requirement for heating systems and lighting. During the coldest months, which typically are December and January, heating systems will contribute to the majority of electrical consumption.

THEY KEY TO REDUCING GENERATOR RUN TIME IS A PROPERLY DESIGNED SOLAR SYSTEM AND INTELLIGENT USE OF ELECTRICITY

DATA NUMBERS

All data is sourced from NASA's propriety Atmospheric Science Data Center.

- over 200 satellite-derived solar energy parameters
- 22 years of data
- solar energy data for 1195 ground sites from around the world

This is the data Sunfind Solar Products utilizes for all system sizes.

ALBERTA SOLAR INSOLATION

This is the available kilowatts per meter square per day in Alberta. This data tells us how much solar energy per day a particular solar array will produce.

JAN = 2.6 FEB: 3.7 MAR=4.8 APRIL: 5.7 MAY=5.8 JUNE=5.9
JULY=6.2 AUG=5.8 SEPT=4.8 OCT=3.7 NOV=3.0 DEC=2.8

The data shows us that during the summer months, there is 2-3 times the energy available vs. the winter months.

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Generators

GENERATOR RUN TIME CONTINUED…

GENERATOR RUN TIME:
Based on load consumption of 7kW per day during the summer and up to 14kW per day during the winter. A 2.0kW solar system is typically used in the application. Most common PV size for a off-grid home.

MONTH	PV GENERATION	CONSUMPTION	GENERATOR RUN TIME
January	156 kW	367 kW	76 hours
February	222 kW	315 kW	34 hours
March	259 kW	Less than generation	0 hours
April	273 KW	Less than generation	0 hours
May	278 kW	Less than generation	0 hours
June	283 kW	Less than generation	0 hours
July	297 kW	Less than generation	0 hours
August	278 kW	Less than generation	0 hours
September	259 kW	Less than generation	0 hours
October	222 kW	315 kW	34 hours
November	180 kW	368 kW	68 hours
December	168 kW	420 kW	92 hours

AVERAGE TOTAL YEARLY GENERATOR RUN TIME: 304 hours plus equalization. Typical generator run time per year is 200-400 hours.

It is more economical to increase the solar system to allow the generator to run 200 hrs / year verse allowing the generator to run 400 hrs per year.

NOTE: Generator run time was calculated using the Xantrex XW 4548. Generator run time will vary depending on inverter system and the size of the charger.

Generators

GENERATOR RUN TIME CONTINUED…

REDUCING GENERATOR RUN TIME

1. REDUCE CONSUMPTION

- Many off grid homes have a wood burning stove to compliment a traditional furnace / boiler system.
- Turn the heat down at night and when away
- Energy efficient lighting: Fluorescent and LED
- Adding an additional external charger to older inverter/chargers that have smaller chargers.

2. INCREASE ENERGY PRODUCTION:

- Add additional solar modules allows for more energy production, thus reducing generator run time
- Ensuring modules are orientated correctly. Due South. 65-75degree angle during winter months.

Our current SUNFIND HP systems utilize the Xantrex inverter systems. These system both provide energy production data as well as energy consumption data. This data can be compiled for troubleshooting and educational purposes.

IT IS IMPORTANT TO DISCUSS YOUR GENERATOR INSTALLATION WITH YOUR GENERATOR SUPPLIER TO ENSURE IT IS PERFORMED PROPERLY. ALSO, IT IS IMPORTANT THAT THE PROPER SAFETY CODES ARE FOLLOWED WITH ANY TYPE OF GENERATOR INSTALLATION.

There are two types of installation possibilities: OUTDOOR and INDOOR.

OUTDOOR:

This type of installation is relatively simple. This type of installation will require the generator to have a outdoor rated enclosure. Most modern stand-by and prime power generator are available with the proper enclosure from the manufacturer.

If the generator is going to be operating in colder temperatures (-5 Celsius or colder) a cold weather kit is required. It is recommended to always request this feature if your generator is going to operate in colder temperatures.

