

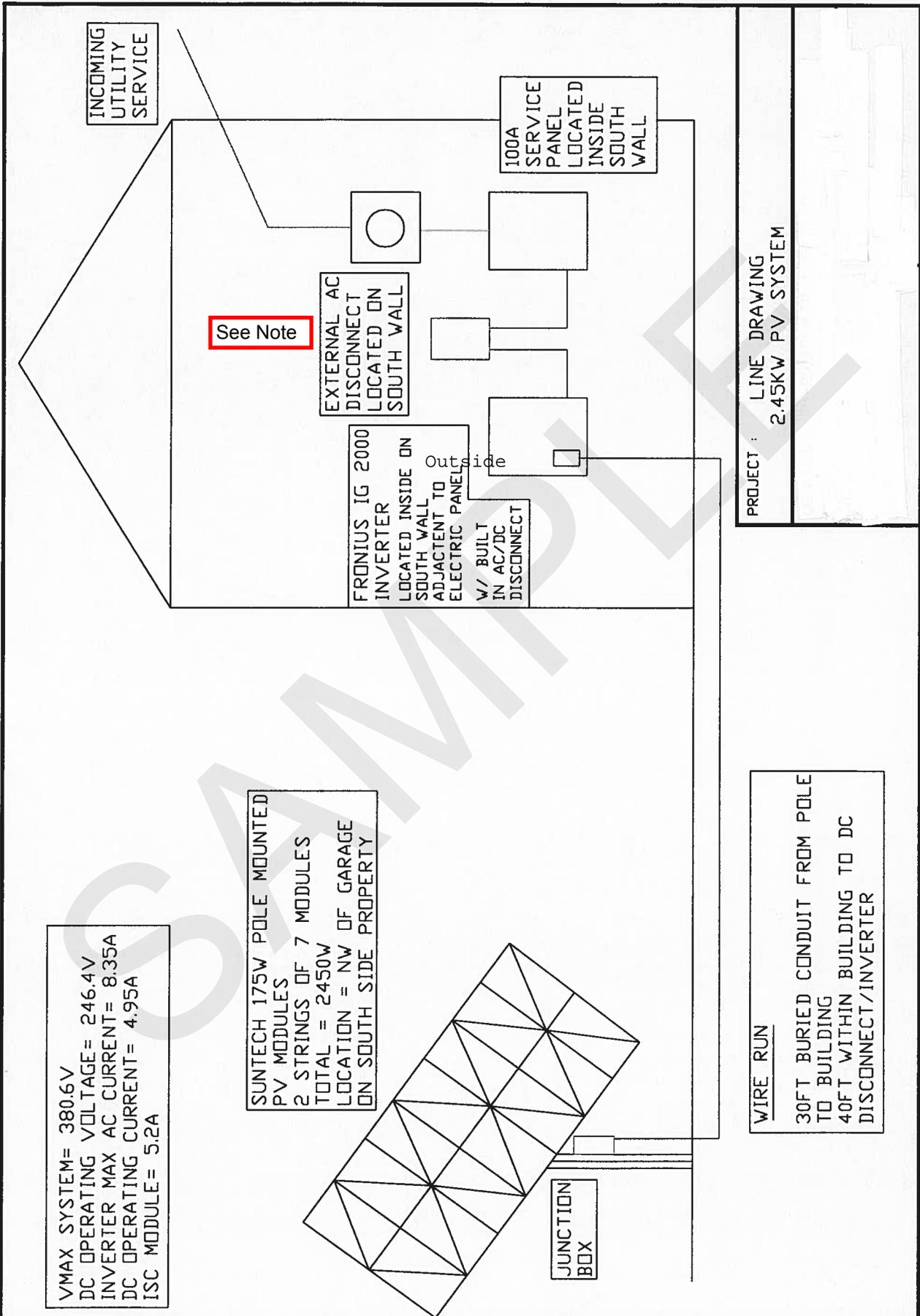


**“SAMPLE”
SUPPORTING DOCUMENTATION
NET METERING APPLICATION**

- A critical safety requirement your system **MUST** include is a manual, visible, accessible AC disconnect switch located between the inverter and the AC panel. This AC disconnect switch needs to be accessible to Ameren Missouri at all times. **PLEASE NOTE THE SPECIFIC LOCATION OF THIS AC DISCONNECT SWITCH ON YOUR ONE-LINE.**
- If the renewable installation is designed to operate in parallel with the Ameren system, then the installation must meet the requirements as specified in IEEE-1547, and more specifically, for inverters UL-1741. **NOTE:** Due to the anti-islanding requirements of IEEE-1547 and UL-1741, the example installation as shown would not allow for the customer to use their generation as backup generation. In other words, if Ameren’s system is down your renewable generation will not operate either.
- If customer intends to operate their renewable system independent of Ameren’s system during the times customer has lost their Ameren supply, then Ameren will require other components in the customer’s design for utility safety reasons. Thus the customer’s design will differ from this sample, and requires Ameren approval.
- The utility bi-directional meter is used for billing data. Only kWh actually fed back into the grid will appear on the bi-directional meter and show on your Ameren Missouri bill. If the renewable system is producing power and you are consuming power simultaneously, the bi-directional meter does not record the produced or used power. Check with your installer if you are interested in optional monitoring systems, such as Fat Spaniel, for more detailed renewable system usage and production data.

Be sure to contact Ameren Missouri BEFORE installation of your renewable energy system.

If you have any questions please contact licosgrove@ameren.com or 314.554.2649.



VMAX SYSTEM= 380.6V
 DC OPERATING VOLTAGE= 246.4V
