



SunSource®

Commercial Energy System

Bulletin No. 210604

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Supersedes July 2011

## PRODUCT SPECIFICATIONS

**SUNSOURCE®**  
Commercial Energy System



**ENERGENCE®**  
Saving Energy with Intelligence™

All EnergyGence® 3 through 6 ton commercial rooftop units are upgradable to the SunSource® Commercial Energy System.

Solar energy is first used to meet building cooling/heating demands. When the cooling and heating system is not operating, the system powers lighting, appliances and other electronic devices in the building. And in some locations, any surplus power is sent back to the utility company for a possible credit (check with your local utility company for availability).

The SunSource® Commercial Energy System consists of the following components:

- EnergyGence® 3 to 6 ton commercial rooftop units with factory installed Solar Power Entry Option (circuit protection for solar power and line voltage wiring).
- Solar Modules (up to 21 modules with three-phase power, up to 15 modules with single-phase power) may be used to vary the amount of electricity generated).
- Envoy Communications Gateway that monitors energy usage.
- Enphase Enlighten™ Performance Monitoring Website.

Wiring from the roof mounted solar modules is routed to the rooftop unit.

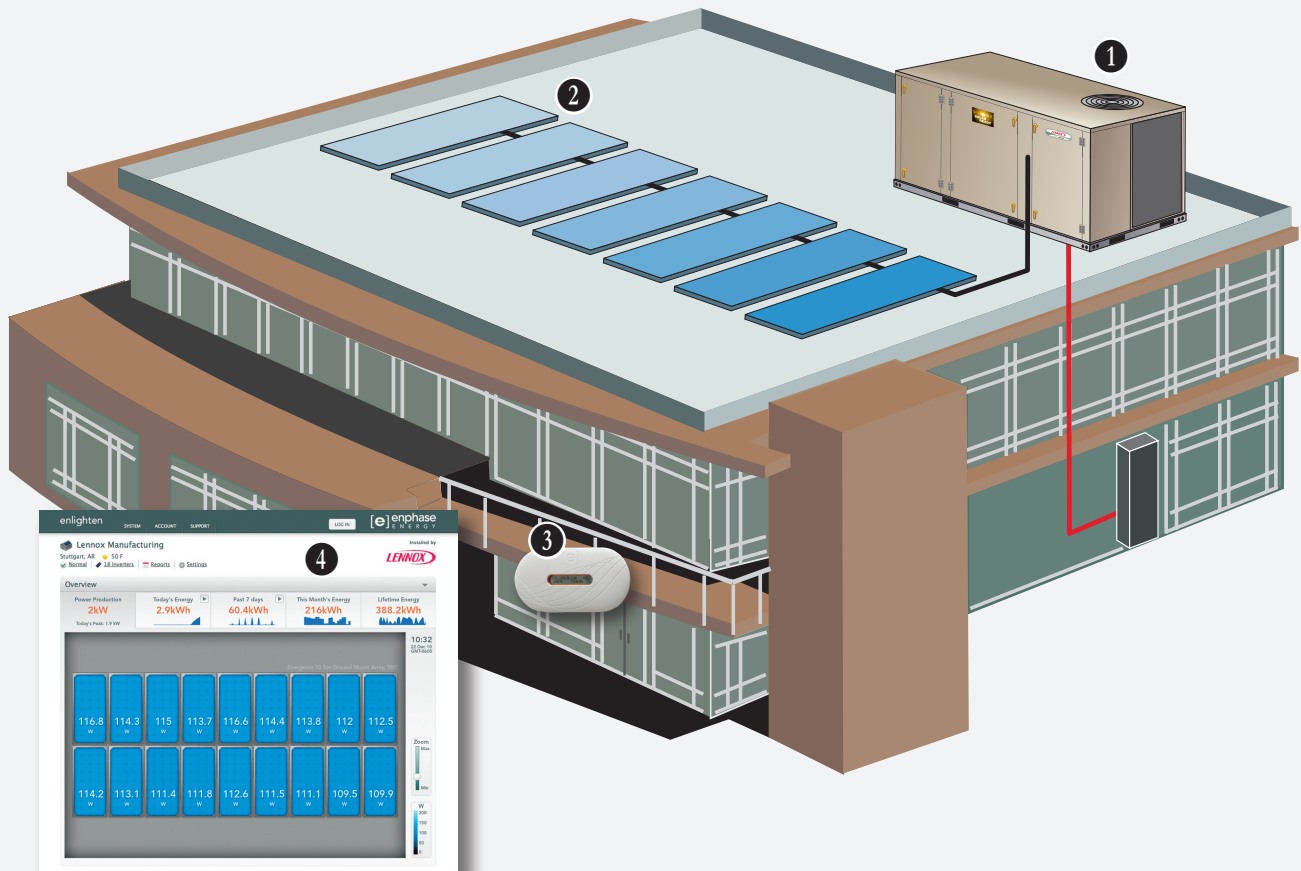
Refer to **SunSource® Commercial Energy System Applications and Design Guidelines** Manual (Corp. 1104-L4) for complete information on designing, sizing and installing a complete system.

**APPROVALS**

SunSource® Commercial Energy System is certified by ETL to conform to UL 1995 and NEC 690 standards.

The SunSource® Solar-Ready EnergyGence® rooftop units can help meet ASHRAE Green Standard 189.1 for high performance green buildings and help meet the LEED® EAC2 On-Site Renewable Energy Credit with the renewable energy credit.

## SUNSOURCE® COMMERCIAL ENERGY SYSTEM - OVERVIEW



- 1 Energycentre® 3 to 6 ton commercial rooftop unit (packaged electric/electric or packaged gas/electric) with Solar Power Entry Option (factory installed circuit protection for solar power and line voltage wiring).
- 2 Solar Modules (up to 21 modules with three-phase power, up to 15 modules with single-phase power) convert sunlight into electricity to operate rooftop unit. When unit is not operating, surplus power is used in the building to power appliances and other devices.
- 3 Envoy Communications Gateway send data to website for online monitoring.  
Standard Electrical outlet (1PH or 208 Wye) or connection to solar wiring (via Line Connection Filter) allows Gateway to detect Solar Module data from existing power wires.  
Broadband Internet Connection connect to online website for monitoring.
- 4 Enphase Enlighten™ Performance Monitoring Website allows you to see how the building energy system is working to lower utility operating costs. It also shows the environmental benefits of using renewable energy for the building.

### **WARRANTY**

**SOLAR MODULES** - 5-year limited warranty against defects from faulty workmanship or damage to the surface. The modules have a 12-year limited performance guarantee that covers a power output of less than 90% and a 25-year limited performance guarantee applies to a power output of less than 80%.

**MICROINVERTER** - 15-year limited warranty.

**ENVOY COMMUNICATIONS MONITOR** - 1-year limited warranty.

**LINE COMMUNICATIONS FILTER** - 1-year limited warranty.

## SUNSOURCE® COMMERCIAL ENERGY SYSTEM - COMPONENTS

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### FEATURED SYSTEM COMPONENTS

#### Enverge® LCH 3 through 6 Ton Packaged Electric/ Electric Rooftop Unit



Energy Star® qualified.  
Up to 17.00 SEER  
efficiency  
Net Cooling Capacity -  
34,800 to 72,000 Btuh

Optional Electric Heat - 7.5 to 30 kW

Prodigy™ control system.

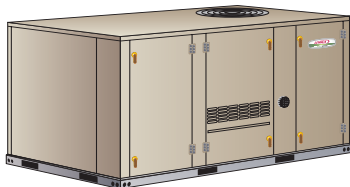
Quiet operation, as low as 75 dB.

R-410A refrigerant.

Dependable and efficient two-stage scroll compressor.

Optimized for use with optional Humiditrol®  
dehumidification system.

#### Enverge® LGH 3 through 6 Ton Packaged Gas/ Electric Rooftop Unit



Energy Star® qualified.  
Up to 17.00 SEER  
efficiency  
Net Cooling Capacity -  
34,800 to 72,000 Btuh

Gas Input Heat Capacity - 65,000 to 150,000 Btuh

Prodigy™ control system.

Quiet operation, as low as 75 dB.

R-410A refrigerant.

Dependable and efficient two-stage scroll compressor.

Optimized for use with optional Humiditrol®  
dehumidification system.

