Soligent

Your Single Source Renewable Energy Distributor

SOLAR ENERGY SOLUTIONS CATALOG 2013

800.967.6917 > www.soligent.net

SOLAR ENERGY YOU CAN TRULY BELIEVE IN

At AE Solar Energy, we leverage over 30 years of power conversion heritage to bring you the most innovative line of transformerless string inverters available. High performance, wireless system monitoring, and an elegant design - backed by the industry's best customer experience.

We're not just another solar energy company.
We're empowering the industry.
advanced-energy.com/solarnow

AE ADVANCED ENERGY®

HELPING SOLAR ELECTRIC CONTRACTORS GROW

Soligent, is the largest and most comprehensive full-service distributor in the Americas. Headquartered in Rohnert Park, California, Soligent maintains distribution centers on both coasts of the U.S., as well as more than ten sales offices to serve your needs in your time zone.

Soligent sells solar electric equipment for both residential and commercial applications, carrying product from all of the best manufacturers around the world. With more than thirty years designing systems for our installers, we have more combined experience in-house than any other solar energy entity.

If you're not already a customer, contact us to sign up today.

WE OFFER:

- **Outstanding Customer Service**
- **Excellent Product Availability**
- **In-House Design and Technical Support**
- **On and Off-Grid Expertise**
- **Overnight Delivery & Same Day Shipments Available**
- **Support in Both English and Spanish**
- **International Distribution**
- **Residential and Commercial Project Financing includeing leases, loans and PPAs**

CONTACT US:

1-800-967-6917 or 1-707-992-3100

When calling in on the 1-800 number simply choose the extension below and you will be transferred to the desired department.

Ext. 1 - **Solar Sales**
sales@soligent.net

Ext. 2 - **Financing**
financing@soligent.net

Ext. 3 - **Customer Service**
customerservice@soligent.net

Ext. 4 - **Technical Support**
techsupport@soligent.net

Ext. 5 - **Credit, Accounts Receivable & Rebates**

Ext. 6 - **Accounts Payable**
accountspayable@soligent.net

Marketing
marketing@soligent.net

Branch Offices
1500 Valley House Drive, Suite 210
Rohnert Park, CA 94928
1-800-967-6917 or 1-707-992-3100

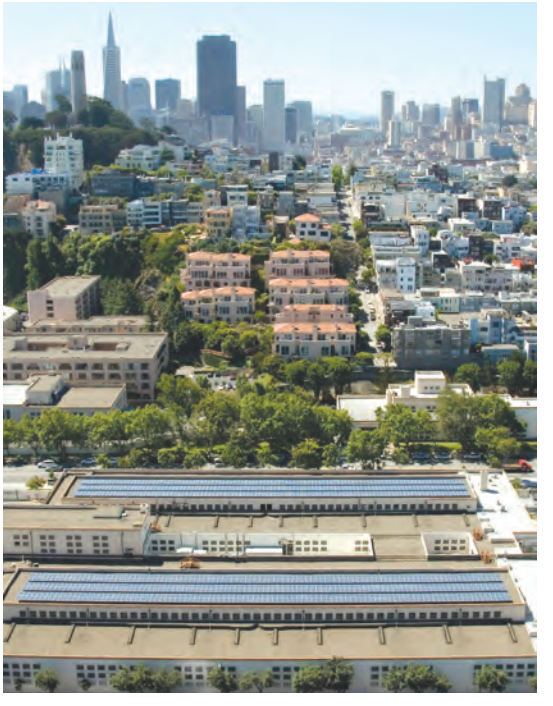
8671 Younger Creek Drive, Suite 200
Sacramento, CA 95828

555 Promenade Avenue, Suite 101
Corona, CA 92879

Three Security Drive, Suite 303
Cranbury, NJ 08512

Soligent

HELPING SOLAR ELECTRIC CONTRACTORS GROW



COMMERCIAL SOLAR PV

With current tax credits and rebates, commercial solar is the fastest growing segment in the industry. To help compete for these commercial projects, we work directly with dealers in cooperative bids and innovative financing solutions.

- **Large Project Partner Program**
- **Power Purchase Agreements (PPAs)**
- **Commercial Leasing**
- **Large-Scale Engineering**

RESIDENTIAL SOLAR PV

Homeowners often place high priority on aesthetics when it comes to a residential solar system. Angled modules, hidden rails and fasteners, and unobtrusive black framing combine to offer attractiveness previously unavailable.

We work closely with dealers to help choose the right economic, functional and aesthetic products for their installations.

OFF-GRID

An off-grid power system is any system that provides power where utility power is unavailable or unreliable. Off-Grid systems typically make financial sense any place where the utility would have to run new lines more than one half of a mile for grid connection or where power interruptions cannot be tolerated for business, health, or safety reasons. We've been in the off-grid business for decades, helping installers with projects around the world.

SOLAR KITS

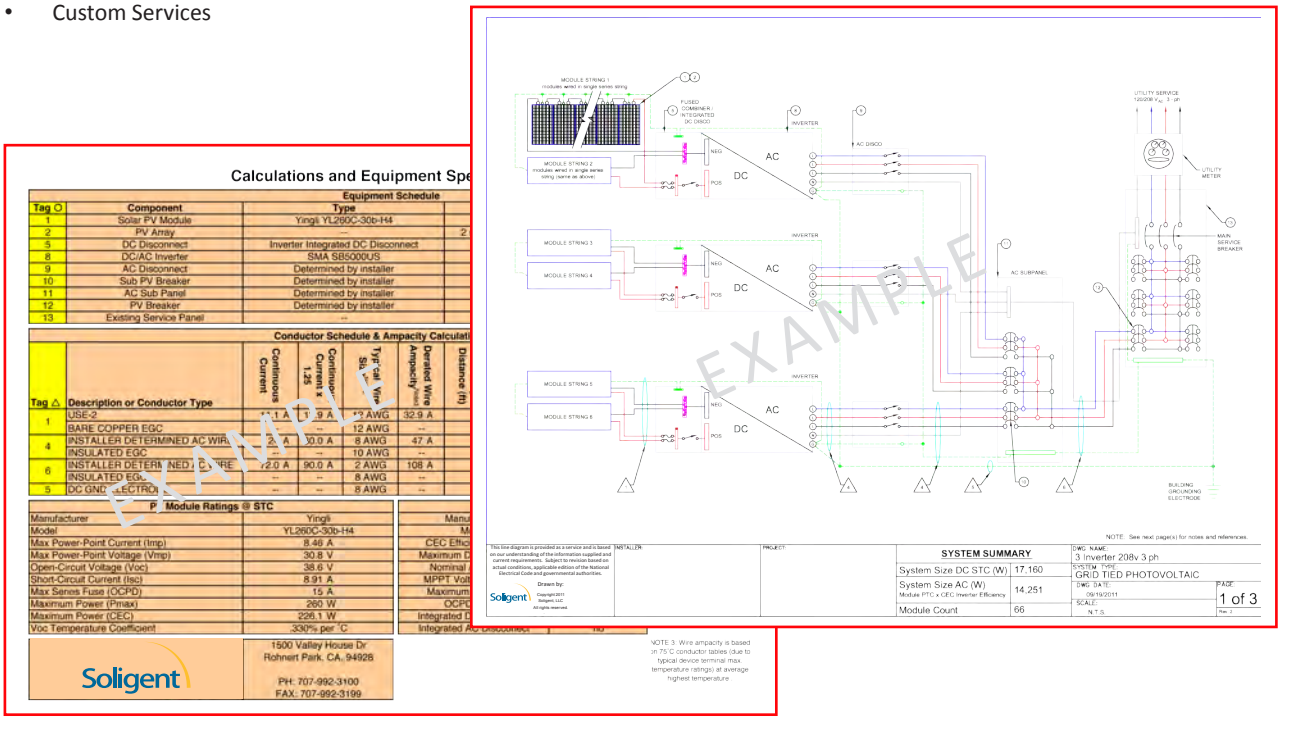
We're always looking for ways to make it easier and more cost effective for installers to get the job done. That's the inspiration behind our Solar Kits, which provide a solution for quick and easy installation. Our pre-packaged solar electric systems come complete with line diagrams and product data sheets. Combine a Sol-Gen Kit with a Sol-Rac Kit for a complete solar solution.

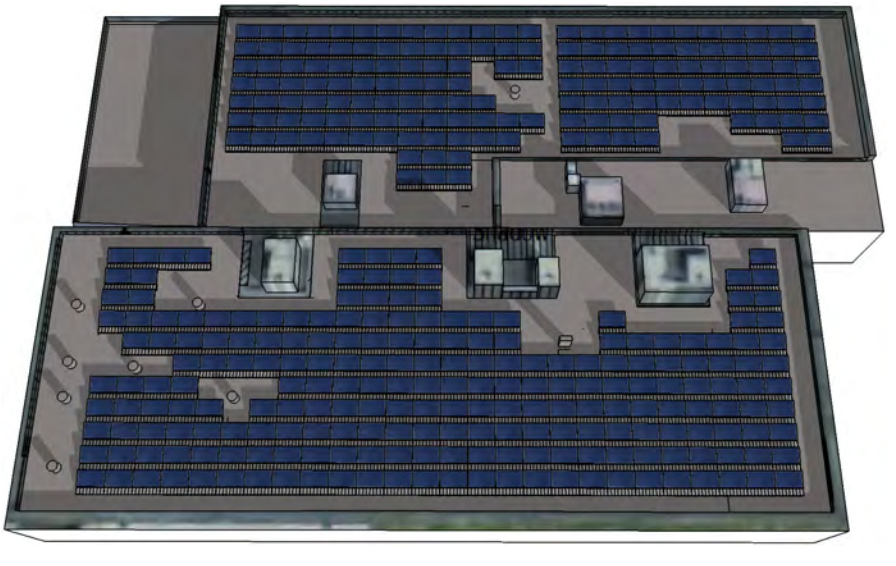
ENGINEERING SERVICES

Soligent offers a comprehensive selection of design, engineering and drawing services. Our technical staff has decades of experience in solar PV, including NABCEP Certified Solar PV Installers. For a nominal fee, we will produce a grid-tied or battery-based system design for you, based on your site information and other system requirements. In addition, we offer a range of drawing services for sales proposals, permitting, installation, and commissioning needs. Custom services are also offered, such as energy production analysis, 3D rendering and shade analysis. For more information, go to the My Engineering Services page on the dealer website.

Available Engineering Services

- System Design and Quote
- Single Line Diagram
- Electrical Wiring Diagram
- Custom Services





BECOME A DEALER!

In order to become a dealer, please complete the online application at the following url.
We will evaluate your application and contact you within two weeks.

www.soligent.net/solar-installer-resources/solar-dealer-resources

DEALER BENEFITS

Once you become a dealer, you can immediately start creating quotes and placing orders.
You will also have access to the added benefits below:

ONLINE CATALOG

You can use the online catalog to view product information, pricing, and create/build your quotes.

ENGINEERING SERVICES

We offer comprehensive design, engineering, and drawing services. Please see page 3 for more info.

CUSTOMER SERVICE

Our customer service department is available to help with a variety of product and order questions: what to do when receiving an order, how to report issues (RMA claim form), and what information is available regarding warranty service and shipment damage.

FINANCING

We've put together Residential and Commercial Leasing Programs to further assist you as a dealer. Please see page 8-9 for more info.

DEALER LOGIN WEBSITE

When you log in to the dealer website, you can create and edit quotes, place orders, create duplicate orders and convert orders to quotes. The dealer login website also provides other helpful information and tools, such as:

- **Price Lists**
- **PV Design Request Forms**
- **Will Call and Damage & Claim Policies**
- **Credit Applications**
- **Technical Product Info**
- **Customer Servie Info**
- **Power Pro, our online proposal generating tool**
- **Solar Design Tool, our online PV system designing tool**

In order to obtain a login to our dealer website, you must first be approved as a dealer. If you are an existing dealer, you can create a login at: **www.soligent.net/dealer/login.aspx**

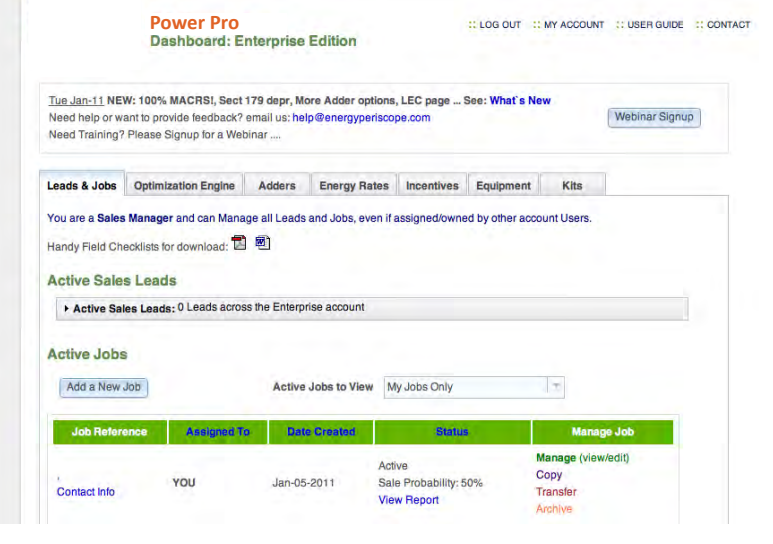
POWER PRO

NEED A MORE PROFESSIONAL PROPOSAL?

As a service to our dealers, we've brought you Power Pro, an online proposal generator tool that will help you create consistent and professional proposals. **Try Power Pro FREE for 30 days!** Visit the "dealer services" section of the dealer login website for more information. See page 5 for information on the dealer login website.

PROPOSAL GENERATION

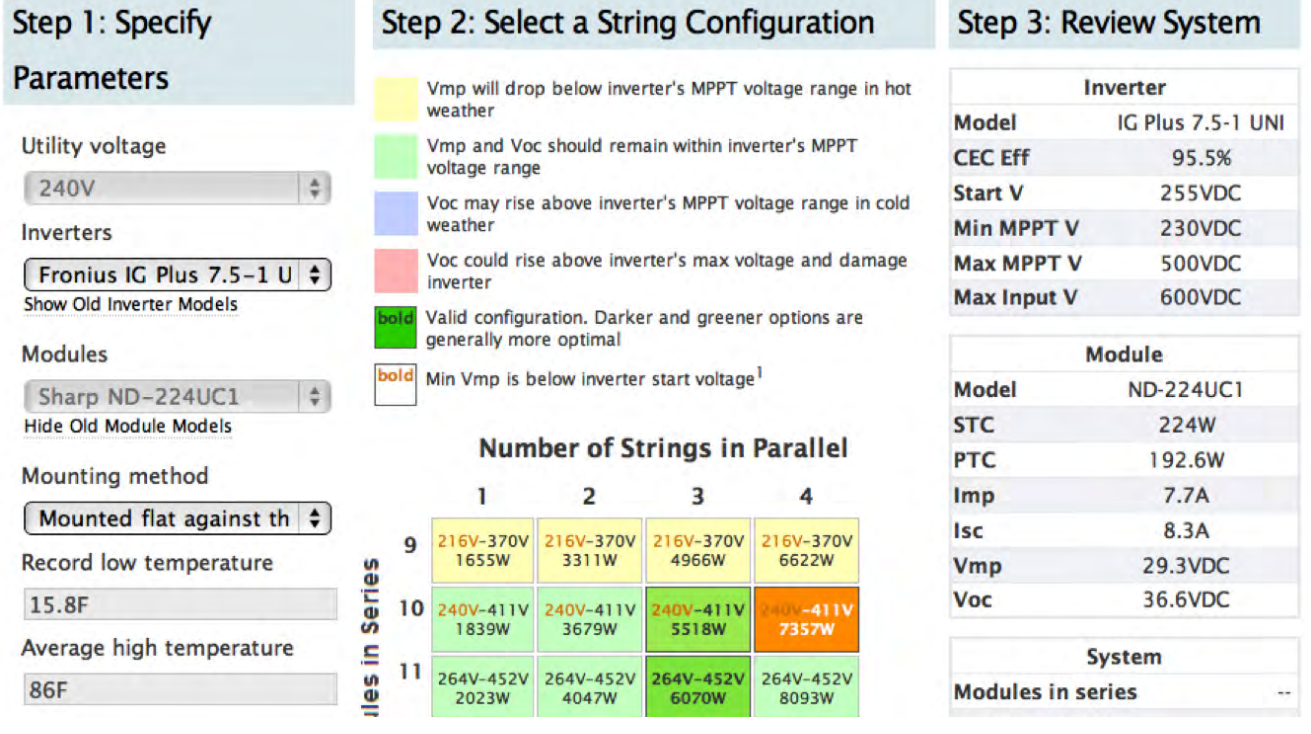
- Add detailed product features, options and pricing
- Include detailed quotes
- Populate proposals with relevant customer data
- Add cover letters from templates
- Add technical datasheets, pictures, and drawings
- Add quality documentation or industry specifications
- Browse and append any external documents
- Include recommended upsell options
- Print, e-mail, or fax proposals to customers
- Generate proposals in MS Word or Adobe PDF



SOLAR DESIGN TOOL

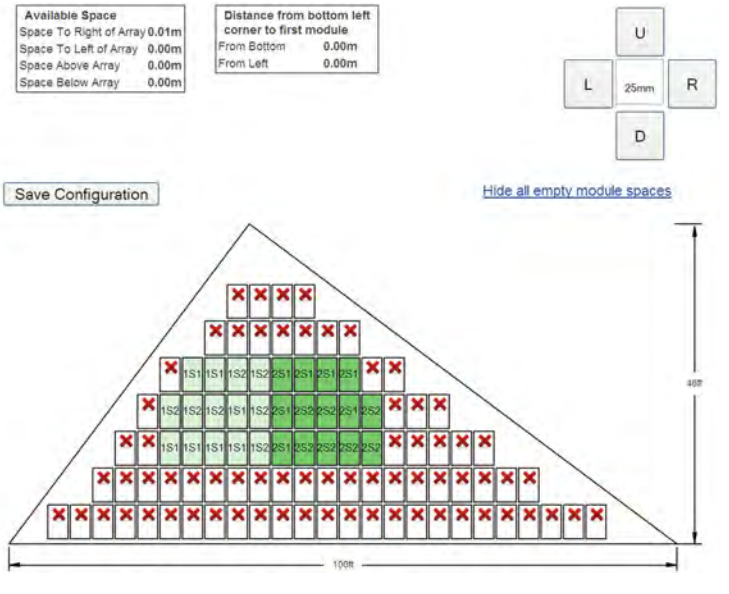
FAST, FLEXIBLE, COMPLETE DESIGNS

SolarDesignTool is the industry's leading web application for PV system design. It streamlines complicated residential and small commercial grid-tied PV system design, accelerating and simplifying the typically labor-intensive and costly steps that are a part of the design process. SolarDesignTool facilitates proposal and technical design processes, reducing lead response time as well as accelerating project permitting.



PROPOSAL GENERATION FEATURES

- Design grid-tied solar electric systems for homes and businesses
- Design for multiple selected modules
- Design both single-inverter and multi-inverter systems
- Configure array layouts for single and multiple roofs
- Compare configured systems side-by-side
- View a graphical representation of a system's array layout
- Arrange solar modules on roof easily by simply dragging and dropping
- Save designs so you can access or edit them later
- Organize designs into projects
- Export the design to a PDF system summary sheet
- Handles both string-sizing and layout of panels
- Use string configurator to quickly build single and multi-inverter systems



Visit the "dealer services" section of the dealer login website for more information. See page 5 for information on the dealer login website.

SOLAR FINANCING PROGRAMS

Soligent is committed to providing cutting edge project financing tools. We are continually developing new programs to meet the financing needs of the dealer and end user.

COMMERCIAL PROJECT FINANCING

Soligent has the financing solutions available for your small to medium size commercial and nonprofit solar installations in all 50 states.

FINANCING OPTIONS

- Loans
- Capital Leases
- Operating Leases
- Solar Power Purchase Agreements
- $0 Down 100% Financing Options
- Construction Progressive Payment

DEALER BENEFITS

- Channel Support
- Facilitating Project Sales
- Design and Engineering Services
- Multiple Lending Sources

ENROLLMENT CRITERIA

- Must be a registered Soligent dealer.
- Dealer pre-qualification and/or credit approval may be required.
- A simple application starts the process for loans up to $75K

PROJECT QUALIFICATIONS

- End-customer or host company must pass bank credit and financing criteria.
- Minimum system size and transaction size may vary by financing options.

CONDITIONS

- All equipment must be purchased from Soligent

RESIDENTIAL FINANCING

RESIDENTIAL SOLAR LEASES AND LOANS

Even in areas with little or no incentive, a residential solar lease or loan can make financial sense. Homeowners with good credit but no cash can qualify. In many areas, the solar lease is a cash-positive event from day one, while the solar loan offers the benefits of ownership with no cash up-front. These and other good reasons to explore residential solar financing have dramatically increased the sales success rate experienced by many of our dealers. Available in many, but not all states. Check with your Soligent sales representative to find out if it's available in your area.

PROGRAM HIGHLIGHTS

- Leases or Loans
- Up to 25-year term with performance guarantee
- 0% to low escalation rates
- Payments below current energy costs lower the homeowners monthly expenses
- Zero down eliminates up front payment
- Pre-paid out of pocket significantly lower than cash sale

HOMEOWNER BENEFITS

- Reasonable FICO score requirements
- No equity required
- Transferable and extendable
- Quick turnaround
- Options to meet homeowner's needs
- No insurance obligation
- Easy application process

DEALER BENEFITS

- Zero cost to enroll
- Increased close rates
- Increased system size (means more revenue)
- Lessor pays equipment cost
- Gets more homeowners into the market
- Recapture previously lost homeowners
- Dealer establishes own profit margin
- Fast approval allowing for one-stop close
- Competitive interest rates
- Online proposal preparation and loan approvals
- Installation payments guaranteed by Soligent

HOW TO MAKE IT HAPPEN

All dealers must enroll in the Soligent Residential Leasing Finance Program before offering financing to their customers. Contact us for enrollment criteria. Once you've enrolled, we'll work on getting you all the details regarding training, necessary paperwork and more.

LARGE PROJECT PARTNER PROGRAM

INCREASE YOUR REACH

Lightstorm Entertainment, Manhattan Beach, CA
AVATAR Solar Project 960kW

CAPITALIZE ON LARGE-SCALE OPPORTUNITIES

- Refer projects over 300 kW to Soligent's EPC division, Stellar Energy
- Earn $10,000 - $50,000 in referral fees for projects outside of your business focus
- Manage risks associated with large projects by leveraging Stellar's experience and resources

MAXIMIZE PROFITS AND VISIBILITY

- Act as a subcontractor on referred projects, if qualified
- Receive residential leads from employee solar programs on qualified projects
- Receive recognition from project publicity
- Gain hands-on knowledge with large commercial projects without the associated risk

HOW IT WORKS

Soligent and its sister company, Stellar Energy, combine forces and expertise to help qualified dealers convert large commercial prospects into successful installations.

WE PROVIDE

- Large commercial experience & expertise
- Project development (financial & technical
- Engineering, design and permitting
- Procurement, construction - local & licensed
- Project management
- Potential for subcontract with partner
- Commissioning, operations & maintenance
- Client & project marketing, PR
- Structured finance solutions

MINIMUM PROJECT QUALIFICATIONS

- Size of project 300 kW+
- Project is not an "Arm's Length" Request for Proposal (RFP)
- Stellar Energy is not already pursuing the project/prospect
- Referred prospect has confirmed interest in going solar
- Partner provides decision makers' contact information

WORKING WITH SOLIGENT & STELLAR ENERGY

We provide large scale project capability as well as financial strength.

- **Experience:** Stellar Energy has been designing and constructing solar power plants since 2004.
- **Financing:** Our group of solar companies has been in business for 30 years. We stand behind our projects.
- **Stability:** Stellar Energy's experience ensures timely project completion.
- **Purchasing Power:** Our scale provides reduced cost of goods, leading to aggressive pricing and the best economics for the end customer.

GET STARTED TODAY

1. Email us at **largeprojects@soligent.net** or call **888-242-8701** to submit your project details.
2. If your potential solar opportunity meets the pre-qualification requirements, we'll contact you to discuss next steps.
3. All qualified projects receive a **confirmation email** with applicable referral rate. **This email is proof of your submission.**
4. Earn referral fees upon project completion if the referred project contracts within 12 months of the referral date.

Contact us at
888-242-8701

Email us at
largeprojects@soligent.net

Soligent

STELLAR ENERGY

/ Battery Charging Systems / Welding Technology / Solar Electronics

Fronius

SHIFTING THE LIMITS

WE MAKE MAXIMUM EARNINGS POSSIBLE. BECAUSE OUR MODULAR INVERTER DESIGN GUARANTEES CONSISTENTLY HIGH PERFORMANCE.

FRONIUS CL 33.3$_{DELTA}$ / 36.0$_{WYE277}$ / 44.4$_{DELTA}$ / 48.0$_{WYE277}$ / 55.5$_{DELTA}$ / 60.0$_{WYE277}$

/ Up to 15 power modules using Fronius MIX™ technology achieve great things for the Fronius CL central inverter series. Individual power stages are switched on and off fully automatically depending on the irradiance level. This optimizes capacity utilization and maximizes earnings – in any weather. But that's not all: the Fronius CL central inverter series for systems up to several hundred kilowatts also ensures extreme reliability and a long service life. For more information, go to **www.fronius-usa.com**

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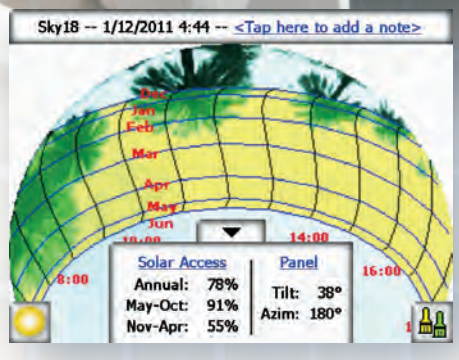
Confidence on the roof, credibility with your customers

Make thorough shade measurements quickly with the SunEye® 210.

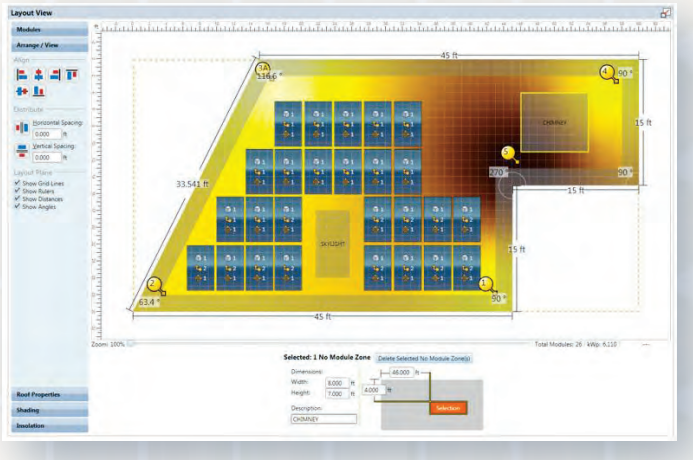


Measure how shade will impact energy production.

And when you can't get on the roof…

Be safe and save time with the SunEye Extension Kit for measurements 18 feet up from ground level.

Visualize your PV designs



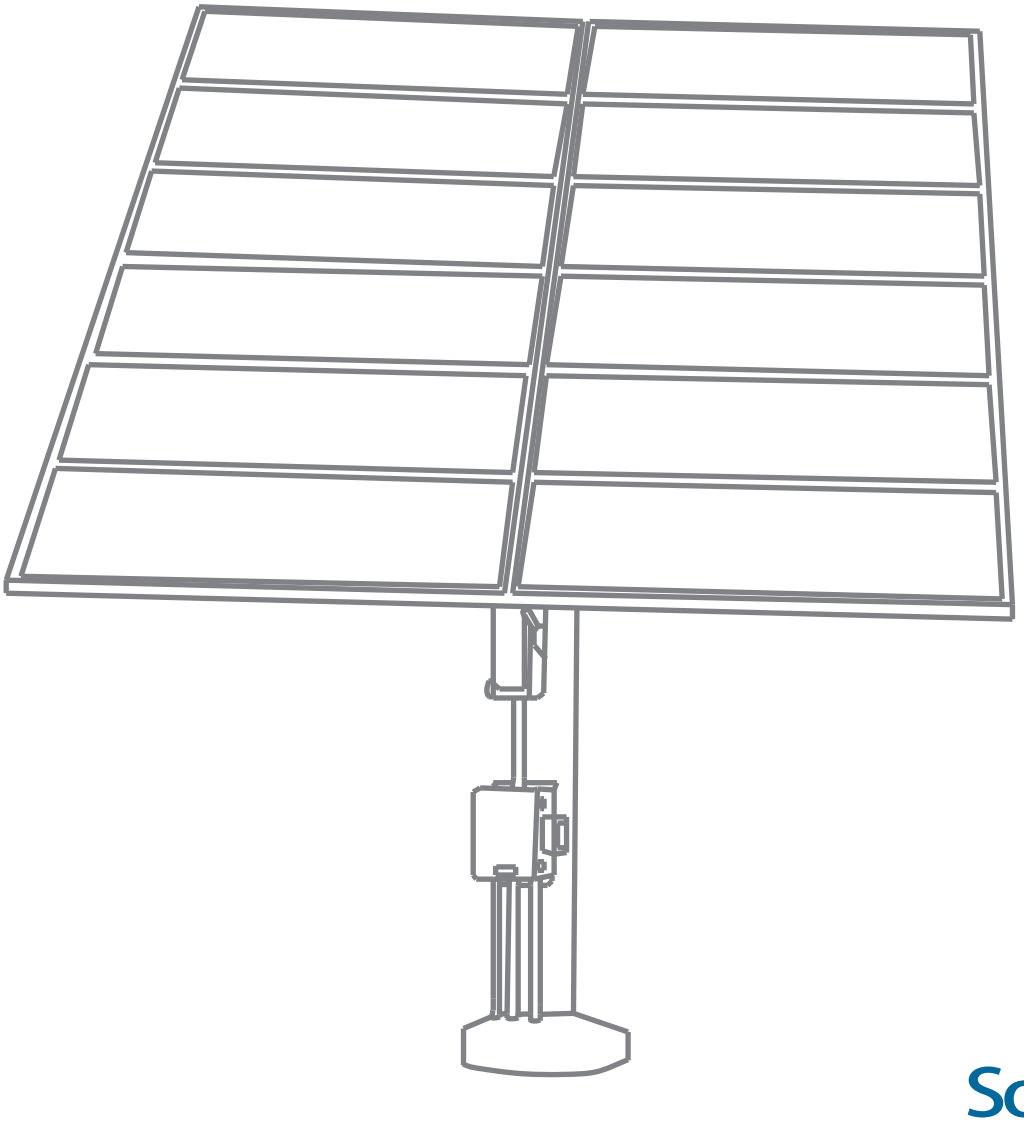
Lay out modules and estimate PV production with PV Designer™ software.

Solmetric

Expert Tools. Better Solar.

www.solmetric.com

PV Modules



Soligent

Solar Modules- The Best Invention Under the Sun

It all begins with the module. The solar panel, or "module," converts the photon energy of sunlight into electric potential or "voltage." Hence the term "photovoltaic."

There are many different ways to accomplish this energy conversion and each process results in a different type of module that has certain strengths, and sometimes weaknesses, in a given operating condition. Some methods yield greater efficiency in extreme heat, some are more efficient by unit area, some do better in partial shading than others, some have important aesthetic differences and some lend themselves well to unique mounting solutions.

Decision Factors

Let Customer Preference Guide You

The customer's preferences are the most important. Do they want low profile, black framed modules on their home, or least expensive on the flat roof of their business? These preferences will define the family of products from which you can choose.

The Right Module is More Important than Cost

The cost of a solar panel is determined in part by the size (in watts), the rated efficiency, the manufacturer and the style (i.e. building integrated or framed). Choosing a solar panel simply because it is less expensive is not wise. It may not fit the install situation, customer preferences or requirements for a local rebate. It is always best to choose the right module and try to get the best price available for that module.

Durability / Warranty

All of our modules have a 20 or 25 year warranty. Anything less than 20 years should not be considered. Despite warranties, the life expectancy of most solar modules is 50 years or more.

Cell Type

Among Silicon based technologies there are 4 main types of cells. Monocrystalline (or Single-Crystalline) silicon is the most efficient and produces the smallest panels for a given watt rating. Polycrystalline (or Multicrystalline) silicon produces the next most efficient type of cell. New developments are increasing its conversion efficiency close to that of mono. Amorphous (or thin-film) silicon uses the least amount of silicon and also produces the least efficient solar cells. This means a thin-film system takes up more area than the other two. Finally there are hybrid cells like the HIT (Heterojunction with Intrinsic Thin Layer) that combine mono and thin-film technologies to produce very high efficiencies. Non-silicon based technologies include Cadmium Telluride (CdTe), Copper Indium Gallium Selenide (CIGS) and Gallium Arsenide multijunction (GaAs-Ge-GaInP). Research is continuing the development of new PV technologies like Dye-sensitized solar cells (DSSCs), Organic/polymer solar cells and Carbon Nanotubes (CNTs).

Cell Number

In the past, PV modules were frequently used in battery based systems, so the 36 cell (nominal 12 volt) and 72 cell (nominal 24 volt) modules using a 5" wafer cell were popular. As the grid-tied solar market has grown and the size of the wafer cell has changed to the 6" wafer, the 60 cell module has now become the most commonly available size.

Size and Watts

Solar panels are usually priced in dollars per watt. The type of solar cells used in its production also determines the size of the solar panel. More efficient monocrystalline solar modules typically produce more power than polycrystalline modules of the same size. While silicon prices were high, thin-film modules were cheaper than monocrystalline and polycrystalline modules. Because of their lower conversion efficiency, they typically require about twice as much space per watt as the more efficient crystalline technology. Recent developments have seen the price of silicon drop significantly such that mono and poly silicon based modules are the most cost effective technologies.

Connectors and Cables

Solar panels originally came with a junction box (JBox) that needed individual wires to be attached to connect them together. This made installation very time-consuming, so pre-installed quick connect cables and plugs were developed, and these have replaced the junction box only modules. Changes in the NEC code now require the use of locking connectors in publicly accessible locations. The most common locking connector is the Multi-Contact MC4. Others are the Amphenol H4, SMK, and the TE Connectivity connectors. The NEC code also introduced new wire insulation requirements for use with ungrounded PV arrays (Source Circuits) when wires are not run in conduit or wire raceways. The new PV-Wire specification requires that the conductor must be listed to UL Standard 4703. Ungrounded arrays are arrays that do not have a ground fault fuse tying one of the source conductors to ground. This is typically found in the new "Transformerless" range of inverters. Most module manufacturers are now supplying their products with locking connectors and PV-Wire to comply with the new standards.

Module Type

Most solar modules sold today are traditional framed crystalline cells. Sometimes however, building integrated photovoltaics (BIPV) are more appropriate or desired. Building integrated modules, like framed modules, are available with all three primary cell types and typically replace other building components, such as concrete roofing tiles, with solar roofing tiles or regular glass with solar glass.

SHARP®
solar electricity

RESIDENTIAL POLYCRYSTALLINE MODULE

Sharp's powerful residential modules, the ND-Q250F7, blends high performance with advanced aesthetics. White backsheet and sleek black frame create a modern silhouette on nearly any roof. Using breakthrough technology, made possible by nearly 50 years of proprietary research and development, this module incorporates an advanced cell surface texturing process to increase light absorption and improve efficiency. It is versatile enough to permit installation on nearly any kind of roof.

ND-Q250F7

ENGINEERING EXCELLENCE

The ND-Q250F7 module is the perfect combination of high performance and design.

ADVANCED AESTHETICS

This sleek, black frame module provides an elegant appearance that blends beautifully with your home's roofline.

5% POSITIVE POWER TOLERANCE

This module is guaranteed a minimum peak power rating of 245 W. Individual modules could test up to 5% higher.

DURABLE

Tempered glass, EVA lamination and weatherproof backskin provide long-life and enhanced cell performance.

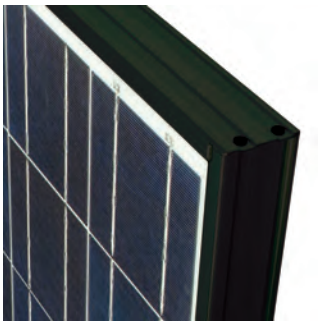
RELIABLE

The ND-Q250F7 module is covered by both the Sharp 10-year limited warranty on materials or workmanship as well as the 25-year limited warranty on power output.

HIGH PERFORMANCE

These modules use an advanced solar cell surface texturing process to increase light absorption and improve efficiency.

Black frame improves aesthetics for residential roof top applications.



Laminated glass construction in a high torsion frame.

ND-Q250F7

Sharp Part #	ND-Q250F7
Part #	110-0801
Electrical Characteristics	
Frame	Black XE
Maximum Power (Pmax)	250 W
Tolerance	+5% / -0%
Type of Cell	Polycrystalline
Cell Configuration	60 in series
Open Circuit Voltage (Voc)	38.3 V
Max Power Voltage (Vmp)	29.8 V
Short Circuit Current (Isc)	8.90 A
Max Power Current (Imp)	8.4 A
Module Efficiency (%)	15.3%
Max System (DC) Voltage	600 V (UL) / 1000 V (IEC)
Series Fuse Rating	15 A
NOCT	46.2 °C
Temp Coefficient (Pmax)	-0.439% / °C
Temp Coefficient (Voc)	-0.321% / °C
Temp Coefficient (Isc)	+0.050% / °C
Mechanical Characteristics	
Dimensions (H x W x D)	64.6" x 39.1" x 1.8"
Cable Length	43.3" (1100 mm)
Output Interconnect Cable	12 AWG w/ SMK Locking Connector
Weight	41.9 lbs
Max Load	50 psf
Operating Temperature	-40 °F to 194°F (-40 °C to 90 °C)
Warranty	25-year limited warranty on power output
Certifications	UL 1703, ULC/ORD-C1703, IEC 61215, IEC 61730, CEC

SHARP®
solar electricity

MULTI-PURPOSE POLYCRYSTALLINE MODULE

Using breakthrough technology, made possible by nearly 50 years of proprietary research and development, Sharp's ND-240QCJ , ND-250QCS and ND-F4Q300 solar modules incorporate an advanced surface texturing process to increase light absorption and improve efficiency. Common applications include commercial and residential grid-tied roof systems as well as ground mounted arrays. Designed to withstand rigorous operating conditions, these modules offer high power output per square foot of solar array.

ENGINEERING EXCELLENCE

High module efficiency for an outstanding balance of size and weight to power and performance.

5% POSITIVE POWER TOLERANCE

These modules are guaranteed a minimum peak power rating of 240 W, 250 W and 300. Individual modules could test up to 5% higher.

RELIABLE

25-year limited warranty on power output and 10-year limited warranty on materials or workmanship.

HIGH PERFORMANCE

These modules use an advanced surface texturing process to increase light absorption and improve efficiency.

"BUY AMERICAN"

These modules are manufactured in Memphis, TN from imported and domestic parts.

CERTIFICATIONS

Both the ND-240QCJ and ND-F4Q300 are UL 1703, Class C, IEC 61215, and IEC 61730 certified. The ND-250QCS module is UL 1703, ELC/ ORD-C1703, IEC 61215, IEC 61730, and CEC certified.

Sharp multi-purpose modules offer industry-leading performance for a variety of applications.

Tempered glass, EVA lamination and weatherproof backskin provide long-life and enhanced cell performance.

"BUY AMERICAN"

Sharp solar modules are manufactured in the US and Japan, and qualify as "American" goods under the "Buy American" clause of the American Recovery and Reinvestment Act (ARRA).

ND-F4Q300

ND-250QCS and ND-240QCJ

ND-F4Q300, ND-250QCS AND ND-240QCJ

Sharp Part #	ND-F4Q300	ND-250QCS	ND-240QCJ
Part #	110-0802	110-0797	110-0516
Electrical Characteristics			
Frame	Clear XE	Clear XE	Clear XE
Maximum Power (Pmax)	300 W	250 W	240 W
Tolerance	+5% / -0%		
Type of Cell	Polycrystalline		
Cell Configuration	72 in series	60 in series	
Open Circuit Voltage (Voc)	45.1 V	38.3 V	37.5 V
Max Power Voltage (Vmp)	35.2 V	29.8 V	29.3 V
Short Circuit Current (Isc)	8.94 A	8.90 A	8.75 A
Max Power Current (Imp)	8.52 A	8.40 A	8.19 A
Module Efficiency (%)	15.3%	15.3%	14.7%
Max System (DC) Voltage	600 V (UL) / 1000 V (IEC)		
Series Fuse Rating	15 A		
NOCT	46.2 °C		
Temp Coefficient (Pmax)	-0.439% / °C		
Temp Coefficient (Voc)	-0.321% / °C		
Temp Coefficient (Isc)	+0.050% / °C		
Mechanical Characteristics			
Dimensions (H x W x D)	77.6" x 39.1" x 1.8"	64.6" x 39.1" x 1.8"	
Cable Length	43.3" (1100 mm)		
Output Interconnect Cable	12 AWG w/ SMK Locking Connector		
Weight	50 lbs	41.9 lbs	
Max Load	30 psf	50 psf	
Operating Temperature	-40 °F to 194°F (-40 °C to 90 °C)		
Warranty	25-year limited warranty on power output		

YINGLI SOLAR
Power Your Life

COMPANY

Yingli Green Energy (NYSE: YGE) is one of the world's leading photovoltaic (PV) manufacturers with over 6 GW of modules deployed worldwide. Yingli Americas offers local expertise through dedicated teams located in New York and San Francisco.

As one of the largest and fastest growing module suppliers in North America, Yingli Americas has over 10,000 projects in more than 25 states, Canada, Latin America, and the Caribbean. Customers span the commercial, utility, and residential markets.

Yingli Americas provides superior customer support and module characterization through its PV Testing Lab (PVTL), a South San Francisco-based R&D facility. The PVTL utilizes the most sophisticated testing equipment available to produce .PAN files and system modeling support.

PRODUCTS

Yingli Green Energy's manufacturing process is defined by world-class technology, high quality workmanship, and robust construction. Yingli Solar modules are trusted around the world for their performance, quality, and reliability. The YGE Series, Yingli Solar's high-performing multi-crystalline product line, delivers proven product reliability, sustainable performance, and long-term quality. The YGE Series has also been recognized for superior energy yield by leading third-party testing labs, including PHOTON and TUV Rheinland.

MULTICRYSTALLINE

- High quality YGE Series modules with product family spans from 230 W to 305 W.
- Module efficiencies of up to 15.6%.
- Now with black and silver frames.
- Ideal for a broad range of applications, from residential rooftops to large-scale solar power plants.

WARRANTIES

- Extensive 10-year limited product warranty and 25-year limited power warranty.
- Competitive power warranty terms guarantee superior performance over time. Terms vary by product.
- Please refer to www.yinglisolar.com/media/download-center for the most up to date warranty and product specifications.

QUALIFICATIONS AND CERTIFICATES

- ISO 9001:2008, ISO 14001:2004, BS OHSAS 18001:2007, SA8000, IEC61215, IEC61730, UL1703, Class C Fire Rating, ISO9001, CEC, FSEC

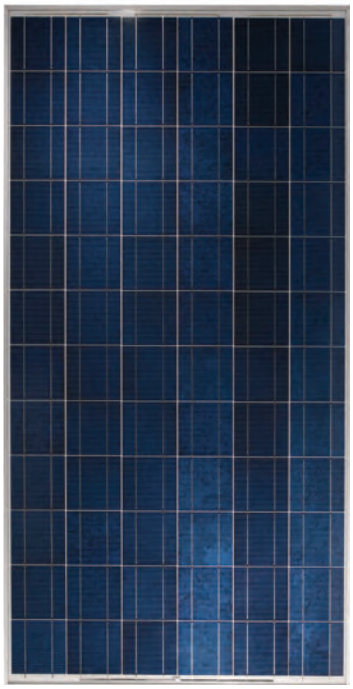
Photo courtesy of "North Jersey Aerial Photography"

Project Name: New York Jets Training Facility
Size: 700 kW DC
Location: Florham Park, New Jersey
Project Type: Commercial
Number of Modules: 3,000
Installer/Partner: SunDurance Energy

Project: Large Residential Project
Size: 52.8 kW
Location: Longmeadow, MA
Number of Modules: 220
Installer/Partner: Green Earth Energy Corporation

YINGLI SOLAR
Power Your Life

Made in China



YGE-U 72 Cell Series

YGE 60 Cell Series

YGE-U 72 CELL SERIES

Yingli Part #	YL285P-35b	YL290P-35b
Part #	110-0775	110-0776
Electrical Parameters		
Power Output (Pmax)	285.0	290.0
Power Output Tolerances	-0 / +3%	
Module Efficiency	14.6%	14.9%
Voltage (Vmp)	35.5 V	35.8 V
Current (Imp)	8.02 A	8.10 A
Open Circuit Voltage (Voc)	45.0 V	45.3 V
Short Circuit Current (Isc)	8.50 A	8.62 A
Max System Voltage	1000 VDC	1000 VDC
Max Series Fuse Rating	15 A	15 A
Thermal Parameters		
NOCT	46 ± 2 °C	
Temp Coefficient (Isc)	+0.06 °C	
Temp Coefficient (Voc)	-0.33 °C	
Temp Coefficient (Pmax)	-0.45 °C	
Mechanical Parameters		
Dimensions (L x W x H)	77.56" x 38.98" x 1.97"	
Weight	59.1 lbs	
Plug Connector Type	Amphenol / H4 / IP68 or Multi-Contact / MC4 / IP67	
Cell Type	Multicrystalline	
Operating Conditions		
Operating Temp	-40 °C to 90 °C	
Max Snow and Wind Load	50 psf	
Frame Color	Silver	

YGE 60 CELL SERIES

Yingli Part #	YL245P-29b	YL250P-29b	YL250P-29b
Part #	110-0576	110-0828	110-0578
Electrical Parameters			
Power Output (Pmax)	245.0	250.0	250.0
Power Output Tolerances	-0 / +3%		
Module Efficiency	15.0%	15.3%	15.3%
Voltage (Vmp)	30.2 V	30.4 V	30.4 V
Current (Imp)	8.11 A	8.24 A	8.24 A
Open Circuit Voltage (Voc)	37.8 V	38.4 V	38.4 V
Short Circuit Current (Isc)	8.63 A	8.79 A	8.79 A
Max System Voltage	1000 VDC	1000 VDC	1000 VDC
Max Series Fuse Rating	15 A	15 A	15 A
Thermal Parameters			
NOCT	46 ± 2 °C		
Temp Coefficient (Isc)	+0.06 °C		
Temp Coefficient (Voc)	-0.33 °C		
Temp Coefficient (Pmax)	-0.45 °C		
Mechanical Parameters			
Dimensions (L x W x H)	64.96" x 38.98" x 1.57"		
Weight	42.1 lbs		
Plug Connector Type	Amphenol / H4 / IP68 or Multi-Contact / MC4 / IP67		
Cell Type	Multicrystalline		
Operating Conditions			
Operating Temp	-40 °C to 90 °C		
Max Snow and Wind Load	50 psf		
Frame Color	Black		Silver

CanadianSolar

HOW CANADIAN SOLAR STARTED

Dr. Shawn Qu, Chairman and Chief Executive Officer of Canadian Solar founded Canadian Solar in 2001 in Canada with the mission to deliver solar powered electricity to millions of people around the globe.