 INVERTER MAX AC CURRENT= 8.35A
 DC OPERATING CURRENT= 4.95A
 ISC MODULE= 5.2A

SUNTECH 175W POLE MOUNTED
 PV MODULES
 2 STRINGS OF 7 MODULES
 TOTAL = 2450W
 LOCATION = NW OF GARAGE
 ON SOUTH SIDE PROPERTY

See Note

EXTERNAL AC
 DISCONNECT
 LOCATED ON
 SOUTH WALL

FRONIUS IG 2000
 INVERTER
 LOCATED INSIDE ON
 SOUTH WALL
 ADJACENT TO
 ELECTRIC PANEL
 W/ BUILT
 IN AC/DC
 DISCONNECT

JUNCTION
 BOX

100A
 SERVICE
 PANEL
 LOCATED
 INSIDE
 SOUTH
 WALL

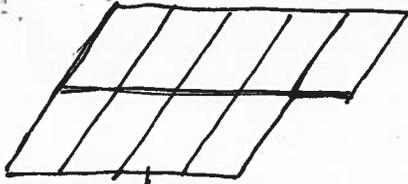
INCOMING
 UTILITY
 SERVICE

PROJECT : LINE DRAWING
 2.45KW PV SYSTEM

WIRE RUN
 30FT BURIED CONDUIT FROM POLE
 TO BUILDING
 40FT WITHIN BUILDING TO DC
 DISCONNECT/INVERTER

NOTE: This is a critical safety requirement. Your system **MUST** include a manual visible AC disconnect switch between the inverter and the AC panel accessible at all times to Ameren Missouri personnel. Please note the specific location of this AC disconnect switch on your one-line drawing.

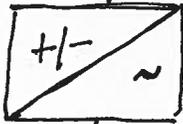
LINE DIAGRAM
1.8 KW



PV Array
Modules = GE 200watt
9 modules in series
1800 Watt total
Location = south side house over garage



DC Disconnect
located outside
south side house
to right of garage



Inverter
Brilliance GE
location - inside
beside breaker panel
southside of home



AC Disconnect
located outside
south side house
to right of garage

See
Note

Incoming
Utility
Service



Utility Bi-directional meter



Main Panel
located inside
downstairs - south wall

NOTE: This is a critical safety requirement. Your system **MUST** include a manual visible AC disconnect switch between the inverter and the AC panel accessible at all times to Ameren Missouri personnel. Please note the location of this AC disconnect switch on your one-line drawing.



FRONIUS IG

GRID-TIED INVERTERS FOR PHOTOVOLTAIC SYSTEMS

Light Weight

At 26 lbs, the FRONIUS IG inverters are the lightest grid-connected inverters making them easy and cost effective to install.