See separate Product Specifications bulletins for  
complete information.

### BASIC SYSTEM REQUIREMENTS

Sufficient south-facing open roof space.

Broadband Internet connection.

208/240 single or three-phase, 460V three-phase

Grid Interconnection Agreement.

See SunSource® Commercial Energy System Planning  
Checklist on page 17 for additional details.

### SOLAR POWER ENTRY OPTION

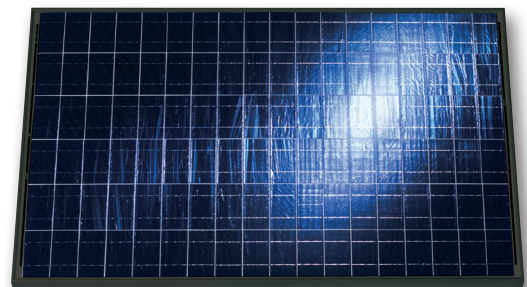
A factory installed power entry option is available for  
Enverge® commercial rooftop units that provides a  
connection point for SunSource® solar modules.

The option provides circuit protection (fuses) for the  
solar connection and rooftop unit components.

An externally accessible disconnect (non-fused) is  
also included to shutdown the system for service. Field  
wiring connections are made directly to the disconnect  
for the utility connection and to a pigtail for easy solar  
connection.

Local codes may require a field provided solar  
disconnect and/or a field provided fused HVAC  
disconnect.

### SOLAR MODULES



Converts solar energy into electricity.

Built-in racking hardware, wiring, grounding and  
microinverters.

Microinverters produce AC power synchronized to the  
utility grid.

Modules operate independently from each other  
allowing modules that are not shaded or dirty to operate  
with optimum performance.

Racking system is built-in to the module frame.

Painted flat black frame.

Solar modules are CSA listed for the US and Canada  
to UL Standard 1703 and meet National and Canadian  
Electrical Code requirements.

## SUNSOURCE® COMMERCIAL ENERGY SYSTEM - COMPONENTS

### **FLAT ROOF MOUNTING SYSTEM**

Flat Roof Mounting system consists of:

- Ballast Pans (ballast and non-ballast)
- Support Brackets with fastening screws
- Solar Splices with Lockwashers
- Left-hand and Right-hand End Bolts with Lockwashers
- Ground Lug Connector(s)

See Solar Module Configurations on page 8 for typical rooftop installation samples.

NOTE - Concrete pavers (15 lbs., 2 x 8 x 16 in.) are not furnished and must be field provided. Pavers are installed in the Ballast Pans to meet system weight and engineering requirements.

### **INSTALLATION KITS AND TOOLS**

#### **AC System Kit (Required - One per each rooftop unit)**

Kit includes interconnection cable required to adapt microinverter cable to field wiring. Includes plug to microinverter and pigtails for field wiring. Also includes the end cap to place on the last microinverter connection in the row. One kit required per rooftop unit.



Kit contains 6 ft. AC interconnection cable and end cap.

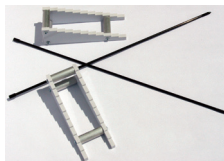
#### **AC 6 Foot Extension Cable**



Six foot extension cable for connecting one row of modules to the next if they are further than the standard interconnection cable can reach (second row above or below, etc.). Only required for multiple rows.

#### **Professional Installer Tool Kit**

Installer tools to aid in installation. Includes driver to tighten splices with ratchet from opposite side of module (in place of wrench) and step block to support module until splices and mounting points are installed.



Includes (2) Splice Drivers and (2) Step Blocks

#### **Solar Module Splices**



Required to join modules together in a row and provide a grounding path.

Two splices per module interface are required. (Left-hand and Right-hand threaded bolts are used at the ends of a row).

### **ELECTRICAL COMPONENTS**

#### **Transformer (For 230V and 460V-3ph Rooftop Units)**

Steps up the output voltage of the microinverters to connect directly to the rooftop unit.

### **SYSTEM MONITORING**

#### **Envoy Communications Gateway (Communications Booster Furnished)**

The Envoy Communications Gateway monitors microinverter (on solar modules) performance and can be connected to a broadband internet connection to send data to the Enphase Enlighten™ web site for online monitoring. The Envoy Communications Gateway is not required, but must be used if system performance monitoring is desired.



Limited system monitoring is also available locally with the Envoy Communications Gateway and a computer if no internet connection is available.

Various Event Messages are also available when monitoring the system via a computer locally.

Contents - (1) Envoy Communications Gateway, (1) Communications Booster, (1) 6 ft. power cord, (1) 10 ft. Ethernet cable.

CSA (US/C) listed.

The Envoy Communications Gateway includes a Communications Booster which may or may not be needed depending upon how far the Envoy is away from the solar modules.

#### **Communications Booster**

Ethernet bridge signal booster for the Envoy Communications Gateway. Booster is only needed if the communications gateway is installed and signal is not strong enough in the installed location. Allows the unit to be plugged into an outlet closer to the distribution panel, yet still plug into the broadband router.

See additional information on page 13



## SUNSOURCE® COMMERCIAL ENERGY SYSTEM - COMPONENTS

### Line Communications Filter



Envoy Communications Gateway mounted in a weatherproof NEMA 4 enclosure.

For outdoor installations, installations with transformers, or when multiple communications

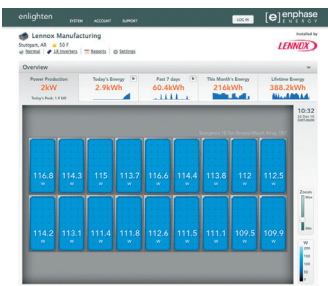
modules are used on one building.

Contains the Envoy Communications Gateway and terminal blocks for easy power hookup from the microinverter branch circuits distribution to the electrical meter or distribution panel. A filter removes any electrical interference from other devices or multiple Envoy Communication Gateways in the same building.

Unit is UL listed for the US and Canada and meet National Electrical Code requirements.

See additional information on page 15.

### Enphase Enlighten™ Performance Monitoring Website



Powered by the Envoy Communications Gateway, the Enphase Enlighten™ Performance Monitoring website allows the user to keep track of building energy usage and see environmental benefits in real time.

See demos, view reference

installations and other additional information at:

<http://enphase.com/products/enlighten/>

See additional information on page 16.

### SYSTEM ORDERING

- Specify the number of Solar Modules needed and number of rows required along with the associated order no. (example: **2 x 7, SUNS1**). The correct number of components (Solar Splices, AC Extension Cables, Ballast Pans, Pans, Support Brackets and Fastening Hardware) for the Flat Roof Mounting System will be furnished with the solar modules and shipped as a kit.

See Solar Module Configurations on page 8 for typical rooftop installation examples.

- Energence® 3 to 6 ton packaged rooftop unit must be ordered with the factory installed Solar Power Entry Option.
- Envoy Communications Gateway or Line Communications Filter must be ordered separately.
- Transformer must be ordered separately.

Contact your nearest Lennox Sales Representative for ordering information.

### SOLAR MODULES

Configuration: No. of Rows x Solar Modules	Total No. of Solar Modules	Order No.
2 x 7	14	<b>SUNS1</b>
2 x 8	16	
2 x 9	18	
2 x 10	20	
3 x 6	18	
3 x 7	21	
3 x 15	45	
4 x 3	12	
4 x 4	16	
4 x 5	20	<b>SUNS2</b>
1 x 7	7	
1 x 9	9	
1 x 8	8	
1 x 10	10	
2 x 4	8	
2 x 5	10	
2 x 6	12	
3 x 4	12	<b>SUNS3</b>
3 x 5	15	
1 x 4	4	
1 x 5	5	
1 x 6	6	
2 x 2	4	
2 x 3	6	
1 x 2	2	<b><sup>1</sup> Special Order</b>
1 x 3	3	

### SYSTEM MONITORING

Description	Order No.
Envoy Communications Gateway w/ Booster (internal)	<b>Y4263</b>
Line Communications Filter (external)	<b><sup>1</sup> Special Order</b>

### TRANSFORMERS

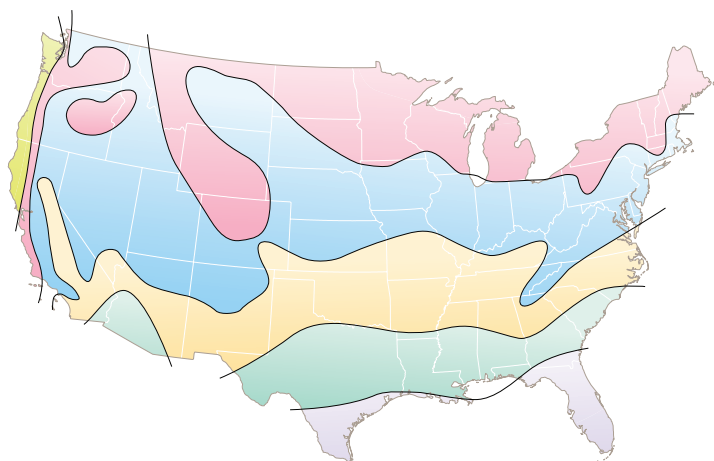
Description	Order No.
E1TRFM10AD1Y (230 VAC Delta)	<b>80W91</b>
E1TRFM10AD1G (460 VAC Delta)	<b>80W92</b>
E1TRFM15AD1G (460 VAC Wye)	<b>80W93</b>

<sup>1</sup> Contact your local Lennox Sales Representative for information.