WHO CANADIAN SOLAR IS

As one of the world's largest solar power companies in the world, they bring more than a decade of industry experience. Customers and partners trust their technical expertise, bankability, and commitment to sustainable development. Listed on the NASDAQ (CSIQ) stock exchange since 2006, customers have already installed more than 5.0GW of Canadian Solar modules in more than 70 major solar markets.

WHAT CANADIAN SOLAR DOES

They are a leading vertically integrated manufacturer of mono-crystalline and multi-crystalline ingot, wafer, cell, modules, and specialty system solar products. They also have a pipeline of over 750MW of utility-scale PV projects around the globe. Canadian Solar providing customers with total turnkey solar solutions that reduce installation complexities and costs.

With a module manufacturing capacity in excess of 2.4GW, they are one of the top 4 PV manufactures in the world. The brand is well-recognized for quality, reliability and bankability, as evidenced by the 1.54GW of solar module shipments in 2012 alone. The highly automated principle manufacturing facilities based in Ontario, Canada as well as Suzhou, China provide great flexibility.

WHERE CANADIAN SOLAR IS

Canadian Solar is headquartered in Guelph, Ontario with seven wholly owned manufacturing subsidiaries across China and with more than 10,000 dedicated employees. They successfully operate their PV business in more than a dozen countries and in 6 continents. They focus on delivering high quality products at a high return on investment.

DESIGN TO PERFORM, BUILD TO LAST

Canadian Solar's products are manufactured with continuous innovation, meticulous design and production techniques, combined with rigorous quality control, in-house testing and adherence to strict international quality standards.

Canadian Solar products feature plus-only power tolerance for high reliability and output. Products and parts are guaranteed for 10 years and they offer a linear guarantee of power performance for 25 years. In addition to industry leading warranty, Canadian Solar provides 25-year warranty insurance for PV modules, offered by AM best rated insurance companies in Europe and the USA, providing double protection for customers, investors, financiers and solar system owners.

Photo courtesy of "Rosendin Electric"

Project Name: San Jose Mineta International Airport
Application: Commercial Airport Installation
Installation Type: Rooftop
Size: 1.12 MW
Location: San Jose, CA
Annual System Output: 1,713 MWh
CO_2 Emmision: 1,284 Tons
System Activated: June 2012
Modules Used: CS5P-M
Installer/Partner: Rosendin Electric

Photo courtesy of "Southland Solar"

Project Name: Pelissero Residence
Application: Residential
Installation Type: Rooftop
Size: 8.64 kW
Location: Riverside, CA
Annual System Output: 13,612 kWh
CO_2 Emmision: 10 Tons
System Activated: May 2010
Modules Used: CS6P-M
Installer/Partner: Southland Solar

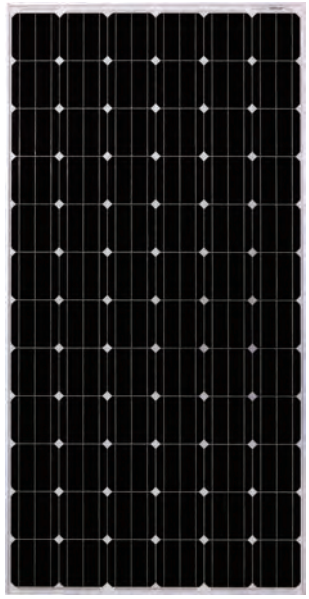
CanadianSolar

Made in China
Tariff Free
(Cells made in Taiwan)

MaxPower Modules

Canadian Solar Part #	CS6X-300M	CS6X-295M	CS6X-295P
Part #	110-0524	110-0530	110-0815
Electrical Data			
Nominal Max Power at STC (Pmax)	300 W	295 W	295 W
Optimum Operating Voltage (Vmp)	36.5 V	36.4 V	36.0 V
Optimum Operating Current (Imp)	8.22 A	8.11 A	8.19 A
Open Circuit Voltage (Voc)	45.0 A	44.9 V	44.5 V
Short Circuit Current (Isc)	8.74 A	8.63 A	8.76 A
Module Efficiency	15.63%	15.37%	15.37%
Operating Temperature	-40 °C ~ +85 °C		
Maximum System Voltage	1000 V (IEC) / 600 V (UL)		1000 V (UL)
Maximum Series Fuse Rating	15 A		
Power Tolerance	0 ~ +5 W		
Mechanical Data			
Connector Type	MC4		
Cell Type	Monocrystalline		Polycrystalline
Cell Arrangement	72 (6 x 12)		
Dimensions (H x W x D)	76.93" x 38.7" 1.57"		
Weight	50.7 lbs		
Front Cover	Tempered Glass		
Frame Material	Anodized Aluminum Alloy		
Frame Color	Silver		

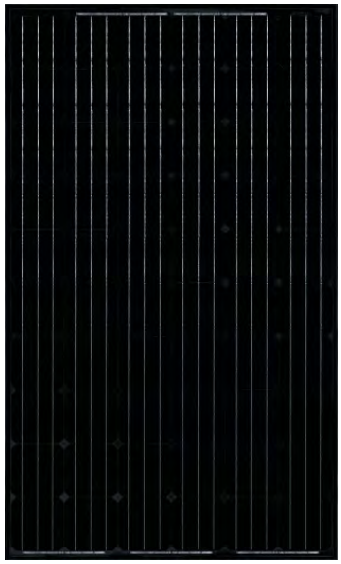
MaxPower CS6X-P



MaxPower CS6X-M

CS6P-M & CS6P-P Modules

Canadian Solar Part #	CS6P-255M	CS6P-250M	CS6P-250P
Part #	110-0821	110-0787	110-0817
Electrical Data			
Nominal Max Power at STC (Pmax)	255 W	250 W	250 W
Optimum Operating Voltage (Vmp)	30.5 V	30.4 V	30.1 V
Optimum Operating Current (Imp)	8.35 A	8.22 A	8.30 A
Open Circuit Voltage (Voc)	37.7 V	37.5 V	37.2 V
Short Circuit Current (Isc)	8.74 A	8.74 A	8.87 A
Module Efficiency	15.85%	15.54%	15.54%
Operating Temperature	-40 °C ~ +85 °C		
Maximum System Voltage	1,000V (IEC) / 600V (UL)		
Maximum Series Fuse Rating	15 A		
Power Tolerance	0 ~ +5 W		
Mechanical Data			
Connector Type	MC4		
Cell Type	Monocrystalline		Polycrystalline
Cell Arrangement	60 (6 x 10)		
Dimensions (H x W x D)	64.5" x 38.7" 1.57"		
Weight	41.9 lbs		
Front Cover	Tempered Glass		
Frame Material	Anodized Aluminum Alloy		
Frame Color	Black On Black		Black



CS6P-M Module

CS6P-P Module

Suniva®

The Brilliance of Solar Made Sensible®

COMPANY

Suniva® is an American manufacturer of high-efficiency crystalline silicon photovoltaic (PV) solar cells and high-power solar modules. The company is known for its high-quality products, industry-leading technology, reliability and high power density. Headquartered in metro-Atlanta, GA, Suniva sells its advanced PV cells and modules globally. For additional information on how Suniva is making solar sensible, please visit www.suniva.com.

As a global leader in high-efficiency, low-cost PV manufacturing, Suniva has earned a reputation for creating sensible solar, helping to promote the practical adoption of solar energy all over the world. Suniva's products offer a balance of high quality, high efficiency and cost competitiveness, using American technology from an American company, whose reputation for innovation, quality, and reliability is worldwide.

SUNIVA QUALITY ADVANTAGE

Suniva's high-quality crystalline PV products are created using patented, low-cost manufacturing techniques and pioneering intellectual property to ensure optimum power, performance, reliability and unparalleled value in every product we make. Suniva modules offer a 25 year industry leading linear warranty, positive only power tolerance ensuring predictable output, performance longevity with advanced polymer backsheet, and are certified PID-free. Suniva modules have passed extended/enhanced performance testing beyond UL and IEC certification requirements.

MONOCRYSTALLINE

Suniva Part #	OPT265-60-4-1B0	OPT265-60-4-100	OPT270-60-4-100	OPT300-72-4-100	OPT305-72-4-100	OPT310-72-4-100	OPT315-72-4-100
Part #	110-0829	110-0792	110-0816	110-0762	110-0556	110-0827	110-0807
Electrical Characteristics							
Frame	Black Anodized Aluminum Alloy w/ black backsheet	Silver Anodized Aluminum Alloy					
Maximum Power (Pmax)	265 W	265 W	270 W	300 W	305 W	310 W	310 W
Tolerance	-0 / +2.5 Wp	-0 / +4.99 Wp					
Type of Cell	Monocrystalline						
Cell Arrangement	60 (6 x 10)			72 (6 x 12)			
Open Circuit Voltage (Voc)	38.3 V	38.3 V	38.5 V	45.5 V	45.6 V	45.7 V	45.9 V
Max Power Voltage (Vmp)	30.7 V	30.7 V	31.2 V	36.0 V	36.1 V	36.2 V	36.5 V
Short Circuit Current (Isc)	9.12 A	9.12 A	9.15 A	8.90 A	9.00 A	9.06 A	9.10 A
Max Power Current (Imp)	8.64 A	8.64 A	8.68 A	8.34 A	8.45 A	8.56 A	8.62 A
Module Efficiency (%)	16.33%	16.33%	16.60%	15.50%	15.76%	16.02%	16.27%
Max System (DC) Voltage	1000 VDC for IEC (1000 VDC for UL)						
NOCT	46.0 °C (± 2 °C)						
Temp Coefficient (Pmax)	-0.420% / °C						
Temp Coefficient (Voc)	-0.335% / °C						
Temp Coefficient (Isc)	+0.047% / °C						
Mechanical Characteristics							
Dimensions (H x W x D)	65.04" x 38.66" x 1.57"			77.6" x 38.7" x 1.8"			
Weight	39.50 lbs (± 0.5 lbs)			50.70 lbs			
Junction Box	NEMA IP67 rated; 3 internal bypass diodes						
Cable Length	43.3" (1000 mm)						
Output Interconnect Cable	12 AWG (4.0 mm^2) cable with MC4 compatible connectors						
Operating Temperature	-40°F to +185°F (-40°C to +85°C)						

Specifications are subject to change without notice

COMPANY

SunEdison is a leading solar technology manufacturer and provider of solar technology and solar energy services. Serving business, public sector, utility, and residential customers, SunEdison is dedicated to transforming lives by delivering economical, clean, renewable energy to communities around the globe. Our expertise throughout the value chain allows us to deliver predictable pricing and maximum value and return on investment. SunEdison manages hundreds of sites worldwide via a comprehensive suite of monitoring and O&M capabilities.

KEY FEATURES

- Solaicx® CCz p-type monocrystalline cells for higher conversion efficiency
- Tempered glass with Anti-Reflective Coating (ARC) for higher energy production
- Positive power tolerance provides increased power output
- Withstands loads up to 5400 Pa as tested to IEC standards
- Non-corroding anodized aluminum frame for ruggedness with black anodized aluminum.
- Modules with a range of power output available

MONOCRYSTALLINE

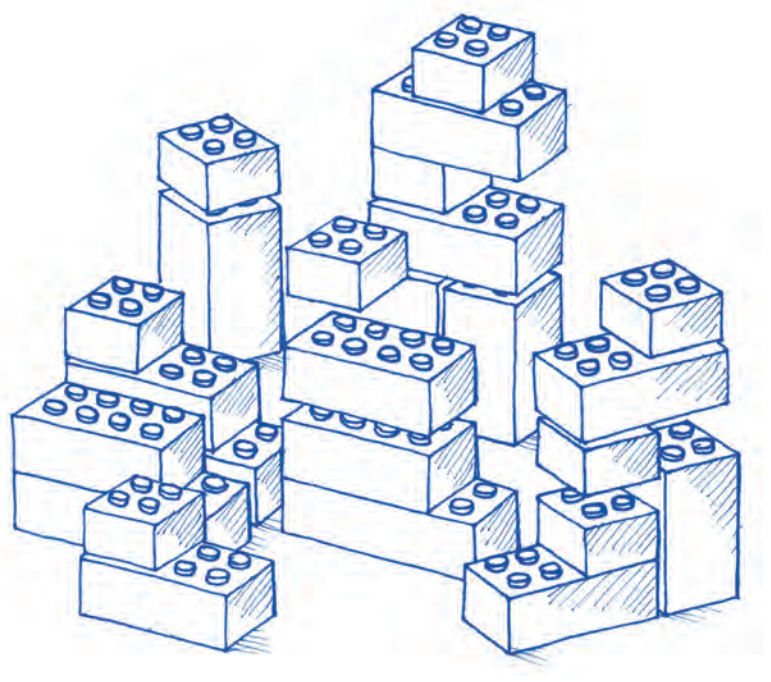
SunEdison Part #	M250CyC
Part #	110-0830
Electrical Parameters	
Power Output (Pmax)	250 W
Power Output Tolerances	-0 / +5%
Module Efficiency	15.2%
Voltage (Vmp)	30.6 V
Current (Imp)	8.17 A
Open Circuit Voltage (Voc)	38.1 V
Short Circuit Current (Isc)	8.98 A
Max System Voltage	1000 VDC (UL) & 1000 VDC (IEC)
Max Series Fuse Rating	15 A
Thermal Parameters	
NOCT	46 ± 2 °C
Temp Coefficient (Isc)	+0.05 °C
Temp Coefficient (Voc)	-0.34 °C
Temp Coefficient (Pmax)	-0.45 °C
Operating Conditions	
Operating Temp	-40 °C to +85 °C
Mechanical Parameters	
Dimensions (L x W x H)	65.28" x 38.98" x 1.97"
Weight	42.5 lbs
Number of Cells	60
Front Cover	3.2 mm Tempered ARC Glass
Frame Material	Anodized Aluminum
Cell Type	Monocrystalline
Frame Color	Black on White Backsheet

QUALITY & SAFETY

- SunEdison modules are designed to the highest industry standards of efficieny
- Mono-crystalline wafers provide high efficiency and consistent high quality
- Manufactured in highly automated, state-of-the-art facilities certified to ISO9001 and ISO14001
- IEC61215 certified by TÜV SÜD to ensure long-term operation in a variety of climates (pending)
- IEC61730 certified by TÜV SÜD to ensure electrical safety (pending)
- MCS certified by BABT for the UK (pending)
- Stringent outgoing quality acceptance criteria benchmarked to industry standards
- UL1703 listed by CSA for Canada and US

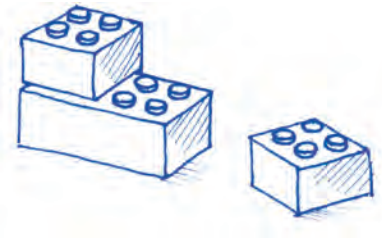
WARRANTIES

- 10-year limited warranty for materials and workmanship
- 25-year linear power warranty with coverage for power loss greater than 3.5% in the first year and 0.7% degradation per year thereafter
- Backed by SunEdison Products Singapore



FLEXIBILITY

Optimized by solaredge



More power where you need it?
Sure thing.

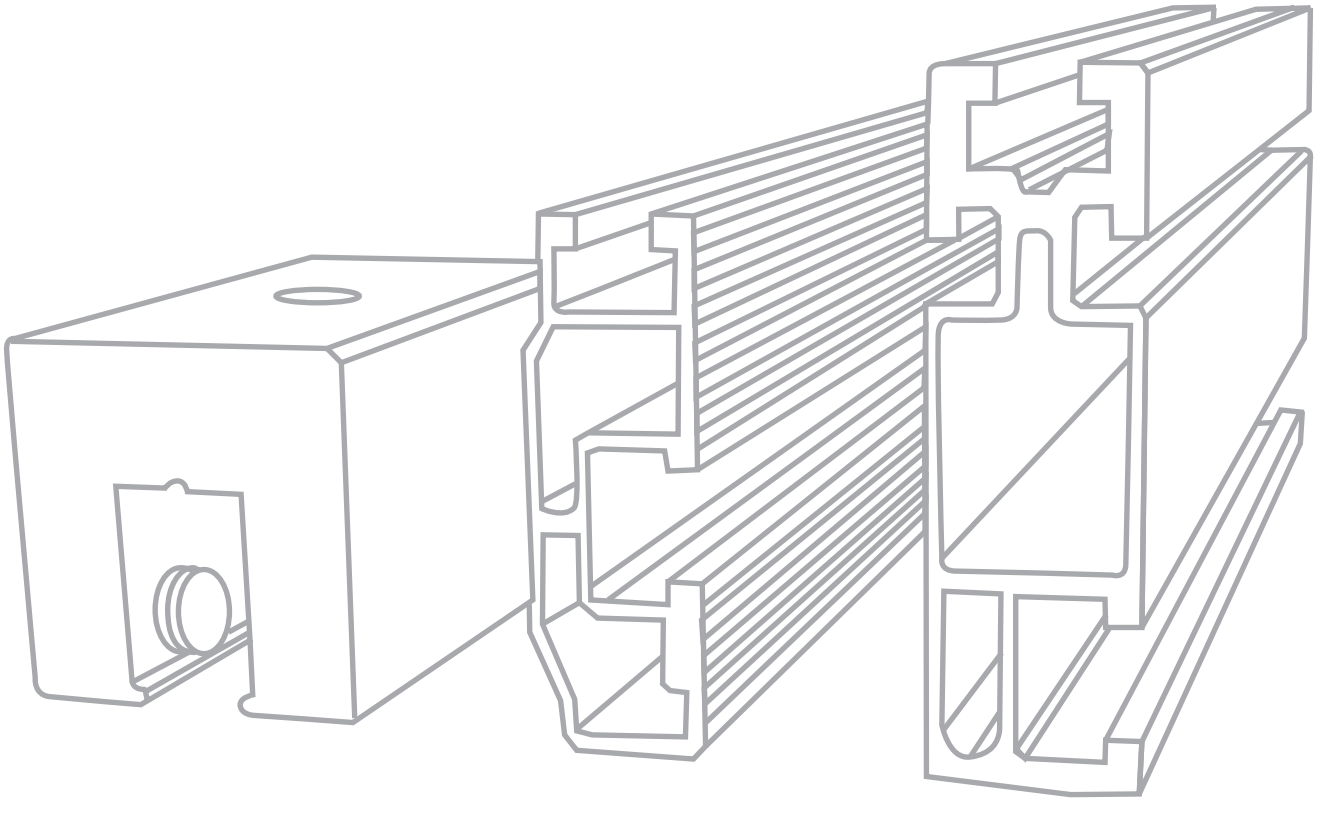
SolarEdge brings revolutionary design flexibility to any photovoltaic installation, eliminating known design constraints and enabling great design solutions for every given site. Tolerant to shady areas and to mismatch between modules and strings, the SolarEdge system enables connection between any modules you use, regardless of capacity, model, tilt or manufacturer. Want more? SolarEdge also supports the parallel connection of strings of different lengths and across multiple facets, ensuring the best possible design in the trickiest of spaces.

Get the most out of solar power! www.solaredge.com

- Join the SolarEdge Alliance Program - www.solaredge.com/alliance
- Attend one of our training events or online webinars - www.solaredge.com/training

solaredge
architects of energy™

Mounting Hardware



Soligent

Module Mounting Hardware

Getting them to stay put!

Photovoltaic module racking has become much more sophisticated in recent years. Manufacturers are constantly improving their hardware designs to make installation easier and the results more robust. Racking is now provided in complete pre-engineered systems for a variety of situations.

Major mounting configurations and common applications include:

- **Standoff and rail mounts on pitched roofs**
- **Ballasted systems on flat roofs**
- **Ground mount systems**
- **Fixed and tracking pole mounted systems**

Pitched Roof Systems

The most common module racking application is a pitched roof using flashed stand-offs and rails. Total installed system weights for these systems typically come out between 3.5 - 4 lbs psf. This is generally less than a second layer of composition shingles and usually presents no additional structural requirements (confirm your application with a local engineer or professional building department). Attachment into wood rafters is typically done using lag screws with the resulting pullout strength a function of the screw diameter, length of imbedded thread, and rafter wood type. Post type standoff heights are commonly 3 to 7 inches tall. These are usually flashed using a no-caulk type flashing collar. Another popular attachment option is the all-in-one flashed mounts from Quick Mount. These mounts can be slid directly into existing roof shingles and just lagged down. Rails are then mounted to the stand-off or pre-flashed mounting block either directly or via an L-foot bracket. For tile roofs, other mounting options include track mounted studs and tile hooks that reach through or around various barrel and Spanish tiles. Hanger bolts make for simple attachment through corrugated metal roofing. Compression S-5! clamps allow mounting to the seams of standing seam metal roofs without penetration.

Rails come in a variety of lengths and styles. Each manufacturer specifies the span (distance between required attachment points) that their rail is capable of under various wind and dead load conditions. Typical spans are from 4 to 10 feet. The design wind and snow load (in psf) of your location, combined with the exposure category (B, C, or D) and the zone of the roof (1, 2, or 3) you are installing on will dictate your requirement. Rail manufacturers also specify the maximum cantilever allowed for their rails. This is the distance the rail can project beyond the last mount point. One third of the rail span is typical (2 ft. on a 6 ft. foot spacing).

Additional racking components include module end and mid clamps (different clamps for different module thicknesses), rail splices, various rail end caps and covers. Again, each manufacturer provides these parts as part of a pre-engineered system. Look at the options and decide what's best for your job!

Flat Roof Options

Flat roofs are attractive mounting locations for PV modules. Attachment is usually done via standoffs that are installed by the roofers using the same roofing technique. Another option is a ballasted system. These systems usually provide for a 5-15 degree module tilt and rely on system weight and ballast, typically concrete cap blocks (additional attachments required in seismic zones). These systems typically add 5-10 psf to the roof and commonly require the sign-off of a structural engineer.

Ground Mounts

Ground mounts use a pole and cross beam structure to support module mounting rails. This structure is typically made of locally supplied 1½ to 4 inch diameter galvanized steel pipe. The size of the pipe and number of posts required will be a function of your soil and wind conditions and vertical height of your array. It is usually advisable (and frequently required on ground arrays higher than 6 feet) to enlist the services of a professional engineer to confirm your site's requirements. Typically, the posts end up 6-12 feet apart in holes 12-24" in diameter, 4-5 feet deep, and filled with concrete. T-fittings are placed on top of these posts and provide for the horizontal pipe structure. Rails (same for the pitched roofs) are then U-bolted to the pipe structure. Front edge height off the ground (avoiding future weed and/or snow shading) and overall array height are additional considerations. If you have the room, ground mounts allow for large arrays at your choice of tilt and azimuth.

Pole and Tracking Mounts

Pole mounts are popular with smaller ground mounts (although a single 8" schedule 80 pipe pole can be racked to hold up to 280 sq. ft. of modules) and also tracking systems. Required diameter of the pole and length of pipe in the ground is a function of the surface area of the array and your expected wind conditions (typically from 2"sch.40 to 8"sch.80). Trackers are still popular on small off-grid pump projects (to increase total gallons per day pumped) and some larger installations. Trackers can be passive (movement driven by phase changing fluid balance shift) or active (servo motor driven) and single axis (azimuth change only) or dual axis. Gains from trackers are typically greater (up to 30% or more) during the long days of summer in wide open, horizon to horizon, areas.

PV Module Clamp Sizing Chart

				IronRidge Clamp		Unirac Clamp		ProSolar Clamp	
Item Description	Color	Depth (mm)	Depth (in)	End	Mid	End	Mid	End	Mid
Canadian Solar 190 - 290 W	Clear	40	1.57	D	C-D-E-J	K	A-B-C-D-K	1.572	2.25
ET Solar 70 - 85 W	Clear	35	1.38	B	A-B-I	C	A-B-C-D-K	1.358	2.25
ET Solar 120 - 215 W	Clear	50	1.97	G	F-G-K	E	E-F-J-M-N	1.968	2.75
Kyocera 135 - 215 W	Black	46	1.81	F	F-G-K	F	E-F-J-M-N	1.810	2.50
Sharp 80 - 250 W (except SRS)	Clear	46	1.81	F	F-G-K	F	E-F-J-M-N	1.810	2.50
Solartech Power 20 - 30 W	Clear	25	0.98	-	-	A	A-B-C-D-K	-	-
Solartech Power 40 W	Clear	35	1.38	B	A-B-I	C	A-B-C-D-K	1.358	2.25
SolarWorld 155 - 185 W, 220 - 245 W	Clear	34	1.34	A	A-B-I	C	A-B-C-D-K	1.332	2.25
SolarWorld 220 - 240 W	Clear	31	1.34	A	A-B-I	C	A-B-C-D-K	1.332	2.25
Suniva 255 W	Black	46	1.81	F	F-G-K	F	E-F-J-M-N	1.810	2.50
Suniva 260 W	Clear	46	1.81	F	F-G-K	F	E-F-J-M-N	1.810	2.50
Suntech 200 W, 210 W	Clear	36	1.42	B	A-B-I	C	A-B-C-D-K	1.396	2.25
Trina Solar 230 W	Clear	46	1.81	F	F-G-K	F	E-F-J-M-N	1.810	2.50
Yingli YGE 240 Series	Clear	40	1.57	D	C-D-E-J	K	A-B-C-D-K	1.572	2.25

Unirac Clamp Sizes			
Type	Depth mm	Depth Inches	Mid Bolt
A	24 - 26	0.94 - 1.02	2.0"
B	30 - 32	1.18 - 1.26	2.0"
C	34 - 36	1.34 - 1.42	2.0"
D	38 - 40	1.50 - 1.57	2.0"
K	39 - 41	1.54 - 1.61	2.0"
J	41 - 43	1.61 - 1.69	2.5"
F	45 - 47	1.77 - 1.85	2.5"
M	47 - 49	1.85 - 1.93	2.5"
E	50 - 52	1.97 - 2.05	2.5"
N	57 - 59	2.24 - 2.32	2.5"
G	High Lipped (Sharp)		-

IronRidge Clamp Sizes				
Type	Depth mm	Depth Inches	End	Bolt
I	31.0 - 32.5	1.22 - 1.28	1.25"	2.00"
A	33.3 - 34.8	1.31 - 1.37	1.34"	2.00"
B	35.1 - 36.6	1.38 - 1.44	1.41"	2.00"
C	39.1 - 40.6	1.54 - 1.60	1.57"	2.25"
D	39.9 - 41.4	1.57 - 1.63	1.60"	2.25"
J	41.1 - 42.7	1.62 - 1.68	1.65"	2.25"
E	42.7 - 44.2	1.68 - 1.74	1.71"	2.25"
F	45.2 - 46.7	1.78 - 1.84	1.81"	2.50"
K	46.7 - 48.3	1.84 - 1.90	1.87"	2.50"
G	49.3 - 50.8	1.94 - 2.00	1.97"	2.50"
H	57.7 - 59.2	2.27 - 2.33	2.30"	2.75"

ProSolar Clamp Sizes			
Depth mm	Depth Inches	End	Mid
30.7	1.210	C1210EC	C200IMC
33.8	1.332	C1332EC	C225IMC
34.5	1.358	C1358EC	C225IMC
35.5	1.396	C1396EC	C225IMC
37.7	1.486	C1486EC	C225IMC
39.9	1.572	C1572EC	C225IMC
40.8	1.606	C1606EC	C250IMC
42.2	1.660	C1660EC	C250IMC
43.4	1.707	C1707EC	C250IMC
44.8	1.762	C1762EC	C250IMC
46.0	1.810	C1810EC	C250IMC
50.0	1.968	C1968EC	C275IMC
57.4	2.260	C2260EC	C300IMC

Contact your sales representative for assistance with any of the above design options.

UNIRAC

SolarMount (E)volution

SolarMount (E)volution has redefined what residential mounting systems can offer distributors and installers. With its installer-inspired design, more intuitive attachments, and a future-proof approach to engineering excellence, SolarMount (E)volution makes it easy to support future codes and standards.

Key Benefits

- Integrated bonding
- Faster permitting and inspections
- Easier specifications
- Fewer project delays
- Lower risk (SolarMount (E)volution is engineered to be compliant with IBC codes)
- Industry-leading 20-year limited parts warranty

Assemble, Don't Build

With no drilling required and "click and cam" connections, SolarMount (E)volution eliminates the need for nuts and bolts.

Clean Aesthetics

Carefully designed to be sleek, clean and minimal in appearance, while maintaining high levels of strength and durability - after all, it is your roof.

In Stock & Ready to Ship

A nationwide distribution network ensures fast fulfillment of all orders.

Technical Support

Comprehensive online tools, tutorials and support videos are always at the ready.

UNIRAC

SolarMount (E)volution

Components

HOLLOW I-BEAM

Versatility is also a key feature of SolarMount (E)volution. The hollow I-Beam construction fits all module configurations.

Part #	Length	Finish	Qty	Unirac Part #
210-0964	132"	Mill	1	012132M
210-0965	168"	Mill	1	012168M
210-0966	208"	Mill	1	012208M
210-0967	240"	Mill	1	012240M

LEVELING COMPONENT

No roof is completely flat. Unirac's new Leveling Component allows you to square and level your SolarMount (E)volution array with remarkable ease.

Part #	Description	Finish	Qty	Unirac Part #
211-0414	Leveling Gauge	Mill	1	003004M

UNIVERSAL END CLAMP

A single-sized module clamp also speeds installation and simplifies stocking for distributors. Integrated module bonding is also built into SolarMount (E)volution's new clamping system. These end clamps come with slide-in and bolt

Part #	Size	Finish	Qty	Unirac Part #
260-0688	24-36.4 mm	Mill	1	002010M
260-0689	36.5-51 mm	Mill	1	002011M

UNIVERSAL MID CLAMP

New mounting hardware allows for easy insertion anywhere along a rail regardless of module thickness. In addition, anti-seize is not required during installation. These mid clamps come with cam-in slider and bolt.

Part #	Size	Finish	Qty	Unirac Part #
260-0690	24 - 36.4 mm	Mill	1	002105M
260-0691	36.5 - 51 mm	Mill	1	002106M

FIXED TILT LEGS

Part #	Length	Finish	Qty	Unirac Part #
211-0418	7" long with 5/16" bolt	Clear	1	007007M
211-0419	15" long with 5/16" bolt	Clear	1	007015M
211-0420	20" long with 5/16" bolt	Clear	1	007020M
211-0421	34" long with 5/16" bolt	Clear	1	007034M
211-0432	7" long with 3/8" bolt	Clear	1	006007M
211-0433	15" long with 3/8" bolt	Clear	1	006015M
211-0434	20" long with 3/8" bolt	Clear	1	006020M
211-0435	34" long with 3/8" bolt	Clear	1	006034M

1- FLANGE FOOT & CLIP

Versatile 1 Flange Connections can be used in conjunction with standoffs, Quick Mount PV, or directly to composite shingles using a lag bolt. Both connection options utilize Clickfit technology, allowing attachment to beams without use of any tools or additional components.

Part #	Description	Finish	Qty	Unirac Part #
211-0417	SM(E)/SM(I) One-Flange foot, no hardware	Mill	1	004009M
211-0415	SM(E)/SM(I) Clip for one-flange	Mill	1	003005M

RETAINING SPLICE

Part #	Description	Finish	Qty	Unirac Part #
211-0413	SM(E) Retaining Splice for beam with 4 Tec screws	Mill	1	003002M

MISCELLANEOUS HARDWARE

Part #	Description	Finish	Qty	Unirac Part #
550-0428	Five wire clip	-	1	008007S
590-0075	Grounding Clip, UGC-3	-	1	008006S
211-0416	Positive Stop for beam with 2 Tec screws	Mill	1	003007M

UNIRAC®

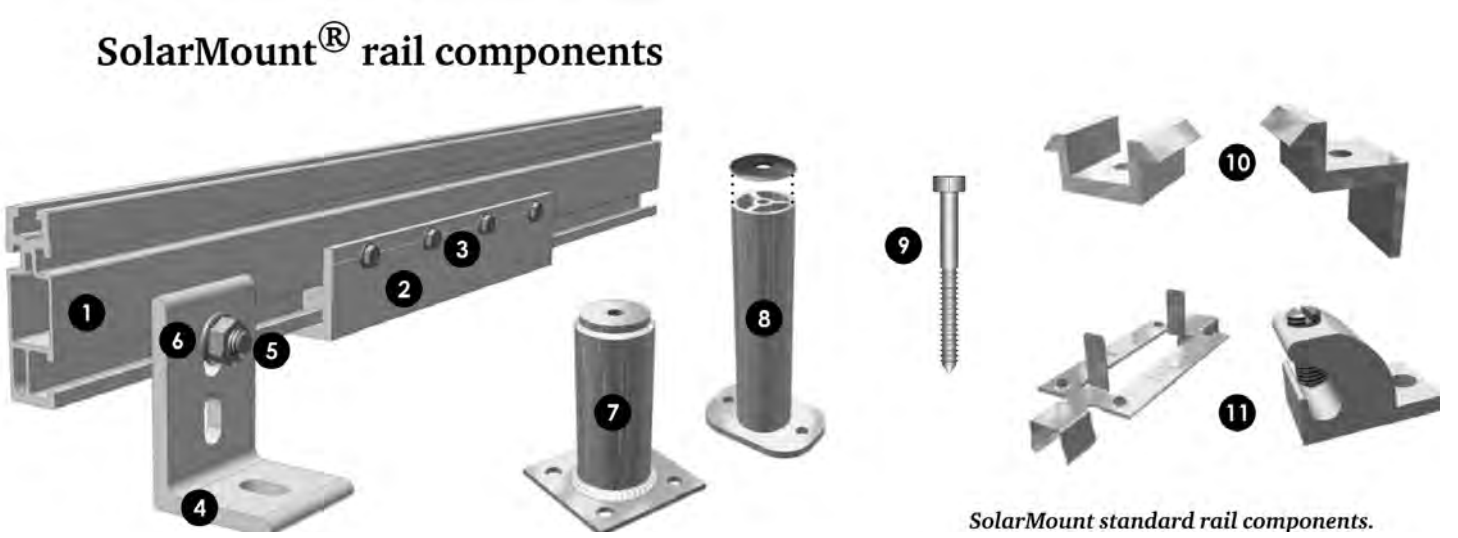
SOLARMOUNT®

Need Technical Support?

Unirac provides a technical support system complete with installation and code compliance documentation, an on-line estimator and design assistance to help you solve the toughest challenges.

See http://www.Unirac.com/?q=residential/residential-solutions

This is a U-LA installation using SolarMount beams and clamps.
Designed and installed by Minyard Solar



SolarMount standard rail components.

1. Rail - Supports PV modules. Use two per row of modules. 6105-T5 aluminum extrusion, anodized.
2. Rail splice - Joins and aligns rail sections into single length of rail. It can form either a rigid or thermal expansion joint, 8 inches long, pre-drilled. 6105-T5 aluminum extrusion, anodized.
3. Self-drilling screw - (No. 10 x 3/4") - Use 4 per rigid splice or 2 per expansion joint. Galvanized steel.
4. L-foot - Use to secure rails either through roofing material to building structure or standoffs. Refer to loading tables for spacing.
5. L-foot bolt (3/8" x 3/4") - Use one per L-foot to secure rail to L-foot. 304 stainless steel.
6. Flange nut (3/8") - Use one per L-foot to secure rail to L-foot. 304 stainless steel.
7. Steel Standoff- Includes 3/8" x 1/4" bolt with lock washer for attaching L-foot. Flashings: Use one per standoff. Unirac offers appropriate flashings for all three standoff types. Note: There is also a flange type standoff that does not require an L-foot.
8. Aluminum two-piece standoff (4" and 7") - Use one per L-foot. Two-piece: 6105-T5 aluminum extrusion. Includes 3/8" x 3/4" serrated flange bolt with EPDM washer for attaching L-foot.
9. Lag bolts.
10. Top mounting grounding clips and lugs.
11. Grounding clips and lugs.

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STANDARD RAIL

The Universal SolarMount Rail System has 3 options which can be assembled into a wide variety of PV mounting structures to accommodate any job site.

Part #	Length	Finish	Unirac Part #
210-0203	132"	Clear	310132C
210-0595	168"	Dark	310168D
210-0206	168"	Clear	310168C
210-0596	208"	Clear	310208C
210-0212	240"	Clear	310240C
210-0599	240"	Dark	310240D

HEAVY DUTY RAILS

Clear anodized aluminum.

Part #	Length	Finish	Unirac Part #
210-0272	144"	Mill	410144M
210-0274	168"	Mill	410168M
210-0277	204"	Mill	410204M
210-0280	240"	Mill	410240M

Unirac Clamps

Ideal for flush mount applications, such as residential rooftops where it is most convenient to secure footings and rails before installing modules, top mounting clamps securely grip the module frame, freeing you from the constraints of module mounting holes, but comply with your module manufacturer's installation points. For individual installations, order 4 end clamps for each row of modules you plan to mount.

Please reference page 29 for the module clamp sizing chart.

SOLARMOUNT BOTTOM MOUNT CLAMP

Use bottom mounting clips whenever you prefer to preassemble the array using module mounting holes. Simply fit the clip into its rail slot over the mounting bolt for a secure connection. Adjust the clip position anywhere along the rail slot.

Part #	Finish	Qty	Unirac Part #
260-0194	Clear	1	302000C

SOLARMOUNT MID CLAMPS

For each row, take one less than the number of modules in the row and multiply that figure by 2. For example, a row of 4 modules requires 6 mid clamps: (4 - 1) x 2 = 6.

Part #	Size	Finish	Qty	Unirac Part #
260-0063	A - B - C - D - K	Clear	1	302101C
260-0064	E - F - J	Clear	1	302103C
260-0134	A - B - C - D - K	Dark	1	302101D
260-0135	E - F - J	Dark	1	302104D
260-0136	G Lipped Modules	Dark	1	302105D

SOLARMOUNT END & MID CLAMPS

In size H, end & mid clamps are identical. Hexhead bolts replace T-bolts.

Part #	Size	Finish	Qty	Unirac Part #
260-0224	H-Sanyo Lipped- Not Bifacial	Dark	1	302106D
260-0576	L-Sanyo Bifacial w/ Hex bolt	Clear	1	302010C

SOLARMOUNT END CLAMPS

End clamps: Order 4 for each row of modules you plan to mount.

Part #	Size	Finish	Qty	Unirac Part #
260-0663	A-24-26 mm	Clear	1	302001C
260-0057	B-30-32 mm	Clear	1	302002C
260-0685	B-30-32 mm	Dark	1	302002D
260-0058	C-34-36 mm	Clear	1	302003C
260-0132	C-34-36 mm	Dark	1	302003D
260-0059	D-38-40 mm	Clear	1	302004C
260-0168	D-38-40 mm	Dark	1	302004D
260-0060	E-50-52 mm	Clear	1	302005C
260-0133	E-50-52 mm	Dark	1	302005D
260-0061	F-45-47 mm	Clear	1	302006C
260-0138	F-45-47 mm	Dark	1	302006D
260-0062	G-Lipped Modules	Dark	1	302007D
260-0454	J-41-43 mm	Clear	1	302008C
260-0474	J-41-43 mm	Dark	1	302008D
260-0192	K-39-41 mm	Clear	1	302009C
260-0458	K-39-41 mm	Dark	1	302009D
260-0475	M-39-41 mm	Clear	1	302011C
260-0686	N-57-59 mm	Clear	1	302011C

Unirac SolarMount Rail Splice Options

SPLICE BAR

Splice bars are structural elements that may be used to join together lengths of one of the extruded aluminum rails used in Unirac products: SolarMount™ standard, Solar-Mount™ HD (heavy duty), or SunFrame™.

Part #	Finish	Qty	Unirac Part #
211-0054	Clear	1	303001C
211-0052	Dark	1	303002D

SPLICE PLATE

Splice plates join SolarMount rails by means of footing slot bolts.

Part #	Finish	Qty	Unirac Part #
210-0384	Clear	1	303003C

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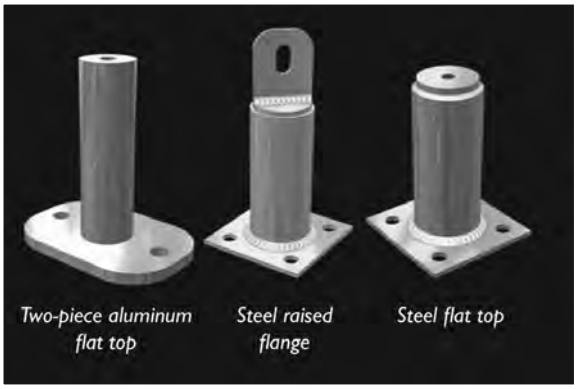
Unirac Rail Mounting Components

STANDOFF

Use standoffs whenever extra clearance is required, on tile roofs, for example. Two-piece aluminum standoff allow precise placement of a flashing over a secured base prior to the installation of the standoff itself. All standoff types come in four standard heights: 3, 4, 6, and 7 inches. Appropriate flashings are available.



1-PIECE FLAT-TOP ZINC PLATED STEEL STANDOFF

Flat-top one-piece, zinc plated steel standoffs. Shaft outside diameter = 13/8" (1-5/8"). Does not include lag bolts.

Part #	Height	Qty	Finish	Unirac Part #
210-0345	3"	1	Clear	004301G
210-0346	4"	1	Clear	004401G
210-0347	6"	1	Clear	004601G
211-0360	7"	1	Clear	004701G

2-PIECE FLAT-TOP ALUMINUM STANDOFF

Flat-top two-piece aluminum standoffs. Shaft outside diameter = 1-5/8". Does not include lag bolts. Two-piece standoffs speed installation on tile roofs.

Part #	Height	Finish	Qty	Unirac Part #
210-0433	3"	Clear	1	004300C
210-0662	3"	Dark	1	004300D
210-0434	4"	Clear	1	004400C
211-0357	4"	Dark	1	004400D
210-0435	6"	Clear	1	004600C
210-0439	6"	Dark	1	004600D
210-0436	7"	Clear	1	004700C
210-0664	7"	Dark	1	004700D

RAISED FLANGE ZINC PLATED STEEL STANDOFF

Raised flange, zinc plated steel standoffs. Use only with SunFrame, SolarMount standard or HD rails. Does not include lag bolts.

Part #	Height	Qty	Unirac Part #
211-0356	3"	1	004302G
211-0358	4"	1	004402G
211-0359	6"	1	004602G
211-0361	7"	1	004702G

ACECLAMP JR.

Part #	Size	Use With	Finish	Qty	Unirac Part #
260-0473	3/8"	L-foot to mount rails to standing seam	Mill	1	004031M

ADJUSTABLE TILT LEGS

Does not include L-Foot.

Part #	Length	Finish	Qty	Unirac Part #
211-0043	8" - 12"	Clear	1	307107M
211-0044	18" - 30"	Clear	1	307115M
211-0045	26" - 44"	Clear	1	307120M
211-0352	40" - 72"	Clear	1	307134M

FIXED TILT LEGS

Does not include L-Foot.

Part #	Length	Finish	Qty	Unirac Part #
211-0102	7"	Clear	1	307007M
211-0353	15"	Clear	1	307015M
211-0354	20"	Clear	1	307020M
211-0355	34"	Clear	1	307034M

SERRATED L-FOOT

Standard for ground mount installations on residential and commercial rooftops, use L-feet alone above asphalt composition shingles or in conjunction with flat top standoffs. Mount standard or HD rails. Configure to either of two rail heights, one promoting air flow for cooling, and the other offering close-to-the-roof aesthetics. L-feet can be easily adjusted along fixed sliders to ensure rails fit snugly against modules for SunFrame installations.

Part #	Finish	Qty	Unirac Part #
211-0034	Clear	1	304000C
211-0032	Dark	1	304000D

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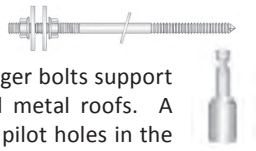
SHIMS

Shims level or raise standoffs & L-feet and precisely align rails. Horseshoe shims come in three color-coded thicknesses. Our tapered shim is particularly useful in leveling.

Part #	Size	Finish	Qty	Unirac Part #
270-0132	1-1/2" x 2" x 1/16"	Blue Plastic	1	009001D
270-0133	1-1/2" x 2" x 1/4"	Black Plastic	1	009002D
270-0134	1-1/2" x 2" x 1/8"	Red Plastic	1	009003D
270-0135	1-1/2" x 3-3/8"	Tapered Shim Black Plastic	1	009004D

HANGER BOLTS & BOLT DRIVERS



Used in conjunction with L-feet, 8-inch hanger bolts support SolarMount rails above tile or corrugated metal roofs. A driver allows easy insertion into 3/16-inch pilot holes in the rafters.

Part #	Description	Size	Finish	Qty	Unirac Part #
270-0006	Hanger Bolt Driver	8" x 3/8"	Clear	1	030022C
270-0005	Hanger Bolt	8" x 3/8"	Clear	1	030021C

BREAK AWAY NUTS

Breakaway nut before and after installation

Part #	Size	Finish	Qty	Unirac Part #
270-0120	1/4"	Clear	1	030003C
270-0119	3/8"	Alum	1	030002C

STARHEAD BOLT

Note that starhead bolt heads do not fit into SolarMount rail slots (where standard bolt heads are inaccessible). Use them where heads are exposed—with bottom mounting module clips, for example.

Starhead bolt

Part #	Size	Finish	Qty	Unirac Part #
270-0125	3/8"-16 x 1-1/4"	Stainless Steel	1	030024C

STAR KEYS

Part #	Size	Qty	Unirac Part #
270-0668	1/4"	1	030025C
270-0016	3/8"	1	030026C

Star key

Ontario F.I.T. Compliant

Contact your sales representative if you need Ontario F.I.T. product. (Only available for SolarMount products.)