Flexible

The wide voltage range of 150-500 V allows you to use different types of modules and system configuration possibilities.

Lower Cost

Integrated UL approved DC & AC disconnects which reduce installation time and complexity - often eliminating the need for additional disconnects.

LCD Display

User-friendly and comes standard with every FRONIUS IG; tracks more than 20 critical system performance parameters.

Plug-and-Play

Expansion slots in the inverter allow you to easily upgrade the inverter with data communication options.

Reliable

Fronius has been in business for over 60 years and has more than 200,000 FRONIUS IG inverters installed worldwide.

Warranty

10 year Premium Warranty.



POWERING YOUR FUTURE

FRONIUS IG

FRONIUS IG 2000 / 3000 / 2500-LV - Specifications

DC Input Data	FRONIUS IG 2000	FRONIUS IG 3000	FRONIUS IG 2500-LV
Recommended PV power	1500 – 2500 Wp	2500 – 3300 Wp	1800 – 3000 Wp
Max. DC input voltage	500 V	500 V	500 V
Operating DC voltage range	150 – 450 V	150 – 450 V	150 – 450 V
Max. usable DC input current	13.6 A	18 A	16.9 A
AC Output Data	FRONIUS IG 2000	FRONIUS IG 3000	FRONIUS IG 2500-LV
Maximum output power @40° C	2000 W	2700 W	2350 W
Nominal AC output voltage	240 V		208 V
Utility AC voltage range	212 – 264 V (240 V +10% / -12%)		183 – 227 V
Maximum AC current	8.35 A	11.25 A	11.25 A
Maximum utility back feed current	0.0 A	0.0 A	0.0 A
Operating frequency range	59.3 – 60.5 Hz (60 Hz nom)		
Total Harmonic Distortion THD	< 5%		
Power Factor (cos phi)	1		
General Data	FRONIUS IG 2000	FRONIUS IG 3000	FRONIUS IG 2500-LV
Max. efficiency	95.2%	95.2%	94.4%
Consumption in stand-by	< 0.15 W (night)		
Consumption during operation	7 W		
Enclosure	NEMA 3R		
Size (l x w x h)	18.5 x 16.5 x 8.8 inches (470 x 418 x 223 mm)		
Weight	26 lbs. (11.8 kg)		
Ambient temperature range	-5 to 122 °F (-20 to +50 °C)		
Cooling	controlled forced ventilaton		
Integrated AC and DC disconnects	standard UL approved DC & AC disconnects		
Protections			
Ground fault protection	Internal GFDI, in accordance with UL 1741		
DC reverse polarity protection	Internal diode		
Islanding protection	Internal, in accordance with UL 1741, IEEE 1547		
Over temperature	Output power derating		
Surge protection	Internal DC & AC protection, Tested to 6 kV		
Compliance			
Safety	See Note	UL 1741	
EMI	FCC Part 15; Class A & B		
Anti-Islanding protection	UL 1741, IEEE 1547		
Ground fault detector and interrupter	Compliant with NEC Art. 690 requirements, UL 1741		
Miscellaneous			
Maximum AC over current protection	Two-pole, 15 / 20 A circuit breaker		
AC wire sizing	Use maximum AWG 6 194°F (90 °C) copper wire		
DC wire sizing	Use maximum AWG 8 194°F (90 °C) copper wire		
AC disconnect	16 A		
DC disconnect	25 A		
Warranty	10 year Premium Warranty is Standard		

NOTE: Inverters **MUST** meet UL-1741 certification. Installation must meet the requirements as specified in



Fronius USA LLC
 Solar Electronic Division
 10421 Citation Drive
 Suite 1100 Brighton, Mi 48116
 Phone: 810-220-4414
 Fax: 810-220-4424
 E-Mail: pv-us@fronius.com
 www.fronius-usa.com

■ GEPVp-200-MS

200 WATT PHOTOVOLTAIC MODULE
FOR 600 VOLT APPLICATIONS

FEATURES

- 54 poly-crystalline cells connected in series
- Peak power of 200 watts at 26.3 volts
- Designed for optimum use in residential and commercial grid-tied applications
- 20-year limited warranty on power output, 5-year limited warranty on materials and workmanship*
- Junction box and 1.8 meter cable with easy-click Solarlok Connectors included