## ESTIMATED ANNUAL OPERATING COSTS SAVINGS

### Overall Impact of the SunSource® Energy System on Heating and Cooling Costs

#### CLIMATE REGIONS



- Region 1
- Region 2
- Region 3
- Region 4
- Region 5
- Region 6

Estimated annual operating cost savings<sup>1</sup> of a 17 SEER Energence® rooftop unit with solar modules, compared to a 13 SEER rooftop unit.

Lennox' SunSource Commercial Energy System can help significantly reduce energy costs all across North America. In certain regions, adding additional solar modules can help the rooftop unit achieve net-zero energy status, as the SunSource system will generate more power than what the rooftop unit consumes.

<sup>1</sup> Estimates of annual solar energy production are calculated using National Renewable Energy Laboratory's (NREL) PVWatts, Version 1. Estimates of annual operating cost savings for the rooftop units are calculated using Lennox' Total Cost of Ownership Calculator, with operating hours from 10 a.m. to 10 p.m. in a small retail environment.

Climate Regions	With 6 Modules	With 15 Modules	With 21 Modules
Region 1	33.1%	51.5%	63.8%
Region 2	34.4%	56.4%	71.1%
Region 3	36.7%	63.6%	81.5%
Region 4	39.4%	71.6%	93.0%
Region 5	48.6%	94.2%	124.6%
Region 6	45.1%	86.8%	114.6%

## SOLAR MODULE

### ELECTRICAL CHARACTERISTICS

(At Standard Test Conditions)

STC: irradiance of 1000W/m<sup>2</sup>,  
spectrum AM 1.5g, and cell temperature of 25°C

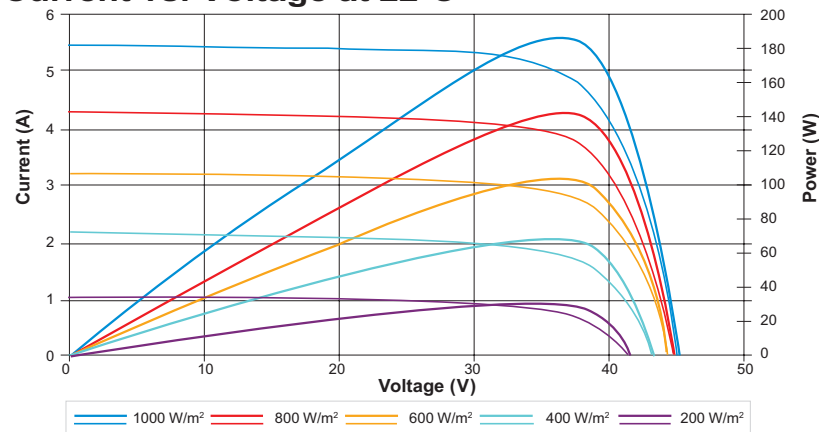
<sup>1</sup> Peak Power	P <sub>max</sub>	190W
Output Tolerance		0/+5W%
Rated Current	I <sub>mp</sub>	5.20A
Rated Voltage	V <sub>mp</sub>	36.6V
Short-Circuit Current	I <sub>sc</sub>	5.43A
Open-Circuit Voltage	V <sub>oc</sub>	45.2V
Series Fuse Rating		15A
Maximum System Voltage		600V
Temperature Coefficients	Power	-0.45%/°C
	Voltage	-0.34%/°C
	Current	-0.050%/°C
Cell Technology	72 Cell Mono-Si, 125 x 125 mm	