SOLARMOUNT RAIL

Part #	Length	Finish	Qty	Unirac Part #
210-0919	144"	Clear	1	210144C-0001
210-0920	192"	Clear	1	210192C-0001
210-0921	240"	Clear	1	210240C-0001

SOLARMOUNT MID CLAMP

Part #	Size	Finish	Qty	Unirac Part #
260-0682	A-B-C-D-K	Clear	1	202026C-0100
260-0683	E-F-J	Clear	1	202027C-0100

SOLARMOUNT END CLAMP

Part #	Size	Finish	Qty	Unirac Part #
260-0677	C	Clear	1	202003C-0100
260-0678	D	Clear	1	202004C-0100
260-0681	F	Clear	1	202006C-0100
260-0680	J	Clear	1	202010C-0100
260-0679	K	Clear	1	202011C-0100

SOLARMOUNT BOTTOM MOUNT CLAMP

Part #	Finish	Qty	Unirac Part #
260-0684	Clear	1	202050C-0050

SOLARMOUNT SPLICE BAR

Part #	Finish	Qty	Unirac Part #
211-0379	Clear	1	203010C-0050

SOLARMOUNT SERRATED L-FOOT

Part #	Finish	Qty	Unirac Part #
211-0380	Clear	1	204010C-0025

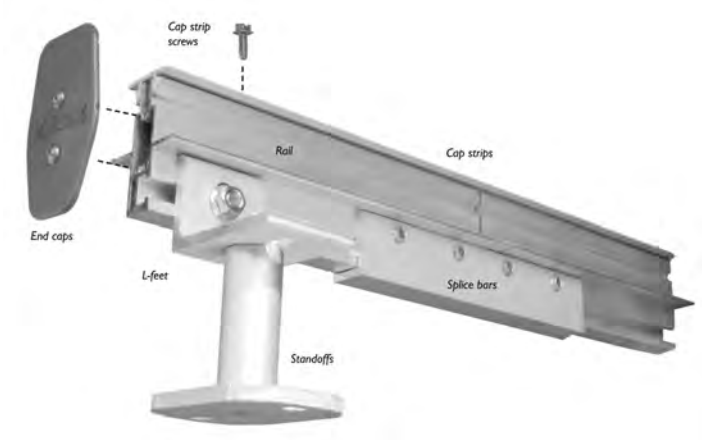
MISCELLANEOUS

Part #	Description	Qty	Unirac Part #
590-0071	Grounding Clip	1	208005S-0100
590-0070	Grounding Lug	1	208001A-0100
550-0355	1 Wire Stainless Steel Clip DCS 1306	1	208010S-0100
550-0356	2 Wire Stainless Steel Clip DCS 1307	1	208020S-0100

UNIRAC

SUNFRAME

SunFrame



Its sleek design is engineered to sit low to the roof without gaps and implements shared rails for the best value.

SunFrame is also the choice of solar experts as an optimal solution for custom carport structures. It's accompanied by a technical support system that provides complete installation and code compliance documentation, an on-line estimator and design assistance to help you solve the toughest challenges.

SUNFRAME CAP STRIP

Secure modules with SunFrame cap strips, designed to accommodate varying module heights. You will seldom have to drill cap strips because they come pre-punched.

Part #	Length	Size	Required Screw Length	Finish	Qty	Unirac Part #
210-0531	192”	C	3/4”	Clear	1	202001C
210-0580	192”	C	3/4”	Dark	1	202001D
210-0582	192”	D	3/4”	Dark	1	202002D
210-0581	192”	D	3/4”	Clear	1	202002C
210-0583	192”	E	1-1/4”	Clear	1	202003C
210-0584	192”	E	1-1/4”	Dark	1	202003D
210-0410	192”	F	1”	Clear	1	202004C
210-0406	192”	F	1”	Dark	1	202004D
210-0585	192”	G	1”	Dark	1	202005D
210-0586	192”	H	3/4”	Dark	1	202006D
210-0588	192”	L	1-1/2”	Clear	1	202007C

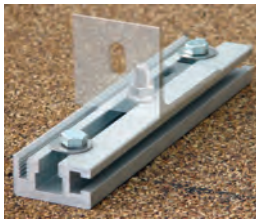
Please reference page 29 for the module clamp sizing chart.

SUNFRAME CAP STRIP SCREWS

The letters in this table correspond to the SunFrame Cap Strips table.

Part #	Size	Use With	Finish	Qty	Unirac Part #
270-0130	1-1/2”	L	Clear	1	209003C
270-0131	1-1/2”	L	Dark	1	209003D
270-0126	1”	F & G	Clear	1	209001C
270-0127	1”	F & G	Dark	1	209001D
270-0128	1-1/4”	E	Clear	1	209002C
270-0129	1-1/4”	E	Dark	1	209002D
270-0749	3/4”	C & D & H	Clear	1	209000C
270-0750	3/4”	C & D & H	Dark	1	209000D

SunFrame Continued



SUNFRAME L-FOOT ADJUSTING SLIDERS

Part #	Finish	Qty	Unirac Part #
211-0047	Clear	1	204001C

SUNFRAME THREADED SLOT RAIL

UV resistant black end caps hide the rail end extrusion completing your installation.

Part #	Length	Finish	Qty	Unirac Part #
210-0591	192”	Clear	1	210192C
210-0592	192”	Dark	1	210192D

END CAP FOR THREADED SLOT RAIL

UV resistant black end caps hide the rail end extrusion completing your installation.

Part #	Finish	Qty	Unirac Part #
210-0590	Dark	1	202000D

Unirac U-LA

U-LA RAIL MOUNTING BRACKET

Part #	Diameter	Material	Qty	Unirac Part #
270-0030	2”	Aluminum	1	403213C
270-0034	3”	Aluminum	1	403313G

U-LA BRACE

Part #	Diameter	Height	Material	Qty	Unirac Part #
270-0027	2”	7’	Aluminum	1	403200C
270-0028	2”	10.5’	Aluminum	1	403201C
270-0029	2”	14’	Aluminum	1	403202C
240-0406	2”	21’	Aluminum	1	403203C
270-0031	3”	7’	Aluminum	1	403301C
270-0032	3”	10.5’	Aluminum	1	403302C
270-0033	3”	14’	Aluminum	1	403303C

U-LA FRONT CAP

Part #	Diameter	Material	Qty	Unirac Part #
240-0190	2”	Aluminum	1	403211C
240-0180	2”	Zinc Plated Steel	1	403211G
240-0185	3”	Zinc Plated Steel	1	403311G

U-LA REAR CAP

Part #	Diameter	Material	Qty	Unirac Part #
270-0025	2”	Aluminum	1	403214C
240-0181	2”	Zinc Plated Steel	1	403214G
240-0186	3”	Zinc Plated Steel	1	403314G

U-LA SLIDER

Part #	Description	Diameter	Material	Qty	Unirac Part #
270-0026	1 Flange	2”	Aluminum	1	403215C
240-0184	1 Flange	2”	Zinc Plated Steel	1	403215S
240-0189	1 Flange	3”	Zinc Plated Steel	1	403315S

U-LA THREADED FOOT

Part #	Diameter	Material	Qty	Unirac Part #
240-0183	2”	Zinc Plated Steel	1	403216S
240-0188	3”	Zinc Plated Steel	1	403316S

U-LA PLASTIC PIPE CAP

Part #	Diameter	Finish	Qty	Unirac Part #
270-0091	2”	Grey	1	403210P

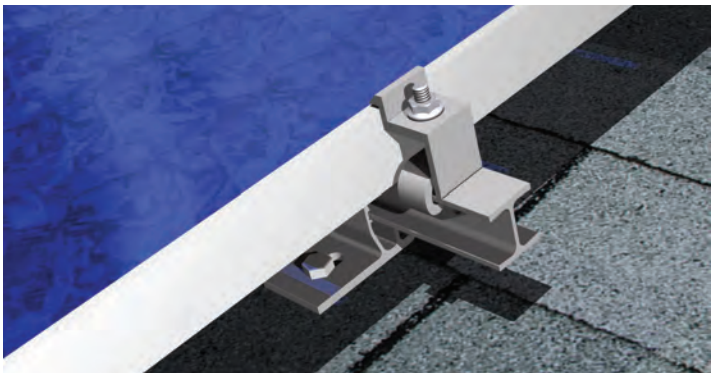
UNIRAC
SolarMount-I™

SolarMount-I is the most economical residential PV mounting solution on the market today.

SolarMount-I is designed for flush roof mounting applications. The SolarMount-I offers superior aesthetics with great value and is easily installed on most roofing types, including barrel and Spanish tiles.

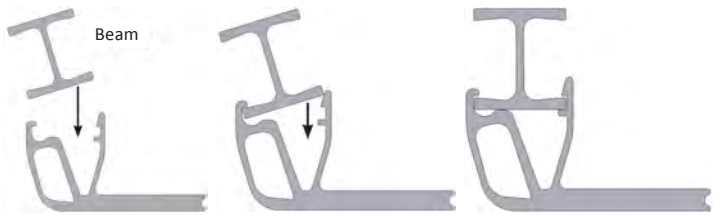
The unique I-beam design of SM-I optimizes strength, offering a cost effective solution as low as 10 cents per watt for flush mount applications.

Engineered with "click and secure" connections that eliminate bolts and nuts, SolarMount-I saves an estimated 33 percent in labor with only 5 installation steps from roof attachments to top mounting hardware – nearly half the installation steps of competitive flush mount products. Other time saving features include integral grounding and beam to beam connections that eliminate field drilling at splices.

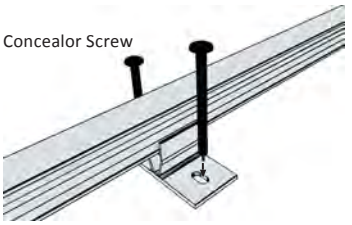


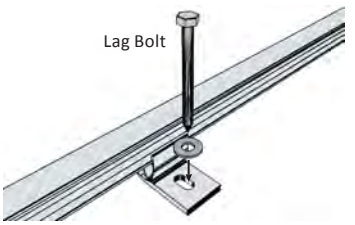
Installing SolarMount-I

Step 1



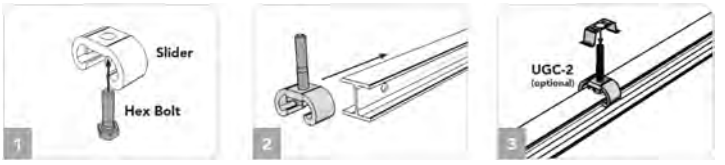
Step 2



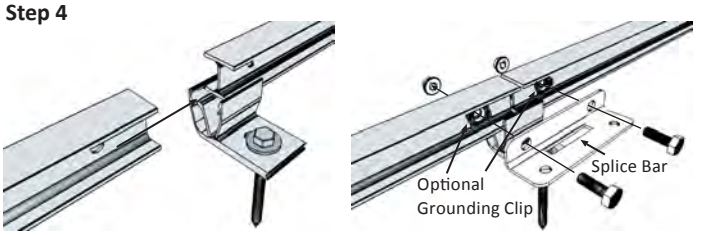


Vertical adjustments require shims.

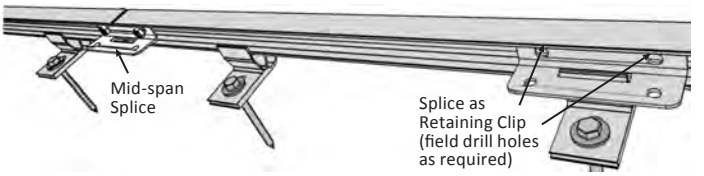
Step 3



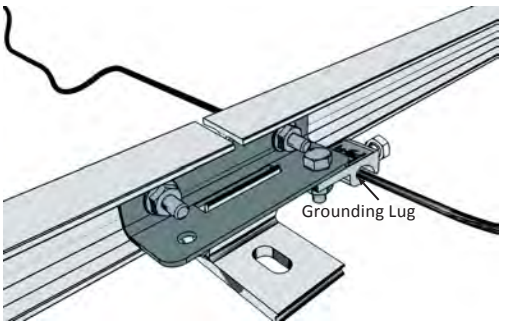
Step 4



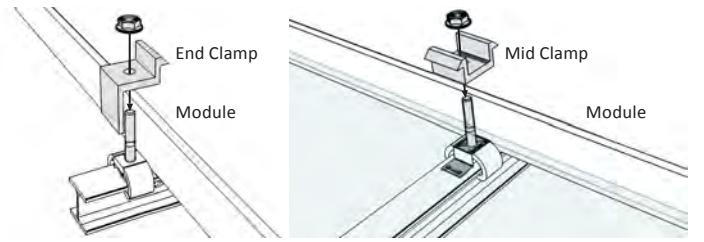
Remember to slide all mid-clamps into place prior to splicing.



Step 5



Step 6



Components

BEAMS

Aluminum support beams are one of the most efficient designs for PV racking, reducing material, cost and carbon footprint while achieving the same strength requirements as standard box frame rail designs.

Part #	Description	Length	Finish	Qty	Unirac Part #
210-0532	1.0 Beam	144"	Mill	1	010144M
210-0733	2.5 Beam	144"	Mill	1	011144M
210-0734	2.5 Beam	192	Mill	1	011192M

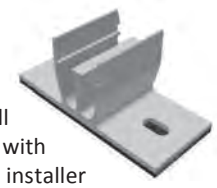
1- FLANGE CONNECTION

Versatile 1 Flange Connections can be used in conjunction with standoffs, Quick Mount PV, or directly to composite shingles using a lag bolt. Both connection options utilize Clickfit technology, allowing attachment to beams without use of any tools or additional components.

Part #	Description	Finish	Qty	Unirac Part #
210-0703	Without Lag Bolt	Clear	1	004000M

UNIRAC
SolarMount-I™

2- FLANGE CONNECTION



Efficiently secure beams to the roof with 2 Flange Connections using 3" concealer screws that can be driven into the structure with a cordless drill and no pilot holes. 2 Flange Connections come with or without the integrated butyl to allow for the installer to use his or her preferred sealing method.

Part #	Description	Finish	Qty	Unirac Part #
210-0701	2-Flange Connection, No Hardware	Clear	1	004001M
210-0702	2-Flange Connection, Butyl, without concealer screw	Clear	1	004002C

FLASHING

A custom flashing specifically designed for SolarMount-I, the Quick Mount PV comes complete with 1 Flange Connection and lag hardware. With an increased height of 3/4" and faster beta installation over standard installations, this flashing provides a clear advantage over standard flashing techniques.

Part #	Description	Finish	Qty	Unirac Part #
210-0705	Quick Mount Alum Flashing 9.5" x 12.5"	Clear	1	004011C

CREOTECC TILE HOOK (TOP)

Made from cast aluminum, the tile hook attachment provides SolarMount-I, SolarMount, and SunFrame with a cost-effective solution for barrel or Spanish tile roof. Refer to the tile hook engineering data for max load capabilities. Lag bolt is not included.

Part #	Description	Qty	Unirac Part #
210-0738	Creotecc Roof Tile Hook Front Mount	1	004006C
210-0739	Creotecc Roof Tile Hook Side Mount	1	004007C
210-0740	Creotecc Roof Tile Hook Top Mount	1	004008C

BEAM SPLICE

Attach to rails using a beam splice and the pre-drilled holes at the end of each rail. The beam splice can also be used as a retaining clip on single beam applications.

Part #	Description	Finish	Qty	Unirac Part #
210-0710	Splice Kit	Clear	1	003000S
210-0711	Splice Kit w/ Grounding	Clear	1	003001S

UGC-2 GROUNDING

Use UGC-2 grounding with splices to eliminate the need to ground modules individually and greatly reduce the cost of grounding lugs and bare copper wire.

GROUNDING CLIP

Part #	Description	Qty	Unirac Part #
590-0027	UGC-2 IC Grounding Clip	1	008005S

SLIDERS & TOP MOUNTING CLAMPS

Sliders hold hex bolts in place while top mounting clamps securely grip any point of the module frame, freeing you from the constraints of module mounting holes.

END CLAMP & SLIDER

Part #	Size	Finish	Qty	Unirac Part #
260-0265	A	Clear	1	002001C
260-0266	B	Clear	1	002002C
260-0267	C	Clear	1	002003C
260-0268	D	Clear	1	002004C
260-0269	E	Clear	1	002005C
260-0270	F	Clear	1	002006C
260-0271	J	Clear	1	002007C
260-0420	K	Clear	1	002008C
260-0476	M	Clear	1	002009C

See chart on page 29 for letter designations by thickness of module.

MID CLAMP & SLIDER

Part #	Size	Finish	Qty	Unirac Part #
260-0272	A	Clear	1	002101C
260-0273	B - C	Clear	1	002102C
260-0274	D - K	Clear	1	002103C
260-0275	E - F -J	Clear	1	002104C

See chart on page 29 for letter designations by thickness of module.

SOLARMOUNT-I MOUNTING KIT FOR ENPHASE MICRO INVERTERS

Part #	Finish	Qty	Unirac Part #
260-0364	Clear	1	008000C

UNIRAC

RAPIDRAC

RapidRac

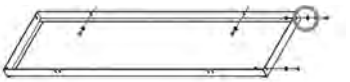
Unirac's new improved RapidRac is one of the best commercial flat-roof solution for the PV Mounting industry. With minimal parts, reduced labor expenses and the versatility to accommodate a wide range of modules, RapidRac is one of the fastest, easiest and most cost-effective ballast solutions on the market today.

Aluminum module mounting frames support modules attached to module brackets. Frames can be offset to accommodate roof structures such as air conditioners. Module brackets secure modules to bay frame and are specifically designed for your project's desired tilt angle, eliminating time-consuming adjustments. Integral PEM nuts are attached to brackets to speed installation.

FRAMES AND BRACKETS

Part #	Description	Unirac Part #
250-1135	Sanyo HIT Power 210N	310355-1416
250-1157	Schott 200 Series	310355-1509
250-1078	SolarWorld SW 175 mono	310355-2008
250-1229	Sunpower SER-228P	310355-2112
250-1080	Sunpower SPR-210	310355-2103
250-1083	Sunpower SPR-230	310355-2106
250-1266	Canadian Solar CSI 235PX	310355-2613
250-1270	Itek Energy IT 225-255, 310355-9700	310355-9700
250-1267	LG Electronics LG230R1C for mounting hole dimension of 36.45"	310355-9001
250-1206	Sharp ND-U230Q1/ ND-230C1	310355-1735
250-1142	Sharp NU-U235F1	310355-1734
250-1273	SolarWorld SW (220-245) - 2.5 frame	310355-2033
250-1208	Sunpower SPR-225-BLK	310355-2107
250-1329	Suntech STP190S-24/adb+	310355-2222
250-1141	Yingli YL230P-29b	310355-2506

Contact your sales representative for RapidRac part numbers for any framed module.



FRAME ONLY

Part #	Description	Unirac Part #
250-1134	Sanyo HIT Power 210N	310351-1416
250-1156	Schott 200 Series	310351-1509
250-1228	Sunpower SER-228P	310351-2112
250-1079	Sunpower SPR-210	310351-2103
250-1084	Sunpower SPR-230	310351-2106
250-1265	Canadian Solar CSI 235PX	310351-2613
250-1269	Itek Energy IT 225-255	310351-9700
250-1268	LG Electronics LG230R1C for mounting hole dimension of 36.45"	310351-9001
250-1195	Sharp ND-U230Q1/ ND-230C1	310351-1735
250-1143	Sharp NU-U235F1	310351-1734
250-1274	SolarWorld SW (220-245) - 2.5 frame	310351-2033
250-1197	Sunpower SPR-225-BLK	310351-2107
250-1330	Suntech STP190S-24/adb+	310351-2222
250-1140	Yingli YL230P-29b, 310351-2506	310351-2506

RAPIDFOOT ASSEMBLY

RapidFoot attachment for RapidRac G10 features Eco-Fasten technology by the Alpine Snow Guard Company. Attach to metal, concrete and wood decks without compromising the integrity of the roof.

Part #	Qty	Unirac Part #
270-0061	1	622069C

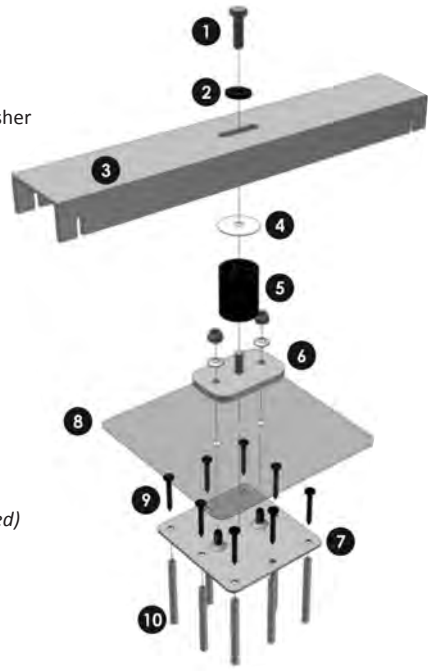
RapidFoot:

1. 3/8" x 1-1/4" Bolt
2. 3/8" x 1/8" x 1-1/2" Washer
3. Clamp Bar
4. EPDM Washer
5. Standoff
6. Rapid Top Plate
7. Rapid Base Plate

Accessories:

8. **Flashing**
9. **Concealer Screw**
10. **Ferrules**

(Note: For concrete roofs, Scru-lead anchors must be used)



UNIRAC

RAPIDRAC

RAPIDFOOT CONCEALER SCREWS

Part #	Description	Qty	Unirac Part #
270-0121	DP1 - 1-1/2"	1	030004C
270-0122	DP1 - 4"	1	030010C
270-0711	DP1 - 2"	1	030005C
270-0712	DP1 - 3"	1	030007C
270-0713	DP1 - 4-1/2"	1	030011C
270-0714	DP1 - 5"	1	030013C
270-0715	DP1 - 6"	1	030015C
270-0716	DP1 - 7"	1	030017C
270-0717	DP4 - 1-3/8"	1	030009C
270-0718	DP4 - 2-3/4"	1	030006C
270-0719	DP4 - 3-3/4"	1	030008C
270-0720	DP4 - 4-3/4"	1	030012C
270-0721	DP4 - 5-3/4"	1	030014C
270-0722	DP4 - 6-3/4"	1	030016C
270-0123	DP4 - 7-3/4"	1	030018C

RAPIDFOOT FERRULES

Part #	Description	Qty	Unirac Part #
270-0057	4' cut as needed	1	030019C

RAPIDFOOT PATCH FOR MEMBRANE ROOFS

Part #	Description	Finish	Qty	Unirac Part #
270-0059	Flashing Peel & Stick EPDM	Black	1	004017D

FASTFOOT™ STANDOFF ASSEMBLY

The FastFoot™ attachment features Eco-Fasten technology by the Alpine Snow Guard Company, allowing attachments to metal, concrete and wood decks without compromising the integrity of the roof.

Part #	Height	Qty	Unirac Part #
211-0349	3"	1	004003C
211-0350	4"	1	004004C
211-0351	7"	1	004005C

Miscellaneous

GROUNDING CLIP

Part #	Type	Finish	Qty	Unirac Part #
590-0000	UGC-1 Stainless Steel Grounding Clip for SolarMount Top Mounting	Clear	1	308001S

GROUNDING LUG

For use with Unirac SolarMount. Unirac grounding lugs are attached to mounting rails and the equipment grounding conductor.

Part #	Type	Finish	Qty	Unirac Part #
590-0003	Tin Plated Grounding Lug	Copper	1	008002S

WIRE MANAGEMENT CLIPS

Part #	Type	Qty	Unirac Part #
550-0349	Stainless Steel One-Wire Clip	1	008003S
550-0350	Stainless Steel Two-Wire Clip	1	008004S

STAINLESS STEEL T-BOLT WITH FLANGE NUT

Spare T-Bolts for SolarMount top mounting clamps.

Part #	Size	Finish	Qty	Unirac Part #
270-0137	1/4" x 2"	Clear	1	330001C
270-0138	1/4" x 2"	Dark	1	330002D
270-0139	1/4" x 2.5"	Clear	1	330003C
270-0140	1/4" x 2.5"	Dark	1	330004D

PUSH MOUNT CABLE TIE

Part #	Finish	Qty	Unirac Part #
270-0136	Black	1	309001D

LAG BOLT

Part #	Size	Qty	Unirac Part #
270-0124	5/16" x 3-1/2"	1	030023C

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RoofTrac®

GroundTrac®

Rails & Rail Splice Options

RoofTrac®

The original, low cost and simple to install top down roof mounting system. All systems engineered and load tested to withstand high loads per specification. Utilizes aluminum and Stainless Steel components for maximum strength and corrosion resistance.

BENEFITS

- The most cost effective and easy to install roof mount system
- Typically installed on residential sloped roof; RoofTrac® Tilt Kit or SolarWedge® used for residential flat roofs.
- Each system engineered and load tested to 50 lb/ft^2 , equivalent of 125 mph winds per 2010 CBC / 2009 IBC to ensure safety and quality
- Spans 4 foot on center with 1-1/2” tall RoofTrac® rail
- Spans 6 foot on center with 2-1/2” tall RoofTrac® rail
- Over 10 years of installer preferred design
- Aluminum and Stainless Steel components for corrosion resistance and strength
- Sleek, low profile design for great looking installs
- Designed for use with ProSolar FastJack®, FoamJack®, or TileTrac® attachments

GroundTrac®

The low cost and simple to install ground mount system. Utilizes aluminum and stainless steel ProSolar components and readily available galvanized support pipe.

BENEFITS

- The most cost effective and easy to install ground mount system
- Used for kW (residential) to MW (commercial) projects
- Each system engineered and load tested to 100 mph wind equivalent per 2010 CBC / 2009 IBC
- 1-1/2” schedule 40 steel water pipe design spans:
  - 124” x 2-1/2” and 136” x 2-1/2” RoofTrac® support rail
    - 10 foot on center max (non-snow load)
    - 6 foot on center max (30 lb/ft^2 snow load)
    - Snow load enhancer accessory available
  - 164” x 3” RoofTrac® support rail
    - 8 foot on center max (non-snow load)
- Designed without the need for cross bracing
- Aluminum and Stainless Steel ProSolar components for corrosion resistance and strength

RoofTrac®

PROSOLAR RAILS

Support rails are heavy duty, lightweight, anodized aluminum for easy handling and maximum corrosion resistance.

Standard

Deep

Extra Deep (XD)

	Part #	Thickness	Size	Qty	ProSolar Part #
Standard Support Rails	210-0049	1.5”	136"	1	R-136
Deep Channel Support Rails	210-0047	2.5”	124"	1	R-124D
	210-0051	2.5”	136"	1	R-136D
ProSolar XD Channel Support Rails	210-0447	3”	136"	1	R-136XD
	210-0600	3”	164”	1	R-164XD

Clamps

The original top down mounting clamps consist of precision fit anodized aluminum end and mid clamps. Precision fit design ensures secure connection and optimal safety. Clamps bolt into anodized support rail nuts which glide within the rail, freeing installer hands. Support rail nuts sold separately. Clamps come with larger diameter 5/16” stainless steel bolts and stainless steel lock washers for optimal strength.

MID CLAMPS

Precision fit anodized aluminum with 5/16” stainless steel bolts and lock washers.

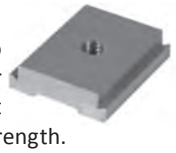
Part #	Thickness	Finish	Qty	ProSolar Part #
260-0660	1.205"-1.230" (30.7 mm-31.2 mm)	Clear	1	C200IMC-1
260-0667	1.205"-1.230" (30.7 mm-31.2 mm)	Black	1	C200IMC-1B
260-0043	1.353"-1.626" (34.4 mm-41.3 mm)	Clear	1	C-225IMC-1
260-0256	1.353"-1.626" (34.4 mm-41.3 mm)	Black	1	C-225IMC-1B
260-0046	1.655"-1.830" (42.0 mm-46.4 mm)	Clear	1	C-250IMC-1
260-0049	1.655"-1.830" (42.0 mm-46.4 mm)	Black	1	C-250IMC-1B
260-0257	1.963"-1.988" (49.9 mm-50.4 mm)	Clear	1	C-275IMC-1
260-0258	1.963"-1.988" (49.9 mm-50.4 mm)	Black	1	C-275IMC-1B

END CLAMPS

Precision fit anodized aluminum with 5/16” stainless steel bolts and lock washers.

Part #	Thickness	Finish	Qty	ProSolar Part #
260-0661	1.205"-1.230" (30.7 mm-31.2 mm)	Clear	1	C1210EC-1
260-0668	1.205"-1.230" (30.7 mm-31.2 mm)	Black	1	C1210EC-1B
260-0243	1.353"-1.378" (34.4 mm-35.0 mm)	Clear	1	C-1358EC-1
260-0276	1.353"-1.378" (34.4 mm-35.0 mm)	Black	1	C-1358EC-1B
260-0013	1.391"-1.416" (35.4 mm-35.9 mm)	Clear	1	C-1396EC-1
260-0260	1.391"-1.416" (35.4 mm-35.9 mm)	Black	1	C-1396EC-1B
260-0676	1.481"-1.520" (37.7 mm-38.6 mm)	Clear	1	C1486EC-1
211-0408	1.481"-1.520" (37.7 mm-38.6 mm)	Black	1	C1486EC-1B
260-0019	1.567"-1.592" (39.9 mm-40.4 mm)	Clear	1	C-1572EC-1
260-0406	1.567"-1.592" (39.9 mm-40.4 mm)	Black	1	C-1572EC-1B
260-0023	1.601"-1.626" (40.7 mm-41.3 mm)	Clear	1	C-1606EC-1
260-0560	1.655"-1.680" (42.0 mm-42.6 mm)	Clear	1	C-1660EC-1
260-0609	1.655"-1.680" (42.0 mm-42.6 mm)	Black	1	C-1660EC-1B
260-0570	1.685"-1.710" (42.8 mm-43.4 mm)	Clear	1	C-1707EC-1
260-0665	1.757"-1.782" (44.7 mm-45.2 mm)	Clear	1	C1762EC-1
260-0666	1.757"-1.782" (44.7 mm-45.2 mm)	Black	1	C1762EC-1B
260-0029	1.805"-1.830" (45.9 mm-46.4 mm)	Clear	1	C-1810EC-1
260-0032	1.805"-1.830" (45.9 mm-46.4 mm)	Black	1	C-1810EC-1B
260-0261	1.963"-1.988" (49.9 mm-50.4 mm)	Clear	1	C-1968EC-1
260-0262	1.963"-1.988" (49.9 mm-50.4 mm)	Black	1	C-1968EC-1B

CHANNEL NUTS



Anodized support rail channel nuts glide easily into position with clamping hardware. One required per clamp. Also used to attach micro-inverters to support rail. Larger diameter 5/16” thread size for optimal strength.

Part #	Qty	ProSolar Part #
210-0045	1	P-CN-1

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END CAPS

The new anodized aluminum support rail end caps are designed to provide a finished appearance while allowing water to flow through the channel, preventing potential freeze.

Part #	Thickness	Finish	Qty	ProSolar Part #
211-0130	1.5”	Clear Anodized	1	A-EZECAP
211-0198	1.5”	Black Anodized	1	A-EZECAP-B
211-0197	2.5”	Clear Anodized	1	A-EZECAPD
211-0199	2.5”	Black Anodized	1	A-EZECAPD-B
211-0200	3”	Clear Anodized	1	A-EZECAPXD

EZ SPEED DRILL BIT AND GUIDE BASE

Part #	Finish	ProSolar Part #
270-0111	Red anodized aluminum base with bronze bushings, 3/16" & 1/4" FastJack pilot hole drilling	FJ-DRILL
270-0729	Drill bit, 1/2", Unibit #10, for Support Rail Locking Hole	A-UNIBIT
270-0682	Drill bit, 3/4" Titanium Unibit #3 (6 mm-18 mm) Self Starting, for SolarWedge Support Rail Locking Hole	A-UNIBIT 3/4

RAIL SPLICE OPTIONS

Aluminum and stainless steel rail splice allows for rails to be structurally attached to one another while allowing rails to expand and contract. Two splice sizes available. Standard splice (shown) used for standard 1-1/2” tall rail and deep 2-1/2” tall rail. XD splice used for Extra Deep 3” tall rail.

Part #	Description	Qty	ProSolar Part #
210-0037	Splice Bar for Standard and Deep Rail	1	A-SPLICE-1
210-0449	XD Splice Bar	1	A-SPLICEXD-1

GroundTrac® Components

U-BOLT LOCK EXAMPLE

Aluminum and stainless steel design conceals bolts with rail for clean appearance.

Part #	Description
240-0261	For 3 Schott Poly 200 Series Modules in Landscape
240-0201	For 3 Sharp 200W Series Modules in Landscape
240-0385	For 3 Yingli 200-Series in Landscape
240-0262	For 4 Schott Poly 200 or Yingli 200 Series Modules in Landscape with XD rail
240-0204	For 4 Sharp 175W Series Modules in Landscape
240-0243	For 4 Sharp 200W Series Modules in Landscape with XD rail
240-0386	For 4 Yingli 200-Series in Landscape

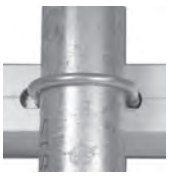
GRADE STAKE KIT

Part #	Description	ProSolar Part #
240-0387	6 re-usable guide stakes	A-GS-6

U-BOLT ASSEMBLY

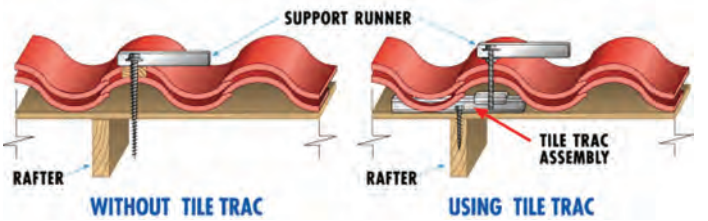
Part #	Finish	Qty	ProSolar Part #
240-0178	Clear	1	A-UAS-1

SNOW LOAD RAIL ENHANCER



Part #	Finish	Qty	ProSolar Part #
210-0648	Clear	1	A-SLE-1

TileTrac®



BENEFITS

- Easy to install
- Patented single lag bolt design Patent #5,746,091
- Independently laboratory tested to 1,740 lbs ultimate pullout load
- Most cost effective, water tight seal, tile attachment
- 12 years of industry preferred design
- No tile replacement needed
- Stainless Steel and Aluminum design
- 10 square inches of base evenly distributes roof load

TileTrac®

Part #	Description	Qty	ProSolar Part #
211-0030	6” Tall for S-Curve Concrete Tile with Stainless Steel flashing	1	TT-1-T6
211-0101	4” Tall for Flat Concrete Tile with Stainless Steel flashing	1	TT-1-T4
211-0029	1-1/2” Tall	1	TT-1-1.5
211-0135	2” Tall E-Series	1	TT-1E-2

SolarWedge®

SolarWedge® and SolarWedge® XD are the most cost effective and easy to install flat roof mount systems. Available in either 5°, 10°, or 15° tilt angles. Single row design structurally attaches to building to meet all necessary load requirements. Utilizes aluminum and stainless steel components for maximum strength and corrosion resistance.

ADVANTAGES

- Typically installed on residential or commercial flat roofs
- Each system engineered and load tested to 30 lb/sq. ft. , equivalent of 100 mph winds per 2010 CBC / 2009 IBC to ensure safety and quality
- Spans 6 foot on center max with 2-1/2" tall RoofTrac® rail
- Spans 8 foot on center max with 3" tall RoofTrac® XD rail
- Available in either 5 or 10 or 15 degree tilt angles
- Aluminum and Stainless Steel components for corrosion resistance and strength
- Structurally attaches to building for Seismic (Earthquake) safety
- Compensates for approximately 2" of roof height variation with integrated leveling feature
- System does not affect roof drainage, allowing roof to breathe and dry out
- Allows for easy access to roof surface below modules

Part #	Description	Qty	ProSolar Part #
211-0025	5° w/ 1 ea 3" Lower & 7.5" Upper Post	1	SW5-1
211-0021	10° w/ 1 ea 3" Lower & 11" Upper Post	1	SW10-1
211-0023	15° w/ 1 ea 3" Lower & 15.5" Upper Post	1	SW15-1

TILT UP RACKING KIT

For use with the RoofTrac® Mounting System.

The RoofTrac® Tilt Up Kit is an easy-to-install accessory for your RoofTrac® system. When integrating with the FastJack® attachment device, the installer MUST use strut to grid the system.

Part #	Qty	ProSolar Part #
210-0039	1 Kit of 3 Legs	A-TU24-1

FastJack Standoffs

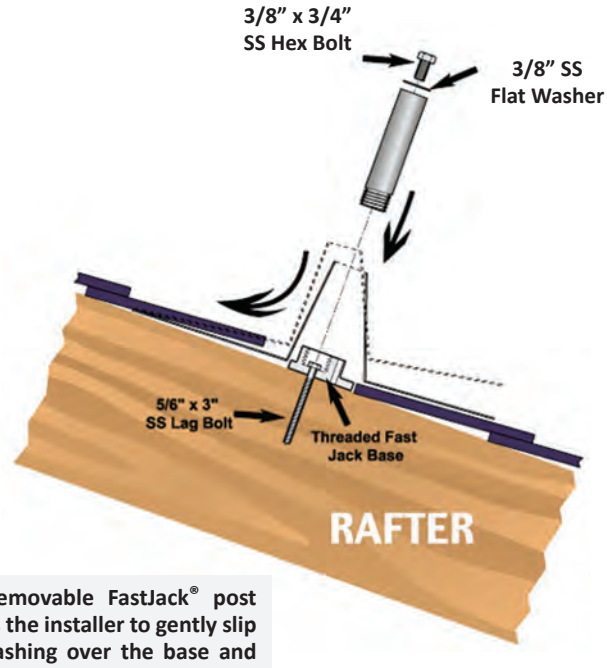
The FastJack® 2x Bracket is a connection "splice" which allows 2 support rails to be mounted on a single FastJack®. This bracket minimizes the number of needed FastJacks® by 25%. Recommended for sloped roof-tops only.

Part #	Finish	Qty	ProSolar Part #
270-0004	Clear	1	A-FJT-1

FASTJACK® STANDOFF

- Easy to install
- Patented single lag bolt design Patent No. 6,360,491
- Independently laboratory tested to 2,359 lbs ultimate pull out, 808 lbs ultimate side axial loads
- Used for mounting: PV solar panels, solar thermal panels, communication equipment etc.
- Lightweight and corrosion resistant Aluminum and Stainless Steel materials
- Solid Aluminum post prevents water funneling down through top of post
- No welds to corrode or break
- Includes integrated 3/16" pilot hole drill guide
- 1" OD post diameter compatible with standard 3/4" flashings
- Available in 3", 4-1/2", 6", and 7-1/2" tall sizes
- Includes 5/16"x3-1/2" Stainless steel lag bolt, washer, and support rail attachment bolt and washer
- Leveling kit available to accommodate roof height variation

Part #	Description	Qty	ProSolar Part #
211-0011	3" Standoff	1	FJ-300-1
210-0042	4.5" Standoff	1	FJ-450-1
211-0014	6" Standoff	1	FJ-600-1
211-0015	7.5" Standoff	1	FJ-750-1



The removable FastJack® post allows the installer to gently slip the flashing over the base and under the delicate composition shingles.

professional SOLAR products inc.

RESIDENTIAL FASTJACK® E-SERIES

- Easy to install
- Patented single lag bolt design Patent No. 6,360,491
- Independently laboratory tested to 3,600 lbs ultimate pull out, 1,380 lbs ultimate side axial loads
- Lightweight and corrosion resistant Aluminum and Stainless Steel materials (no inferior ferrous metals which rust and weaken over time)
- Solid Aluminum post prevents water funneling down through top of post
- No welds to corrode or break
- Designed for the Experienced high volume installer
- 3/16" pilot hole drill guide accessory available
- Available in 2", 3" and 4-1/2" tall sizes
- 1" OD post diameter (1-1/2" OD base diameter)
- Leveling kit available to accommodate roof height variation 0,491

Part #	Description	Qty	ProSolar Part #
211-0422	2" Standoff	1	FJE-200-1
211-0088	3" Standoff	1	FJE-300-1
211-0086	4.5" Standoff	1	FJE-450-1

FastJack® E-SERIES FLASHING

- Low cost, heavy duty, aluminum flashing, for optimal strength and corrosion resistance
- Black powder coated Aluminum roof flashing with compression collar
- Compatible with all 1" OD FastJack® E-Series attachments

Part #	Description	Qty	ProSolar Part #
270-0748	For all FastJack E-Series standoff sizes	1	FJE-Flash-1

FLASHING TEMPLATES

The Oatey® and Standard Flashing Templates are designed to help the installer cut in a professional flashing every time. Machined aluminum with a convenient handle.

TEMP-STD TEMP-OAT

Part #	Type	ProSolar Part #
260-0242	Standard	TEMP-STD
260-0226	For Oatey	TEMP-OAT

COMMERCIAL FastJack® E-SERIES

- Easy to install
- Patented single lag bolt design Patent No. 6,360,491
- Independently laboratory tested to 4,050 lbs ultimate pull out, 1,875 lbs ultimate side axial loads
- Lightweight and corrosion resistant Aluminum and Stainless Steel material
- Solid Aluminum post prevents water funneling down through top of post
- No welds to corrode or break
- 1-1/4" OD post diameter (2" OD base diameter) compatible with standard 1" approved flashings
- Hardware not included
- Available in 4-1/2", 6", 8", 10", 12" tall sizes
- Leveling kit available to accommodate roof height variation

Part #	Height	Diameter	Qty	ProSolar Part #
211-0083	4.5"	1.25"	1	CFJE-450
211-0084	6"	1.25"	1	CFJE-600-1
211-0108	8"	1.25"	1	CFJE-800-1
211-0147	10"	1.25"	1	CFJE-1000-1
211-0201	12"	1.25"	1	CFJE-1200-1

FoamJack® WITH LAG BOLT BASE

- Easy to install
- Patented single lag bolt design Patent No. 6,360,491
- Independently laboratory tested to 2,870 lbs ultimate pull out, 2,615 lbs ultimate side axial loads
- Designed to work with the patented ProSolar RoofTrac® support rail
- Lightweight and corrosion resistant Aluminum material (no inferior ferrous metals which rust and weaken over time)
- Solid Aluminum post prevents water funneling down through top of post

Part #	Description	Qty	ProSolar Part #
211-0075	4 1/2" w/ 3/8" Post	1	FMJ-450-38-1L
211-0079	5" w/ 1/2" Post	1	FMJ-500-12-1L

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ProSolar Installation Tools

COMMERCIAL LEVELING KIT

The new stainless steel FastJack® leveling kit accessory adds 1/4" to 1" of height for occasional uneven roof sections.

FJ-LEVEL CFJE-LEVEL

Part #	ProSolar Part #
210-0871	FJ-LEVEL
210-0041	CFJE -LEVEL

OATEY FLASHINGS

Oatey Flashings are used to extensively seal penetrations for pipes and to seal standoffs.

Part #	Diameter	Base	Finish	Qty	Oatey Part #
270-0000	.5"-1.0"	9" x 12.5" Galvanized, No Calk	Clear	1	11830
270-0693	.5"-1.0"	11" x 14.5" Galvanized	Black	1	11859
270-0657	.5"-1.0"	18" x 18" Galvanized, No Calk	Clear	1	11831
270-0691	.5"-1.0"	18" x 18" Aluminum	Clear	1	11833
270-0651	.5"-1.125"	9" x 12.5" Aluminum	Clear	1	11832
270-0652	1.25"-1.5"	9" x 12.5" Aluminum	Clear	1	12920
270-0653	1.25"-1.5"	18" x 18" Aluminum	Clear	1	12836
270-0002	1.25"-1.65"	9" x 12.5" Galvanized	Clear	1	11840
270-0692	2.0"	9" x 12.5" Galvanized	Clear	1	11853
270-0696	2.0"	18" x 18" Galvanized/ Shake Roof	Clear	1	11934
270-0695	3.0"	11" x 14.5" Galvanized	Clear	1	11866

Hollaender®

HOLLAENDER BASE FLANGES

Part #	Size	Pipe Size	Hollaender Part #
240-0242	Narrow Width, Adjustable, 2 Mounting Holes	1-1/2"	46ADJ-8
240-0241	Narrow Width, 2 Mounting Holes	1-1/2"	46-8

HOLLAENDER T-FITTING

Part #	Description	Size	Hollaender Part #
240-0395	Extended Barrel TEE	1.5" Pipe Size	5EXT-8
240-0176	A-TEE	1-1/2"	5E-8
240-0409	TEE with set screws on side rib	2" Pipe Size	5SR-9
240-0400	TEE with top mount screws	2" Pipe Size	5-9

Oatey®

OATEY MASTERFLASH FLASHING

Part #	Diameter	Base Dimension	Oatey Part #
270-0697	.25" - 2.0"	4-1/2"	BR14050

OATEY AURORA NO-CALK SOLAR FLASHINGS

Part #	Diameter	Base	Finish	Qty	Oatey Part #
270-0735	.5" - 1.5"	9.0" x 12.5" Aluminum	Clear	1	12802
270-0733	.5" - 1.5"	9.0" x 12.5" Galvanized	Clear	1	12801
270-0730	1.5" - 3.0"	18.0" x 18.0" Aluminum	Clear	1	12804
270-0734	1.5" - 3.0"	9.0" x 12.5" Galvanized	Clear	1	12803

OATEY AURORA NO-CALK SOLAR SIDE FLASHINGS

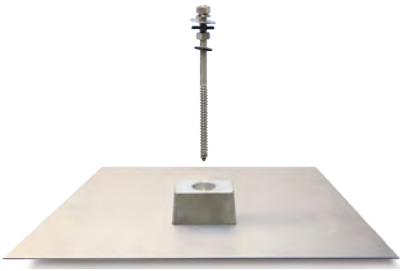
Part #	Diameter	Base	Finish	Qty	Oatey Part #
270-0737	3.0" - 6.0"	12.0" x 12.5" Aluminum	Clear	1	12806
270-0736	.5" - 2.5"	8.0" x 8.5" Aluminum	Clear	1	12805

OATEY RUBBER COLLAR

Part #	Description	Oatey Part #
270-0698	Collar, Converts 1.5" - 2.0" Opening To .5" - 1.0"	00373

Quick Mount PV®
RESPECT THE ROOF®

Made in the USA



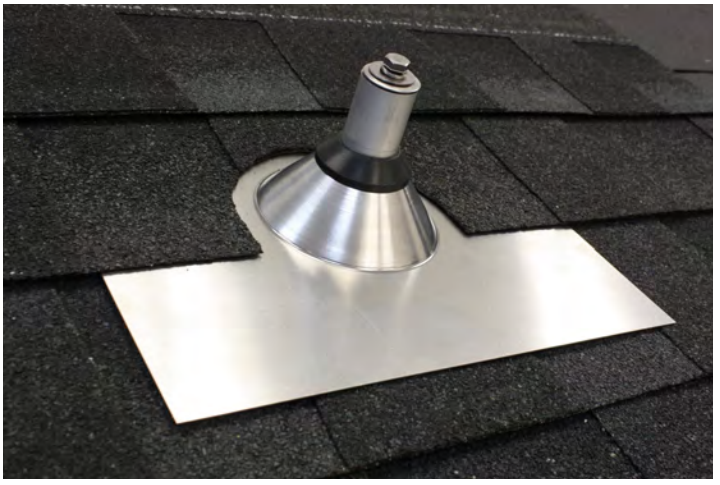
ICC-ESR-2835

Quick Mount PV All-In-One Flashing and Mount

Quick Mount PV designs and manufactures innovative waterproofing systems for rooftop solar installations. With an extensive background in aluminum manufacturing, green construction, roofing, and solar installations, the California-based company is a leader in providing mounting solutions from an installer perspective. All Quick Mount PV products are made in the USA and are designed to meet all the appropriate roofing codes to maintain roof warranties as well as provide a quick and easy installation process that saves time and money on the job.