ADVANTAGES:

1. Relatively simple installation
2. Easy to supply generator with adequate air flow for cooling

Generators

DISADVANTAGES
1. Generator requires cold weather kit to allow proper operation in cold weather
2. Always the possibly of the generator not starting when required in extremely cold weather.

This type of installation are definitely most desirable for locations where below freezing temperatures are not too common. For those locations where cold weather is a concern, a decision will have to be made whether having the generator outside will be more cost effective than inside.

Points to Ponder:

1. Have the generator outside with the cold weather kit plugged in will utilize additional power. That means more generator run time during the cold months. We recommend that the cold weather kit is used if the temperature is going to be below -5 Celsius.
2. Having the generator outside does increase the chance of not starting when needed the most during the winter months.

<u>INDOOR:</u>
This type of installation is more technical and requires a little more planning.

NOTE:
DUE TO THE TECHNICALITIES OF INSTALLING A GENERATOR INDOORS, THE GENERATOR SUPPLIER / TECHNICIANS NEED TO BE INVOLVED IN THE PROCESS. ENSURE YOU DISCUSS THESE ISSUES WITH YOUR SUPPLIER SO THEY CAN PROPERLY ADVISE YOU DEPENDING ON YOUR GENERATOR TYPE.

ADVANTAGES
1. Generator is housed in a warm, safe location
2. Much easier starting during the winter months. No need to use a cold weather kit

DISADVANTAGES
1. Additional cost and planning for indoor installation: ventilation, cooling and safety.

INSTALLATION SCENARIOS:
<u>Central Power Shed</u>: This type of installation is common for installations with a mobile home. The inverter system and battery bank are housed in a insulated and heated shed. With a larger shed, the generator can be installed with the rest of the equipment. This would allow all the equipment, including the generator, to stay nice and warm even during the cold weather months.

Generators

Home with Garage: This is a common installation. While the generator should not be installed directly in the garage, a dedicated generator room can be built off of the garage. Typically this dedicated room will have a concrete floor with a heat loop installed in the floor from the main garage. This keeps the room above freezing during the winter months.

Home with Separate Shop: With a larger detached shop, a dedicated room can be built to house the inverter system, battery bank and generator. This allows the entire system to stay in a room that is heated.

TECHNICAL ASPECTS OF INSTALLING A GENERATOR INDOORS

NOTE: THESE ARE ONLY GUIDELINES. PLEASE CONSULT WITHYOUR GENERATOR SUPPLIER/TECHNICIAN TO ENSURE THE INSTALLATION IS SAFE AND WILL MEET THE GENERATORS REQUIREMENTS.

When a generator is installed and operated in an indoor environment, adequate ventilation for heat dissipation and combustion is required. Ventilation is typically done through the use of an air inlet, air outlet exhaust fan and/or other ventilation openings.

General Rules:

1. The air inlet must be capable of moving enough air through the room to provide the correct minimum Cubic Feet per Minute (CFM) cooling for the generator as specified by the generator supplier / manufacturer.
2. Locate air inlet, ventilation and air outlet opening in a structure so that already exhausted air will not be drawn back in.
3. Whenever possible, face the generator air inlet opening away from the wind.
4. When possible, position the engine of air cooled generators in line with the air inlet per manufacturer's recommendations.
5. Liquid cooled engines need to be positioned as per manufacturer's recommendations