<sup>1</sup> Peak Power at Output Tolerance

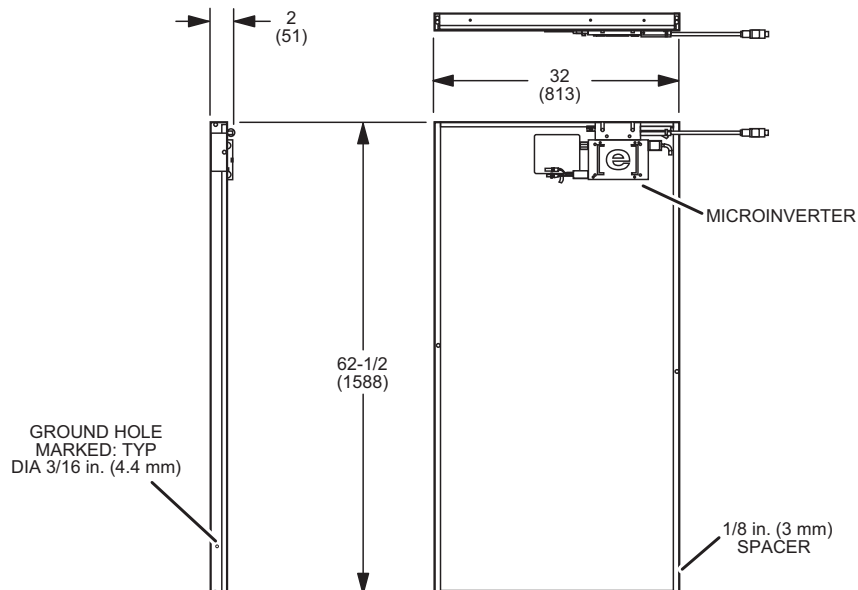


### PERFORMANCE CHARACTERISTICS - DC POWER

#### Current vs. Voltage at 22°C



### DIMENSIONS - INCHES (MM)



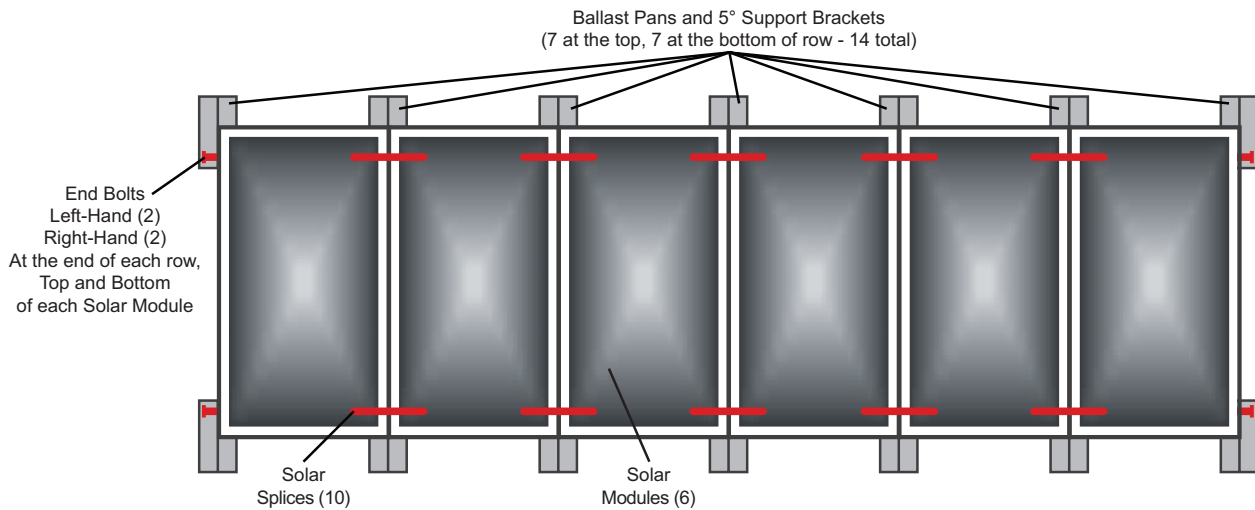
## SOLAR MODULE

### SOLAR MODULE CONFIGURATIONS

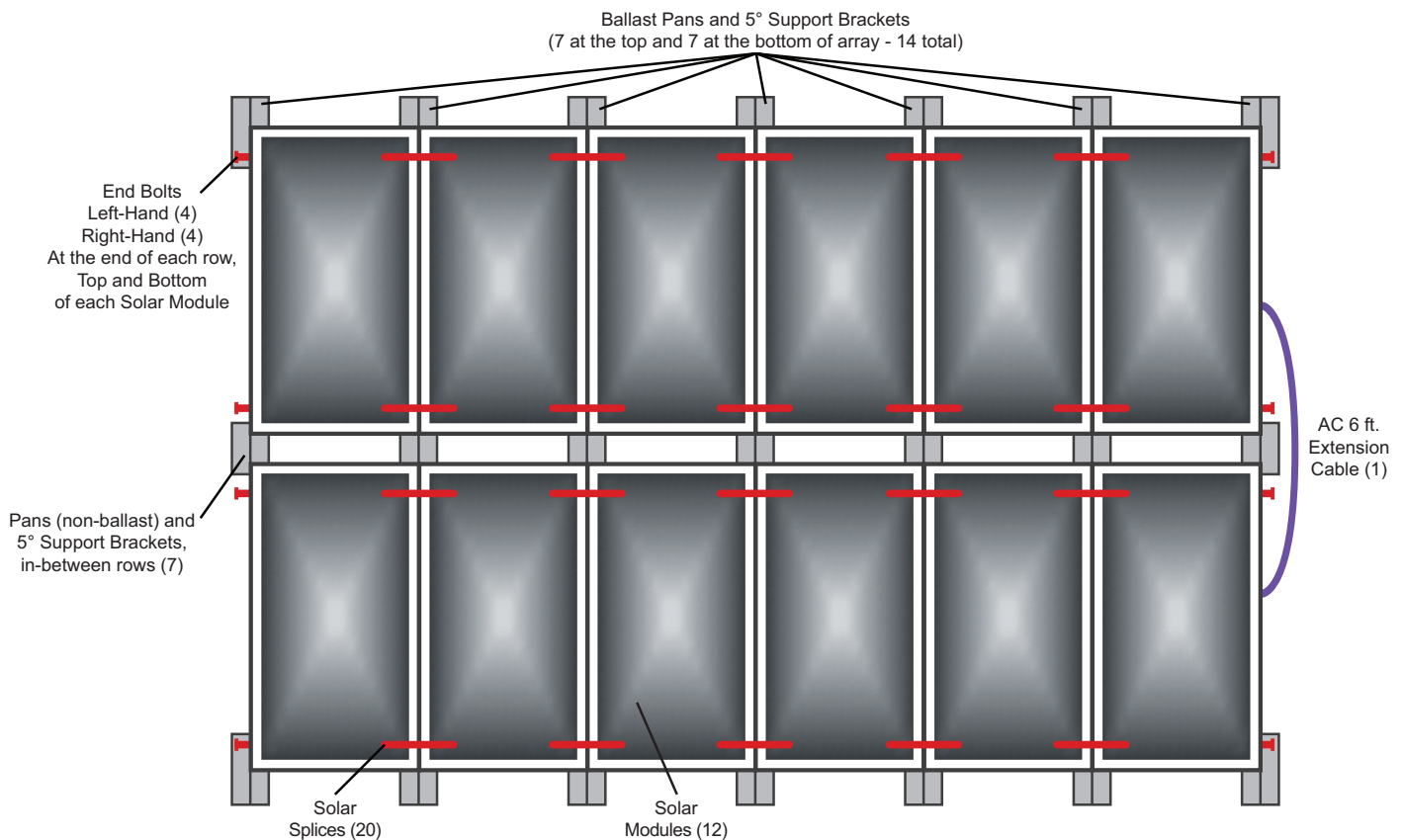
SunSource® Solar Modules can be arranged in a variety of configurations to best use available south-facing sunny roof space.

The following examples show typical multi-panel configurations.

#### 1 ROW X 6 PANELS (6 SOLAR MODULES TOTAL)



#### 2 ROW X 6 PANELS (12 SOLAR MODULES TOTAL)

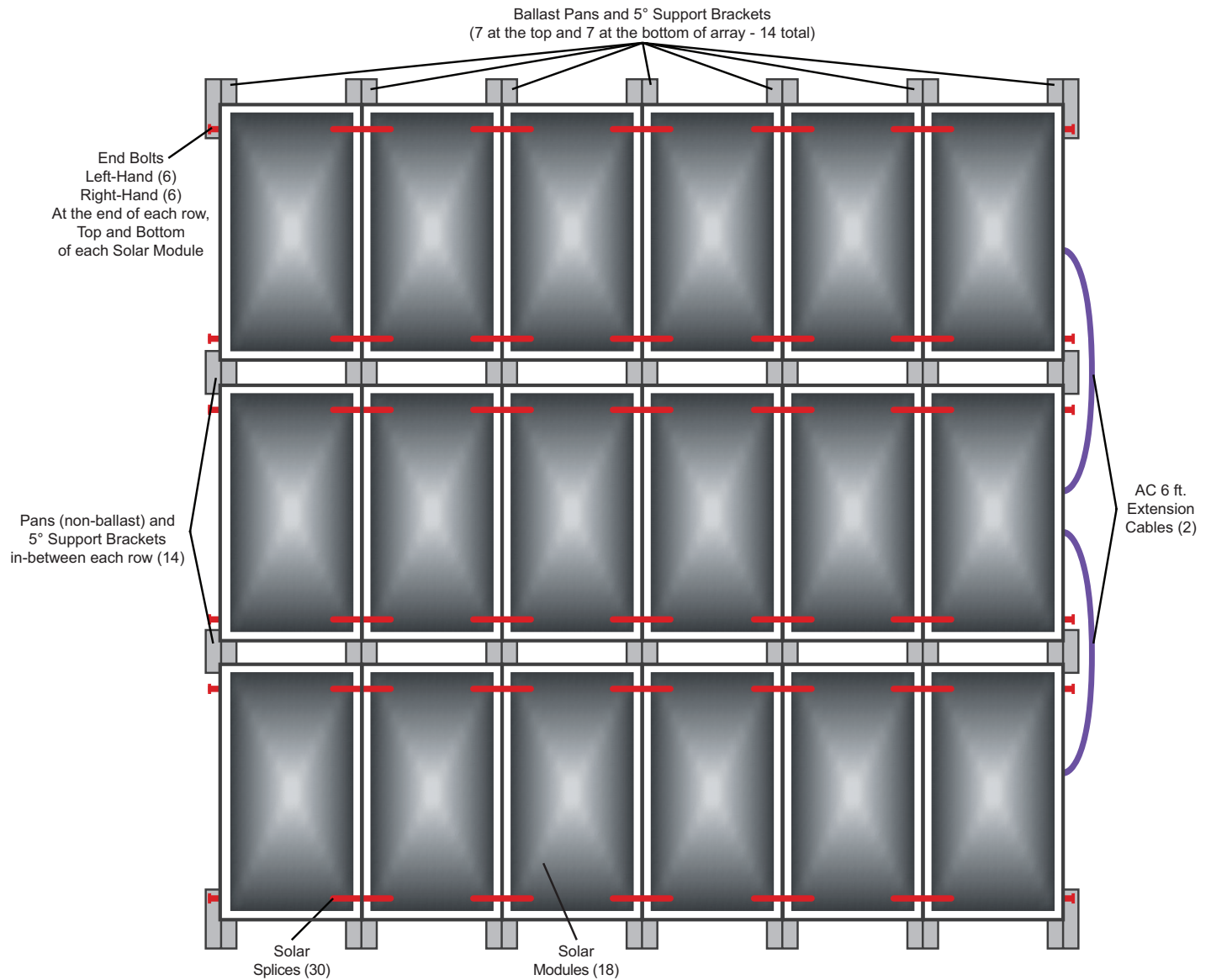




## SOLAR MODULE

### SOLAR MODULE CONFIGURATIONS (CONTINUED)

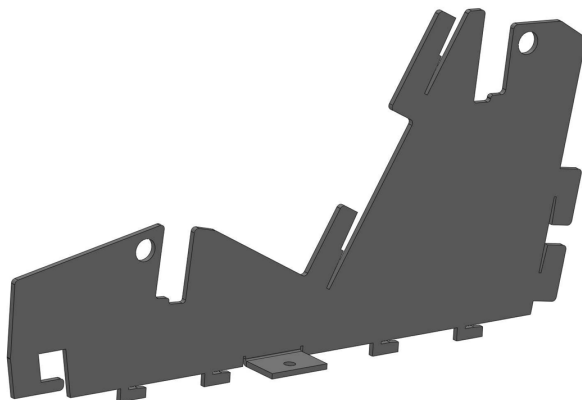
#### 3 ROW X 6 PANELS (18 SOLAR MODULES TOTAL)