BENEFITS

- Output power tolerance of +/- 5%
- Robust, clear anodized aluminum frame with pre-drilled holes for quick installation

CERTIFICATIONS

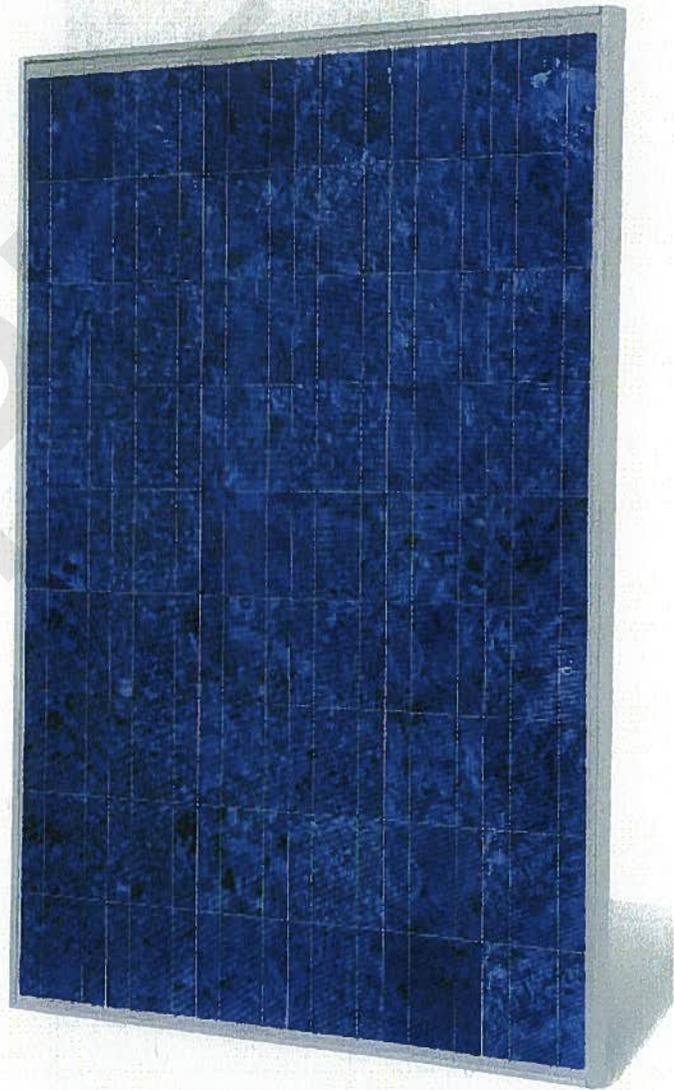
The GEPVp-200-MS Module meets the following requirements:



UL-1703



IEC-61215

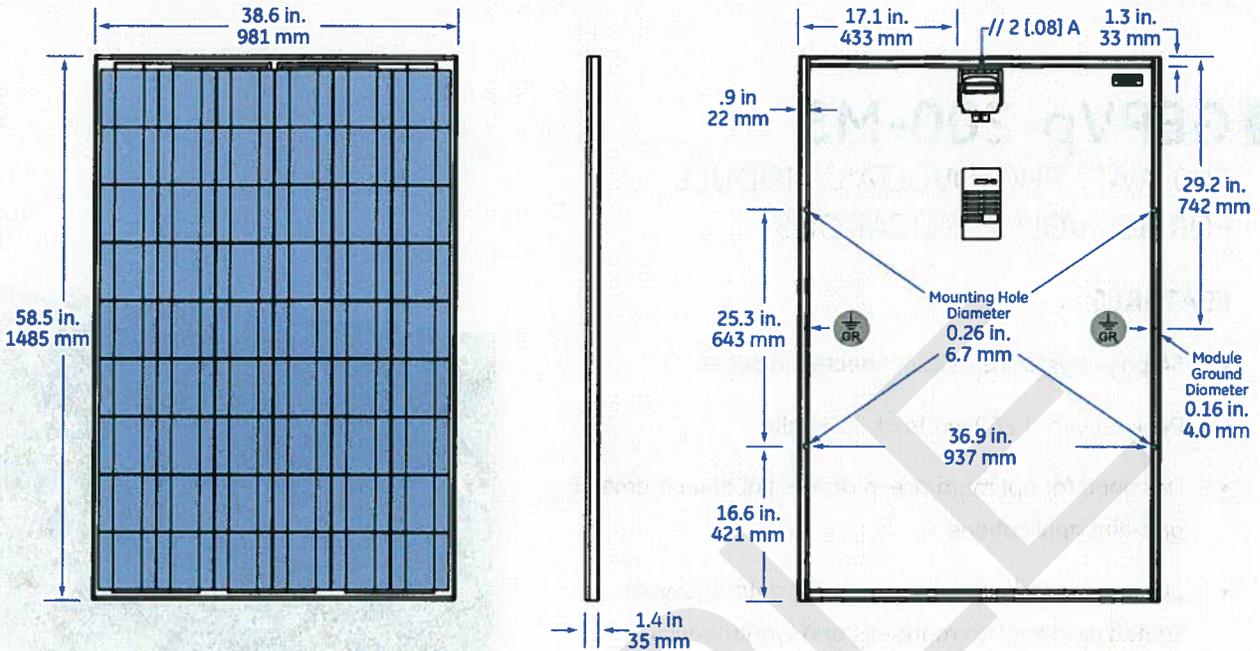


*Refer to GE Energy Product Warranty for specific details



imagination at work

PHYSICAL CHARACTERISTICS

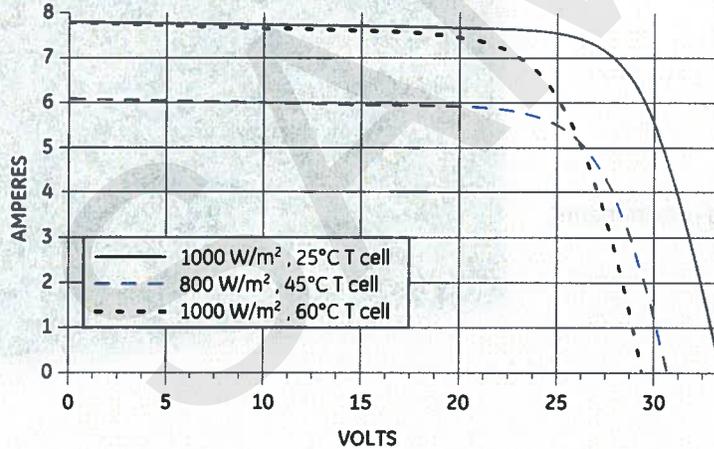


Physical Design Properties

Weight	39.0 lb [17.7 kg]
Weight (Wind) Bearing Potential	50 lbs/ft ² [125 mph equivalent]
Hailstone Impact Resistance	1" @ 50 mph [25 mm @ 80 kph]

ELECTRICAL PERFORMANCE

Typical IV Curve for GEPVp-200-MS Module



Typical Performance Characteristics

Peak Power (Wp)	Watts	200
Max. Power Voltage (Vmp)	Volts	26.3
Max. Power Current (Imp)	Amps	7.6
Open Circuit Voltage (Voc)	Volts	32.9
Short Circuit Current (Isc)	Amps	8.1
Short Circuit Temp. Coefficient	mA/°C	5.6
Open Circuit Voltage Coefficient	V/°C	-0.12
Max. Power Temp. Coefficient	%/°C	-0.5
Max. Series Fuse	Amps	15
Max. System Voltage	Volts	600
Normal Operating Cell Temperature [NOCT]	deg. C	45

IV parameters are rated at Standard Test Conditions (Irradiance of 1000 W/m², AM 1.5G, cell temperature 25°C). As with all poly-crystalline PV Modules, during the stabilization process that occurs during the first few days in service, module power may decrease approximately 3% from typical maximum power due to a phenomenon known as Light Induced Degradation (LID). All measurements are guaranteed at the laminate leads. NOCT is measured at 800 W/m², 20 deg. C ambient, and 1 m/s windspeed.