FEATURES

- Meets or exceeds roofing industry best practices
- Code Compliant with IBC, IRC, SBC, SMACNA and ARMA
- Approved by major roof manufacturers
- Meets/exceeds lifespan of roof and PV systems
- Works with all leading racks
- Labor savings
- No roof cutting for Classic Comp Mount
- All hardware included
- Made in the USA and Ontario, Canada



CLASSIC COMPOSITION MOUNT

This is the standard composition mount. It is shown in a mill finish with IronRidge XRL rail and an L-foot. It is available in mill finish, clear anodized, and bronze anodized finish and includes 5/16" stainless steel hanger bolt and hardware. The flashing is 12" x 12" with 5" x 12" exposed, and 7" x 12" under the next rows of shingles. No roof cutting required. Works with all standard racking systems. 50 year life span. 100% code compliant. Made in the USA and Ontario, Canada.

Ontario Domestic Content Compliant

Part #	Finish	Size	Qty	Quick Mount PV Part #
210-0054	Mill	12" x 12"	1	QMSC A 1
210-0501	Bronze	12" x 12"	1	QMSC B 1
270-0727	Mill	12" x 12"	1	0800 QMSC A 1 OntFIT

QBASE COMPOSITION MOUNT

The QBase Composition Mounts (formerly New Roof Comp Mount) smoothly fit into the workflow between the trades while installing solar arrays during new construction or roof replacement. The product includes all mounts, flashing, and hardware. The mounts are installed prior to the new shingles, then flashing is installed with the shingles.

Part #	Finish	Size	Qty	Quick Mount PV Part #
270-0725	Mill	12" x 12"	1	QMNC A 1
270-0726	Bronze	12" x 12"	1	QMNC B 1

QBASE SHAKE MOUNT AND QBASE SLATE MOUNT

Similar to the QBase Composition Mount, the QBase Shake Mount and QBase Slate Mount are designed to accommodate standoff placement prior to roof shingle installation. The larger 18" x 18" flashing extends under the felt underlayment course, and is wide enough to cover gaps between shingles to maintain a waterproof installation. For slate, this would utilize a stand off attachment that would come up through the cut hole in the slate with a net height of 3.75".

Part #	Finish	Size	Qty	Quick Mount PV Part #
270-0747	Bronze	18" x 18" with 3.25" post/ net 3.75"	1	QMNS B 1
270-0746	Mill	18" x 18" with 3.25" post/ net 3.75"	1	QMNS A 1

CLASSIC SHAKE MOUNT

The flashing is 18" x 18" with 5" x 18" exposed, 10" x 18" under the next row of shakes, and 3" x 18" is under the second shake above as well as under the tar paper. It is imperative to place the flashing under the tar paper to maintain a waterproof installation. It is simplest to remove the shakes directly above to both; find the rafter, as well as insure the flashing gets under the tar paper, then reset the removed shakes.

ICC-ESR-2835

Part #	Finish	Size	Qty	Quick Mount PV Part #
210-0579	Mill	18" x 18"	1	QMLC A 1
210-0505	Bronze	18" x 18"	1	QMLC B 1

QBASE UNIVERSAL TILE MOUNT & FLASHING

The QBase Universal Tile Mount is comprised of all aluminum stand off and flashing. All hardware is included. The tile is removed, the stand off is bolted into the rafter, and the tile is cut to allow for the stand off to pass through. An additional aluminum primary flashing is included for waterproofing at the sub-roof underlayment level. The aluminum flashing is then placed and molded to the shape of the tiles. This product can be installed on curved and flat tile roofs.

Part #	Finish	Size	Qty	Quick Mount PV Part #
210-0949	Mill	18" x 18"	1	QMUTM A 1
210-0955	Bronze	18" x 18"	1	QMUTM B 1

QBASE LOW SLOPE MOUNT

The QBase Low Slope Mount takes the QBase and post mount to its ultimate level. It's the strongest you can buy for mechanically attaching commercial PV systems to TPO, PVC, EPDM, built-up asphalt, and virtually all other non-metal low slope roofs. For built up asphalt roofs (BUR) and other bituminous and modified bitumen roofs, aluminum flashings are available from Quick Mount PV in 4" and 8" tall cones (sold separately).

Part #	Finish	Size	Qty	Quick Mount PV Part #
211-0369	Mill	3-1/4" post + 1/2" base	1	QMLSH-3.75 A 1
211-0370	Bronze	3-1/4" post + 1/2" base	1	QMLSH-3.75 B 1
211-0371	Mill	6-1/2" post + 1/2" base	1	QMLSH-7 A 1
211-0372	Bronze	6-1/2" post + 1/2" base	1	QMLSH-7 B 1
211-0373	Mill	8-1/2" post + 1/2" base	1	QMLSH-9 A 1
211-0374	Bronze	8-1/2" post + 1/2" base	1	QMLSH-9 B 1
211-0375	Mill	11-1/2" post + 1/2" base	1	QMLSH-12 A 1
211-0376	Bronze	11-1/2" post + 1/2" base	1	QMLSH-12 B 1
270-0723	Mill	17" x 17" x 4" Alum Flashing	1	QMLSF-4 A 1
270-0724	Mill	17" x 17" x 8" Alum Flashing	1	QMLSF-8 A 1

CLASSIC HOT WATER COMP MOUNT

Part #	Description	Finish	Size	Qty	Quick Mount PV Part #
210-0812	For Comp Roofs	Mill	12" x 12"	1	QMH2O A 1
210-0954	For Comp Roofs	Bronze	12" x 12"	1	QMH2O B 1

CLASSIC POOL PANEL MOUNT

Part #	Description	Finish	Size	Qty	Quick Mount PV Part #
210-0822	For Comp Roofs	Mill	9" x 12"	1	QMPC A 1
210-0820	For Comp Roofs	Bronze	9" x 12"	1	QMPC B 1

Quick Mount PV®
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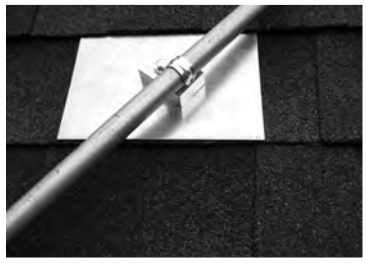
CLASSIC CONDUIT MOUNT

The Classic Conduit Mount is designed to raise conduit off the roof and allow airflow around the conduit relieving it from direct heat conduction. These mounts use Quick Mount PV's proprietary waterproofing technology to seal the roof penetrations and aluminum and stainless steel parts to secure the conduit for the life of the system. Conduit Mounts are 9" x 12" and are available in aluminum mill and bronze anodized. Uses a standard single-hole conduit clamp for 1/2" through 1-1/2" conduits. Conduit clamp not included.



Part #	Description	Finish	Size	Qty	Quick Mount PV Part #
210-0674	For Comp Roofs	Mill	9" x 12"	1	QMCC A 1
210-0801	For Comp Roofs	Bronze	9" x 12"	1	QMCC B 1
210-0950	For Shake Roofs	Mill	12" x 18"	1	QMLCC A 1
210-0816	For Shake Roofs	Bronze	12" x 18"	1	QMLCC B 1

HARDWARE ACCESSORIES

Quick Mount PV also offers height extensions. They are used with the standard composition mounts and the shake mounts when additional height is preferred. Available in 2 1/2", 3 1/4", and 4". Longer hanger bolts are also available for when spanning through insulation installed over the roof structure, which are available in 6", 8", 10" and 12". Other accessories include drivers and sockets for easing the installation process and roofing bars for freeing up any nails found in the way of the flashing.

Part #	Description	Finish	Qty	Quick Mount PV Part #
270-0645	6" Hanger Bolts 5/16" with Nuts & Washers	Stainless Steel	1	QMHS-6 1
270-0646	8" Hanger Bolts 5/16" with Nuts & Washers	Stainless Steel	1	QMHS-8 1
270-0647	10" Hanger Bolts 5/16" with Nuts & Washers	Stainless Steel	1	QMHS-10 1
270-0656	12" Hanger Bolts 5/16" with Nuts and Washers	Stainless Steel	1	QMHS-12 1
210-0677	PV Height Extension 2.5" with Washer & 5/16" x 1" Bolt	Mill	1	QMEXT-2.5 A 1
210-0951	PV Height Extension 2.5" with Washer & 5/16" x 1" Bolt	Bronze	1	QMEXT-2.5 B 1
210-0676	PV Height Extension 3.25" with Washer & 5/16" x 1" Bolt	Mill	1	QMEXT-3.25 A 1
210-0952	PV Height Extension 3.25" with Washer & 5/16" x 1" Bolt	Bronze	1	QMEXT-3.25 B 1
210-0678	PV Height Extension 4" with Washer & 5/16" x 1" Bolt	Mill	1	QMEXT-4.0 A 1
210-0953	PV Height Extension 4" with Washer & 5/16" x 1" Bolt	Bronze	1	QMEXT-4.0 B 1
270-0109	PV 24" Roofing Bar	Stainless Steel	1	QMRB 1
270-0631	1/2" Deep Socket, 3/8" Drive	-	1	QMDS-.50 1
270-0630	Socket Adapter, 3/8" Square Drive Male	-	1	QMSA-.375 1
270-0632	Torque Wrench	-	1	QMTW 1

Zep Solar

ZS Comp

PV Module Installation System

ZS Comp™ from Zep Solar offers the fastest and least expensive way to mount PV arrays on composition shingle roofs

With a series of drop-in and quarter-turn connections, ZS Comp installs way faster than conventional mounting systems. The structural connections of ZS Comp are auto grounding, eliminating the need for separate grounding hardware. And with its hyper-bonded grounding matrix, ZS Comp offers the safest, most reliable way to ground PV arrays.

KEY SYSTEM FEATURES

- Dramatically reduces installation time
- Eliminates mounting rails and clip hardware
- Eliminates separate grounding hardware
- Ultra reliable hyper-bonded grounding matrix
- Rapid, top-accessible precision array leveling
- Ultra-low parts count
- Enhanced aesthetics

KEY TECHNICAL FEATURES

- TÜV tested to IEC 61215 for 5400Pa load conditions
- Suitable for high wind applications
- Interlock ETL tested to UL1703 as ground bond means
- Ground Zep ETL tested to UL467 as grounding and bonding device
- Ultra-low resistance ground-bond connection - 10x better than UL minimum criteria

Zepulator

The Zepulator design tool allows you to easily configure Zep Solar PV arrays according to jobsite engineering requirements. It generates PV array CAD drawings, span and cantilever allowances, and bills of material for easy ordering. *Use it at: www.zepulator.com*

PRODUCT INFORMATION

Item #	Description	Qty	Zep Solar Part #
210-0903	Interlock, Black	1	850-1178
210-0905	Hybrid Interlock, Black	1	850-1174
210-0907	Leveling Foot, Black	1	850-1184
210-0918	Universal Box Bracket	1	850-1196
210-0932	Groove Adapter Kit, Type C	1	850-1168
550-0450	AC/DC Wire Clip	1	850-1222
210-0900	Comp Mount, Clear	1	850-1151
210-0901	Comp Mount, Black	1	850-1149
590-0066	Ground Zep	1	850-1172
270-0705	Zep Tool	1	850-1201
270-0704	Zep Flat Tool	1	850-1199
210-0968	Array Skirt Cap Set, black	1	850-1215

ZEP COMPATIBLE™

Zep Compatible™

ZS Comp mounting hardware is designed for use with Zep Compatible modules. *Contact your sales representative for a current list of Zep Compatible modules.*

ARRAY SKIRT CROSS REFERENCE

Item #	PV Module Manufacturer	Module #	Module Orientation	Description	Qty	Zep Solar Part #
210-0963	Yingli Solar	YL240P-29b	Landscape	Array Skirt, 1663 mm, black	1	850-1112
210-0962	Yingli Solar	YL240P-29b	Portrait	Array Skirt, 2003 mm, black	1	850-1132
210-0909	Canadian Solar	CS6P-PX, black	Landscape	Array Skirt, 1653 mm, black	1	850-1104
210-0911	Canadian Solar	CS6P-PX, black	Portrait	Array Skirt, 1988 mm, black	1	850-1124

ZS Comp™ PV Module Installation System

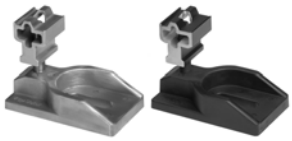
Zep Solar

INTERLOCK

The Interlock provides north-south and east-west structural and ground bond connections creating a structurally contiguous hyper-bonded array. ETL Listed to UL1703.

HYBRID INTERLOCK

The Hybrid Interlock functions as both Interlock and Leveling Foot for areas where the structural attachments falls at an Interlock location.



LEVELING FOOT

The Leveling Foot provides a means of attachment between the PV array and the mounting surface or flashed attachment apparatus and allows for easy array height adjustment. (1.25” throw)

Order (1) Array Skirt Cap per every two exposed Array Skirt ends.

ARRAY SKIRT

Enhancing both function and aesthetics, the Array skirt facilitates easy front-row installation while providing a clean look at the front of the PV array (available in both black and clear finish).

UNIVERSAL BOX BRACKET

The Universal Box Bracket allows rapid attachment of electrical boxes to the perimeter of the PV array.

GROOVE ADAPTER KITS

Groove Adapter Kits allow for easy installation of select third party BOS components to the Zep Groove. Type A Groove Adapter Kits are compatible with M-190 and M-380 Enphase Energy inverters. Type C Groove Adapter Kits are available with PB250-AOB Solar Edge inverters.

ENPHASE CONNECTOR BRACKET

Snaps directly into the Zep Groove for easy management of Enphase Energy’s Engage drop connector.

AC/DC CABLE CLIP

Clips into Zep Groove for ultra-fast and easy management of PV wiring and micro-inverter cables.

COMP MOUNT

The Zep Comp Mount attachment and flashing assembly provides a means of flashed attachment for composition shingle roofs.

GROUND ZEP

Attaches to Zep Groove. One Ground Zep per 72 modules max.

ZEP TOOL, FLAT TOOL

Zep Tool: 4 functions, 1 tool; Flat Tool: For inter-module removal.

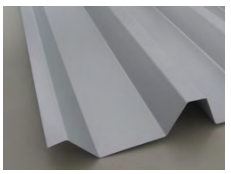
EJOT®

Solar Fastening Systems

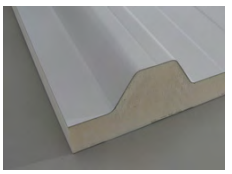
The EJOT® Solar Fastening JA3 and JZ3 offers:

- High product quality through strict quality controls
- Simple, fast, labor saving installation process
- Secure installation through transfer of tensile loads and pressure forces directly into the substructure
- Consistent installation results, since the installer cannot change the predefined fastener setup
- Easy replacement of old roof screws on an existing roof avoiding additional holes
- Highly engineered thread-forms which are specifically designed to fasten in metal and wood substructures
- A precise depth control stop mechanism necessary to assure the appropriate intrusion depth of fastener for your project
- In conjunction with your project criteria the fastening design allows us to offer you a project-related initial sizing
- Design that includes a proven sealing system for metal roofs that are trapezoidal, corrugated or with sandwich panels
- Minimum risk of roofing material damage
- Applicability to all common mounting systems and strut rails, typically used with L- feet or adapter plates
- Perfect sizing and setup to your project
- The EJOT Solar Fastening is **NOT** a hanger bolt

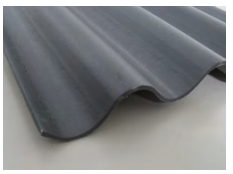
APPLICATIONS



Trapezoidal metal roofs



Roofs with sandwich panels



Roofs with corrugated metal or fiber cement panels

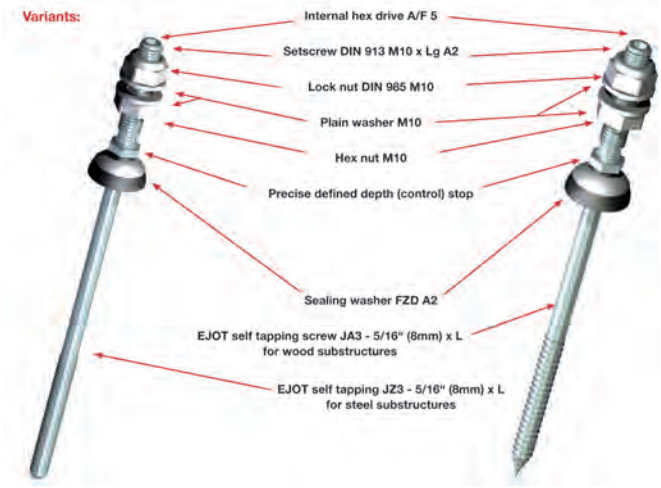
REFERENCES

Project Hassleben, Germany
Photo: Courtesy of Colexon Energy AG

Project Schmuecker, Germany
Photo: Courtesy of Abakus AG

Project Bolart, Germany
Photo: Courtesy of Colexon Energy AG

EJOT® Solar Fastenings JA3 and JZ3



Part #	Description	Ejot Part #
260-0410	SS Solar Fastening for wood, 8 mm diameter, 80 mm long Lag, 10 mm x 50 mm Stud	JA3-SB-8.0x80/50-FZD
260-0411	SS Solar Fastening for wood, 8 mm diameter, 130 mm long Lag, 10 mm x 50 mm Stud	JA3-SB-8.0x130/50-FZD
260-0412	SS Solar Fastening for wood, 8 mm diameter, 150 mm long Lag, 10 mm x 50 mm Stud	JA3-SB-8.0x150/50-FZD
260-0413	SS Solar Fastening for wood, 8 mm diameter, 200 mm long Lag, 10 mm x 50 mm Stud	JA3-SB-8.0x200/50-FZD
260-0414	SS Solar Fastening for metal, 8 mm diameter, 80 mm long Lag, 10 mm x 50 mm Stud	JZ3-SB-8.0x80/50-FZD
260-0415	SS Solar Fastening for metal, 8 mm diameter, 125 mm long Lag, 10 mm x 50 mm Stud	JZ3-SB-8.0x125/50-FZD
260-0416	SS Solar Fastening for metal, 8 mm diameter 150 mm long Lag, 10 mm x 50 mm Stud	JZ3-SB-8.0x150/50-FZD
260-0417	SS Solar Fastening for metal, 8 mm diameter, 200 mm long Lag, 10 mm x 50 mm Stud	JZ3-SB-8.0x200/50-FZD
210-0722	Hex Head driver bit for SS Solar Fastenings	SW5-1/4" x 25
210-0723	Drill bit for wood substructures, 5.5 mm diameter, 175 mm long	Drill HSS-5.5x175
210-0724	Drill bit for wood substructures, 5.5 mm diameter, 220 mm long	Drill HSS-5.5x220
210-0725	Drill bit for steel substructure thickness between gauge 16 to gauge 6, 6.8 mm diameter, 175 mm long	Drill HSS-6.8x175
210-0726	Drill bit for steel substructure thickness between gauge 16 to gauge 6, 6.8 mm diameter, 225 mm long	Drill HSS-6.8x225
210-0727	Drill bit for steel substructure thickness between gauge 5 to 9/32", 7.0 mm diameter, 175 mm long	Drill HSS-7.0x175
210-0728	Drill bit for steel substructure thickness between gauge 5 to 9/32", 7.0 mm diameter, 225 mm long	Drill HSS-7.0x225
210-0729	Drill bit for steel substructure thickness between 19/64" to 25/64", 7.2 mm diameter, 175 mm long	Drill HSS-7.2x175
210-0730	Drill bit for steel substructure thickness between 19/64" to 25/64", 7.2 mm diameter, 225 mm long	Drill HSS-7.2x225
210-0731	Drill bit for steel substructure thickness greater than 13/32", 7.4 mm diameter, 175 mm long	Drill HSS-7.4x175
210-0732	Drill bit for steel substructure thickness greater than 13/32", 7.4 mm diameter, 225 mm long	Drill HSS-7.4x225

EJOT®

EJOT® Solar Fastenings JA3 and JZ3

Security and Simplicity- The Best Option!

EJOT® has developed a range of stainless steel fasteners especially designed for PV and thermal solar installations on metal roofs of commercial, industrial, agricultural and residential buildings.

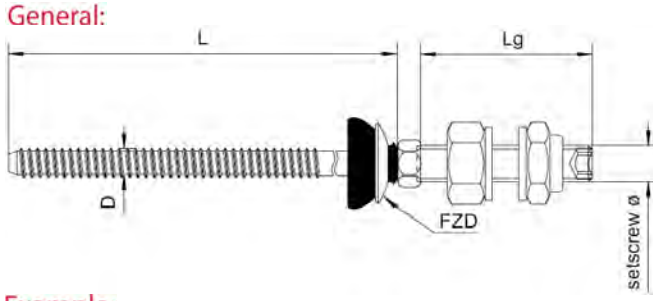
Product key:

JA3 (or JZ3) - SB - D x L / Lg + FZD

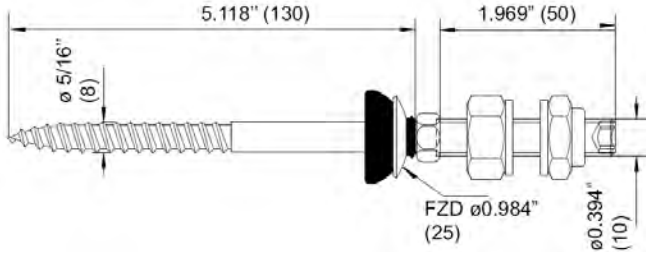
D	=	diameter of screw (lower part)
L	=	length of screw (lower part)
Lg	=	length of setscrew (upper part)
JZ3	=	thread type for steel substructures
JA3	=	thread type for wood substructures

Standard is a Ø 5/16" (8mm) fastener with 0.394"x1.969" (M10x50mm) setscrew; the length L is variable and has to be chosen according to the respective project.

General:



Example:

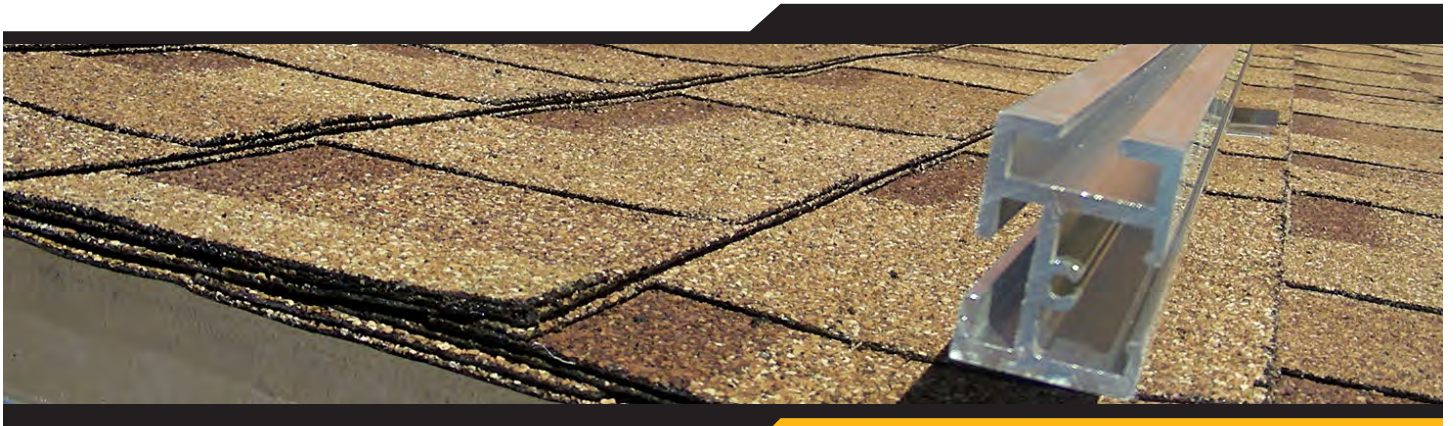


IMPORTANT NOTE: *Metric drill diameters are necessary for optimal holding/clamping characteristics! Metric drills have to be used to not void the warranty. Refer to the US Assembly Instructions for EJOT Solar Fastenings or the installation manual to determine the appropriate pre-drill diameter for your specific project.*

DPW | SOLAR

PREFORMED LINE PRODUCTS

POWER-FAB®



DPW Solar, a wholly owned subsidiary of Preformed Line Products, is a designer and manufacturer of high quality roof, ground and pole mount racks and enclosures.

POWER RAIL™ MOUNTING SYSTEM

TOP-CLAMPING PV MODULE MOUNTING SYSTEM ENGINEERED TO REDUCE INSTALLATION COSTS AND PROVIDE MAXIMUM STRENGTH FOR PARALLEL-TO-ROOF OR TILT UP MOUNTING APPLICATIONS.

The Power Rail top-clamping mounting system is designed with the professional PV solar installer in mind. The top-clamping rails utilize a single tool with a revolutionary RAD™ Fastener for faster bolt placement. The unique shape of the RAD provides an anti-rotation feature, locking the bolt in the proper orientation when installed. The high strength rigid rails also include an integral wiring channel for securing cables and providing a professional finish. The system includes a wide selection of mounting components designed for secure and water tight attachments to any roof style.

PowerRail P6 Extrusion

PowerRail P8 Extrusion

PowerRail P14 Extrusion

Part #	Description	Length	Finish	Qty	DPW Part #
210-0744	P6 Extrusion	84”	Mill	1	P6-84
210-0745	P6 Extrusion	126”	Mill	1	P6-126
210-0746	P6 Extrusion	162”	Mill	1	P6-162
210-0747	P6 Extrusion	204”	Mill	1	P6-204
210-0748	P6 Extrusion	240”	Mill	1	P6-240
210-0749	P6 Extrusion	282”	Mill	1	P6-282
210-0750	P6 Extrusion	324”	Mill	1	P6-324
211-0209	P6 Splice Plate	-	Mill	1	P6-SPK
210-0936	P8 Extrusion	84”	Mill	1	P8-84
210-0937	P8 Extrusion	126”	Mill	1	P8-126
210-0938	P8 Extrusion	162”	Mill	1	P8-162
210-0939	P8 Extrusion	204”	Mill	1	P8-204
210-0940	P8 Extrusion	240”	Mill	1	P8-240
210-0941	P8 Extrusion	282”	Mill	1	P8-282
210-0942	P8 Extrusion	324”	Mill	1	P8-324
211-0341	P8 Splice	-	Mill	1	P8-SPK
210-0974	P14 Extrusion	84"	Mill	1	P14-84
210-0975	P14 Extrusion	126"	Mill	1	P14-126
210-0976	P14 Extrusion	162"	Mill	1	P14-162
210-0977	P14 Extrusion	204"	Mill	1	P14-204
210-0978	P14 Extrusion	240"	Mill	1	P14-240
210-0979	P14 Extrusion	282"	Mill	1	P14-282
210-0980	P14 Extrusion	324"	Mill	1	P14-324
211-0431	P14 Splice Plate	-	Mill	1	P14-SPK

DPW SOLAR
PREFORMED LINE PRODUCTS
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Power Rail™ Mounting Components

POWER POST™ STANCHIONS

Power posts offer high strength solid aluminum construction and are used with flashing cones.

Part #	Length	Diameter	Weight	DPW Part #
240-0053	3"	1.31"	.55 lbs	PP3
240-0054	4"	1.31"	.67 lbs	PP4
240-0055	5"	1.31"	.81 lbs	PP5
240-0056	6"	1.31"	.94 lbs	PP6
240-0057	7"	1.31"	1.1 lbs	PP7

SUPER POST™ STANCHIONS

Super Posts offer high strength solid aluminum construction for larger arrays and higher roof clearance. Super Posts may also be used with the P14 rail.

Part #	Length	Diameter	Weight (lbs)	DPW Part #
211-0402	7"	1.75"	2.4 lbs	SP7
211-0222	8"	1.75"	2.6 lbs	SP8
211-0403	9"	1.75"	2.9 lbs	SP9
211-0223	10"	1.75"	3.2 lbs	SP10

OFFSET POWER POST™ STANCHIONS

Offset Power Posts center the flashing cone and avoid potential gaps with the Power Post Base.

Part #	Length	Diameter	Weight	DPW Part #
240-0229	3"	1.31"	.55 lbs	OP3
240-0230	4"	1.31"	.67 lbs	OP4
240-0231	5"	1.31"	.81 lbs	OP5
240-0232	6"	1.31"	.94 lbs	OP6
240-0233	7"	1.31"	1.1 lbs	OP7

EASY POWER POST™ STANCHIONS

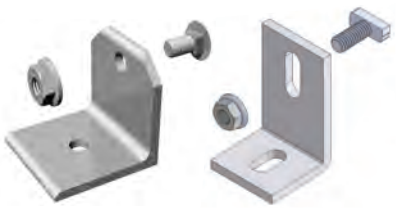
Easy Power Post mount directly to metal and composite shingles or other roofing materials and do not require attachment to a roof structural member. Sealing butyl mastic backing and RoofGrip™ screws are included.

Part #	Type	Description	DPW Part #
240-0221	Easy Power Post	3"	EP3
240-0222	Easy Power Post	4"	EP4
240-0223	Easy Power Post	5"	EP5
240-0224	Easy Power Post	6"	EP6
240-0225	Easy Power Post	7"	EP7

EASY FEET™

Easy Feet™ mount directly to metal and composite shingles or other roofing materials and do not require attachment to a roof structural member. Sealing butyl mastic backing and RSS PHEinox™ screws are included.

Part #	Description	Weight	DPW Part #
210-0032	Pivot Easy Mounting Foot with 1.5" Screws	.76 lbs	PEF-1.5



P14 "L" FOOT POWER POST™ BRACKETS

Part #	For	Weight	DPW Part #
211-0216	P6/P8 Power Post Bracket	.09 lbs	PPB
211-0430	P14 L-Mounting Foot	.50 lbs	P14-LF

"L" FEET

"L" Feet are fabricated from high strength 3/16" aluminum and include a vertical slot for adjusting to irregular surfaces.

Part #	Description	Length	Weight	DPW Part #
211-0214	Tall L-Mounting Foot	2.5"	.20 lbs	LF2
240-0059	Tall L-Mounting Foot	3.5"	.24 lbs	LF3
211-0412	Tall L-Mounting Feet with butyl backing	3.5"	.24 lbs	LF3-x
211-0006	Tall L-Mounting Foot	5"	.40 lbs	LF5
211-0007	Tall L-Mounting Foot	6"	.45 lbs	LF6

TILTED "L" FEET

Part #	Description	Length	Weight	DPW Part #
211-0210	Front Foot	5 Degree	.25 lbs	FF5
211-0211	Back Foot	5 Degree	.50 lbs	BF5
211-0212	Front Foot	10 Degree	.25 lbs	FF10
211-0213	Back Foot	10 Degree	.75 lbs	BF10

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POWER-FAB®

Clamps

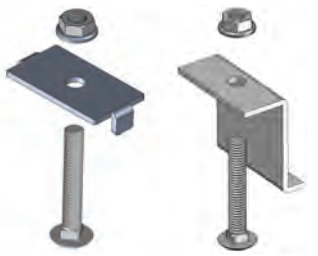
MODULE CLAMPS WITH RAD™ HARDWARE

Mid Clamp End Clamp

Module Clamps are Type 304 stainless steel for higher yield strength and durability. The low profile design and slim 3/8" gap between modules provide a professional appearance and higher module density.
Standard End Clamps are module specific – specify module depth (mm).

Part #	Description	Finish	Weight	DPW Part #
260-0561	End Clamps, with RAD Hardware	Clear	.15 lbs	EC-(depth-mm)-RAD
260-0566	End Clamps, with RAD Hardware	Black	.15 lbs	EC-(depth-mm)-RAD-B
260-0699	Mid Clamp for 28-33 mm thick frame	Clear	.08 lbs	MC-28-33-RAD
260-0700	Mid Clamp for 34-39 mm thick frame	Clear	.08 lbs	MC-34-39-RAD
260-0701	Mid Clamp for 40-46 mm thick frame	Clear	.08 lbs	MC-40-46-RAD
260-0702	Mid Clamp for 47-52 mm thick frame	Clear	.08 lbs	MC-47-52-RAD
260-0703	Mid Clamp for 53-59 mm thick frame	Clear	.08 lbs	MC-53-59-RAD

MODULE CLAMPS WITH CARRIAGE BOLT HARDWARE

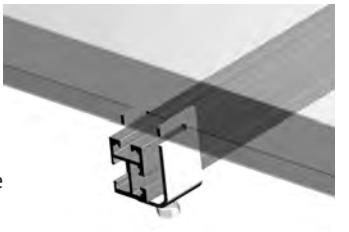


Mid Clamp End Clamp

Standard End Clamps and Mid Clamps with carriage bolts are module specific – specify module depth (mm).

Part #	Description	Finish	Weight	DPW Part #
260-0563	End Clamps, with Carriage Bolt	Clear	.15 lbs	EC-(depth-mm)-CAR
260-0568	End Clamps, with Carriage Bolt	Black	.15 lbs	EC-(depth-mm)-CAR-B
260-0564	Mid Clamp, with Carriage Bolt	Clear	.08 lbs	MC-(depth-mm)-CAR
260-0569	Mid Clamp, with Carriage Bolt	Black	.08 lbs	MC-(depth-mm)-CAR-B

UNIVERSAL END CLAMPS



Universal End Clamps mount to the underside flange of the module.

Part #	Description	Finish	Weight	DPW Part #
260-0565	Universal End Clamps, w/ set bolt (P6)	Clear	.15 lbs	P6-ECU
260-0672	Universal End Clamps, w/ set bolt (P8)	Clear	.25 lbs	P8-ECU

CORRUGATED ROOF MOUNTS

Butyl mastic is included.
"L" foot is ordered separately.

Not all corrugated metal roofs are the same. Contact your sales representative to design mounting bridges that are specific to your application.

Part #	Description	Finish	Qty	DPW Part #
211-0401	Power Rail P6/P8 Corrugated Roof Mount	Clear	1	CMB

TILE ROOF MOUNTS

Roof Rod mounts attach directly to the roof deck and are suitable for tile and other roofing materials. Simply drill a hole through the roofing material. Sealing butyl mastic backing, RSS PHEinox™ screws and "L" foot are included.

Part #	Description	Finish	Qty	Weight	DPW Part #
211-0219	Power Rail P6/P8 Threaded Rod Mount	Clear	1	1.5 lbs	RRM

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POWER-FAB® LOW PROFILE ROOF/ GROUND MOUNTS (LPRGM)

The LPRGM features a single row of modules mounted in portrait. Utilizing the Power Rail™ top clamping system with RAD™ lock-in-place twist bolt, installations are fast, simple and secure. Telescoping Tilt Legs are standard. Adjustable "L" feet are included for attachment to foundations or structural members and rows of up to 6 modules are available. Module clamps ordered separately.

ORDERING GUIDELINE
LPRGM4–D–HD–AA

- AA — Finish Upgrade Options
- HD — Design Strength
- D — DPW Module Series
- 4 — Number of modules

MODULE SIZE RANGE (W x L)	DPW MODULE Type
20-26" x 39-53"	B
22-27" x 56-63"	C
31-33" x 60-67"	D
38-40" x 51-56"	E
38-40" x 58-61"	F
37-42" x 61-67"	G or GL*
38-42" x 77-82"	H or HL*
50-52" x 65-79"	I
*GL or *HL - Includes longer module rails for module widths greater than 39.45" (i.e., Sunpower 305, Sunpower 400)	

POWER-FAB® TWO TIER ROOF/ GROUND MOUNTS (TTRGM)

The TTRGM features two rows of modules mounted in portrait. Utilizing the Power Rail™ top clamping system with RAD™ lock-in-place twist bolt, installations are fast, simple and secure. Telescoping Tilt Legs are standard. Adjustable "L" feet are included for attachment to foundations or structural members and rows of up to 2 high x 5 wide modules are available. Module clamps ordered separately.

ORDERING GUIDELINE
TTRGM4–D–HD–AA

- AA — Finish Upgrade Options
- HD — Design Strength
- D — DPW Module Series
- 4 — Number of modules

Contact your sales representative for a full range and part numbers, as well as a list of upgrade options.

DESIGN STRENGTH CHART

		Snow Load (lbs. per sq. ft.)								
		0	10	20	30	40	50	60	70	80
WIND SPEED (MPH)	90	SD	SD	SD	SD	HD	HD	HD	HD	HD
	100	SD	SD	SD	HD	HD	HD	HD	HD	
	110	HD	HD	HD	HD	HD	HD	HD		
	120	HD	HD	HD	HD	HD	HD			
	130	HD	HD	HD	HD	CONTACT FACTORY				

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POWER-FAB®

POWER-FAB® STANDARD ROOF/ GROUND MOUNTS (SRGM)

The SRGM features a single column of 1 to 5 modules stacked and mounted in landscape. Larger arrays may be formed by arranging SRGMs side-by-side. Utilizing the Power Rail™ top clamping system with RAD™ lock-in-place twist bolt, installations are fast, simple and secure. Telescoping Tilt Legs are standard. Adjustable "L" feet are included for attachment to foundations or structural members. Module clamps ordered separately.

ORDERING GUIDELINE
SRGM3–D–HD–AA

- AA — Finish Upgrade Options
- HD — Design Strength
- D — DPW Module Series
- 3 — Number of modules

MODULE SIZE RANGE (W x L)	DPW MODULE Type
20-26" x 39-53"	B
22-27" x 56-63"	C
31-33" x 60-67"	D
38-40" x 51-56"	E
38-40" x 58-61"	F
37-42" x 61-67"	G or GL*
38-42" x 77-82"	H or HL*
50-52" x 65-79"	I
*GL or *HL - Includes longer module rails for module widths greater than 39.45" (i.e., Sunpower 305, Sunpower 400)	

DESIGN STRENGTH CHART

		Snow Load (lbs. per sq. ft.)								
		0	10	20	30	40	50	60	70	80
WIND SPEED (MPH)	90	SD	SD	SD	SD	HD	HD	HD	HD	HD
	100	SD	SD	SD	HD	HD	HD	HD	HD	
	110	HD	HD	HD	HD	HD	HD	HD		
	120	HD	HD	HD	HD	HD	HD			
	130	HD	HD	HD	HD	CONTACT FACTORY				

Contact your sales representative for a full range and part numbers, as well as a list of upgrade options.

S-5! Attachment Solutions for Standing Seam, Exposed-Fastened and Corrugated Metal Roofs

S-5!® CLAMPS

S-5!® makes clamps for general use that fit many metal roof profiles. They have excellent value for directly attaching photovoltaics, mounting rails or attaching other equipment such as conduit or ducting.

Part #	Description	Size	S-5! Part #
260-0264	Brass Clamp w/ 10 mm Bolt	B	S-5-B
260-0577	Brass Clamp w/ 8 mm Bolt	B Mini	S-5-B Mini
260-0001	Fits Double Folded Seams	E	S-5-E
260-0244	Fits Double Folded Seams	E Mini	S-5-E Mini
260-0241	Fits KlipRib and Similar Profiles	K	S-5-K
260-0418	Fit KlipRib and Similar Profiles	K Mini	S-5-K Mini
260-0692	Fits 1" nail strip metal roof profiles	N	S-5-N
260-0693	Fits 1" nail strip metal roof profiles	N Mini	S-5-N Mini
260-0419	Fits Rib Roof and Similar Profiles	R	S-5-R
260-0386	For Snap-Together Roofs and Horizontal Seams Under .540"	S	S-5-S
260-0403	For Snap-Together Roofs and Horizontal Seams Under .540"	S Mini	S-5-S Mini
260-0239	Fits Roof w/ T-Shaped Seam	T	S-5-T
260-0238	Fits Roof w/ T-Shaped Seam	T Mini	S-5-T Mini
260-0000	Universal Clamp w/ 10 mm Bolt	U	S-5-U
260-0234	Universal Clamp w/ 8 mm Bolt	U Mini	S-5-U Mini
260-0365	For Metal Roofs w/ Bulb Seams	Z	S-5-Z
260-0384	For Metal Roofs w/ Bulb Seams	Z Mini	S-5-Z Mini
260-0235	Custom 2-1/2" x 1-1/8" x 15/16", 3/8-16 Thread	-	S-5 Custom

S-5! VERSABRACKET

VersaBracket™ can be used to mount virtually anything to an exposed-fastened roof system and is compatible with almost any trapezoidal, exposed-fastened profile. No messy sealants to apply! No chance for leaks! The VersaBracket™ comes with factory-applied sealant already in the base for a water-tight attachment.

Part #	Description	S-5! Part #
260-0280	VersaBracket-47, for Face-Fastened Roof System, 1.86" tall w/ Butyl Pad w/o Hardware	VB-47
260-0407	VersaBracket-67, for Face-Fastened Roof System, 2.65" tall w/ Butyl Pad w/o Hardware	VB-67

S-5! CORRUBRACKET

CorruBracket™ can be used to mount almost anything to corrugated metal roofing and is compatible with 7/8" and 3/4" corrugated roofing. Comes with factory-applied butyl sealant already in the base, and the S-5!® patented reservoir conceals the sealant from UV exposure, preventing drying and cracks.

Part #	Description	S-5! Part #
260-0573	CorruBracket mount for corrugated metal roofs, Hardware not included	CorruBracket

S-5! PV KIT

The new S-5-PV Kit is one of the first solar module mounting solutions in the industry to be listed to the new UL 2703, a standard that covers both bonding and mounting. In order to meet the UL requirements, the S-5-PV Kit had to be submitted for tests, being evaluated under the severest of conditions to confirm that the product will withstand the elements while maintaining electrical conductivity. Furthermore, the PV Kit has gained an ETL Listing to UL 1703. UL and ETL listings are widely recognized by most Authorities Having Jurisdiction, which means fewer inspection hassles for installers.

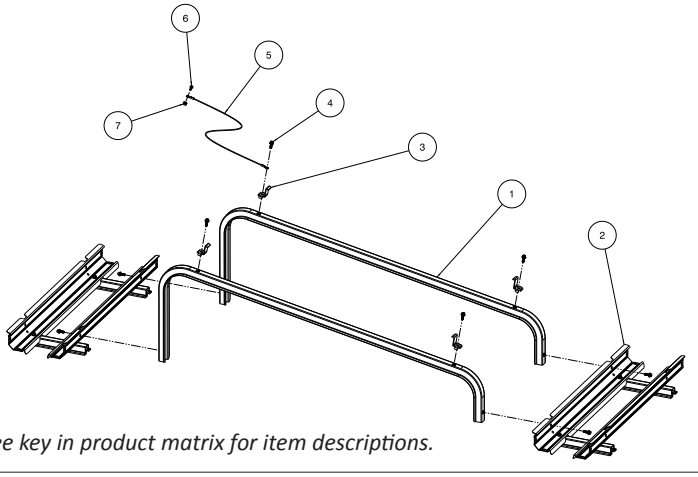
Part #	Description	S-5! Part #
260-0402	PV Anchor Kit Mounting Disc Aluminum	-
260-0453	PV Kit for 1.3" to 2.5" Frame with Stud, PV Grab, Hex Nut and Aluminum Mounting Disc	S-5-PV Kit
260-0687	PV Kit for 1.3" to 2.5" Frame with 8 mm stud, PV Grab, Hex Nut, and Stainless Steel Mounting Disc with attached cable management clips, UL 2703	S-5-PV Kit (UL)
260-0574	PV End Kit: hex flange nut to adapt PV Kit for end/edge condition	S-5-PV End Kit
260-0408	8 mm Stainless Steel Nuts	8mm nut

Applied Energy Technologies (AET) delivers structural components in the renewable energy industry. AET products are design-driven and focus on high-quality components specifically developed for the end-user. AET uses a disciplined engineering approach but is flexible, adapting to the customers' needs. All products are made and available in the US.

RAYPORT™ STAINLESS SERIES ROOF BALLAST RACK

The ONLY stainless steel rack on the market, the Rayport Rack is designed to minimize installation time and cost.

- Fits all panels available on the market today
- Racks include integrated fasteners – allowing one common bolt to be used for all joints
- Wind Tunnel tested to 120 mph
- Grounding lugs required every 20 rows
- No cutting or drilling required
- Panel-to-panel length: 58.65"
- Panel angle: 10° available immediately
- Angles 0°-30° available by custom order
- Panel layout: Landscape
- Panel height from roof: 9.12"
- Contact surface: EPDM feet
- System dead load: As low as 5 psf
- Warranty: 15 year limited

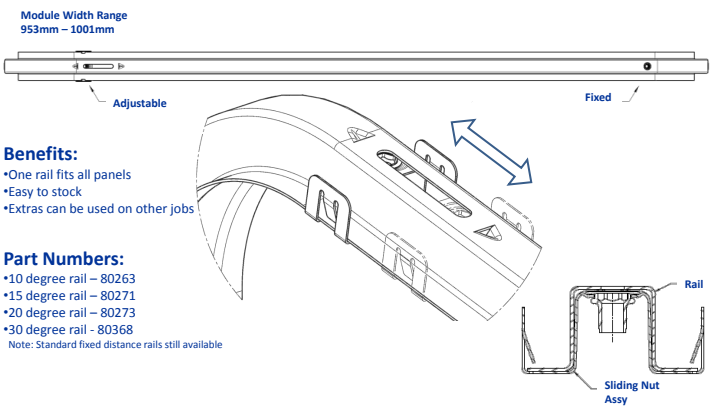


See key in product matrix for item descriptions.