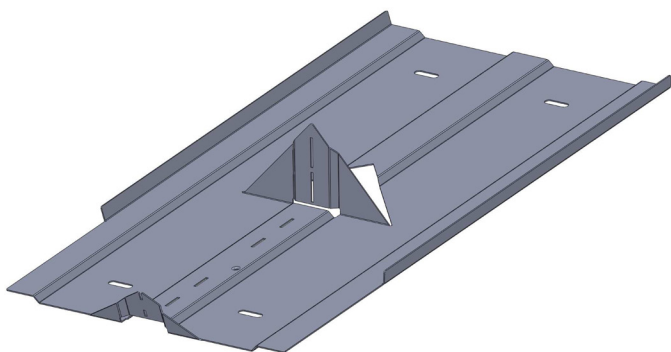
## SOLAR MODULE

### FLAT ROOF MOUNTING COMPONENTS

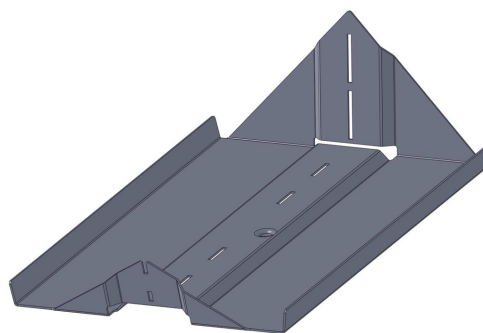
SUPPORT BRACKET



BALLAST PAN



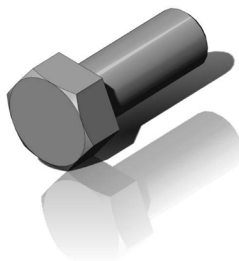
PAN (Non-Ballast)



SOLAR SPLICE



END BOLT  
(Left-hand and Right-hand)



GROUNDING LUG CONNECTOR



## MICROINVERTER

### How the Microinverter Works

The microinverter maximizes energy production from the solar module array. Each microinverter is individually installed on one solar module in the array.

This unique configuration means that an individual Maximum Peak Power Point Tracker (MPPT) controls each solar module. This insures that the maximum power available from each solar module is exported to the utility grid regardless of the performance of the other solar modules in the array.

Even if individual solar modules in the array are affected by shading, soiling or orientation, the microinverter insures optimum performance for each associated solar module. The result is maximum energy production from the SunSource® Energy System.

### Microinverters for 3-Phase Applications

Each microinverter automatically connects to one phase of a 3-phase system. It senses the grid and synchronizes to that phase. When applied in groups of three it creates a balanced 3-phase system. If systems are installed in something other than multiples of three a small imbalance will be created across the phases. The maximum output of each inverter is 0.92A. This would be the maximum imbalance possible.

### Microinverter Status LED Indications and Error Reporting

Startup LED Operation:

Six short green blinks when DC power is first applied to the microinverter indicates a successful microinverter startup sequence.

Six short red blinks when DC power is first applied to the microinverter indicates a failure during microinverter startup.

### Post-Startup LED Operations:

**Flashing Green** - Producing power and communicating with Envoy

**Flashing Orange** – Producing power and not communicating with Envoy

**Flashing Red** – Not producing power

### GFDI Fault:

A solid red status LED when DC power has been cycled, indicates the microinverter has detected a ground fault (GFDI) error. The LED will remain red and the fault will continue to be reported by the Envoy until the error has been cleared. The error can only be cleared via the Envoy after the ground fault condition has been remedied.

### Other Faults:

All other faults are reported to the Envoy.

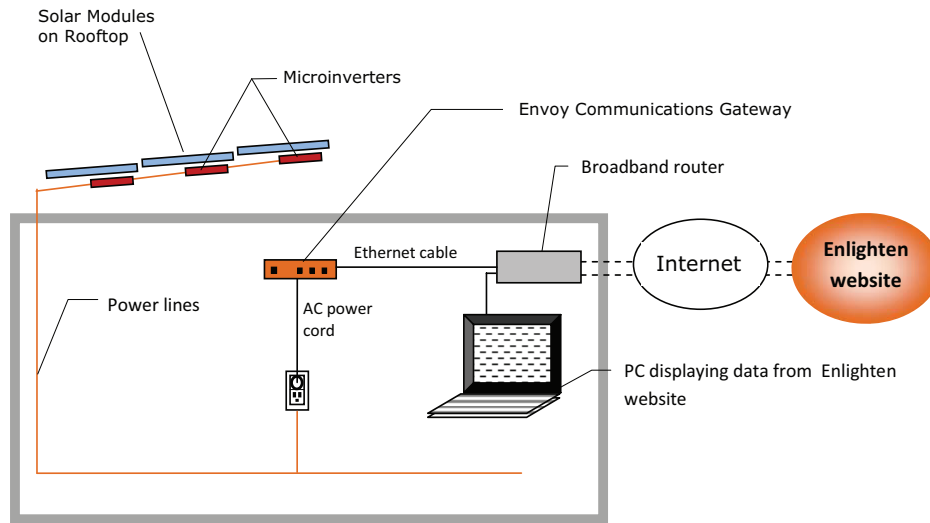
## MICROINVERTER OPERATING PARAMETERS

Description		Unit	Min	Typical	Max
<b>DC OPERATING PARAMETERS</b>					
MPPT voltage range		V	22	---	40
Maximum DC input voltage		V	---	---	54
Maximum DC input short circuit current		A	---	---	12
Maximum DC input current		A	---	---	10
Ground fault protection		mA	---	---	1000
<b>AC OPERATING PARAMETERS</b>					
Maximum AC output Power (-40 to 65°C)		W	190	---	---
Output power factor		---	0.95	0.99	1
Nominal AC output voltage range	208V	Vrms	183	208	229
	240V	Vrms	211	240	264
Extended AC output voltage range	208V	Vrms	179	208	232
	240V	Vrms	206	240	269
Maximum AC output current	208V	mA	---	920	1040
	240V	mA	---	800	900
Nominal AC output frequency range		Hz	59.3	60	60.5
Extended AC output frequency range		Hz	59.2	60	60.6
Maximum AC output overcurrent protection		A	---	---	15 A
Maximum AC output fault current & duration		A <sub>p</sub> /ms	---	---	50.8/1.56
High AC Voltage trip limit accuracy		%	±2.5	---	---
Low AC Voltage Trip limit accuracy		%	±4.0	---	---
Frequency trip limit accuracy		Hz	±0.1	---	---
Trip time accuracy		ms	±33	---	---
<b>MISCELLANEOUS OPERATING PARAMETERS</b>					
Maximum inverters per AC branch circuit	208V	---	1	---	21
	240V	---	1	---	15
Peak inverter efficiency	208V	%	---	---	95.5
CEC weighted efficiency		%	---	---	95.0
Nominal MPP tracking efficiency		%	---	---	99.6
Total Harmonic Distortion		%	---	2.5	5
Operating temperature range		°C	-40	---	65
Night Tare Loss		mW	---	30	---
Storage temperature range		°C	-40	---	65
<b>FEATURES</b>					
Dimensions (in. approximate)		8 x 5-1/4 x 1-1/4			
Weight (lbs.)		4.4			
Enclosure environmental rating		NEMA 6			
Cooling		Convective – no fan			
Communication		Powerline			
Compliance		UL1741, IEEE1547, FCC Part 15 Class B			