GE Energy
231 Lake Drive
Newark, DE 19702
302-451-7500

ge-energy.com/solar

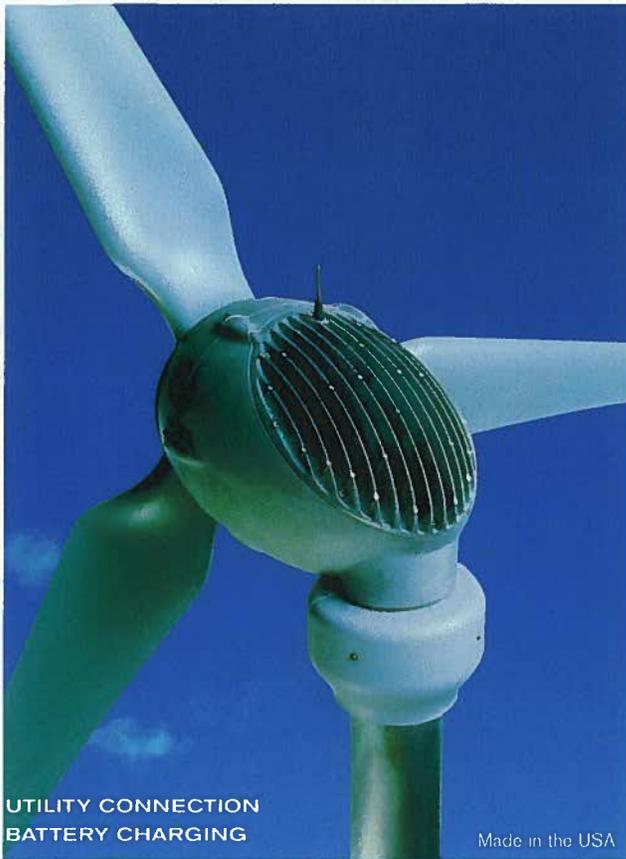
SKYSTREAM 3.7[®]

2.4 KW DISTRIBUTED WIND ENERGY SYSTEM

Take Control of Your Energy Needs

Designed for homes and small businesses, the Skystream 3.7[®] converts wind into clean electricity you can use. It's the first compact, user-friendly, all-inclusive wind generator (with controls and inverter built in) designed to provide quiet, clean electricity in very low winds.

With a rated capacity of 2.4 kW, Skystream can help offset a household or small business's total energy needs.¹ And because it operates at a low RPM, Skystream is as quiet as the trees blowing in the wind.



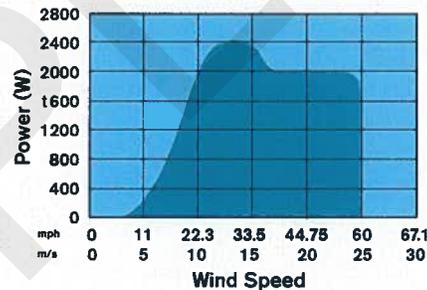
UTILITY CONNECTION
BATTERY CHARGING

Made in the USA

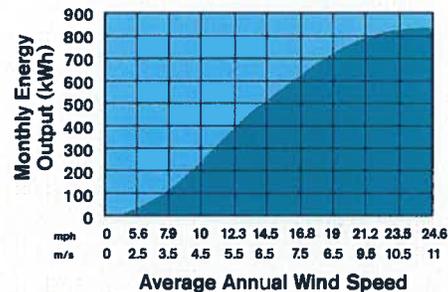
Technical Specifications

Rated Capacity	2.4 kW
Rotor Diameter	12 ft (3.72 m)
Weight	170 lb (77 kg)
Swept Area	115.7 ft ² (10.87 m ²)
Type	Downwind rotor with stall regulation control
Direction of Rotation	Clockwise looking upwind
Blades	(3) Fiberglass reinforced composite
Rated Speed	50 - 330 rpm
Maximum Tip Speed	216.5 ft/s (66 m/s)
Alternator	Slotless permanent magnet brushless
Yaw Control	Passive
Grid Feeding	120/240 VAC Split 1 Ph, 60 Hz 120/208 VAC 3 Ph compatible, 60 Hz (Check with dealer for other configurations)
Battery Charging	Battery Charge Controller kit available for battery charging systems
Braking System	Electronic stall regulation with redundant relay switch control
Cut-in Wind Speed	8 mph (3.5 m/s)
Rated Wind Speed	29 mph (13 m/s)
User Monitoring	Wireless 2-way interface
Survival Wind Speed	140 mph (63 m/s)
Warranty	5 year limited warranty

POWER²



MONTHLY ENERGY



FIVE YEAR WARRANTY



Southwest Windpower

1801 W. Route 66
Flagstaff, AZ 86001 USA

928.779.9463

www.skystreamenergy.com

Makers of Skystream 3.7[®] / AIR / Whisper

¹ Actual savings is based on wind speed at the site and monthly energy consumption.