Part #	Description	Key	AET #
210-0929	Support Rail- 10°; use 2 per panel with an extra 2 per row	1	80001
210-0922	Support Rail- 20°; use 2 per panel with an extra 2 per row	1	80177
250-1317	Ballast Tray Short Rows	2	80238
250-0100	Ballast Tray Standard; use 1 per panel with 1 extra per row and column	2	80009
250-0101	Ballast Tray Long; use 1 per panel with 1 extra per row and column	2	80188
211-0323	Z-Bracket; use 2 per support rail	3	80022
211-0324	Bolt; use 4 per support rail	4	80013
211-0310	Grounding Strap; length depends on panel grounding hole location	5	80102
211-0311	Grounding Screw; 10-32 use for 4-4.2 mm panel grounding hole	6	80083
211-0312	Grounding Screw; 8-32 use for < 4 mm panel grounding hole	6	80087
211-0313	Grounding Screw; 1/4-20 use for > 9 mm panel grounding hole	6	80014
250-1306	Grounding Screw, 10-24 use for SolarWorld 31 mm panel	6	80368
211-0314	Grounding Nut; 10-32 use for 4-4.2 mm panel grounding hole	7	80128
211-0315	Grounding Nut; 8-32 use for < 4 mm panel grounding hole	7	80085
211-0316	Grounding Nut; 10-32 use for 4-4.2 mm panel grounding hole	7	80143
730-0039	Sizing Tool; one per project	-	80034
250-1327	Sizing Tool, Long version to fit module lengths 1742.8 mm - 2602.9 mm	-	80168
211-0321	Seismic Clip Kit; optional- use based on location	-	80129
211-0322	Hard Mount Bracket; optional- use based on location	-	80131
250-1328	Microinverter Bracket Kit	-	80612
250-0102	Ballast Pad	-	80246

Contact your sales representative for panel tilt angles ranging from 0° through 30° or for uniquely sized panels. More Z-Bracket options available as well.

Adjustable Rayport Rail – 6/3/11



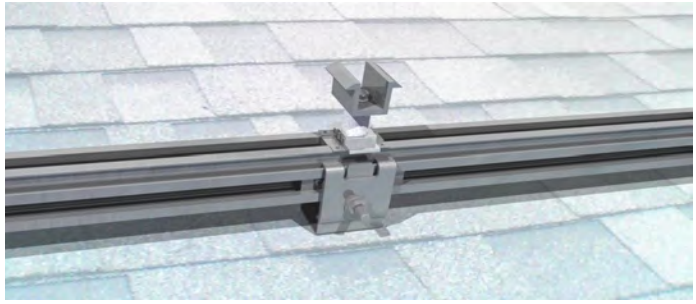
T6 GROUND MOUNT

Designed for specific build. ***Please call your sales representative for specifications and pricing.***

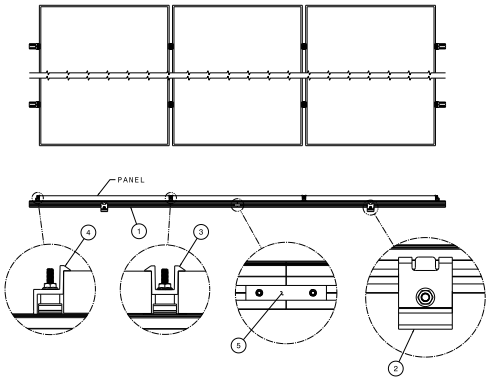
Unique clip-in panel mounting allows for quick placement of clamp anywhere along rail section *(patent pending).*

- Fits all major PV modules including thin film panels
- Single row of poles
- Fully adjustable tilt angle
- Brackets come pre-assembled
- No drilling or cutting required
- No heavy equipment required for installation
- Warranty: 15 year limited
- Panel layout: Portrait
- Panel height from ground: 2-3’
- Max single-array size: 48’, 28 panel (2x14), 4 posts
- Grounding: Panel grounding included
- Material: 6063 T6 Aluminum frame, 4” schedule 40 posts
- Aluminum frame

T6 FLUSH MOUNT



- Panel grounding included
- No drilling required
- Panel attachment clamps install anywhere on the rail (top down installation)
- Attaches to most roof standoff systems
- Adjustable Jaw Clamp (up/down) for roof variation (waviness)
- Unique splice brackets require NO HOLES in rails
- Clamps tested to over 1000 lbs pull-force
- Stainless steel rail clamps
- 6063-T6 Aluminum rails and panel clamps
- Rails available in mill-finish or anodized coating



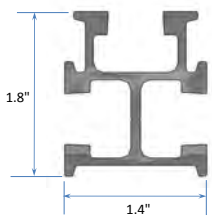
See key in product matrix for item descriptions.

T6 FLUSH MOUNT

Part #	Description	Key	AET #
210-0923	Rail SEC804; 10’ Rail, 2.5” Tall Section	1	80142
210-0924	Rail SEC804; 11’ Rail, 2.5” Tall Section	1	80142
210-0925	Rail SEC804; 12’ Rail, 2.5” Tall Section	1	80142
210-0926	Rail SEC803; 10’ Rail, 1.8” Tall Section	1	80100
210-0927	Rail SEC803; 11’ Rail, 1.8” Tall Section	1	80100
210-0928	Rail SEC803; 12’ Rail, 1.8” Tall Section	1	80100
211-0317	Bracket Assembly (see span chart for required qtr)	2	80111
211-0318	Mid-Clamp Assembly; 2 between each panel	3	80097
211-0319	End-Clamp Assembly; 2 at each panel end	4	80098
211-0320	Splice Kit; required between each connected rail	5	80112

AET 1.8 Pitched Roof Rail

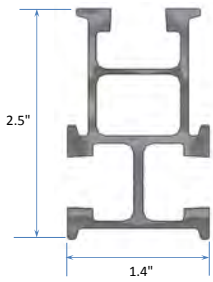
Building Height	Roof Pitch	Ground Snow Load	Wind Speed (Nominal 3-Sec. Gust in mph) 90	105	120	150
20 ft. or Less	20° or Less	0 psf	6	6	6	4
		0 - 10 psf	4	4	4	2
		11- 30 psf	2	2	2	2
	21° to 27°	0 psf	6	6	4	4
		0 - 10 psf	4	4	2	2
		11- 30 psf	2	2	2	2
	28° to 45°	0 psf	6	4	4	2
		0 - 10 psf	4	2	2	2
		11- 30 psf	2	2	2	2
21 ft. to 40 ft.	20° or Less	0 psf	6	6	6	4
		0 - 10 psf	4	4	4	2
		11- 30 psf	2	2	2	2
	21° to 27°	0 psf	6	6	4	2
		0 - 10 psf	4	4	2	2
		11- 30 psf	2	2	2	2
	28° to 45°	0 psf	6	4	4	2
		0 - 10 psf	4	2	2	2
		11- 30 psf	2	2	2	2



AET 2.5 Pitched Roof Rail

Building Height	Roof Pitch	Ground Snow Load	Wind Speed (Nominal 3-Sec. Gust in mph) 90	105	120	150
20 ft. or Less	20° or Less	0 psf	8	8	6	6
		0 - 10 psf	6	6	6	4
		11- 30 psf	4	4	4	4
		31 - 50 psf	2	2	2	2
	21° to 27°	0 psf	8	8	6	6
		0 - 10 psf	6	6	6	4
		11- 30 psf	4	4	4	4
		31 - 50 psf	4	2	2	2
	28° to 45°	0 psf	8	6	6	4
		0 - 10 psf	6	6	4	4
		11- 30 psf	4	4	4	2
		31 - 50 psf	4	4	4	2
21 ft. to 40 ft.	20° or Less	0 psf	8	8	6	6
		0 - 10 psf	6	6	6	4
		11- 30 psf	4	4	4	2
		31 - 50 psf	2	2	2	2
	21° to 27°	0 psf	8	6	6	6
		0 - 10 psf	6	6	4	4
		11- 30 psf	4	4	4	2
		31 - 50 psf	4	2	2	2
	28° to 45°	0 psf	8	6	6	4
		0 - 10 psf	6	6	4	4
		11- 30 psf	4	4	4	2
		31 - 50 psf	4	4	4	2

*Maximum spans based on Exposure Category B



Common Roof Pitch Conversion

Pitch	3:12	4:12	5:12	6:12	8:12	12:12
Degrees	14.0°	18.4°	22.6°	26.6°	33.7°	45.0°

IRONRIDGE

ROOF MOUNT

IRONRIDGE STANDARD (XRS) RAILS

The IronRidge Standard (XRS) Rail's unique curved profile increases its strength while also giving it an attractive look, making it very customer-friendly. In addition, IronRidge Rails are certified for integrated grounding, which eliminates separate module grounding components and procedures, making it very installer-friendly. The XRS rail is manufactured using corrosion resistant aluminum and is available in clear and black finish. Custom lengths are special order; *contact your sales representative for details.*

Part #	Length	Finish	Qty	IronRidge Part #
210-0510	12'	Clear	1	51-7000-144A
210-0716	12'	Black	1	51-7000-144B
210-0511	14'	Clear	1	51-7000-168A
210-0717	14'	Black	1	51-7000-168B
210-0512	16'	Clear	1	51-7000-192A
210-0718	16'	Black	1	51-7000-192B
210-0513	18'	Clear	1	51-7000-216A
210-0719	18'	Black	1	51-7000-216B

IRONRIDGE LIGHT (XRL) RAILS

The IronRidge Light (XRL) Rail is a super-light, highly cost-effective rail. Spanning over 6' between mounts under most load conditions, the XRL rail features top-slot panel clamping for quick and intuitive installation. This rail is manufactured using extruded corrosion resistant aluminum and is available in clear finish. Black finish and custom lengths are special order; *contact your sales representative for details.*

Part #	Length	Finish	Qty	IronRidge Part #
210-0686	12'	Clear	1	51-6000-144A
210-0687	14'	Clear	1	51-6000-168A
210-0688	16'	Clear	1	51-6000-192A
210-0689	18'	Clear	1	51-6000-216A

MID CLAMPS

IronRidge clamps fit both Standard (XRS) and Light (XRL) IronRidge Rails. Mid-Clamp Kits can be ordered with either Hex Bolt or T-Bolt and are available in a clear and black finish.

Part #	Size	Bolt	Finish	Qty	IronRidge Part #
211-0156	A-B-I, 2.0"	Hex	Mill	4	29-7000-105
211-0230	A-B-I, 2.0"	Hex	Black	4	29-7000-105B
211-0382	A-B-I, 2.0"	T-Bolt	Mill	4	29-70TB-105
211-0386	A-B-I, 2.0"	T-Bolt	Black	4	29-70TB-105B
211-0158	C-D-E-J, 2.25"	Hex	Mill	4	29-7000-101
211-0231	C-D-E-J, 2.25"	Hex	Black	4	29-7000-101B
211-0383	C-D-E-J, 2.25"	T-Bolt	Mill	4	29-70TB-101
211-0387	C-D-E-J, 2.25"	T-Bolt	Black	4	29-70TB-101B
211-0161	F-G-K, 2.5"	Hex	Mill	4	29-7000-108
211-0196	F-G-K, 2.5"	Hex	Black	4	29-7000-108B
211-0384	F-G-K, 2.5"	T-Bolt	Mill	4	29-70TB-108
211-0388	F-G-K, 2.5"	T-Bolt	Black	4	29-70TB-108B
211-0163	H, 2.75"	Hex	Mill	4	29-7000-104
211-0232	H, 2.75"	Hex	Black	4	29-7000-104B
211-0385	H, 2.75"	T-Bolt	Mill	4	29-70TB-104
211-0389	H, 2.75"	T-Bolt	Black	4	29-70TB-104B

INTEGRATED GROUNDING MID CLAMPS

Part #	Size	Bolt	Finish	Qty	IronRidge Part #
260-0728	A-B-I, 2.0"	T-Bolt	Clear	4	RS-GD-MCL-200
260-0729	C-D-E-J, 2.25"	T-Bolt	Clear	4	RS-GD-MCL-225
260-0730	F-K-G, 2.5"	T-Bolt	Clear	4	RS-GD-MCL-250
260-0731	H, 2.75"	T-Bolt	Clear	4	RS-GD-MCL-275
260-0732	A-B-I, 2.0"	T-Bolt	Black	4	RS-GD-MCL-200B
260-0733	C-D-E-J, 2.25"	T-Bolt	Black	4	RS-GD-MCL-225B
260-0734	F-K-G, 2.5"	T-Bolt	Black	4	RS-GD-MCL-250B
260-0735	H, 2.75"	T-Bolt	Black	4	RS-GD-MCL-275B

GROUNDING

Part #	Description	Finish	Qty	IronRidge Part #
260-0736	Grounding Strap	Clear	2	RS-GDST-001
260-0737	Grounding Strap Expansion Joint	Clear	1	RS-GDXP-001

ADJUSTABLE AND FIXED TILT-LEGS

Part #	Description	Qty	IronRidge Part #
211-0362	Adjustable Tilt Leg (18-22")	1	51-7516-016H
211-0363	Adjustable Tilt Leg (30-46")	1	51-7528-028H
211-0364	Adjustable Tilt Leg (58-94")	1	51-7556-056H
211-0168	Fixed Tilt Leg, Front Leg 6" & Rear Leg 10"	1	51-7210-010
211-0171	Fixed Tilt Leg, Front Leg 6" & Rear Leg 15"	1	51-7215-015
211-0175	Fixed Tilt Leg, Front Leg 6" & Rear Leg 20"	1	51-7220-020
211-0177	Fixed Tilt Leg, Front Leg 6" & Rear Leg 25"	1	51-7225-025
211-0179	Fixed Tilt Leg, Front Leg 6" & Rear Leg 30"	1	51-7230-030
211-0180	Fixed Tilt Leg, Front Leg 6" & Rear Leg 40"	1	51-7240-040

END CLAMPS

Part #	Clamp Type	Module Thickness	Finish	Qty	IronRidge Part #
211-0148	A	1.31" - 1.37"	Mill	4	29-7000-134
211-0206	A	1.31" - 1.37"	Black	4	29-7000-134B
211-0149	B	1.37" – 1.45"	Mill	4	29-7000-224
211-0203	B	1.37" – 1.45"	Black	4	29-7000-224B
211-0150	C	1.53" – 1.61"	Mill	4	29-7000-157
211-0204	C	1.53" – 1.61"	Black	4	29-7000-157B
211-0152	E	1.68" – 1.74"	Mill	4	29-7000-171
211-0228	E	1.68" – 1.74"	Black	4	29-7000-171B
211-0153	F	1.77" – 1.85"	Mill	4	29-7000-214
211-0195	F	1.77" – 1.85"	Black	4	29-7000-214B
211-0154	G	1.93" – 2.01"	Mill	4	29-7000-204
211-0207	G	1.93" – 2.01"	Black	4	29-7000-204B
211-0155	H	2.26" - 2.32"	Mill	4	29-7000-230
211-0208	H	2.26" - 2.32"	Black	4	29-7000-230B
211-0326	I	1.22" – 1.28"	Mill	4	29-7000-125
211-0348	I	1.22" – 1.28"	Black	4	29-7000-125B
211-0233	J	1.62" - 1.68"	Mill	4	29-7000-165
211-0325	J	1.62" - 1.68"	Black	4	29-7000-165B
260-0670	K	1.84" - 1.90"	Mill	4	29-7000-187
260-0669	K	1.84" - 1.90"	Black	4	29-7000-187B

XRS UNDER CLAMPS

Part #	Finish	Qty	IronRidge Part #
211-0164	Clear	4	29-7000-117

END CAPS

Part #	Description	Qty	IronRidge Part #
211-0453	for XRS	1	29-4000-099
211-0452	for XRL	1	29-4000-088

STAND OFFS

Part #	Description	Length	Finish	Qty	IronRidge Part #
210-0692	Aluminum Flush Mount	3"	Mill	1	51-6003-500L
210-0691	Aluminum Flush Mount	4"	Mill	1	51-6004-500L
210-0693	Aluminum Flush Mount	6"	Mill	1	51-6006-500L
210-0694	Aluminum Flush Mount	7"	Mill	1	51-6007-500L
210-0981	Aluminum Tilt Mount	3.7"	Mill	1	RF-TLT-SO-375
210-0982	Aluminum Tilt Mount	7"	Mill	1	RF-TLT-SO-700
210-0969	Aluminum Tilt Mount	9"	Mill	1	RF-TLT-SO-900

XRS & XRL PVC PLASTIC WIRE CLIPS

Part #	Description	Qty	IronRidge Part #
550-0382	Holds module wires and/or Enphase wire	20	29-4000-077
270-0740	Enphase mounting kit (hardware)	1	29-5003-005

SPLICE KITS

Part #	Description	Qty	IronRidge Part #
211-0092	XRS Splice Kit,Splice & 2 Tek Screws	1	29-7000-010
211-0165	XRL Splice Kit, Splice & 2 Tek Screws	1	29-7000-000

L-FEET KITS

Part #	Description	Finish	Qty	IronRidge Part #
211-0094	L-Feet and Hardware	Mill	4	29-7000-017
211-0229	L-Feet and Hardware	Black	4	29-7000-017B

IRONRIDGE

DESIGN ASSISTANT FOR ROOF MOUNT

To configure your project visit ironridge.com/rm.

BALLASTED ROOF SYSTEM

IronRidge Ballasted System is compact, easy to ship, light on the roof and engineered for quick and intuitive installation. This system works with most solar panels and, because it is a rail-less system, handles uneven and obstructed roofs with ease.

BALLAST TRAY

Part #	Description	Qty	IronRidge Part #
250-1351	Ballast Tray, Galvanized Steel, 10 degree	1	BRM-10BT-G

WIND DEFLECTORS

Part #	Description	Qty	IronRidge Part #
250-1335	Deflector Assy, Mill (fits >60"-62" modules)	1	BRM-DF-61-06A
250-1336	Deflector Assy, Mill (fits >62"-64" modules)	1	BRM-DF-63-06A
250-1337	Deflector Assy, Mill (fits >64"-66" modules)	1	BRM-DF-65-06A
250-1338	Deflector Assy, Mill (fits >66"-68" modules)	1	BRM-DF-67-06A
250-1339	Deflector Assy, Mill (fits >68"-70" modules)	1	BRM-DF-69-06A
250-1340	Deflector Assy, Mill (fits >70"-72" modules)	1	BRM-DF-71-06A
250-1341	Deflector Assy, Mill (fits >72"-74" modules)	1	BRM-DF-73-06A
250-1342	Deflector Assy, Mill (fits >74"-76" modules)	1	BRM-DF-75-06A
250-1343	Deflector Assy, Mill (fits >76"-78" modules)	1	BRM-DF-77-06A
250-1344	Deflector Assy, Mill (fits >78"-80" modules)	1	BRM-DF-79-06A

HIGH WIND DEFLECTOR KIT

Part #	Description	Qty	IronRidge Part #
250-1346	High Wind Deflector Kit (2 tek screws)	1	BRM-DFK

ROOF PADS

Part #	Description	Qty	IronRidge Part #
250-1350	Thick Roof Pad, 3/8" thickness	2	BRM-RP-01
250-1362	Thin Roof Pad, 1/8" thickness	2	BRM-RP-02

WIRE MANAGEMENT

Part #	Description	Qty	IronRidge Part #
550-0449	E/W Wire Clips, UV Resistant Nylon	1	BRM-WCL-EW

SEISMIC ANCHOR

Part #	Description	Qty	IronRidge Part #
250-1349	Seismic Anchor (Includes Hardware) 6"	1	BRM-ANC-06

More Ballasted Roof components can be found on the next page.

IRONRIDGE

MODULE CLAMPS

Part #	Module Thickness	Qty	IronRidge Part #
260-0711	30.5mm - 31.4mm	1	BRM-MCL-31
260-0712	31.5mm - 32.4mm	1	BRM-MCL-32
260-0713	32.5mm - 33.4mm	1	BRM-MCL-33
260-0714	33.5mm - 34.4mm	1	BRM-MCL-34
260-0715	34.5mm - 35.4mm	1	BRM-MCL-35
260-0716	35.5mm - 36.4mm	1	BRM-MCL-36
260-0717	36.5mm - 37.4mm	1	BRM-MCL-37
260-0718	37.5mm - 38.4mm	1	BRM-MCL-38
260-0719	38.5mm - 39.4mm	1	BRM-MCL-39
260-0720	39.5mm - 40.4mm	1	BRM-MCL-40
260-0721	40.5mm - 41.4mm	1	BRM-MCL-41
260-0722	41.5mm - 42.4mm	1	BRM-MCL-42
260-0723	42.5mm - 43.4mm	1	BRM-MCL-43
260-0704	43.5mm - 44.4mm	1	BRM-MCL-44
260-0705	44.5mm - 45.4mm	1	BRM-MCL-45
260-0706	45.5mm - 46.4mm	1	BRM-MCL-46
260-0707	46.5mm - 47.4mm	1	BRM-MCL-47
260-0708	47.5mm - 48.4mm	1	BRM-MCL-48
260-0709	48.5mm - 49.4mm	1	BRM-MCL-49
260-0710	49.5mm - 50.4mm	1	BRM-MCL-50

MICROINVERTER BRACKET

Part #	Description	Qty	IronRidge Part #
250-1345	Microinverter Bracket (Includes Hardware)	1	BRM-MIB-01

DESIGN ASSISTANT FOR BALLASTED ROOF

To configure your project visit ironridge.com/brm.

GROUND MOUNT

IronRidge Ground Mount components are engineered to combine locally sourced 2” or 3” schedule 40 pipe with their Standard Rail (XRS) module mounting assembly to provide an intuitive, adaptable, cost effective solution.

IRONRIDGE STANDARD (XRS) RAILS

Part #	Length	Finish	Qty	IronRidge Part #
210-0511	14'	Clear	1	51-7000-168A

TOP CAPS

Part #	Description	IronRidge Part #
220-0349	Top Cap for 2” Pipe	70-0200-SGA
220-0350	Top Cap for 3” Pipe	70-0300-SGA

BRACE ASSEMBLIES

Part #	Description	IronRidge Part #
220-0359	2”, 7.5’ Brace Assembly	70-0200-CBR
220-0360	3”, 7.5’ Brace Assembly	70-0300-CBR

RAIL CONNECTORS

Part #	Description	IronRidge Part #
220-0351	Rail Connector for 2” Pipe	29-7001-001
220-0352	Rail Connector for 3” Pipe	29-7001-002

MID CLAMPS

Part #	Size	Bolt	Finish	Qty	IronRidge Part #
211-0156	A-B-I, 2.0”	Hex	Mill	4	29-7000-105
211-0382	A-B-I, 2.0”	T-Bolt	Mill	4	29-70TB-105
211-0158	C-D-E-J, 2.25”	Hex	Mill	4	29-7000-101
211-0383	C-D-E-J, 2.25”	T-Bolt	Mill	4	29-70TB-101
211-0161	F-G-K, 2.5”	Hex	Mill	4	29-7000-108
211-0384	F-G-K, 2.5”	T-Bolt	Mill	4	29-70TB-108
211-0163	H, 2.75”	Hex	Mill	4	29-7000-104
211-0385	H, 2.75”	T-Bolt	Mill	4	29-70TB-104

INTEGRATED GROUNDING MID CLAMPS

Part #	Size	Bolt	Finish	Qty	IronRidge Part #
260-0728	A-B-I, 2.0”	T-Bolt	Clear	4	RS-GD-MCL-200
260-0729	C-D-E-J, 2.25”	T-Bolt	Clear	4	RS-GD-MCL-225
260-0730	F-K-G, 2.5”	T-Bolt	Clear	4	RS-GD-MCL-250
260-0731	H, 2.75”	T-Bolt	Clear	4	RS-GD-MCL-275

END CLAMPS

Part #	Clamp Type	Module Thickness	Finish	Qty	IronRidge Part #
211-0148	A	1.31” - 1.37”	Mill	4	29-7000-134
211-0149	B	1.37” – 1.45”	Mill	4	29-7000-224
211-0150	C	1.53” – 1.61”	Mill	4	29-7000-157
211-0152	E	1.68” – 1.74”	Mill	4	29-7000-171
211-0153	F	1.77” – 1.85”	Mill	4	29-7000-214
211-0154	G	1.93” – 2.01”	Mill	4	29-7000-204
211-0155	H	2.26” - 2.32”	Mill	4	29-7000-230
211-0326	I	1.22” – 1.28”	Mill	4	29-7000-125
211-0233	J	1.62” - 1.68”	Mill	4	29-7000-165
260-0670	K	1.84” - 1.90”	Mill	4	29-7000-187

XRS UNDER CLAMPS

Part #	Finish	Qty	IronRidge Part #
211-0164	Clear	4	29-7000-117

DESIGN ASSISTANT FOR GROUND MOUNT

To configure your project visit ironridge.com/gm.

Ontario FIT & MicroFIT Compliant

Ontario's FIT program is North America's first comprehensive guaranteed pricing structure for renewable electricity production. Eligible renewable electricity generators (which can include homeowners, business owners, farmers, as well as private investors) are paid a cost-based price for the renewable electricity they produce through a qualifying renewable energy project within the Ontario province. The FIT program is divided into two streams – FIT and microFIT. MicroFIT is for projects of 10kW or less, and offers a simplified application and contract issuance process.
The Feed-in Tariff (FIT) Program was enabled by the Green Energy and Green Economy Act of 2009, for the Ontario province of Canada only. For more, please visit: www.ontario.ca/renewableenergyprojects.

"DOMESTIC CONTENT" REQUIREMENTS

Currently, the FIT program categorizes components and labor used in solar power projects as falling into eight distinct categories. The eight categories total 100%, with each category representing a set percentage based on the program rules. To satisfy the FIT and MicroFIT Domestic Content requirement, your project must achieve a score of 60% or greater. For each category, you will receive all or nothing, meaning you must be 100% in compliance within a given category, to count its percentage towards your goal of 60% or greater.
The products IronRidge manufactures address category number six of the eight presented, entitled "Mounting Systems". This category has been given a weight of 9%. If your project's Mounting Systems conforms 100% to the FIT Program requirements, you will then receive 9% towards your goal of 60% or greater. Conversely, if your mounting system is, for example, 95% complaint, you will receive 0% (instead of 9%) towards your goal of 60% or greater.
Here's what it takes to conform: "Mounting systems, where the structural components of the fixed or moving mounting systems, have been entirely machined or formed or cast in Ontario. The metal for the structural components may not have been pre-machined outside Ontario other than peeling/roughing of the part for quality control purposes when it left the smelter or forge. The machining and assembly of the mounting system must entirely take place in Ontario (i.e. bending, welding, piercing, and bolting)." – Ontario Power Authority

IRONRIDGE PRODUCTS NEEDED TO MEET THE "DOMESTIC CONTENT" REQUIREMENTS

To simplify achieving the all-or-nothing 9% score assigned to category six, "Mounting Systems", IronRidge offers a FIT Compliant version of their premium, best performing IronRidge Standard Rail (XRS) Assembly. These Standard Rail components ship from Mississauga Ontario. Their Light Rails are not yet available as FIT Compliant.
As per the definition of category six entitled 'Mounting Systems', we supply the following IronRidge products as FIT and MicroFIT compliant.

ADJUSTABLE L-FOOT *See page 63 for details*

Part #	Description	Finish	Qty	IronRidge Part #
211-0406	L-Foot and hardware	Mill Finish	4	29-70CF-017

XRS RAILS (ANODIZED ALUMINUM) *See page 62 for details*

Part #	Length	Finish	Qty	IronRidge Part #
210-0895	9'	Clear	1	51-70CR-108A
210-0896	12'	Clear	1	51-70CR-144A
210-0897	14'	Clear	1	51-70CR-168A
210-0898	16'	Clear	1	51-70CR-192A
210-0899	18'	Clear	1	51-70CR-216A

XRS SPLICE BAR *See page 63 for details*

Part #	Description	Finish	Qty	IronRidge Part #
211-0305	XRS Splice bar and hardware	Mill Finish	1	29-70CS-010

See pages 62-63 for IronRidge Rail Mid and End Clamps. With these clamps your project will achieve 100% of the "Domestic Content" requirements as per Ontario Power Authority guidelines.

POLE MOUNTS


Single-Arm Side Side of Pole

SINGLE-ARM SIDE & SIDE OF POLE MOUNTS

Part #	For Modules	Description	IronRidge Part #
220-0222	Width 5.26" to 14.0"	Single Arm Mount	UNI-SA/14.0
220-0237	Width 14.1" to 21.5"	Single Arm Mount	UNI-SA/21.5
220-0334	Width 16" to 26"	Single Arm Mount	UNI-SA/26.0
220-0289	Up to 25" wide	Use 2" to 4.5" Pipe	UNI-SP/01
220-0371	Up to 27.5" wide	Use 2" to 4.5" Pipe	UNI-SP/01A
220-0329	Up to 30" wide	Use 2" to 4.5" Pipe	UNI-SP/01XH
220-0330	Up to 30" wide	Use 2" to 4.5" Pipe	UNI-SP/01XX
220-0280	Up to 45" wide	Use 2" to 4.5" Pipe	UNI-SP/02
220-0332	Up to 45" wide	Use 2" to 4.5" Pipe	UNI-SP/02X
220-0331	Up to 55" wide	Use 2" to 4.5" Pipe	UNI-SP/02A
220-0333	Up to 70" wide	Use 2" to 4.5" Pipe	UNI-SP/03

TOP OF POLE MOUNTS


Top of Pole

Part #	Use	Module Orientation	Rail length	# Rows	IronRidge Part #
220-0186	4" Pipe	Portrait	45"	Single	UNI-TP/02
220-0232	4" Pipe	Portrait	55"	Single	UNI-TP/02A
220-0201	4" Pipe	Portrait	70"	Single	UNI-TP/03
220-0203	4" Pipe	Portrait	90"	Single	UNI-TP/04
220-0200	4" Pipe	Portrait	110"	Single	UNI-TP/04A
220-0233	6" Pipe	Portrait	70"	Dual	UNI-TP/06
220-0199	6" Pipe	Landscape	70"	Dual	UNI-TP/06LL
220-0202	6" Pipe	Portrait	90"	Dual	UNI-TP/08
220-0234	6" Pipe	Landscape	90"	Dual	UNI-TP/8LL
220-0235	6" Pipe	Portrait	115"	Dual	UNI-TP/10
210-0948	6" Pipe	Landscape	115"	Dual	UNI-TP/10LL
220-0236	6" Pipe	Portrait	140"	Dual	UNI-TP/12
220-0106	6" Pipe	Landscape	140"	Dual	UNI-TP-12LL

DPW | SOLAR
PREFORMED LINE PRODUCTS
POWER-FAB®

Top-of-Pole Mounts (TPM)

The TPM utilizes high strength welded steel components and corrosion resistant hardware for long term reliability. Seasonal adjustability for maximizing production is provided by six different tilt-angle settings and is a single person operation.

ORDERING GUIDELINE
TPM8–D–SHARP–NE170UC1–HWV–AA

- TPM8 – Number of modules
- D – DPW Module Series
- SHARP – Module Manufacturer
- NE170UC1 – Module Mftr's Part Number*
- HWV – Upgrade Options
- AA – Upgrade Options

*Important: Include complete module part # as listed on module manufacturer's specification sheet.

MODULE SIZE RANGE (W x L)	DPW MODULE Series
19-23" x 35-44"	A
20-26" x 39-53"	B
22-27" x 56-63"	C
31-33" x 60-67"	D
38-40" x 51-56"	E
38-40" x 58-61"	F
37-42" x 61-67"	G
38-42" x 77-82"	H
50-52" x 65-79"	I

Side-of-Pole Mounts (SPM)

The SPM utilizes high strength aluminum components and corrosion resistant hardware for long term reliability. Seasonal adjustability for maximizing production is provided by several tilt-angle settings and is a one person operation.

KEY BENEFITS

- Maximum Strength and Durability
- Module-Specific Design – Less Parts
- Ease of Assembly
- Single Ground Penetration
- Seasonal Elevation Adjustment

Contact your sales representative for a full range and part numbers, as well as a list of upgrade options.

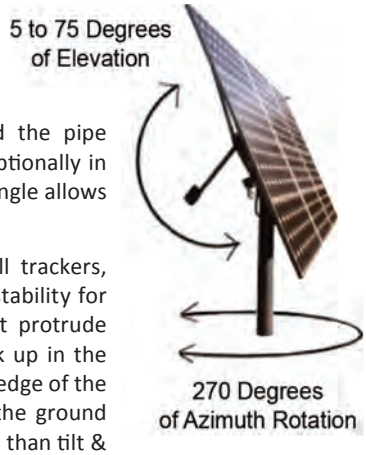
Ordering Guideline
SPM4–D–SHARP–NE170UC1–HWV–AA

- SPM4 – Number of modules
- D – DPW Module Series
- SHARP – Module Manufacturer
- NE170UC1 – Module Mftr's Part Number*
- HWV – Upgrade Options
- AA – Upgrade Options

*Important: Include complete module part # as listed on module manufacturer's specification sheet.

WATTSUN™
SOLAR TRACKERS
By Array Technologies, Inc.

The Wattsun electrically operated tracker automatically follows the sun for optimal energy harvest. Standard for all models is azimuth tracking through rotation around the pipe mast. In the larger models and optionally in the smaller models a variable tilt angle allows ideal production year round.



Compared to passive, tilt and roll trackers, azimuth trackers provide greater stability for large arrays. The corners do not protrude down towards the ground or stick up in the air to catch the wind. The bottom edge of the array always remains parallel to the ground and requires less ground clearance than tilt & roll designs. Wattsun Solar Trackers are available in five different sizes all manufactured in the USA.

DURATRACK™ HZ AXIS TRACKER

The DuraTrack™ HZ axis tracker maximizes the economic payback of a commercial PV installation by reducing initial installation and labor costs, as well as providing reliable long-term operation at a low cost with minimal maintenance. *Contact your sales representative for details.*

DUAL AXIS OPTION

The AZ-225 has dual axis tracking standard. The AZ-125 comes standard with single axis, (azimuth only) but can be ordered with the dual axis option.

Part #	Description
230-0036	Dual Axis Option For AZ-125

MANUAL CONTROLS

Manual Control Option - A switch that disables automatic tracking and allows the owner to move the tracker into position. Most useful for laying the tracker flat in high winds or for dumping accumulated snow.

Part #	Description
230-0038	Manual Control Kit for Field Installation
230-0037	Manual Control Option, Factory Installed

POWER SUPPLIES

The Wattsun Solar Tracker Controller operates at a nominal 24 VDC. That power can be taken directly from a 24 volt battery bank, or with a converter, from a 12 to 48 volt battery bank or use a 120 VAC to 24 VDC converter. We can provide two small modules trickle charging a small battery to provide power. *Contact your sales representative for details.*

Part #	Current	Description	Wattsun Part #
230-0001	DC / DC	Step Down from 48 V to 24 V	48-24-LVC
230-0033	AC / DC	120/240 VAC input to 24 VDC	IDEC PS5R-SF24
230-0034	AC / DC	24 VDC for high voltage water pumping array	DR-4524

SOLAR TRACKER

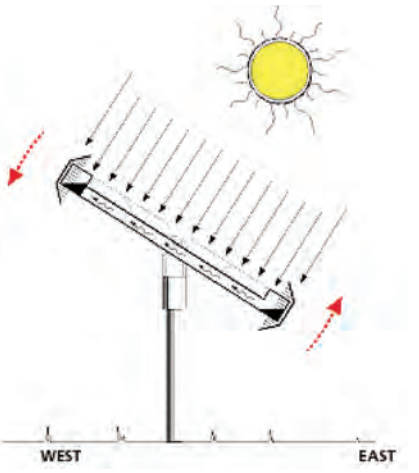
Many different solar panel models share frames and can therefore be mounted in the same tracker.

Part #	Description	Wattsun Part #
230-0003	AZ-125 for 6 Sharp 185 W Modules	AZ-12506SH185
230-0080	AZ-125 for 6 Sharp 198 W Modules	AZ-12506SH198/187
230-0079	AZ-125 for 6 Sharp 200 Series Modules	AZ-12506SH224
230-0151	AZ-125 for 6 SunPower 228 W Modules	AZ-125WSPR22806S
230-0014	AZ-125 for 6 SunTech 175 W Modules	AZ-1256ST175
230-0102	AZ-125 for 8 Sanyo HIP-186DA3 Modules	AZ-1258SA186
230-0005	AZ-125 for 8 Sharp 185 W Modules	AZ-12508SH185
230-0006	AZ-125 for 8 SunPower 220 W Modules	AZ-12508SP220
230-0015	AZ-125 for 8 SunTech 175 W Modules	AZ-1258ST175
230-0087	AZ-125 for 9 Sanyo HIP-205 W Modules	AZ-1259SA205
230-0007	AZ-125 for 9 Sharp 185 W Modules	AZ-12509SH185
230-0016	AZ-125 for 9 SunTech 175 W Modules	AZ-1259ST175
230-0008	AZ-125 for 10 Sharp 123 W Modules	AZ-12510SH123
230-0075	AZ-125 for 12 Kyocera 130 W Modules	W Kyocera 130-12 S
230-0068	AZ-225 for 8 Sharp 216 W Modules	AZ-22508SH216
230-0017	AZ-225 for 9 Sharp 208 W Modules	AZ-22509SH208
230-0154	AZ-225 for 9 Yingli 230 W Modules	AZ-22509YL230
230-0088	AZ-225 for 12 Sanyo 215N W Modules	AZ-22512DA215N
230-0020	AZ-225 for 12 Sharp 185 W Modules	AZ-22512SH185
230-0081	AZ-225 for 12 Sharp 198 W Modules	AZ-22512SH198
230-0021	AZ-225 for 12 Sharp 208 W Modules	AZ-22512SH208
230-0125	AZ-225 for 12 Sharp 235 W Modules	AZ-225SHNU235F1
230-0022	AZ-225 for 12 SunPower 210 W Modules	AZ-22512SP210
230-0101	AZ-225 for 12 SunPower 315 W Modules	AZ-22512SP315
230-0023	AZ-225 for 12 SunTech 175 W Modules	AZ-22512ST175
230-0155	AZ-225 for 12 Yingli 230 W Modules	AZ-22512YL230
230-0011	AZ-225 for 15 Sharp 130 W Modules	AZ-22515SH130
230-0073	AZ-225 for 16 Sanyo 215N W Modules	AZ-22516SA215N
230-0026	AZ-225 for 16 Sharp 185 W Modules	AZ-22516SH185
230-0027	AZ-225 for 16 SunPower 200 Series Modules	AZ-22516SP200
230-0028	AZ-225 for 16 SunTech 175 W Modules	AZ-22516ST175
230-0029	AZ-225 for 18 Sharp 123 W Modules	AZ-22518SH123

EXTENDED WARRANTY

Part #	Description
230-0076	from Standard 2-Year to 5-Year Warranty, Per Tracker

WATTSUN™
SOLAR TRACKERS
By Array Technologies, Inc.



HARDWARE KIT

Part #	For	Finish	Wattsun Part #
230-0044	2 Modules	Stainless Steel	TRKAWSSHW2
230-0048	4 Modules	Stainless Steel	TRKAWSSHW4
230-0049	6 Modules	Stainless Steel	TRKAWSSHW6
230-0050	8 Modules	Stainless Steel	TRKAWSSHW8
230-0051	9 Modules	Stainless Steel	TRKAWSSHW9
230-0039	10 Modules	Stainless Steel	TRKAWSSHW10
230-0040	12 Modules	Stainless Steel	TRKAWSSHW12
230-0041	15 Modules	Stainless Steel	TRKAWSSHW15
230-0042	16 Modules	Stainless Steel	TRKAWSSHW16
230-0043	18 Modules	Stainless Steel	TRKAWSSHW18
230-0045	20 Modules	Stainless Steel	TRKAWSSHW20
230-0046	24 Modules	Stainless Steel	TRKAWSSHW24
230-0047	28 Modules	Stainless Steel	TRKAWSSHW28

MISCELLANEOUS

Part #	Description	Wattsun Part #
230-0126	Azimuth Motor	MHWA-WMOTOR-AZ125-225
230-0127	8 A Voltage Converter	MHWA-X8A
230-0083	Controller Extension Wire Kit	Ex Wire Kit

ZOMEWORKS CORPORATION
Passive Energy Products

UNIVERSAL TRACK RACK™ PASSIVE SOLAR TRACKER FOR PHOTOVOLTAIC MODULES

Incorporating over two decades of experience with tracker design and more than three decades of innovation of new products, Zomeworks has introduced the F-Series Track Rack™ Passive Solar Tracker to their line of UTR Universal Trackers. It features an integral early morning rapid return system, is shipped partially assembled, is easy to install, and it fits all common photovoltaic modules.

PASSIVE TRACKERS

Part #	Description	Zomeworks Part #
230-0055	Passive Tracker UTR-020	UTR-020
230-0066	Passive Tracker UTRK-040	UTRK-040
230-0056	Passive Tracker UTRF-064	UTRF-064
230-0057	Passive Tracker UTRF-090	UTRF-090
230-0059	Passive Tracker UTRF-120	UTRF-120
230-0061	Passive Tracker UTRF-168, includes High Wind Kit standard	UTRF-168-2(+)

FIXED MOUNTS

Part #	# of Modules
240-0414	Roof/Ground Fixed Mount
220-0638	Top of Pole/Fixed Rack
220-0703	Top of Pole/Fixed Rack for 8 BP3230T or YL-23
240-0416	Low Profile Roof/Ground Fixed Mount

ACCESSORIES

Part #	Description	Zomeworks Part #
230-0094	Stainless Steel Marine Bearings	FG-BEARING-MARINE
230-0098	Stainless Steel Hardware	FG-HRDW-UTRF-SS
230-0095	Epoxy primer option	FG-PAINT-EPOXY-TR

EXTRA RAIL SETS

Part #	Description	Zomeworks Part #
230-0134	Option Extra Rail Sets for UTRF-064	FG-RAIL-UTRF-064
230-0137	Option Extra Rail Sets for UTRF-090	FG-RAIL-UTRF-090
230-0135	Option Extra Rail Sets for UTRF-120	FG-RAIL-UTRF-120
230-0136	Option Extra Rail Sets for UTRF-168	FG-RAIL-UTRF-168
230-0139	Option 2 Extra Rail Sets for UTRF-064	FG-RAIL-UTRF-064
230-0142	Option 2 Extra Rail Sets for UTRF-090	FG-RAIL-UTRF-090
230-0140	Option 2 Extra Rail Sets for UTRF-120	FG-RAIL-UTRF-120
230-0141	Option 2 Extra Rail Sets for UTRF-168	FG-RAIL-UTRF-168

HIGH WIND KIT

Part #	Description	Zomeworks Part #
230-0146	Zomeworks, Option High Wind Kit NOT ordered at same time as UTRF- 64, 90,120, includes shocks, mount arm, & hardware	FG-HWU-UTRF
230-0103	Zomeworks, Option High Wind Kit ordered at same time as UTRF- 64, 90,120, includes shocks, mount arm, & hardware	FG-HWO-UTRF
230-0144	Zomeworks, Option High Wind Kit ordered at same time as UTRK- 040, includes hardware	FG-SHOCK-JWF-W HRDW

Easy to install. Shade tolerant. And from a provider you can trust.

> Introducing the Conext™ line of inverters with Fast Sweep™ shade tolerant maximum power point tracking technology.

Schneider Electric Conext

Features:

- Available models: 2.8, 3.3, 3.8, 5.0 kW
- Easy installation
- High efficiency
- Integrated AC/DC disconnects
- Passive cooling
- Shade tolerant Fast Sweep MPPT technology

Make the most of your energy

Schneider Electric provides a complete range of inverters, breakers, disconnects and load centers for a total solar solution.