## VOLTAGE AND FREQUENCY LIMITS FOR UTILITY INTERACTION

Condition	Simulated utility source		Maximum time (sec) (cycles) at 60 Hz before cessation of current to the simulated utility
	Voltage (V)	Frequency (Hz)	
A	$< 0.50 V_{\text{Typical}}$	Rated	0.16
B	$0.50 V_{\text{Typical}} \leq V < 0.88 V_{\text{Typical}}$	Rated	2
C	$1.10 V_{\text{Typical}} < V < 1.20 V_{\text{Typical}}$	Rated	1
D	$1.20 V_{\text{Typical}} \leq V$	Rated	0.16
E	Rated	$f > 60.5$	0.16
F	Rated	$f < (59.8 - 57.0)$	0.16 – 300
G	Rated	$f < 57.0$	0.16

## ENVOY COMMUNICATIONS GATEWAY



The Envoy Communications Gateway is an integral component of the SunSource® Energy System. It operates between the microinverters on the Solar Modules and the Enphase Enlighten™ Performance Monitoring website and analysis system. The Envoy functions as a gateway and monitors the microinverters that are connected to the modules.

The Envoy collects energy and performance data from the microinverters over existing home AC power wiring. It then forwards that data to the Enphase Enlighten™ web-based monitoring and analysis, via the Internet, for statistical reporting.

The microinverter system is a fully integrated device that converts the DC output of a single Solar Module into grid-compliant AC power. In addition to performing the DC to AC conversion, it maximizes the modules' energy production by utilizing a sophisticated Maximum Power Point Tracking (MPPT) algorithm. This integrated system maximizes energy harvest, increases system reliability, and simplifies design, installation and management.

The Enphase Enlighten™ web-based monitoring and analysis system analyzes the per-module data collected by each microinverter. Enlighten automatically detects any shortfall in energy production, identifies possible causes, and suggests solutions to correct the problem. The Enphase Enlighten website is constantly monitoring every module on every installation.

Installation and operation of the Envoy requires no special computer or networking knowledge, nor any specialized equipment. It simply plugs into a broadband Internet router for communications with the Enphase Enlighten™ monitoring and analysis website. The Envoy communicates with the individual microinverters over the existing power wires in the building.

After the Envoy is installed, no additional configuration is required.

After the Envoy is installed and completes its initial scan, it assembles an internal database of all known Enphase microinverters at the site it manages. At regular intervals, the Envoy polls each microinverter for

its energy data. Using the site's Broadband router, the Envoy then forwards that information on to the Enphase Enlighten™ monitoring and analysis website. The Envoy also reports any error conditions that affect itself or the microinverters. You can view both energy data and error conditions at the Enphase Enlighten™ web-based monitoring and analysis system.

A Menu Button on the panel allows user to view system status on the LCD panel display and initiate scans and communication checking.

If there is no Internet access at the installation site, it is still possible to communicate directly with the Envoy using the Ethernet port and a personal computer with a web browser. Home Screen, Production Screen and Inventory Screen allow user to monitor the system. Event Messages are also displayed on the computer screen. See next page for a complete list of event messages.

### SPECIFICATIONS

#### COMMUNICATIONS INTERFACE

Powerline	Enphase Proprietary
Ethernet	10/100 Auto-sensing, Auto-negotiation

#### POWER REQUIREMENTS

AC Outlet	120 VAC, 60 Hz
Power Consumption	2.5 Watts typical, 7 watts maximum

#### MECHANICAL DATA

Dimensions - in. (mm) (W x H x D)	8.8 x 4.4 x 1.7 (222.5 x 112 x 43.2)
Weight	12 oz.
Ambient Temperature Range	-40 to 149°F (-40 to +65°C)
Cooling	Natural Convection – no fans
Enclosure Environmental Rating	Indoor - NEMA 1

#### FEATURES

Standard Warranty	1 year
Compliance	UL 60950, EN 60950, FCC Part 15 Class B

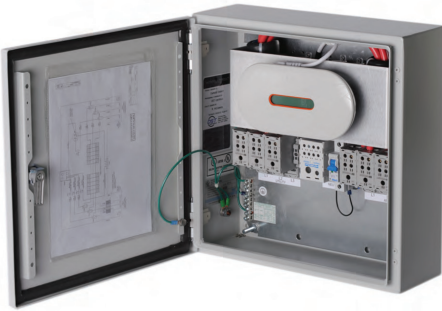


## ENVOY COMMUNICATIONS GATEWAY

Table lists messages that the Envoy can produce to indicate certain conditions. These messages appear on screen when your computer is connected to the Envoy local interface. These messages can provide Enphase Customer Support with information, should you need to call for assistance.

EVENT MESSAGES		
Home Screen	Inventory Screen	Description
AC Frequency Out Of Range	ac-freq-oor	The frequency of the AC grid has exceeded the limits specified by UL 1741.
AC Voltage Out Of Range	ac-voltage-oos-p# (# = 1, 2 or 3)	The voltage of the indicated AC phase (relative to neutral) has exceeded the limits specified by UL 1741.
Audible alarm active	audible-active	The inverter's buzzer is active, either due to an internally detected error or by user command.
Bad Flash Image	bad-flash-image	The inverter is not producing power because one of its flash memory images is corrupt. Contact Enphase Energy customer support at 877- 797-4743 for assistance.
Commanded Reset	commanded-reset	The inverter has reset, either following a successful image download or by user command.
Control Request		This event logs a user control request made using the Administration > Device Conditions and Controls page or via Enlighten.
Critical Temperature	critical-temp	The inverter is producing less power in an attempt to not overheat (see Over Temperature)
DC Too High	dc-voltage-hi	The DC input voltage to the inverter is too high; check that the PV module and inverter are compatible.
DC Too Low	dc-voltage-lo	The DC input voltage to the inverter is too low; this is a normal condition at night, but during the day may indicate a bad or missing DC connection to the inverter.
Download to module begun		The Envoy has begun an image download to the indicated inverter.
Download to module ended		The Envoy has successfully downloaded an image to an inverter.
Download to module failed		The Envoy was unable to successfully download an image to an inverter.
GFI Tripped	gfi-tripped	An inverter has detected ground fault current greater than one amp. The error can only be cleared via the Envoy after the ground fault condition has been remedied. The GFI can be cleared using the Device Conditions and Controls page unless the failure is permanent. Contact Enphase Energy customer support at 877-797-4743 for assistance.
Grid Gone	grid-gone	The AC utility grid is no longer present.
Grid Instability	grid-instability	The inverter is not producing power due to one or more of these conditions: AC Frequency Out Of Range, AC Voltage Out Of Range, or Grid Gone. Note that Grid Instability will remain for about 5 minutes after the underlying conditions clear.
Module added		The Envoy has detected and is now associated to a new inverter.
Module failed to report		The Envoy has not received a response to the last three messages sent to an inverter.
Module Sleeping		Inverter is off for the night
Over Temperature	over-temp	The inverter is not producing power, because it is too hot.
Power generation off by command	forced-pwr-prod-off	The inverter is not producing power by user command.
Power On Reset	power-on-reset	The inverter has powered on after having both AC and DC disconnected.
Shutdown		The Envoy shut down its internal processing.
Skipped Cycles	skipped-cycles	The inverter has not produced power for more than 5% of the most recent production interval; this may be due to real problems in the grid, or a hardware failure of the inverter.
Startup		The Envoy started its internal processing.

## LINE COMMUNICATIONS FILTER



Envoy Communications Gateway mounted in a weatherproof NEMA 4 enclosure.

For outdoor installations, installations with transformer or when multiple communications modules are used on one building.

Contains the Envoy Communications Gateway and terminal blocks for easy power hookup from the microinverter branch circuits distribution to the electrical meter or distribution panel. A filter removes any electrical interference from other devices or multiple Envoy Communication Gateways in the same building.

Unit is UL listed for the US and Canada and meets National Electrical Code requirements.