² Data measured and compiled by USDA-ARS Research Lab, Bushland, TX.

SKYSTREAM 3.7*

SMALL WIND TURBINE

Inverter Specifications

Manufacturer:	Southwest Windpower
Model:	Skystream 3.7
Inverter Type:	True sine wave, utility-interactive
Generator Type:	Permanent magnet, synchronous, rectified and inverted to grid
Commutation Type:	Line commutation
Nameplate/Rated Capacity:	2.3 [kW] continuous at 25 C, 2.4 [kW] peak
KVA Capacity:	2.3 [KVA] continuous at 25 C, 2.4 [KVA] peak
Power Factor:	99.9% at rated capacity
Nominal output voltage (AC):	120/240 [VAC] or 120/208 [VAC]
Max continuous output current:	10 [A] at 120/240 [VAC] or 120/208 [VAC] or 11.54 [A] at 120/208 [VAC]
Ambient temperature range:	-20 C to 50 C
Total Harmonic Distortion:	2.7% at rated capacity, meets UL 1741 and IEEE 1547 requirements
Efficiency:	93% at rated capacity
Frequency Accuracy:	+/- 0.05 [Hz]
Voltage Accuracy:	+/- 2.0V (L-N)
Surge Rating:	IEEE1547 Surge Rating B3
Short Circuit Current:	720A peak before fast acting fuses open
Enclosure type:	3R (Rainproof)

Utility Interactive Ready

Meets UL 1741, Standard for Safety for Inverters, Converters, Controllers and Interconnections System Equipment for Use with Distributed Energy Resources, 1st Ed.; CAN/CSA-C22.2 No.107.1-01, 3rd Ed., General Use Power Supplies, IEEE 1547.

Configurations

Grid Type	Voltage Range [VAC_L-N]	Voltage Range [VAC_L-L]	Frequency Range [Hz]	Line Configuration
120/240 [VAC], 60 [Hz], Split Single Phase	105.6 - 132.0	211.2 - 264.0	59.3 - 60.5	L - N - L
120/208 [VAC], 60 [Hz], Three Phase	105.6 - 132.0	182.9 - 228.6	59.3 - 60.5	L - N - L

SKYSTREAM 3.7*

SERIAL

This unit is provided with fixed trip limits and shall not be aggregated above 30KW on a single point of common connection.

configuration	120/240V	120/208V	240V
output power factor rating	1.0		
operating voltage range (ac)	106-132V 1-n	1212-264V	
operating frequency range	59.3-60.5 Hz		
nominal output voltage (ac)	240V	208V	240V
normal output frequency	60Hz		
max continuous output current	10A	11.5A	10A
rated output power	2300W		
peak output power	2400W		
software revision	REV 2.02.00		
max ambient temperature	50C. output is reduced above 60C. nacelle		

Caution Risk of electric shock, do not remove cover. No user serviceable parts inside. Refer to qualified personnel.

Caution Risk of electric shock, both AC and DC voltage sources are terminated inside this equipment. Disconnect AC source and restrain turbine blades before servicing.

Skystream utility interactive inverter
E300731

Enclosure Type
3R Rainproof
IEEE 1547 Surge Rating B3

Southwest Windpower
Renewable Energy Made Simple
made in the USA

NOTE: Inverters **MUST** meet UL-1741 certification. Installation must meet the requirements as specified in IEEE-1547.

Southwest Windpower

1801 W. Route 66 928.779.9463
Flagstaff, AZ 86001 USA www.skystreamenergy.com

Makers of Skystream 3.7* / AIR / Whisper

Please recycle