Download the FREE white paper

"String inverter shade tolerant MPPT technology"

Visit www.SEreply.com | Key Code t222v

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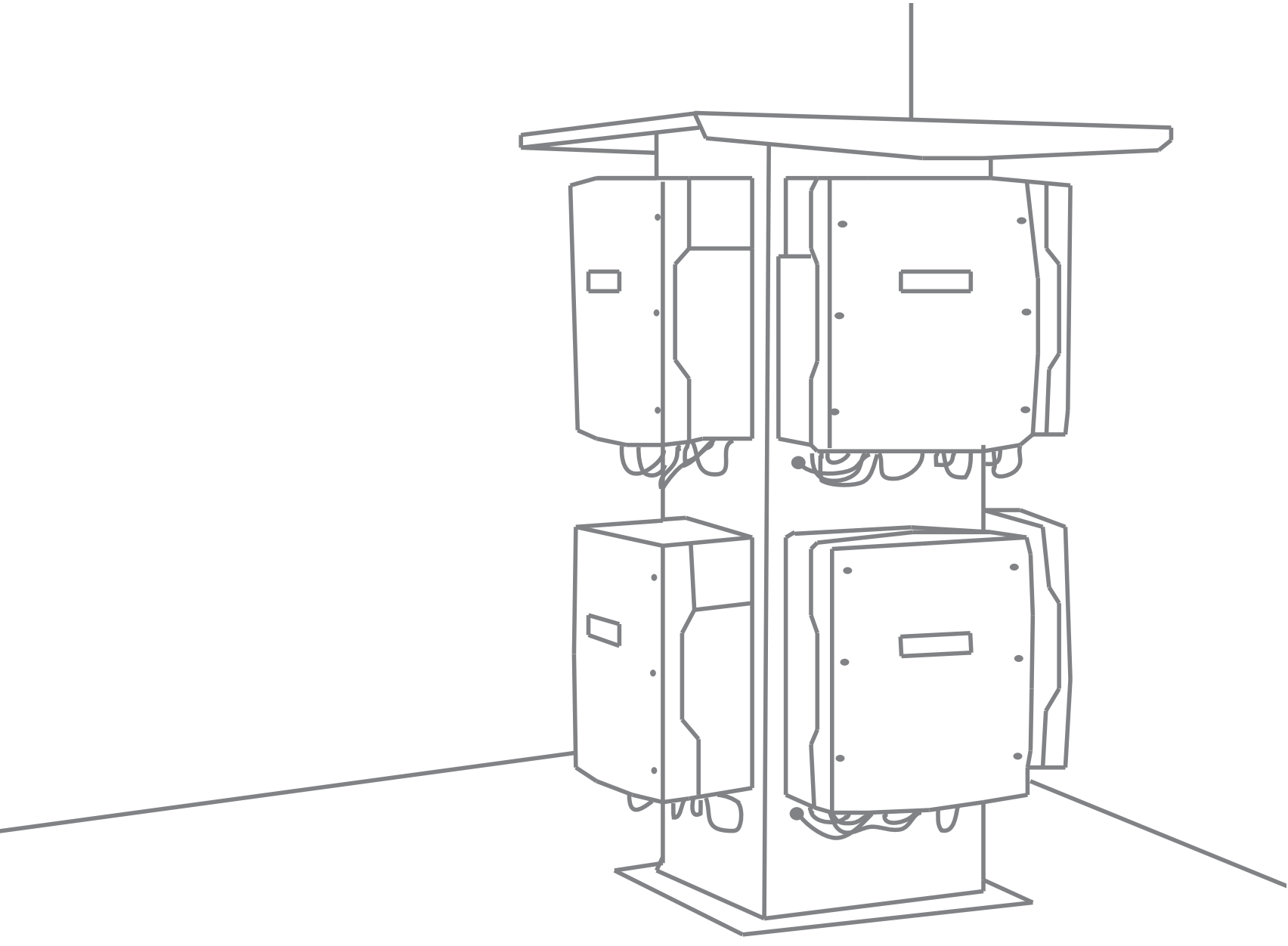
Inverters & Accessories



Soligent

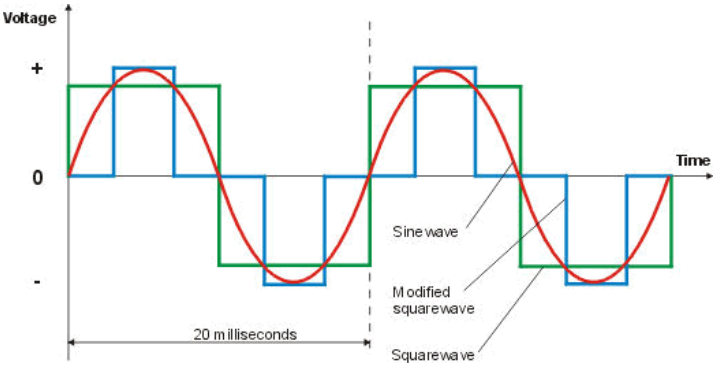
Main Inverter Types

OFF-GRID BATTERY BASED

Typically ranging in size from 500 watts to 5000 watts, off-grid inverters serve remote cabins, homes, barns and other facilities with no access to the public utility grid. Electricity from solar modules or wind turbines is stored in large battery banks from which the inverter draws power when needed.

Off-grid inverters come in two primary varieties:

1. Square wave or modified sine wave (modified square wave)
2. Sine wave (sometimes described as "Pure Sine wave")



SQUARE WAVE OR MODIFIED SINE WAVE

The square wave inverter is the easiest type of inverter to make. The output voltage is switched between maximum positive and negative every half cycle. This results in a wave form with sharp transients or spikes. The modified sine wave form spends a portion of each cycle at zero volts with a higher positive and negative maximum value that more closely matches the peak of the sine wave it is representing. The modified sine wave still has sharp corners or spikes and can cause problems with devices that rely on quick zero crossing transients like light dimmers and motor controllers.

SINE WAVE

The Sine wave form replicates the waveform provided by the utility grid. Most appliances are designed to work with this pure sine wave rather than a modified or square form.

Many AC appliances will work perfectly well with a modified sine wave form wave. Some appliances such as computers, televisions, radios or music centers have built-in power supplies that reduce the voltage, rectify it to produce a DC current, and smooth it to give a steady DC voltage. This process will often smooth out any noise that was in the original AC supply.

However there is the possibility, without a sine wave inverter, that a television picture or computer monitor may exhibit noise bars caused by the voltage spikes from the square wave. Things with a timer (e.g., a bread maker) may not run at the correct speed. Some appliances like microwave ovens rely on the peak voltage of the sine wave and will cook at lower power levels when run from square wave inverters.

There may also be a noise problem. Any equipment that may give a quiet hum when connected to the utility grid, is likely to give a more annoying buzz when using a modified sine wave inverter or square wave inverter. This effect is most prominent in home appliances such as ceiling fans, particularly when running at lower speeds.

These potential problems will need to be balanced against the price difference (modified sine wave inverters will be significantly cheaper than pure sine wave) taking into account the appliances you expect to be using.

GRID-TIED BATTERYLESS

A grid-tied inverter or utility intertie inverter converts DC current from solar modules into AC current and feeds the user's electricity needs directly. To the extent that the solar modules produce more than the user requires, excess power is pushed by the inverter into the public utility grid where it is purchased by the utility company according to local rules and regulations. Grid-tied systems use the utility grid, as the

storage bank, drawing from the grid when necessary and pushing into the grid when there is excess power.

These inverters are designed to typically operate between 200 and 600 volts DC, requiring that solar modules be grouped into strings that combine to reach this voltage window. As a result, grid-tied inverters are also called string inverters. At these voltages, electricity is very dangerous and should be managed in a careful manner.

Because grid-tied inverters cannot handle storage systems such as batteries, grid-tied systems are subject to the weaknesses of the local grid. When the grid goes down the grid-tied solar energy system will stop producing power.

GRID-TIED BATTERY BACKUP

Dual function inverters work both as an off-grid and grid-tied inverter in one box, allowing battery storage for use when the grid goes down, and also pushing power to the grid when the batteries are full and the solar panels are producing excess electricity. These inverters are typically used where there is an unreliable grid that goes down for extended periods of time or in situations where even a short grid blackout is intolerable.

These systems are called Grid-Tied Battery Backup systems and are the most expensive choice for customers wishing to go solar. They necessarily require the expense of both the off-grid and grid-tied systems.

SIZING INVERTERS

Off-grid inverters will necessarily be sized according to the maximum requirements of the home or business of which they serve. The inverter must be able to supply enough power at any given instant to supply the expected combined anticipated draw even if that draw will only occur occasionally. If appliances in the home simultaneously combine to require 4000 watts the inverter must be sized at or above 4000 watts.

Grid-tied inverters on the other hand, are not required to match the simultaneous maximum draw wattage like off-grid inverters must. Instead, the system draws power from the grid when the requirements of the home or business exceed the capability of the inverter. As a result, grid-tied inverters are sized according to the maximum power output of the attached solar modules, which may or may not be near the maximum requirements of the home.

SMA's Sunny Boy Inverters

SMA America is the U.S.-based subsidiary of SMA Solar Technology AG, headquartered in Germany, and provides North America with some of the world's finest inverter, control and monitoring products for renewable energy sources.

With more than 30 years of experience, SMA continues to lead the global solar inverter market with unmatched technological innovation, strong service support and educational programs. SMA is the world leader in solar inverter technology and manufacturing, with subsidiaries on four continents, and takes pride in a product range of inverters compatible with any module and power class, for grid-tied as well as off-grid and backup applications. The Sunny Boy is the world's most popular line of solar inverters. The reasons for this success are straightforward: unmatched versatility, reliability, efficiency and durability. The graduated power classes of this family of inverters provide flexibility in system design, meaning the Sunny Boy is the right solution for any application.

As the world leader of solar inverter technology and manufacturing, SMA stands behind the reliability of the Sunny Boy line for the long term and takes pride in providing customer service that is second to none.

Sunny Boy 5000-US / 6000-US / 7000-US / 8000-US

The Sunny Boy 5000-US, 6000-US, 7000-US and 8000-US inverters are UL certified and feature excellent efficiency. Graduated power classes provide flexibility in system design. Automatic grid voltage detection* and an integrated DC disconnect switch simplify installation, ensuring safety as well as saving time. These models feature galvanic isolation and can be used with all types of modules-crystalline as well as thin-film. Extended operating temperature range to -40 °C available. Please specify when ordering.

Sunny Boy 3000-US / 3800-US / 4000-US

The Sunny Boy 3000-US, 3800-US and 4000-US inverters are designed for countries that require UL certification. Automatic grid voltage detection and an integrated DC disconnect switch simplifies installation, ensuring safety as well as saving time. These models feature galvanic isolation and can be used with all types of modules — crystalline as well as thin-film. The die-cast aluminum enclosure, with the OptiCool active temperature management system, guarantees the highest yields possible and a long service life, even under extreme conditions. The Sunny Boy 3800-US is designed for projects with an output current limit of 16 A.

Some inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

SMA Part #	SB 3000-US	SB 3800-US	SB 4000-US	SB 5000-US	SB 6000-US	SB 7000-US	SB 8000-US
Part # - 10 (no arc fault protection)	310-0031	310-0322	310-0034	310-0035	310-0036	310-0037	310-0190
Part # - 12 (w/ arc fault protection)	310-0394	310-0396	310-0398	310-0400	310-0412	310-0414	310-0416
Input Data (DC)							
Recommended Max PV Power (Module STC)	3750 W	4750 W	208 V: 4375 W 240 V: 5000 W	6250 W	7500 W	8750 W	10000 W
DC Max Voltage	500 V	600 V					
Peak Power Tracking Voltage	208 V: 175 - 400 V 240 V: 200 - 400 V	250 - 480 V	208 V: 220 - 480 V 240 V: 250 - 480 V	250 - 480 V			300 - 480 V
DC Max Input Current	17 A	18 A	18 A	21 A	25 A	30 A	30 A
# of String Inputs	4 (in fused DC disconnect)						
PV Start Voltage	228 V	285 V		300 V			365 V
Output Data (AC)							
AC Nominal Power	3000 W	3800 W	208 V: 3500 W 240 V: 4000 W	5000 W	6000 W	7000 W	8000 W
AC Max Apparent Power	3000 VA	3800 VA	208 V: 3500 VA 240 V: 4000 VA	5000 VA	6000 VA	7000 VA	208 V: N/A 240 V: 7680 VA 277 V: 8000 VA
AC Max Output Current	208 V: 15 A 240 V: 13 A 277 V: N/A	208 V: N/A 240 V: 16 A 277 V: N/A	208 V: 17 A 240 V: 17 A 277 V: N/A	208 V: 24 A 240 V: 21 A 277 V: 18 A	208 V: 29 A 240 V: 25 A 277 V: 22 A	208 V: 34 A 240 V: 29 A 277 V: 25 A	208 V: N/A 240 V: 32 A 277 V: 29 A
AC Nominal Voltage Range	208 V: 183 - 229 V 240 V: 211 - 264 V	211-264 V	208 V: 183 - 229 V 240 V: 211 - 264 V	208 V: 183 - 229 V 240 V: 211 - 264 V 277 V: 244 - 305 V			208 V: N/A
AC Frequency Range	60 Hz / 59.3 Hz - 60.5 Hz (Nominal)						
Power Factor	0.99 (Nominal)						
Max Efficiency	208 V: 96.0% 240 V: 96.5% 277 V: N/A	208 V: N/A 240 V: 96.8% 277 V: N/A	208 V: 96.5% 240 V: 96.8% 277 V: N/A	208 V: 96.7% 240 V: 96.8% 277 V: 96.8%	208 V: 96.9% 240 V: 96.8% 277 V: 97.0%	208 V: 97.1% 240 V: 96.9% 277 V: 97.0%	208 V: N/A 240 V: 96.3% 277 V: 96.5%
CEC Efficiency	208 V: 95.0% 240 V: 95.5% 277 V: N/A	208 V: N/A 240 V: 96.0% 277 V: N/A	208 V: 95.5% 240 V: 96.0% 277 V: N/A	208 V: 95.5% 240 V: 95.5% 277 V: 95.5%	208 V: 95.5% 240 V: 95.5% 277 V: 96.0%	208 V: 95.5% 240 V: 96.0% 277 V: 96.0%	208 V: N/A 240 V: 96.0% 277 V: 96.0%
Mechanical Data							
Dimensions (W x H x D)	18" x 14" x 9"			18.5" x 24" x 9"			
Weight / Shipping Weight	84 lbs / 97 lbs			141 lbs / 147 lbs			145 lbs / 152 lbs
Ambient Temp Range	SBXXXX-US-10: -13 °F to +113 °F SBXXXX-US-12: -40 °F to +113 °F						
Night Pwr Consumption	0.1 W						
Warranty	10-Year (Extended Warranties Available)						
Cooling Concept	OptiCool™ Forced Active Cooling						

SUNNY BOY 2000 HF-US / 2500 HF-US / 3000 HF-US

The new Sunny Boy high frequency inverters are designed for projects requiring UL certification and represent the next step in innovative SMA technology. Featuring world-class efficiency, a slim-line enclosure and reduced weight, the Sunny Boy HF series of inverters can be mounted in between wall studs, making it perfect for new construction or space-constrained retrofits. Installation is made simple by automatic grid detection, field configuration for positive ground modules and a wide input voltage range of 175 V to 600 V, which provides exceptional system design flexibility. A modern graphic display and wireless *Bluetooth*® communication system provides a wealth of data in a user-friendly format.

HIGH YIELDS

- Maximum efficient 97.3%
- The best tracking efficiency with OptiTrac™ MPP tracking
- OptiCool™ active temperature management

SAFE

- Galvanic isolation
- Integrated DC disconnect switch

USER FRIENDLY

- Slim enclosure mounts in between wall studs
- Plug-in grounding with GFDI
- Reduced weight
- Quick and easy configuration thanks to Quick Module

INFORMATIVE

- Modern graphic display & *Bluetooth*® technology

SMA Part #	SB 2000HFUS-30N	SB 2500HFUS-30	SB 3000HFUS-30
Part #	310-0191	310-0192	310-0193
Input Data (DC)			
Max Recommended PV Power (@ module STC)	2500 W	3125 W	3750 W
Max DC Power (@ cos Φ = 1)	2100 W	2600 W	3150 W
Max DC Voltage	600 V		
DC Nominal Voltage	480 V		
MPP Voltage Range	175 V - 480 V	220 V - 480 V	
Min DC Voltage / Start Voltage	175 V / 220 V		220 V / 220 V
Max Input Current / Per String	15 A / 15 A		
Number of MPP Trackers / Fused Strings per MPP Tracker	1 tracker / 2 strings standard, extendable to 3		
Output Data (AC)			
AC Nominal Power	2000 W	2500 W	3000 W
Max AC Apparent Power	2000 VA	2500 VA	3000 VA
Nominal AC Voltage / Adjustable	208 V / 240 V		
AC Voltage Range	208 V: 183 - 229 V / 240 V: 211- 264 V		
AC Grid Frequency / Range	60 Hz / 59.3 - 60.5 Hz		
Max Output Current	208 V: 9.6 A / 240 V: 8.3 A	208 V: 12.0 A / 240 V: 10.4 A	208 V: 14.4 A / 240 V: 12.5 A
Power Factor (cos Φ)	1		
Phase Conductors	1 / 2		
Harmonics	< 4%		
Efficiency			
Max Efficiency	97.3%		
CEC Efficiency	97.0%	96.5%	96.5%
General Data			
Dimensions (W x H x D) / Weight / Disconnect Weight	14" x 29" x 7" including DC disconnect / 51 lbs including DC disconnect		
Operating Temperature Range (full power)	-25 °C to +45 °C		
Internal Consumption at Night	0.8 W		
Topology / Cooling Concept	HF Transformer / OptiCool		
Cooling Concept	OptiCool™ Forced Active Cooling		
Electronics Protection Rating / Connection Area	NEMA 3R / NEMA 3R		
Warranty	10 years standard / 15, 20 year optional		
Certificates and Permits (more available upon request)	UL 1741, UL 1998, IEEE 1547, FCC Part 15 (Class A & B), CSA C22.2 No. 107.1-01		

Transformerless Technology

SUNNY BOY 3000 TL-US / 4000 TL-US / 5000 TL-US

The Sunny Boy 3000TL-US/4000TL-US/5000TL-US represents the next step in performance for UL certified inverters. Its transformerless design means high efficiency and reduced weight. Maximum power production is derived from wide input voltage and operating temperature ranges. Multiple MPP trackers and OptiTrac™ Global Peak mitigate the effect of shade and allow for installation at challenging sites. The unique Secure Power Supply feature provides daytime power in the event of a grid outage. These new inverters meet the 2011 NEC requirements by including arc fault circuit interruption (AFCI) compliant to UL 1699B. High performance, flexible design and innovative features make the Sunny Boy TL-US series the first choice among solar professionals.

SMA Part #	SB 3000TL-US-22	SB 4000TL-US-22	SB 5000TL-US-22
Part #	310-0441	310-0442	310-0443
Input Data (DC)			
DC Max Power (@ cos Φ = 1)	3200 W	4200 W	5300 W
Max DC Voltage	600 V		
MPP Voltage Range	175 - 480 V		
Min DC Voltage / Start Voltage	125 V / 150 V		
Max Input Current / Per MPP Tracker	18 A / 15 A	24 A / 15 A	30 A / 15 A
# of MPP Trackers / Strings Per MPP Tracker	2 / 2		
Output Data (AC)			
AC Nominal Power	3000 W	4000 W	208 V: 4550 W 240 V: 5000 W
Max AC Apparent Power	3000 VA	4000 VA	208 V: 4550 VA 240 V: 5000 VA
Nominal AC Voltage (adjustable)	208 V / 240 V		
AC Voltage Range	208 V: 183 V - 229 V 240 V: 211 V - 264 V	208 V: 183 V - 229 V 240 V: 211 V - 264 V	208 V: 183 V - 229 V 240 V: 211 V - 264 V
AC Grid Frequency / Range	60 Hz / 59.3 Hz - 60.5 Hz		
Max Output Current	15 A	20 A	22 A
Power Factor	1	1	1
Phase Conductors / Connection Phases	1 / 2	1 / 2	1 / 2
Efficiency			
CEC Efficiency / Max Efficiency	208 V: 96% / 96.8% 240 V: 96.5% / 97.1%	208 V: 96% / 96.8% 240 V: 96.5% / 97.2%	208 V: 96% / 96.8% 240 V: 96.5% / 97.1%
General Data			
Dimensions (W x H x D)	19.3" x 20.5" x 7.3"		
DC Disconnect Dimensions (W x H x D)	7.4" x 11.7" x 7.5"		
Weight / DC Disconnect Weight	53 lbs / 8 lbs		
Operating Temp Range	-40 °C to +60 °C / -40 °F to +140 °F		
Noise Emission (typical)	≤ 25 dB (A)	< 25 dB (A)	< 29 dB (A)
Internal Consumption at Night	< 1 W		
Topology	Transformerless		
Cooling Concept	Convection		
Electronics Protection Rating	NEMA 3R		
Certificates and Permits	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN / CSA C22.2 107.1-1		
Features			
Display / Power Supply (Standard)	Graphic Display / Secure Power Supply		
Interfaces (Optional)	RS485 / Webconnect / ZigBee		
Warranty	10 Years standard (15 and 20 Years optional)		

Transformerless Technology SUNNY BOY 6000 TL-US / 7000 TL-US / 8000 TL-US

The new Sunny Boy TL-US Series is UL-listed for North America and features SMA's innovative H5 topology, resulting in superior efficiencies up to 98 percent and unmatched solar yields. The transformerless design reduces weight, increases the speed of payback and provides optimum value for any decentralized, commercial PV system. The Sunny Boy TL-US series is an ideal choice for mid-size and large plants from 24 kWp up to the MW range.

SMA Part #	SB 6000TL-US	SB 6000TL-US-No-CB (no combiner box)	SB 7000TL-US	SB 7000TL-US-No-CB (no combiner box)	SB 8000TL-US	SB 8000TL-US-No-CB (no combiner box)
Part # - 208 V - 10 (no arc fault protection)	-	-	-	-	310-0267	310-0270
Part # - 12 (w/ arc fault protection)	310-0393	310-0395	310-0397	310-0399	310-0413	310-0411
Input Data (DC)						
Rec Max PV Power (Module STC)	7500 W		8750 W		10000 W	
DC Max Power (@ cos Φ = 1)	208 V: 6300 W 240 V: 6200 W		208 V: 7300 W 240 V: 7300 W		208 V: 8400 W 240 V: 8300 W	
Max DC Voltage	600 V					
DC Nominal Voltage	208 V: 345 V 240 V: 379 V					
MPP Voltage Range / Rated Input Voltage	208 V: 300 - 480 V / 345 V 240 V: 345 V - 480 V / 379 V					
Min DC Voltage / Start Voltage	208 V: 300 V / 360 V 240 V: 345 V / 360 V					
Max Input Current / Per String (at DC combiner box)	208 V: 20.9 A / 20.9 A 240 V: 18.1 A / 18.1 A		208 V: 24.4 A / 24.4 A 240 V: 21.1 A / 21.1 A		208 V: 27.9 A / 27.9 A 240 V: 24.1 A / 24.1 A	
# of MPP Trackers / Strings Per MPP Tracker	1 / 6 (@ Combiner Box)					
Output Data (AC)						
AC Nominal Power	6000 W		7000 W		8000 W	
Max AC Apparent Power	6000 VA		7000 VA		8000 VA	
AC Voltage Range	208 V: 183 V - 229 V 240 V: 211 V - 264 V					
AC Grid Frequency / Range	60 Hz / 59.3 Hz - 60.5 Hz					
Max Output Current	208 V: 28.8 A 240 V: 25 A		208 V: 33.7 A 240 V: 29.2 A		208 V: 38.5 A 240 V: 33.4 A	
Power Factor	1					
Phase Conductors / Connection Phases	1 / 2					
Efficiency						
CEC Efficiency / Max Efficiency	208 V: 98% / 98.6% 240 V: 98.5% / 98.7%				208 V: 98% / 98.6% 240 V: 98% / 98.6%	
General Data						
Dimensions (W x H x D)	18.4" x 24.1" x 9.5"					
DC Disconnect Dimensions (W x H x D)	7.28" x 11.7" x 7.5"					
Weight / DC Disconnect Weight	78 lbs / 8 lbs					
Operating Temp Range	-40 °C to +60 °C / -40 °F to +140 °F					
Noise Emission (typical)	≤ 46 dB (A)					
Internal Consumption at Night	0.15 W					
Topology	Transformerless H5					
Cooling Concept	OptiCool					
Protection Rating / Connection Area	NEMA 3R / NEMA 3R					
Certificates and Permits	UL1741,UL1998, IEEE 1547, FCC Part 15 (Class A & B), CSA C22.2 No. 107.1-2001 (more available upon request)					
Features						
Display (Standard)	Text Line Display					
Interface (Optional)	RS485 / Bluetooth					
Warranty	10-yr standard (15 and 20-yr optional)					

Transformerless Technology

SUNNY BOY 9000 TL-US / 10000 TL-US / 11000 TL-US

SMA Part #	SB 9000TL-US	SB 9000TL-US-No-CB (no combiner box)	SB 10000TL-US	SB 10000-US-No-CB (no combiner box)	SB 11000TL-US	SB 11000-US-No-CB (no combiner box)
Part # - 208 V - 10 (no arc fault protection)	310-0268	310-0271	310-0269	310-0272	-	-
Part # - 12 (w/ arc fault protection)	310-0417	310-0415	310-0419	310-0421	310-0401	310-0402
Input Data (DC)						
Rec Max PV Power (Module STC)	11250 W		12500 W		13750 W	
DC Max Power (@ cos Φ = 1)	208 V: 9400 W 240 V: 9300 W		208 V: 10500 W 240 V: 10350 W		11500 W	
Max DC Voltage	600 V					
DC Nominal Voltage	208 V: 345 V 240 V: 379 V				- 240 V: 379 V	
MPP Voltage Range / Rated Input Voltage	208 V: 300 - 480 V / 345 V 240 V: 345 V - 480 V / 379 V				- 240 V: 345 V - 480 V / 379 V	
Min DC Voltage / Start Voltage	208 V: 300 V / 360 V 240 V: 345 V / 360 V				- 240 V: 345 V / 360 V	
Max Input Current / Per String (at DC combiner box)	208 V: 31.4 A / 31.4 A 240 V: 27.1 A / 27.1 A		208 V: 35 A / 35 A 240 V: 30.2 A / 30.2 A		- 240 V: 33.3 A / 33.3 A	
# of MPP Trackers / Strings Per MPP Tracker	1 / 6 (@ Combiner Box)					
Output Data (AC)						
AC Nominal Power	9000 W		10000 W		11000 W	
Max AC Apparent Power	9000 VA		10000 VA		11000 VA	
AC Voltage Range	208 V: 183 V - 229 V 240 V: 211 V - 264 V				- 240 V: 211 V - 264 V	
AC Grid Frequency / Range	60 Hz / 59.3 Hz - 60.5 Hz					
Max Output Current	208 V: 43.3 A 240 V: 41.7 A		208 V: 48.1 A 240 V: 41.7 A		- 240 V: 45.8 A	
Power Factor	1					
Phase Conductors / Connection Phases	1 / 2					
Efficiency						
CEC Efficiency / Max Efficiency	208 V: 98% / 98.6% 240 V: 98% / 98.7%		208 V: 97.5% / 98.6% 240 V: 98% / 98.7%		- 240 V: 98% / 98.7%	
General Data						
Dimensions (W x H x D)	18.4" x 24.1" x 9.5"					
DC Disconnect Dimensions (W x H x D)	7.28" x 11.7" x 7.5"					
Weight / DC Disconnect Weight	78 lbs / 8 lbs					
Operating Temp Range	-40 °C to +60 °C / -40 °F to +140 °F					
Noise Emission (typical)	≤ 46 dB (A)					
Internal Consumption at Night	0.15 W					
Topology	Transformerless H5					
Cooling Concept	OptiCool					
Protection Rating / Connection Area	NEMA 3R / NEMA 3R					
Certificates and Permits	UL1741,UL1998, IEEE 1547, FCC Part 15 (Class A & B), CSA C22.2 No. 107.1-2001 (more available upon request)					
Features						
Display (Standard)	Text Line Display					
Interface (Optional)	RS485 / Bluetooth					
Warranty	10-yr standard (15 and 20-yr optional)					

SHIFTING THE LIMITS

Fronius IG Plus V and IG Plus Advanced (With Integrated AFCI)

Grid Connected PV Inverter

Maximum Energy Harvest. Cloudy or Clear. Reliable. Proven. Smart.

An outstanding addition to the family: The Fronius IG Plus V inverter builds on a successful model with multiple enhancements, including maximum power harvest, a built-in six circuit string combiner, an integrated external lockable DC disconnect, significantly improved efficiency, and unbeatable reliability. New, larger power stages expand the proven Fronius IG family from 2 to 12 kW in a single inverter.

FEATURES

- All Fronius inverters have been certified by CSA for use in the US and Canada
- Smart, integrated MIX™ technology to maximize energy harvest even on cloudy days
- Significantly improved efficiency
- Integrated and lockable DC disconnect
- Built in six-circuit string combiner
- Field programmable to 208, 240 and 277 volts*

*note: The IG Plus V 10.0-3 and 11.4-3 Delta are compatible for 208, 208/ 120, and 240 Volt service. The IG Plus V 12.0-3 Wye only works on 277 Volts (the wye portion of a 480/ 277)

FRONIUS IG PLUS ADVANCED INVERTER WITH INTEGRATED AFCI

The Fronius IG Plus Advanced is the first complete inverter lineup of the NEC 2011 compliant AFCI protected inverters in the United States. Power classes ranging from 3 to 12 kW in both single and true 3 phase applications with integrated Fronius MIX Technology and wide voltage windows are the perfect match for your system design.

Fronius IG Plus V 3.0-1$_{uni}$-3.8-1$_{uni}$

The smallest size inverter in the Fronius IG Plus family. Available in 3.0 and 3.8 kW. Best suited for smaller solar applications, e.g., residential and smaller commercial applications.

Fronius IG Plus V 5.0-1$_{uni}$, 6.0-1$_{uni}$, 7.5-1$_{uni}$

This two power stage inverter is available in 5.0, 6.0 and 7.5 kW and is field programmable to 208, 240 or 277 volts. Best suited for residential and smaller commercial applications.

Fronius IG Plus V 10.0-1$_{uni}$, 10.0-3$_{Delta}$, 11.4-1$_{uni}$, 11.4-3$_{Delta}$, 12.0-3$_{WYE277}$

This three power stage inverter is available in 10.0, 11.4 single or three phase and 12.0 kW three phase. Best suited for large residential and commercial applications.

Inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

Fronius IG Plus V and IG Plus Advanced
Featuring Integrated Arc Fault Protection (AFCI)

SHIFTING THE LIMITS

Fronius IG Plus V	3.0-1$_{UNI}$	3.8-1$_{UNI}$	5.0-1$_{UNI}$	6.0-1$_{UNI}$	7.5-1$_{UNI}$	10.0-1$_{UNI}$	11.4-1$_{UNI}$	10.0-3$_{Delta}$	11.4-3$_{Delta}$	12.0-3$_{WYE277}$
Part # - (no arc fault protection)	310-0305	310-0306	310-0307	310-0308	310-0309	310-0311	310-0275	310-0335	310-0312	310-0310
Part # - (with arc fault protection)	310-0427	310-0428	310-0429	310-0430	310-0431	310-0432	310-0434	310-0433	310-0435	310-0436
Input Data										
Recommended PV-Power (kWp)	2.50-3.45	3.20-4.40	4.25-5.75	5.10-6.90	6.35-8.60	5.50-11.50	9.70-13.10	8.50-11.50	9.70-13.10	10.20-13.80
MPPT-Voltage Range	230 - 500 V									
DC Startup Voltage	260 V									
Max Input Voltage	600 V									
Nominal Input Current	8.3 A	10.5 A	13.8 A	16.5 A	20.7 A	27.6 A	31.4 A	27.6 A	31.4 A	33.1 A
Max Usable Input Current	14.0 A	17.8 A	23.4 A	28.1 A	35.1 A	46.7 A	53.3 A	46.7 A	53.3 A	56.1 A
Admissible Conductor Size (DC)	#14 - 6 AWG									
Number of DC Input Terminals	6									
Max Current per Input Terminal	20 A (Bus Bars available for higher input currents, 2 per inverter)									
Output Data										
Nominal Output Power (PAC nom)	3000 W	3800 W	5000 W	6000 W	7500 W	9995 W	11400 W	9995 W	11400 W	12000 W
Max Continuous Output Power	3000 W	3800 W	5000 W	6000 W	7500 W	9995 W	11400 W	9995 W	11400 W	12000 W
Nominal AC Output Voltage	208 / 240 / 277							208 / 240		480 / 277 WYE
AC Voltage Range 208 V	183 - 229 V (-12 / +10%)									
AC Voltage Range 240 V	211 - 264 V (-12 / +10%)									
AC Voltage Range 277 V	244 - 305 V (-12 / +10%)									
Max Output Current 208 V	14.4 A	18.3 A	24.0 A	28.8 A	36.1 A	48.1 A	54.8 A	27.7 A	31.6 A*	N/A
Max Output Current 240 V	12.5 A	15.8 A	20.8 A	25.0 A	31.3 A	41.7 A	47.5 A	24.0 A	27.4 A*	N/A
Max Output Current 277 V	10.8 A	13.7 A	18.1 A	21.7 A	27.1 A	36.1 A	41.2 A	N/A	N/A	14.4 A*
Admissible Conductor Size (AC)	#14 - 4 AWG									
Max Utility Back Feed Current	0 A									
Nominal Output Frequency	60 Hz									
Operating Frequency Range	59.3 - 60.5 Hz									
Total Harmonic Distortion	< 3%									
Power Factor	0.85 - 1 ind. / cap.									
General Data										
Max. Efficiency	96.20%									
CEC Efficiency 208 V	95.0%	95.0%	95.5%	95.5%	95.0%	95.0%	95.0%	95.5%	95.0%	N/A
CEC Efficiency 240 V	95.5%	95.5%	95.5%	96.0%	95.5%	95.5%	95.5%	95.5%	96.0%	N/A
CEC Efficiency 277 V	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%	N/A	N/A	96.0%
Consumption in Standby (night)	< 1.5 W									
Consumption During Operation	8 W		14 W			20 W				
Cooling	Controlled forced ventilation, variable fan speed									
Enclosure Type	NEMA 3R									
Unit Dimensions (W x H x D)	17.1" x 26.5" x 9.9"		17.1" x 38.1" x 9.9"			17.1" x 49.7" x 9.9"				
Power Stack Weight	31 lbs (14 kg)		57 lbs (26 kg)			84 lbs (38 kg)				
Wiring Compartment Weight	24 lbs (11 kg)		24 lbs (11 kg)			26 lbs (12 kg)				
Admissing Ambient Operating Temp	-13 °F to +131 °F (-25 °C to + 55 °C)									
Compliance	UL1741-2010, IEEE1547-2003, IEEE1547.1, UL1699B-2013, ANSI/IEEE C62.41, FCC Part 15 A & B, NEC Article 690, C22.2 No. 107.1-01 (Sept. 2001), CA Solar Initiative-Program Handbook-Appendix C: Inverter Integral 5% Meter Performance Specification									
Safety Equipment										
Ground Fault Protection	Internal GFDI (Ground Fault Detector/ Interrupter) in accordance with UL 1741-2010 and NEC Art. 690									
DC Reverse Polarity Protection	Internal diode									
Islanding Protection	Internal; in accordance with UL 1741-2010, IEEE 1547-2003 and NEC									
Over Temp	Output power de-rating/ active cooling									

*per Phase

SHIFTING THE LIMITS

The Fronius IG

Grid Connected PV Inverter

Fronius IG 2000/3000/2500-LV/4000/5100/4500-LV

The IG has gained broad market acceptance due to its advanced High Frequency technology which offers high efficiency, precision MPP-tracking, and active cooling, all of which result in superior energy production from photovoltaic systems.

Fronius IG	IG 2000	IG 3000	IG 2500-LV	IG 4000	IG 5100	IG 4500-LV
Part #	310-0000	310-0002	310-0001	310-0003	310-0005	310-0004
DC Input Data						
Recommend PV Power (Wp)	1500 - 2400	2100 - 3300	1800 - 2700	3000 - 4800	4000 - 6300	3500 - 5300
Max DC Input Voltage	500 V					
Operating DC Voltage Range	150 - 450 V					
Max Usable DC Input Current	13.6 A			26.1 A	33.2 A	29.3 A
AC Output Data						
Max Output Power @ 40 °C	2000 W	2700 W	2350 W	4000 W	5100 W	4500 W
Nominal AC Output Voltage	240 V	240 V	208 V	240 V	240 V	208 V
Utility AC Voltage Range	212 - 264 V (240 V + 10% /-12%)		183 - 227 V	212 - 264 V (240 V + 10% / -12%)		183 - 229 V
Max AC Current	8.3 A	11.3 A	11.3 A	16.7 A	21.3 A	21.6 A
Max Back Feed Current	0 A					
Operating Frequency Range	59.3 - 60.5 Hz (60 Hz Nominal)					
Total Harmonic Distortion	< 5%					
Power Factor (cos phi)	1					
General Data						
Max Efficiency	95.2%	95.2%	94.4%	95.2%	95.2%	94.4%
CEC Efficiency	93.5%	94.0%	93.0%	94.0%	94.5%	93.5%
Consumption in Stand-By	< 0.15 W (night)					
Consumption in Operation	7 W			15 W		
Enclosure	NEMA 3R					
Dimensions (L x W x H)	18.5" x 16.5" x 8.7" (470 x 418 x 223 mm)			28.3" x 16.5" x 8.7" (720 x 418 x 223 mm)		
Weight	26 lbs (11.8 kg)			42 lbs (19 kg)		
Ambient Temp Range	-13 °F to 122 °F (-25 °C to +50 °C)					
Cooling	Controlled Forced Ventilation					
Disconnects	Standard UL Approved DC & AC disconnects					
Protections						
Ground Fault Protection	Internal GFDI, in accordance with UL 1741-2010 & NEC Art. 690					
DC Reverse Polarity	Internal diode					
Islanding Protection	Internal, in accordance with UL 1741-2.5, IEEE 1547-2003 & NEC					
Over Temp	Output power de-rating / active cooling					
Surge Protection	Internal DC & AC protection to 6 kV					
Compliance	UL 1741-2010, IEEE 1547-2003, IEEE 1547.1, ANSI/ IEEE C62.41, FCC Part 15 A & B, NEC Article 690, C22.2 No. 107.1-01 (Sept. 2001), California Solar Initiative - Program Handbook - Appendix C: Inverter Integral 5% Meter Performance Specification					
Miscellaneous						
Max AC Over Current Protection	Two-pole, 15 / 20 A circuit breaker			Two-pole, 30 A circuit breaker		
AC Wire Sizing	#14 - 6 AWG					
DC Wire Sizing	#14 - 4 AWG					
AC Disconnect	16 A			32 A		
DC Disconnect	25 A			40 A		

FEATURES

- Graphic Display & User Interface
- Lightweight
- Integrated DC/AC Disconnects
- High Frequency (HF) Technology
- Wide Input Voltage Range
- Intelligent Thermal Management

SHIFTING THE LIMITS

INVERTER-SPECIFIC MONITORING

DATALOGGER WEB WITH WLAN

Fronius Datalogger Web, featuring an output connection to the customer's Local Area Network has been updated to offer a Wireless adapter. It functions like your own small web server that automatically converts system data into a website. The Fronius Datalogger website can be accessed by several users simultaneously via any common browser independent of the operating system both wired and wirelessly. This enables you to get real-time system information for up to 100 inverters whenever you want. The datalogger web can also upload system data to the free online portal for remote monitoring of Fronius PV systems.

WLAN sticks are used for integrating the Fronius Datalogger Web into existing wireless networks. The WLAN stick is configured using the Fronius Datalogger Web website. WLAN sticks are available for both indoor and outdoor use.

Part #	Description	Fronius Part #
501-0061	Datalogger Web Box, Ethernet Interface with new WLAN features	4,240,123
570-0814	WLAN USB stick	41,0018,0070
570-0815	Industrial Grade WLAN USB Adapter	41,0018,0071

INTERFACE BOX

Enables a user to output data into an open protocol for a system of anywhere between 1 and 100 Fronius Inverters. This data could then be used by third-party sources for different monitoring options.

Part #	Description	Fronius Part #
570-0069	Interface Box, Open Protocol for 3rd Party Monitoring, for 1 to 100 Inverters	4,240,109

MODBUS CARD

The Fronius Modbus Card converts PV system data to the standardized Modbus RTU – SunSpec protocol allowing easy integration with third-party monitoring systems. It works with Fronius IG, Fronius IG Plus and Fronius CL inverters and does not require the COM Card or datalogger.

Part #	Description	Fronius Part #
570-1035	Modbus Card for SunSpec RS485 protocol	4,240,021,Z

COM CARD, RETROFIT

The COM Card is the inverter's voice in the DATCOM system and works with all Fronius inverters (IG, IG Plus, or CL). It provides the power supply to other Fronius DATCOM components and handles communication to all devices within the monitoring system. Fronius IG Plus and Fronius CL inverters can output the open interface protocol via the Fronius Com Card.

Part #	Description	Fronius Part #
570-0001	COM Card Retrofit	4,240,001,Z

SMART CONVERTER RS232 BOX/CARD

Interface converter is used for converting the RS 422 interface into an RS 232 interface. The interface converter allows third-party components to be used for the professional monitoring of PV systems. It converts the Fronius DATCOM system RS 422 interface into an RS 232 hardware interface. The software protocol (Fronius Solar Net or Interface Protocol) is not converted. This device is compatible with the Fronius IG Plus and CL series inverters only.

Part #	Description	Fronius Part #
570-0818	Smart Converter RS232 Box/ Card	4,240,118

FRONIUS CONVERTER USB

The Converter USB makes it easy to use third-party components for professional system monitoring. It converts the Fronius DATCOM system RS 422 interface into a USB hardware interface. There is no conversion of the software protocol. This can be selected directly via the inverter display. This device is compatible with the IG Plus and CL inverters but not the IG series

Part #	Description	Fronius Part #
570-0819	Converter USB	4,240,119
570-0817	Smart Converter RS-232 Card Retrofit	4,240,018,Z

TERMINATION PLUG

Part #	Description	Fronius Part #
370-0057	RJ45 DatCom Termination Plug	43,0003,0812

9 POLE-6.5 FT NULL MODEM INTERFACE CABLE RS232

Part #	Description	Fronius Part #
570-0077	Null Modem Interface Cable, RS-232, 9 Pin-6.5 ft	43,0004,1692

CABLE, INTERFACE, 26 AWG/ 3.3 FT/ CAT5

Part #	Description	Fronius Part #
570-0078	Cable Interface, 26 AWG, 3.3', CAT5	43,0004,2435

DATCOM POWER SUPPLY

Part #	Description	Fronius Part #
570-0075	DATCOM Power Supply	43,0001,1211

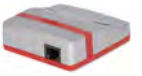
SHIFTING THE LIMITS

INVERTER-SPECIFIC MONITORING CONTINUED

FRONIUS PERSONAL DISPLAY DL

The Fronius Personal Display DL delivers PV system performance data. It is easy to install in any room in the building, from where it continuously provides the latest data – for up to 15 inverters. Data transfer from the inverter to the display is via a wireless connection.

FRONIUS PERSONAL DISPLAY DL WIRELESS TRANSMITTER BOX



Transfers data wirelessly between the Personal Display DL and the inverter. The Fronius Personal Display DL Box has a memory which retains system data, even if the wireless connection is terminated.

Part #	Description	Fronius Part #
570-0934	Wireless LCD Display and Datalogger, Micro USB port and power supply	4,240,133
570-0935	Wired DatCom to Wireless transmitter, NEMA 1	4,240,137

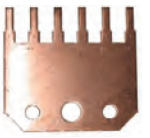
FRONIUS WIRELESS CARD

Transfers data wirelessly to the Fronius Personal Display DL by inserting the card into the inverter. The accompanying antenna can be mounted either directly to the inverter or close to it. The wireless card only provides real-time data and does not work with the Personal Display DL datalogger.

Part #	Description	Fronius Part #
570-0005	Wireless Remote Card, for 208/ 240 VAC only	4,240,008,Z

ACCESSORIES

FRONIUS BUS BAR FOR IG PLUS & IG PLUS V



These bars are required when the combined short circuit current X 1.25 exceeds 20 Amps. Please order in quantity of 2 per inverter.

Part #	Description	Fronius Part #
370-0025	IG Plus String Input Combiner, 6 inputs to 1	42,0201,2923

WARRANTY EXTENSIONS TO 15 OR 20 YEARS

Part #	For	Fronius Part #
350-0186	IG2000, IG2500LV and IG3000, 5 Yr (15 Yrs total)	41,200,126
350-0187	IG4000, IG4500LV and IG5100, 5 Yr (15 Yrs total)	41,200,127
350-0344	All CL Inverters, 5 Year Extension (10 years total)	41,200,120
350-0325	All CL Inverters, 15 Year Extension (20 years total)	41,200,121
350-0307	IG Plus & IG Plus V (3.0, 3.8), 10 Yr (20 Yrs total)	41,200,130
350-0306	IG Plus & IG Plus V (5.0, 6.0, 7.5), 10 Yr (20 Yrs total)	41,200,131
350-0308	IG Plus & IG Plus V (10.0, 11.4, 12.0) 10 Yr (20 Yrs total)	41,200,132

ENVIRONMENTAL MONITORING

FRONIUS SENSOR BOX

With the Fronius Sensor Card/Box, sensors for measuring irradiation, ambient temperature, module temperature, wind speed, etc. can be integrated into the Fronius DATCOM system.

Part #	Description	Fronius Part #
570-0067	Sensor Box, 1 Irradiance, 2 Temperature, 2 Digital and 1 Standard 20 ma i/f	4,240,104

SENSOR CARD

Sensor card functions the same as a SensorBox, but is located inside the inverter in the plug-and-play section. Features the same six sensor input channels for use within DATCOM System.

Part #	Description	Fronius Part #
570-0004	Sensor Card, Features the same 6 Sensor Input Channels Use with DATCOM System	4,240,004,Z

OPTIONAL ENVIRONMENTAL SENSORS

SENSOR, MODULE TEMPERATURE

- SensorBox / Card compatible
- Type PT1000

Part #	Description	Fronius Part #
570-0074	Sensor, Module Temperature, Type PT1000, SensorBox, Card Compatible	43,0001,1190

SENSOR, WIND SPEED

- SensorBox / Card compatible
- Digital output

Part #	Description	Fronius Part #
570-0071	Sensor, Wind Speed, Digital Output	42,0411,0027

SENSOR, AMBIENT TEMPERATURE

- SensorBox / Card compatible
- Type PT1000

Part #	Description	Fronius Part #
570-0072	Sensor, Ambient Temperature, Type PT1000	43,0001,1188

SENSOR, IRRADIANCE

- Sensor Box / Card compatible
- 0-100mv output

Part #	Description	Fronius Part #
570-0073	Sensor, Irradiance, 0-100mv Output, Sensor Box, Card Compatible	43,0001,1189

POWER-ONE

Power-One is a US based company headquartered in Camarillo, CA with manufacturing in Phoenix, AZ. They offer a full range of photovoltaic and wind products from small residential units up to large utility-grade units.

PVI SERIES DUAL-MPPT TRANSFORMERLESS INVERTERS

The revolutionary switching technology utilized in the Aurora inverter includes state-of-the-art for silicon Power Devices such as CoolMOS™ and Insulated Gate Bi-Polar Transistors (IGBTs) to reduce switching losses. Aurora has been designed with large de-rating criteria on all critical components, achieving an extremely robust and reliable inverter designed to last for 25 years and to deliver true maximum output power on a continuous basis.

With this design concept, peak efficiencies of over 97% are achieved. Total current harmonic distortion, on the other hand, is typically less than 2% for all the single phase inverters through the use of high-frequency switching techniques.