### SPECIFICATIONS

#### UNIT RATINGS

Operating Voltage	208/240 VAC
Maximum Voltage	600 VAC
Continuous Current	100 Amps
Maximum Overcurrent Protection Device	125 Amps
Short Circuit Current	10kA RMS Symmetrical

#### TERMINAL BLOCK DATA

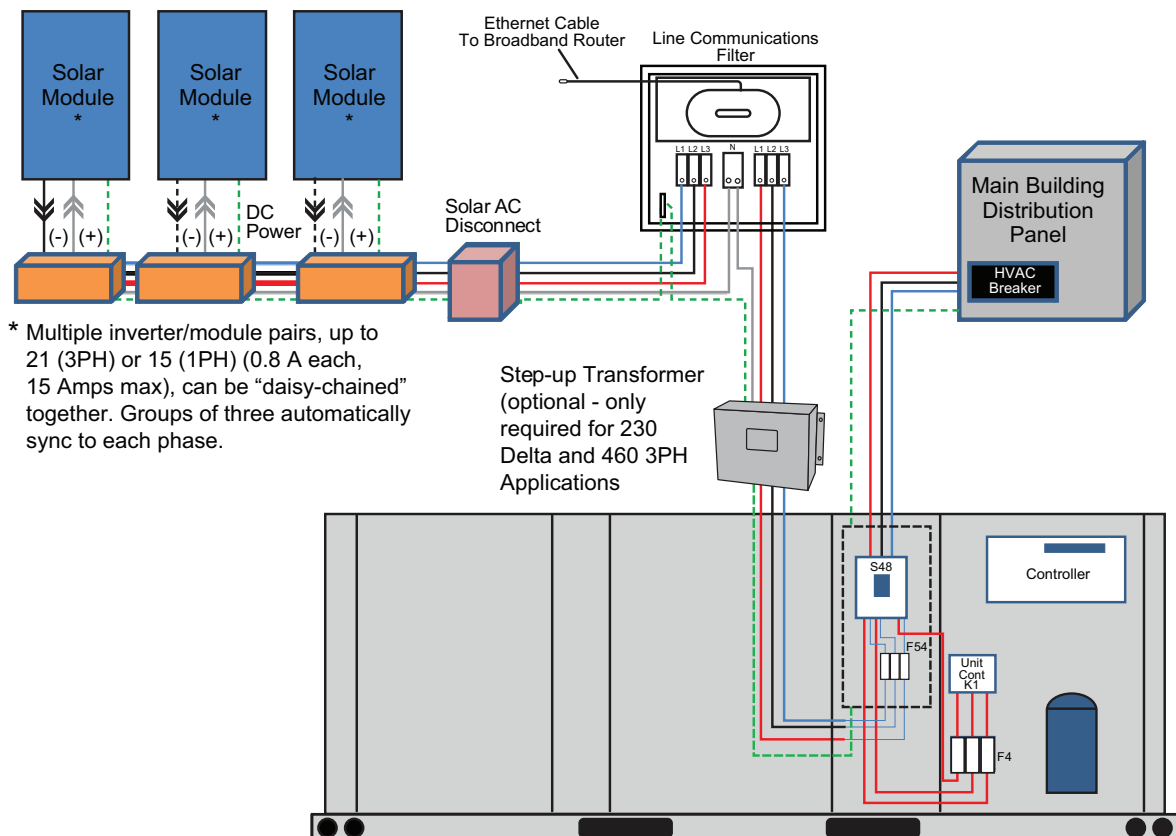
L1, L2, L3	Single 2/0 Maximum
Neutral	2/0 Maximum and 350 mcm Maximum
Equipment Grounding	4 AWG Maximum

#### MECHANICAL DATA

Operating temperature range	-40°F to 149°F
Power consumption	5 W
Dimensions (W x H x D)	15-3/4 x 15-3/4 x 6 in.
Weight	31 lbs.
Cooling	Natural Convection – No Fan
Enclosure environmental rating	Outdoor – NEMA TYPE 4

#### FEATURES

Communication Interface	Ethernet, 10/100 Auto Sensing, Auto Negotiating
Warranty	1 Year
Compliance	UL508A

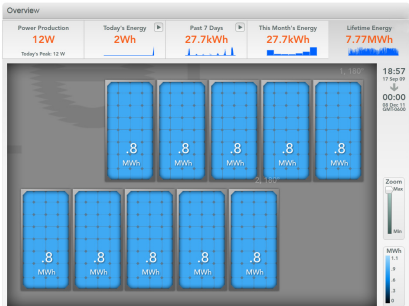


## PERFORMANCE-MONITORING WEBSITE

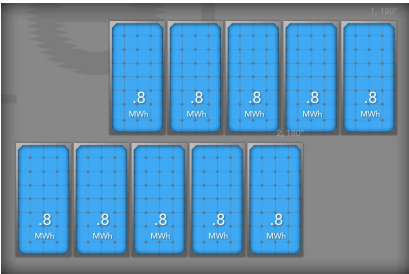
The performance-monitoring website delivers visible proof of the SunSource® Commercial Energy System's reliability, and allows the user to better understand its operation. The user can log onto the website any time to view an easy-to-interpret display of both real-time and historic performance data and analysis.

\*Free lifetime monitoring service.

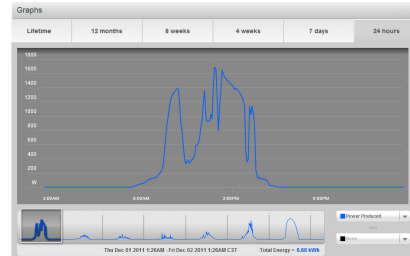
\*Performance monitoring website provided by an independent third party, Enphase Energy, Inc.



The overview pane displays current system status, current energy production, the energy produced for the day, the month and the lifetime of the SunSource system.

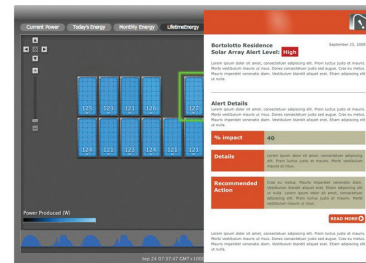


This section of the screen displays an aerial view of the roof, showing how the solar modules are physically configured. The user can view energy production information for each module on a current, daily, monthly and lifetime basis.



View time-lapse animation of the solar array (bottom of screen) to see how power generation is affected by the sun and obstructions such as shade trees or nearby obstructions.

### Constant Monitoring And Analysis Ensures Reliability



The SunSource performance-monitoring website also analyzes production shortfalls, establishes a possible cause and suggests solutions to remedy the situation. Beyond monitoring and analysis, the website can even notify the homeowner and the installing contractor if a problem occurs. At the time of installation, the system can be instructed to send the user, or the Installer, an alert if a production issue or some other situation warrants attention.



The performance monitoring website also automatically calculates the environmental benefits provided by the SunSource® Commercial Energy System.

# SUNSOURCE® COMMERCIAL ENERGY SYSTEM PLANNING CHECKLIST

CUSTOMER NAME:

DATE:

CUSTOMER ADDRESS:  
(Street, City, State  
and Zip Code)

ELECTRIC  
UTILITY:

QUOTE NO.

ORDER NO.