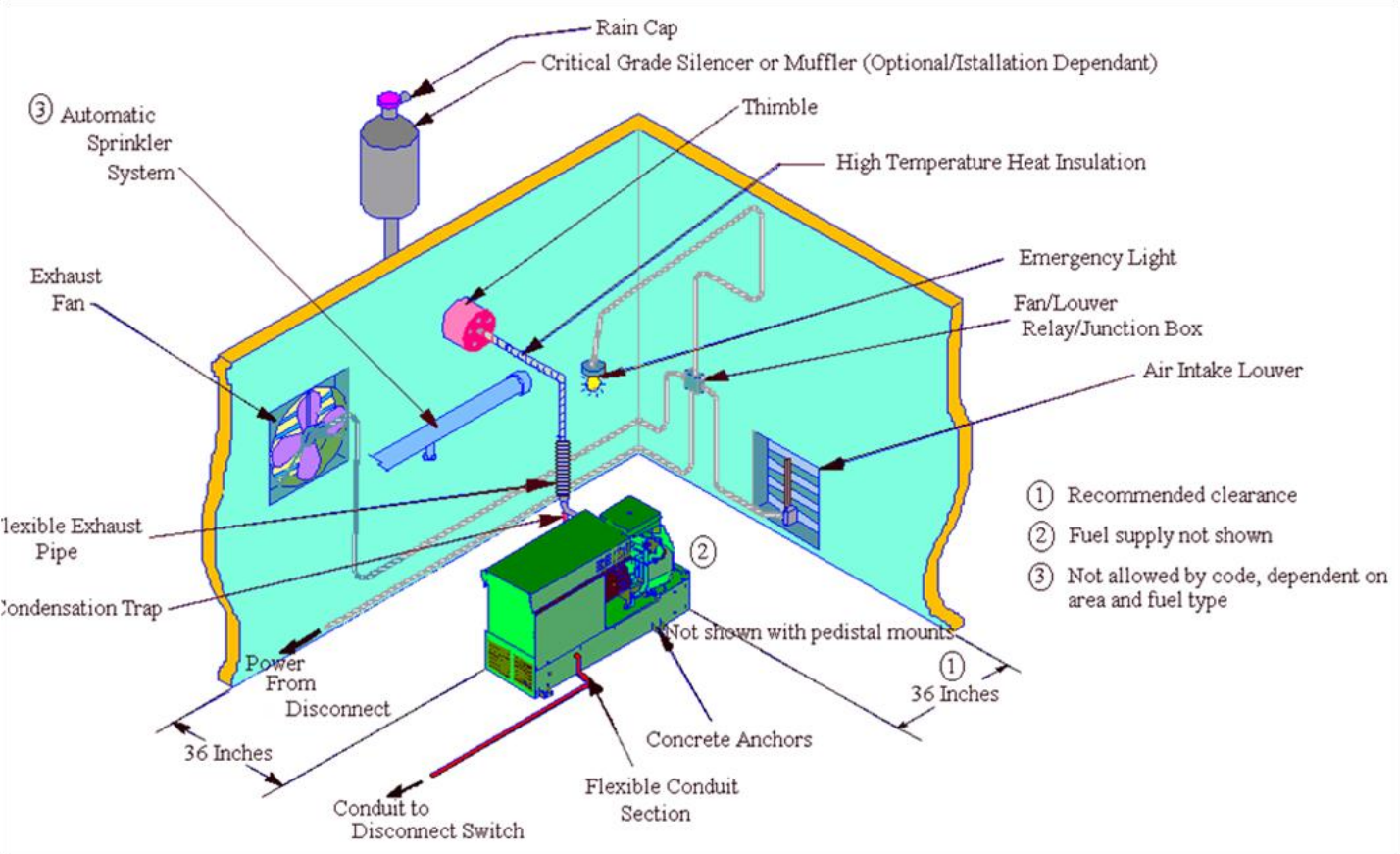
Generators

EACH GENERATOR WILL HAVE DIFFEENT REQUIREMENTS. CONTACT YOUR GENERATOR SUPPLIER FOR MORE INFO.

Some indoor installations may require the use of one more exhaust fans / air inlet louvers to provide adequate ventilation during generator operation. If the items are required, here are some general rules:

1. Exhaust fans must have the proper capacity for the specific application
2. Fans must me located so that engine exhaust gases will not re-enter the building.
3. Power is required to operate the exhaust fan / louvers. This power can be provided directly from the generator. This allows power to be applied to these loads only when the generator is running.

Ensuring that the generator is properly installed is going to ensure the generator system will operate easily and efficiently with the solar system. When it comes to installing the generator, generator installation requirements will need to be provided from the generator supplier.



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