Power-One Part #	PVI-3.0-OUTD US & S-US	PVI-3.6-OUTD US & S-US	PVI-4.2-OUTD US & S-US	PVI-5000-OUTD-US	PVI-6000-OUTD-US
Part #	310-0076	310-0078	310-0080	-	-
Part # (w/ DC Switch)	310-0077	310-0079	310-0081	310-0009	310-0010
Part # (w/ arc fault protection)	310-0459	310-0458	310-0456	310-0455	310-0454
Rated Output Power	3000 W	3600 W	4200 W	5000 W	6000 W
Peak Efficiency	96.9%	97.0%		97.1%	
CEC Efficiency	208 V / 240 V / 277 V: 96%			208 V: 96% 240 V / 277 V: 96.5%	
Start-up Input Voltage	200 V (adj 120 - 350 V)				
Operating Input Range	0.7 x V start to 580 V				
DC Max Input Voltage	600 V				
Independent MPPT	2				
AC Nominal Voltage	208 V / 240 V / 277 V				
Phase Supply	1 Φ / Split Phase				
Grid Frequency	60 Hz				
AC Max Output Current 208 V	14.5 A	17.2 A	20 A	27 A	30 A
AC Max Output Current 240 V	14.5 A	16 A	20 A	23 A	28 A
AC Max Output Current 277 V	12 A	16 A	20 A	20 A	24 A
Inverter Direct Data Monitoring	Optional				
Outdoor Rated Enclosure	NEMA 4X				
Dimensions with Int Disc Switch (H x W x D)	33.8" x 12.8" x 8.7"			41.4" x 12.8" x 8.7"	
Warranty	10 year standard / Extended optional				
Weight	< 38.5 lbs			< 59.5 lbs	
Cooling System	Natural Convection				
Operating Temp Range	-13 °F to +140 °F				
Compliance	UL 1741, CSA-C22.2 N.107.1-01, IEEE 1547				

PVI SERIES DUAL-MPPT ISOLATED INVERTERS WITH GFDI (3-PHASE)

Power-One Part #	PVI-10.0-I-OUTD		PVI-12-I-OUTD	
	208 V	480 V	208 V	480 V
Part # - S	310-0385	330-0313	-	-
Part # - S1 (AC Switch)	310-0259	310-0260	-	310-0438
Part # - S2 (DC / AC Switch)	310-0362	330-0269	-	310-0324
Rated Output Power	10 kW		12 kW	
Peak Efficiency	97.3%			
CEC Efficiency	97.0%			
Start-up Input Voltage	200 V (adj 120 - 350 V)			
Operating Input Range	0.7 x V start to 520 V			
DC Max Input Voltage	520 V			
Independent MPPT	2			
Phase Supply	3 Φ			
Grid Frequency	60 Hz			
AC Max Output Current	30.0 A (3 Φ / 3 W or 4 W + Ground) 14.0 A (3 Φ / 3 W + 4 W + Ground)			
Outdoor Rated Enclosure	NEMA 4X			
Dimensions (H x W x D)	28.2" x 25.4" x 8.7"		37.7" x 25.4" x 8.7"	
Warranty	10 year standard/ Extended optional			
Weight (lbs)	101 (S) 107 (S1) 114 (S2)			
Cooling System	Natural Convection			
Operating Temp Range	-13 °F to +140 °F			
Compliance	UL 1741, CSA-C22.2 N.107.1-04/ N.107.1-05/ N.107.1-06, IEEE 1547			

Some inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

power-one®
Changing the Shape of Power

NEW! POWER-ONE AURORA 250 & 300 W MICRO-INVERTERS

The new Aurora 250 & 300-watt micro-inverter product offers something new to Power-One customers. The ability to individually link all modules within a specific installation is an alternative to the traditional Power-One Aurora string inverters

Micro-inverters have some advantages over string inverters. They allow you to control the panels output individually and offer Maximum Power Point Tracking (MPPT) for each single module. They also allow you to control individual panels in different ways and reduce the losses in efficiency in a variety of challenging conditions.

Power-One Part #	MICRO-0.25-I-OUTD-US-208/240		MICRO-0.3-I-OUTD-US-208/240	
Part #	321-0180		321-0181	
Nominal Output Power	250 W		300[1] W	
Rated AC Voltage	208 V	240 V	208 V	240 V
Max Output Power	250 W		300 W	
Input Side (DC)				
Max Input Power	265[2] Wp		320[2] Wp	
Max Voltage	65 V			
Start-Up Voltage	25 V			
MPPT Voltage Range	25 V - 60 V		30 V - 60 V	
Operating Voltage Range	12 - 60 V			
Max Usable Current	10.5 A			
Max Short Circuit Current Limit	12.5 A			
DC Connection Type	Amphenol H4 (MC4 compatible) PV connector			
Output Side (AC)				
Grid Connection Type	1 Φ / 2 W	Split - Φ / 3 W	1 Φ / 2 W	Split - Φ / 3 W
Grid Wiring Termination Type	12 AWG Drop Cable from Inverter to 10 AWG AC Trunk Cable			
Adjustable Voltage Range	183 V - 228 V	211 V - 264 V	183 V - 228 V	211 V - 264 V
Grid Frequency	60 Hz			
AC Max Output Current	1.20 A	1.04 A	1.44 A	1.25 A
Power Factor	> 0.95			
Efficiency				
Maximum Efficiency	96.5%			
CEC Efficiency	96%			
Environmental Specifications				
Operating Temperature Range	-40 °F to +167 °F (-40 °C to +75 °C) with derating above 149 °F (65 °C)			
Storage Temperature Range	-40 °F to +167 °F (-40 °C to +75 °C)			
Noise Emission	< 30 db (A) @ 1m			
Mechanical Specifications				
Enclosure Rating	NEMA 4X			
Cooling System	Natural Convection			
Dimensions (H x W x D)	10.5" x 9.7" x 1.37"			
Weight	< 3.5 lbs (1.65 kg)			
General Specifications				
Warranty	10 year standard			
Safety and EMC Standard	UL1741, EN61000-6-2, EN61000-6-3, FCC Part 15			
Safety Approval	$_{c}$CSA$_{us}$			

[1]With derating below 200V for 208VAC operation
[2]This is the maximum power that the inverter will utilize. It does not define the maximum power rating for the PV module.

AURORA CDD

The AURORA CDD connects your PV System to the Internet in a simple and quick way. It uses wireless communication to monitor each micro-inverter and panel optimizer without additional wiring. Through the free web-based portal, you can view the daily and historical photovoltaic production.

Part #	Description	Power-One Part #
570-1038	Wireless Communication Datalogger Gateway	PVI-CDD
360-0260	Optional 15 meters coax extension cable for CDD antennas	MOBILE-MARK-CABLE-ASSY-C25-26-15L

AC TRUNK CABLES

Part #	Description	Qty	Power-One Part #
360-0257	1-Ph (4-Wire) 14.6 mm OD, Continuous length in Portrait (41"), 10 AWG	1	AC-TRUNK-SPOOL-41INCHES-50PLUGS
360-0258	1-Ph (4-Wire) 14.6 mm OD, Continuous length in Landscape (67"), 10 AWG	1	AC-TRUNK-SPOOL-67INCHES-32PLUGS
360-0259	1-Ph (4-Wire) 14.6 mm OD, Continuous length in Landscape (81"), 10 AWG	1	AC-TRUNK-SPOOL-81INCHES-27PLUGS

ACCESSORIES FOR AC TRUNK CABLES

Part #	Description	Qty	Power-One Part #
360-0268	End Cap Branch Terminator	1	AC-TRUNK-END-CAP
370-0080	Unlock and Disconnect Tool	1	AC-TRUNK-UNLOCK-TOOL
360-0269	Water Tight Cap	1	AC-TRUNK-PLUG-CAP

power-one®
Changing the Shape of Power

AURORA UNO-2.0-I AND UNO-2.5-I STRING INVERTERS

Aurora UNO 2.0 and 2.5 string inverters offer the levels of performance and reliability you expect from Power-One with class-leading energy harvest due to Power-One's high speed and precise MPPT algorithm along with a CEC weighted efficiency of 96%.

Available in 2 kW or 2.5 kW and with a wide MPPT input range, the Aurora UNO 2.0 and 2.5 are well suited for residential rooftop installations and provide the flexibility system designers need. Aurora UNO 2.0 and 2.5 are simple to wall mount and are extremely lightweight while still featuring an inverter-integrated DC disconnect with combiner, lowering overall installation cost.

Incorporating over 30 years of high reliability power electronics design experience, the Aurora UNO 2.0 and 2.5 include a standard 10-year warranty with available warranty extensions up to 20 years.

Power-One Part #	UNO-2.0-I-OUTD-US	UNO-2.5-I-OUTD-US
Part # (w/ DC Switch)	310-0408	310-0410
Electrical Specifications		
Nominal Output Power	2000 W	2500 W
Rated Grid AC Voltage	208 V / 240 V / 277 V	
Peak Efficiency	96.3%	
CEC Efficiency	208 V / 240 V / 277 V: 95.5%	208 V: 95.5% 240 V / 277 V: 96%
DC Start-up Input Voltage	200 V (adj 120 - 350 V)	
DC Full Power MPPT Voltage Range	170 V - 470 V	205 V - 470 V
DC Operating MPPT Voltage Range	0.7 x V start to 520 V	
DC Max Input Voltage	520 V	
DC Independent MPPT Channels	1	
AC Grid Frequency	60 Hz	
AC Adjustable Grid Frequency Range	57 Hz - 60.5 Hz	
AC Max Output Current	10 A	12 A
Harmonic Distortion (%THD)	< 2%	
Power Factor	> .99	
Environmental Specifications		
Operating Temp Range	-25 °C to +60 °C / -13 °F to +140 °F	
Storage Temp Range	-40 °C to +80 °C / -40 °F to +176 °F	
Noise Emission Level	< 50db (A) @1m	
Outdoor Rated Enclosure	NEMA 4X	
Cooling System	Natural Convection	
Mechanical Specifications		
Dimensions with Integrated Disconnect Switch	30.3" x 14.4" x 6.3"	
Weight	< 42.5 lbs	
General Specifications		
User-Interface	5.5" x 1.25" Graphic Display	
Communication	Remote Monitoring and Wired / Wireless Local Monitoring (Optional)	
Warranty	10 year standard / Extended optional	
Safety and EMC Standard	UL1741(2010), IEE1547, CSA C22.2 N. 107.1-01, FCC Part 15 Class B	
Safety Approval	$_{c}$CSA$_{us}$	

FEATURES

- 96% CEC efficiency and Industry-leading MPPT for real time power tracking and improved energy harvesting
- Wide MPPT input voltage range enables high flexibility in string design
- Extra quiet high frequency transformer inverter architecture, NEMA4X enclosure and light weight design enable leading inverter mounting flexibility
- Fully inverter-integrated DC disconnect and wiring box saves installation time and cost
- Flexible data monitoring options to view inverter performance where and how you need it
- Standard 10-Year Warranty, available extensions to 15 and 20 years

MICROINVERTERS

The Enphase Microinverter System is an integrated platform for increasing the productivity, reliability and intelligence of solar systems. Each Enphase System consists of Enphase Microinverters, an Envoy Communications Gateway and the Enlighten Website. The combination of these technologies maximizes energy harvest, increases system reliability and dramatically simplifies design, installation and management. In addition, Enphase offers a smart thermostat device, known as Environ, which integrates with Envoy and Enlighten to enable web-based monitoring and control of home temperature.

PRODUCTIVE

- Per-module Maximum Power Point Tracking (MPPT) contributes to energy harvest gains of 5-25%
- With Enphase Microinverters, the modules are resistant to dust, debris and shading
- Enphase Burst Mode technology provides greater production in low-light conditions

RELIABLE

- No single point of system failure
- Microinverter provides continuous monitoring of the performance of each PV module
- Soft switching reduces component stress

SMART

- Quick and simple installation
- No central or string inverter to install or design
- The system provides 24/7 monitoring and management for each module
- Ability to integrate with other smart energy technology

SAFE

- Low voltage DC
- Reduced fire risk

INVERTER-SPECIFIC MONITORING & MANAGEMENT

ENVOY COMMUNICATIONS GATEWAY

The Enphase Envoy is a communications gateway that collects performance information from each solar module over the existing power lines in a building, and transmits this data to the Enlighten™ website, where users can view and manage the performance of their solar power systems. Envoy is also the communications gateway for the Enphase Environ Smart Thermostat.

Enphase requires approved outside monitoring for some rebate programs. See monitoring section for options.

Enphase Part #	IEMU-03
Part #	360-0215
Communication Interface	
Powerline	Enphase Proprietary
LAN	10/ 100 Auto-Sensing, Auto-Negotiating
Power Requirements	
AC Outlet	120 VAC, 60 Hz
Power Consumption	5 W
Mechanical Data	
Dimensions (W x H x D)	8.8" x 4.4" x 1.7"
Weight	12 oz (340 g)
Ambient Temp Range	-40 ºC to +65 ºC
Cooling	Natural Convection - No Fans
Enclosure Environmental Rating	Indoor- NEMA 1
Features	
Enlighten Service	Lifetime Subscription included free
Ethernet Bridge	Power Line Bridge Pair included free
Warranty	1-Year
Compliance	UL 60950/ EN 60950 - FCC Part 15 Class B

REVENUE GRADE METER AND ACCESSORIES

Part #	Description	Enphase Part #
570-1001	Compatible GE i210+ Revenue Grade Meter (RGM) with integrated ZigBee wireless	RGM-MTR-01
570-1002	ZigBee Repeater for RGM	RGM-RR-01
570-1003	ZigBee USB stick for Envoy communication w/ RGM	RGM-ZGB-01

LINE COMMUNICATION FILTER

For installations of more than 500 inverters. The LCF can be used for both 204 V split-phase and 208 V 3-phase systems. It includes an Envoy Communications Gateway.

ENLIGHTEN MONITORING & ANALYTICS

Enlighten provides unprecedented visibility into the performance of every solar module in a system. Customers can view real-time and historic performance information. Enlighten also plays a key role in protecting against performance problems, with built-in analytics that automatically diagnose any system problems and notify system owners and installers if action is required.

If a microinverter requires replacement, Enphase will actually pay for the cost of a site visit, up to $150, in addition to providing a replacement unit (visit the support section of their website for replacement program details). The Enlighten Monitoring Service is now a free service.

ACCESSORIES

ETHERNET BRIDGE

For installations with long distances between the load center and the Envoy Communications Gateway, an Ethernet bridge device is sometimes needed to improve signal quality.

Part #	Qty	Enphase Part #
360-0133	2	EPLC-01

M215 MICROINVERTER

Each Enphase Microinverter is individually connected to one PV module in your array. This unique configuration means that an individual Maximum Power Point Tracker (MPPT) controls each PV module. This ensures that the maximum power available from each PV module is exported to the utility grid regardless of the performance of the other PV modules in the array.

The M215 Microinverter is connected to the AC branch circuit using the Engage Cable System. The Engage Cable is a continuous length of 12AWG cable with pre-installed connectors for Enphase Microinverters to plug into. The cable is handled like standard outdoor-rated electrical wire, allowing it to be cut, spliced and extended as needed.

The Enphase M215 Microinverters are designed to operate with most 60-cell PV modules. Be sure to verify the voltage and current specifications of your PV module match those of the microinverter.

Enphase Part #	M215-60-2LL -S22 / NA	M215-60-2LL -S22-ZC	M215-60-2LL -S23	M215-60-2LL -S24 / NA
Part # (w/ TE connectors)	-	-	321-0166	-
Part # (w/ MC4 connectors)	321-0164	321-0169	-	-
Part # (w/ SMK connectors)	-	-	-	321-0168
Part # (Ontario FIT w/ MC4 connectors)	321-0172	-	-	321-0170
Input Data (DC)				
Recommended Input Power (STC)	260 W			
Max Input DC Voltage	45 V			
Peak Power Tracking Voltage	22 V - 36 V			
Minimum Start Voltage	26.4 V			
Max Start Voltage	45 V			
Max DC Short Circuit Current	15 A			
Max Input Current	10.5 A			
Output Data (AC)				
Max Output Power	215 W			
Nominal Output Current	208 V: 1.0 A 240 V: 0.9 A			
Voltage Range	208 V: 183 V - 229 V 240 V: 211 V - 264 V			
Nominal Frequency / Range	60.0 / 59.3 - 60.5			
Extended Frequency / Range	60.0 / 59.2 - 60.6			
Power Factor	> 0.95			
Max Units per 20 A Branch Circuit	208 V: 25 (three phase) 240 V: 17 (single phase)			
Efficiency				
Peak Inverter Efficiency	96.3%			
CEC Weighted Efficiency	96.0%			
Mechanical Data				
Dimensions (W x H x D)	6.8" x 6.45" x 1.0"			
Weight	3.5 lbs			
Operating Temperature Range (internal)	-40 ºC to +85 ºC			
Nighttime Power Consumption	46 mW			
Cooling	Natural Convection – No Fans			
Enclosure Environmental Rating	Outdoor – NEMA 6			
Features				
Compatibility	Pairs with most 60 - cell PV modules			
Communication	Powerline			
Warranty	25-Year Limited Warranty			
Compliance	UL1741/ IEEE1547, FCC Part 15 Class B CAN/ CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01			

CABLES & WIRING

INSTALL KITS

This kit includes 4 Terminators, 5 water tight caps, and a disconnect tool.

Part #	Description	Qty	Enphase Part #
360-0206	M215 Install Kit	1	ET-INSTL

ENGAGE CABLING TOOLS FOR M215

Part #	For	Qty	Enphase Part #
370-0055	Cable Disconnect Tool	1	ET-DISC-05
360-0205	Water Tight Cap	1	ET-SEAL-10
360-0203	Branch Terminator	1	ET-TERM-10
360-0204	Engage Coupler	1	ET-SPLK-05

M215 ENGAGE CABLES

Part #	Length	Cables	Connectors	Enphase Part #
360-0216	1.7 m (Landscape)	1-Phase (4-wire)	Per Qty	ET17-240
360-0217	1 m (Portrait)	1-Phase (4-wire)	Per Qty	ET10-240
360-0218	1.7 m (Landscape)	3-Phase (5-Wire)	Per Qty	ET17-208
360-0219	1 m (Portrait)	3-Phase (5-Wire)	Per Qty	ET10-208

Schneider Electric XW Inverter/Charger

The Schneider Electric XW Series Inverter/ Charger is a true sine wave inverter/ charger that can be used for both residential and small commercial applications; stand-alone, grid-backup, and grid-tied with battery energy storage. Capable of being grid-interactive or grid-independent, the XW Series will operate with generators and renewable energy sources to provide full-time or backup power.

Designed with consultation and input from industry experts, dealers, and installers, the XW sets a new standard for battery-based inverter/ chargers.

The XW System allows the connection of up to three inverters through the distribution panel. They are designed to be easily assembled inside. Schneider Electric XW MPPT Solar Charge Controller with ground fault protection, fields power from solar arrays through circuit breakers installed in the distribution panel. The control panel is networked using standard ethernet cabling, with inverters, charge controllers and other devices. A generator start module allows connection to 2-wire or 3-wire start generators. The gateway is a gateway to a PC or the internet, for remote monitoring.

230 V / 50 Hz Versions of the 4500 W & 4000 W are also available.

Picture shows a complete XW Series with one inverter (1), distribution panel (2), conduit box included with distribution panel (3) and charge controller (4).

Some inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

*XW Accessories are on page 137.

SCHNEIDER ELECTRIC XW SERIES INVERTER/ CHARGER

Schneider Electric Inverter	XW6048 120/240 60	XW4548 120/240 60	XW4024 120/420 60
Part #	311-0016	311-0015	311-0014
Schneider Electric Part #	RNW86510001	RNW8651005	RNW8651010
Electrical Specifications			
Continuous power	6.0 kVA	4.5 kVA	4.0 kVA
Surge rating	12.0 kVA (15 sec)	9.0 kVA (20 sec)	8.0 kVA (20 sec)
Peak output current	L-N: 105 A (15 sec) L-L: 52.5 A (15 sec)	L-N: 75 A (20 sec) L-L: 40 A (20 sec)	L-N: 70 A (20 sec) L-L: 35 A (20 sec)
Input current at rated power	130 A	96 A	178 A
Type of signal	True sine wave	True sine wave	True sine wave
Automatic transfer relay	60 A		
Typical transfer time	8 ms		
DC input voltage (nominal)	48 V		24 V
Input voltage limits	44 to 64 V		22 to 32 V
Charging current	100 A	85 A	150 A
Power factor corrected charging	0.98		
Emissions	FCC Class B		
Auxiliary relay output	0 to 12 V, maximum 250 mA DC		
Idle consumption (search mode)	< 8 W		
AC input voltage (nominal)	120/ 240 V split-phase		
AC output voltage	L-N: 120 V +/- 3% L-L: 240 V +/- 3%	L-N: 120 V +/- 3% L-L: 240 V +/- 3%	L-N: 120 V +/- 3% L-L: 240 V +/- 3%
Input voltage limits (bypass/charge mode)	L-N: 80 to 150 V (120 V nominal) L-L: 160 to 270 V (240 V nominal)		
AC1 voltage range (sell mode)	L-N: 108 to 130 +/- 1.5 V; L-L: 214 to 260 +/- 3.0 V (automatically adjusts when entering sell mode)		
Frequency	60.0 +/- 0.1 Hz		
AC input frequency range (bypass/charge mode)	55 to 65 Hz (default); 44 - 70 Hz (allowable)		
AC1 frequency range (sell mode)	59.4 to 60.4 +/- 0.05 Hz (automatically adjusts when entering sell mode)		
Total harmonic distortion (THD)	< 5%		
AC connections	AC1 (Grid), AC2 (Generator)		
AC input breaker	60 A two-pole		
Utility interactive	Yes		
CEC power rating	5.752 kW	4.5 kW	4.0 kW
Efficiency			
Peak	95.4%	95.6%	94.0%
CEC weighted	92.5%	93.0%	91.0%
Maximum charge rate	89.4%	90.2%	85.8%
General Specifications			
NEMA degree of protection	NEMA1R (Indoor rating) (sensitive electronic components sealed inside enclosure)		
Product weight	121.7 lbs (55.2 kg)	118 lbs (53.5 kg)	116 lbs (52.5 kg)
Shipping weight	169 lbs (76.7 kg)	165 lbs (75 kg)	163 lbs (74 kg)
Product dimensions (H x W x D)	23" x 16" x 9" (58 x 41 x 23 cm)		
Shipping dimensions (H x W x D)	28" x 22.25" x 10.5" (71.1 x 56.5 x 26.7 cm)		
Device mounting	Wall mount (back plate included)		
Ambient air temperature for operation	-25 °C to 70 °C (-13 °F to 158 °F) (power derated above 45 °C (113 °F))		
Communication network type	Xanbus™ (publish-subscribe network, no need for hubs or special cards)		
Warranty	Five-year standard		
Features and Options			
Display type	Status LEDs indicate AC In status, faults/ warnings, equalize mode, battery level. Three-character display indicates output power or charge current, fault/ warning codes. On/off and equalize buttons		
Supported battery types	Flooded (default), Gel, AGM, custom Flooded (default), Gel, AGM, custom Flooded (default), Gel, AGM, custom		
Battery bank size	100 to 2000 Ah (scaled to PV array size)		
Battery temperature sensor	Included		
Non volatile memory	Yes		
Multiple-unit configurations	Split-phase: up to four parallel units in 120/ 240 V. Three-phase: up to two units per phase (six units total)		
Regulatory Approvals			
Safety	UL1741 rev. 2005, CSA 107.1		
EMC	FCC and Industry Canada Class B		
Interconnect	IEEE 1547 and CSA 107.1		

SCHNEIDER ELECTRIC XW SERIES INVERTER/ CHARGER CONTINUED

Schneider Electric Inverter	XW6048 230 50	XW4548 230 50	XW4024 230 50
Part #	311-0029	311-0021	311-0022
Schneider Electric Part #	RNW8651035	RNW8651040	RNW8651045
Electrical Specifications			
Continuous Output Power	6000 W	4500 W	4000 W
Surge Rating	12,000 W (15 sec)	9000 W (20 sec)	8000 W (20 sec)
Surge Current	53 A rms	40 A rms	35 A rms
Waveform	True Sine Wave		
Low-Load Efficiency	95.4%	95.6%	94%
Idle Consumption- Search Mode	< 7 W		
AC Connections	AC1 (Grid) / AC2 (Generator)		
AC Input Voltage Range	165 - 280 VAC (230 V Nominal)		
AC Input Frequency Range	40 - 68 Hz (50 Hz Nominal)		
AC Output Voltage	230 VAC ± 3%		
Max AC Pass Through Current	56 A		
AC Output Continuous Current	26.1 A	19.6 A	17.4 A
AC Output Frequency	50 Hz ± 0.1 Hz		
Total Harmonic Distortion	< 5% at Rated Power		
Typical Transfer Time	8 ms		
DC Current at Rated Power	131 A	96 A	178 A
Utility Interactive	Disabled		
DC Input Voltage Range	44 - 64 VDC		22 - 32 VDC
Continuous Charge Rate (Nom)	100 A	85 A	150 A
Power Factor Corrected Charging	0.98		
DC Input Voltage (Nominal)	48 VDC		24 VDC
General Specifications			
Mounting	Wall mount, back plate included		
Inverter Dimensions (H x W x D)	23" x 16" x 9" (580 x 41 x 23 cm)		
Inverter Weight	121.7 lbs (55.2 kg)	118 lbs (53.5 kg)	116 lbs (52.5 kg)
Shipping Dimensions	28" x 22.25" x 10.5" (71.1 x 57.2 x 39.4 cm)		
Shipping Weight	169 lbs (76.7 kg)	165 lbs (75 kg)	163 lbs (74 kg)
Supported Battery Types	Flooded (Default), Gel, AGM, Custom		
Battery Bank Size	100 - 1000 Ah		
Battery Temperature Sensor	Included		
Non Volatile Memory	Yes		
Display Panel	Status LEDs indicate AC In status, faults/ warnings, equalize mode, On/Off and equalize button battery level. 3-Character display indicates output power or charge current.		
Multiple Unit Configurations	Single-Phase: Up to 4 Parallel Units / Three-Phase: 2 Units per Phase		
System Network	Xanbus™		
Warranty	5-Year		
Environmental Specifications			
Enclosure Type	IP20 (sensitive electrical components sealed inside enclosure)		
Operational Temperature Range	-13 °F to 158 °F (- 25 °C to 70 °C)		
Accessories			
Remote Display (865-1050)	Monitors and configures all devices connected to Xanbus Network.		
Generator Support (865-1060)	Connects to Xanbus Network. Activates generator to recharge depleted battery bank or assist inverter with heavy loads.		
Conduit Box (865-1025)	Encloses the bottom of the inverter and protects the cabling. Knockouts for 2 cm, 2.5 cm, 3.2 cm, 6 cm and 6.5 cm conduit		
Solar Charge Controller w/ MPPT	Delivers the maximum energy available from the PV array to the battery bank		
Configuration Tool (865-1155)	Aids dealers and installers by simplifying and expediting the configuration and/or troubleshooting of an XW System.		
Regulatory Approval			
EMC Directive	EN61000-6-1, EN61000-6-3, EN61000-3-3		
Low Voltage Directive	EN50178		

PVI 1800, PVI 2500, PVI 3000, PVI 3000S, PVI 4000, PVI 4000S, PVI 5000, PVI 5000S, PVI 5300, PVI 6500, PVI 7500

The PVI 1800 and PVI 2500 are among the smallest single phase inverters in the industry and tested in the harshest weather conditions. These compact, lightweight inverters are easy to handle and install and come pre-wired with AC and DC connections. The integrated panel assembly option allows for the inverters to be mounted on an industrial grade aluminum panel with disconnects and a kWh meter.

At 96% CEC efficiency, the Solectria Renewables' string inverter series, ranging from 3.0 kW to 7.5 kW, is the most efficient transformer isolated string inverter on the market. These inverters consist of nine power ratings to optimally match your grid-tied PV system. They boast fully-integrated AC and DC disconnects, LCD display, and 3, 4 or 5 fused string combiner, all contained within a detachable wiring box. This feature allows for a clean, simple and safe installation with easy serviceability. The integrated panel assembly option allows for this inverter series to be pre-wired and mounted on an industrial grade aluminum panel with kWh meter and optional AC visible-blade disconnect.

PVI 1800/ 2500 FEATURES

- Lightweight
- Tested in harsh weather conditions
- NEMA 4X
- 208 VAC or 240 VAC
- RS232/ RS485 communications
- User interactive LCD display

PVI 1800/ 2500 OPTIONS

- Integrated panel assembly
- Web-based monitoring

PVI 3000-7500 FEATURES

- 96% CEC efficiency
- Wide input operating voltage window
- 208 VAC, 240 VAC or 277 VAC
- Fully-integrated design
- Detachable wiring box
- Standard 10-year warranty
- RS485 communications
- User interactive LCD display

PVI 3000-7500 OPTIONS

- Integrated panel assembly
- Web-based monitoring

The PVI 1800/2500 does not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

SOLECTRIA RENEWABLES

Solectria PVI 1800, PVI 2500 String Inverters

The PVI 1800 and PVI 2500 are among the smallest single phase inverters in the industry and tested in the harshest weather conditions. These compact, lightweight inverters are easy to handle and install and come pre-wired with AC and DC connections. The integrated panel assembly option allows for the inverters to be mounted on an industrial grade aluminum panel with disconnects and a kWh meter.

Solectria Inverter	PVI 1800	PVI 2500
Part # - 208 V	310-0023	310-0025
Part # - 240 V	310-0024	310-0026
AC Output		
Nominal Output Voltage	208 or 240 VAC, 1-phase	
AC Voltage Range (standard)	-12% / +10%	
Continuous Output Power	208 V / 240 V: 1.8 kW	208 V / 240 V: 2.5 kW
Continuous Output Current	208 V: 8.7 A 240 V: 7.5 A	208 V: 12 A 240 V: 10.4 A
Maximum Backfeed Current	0 A	
Nominal Output Frequency	60 Hz	
Output Frequency Range	59.3 - 60.5 Hz	
Power Factor	Unity, > 0.99	
Total Harmonic Distribution (THD)	< 4%	
DC Input		
Absolute Maximum Input Voltage	400 VDC	
MPPT Input Voltage Range	125 - 350 VDC	
Maximum Operating Input Current	11 A	15 A
Efficiency		
Peak Efficiency	208 V / 240 V: 94.5%	
CEC Efficiency	208 V: 92.5%	208 V: 92.0%
	240 V: 92.5%	240 V: 93%
Tare Losses	208 V: 0.26 W	208 V: 0.10 W
	240 V: 0.14 W	240 V: 0.32 W
Temperature		
Ambient Temperature Range (full power)	-13 °F to +131 °F (-25 °C to +55°C)	
Storage Temperature Range	-13 °F to +131 °F (-25 °C to +55 °C)	
Relative Humidity (non-condensing)	5 - 95%	
General		
Testing & Certifications	UL 1741/ IEEE 1547, IEEE 62.41 C1 & C3, FCC part 15 A & B	
Warranty	5 year standard / 10 year optional	
Enclosure		
Transformer	Standard, fully integrated (internal)	
AC/DC Disconnects	Optional with integrated panel	
Dimensions (H x W x D)	18.5" x 13.1" x 5.6"	23.6" x 13.1" x 5.6"
Weight	34.1 lbs	36.3 lbs
Enclosure Rating	NEMA 4X	
Enclosure Finish	Anodized aluminum	

INTEGRATED PANEL OPTION

Part #	For	Description
510-0135	PVI 1800, 2500	Unfused DC disconnect
510-0136	PVI 1800, 2500	Fused DC disconnect

FEATURES

- Fully pre-wired and mounted
- Quick and easy installation
- Wide input operating voltage window
- Disconnect and breaker options
- RS232/ RS485 communications
- Revenue grade meter

OPTIONS

- Web-based monitoring

A single PVI 1800 - PVI 2500 integrated panel makes for quick and easy installation.

You may combine any PVI 1800 - 2500 creating an integrated panel up to 10 kW panel.

SOLECTRIA RENEWABLES

Solectria PVI 3000, PVI, 3000S, PVI 4000, PVI 4000S, PVI 5000, PVI 5000S, PVI 5300, PVI 6500, PVI 7500

At 96% CEC efficiency, this string inverter series is the most efficient transformer isolated string inverter on the market. These inverters consist of nine power ratings to optimally match your grid-tied PV system, and boast fully-integrated DC and AC disconnects, LCD display, and a 3, 4 or 5 fused string combiner all contained within a detachable wiring box. This feature allows for a clean, simple and safe installation with easy serviceability. The integrated panel assembly option allows for this inverter series to be pre-wired and mounted on an industrial grade aluminum panel with kWh meter and optional AC visible-blade disconnect or circuit breakers on a 2-inverter panel assembly.

Solectria Inverter		PVI 3000S	PVI 4000/ PVI 4000S	PVI 5000S	PVI 5300	PVI 6500	PVI 7500
Part #		-	310-0062	-	310-0066	310-0365	310-0366
Part # (S-Type)		310-0439	310-0387	310-0440	-	-	-
AC Output							
Nominal Output Voltage		208 or 240 VAC				208, 240, or 277 VAC	
AC Voltage Range (standard)		-12% / +10%					
Continuous Output Power	208 V / S-Type	2700 W / 2800 W	3400 W / 3500 W	4300 W / 4400 W	4600 W	6500 W	7500 W
	240 V / S-Type	2900 W / 3000 W	3900 W / 4000 W	4900 W / 5000 W	5300 W	6500 W	7500 W
	277 V	-	-	-	-	6500 W	7500 W
Continuous Output Current	208 V / S-Type	13 A / 13.5 A	16.3 A / 16.8 A	20.7 A / 21.1 A	22.1 A	31.3 A	36.1 A
	240 V / S-Type	13 A / 13.5 A	16.3 A / 16.8 A	20.7 A / 21.1 A	22.1 A	27.1 A	31.3 A
	277 V	-	-	-	-	23.5 A	27.1 A
Max Backfeed Current		0 A					
Nominal Output Frequency		60 Hz					
Output Frequency Range		59.3 - 60.5 Hz					
Power Factor		Unity, > 0.99					
Total Harmonic Distortion (THD)		< 3%					
DC Input							
Absolute Max Input Voltage		600 VDC					
AC Voltage Range (standard)		200 - 550 VDC				230 - 500 VDC	
Max Operating Input Current		16 A	20 A	25 A	25 A	35 A	35 A
Efficiency							
Peak Efficiency	208 V	96.4%	96.5%	96.4%	96.2%	96.0%	96.2%
	240 V	96.7 %	96.7%	96.7%	96.4%	96.3%	96.5 %
	277 V	-	-	-	-	96.7%	96.7%
CEC Efficiency	208 V	95.5%	95.5%	96.0%	95.5%	95.5%	95.5%
	240 V	96.0%	96.0%	96.0%	96.0%	96.0%	96.0%
	277 V	-	-	-	-	96.0%	96.0%
Tare Loss		0.5 W					
Integrated String Combiner							
Fused String Inputs		3	4	4	4	5	5
Temperature							
Ambient Temp Range (full power)		-13 °F to +131 °F (-25 °C to +55 °C)					-13 °F to +122 °F (-25 °C to +50 °C)
Storage Temp Range		-13 °F to +131 °F (-25 °C to +55 °C)				-13 °F to +149 °F (-25 °C to +65 °C)	
Relative Humidity (non-condensed.)		5 - 95%					
General							
Testing & Certifications		UL1741/ IEEE 1547, IEEE 1547.1, CSA C22.2#107.1, FCC part 15 B					
Warranty		10-Year Standard					
Enclosure							
AC/DC Disconnects		Standard, fully integrated (internal)					
Dimensions (H x W x D)		28.8" x 17.9" x 6.9"		28.8" x 17.9" x 8.3"		28.8" x 17.3" x 8.2"	
Weight		47 lbs	48 lbs	58.5 lbs	60 lbs	88.9 lbs	
Enclosure Rating		NEMA 3R					
Enclosure Finish		Painted aluminum					

POSITIVE GROUND OPTION

Part #	For	Solectria Part #
360-0164	Any PVI 3000 - 7500	OPT-Pos Ground

INTEGRATED PANEL OPTION

Part #	For	Solectria Part #
510-0104	Any PVI 3000 - 7500	PWS-010024-FUM

FLEXpower ONE

The new FLEXpower ONE System accommodates all of the essential protective devices in the smallest possible space at the lowest installed cost making it ideal for applications with modest power requirements such as cabins, chalets, homes, remote communication sites and back-up power systems. Utilizing an extremely compact design and an easy-to-install mounting bracket, the fully pre-wired and factory tested FLEXpower ONE System is designed for a quick installation, saving both time and money.

OutBack inverters do not include GFIC protection. If required in your jurisdiction, order separately.

Part #	Description	For	OutBack Part #
348-0003	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 250 A Breaker, GVFX3524, GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-3
348-0004	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 175 A Breaker, GVFX3648, GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-4
348-0017	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 250 A Breaker, GTFX2524-HI, GFDI 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-36
348-0018	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 175 A Breaker, GTFX3048-HI, GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-37

FLEXpower TWO

The new FLEXpower TWO System accommodates all of the essential protective devices in an easy-to-install, fully pre-wired and factory tested dual inverter system. The FLEXpower TWO is ideal for applications with medium sized power requirements such as homes, light commercial or larger back-up power systems. Utilizing a compact design and an easy-to-install mounting plate, the FLEXpower TWO System can be mounted in either a horizontal or vertical orientation to allow installation in more space-limited locations and is designed for a quick installation, saving both time and money.

Part #	Description	OutBack Part #
348-0011	7 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 250 A breakers, two GVFX3524 inverter/ chargers, MATE2, HUB10, RTS, and surge protector for 120 V / 240 V 60 Hz applications	FP2-28
348-0012	7.2 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 175 A breakers, two GVFX3648 inverter/ chargers, MATE2, HUB10, RTS, and surge protector for 120 V / 240 V 60 Hz applications	FP2-29
348-0015	6 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 175 A breakers, two GTFX3048-HI inverter/ chargers, MATE2, HUB10, RTS, and surge protector for 120 V / 240 V 60 Hz applications	FP2-30

Some inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

RADIAN SERIES INVERTER/ CHARGER

The new Radian Series Inverter/ Charger is an integrated power appliance that does it all!

You asked for it, and it's finally here. OutBack Power is very excited to introduce the new Radian Series Inverter/ Charger.

The Radian Series will simplify your life, make design and installation more streamlined, and make it easier for you to manage your inventory, sell more products, and grow your business.

Powerful features

- Grid-interactive and stand-alone capability in the same package
- 8000 Watts of continuous power
- Unsurpassed surge capacity
- 120/ 240 V split-phase power
- Dual AC inputs
- Field serviceable modular design
- Flexible design for systems from 8 to 80kW
- GSLC load center option allows for quick and easy installation
- Built on our core FX FET board technology—the industry standard for reliability

Models	GS8048
Part #	311-0035
Electrical Specifications	
Nominal DC Input Voltage	48 VDC
Continuous Output Power at 25 °C	8000 VA
AC Output Voltage/Freq.	120 / 240 VAC / 60 Hz
Continuous AC Output Current at 25 °C	33.3 A at 240 VAC
Idle Consumption - Invert mode, no load	30 W
CEC Weighted Efficiency	90%
Total Harmonic Distortion	Max total harmonic: <5% Max single voltage harmonic: <2%
Output Voltage Regulation	± 2%
Max Output Current	1 ms peak: 100 A at 240 VAC, 200 A at 120 VAC 100 ms RMS: 70.7 A at 240 VAC
Overload Capability	100 ms surge: 16.97 kVA 5 second: 12 kVA 30 minute: 9 kVA
AC Input Voltage Range (Adjustable)	(L1 or L2) 70 to 140 VAC
AC Input Frequency Range	54 - 66 Hz
Grid-Interactive Voltage Range (IEEE)	(L1 or L2) 108 to 132 VAC
Grid-Interactive Frequency Range (IEEE)	(L1 or L2) 59.3 to 60.5 Hz
Max AC Input Current	50 A at 240 VAC
Continuous Battery Charge Output (DC)	115 A
Temperature Range	Operating: 0 °C to 50 °C (power derated above 25 °C) Storage: -40 °C to 60 °C
DC Input Voltage Range	40 to 64 VDC
Mechanical Specifications	
Dimensions (H x W x D)	Unit: 28" x 16" x 8.7" Shipping: 14.5" x 34.5" x 21"
Weight	Unit: 125 lbs (56.8 kg) Shipping: 140 lbs (63.6 kg)
Accessory Ports	Remote Temperature Sensor and MATE3/ HUB Communications
Non-volatile Memory	Yes
Field Upgradable Firmware	Yes
Chassis Type	Vented
Certifications	ETL Listed to UL1741 CSA C22.2 No. 107.1

RADIAN SERIES ACCESSORIES

Part #	Description	OutBack Part #
500-0147	DC Shunt Bus for GS Load Center	GS-SBUS
500-0146	GS Bypass Kit, Split Phase 120/ 240 VAC	GS-IOB-120/240VAC
341-0098	GS Load Center, Box only	GSLC
341-0099	Pre-wired GS Load Center with 175 A inverter disconnects, 120/ 240 VAC inverter bypass, dual AC inputs	GSLC175-120/240
341-0100	Prewired GS Load Center with 175 A inverter disconnects, GFDI and PV disconnects for two charge controllers, FLEXnet DC w/ 3 shunts, 120/ 240 VAC inverter bypass, dual AC inputs	GSLC175-PV-120/240

ENERGY STORAGE

As the demand for renewable energy increases, the needs of system integrators and installers are rapidly evolving as well. OutBack is responding by engineering its acclaimed line of balance-of-system components into preassembled systems to give installers the best of both worlds: OutBack quality in a more easily specified and installed package. Battery back-up capability has always been in the "DNA" of OutBack's acclaimed off-grid and grid-interactive inverter/chargers. Now system installers can design a total power solution around the brand they most trust.

OutBack Part #	EnergyCell 170RE	EnergyCell 200RE
Part #	410-0173	410-0172
Cell Per Unit	6	
Voltage Per Unit	12 VDC	
Ah @ 20 Hr Rate	153.8	178.0
Operating Temperature Range	Discharge: -40°F (-40°C) to 160°F (71°C) Charge: -10°F (-23°C) to 140°F (60°C)	
Optimal Operating Temperature Range	74°F (23°C) to 80°F (27°C)	
Maximum Charging Current Limit/ String	25 ADC	30 ADC
Float Charging Voltage	13.62 to 13.8 VDC at 77°F (25°C)	
Absorb Charging Voltage	14.4 to 14.8 VDC at 77°F (25°C)	
Self Discharge	Battery can be stored at up to 6 months at 77 °F (25 °C) before a freshening charge is required. Batteries stored at temps >77 °F (25 °C) will require recharge sooner than batteries stored at lower temps.	
Temperature Compensation Factor	5mV per degree C per cell (2V)	
Terminal	Threaded copper alloy insert terminal to accept ¼ -20 UNC bolt	
Terminal Hardware Initial Torque	110 in-lb (12.4 Nm)	
Weight	115 lbs (52 kg)	131 lbs (60 kg)
Dimensions (H x D x W)	11.14" x 22.01" x 4.95	12.60" x 22.01" x 4.95"

INTEGRATED BATTERY RACK

The OutBack Integrated Battery Rack system is a comprehensive battery enclosure solution with cell interconnects, cabling, and series string overcurrent protection and disconnects included, making it easy to order and install. All electrical connections are made at the factory and ship fully assembled with the exception of the batteries, which can be quickly added and connected on the jobsite. Crafted of powder coated aluminum, the rack maintains a clean, durable appearance even in challenging environments while weighing less than 90 pounds. Clear covers allow for visual inspection while providing additional protection for the batteries and electrical connections. The rack supports systems up to 48 Volts and accommodate up to twelve (12) batteries.

OutBack Part #	IBR-3-48-175
Part #	450-0133
Dimensions (H x W x D)	48.6 x 27.0 x 24.4"
Weight	89 lbs (40.4 kg) without batteries
Physical	0.125-inch thick aluminum enclosure with FLEXware silver finish; plated copper bus bars and clear protective covers. Ships fully assembled (except for batteries)
String Overcurrent Protection	175 ADC
Gauge of Conductors	1/0 AWG
Capacity	Up to twelve (12) EnergyCell RE batteries
Nominal System Voltage	48 VDC
Supported Batteries	EnergyCell 170RE and EnergyCell 200RE

solaredge

SOLAREDGE SYSTEMS

SolarEdge offers an end-to-end distributed power harvesting system with per-module DC-DC power optimizers and a DC-AC string inverter. This inverter is designed to work exclusively with the SolarEdge power optimizers, and module-level monitoring. The SolarEdge system maximizes energy yield of a PV installation with maximum power point tracking (MPPT) of each module, which eliminates performance and power loss problems, and with fixed string DC voltage that ensures the inverter always operates at its peak efficiency voltage regardless of the number of modules in the string.

SolarEdge power optimizers are available for modules with MC4, H4, TE, H+S and SMK connectors and come with an integrated monitoring datalogger and communication gateway, 25 years of free access to module-level real-time monitoring data and to site-level web dashboard. The SolarEdge system is accompanied by a 25- year warranty for the power optimizers and a 12-year warranty for the inverters (extendable to 20 or 25 years). Power optimizers and inverters are ETL Listed to UL 1741 for the U.S. and Canada. Power optimizers are NEMA 4 rated and inverters are NEMA 3R rated.

RESIDENTIAL SOLUTIONS INVERTER

The SolarEdge inverter combines a sophisticated, digital control technology and a one stage, ultra-efficient power conversion architecture to achieve superior performance – 97.5%-98% weighted efficiency and best-in-class reliability. Their fixed-voltage technology ensures the inverter is always working at its optimal input voltage, regardless of the number of modules or of environmental conditions. A proprietary data monitoring receiver is integrated in the single phase inverter and aggregates performance data from each PV module. Multiple inverters can be connected in an RS485 bus or using a wireless ZigBee MESH network. The inverter comes with an AC/DC Safety Switch and is light enough for a single person to install on a supplied bracket.