## SECTION I – SITE AND CUSTOMER

1.	<p><b>Does site have the appropriate voltage and building electrical configuration?</b></p> <p><b>Commercial Single-Phase HVAC Unit Applications</b> The utility-interactive SunSource® Commercial Energy System is for split-phase power and will only interconnect and supply power if the grid power meets the following specifications:</p> <ul style="list-style-type: none"> <li>• L1 - L2 voltage measures between 211 Volts and 264 Volts _____</li> <li>• Line to neutral/ground voltage measures between 106 and 132 Volts _____</li> <li>• Frequency measures between 59.3 Hz and 60.5 Hz _____</li> </ul> <p><b>Commercial Three-Phase HVAC Unit Applications</b> The utility-interactive SunSource® Commercial Energy System will only interconnect and supply power if the grid power meets the following specifications:</p> <ul style="list-style-type: none"> <li>• L1 - L2 - L3 voltage measures between 183 Volts and 229 Volts _____</li> <li>• Line to neutral/ground voltage measures between 106 and 132 Volts _____</li> <li>• Frequency measures between 59.3 Hz and 60.5 Hz _____</li> <li>• Nominal 208 VAC Wye configuration _____</li> </ul> <p><i>NOTE - A transformer can be used to step-down 460 and 230VAC building voltage to the appropriate levels and adapt to delta systems.</i></p>	<p><sup>1</sup> 240/120 (1-Phase) <input type="checkbox"/></p> <p><sup>2</sup> 208/120 (1-Phase) <input type="checkbox"/></p> <p>208 Wye <input type="checkbox"/></p> <p>230 Delta <input type="checkbox"/></p> <p>460/277 Wye <input type="checkbox"/></p> <p>460 Delta <input type="checkbox"/></p> <p>Other: _____</p>
2.	<p><b>Array Information</b></p> <ul style="list-style-type: none"> <li>• No. of columns: _____</li> <li>• No. of solar modules: _____</li> <li>• No. of rows: _____</li> <li>• Distance to HVAC Rooftop Unit (ft.): _____</li> <li>• Distance to distribution panel (ft.): _____</li> </ul>	<p>---</p>
3.	<p><b>Is the building's electrical distribution panel adequate?</b></p> <p>Generally, the distribution panel should be rated 75 AMP for 230 VAC systems or 40 Amp for 460 VAC systems for one SunSource® Commercial Energy system installation. For two systems, the panel should be twice as large. (Also see <b>Code Compliance</b> section).</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>
4.	<p><b>A. Does site have good southern exposure?</b></p> <p>Perform a solar site survey using a Solar Pathfinder™ or other survey tool to assess the solar resource available. Next, use the web-based program, PVWatts (ver. 1), from the National Renewable Energy Lab, to estimate the monthly and annual solar energy generation potential NOTE: For more information concerning Solar Pathfinder, see <i>Lennox Corp 1104-L4, Application and Design Guidelines</i> for more information</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>

This checklist is to be used as an aid in assessing the conditions that prevail at a particular site. A "NO" check-box answer does not necessarily mean a system cannot be installed. Rather, it may indicate that there may be additional action needed - for example, additional electrical work is required.

For more detailed information see Lennox Corp. 0924-L11 and 0925-L11 **SunSource® Commercial Energy System Application and Design Guidelines**.

# SUNSOURCE® COMMERCIAL ENERGY SYSTEM PLANNING CHECKLIST

## SECTION I – SITE AND CUSTOMER (Continued)

5.	<b>Is the roof suitable for mounting solar modules?</b>	<p>1. Is there enough area for the solar modules? One solar module requires about 15 square feet.</p> <p><i>NOTE - Do not exceed the maximum number of solar modules that can be connected to each HVAC unit (15 for 1 phase applications, 21 for 3 phase applications).</i></p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>
		<p>2. What type of roof is it? There are several types of mounting kits to accommodate the more common styles of roofs. (Since the solar modules must be removed during a re-roof, it is best not to install the solar modules on a roof in poor condition. Take note of the pitch of the roof and the height of the eaves. OSHA has fall protection compliance guidelines. For example, see <i>OSHA Directive STD 03-00-001</i>.</p> <p>• Pitch: _____</p> <p>• Height of Eaves: _____</p>	<p>Flat Roof <input type="checkbox"/></p> <p>Pitch Roof <input type="checkbox"/></p> <p>Standing Seam <input type="checkbox"/></p>
		<p>3. In flat roof applications, will stanchions (attached to the building structure under the roof) be required instead of OR as a supplement to a simple ballast system?</p> <p>If yes, provide information on the planned system used to secure the solar array:</p> <hr/> <p><i>NOTE: Lennox is not responsible for determining design requirements and roof attachments. The American Society of Civil Engineers standard ASCE 7-05 provides an analytic method for determining wind, snow and seismic loads. Some items to consider when selecting a SunSource system are: exposure category (B,C,D), design wind speed, design snow load, roof maximum load limits, etc.</i></p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>
6.	<b>Will the solar modules be closer to HVAC unit or distribution panel?</b>	<p>Wiring may be routed to the solar power circuit from either the HVAC rooftop unit or the electrical distribution panel. For speed and ease of installation, route wiring from the closer location.</p>	<p>HVAC <input type="checkbox"/></p> <p>Panel <input type="checkbox"/></p>
7.	<b>Check for ease of modifications to distribution panel.</b>	<p>If the solar power circuit back feeds through the HVAC branch circuit breaker (in the distribution panel), it will need to be relocated to a slot that is at the opposite end from the main breaker.</p> <p><i>NOTE - The HVAC branch circuit breaker does not need to be relocated if the sum of the main panel breaker rating and the solar fuse (F54) rating is less than the electrical distribution panel's buss bar rating.</i></p> <p>If the solar power circuit is run directly to the distribution panel, a new 15 AMP breaker will need to be installed in one of the slots that is at the opposite end from the main breaker.</p> <p>This step is to get an early view of issues such as no available slots or difficulty relocating the HVAC branch circuit breaker.</p> <p>In addition, the back feed breaker, whether it is the HVAC branch circuit breaker or a separate 15 AMP breaker, is suitable if it is a conventional breaker and the terminals are NOT marked Line and Load. It should not be a GFCI or arc-fault type circuit breaker.</p>	<p>Easy <input type="checkbox"/></p> <p>Hard <input type="checkbox"/></p>
8.	<b>Does the customer have an "always on" internet connection?</b>	<p>An internet connection, with broadband router is required for the Envoy Communications Gateway to connect to the monitoring service. While use of the Envoy and the service are highly recommended, they are not required for the solar power system to operate.</p> <p><i>NOTE - If a transformer is used, a Line Communications Filter will be required and should be connected on the solar" side of the transformer.</i></p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>

This checklist is to be used as an aid in assessing the conditions that prevail at a particular site. A "NO" check-box answer does not necessarily mean a system cannot be installed. Rather, it may indicate that there may be additional action needed - for example, additional electrical work is required.

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## SUNSOURCE® COMMERCIAL ENERGY SYSTEM PLANNING CHECKLIST

### SECTION II – INTERCONNECTION AND NET-METERING

9.	<b>Does the electric utility have a net-metering program?</b>	It is necessary to notify the electric utility of the customer's intention to install a utility-interactive solar power generation system. Most utilities are familiar with these systems and will already have a policy and rules for "net-metering".	Yes <input type="checkbox"/> No <input type="checkbox"/>
10.	<b>Does the electric utility have any special requirements?</b>	Some utilities will require an indicating, lockable disconnect switch on the solar power system. If the utility has some form of incentive program, they may require the solar power system to be sub-metered. When the utility has requirements like this, they sometimes provide the required hardware.	Yes <input type="checkbox"/> No <input type="checkbox"/>
11.	<b>If there is an incentive program, is there a minimum kW threshold?</b>	For example, some utilities require a 1kW and 2kW threshold for some rebate/incentive programs.	Yes <input type="checkbox"/> No <input type="checkbox"/>
12.	<b>Does customer understand this is not a grid independent system?</b>	It is important to make sure the customer understands that this is a utility-interactive PV system and <u>WILL NOT</u> generate power when the grid is down. In addition the SunSource® Commercial Energy System will not produce power concurrently with a back-up generator.	Yes <input type="checkbox"/> No <input type="checkbox"/>

### SECTION III – CODE COMPLIANCE

13.	<b>Have all the local electrical code requirements been identified?</b>	In almost all US jurisdictions, the National Electric Code (NEC) will be cited as the authority for electrical inspections. In Canada, it is the Canadian Electric Code (CEC). There may be additional local requirements. NEC section 690 gives the requirements for solar PV installations. Wind and structural load calculations are sometimes requested by code officials.  If this is the first time to install a SunSource® Commercial Energy System in this jurisdiction, it is advisable to meet with the local inspection department to find out what requirements exist. This will save time in the long run since the permit submission can address any special requirements.	Yes <input type="checkbox"/> No <input type="checkbox"/>
14.	<b>Is grounding electrode required for the solar PV systems?</b>	Solar PV AC modules are not required by the NEC to have a separate grounding electrode but the local jurisdiction may require one to be installed.	Yes <input type="checkbox"/> No <input type="checkbox"/>

This checklist is to be used as an aid in assessing the conditions that prevail at a particular site. A "NO" check-box answer does not necessarily mean a system cannot be installed. Rather, it may indicate that there may be additional action needed - for example, additional electrical work is required.

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## REVISIONS

Sections	Description of Change
Performance Monitoring Website	Changed to lifetime monitoring.
Solar Module	New 185 watt solar modules. Updated specifications and performance ratings.



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