SolarEdge #	SE3000A-US	SE3800A-US	SE5000A-US	SE6000A-US	SE7000A-US
Part #	310-0367	310-0368	310-0369	310-0370	310-0371
Output					
Rated AC Power Output	3000 W	3800 W	5000 W	208 V: 5200 W	208 V: 5200 W
				240 V: 6000 W	240 V: 6000 W
				277 V: 6000 W	277 V: 7000 W
Max AC Power Output	3000 W	3800 W	5000 W	208 V: 5200 W	208 V: 5200 W
				240 V: 6000 W	240 V: 6000 W
				277 V: 6000 W	277 V: 7000 W
AC Output Voltage Min - Nom - Max	183 - 208 - 229 / 211 - 240 - 264 VAC		183 - 208 - 229 / 211 - 240 - 264 / 244 - 277 - 294 VAC		
AC Frequency Min - Nom - Max	59.3 - 60 - 60.5 Hz				
Max Continuous Output Current	208 V: 14.5 A	208 V: 18.5 A	208 V: 24 A	208 V: 25 A	208 V: 25 A
	240 V: 12.5 A	240 V: 16 A	240 V: 21 A	240 V: 25 A	240 V: 25 A
	-	-	277 V: 18.5 A	277 V: 22 A	277 V: 25 A
Input					
Max Input Voltage	500 VDC				
Nominal DC Input Voltage	208 V: 325 VDC / 240 V: 350 VDC / 277 V: 400 VDC				
Max Input Current	10 A	12.5 A	16 A	18 A	18.5 A
Nighttime Power	< 2.5 W				
Standard Compliance					
Safety	UL1741, CSA 22.2				
Installation Specifications					
AC output conduit size / AWG range	3/4" minimum / 24-6 AWG				
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 24-6 AWG				
Dimensions (H x W x D) / with AC/DC Safety Switch	21" x 12.5" x 7" / 30.5" x 12.5" x 7"	21" x 12.5" x 7.5" / 30.5" x 12.5" x 7.5"			
Weight / with AC/DC Safety Switch	42 lbs / 48.5 lbs	45 lbs / 52 lbs			
Cooling	Natural Convection				
Operating Temp Range	-13 °F to +140 °F (-40 °F to +140 °F version available)				
Protection Rating	NEMA 3R- Rainproof				

solaredge

RESIDENTIAL POWER OPTIMIZERS

A power optimizer can be connected to a PV module with a maximum output of 250/ 300 / 400 Watts and maximum voltage of 55 / 75 VDC. Each power optimizer employs DC-DC conversion allowing it to either boost (increase) or buck (reduce) the output voltage of the module without changing the output power. The DC conversion is highly efficient with a peak efficiency of 99.5%. Power optimizers guarantee unprecedented installer and firefighter safety with SafeDC™ which shuts down each power optimizer's voltage when an inverter is disconnected or shut off.

SolarEdge #	OP250-LV-AH4SM	OP300-MV-AH4SM	OP400-MV-AH4SM
Part # (H4-in, MC4-out)	565-0161	565-0172	565-0176
SolarEdge #	OP250-LV-HSRRM	OP300-MV-HSRRM	OP400-MV-HSRRM
Part # (H&S-in,MC4-out)	565-0177	565-0171	565-0175
SolarEdge #	OP250-LV-MC4SM	OP300-MV-MC4SM	OP400-MV-MC4SM
Part # (MC4-in, MC4-out)	565-0159	565-0169	565-0173
SolarEdge #	OP250-LV-TYCRM	OP300-MV-TYCRM	OP400-MV-TYCRM
Part # (TE-in, MC4-out)	565-0160	565-0170	565-0174
Input			
Rated Input DC Power	250 W	300 W	400 W
Max Input Voltage	55 VDC	75 VDC	
MPPT Operating Range	5 - 55 VDC	5 - 75 VDC	
Maximum Short Circuit Current (Isc) of connected PV Module	10 A		
Maximum DC Input Current	12.5A		
Reverse Polarity Protection	Yes		
Max Efficiency	99.5%		
Inductive Lightning Protection	3'		
Nighttime Power Consumption	0 W		
Output During Operation (Power Optimizer Connected to Operating Inverter)			
Max Output Current	15 ADC		
Operating Output Voltage	5 - 60 VDC		
Total Max String Voltage	500 VDC		
Output During Standby (Power Optimizer Disconnected or Inverter off)			
Safety Output Voltage	1 VDC		
Installation Specifications			
Dimensions (W x L x H)	5.63" x 8.26" x 1.75"		
Weight	1.0 lbs		
Output PV Wire	3.0' length; 10 AWG; MC4		3.9' length; 10 AWG; MC4
Operating Temp Range	-40 °F to + 150 °F		
Protection Rating	NEMA 4		
Relative Humidity	0 - 100%		

ZEP COMPATIBLE POWER OPTIMIZER

SolarEdge also offers power optimizers compatible with Zep groove framed modules. The power optimizer attaches to the module frame without screws to reduce on-roof labor and mounting costs.

Contact your sales representative for more information.

WIRELESS MONITORING OPTIONS

The ZigBee products for wireless connectivity enable either a wireless mesh network between multiple inverters at a site, or a wireless link between a master inverter and a remote internet gateway point.

Wireless connectivity allows simplifying installations, making them more reliable – no outdoor cabling protection required, safe – no lightning protection required and aesthetic – no long cables and fixtures.

Part #	Description	SolarEdge Part #
570-0844	ZigBee Master Wireless Card for Inverter	SE1000-ZB02-MST-NA
570-0845	ZigBee Slave Wireless Card for Inverter	SE1000-ZB02-SLV-NA
570-0910	ZigBee to Ethernet interface, X2 Kit with Extended Range Antenna and on Slave module	SE1000-ZBDG2X-NA

solaredge

COMMERCIAL SOLUTIONS INVERTER

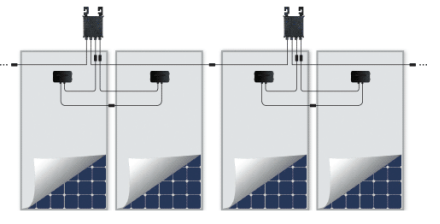
SolarEdge three phase inverters combine with SolarEdge power optimizers to provide superior performance at a competitive price. A CEC weighted efficiency up to 98%, lightweight construction and best-in-class reliability all combine to make these the best choice for commercial systems. The SolarEdge fixed voltage technology is designed for use with SolarEdge power optimizers to ensure that the inverter is always working at its optimal input voltage. The inverter has an integrated AC/DC Safety Switch and a built-in monitoring receiver, and comes with a 12 year standard warranty, extendable to 20 or 25 years.

SolarEdge #	SE9KUS-208	SE10KUS-480	SE20KUS-480
Part #	330-0324	330-0325	330-0326
Output			
Rated AC Power Output	9000 W	10000 W	20000 W
Max AC Power Output	9000 W	10000 W	20000 W
AC Output Voltage Min - Nom - Max (L-N)	105-120-132.5 VAC	244-277-305 VAC	
AC Frequency Min - Nom - Max	59.3 - 60 - 60.5 Hz (with HI country setting 57 - 60 - 60.5)		
Max Continuous Output Current (per Phase)	25 A	12 A	24 A
Input			
Max Input Voltage	11250 VDC	12500 VDC	25000 VDC
Nominal DC Input Voltage	185 VDC	420 VDC	
Max Input Current	26.5 A	13.5 A	26.5 A
Nighttime Power	< 3 W		
Standard Compliance			
Safety	UL1741, CSA 22.2		
Installation Specifications			
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG		
DC input conduit size / # of strings / AWG range	3/4" minimum / 1-2 strings / 12-6 AWG		
Dimensions (H x W x D)	21" x 12.5" x 10.5"		
Dimensions with AC/DC Safety Switch (H x W x D)	30.5" x 12.5" x 10.5"		
Weight	73.2 lbs		
Weight with AC/DC Safety Switch (H x W x D)	79.7 lbs		
Cooling	Fans (user replaceable)		
Operating Temp Range	-13 °F to +140 °F (-40 °F to +140 °F version available)		
Protection Rating	NEMA 3R- Rainproof		

COMMERCIAL POWER OPTIMIZER

While all SolarEdge power optimizers work with SolarEdge's 3-phase inverters, the OP600 offers the ability to connect 2 x 60-cell PV modules in series to a single power optimizer. SolarEdge power optimizers offer more power, maximum design flexibility, module-level monitoring, smart alerts, and unprecedented installer and firefighter safety. The power optimizers have the SafeDC™ feature which automatically lowers string voltage to a safe level whenever the inverter or grid power is shut down, and come with a 25 year standard warranty.

SolarEdge #	OP600-96V-AH4SA-2NAUL
Part # (H4-in, MC4-out)	565-0182
SolarEdge #	OP600-96V-MC4SA-2NAUL
Part # (MC4-in, MC4-out)	565-0181
Input	
Rated Input DC Power	600 W
Max Input Voltage	96 VDC
MPPT Operating Range	12.5 - 80 VDC
Maximum Short Circuit Current (Isc) of connected PV Module	10 A
Maximum DC Input current	12.5 A
Reverse Polarity Protection	Yes
Max Efficiency	99.5%
Inductive Lightning Protection	3'
Nighttime Power Consumption	0 W
Output During Operation (Power Optimizer Connected to Operating Inverter)	
Max Output Current	15 ADC
Operating Output Voltage	10 - 85 VDC
Total Max String Voltage	980 VDC
Output During Standby (Power Optimizer Disconnected or Inverter off)	
Safety Output Voltage	1 VDC
Installation Specifications	
Dimensions (W x L x H)	5.63" x 8.26" x 1.75"
Weight	1.0 lbs
Output PV Wire	5.9' length; 10 AWG; MC4 compatible
Operating Temp Range	-40 °F to + 150 °F
Protection Rating	NEMA 4
Relative Humidity	0 - 100%



60 cell modules

Fronius CL - PV Central inverter with Fronius MIX™ technology

The Fronius CL combines high-yield power electronics with the unique, modular system design of up to 15 identical power stages using MIX™ technology. Maximum yield and the highest stability are the advantages of this sophisticated system. The Fronius CL is the optimal central inverter for PV systems of up to several hundred kilowatts. Other features include the exact MPP tracking of the module manager, the automatic transformer switching function and much more. This makes the Fronius CL a distinctive multi-purpose device that guarantees continual high performance. Standard 5-year warranty, upgradable to 20 years.

Fronius

SHIFTING THE LIMITS

All Fronius inverters have been certified by CSA for use in the US and Canada.

Fronius CL		33.3_{Delta}	36.0_{WYE277}	44.4_{Delta}	48.0_{WYE277}	55.5_{Delta}	60.0_{WYE277}
Part #		330-0316	330-0317	330-0318	330-0319	330-0320	330-0321
Input Data							
Recommended PV-Power		28.3 - 39.0 kWp	30.6 - 42.1 kWp	37.8 - 52.0 kWp	40.8 - 56.2 kWp	47.2 - 65.0 kWp	51.0 - 70.2 kWp
MPPT-Voltage Range		230 - 500 V					
Max Input Voltage		600 V					
Nominal Input Voltage		390 V					
Nominal Input Current		90.8 A	98.2 A	121.1 A	130.9 A	151.4 A	163.7 A
Max Usable Input Current		154.0 A	166.5 A	205.4 A	222.0 A	256.7 A	277.5 A
DC Startup Voltage		245 V					
Admissible Conductor Size (DC)		350 MCM					
# of DC Input Terminals		2x M12 (1/2") lug per hole					
# of MPP Trackers		1					
Output Data							
Nominal Output Power (PAC nom)		33,300 W	36,000 W	44,400 W	48,000 W	55,500 W	60,000 W
Nominal AC Output Voltage		208 / 240 V	277 V	208 / 240 V	277 V	208 / 240 V	277 V
Operating AC Voltage Range	208 V	183 - 229 V	N/A	183 - 229 V	N/A	183 - 229 V	N/A
	240 V	211 - 264 V	N/A	211 - 264 V	N/A	211 - 264 V	N/A
	277 V	N/A	244 - 305 V	N/A	244 - 305 V	N/A	244 - 305 V
Nominal Output Current	208 V	92.4 A	N/A	123.2 A	N/A	154.0 A	N/A
	240 V	80.1 A	N/A	106.8 A	N/A	133.5 A	N/A
	277 V	N/A	43.3 A	N/A	57.8 A	N/A	72.2 A
Number of phases		3					
Admissible conductor size (AC)		350 MCM					
# of AC Terminals		2x M10 (7/16") lug per hole					
Max Continuous Utility Backfeed Current		0 A					
Nominal Output Frequency		60 Hz					
Operating Frequency Range		59.3 - 60.5 Hz					
Total Harmonic Distortion		< 3%					
Power Factor		1					
General Data							
Max Efficiency		95.9%					
CEC Efficiency	208 V	94.5%	N/A	94.5%	N/A	94.5%	N/A
	240 V	95.0%	N/A	95.0%	N/A	95.0%	N/A
	277 V	N/A	95.5%	N/A	95.5%	N/A	95.5%
Consumption in Standby (night)		< 15 W					
Consumption During Operation		65 W		95 W		110 W	
Cooling		Controlled forced ventilation, variable fan speed					
Enclosure Type		NEMA 3R, Powder Coated Aluminum Enclosure (standard)					
Unit Dimensions w/ socket (W x H x D)		43.5" x 76.6" x 31.4"					
Inverter Weight		661 lbs		721 lbs		783 lbs	
Admissible Ambient Operating Temp		-13 °F to 122 °F (-25 °C to + 50 °C)					
AC & DC Disconnects		Integrated					
Compliance		UL 1741-2005, IEEE1547-2003, IEEE 1547.1, ANSI/ IEEE C62.41, FCC Part 15 B, NEC Article 690, C22. 2 No. 107.1-01 (Sept. 2001). California Solar Initiative - Program Handbook - Appendix C: Inverter Integral 5% Meter Performance Specification					

STRING CONTROL 250/ 25

The Fronius String Control 250/ 25 continually compares the string current outputs of multiple strings enabling the early detection and localization of problems within the entire system. Up to 25 module strings (5 per Chanel) can be combined and every string is protected with its own DC fuse. As a result, there is nothing to stand in the way of reliable energy production.

Part #	Description	Fronius Part #
510-0143	Smart Combiner box, max 20 A Fuses, 250A Busbar, Neg or Pos Grounded, NEMA 3R	4,240,140,800

BASE PLATE

Part #	Description	Fronius Part #
360-0221	Required for CL Series Inverters	44,0240,0006

power-one®
Changing the Shape of Power

AURORA PVI-CENTRAL-50 AND 100 INVERTERS

BENEFITS

- High efficiencies deliver more energy
- Flexible Configuration
- Low Installation and Maintenance Costs
- Reverse-polarity protection minimizes potential damage caused by array mis-wiring

AURORA PVI-CENTRAL-250, 300, 350 AND 400 INVERTERS

BENEFITS

- Modular design improves reliability and uptime. In the event of a component failure, a maximum of 50kW will be lost.
- Quiet full power operation
- Integrated DC and AC distribution and protection

AURORA PVI-CENTRAL-50 AND 100 INVERTERS

The Aurora PVI-CENTRAL-50kw and 100kW commercial-grade inverters are designed for commercial roof top installations. These extremely scalable modular inverter systems, based on 50kW conversion modules, increase usable power and improve availability.

Industry-leading power conversion efficiencies of up to 95.8%, combined with high-speed Maximum Power Point Tracking (MPPT) channels, optimize energy harvesting across a wide array of operating conditions. Inverter systems are delivered pre-configured and pre-tested, significantly reducing on-site wiring and testing.

Power-One's commercial-grade inverters feature scalability in a common enclosure package that is delivered pre-configured and pre-tested.

AURORA PVI-CENTRAL-250 AND 300 INVERTERS

The PVI-CENTRAL-250 kW and 300 kW inverters are designed for commercial grade applications.

Power-One's grid-tied central inverters offer a unique combination of ultra-high efficiencies, installer-friendly designs, long service life, and competitive initial acquisition costs; significantly increasing return on investment in solar-power installations.

Power-One Part #	PVI-CENTRAL-50-US-208 PVI-CENTRAL-50-US-480	PVI-CENTRAL-100-US-208 PVI-CENTRAL-100-US-480	PVI-CENTRAL- 250-US-480	PVI-CENTRAL- 300-US-480
Part # - 208 V	330-0079	330-0134	330-0187	330-0188
Part # - 480 V	330-0094	330-0066	-	-
Rated Output Power	50 kW	100 kW	250 kW	300 kW
Peak Efficiency	95.6%	95.8%	97.6%	97.6%
Weighted Efficiency (CEC)	95.0%		97.0%	97.0%
MPPT Input Range	330 - 600 V		320 - 550 V	320 - 550 V
DC Max Input Current	170 A	340 A	850 A	1020 A
DC Max Input Voltage	600 V			
Independent MPPT	1		3	
AC Nominal Voltage	208 V / 480 V		480 V	480 V
Phase Supply	3 Φ			
Grid Frequency	60 Hz			
AC Max Output Current	139 A / 61 A	278 A / 121 A	315 A	378 A
Outdoor Rated Enclosure	NEMA 1		NEMA 3R	
Dims w/ Int Disc Switch (H x W x D)	66.0" x 50.2" x 33.5"		84.5" x 115.7" x 49.3"	
Warranty	Standard 10 year / Extended optional			
Weight	1550 lbs / 1873 lbs		5500 lbs	6000 lbs
Cooling System	Forced Air			
Operating Temp Range	+10 °F to +122 °F		-13 °F to +140 °F	
Compliance	UL 1741, CSA-C22.2 N.107.1-01, IEEE 1547			

power-one® Changing the Shape of Power

POWER-ONE TRIO INVERTERS

The TRIO-20.0-TL and TRIO-27.6-TL are powerful, flexible and dependable three phase string inverters with innovative features to lower system LCOE and improve ROI for commercial solar installations.

Because these string inverters are certified to UL1741 for 1000 VDC, a commercial PV system using a TRIO based modular architecture can reduce BOS costs by as much as 40%. With two independent MPP trackers and peak efficiency ratings of 98.3%, these inverters offer superior energy harvest. Employing fan-less convection cooling and no electrolytic capacitors, TRIO is designed for long service life. Equipped with integrated Modbus and utility interactive controls including adjustable power factor and curtailment, these inverters provide the monitoring and control features required in today's commercial solar installations.

Power-One Part #	TRIO-20.0-TL-OUTD-x-US-480	TRIO-27.6-TL-OUTD-x-US-480
-S (DC switch - No input Fuses)	-	310-0453
-S1 (DC switch - 2x4 dual Fuses)	310-0437	310-0426
Nominal Output Power	20 kW	27.6 kW
Max Output Power	22 kW*	30 kW*
Rated Grid AC Voltage	480 V	480 V
Independent MPPT	2	2
DC Max Voltage	1000 V	
Start-up Input Voltage	360 V (adj 250 - 500 V)	
Full Power MPPT Voltage Range	450 V -800 V	520 V - 800 V
Operating MPPT Voltage Range	200 V - 950 V	
DC Max Current per MPPT	25.0 A	30.9 A
DC Max Isc per MPPT	30.0 A	36.0 A
Grid Connection Type	3 Φ / 3W or 4W +Ground	
AC Voltage Range	422 V - 528 V	
Grid Frequency / Adjust Range	60 Hz / 57 - 63 Hz	
AC Max Current per phase	27.0 A	36.0 A
Peak Efficiency	98.2%	
CEC Efficiency	97.5%	
Power Factor	> 0.995 (adj. ±0.8, or ±0.9 for active power > Max Output Power)	
Outdoor Rated Enclosure	NEMA 4X	
Dimensions (H x W x D)	41.7" x 27.6" x 11.5"	
Warranty	10 year standard / Extended optional	
Weight	157.5 lbs (71 kg)	168 lbs (76 kg)
Cooling System	Natural Convection	
Operating Temp Range	-22 °F to +140 °F (-30 °C to +60 °C) Derating above +113 °F (45 °C)	
Storage Temp Range	-40 °F to +185 °F (-40 °C to +85 °C)	
Noise Emission	< 50 db (A) @ 1 m	
Display	5.5" x 1.25" Graphic Display	
Compliance	UL 1741, IEEE 1547, IEEE1547.1, CSA C22.2 107.1-01-2001, FCC Part 15 Sub-part B Class B Limits	

*Capability enabled within maximum input current, maximum input power, maximum output current and ambient operating temperature limits

Some inverters do not include fuses. Please check your jurisdictional requirements and order fuses separately if necessary.

FEATURES

- Fully utilize available roof space and maximize harvest with dual independent MPP trackers
- Wall mountable design and 1000Vdc input voltage reduces installation costs
- Wide DC input voltage and operating temperature range enable greater PV array design flexibility
- Improve system uptime and eliminate single point of failure with a modular design using TRIO
- Utility interactive control features and Modbus protocol integrates with monitoring systems
- Design uses natural convection cooling and no electrolytic capacitors for segment leading reliability

TRIO LIFTING KIT

Part #	Description	Power-One Part #
570-1045	Includes 4 handles for manual lifting and 2 eyebolts for lifting with winch or crane	TRIO-LIFTING-KIT

Designed with the installer in mind, SMA has combined ease of installation, a low cost per watt and high efficiency in the Sunny Tower-US. The UL and CSA compliant inverter system can be pre-configured in any combination between 30—48 kW. Its modular design eliminates the need for cost-prohibitive heavy machinery, as is required for large central inverters. It allows installers to apply their existing experience and tools in the residential market to attract commercial grade projects, all while benefiting from the Sunny Boy's world-class efficiency and SMA's industry-best reliability.

SMA Part #	Sunny Tower 30	Sunny Tower 30 w/ WebBox	Sunny Tower 36	Sunny Tower 36 w/ WebBox	Sunny Tower 42	Sunny Tower 42 w/ WebBox	Sunny Tower 48	Sunny Tower 48 w/ WebBox
Part #	330-0289	330-0288	330-0022	330-0023	330-0024	330-0025	330-0135	330-0136
Input Data (DC)								
Max Recommended Array Input Power (DC @ STC)	37.5 kW	37.5 kW	45.0 kW		52.5 kW		60 kW	
Max DC Voltage	600 V							
Peak Power Tracking Voltage	250 - 480 V						300 - 480 V	
DC Max Input Current	126 A		150 A		180 A			
Number of Fused String Inputs	24 x 15 A (AC / DC Disconnect)							
PV Start Voltage (Adjustable)	300 V						365 V	
Output Data (AC)								
AC Nominal Power	30.0 kW		36.0 kW		42.0 kW		48.0 kW	
AC Max Output Power	30.0 kW		36.0 kW		42.0 kW		48.0 kW	
AC Max Output Current	208 V: 144 A		208 V: 100 A		208 V: 117 A		208 V: N/A	
	240 V: 126 A		240 V: 87 A		240 V: 101 A		240 V: 116 A	
	277 V: 108 A		277 V: 44 A		277 V: 51 A		277 V: 58 A	
AC Nominal Voltage Range	208 V: 183 - 229 V		208 V: 187 - 229 V				208 V: N/A	
	240 V: 211 - 264 V 277 V: 244 - 305 V							
AC Frequency / Range	60 Hz / 59.3 Hz - 60.5 Hz							
Power Factor	0.99 (Nominal)							
Efficiency								
Peak Inverter Efficiency	96.8%		97.0%		97.1%		96.5%	
CEC Weighted Efficiency	208 V: 95.5%		208 V: 95.5%		208 V: 95.5%		208 V: N/A	
	240 V: 95.5%		240 V: 95.5%		240 V: 96.0%		240 V: 96.0%	
	277 V: 95.5%		277 V: 96.0%		277 V: 96.0%		277 V: 96.0%	
Mechanical Data								
Dimensions (W x H x D)	43.3" x 70.5" x 39"							
Weight / with 6 Inverters / Shipping	330 lbs / 846 lbs / 1388 lbs						330 lbs / 888 lbs / 1430 lbs	
Ambient Temperature Range	–13 °F to +113 °F							
Night Power Consumption	0.6 W							
Topology	Low frequency transformer, true sine wave							
Cooling Concept	OptiCool™ Forced Active Cooling							
Mounting Location Indoor / Outdoor (NEMA 3R)	Included							
Features								
LCD Display	Included							
Communication: RS485 / Wireless	Optional							
Warranty	10-Year							
Compliance	IEEE-929, IEEE-1547, UL 1741, UL 1998, FCC Part 15 A & B							

SUNNY TRIPOWER 12000TL- US / 15000TL-US / 20000TL-US / 24000TL-US

SMA's new Sunny Tripower TL-US is raising the level of performance for decentralized commercial PV plants. This three-phase transformerless inverter is UL listed for up to 1000 V DC maximum system voltage and has peak efficiency above 98 percent, while OptiTrac Global Peak minimizes the effects of shade for maximum energy production. The Sunny Tripower delivers a future-proof solution with full grid management, communications and monitoring features. The UL-listed Sunny Tripower is also equipped with all-pole ground fault protection and integrated AFCI for a safe, reliable solution. It offers unmatched flexibility with a wide input voltage range, dual MPP tracking and two independent DC inputs. Applicable for both 600 V DC and 1,000 V DC applications, the Sunny Tripower allows for flexible design and a lower levelized cost of energy. All of the Tripower inverters listed below come bundled with the 1000 VDC dual-fused disconnect and the Webconnect Communication Module.

SMA Part #	STP 12000TL-US-10 CU1000-US-10 SWDM-US-10	STP 15000TL-US-10 CU1000-US-10 SWDM-US-10	STP 20000TL-US-10 CU1000-US-10 SWDM-US-10	STP 24000TL-US-10 CU1000-US-10 SWDM-US-10
Part #	310-0449	310-0450	310-0451	310-0452
Input Data (DC)				
Max Recommended PV Power (DC @ STC)	15000 W	18750 W	25000 W	30000 W
Max DC Voltage	1000 V			
MPP Voltage Range	300 V - 800 V		380 V - 800 V	450 V - 800 V
Min DC Voltage / Start Voltage	150 V / 188 V			
Max Input Current / Per MPP Tracker Input	66 A / 33 A			
# of MPP Trackers Inputs	2			
Output Data (AC)				
AC Nominal Power	12000 W	15000 W	20000 W	24000 W
Max AC Apparent Power	12000 VA	15000 VA	20000 VA	24000 VA
Nominal AC Voltage (adjustable)	480 V / 277 V Wye			20000 W
AC Voltage Range	244 V - 305 V			
Rated AC Grid Frequency	60 Hz			
AC Grid Frequency / Range	50 Hz, 60 Hz / 44 Hz - 65 Hz			
Max Output Current	14.4 A	18 A	24 A	29 A
Power Factor at Rated Power / Adjustable Displacemnt	1 / 0.8 leading - 0.8 lagging			
Phase Conductors / Connection Phases	3 / 3-N-PE			
Harmonics	< 3%			
Efficiency				
Max Efficiency	98.0%			
General Data				
Dimensions (W x H x D)	26.1" x 27.1" x 10.4"			
Weight	121 lbs			
Operating Temp Range	-35 °C to +60 °C / -31 °F to +140 °F			
Noise Emission (typical)	51 dB (A)			
Internal Consumption at Night	1 W			
Topology	Transformerless			
Cooling Concept	OptiCool			
Electronics Protection Rating	NEMA 3R			
Certificates and Permits (pending)	UL 1741, UL 1998, UL 1699B, IEEE 1547, FCC Part 15 (Class A & B), CAN / CSA C22.2 107.1-1			
Features				
LED Indicators (Standard)	Status / Fault / Communication			
Interfaces	Standard: Webconnect / Optional: RS485			
Warranty	10 Years standard (15 and 20 Years optional)			

Sunny Central Family

SMA developed Sunny Central inverters specially for use in large PV plants. String monitoring, modular design and the ability to feed into the medium-voltage power grid make them the first choice for centralized PV systems.

With peak efficiencies greater than 98 percent, the Sunny Centrals are the most efficient central inverters on the market. Maximum reliability and durability furthermore ensure the greatest investment security.

The Sunny Central CP-US series delivers outstanding performance. In combination with an external transformer, the Sunny Central CP-US can be connected with any utility grid while directly providing grid management features. The CP-US family is UL listed at 1,000 V DC and features an integrated AC disconnect in accordance with NEC 2011 requirements. Both the outdoor enclosure with the OptiCool™ cooling concept and the separate connection area ensures simple installation while maximizing returns. With a peak efficiency of 98.7 percent, it outperforms all other inverters in its class. The Sunny Central CP-US can also be integrated with the Power Plant Controller as well as the Medium-Voltage Power Platform for utility-scale applications.

SMA Part #	Sunny Central 500CP-US	Sunny Central 630CP-US	Sunny Central 720CP-US	Sunny Central 750CP-US	Sunny Central 800CP-US
Part #	330-0305	330-0306	330-0307	330-0308	330-0309
Input Data (DC)					
Max Recommended DC Power	560 kW	713 kW	808 kW	853 kW	898 kW
Max DC Voltage	1000 V				
Peak Power Tracking Voltage	430 V - 820 V	500 V - 820 V	525 V - 820 V	545 V - 820 V	570 V - 820 V
Input Voltage / Min Input	480 V / 429 V	550 V / 498 V	565 V / 515 V	595 V / 545 V	620 V / 568 V
DC Max Input Current	1250 A	1350 A	1600 A		
Number of Fused String Inputs	1; 6 - 9				
Output Data (AC)					
Nominal AC Power (@ 50 °C)	500 kVA	630 kVA	720 kVA	750 kVA	800 kVA
Rated Power (@ 25 °C)	550 kVA	700 kVA	792 kVA	825 kVA	880 kVA
AC Max Output Current	1176 A	1283 A	1411 A		
AC Voltage	270 V	315 V	324 V	342 V	360 V
AC Nominal Voltage Range	243 V- 297 V	284 V- 347 V	292 V - 356 V	308 V - 376 V	324 V - 396 V
AC Frequency / Range	50 Hz, 60 Hz / 47 Hz - 63 Hz				
Harmonic	< 3%				
Power Factor	1 / 0.8 leading- 0.8 lagging				
Efficiency					
Peak Inverter Efficiency	98.5%		98.6%		98.7%
CEC Efficiency	98.0%				98.5%
Mechanical Data					
Dimensions (W x H x D)	101” x 90” x 38”				
Weight (lbs)	4000				
Operating Temperature Range	-25 °C to +50 °C - 13 °F to +122 °F				
Night Power Consumption	< 100 W				
Cooling Concept	OptiCool™				
Electronics Protection Rating / Connection Area	NEMA 3R / NEMA 3R				
Features					
LCD Display	Optional				
Communication	RS485 / Wireless				
Warranty	5 years standard / 10, 15, 20, 25 years optional				
Certificate and Permits	EMC conformity according to FCC, Part 15, Class A, UL 1741, UL 1998, IEEE 1547 (more available upon request)				

SUNNY CENTRAL 250-US / 500-US / 500 HE-US

The Sunny Central 250-US and 500-US solar inverters are ideally suited for commercial projects in North America. The integrated transformer makes direct connection with the low-voltage grid possible and, thanks to the outdoor-rated enclosure and OptiCool™ temperature management system, the units can be installed practically anywhere. The CEC efficiency of 97 percent is remarkable for transformer based inverters. Monitoring and remote maintenance is performed via the integrated data logger, which is accessible through RS485, Ethernet or OPC interfaces. The Sunny Central 500HE-US couples to an external medium-voltage transformer to accommodate long distance power feeds to distribution substations and delivers the highest efficiency available for large PV inverters. An updated user interface features a large LCD that provides a graphical view of the daily plant production as well as the status of the inverter and the utility grid. Flexible plant monitoring is available through various communications solutions such as Ethernet, Modbus, RS485 and OPC. Designed for easy installation, operation and performance monitoring, the UL-certified Sunny Central 500HE-US is the ideal choice for large-scale PV projects.

SMA Part #	Sunny Central 250-US	Sunny Central 500-US	Sunny Central 500HE-US
Part #	330-0081	330-0083	330-0125
Inverter Technology	True sine wave, high frequency PWM		
AC Power Output (Nominal)	250 kW	500 kW	
AC Voltage (Nominal)	480 VAC WYE		200 V (range 180 - 220 V)
AC Frequency (Nominal)	60 Hz		
Max THD	< 3%		
Power Factor (Nominal)	> 0.99		
AC Output Current Limit	480 V: 300 A	480 V: 600 A	200 V: 1470 A
DC Input Voltage Range	300 - 600 VDC		
Number of DC Inputs	4-6	6-9	
MPP Tracking	330 - 600 VDC		330 - 480 VDC
PV Start Voltage (configurable from 300 V - 600 V)	400 VDC		300 VDC
Max DC Current	800 A	1600 A	1600 A
Peak Efficiency	97.5%	97.4%	98.6%
CEC Weighted Efficiency	97.0%	97.0%	98.0%
Standby Nighttime Consumption	< 69 W	< 80 W	< 110 W
Operating Temp Range	-13 °F to 122 °F		-13 °F to 140 °F
Max Temperature for Nominal Conditions	+113 °F		
Cooling	Variable speed forced air (temperature controlled)		
Enclosure	NEMA 3R		
Dimensions (W x H x D)	110" x 80" x 33"	140" x 80" x 37"	101" x 90" x 38"
Weight	4189 lbs	7165 lbs	3970 lbs
Warranty	5-Year		
Compliance	UL 1741, IEEE-1547		

SUNNY CENTRAL STRING MONITOR AND SMART COMBINER BOX

Part #	Description	SMA Part #
510-0139	64 String input (8 per Channel), 8 A Fuses, 512 A Busbar, Neg Grounded, NEMA 3R	SSM-US-20

*SMA accessories are on pages 136-137.

AE 35TX, AE 50TX, AE 75TX, AE 100TX, AE 260TX AND AE 500TX INVERTERS

THE NEW INDUSTRY STANDARD FOR RELIABILITY AND EASE OF INSTALLATION

High reliability is enabled by market-leading features including bus bar power connections, redundant cooling system, card cage circuit board design and wide operating temperature rating. The highly integrated system saves installers time and money by including load-break rated AC & DC service disconnects, neutral-free installation, oversized busbar landings and generous cable bending area for bottom and side entry options.

The AE 260TX has a standard 295 VDC minimum MPPT and an optional full power 265 VDC minimum MPPT- one of the lowest MPPT voltage of any commercial inverter in the industry. This low input voltage option enables exceptional stringing capability with all PV module technologies including thin-film modules.

The AE 260TX also simplifies performance monitoring by offering inverter-integrated solutions from market leaders DECK Monitoring, Locus Energy and others. Additional options include integrated revenue grade meter and subcombiner monitoring.

AE 260TX Inverter

RELIABILITY

- Redundant cooling system with Smart Air Management™
- Low parts count reduces potential failure points
- Card cage circuit board system minimizes electronic interconnections

INSTALLABILITY

- Bottom and side cable entry with generous bending area
- Large DC subcombiner compartment with multiple fuse options from 70 A to 400 A
- Exterior mounting flanges for fast and easy anchoring with no pre-drilling

EASY TO MAINTAIN

- All maintenance and service via front and side access
- Fast change circuit board system shortens service time
- Load break rated AC and DC service disconnects

AE 35TX, AE 50TX and AE 75TX

Advanced Energy Part #	AE 35TX	AE 50TX	AE 75TX
Part # - 208 V	330-0162	330-0165	310-0049
Part # - 480 V	330-0163	330-0166	310-0050
Electrical Specifications			
Continuous Power Output	35 kW	50 kW	75 kW
CEC Weighted Efficiency	208 V: 95.5%	208 V: 96.0%	208 V: 95.5%
	480 V: 96.0%	480 V: 96.0%	480 V: 95.5%
	600 V: 95.5%	600 V: 96.0%	600 V: 96.0%
Max DC Input Voltage	600 V		
DC Peak Power Tracking Range	295 - 595 V		
DC Imp Nominal Current	125 A	178 A	267 A
AC Nominal Voltage	208 V / 480 V / 600 V		208 V / 480 V
AC Operating Range	208 V: 183 - 228 V		
	480 V: 422 - 528 V		
	600 V: 528-660 V		
AC Frequency Range	59.3 - 60.5 Hz		
AC Max Continuous Current	208 V: 100 A	208 V: 141 A	208 V: 208 A
	480 V: 43 A	480 V: 61 A	480 V: 90 A
	600 V: 35 A	600 V: 49 A	600 V: 72 A
Standby Losses (W)	33 W		42 W
Harmonic Distortion (%THD)	< 3%		
Power Factor	> .99		
Mechanical Specifications			
Enclosure	NEMA 4		
Construction	Powder Coated Steel Stainless Steel option on 50 kW, 75 kW.		
Mounting	Pad Mount		
Weight	1200 lbs	1500 lbs	2750 lbs
Cooling	Forced Convection		
Temperate Range	-30 ºC to 50 ºC		
Isolation Transformer	Yes		
Agency Approvals			
UL 1741, IEEE 1547 Compliant, FCC Class A & B	x	x	-
UL 1741, IEEE1547, IEEE519, IEEE929	x	x	x
FCC Class A for Conducted & Radiated	-	-	x
FCC Class A for Conducted, B for Radiated	-	-	x

INTELLISTRING SMART COMBINER BOXES

String-level performance data is a valuable tool for PV system owners because it enables fast diagnosis of PV system underperformance due to failed modules, shading or soiling. Until now this important tool was primarily used on large expensive systems due to the high cost of monitoring at the string level. Now the Intellistring line of smart string combiner boxes offers a solution that is practical and affordable enough to use on all commercial installations. AE IntelliString combiner boxes come with a 5-year warranty and NEMA 4X construction.

Part #	# of Circuits	Voltage	Amps	NEMA Rating	AE Part #
510-0058	8	600 VDC	160	4X	AEI-CB-08M
510-0102	16	600 VDC	320	4X	AEI-CB-16M
510-0199	24	600 VDC	360	4X	AEI-CB-24M

35/50 kW

75 kW

ACCESSORIES FOR COMMERCIAL INVERTERS

SUB-COMBINER OPTION*

Part #	For	# of Fuses	Amps
360-0222	35 kW	2	100
360-0227	50 kW	2	150
360-0202	50 kW	2	200
360-0237	50 kW	3	100
360-0060	50 kW	9	50
360-0056	75 kW	1	450
360-0057	75 kW	2	225
360-0058	75 kW	3	150
360-0149	75 kW	4	100
360-0220	75 kW	5	100
360-0059	75 kW	6	75
360-0061	100 kW	1	600
360-0062	100 kW	2	300
360-0063	100 kW	3	200
360-0150	100 kW	4	150
360-0200	100 kW	5	200
360-0064	100 kW	6	100
360-0065	100 kW	9	75
360-0171	260 kW	4	400
360-0158	260 kW	5	300
360-0201	260 kW	16	100

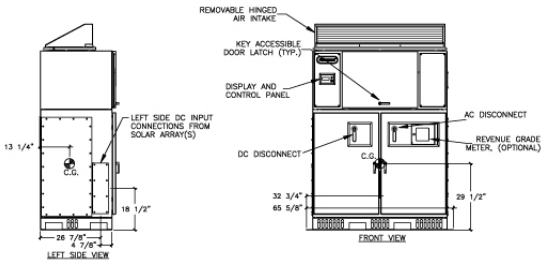
*For custom sub-combiner options, please contact your sales representative.

ADVANCED ENERGY®

100 kW

260 kW

500 kW



AE 100TX, AE 260TX, AE 260TX-LV and AE 500TX

PV Powered Part #	AE 100TX		AE 260TX	AE 260TX-LV	AE 500TX
Part #	310-0051	310-0052	330-0082	330-0160	330-0279
Electrical Specifications					
Continuous Power Output	100 kW		260 kW	260 kW	500 kW
CEC Weighted Efficiency	95.5%	96.0%	97%	96.5%	97.0%
Max DC Input Voltage	600 V				
DC Peak Power Tracking Range	295 - 595 V			265 - 595 V	310 - 595 V
DC Imp Nominal Current	356 A		925 A	1030 A	1600 A
AC Nominal Voltage	208 V / 480 V / 600 V	480 V			
AC Operating Range	183 - 228 V	423 - 528 V			
AC Frequency Range	59.3 - 60.5 Hz				
AC Max Continuous Current	278 A	120 A	316 A		608 A
Standby Losses	42 W		67 W		58 W
Harmonic Distortion (%THD)	< 3%				
Power Factor	> .99				
Mechanical Specifications					
Enclosure	NEMA 4				
Construction	Powder Coated Steel with Stainless Steel option				Powder Coated Steel
Mounting	Pad Mount				
Weight	3000 lbs		5000 lbs		8750 lbs
Cooling	Forced Convection				
Temperate Range	-30 ºC to 50 ºC				-30 ºC to 55 ºC
Isolation Transformer	Yes				
Agency Approvals	UL 1741, IEEE1547, IEEE519, IEEE929, FCC Class A for Conducted and Radiated			-	UL 1741, IEEE 1547 Compliant, FCC Class A for conducted, CSA 107.1-1

INTEGRATED REVENUE GRADE METER

Part #	Description	AE Part #
570-0744	Electro Industries Sharp 100 Meter	PVP-RGM-100

ADVANCED ENERGY TRANSFORMERLESS INVERTERS

The AE 333NX inverter is a truly advanced photovoltaic inverter for commercial grid-tied PV installations. With 97.5% CEC and 98.2% peak efficiencies, the 333 kW model offers integrators and independent power producers PV system ROI (Return on Investment) and better balance of system optimization. Both local and remote communications and control are always available via the IDS (Integrated Data System) for greater performance insight.

The durable, AE 500NX PV inverter achieves higher, faster PV system ROI and better balance of system optimization. It is ideally suited for utility-scale or large commercial PV installations. You receive advanced monitoring and control capabilities to provide greater performance insight.

BENEFITS

- Increase system ROI (Return on Investment)
- Reduce balance-of-system (BoS) costs
- Expect high energy output in various outdoor environments
- Monitor and control with flexible, integrated communications
- Rely on worldwide service and support

FEATURES

- Transformerless, bipolar design
- High Power Core (500 kW) and Single Core (333 kW) engines- with a small footprint and the lightest weight in its class.
- 97.5% CEC efficiency
- Integrated Data System communications
- Remote PV Tie (RPT) accessory
- Nearly three decades of experience in solar PV industry

AE INVERTER BIPOLAR ARRAY TRANSFORMERLESS

Part #	Description	AE Part #
330-0270	AE 250NX, 480 VAC, 97.5% CEC	AE 250NX
330-0315	AE 500NX, 480 VAC, 98.0% CEC	AE 500NX
330-0314	AE 500NX-HE, 480 VAC, 98.0% CEC	AE 500NX-HE

AE 250NX AND AE 333NX

AE Inverter	333 kW	250 kW
Part #	330-0062	330-0270
Physical		
Enclosure	Modular Cabinet Design w/ Sturdy E-Coat Steel	
Environmental Rating	NEMA 3R with NEMA 4 (electronics)	
Unit Weight	2045 lbs	
Shipping Weight	2344 lbs	
Connector & Cable Specs		
Output Power Connector	2 x 500 MCM wires (Cu or Al) & M10 lug	
Input Power Connector	4 x 500 MCM wires (Cu or Al) & M10 lug	16 x 2/0
User Display	Front panel LCD, keypad including security lock-outs, & emergency shutdown button	
Output Power		
Max Power	480 V: 333 kW	480 V: 250 kW
Voltage Range	432 to 528 VAC	
Frequency	60 Hz	
Line Power Factor	> 0.99 Typical	
AC Current Distortion/TDD	< 5%	
AC Line Current	400 A Typical	300 A typical
Peak & CEC Efficiency	98.3% & 97.5%	98.1% & 97.5%
Input Power		
Array Config	Bipolar Using Standard PV modules	
Voltage	± 330 to ± 600 VDC	
MPP DC Current	500 A Max	375 A Max
Open-Circuit Wake-Up Voltage	± 425 VDC Default (Configurable)	
Tare Losses	<100 W	
MPPT Window	± 330 to ± 600 VDC	
Factory-Installed Communication Interfaces	RS-232, RS-422, and RS-485	
Data Storage	> 10-Year/ 2 GB SD Card (Upgradable)	
Environmental Rating		
Ambient Operating Temp	-4 °F to 122 °F (-20 °C to 50 °C) Cold Weather Option to -35 °C	
Storage Temp	-22 °F to 158 °F (-30 °C to 70 °C)	
Relative Operating Humidity	0% to 95% Non-Condensing	
Atmospheric Pressure	800 to 1060 mbar (80 to 106 kPa)	
Elevation	6000' (1828.8m) Max	
Cooling Medium	Combo Air & Liquid Cooling (Self-Contained System)	
Certifications	NRTL Certified to UL 1741-2005 by CSA, International, IEEE 519, 929, 1547/1547.1, NEC Article 690 (compatible), CEC Eligible-97.5%	

Solectria PVI 10KW, 13KW and 15KW Commercial Inverters

Popular among schools and small business customers, these inverters are among the smallest true 3-phase inverters in the industry. This series of commercial grade inverters comes standard with integrated AC and DC disconnects, LCD display and monitoring gateway. Options include an integrated 8 position fused string combiner, forward facing disconnects and web-based monitoring.

Solectria Inverter	PVI 10KW	PVI 13KW	PVI 15KW
Part # - 208 V	330-0231	310-0019	310-0021
Part # - 240 V	330-0268	310-0346	310-0235
Part # - 480 V	330-0232	310-0020	310-0022
AC Output			
Continuous Output Power	10 kW	13.2 kW	15 kW
AC Voltage Range (Standard)	-12% / 10%		
Nominal Output Voltage	208 V / 240 V / 480 V / 600 V, 3-Phase		
Continuous Output Current	208 V: 28 A	208 V: 37 A	208 V: 42 A
	240 V: 24 A	240 V: 32 A	240 V: 36 A
	480 V: 12 A	480 V: 16 A	480 V: 18 A
	600 V: 9.6 A	600 V: 12.7 A	600 V: 14.4 A
Nominal Output Frequency	60 Hz		
Output Frequency Range	59.3 - 60.5 Hz		
Power Factor	Unity, > 0.99		
Total Harmonic Distortion (THD)	< 5%		
DC Input			
Absolute Max Input Voltage	475 VDC		
Max Operating Input Current	52 A	69 A	77 A
MPPT Input Voltage Range	205 - 385 VDC		
Efficiency			
Peak Efficiency	95.6%	95.8%	
CEC Efficiency	-	208 V: 94.0%	
	-	480 V: 94.5%	
Tare Loss	208 V / 240 V: 4 W		
	480 V: 5 W		
	600 V: 7 W		
String Combiner Options			
8 Fused Positions	6, 8, 10, 12, 15, 20 A		
Temperature			
Ambient Temp / Storage Temp	-40 °F to +122 °F (full power) / -40 °F to +158 °F		
Relative Humidity	5 - 95%		
General			
Safety Listings & Certifications	UL 1741/IEEE 1547, IEEE 1547.1, IEEE 62.41.2, IEEE 62.45, IEEE C37.90.2, CSA C22.2#107.1, FCC part 15 B		
Warranty	5-Year Standard (10, 15, 20 Extended Options)		
Enclosure			
Transformer	Standard, fully integrated (internal)		
AC/DC Disconnects	Standard, fully integrated		
Dimensions (H x W x D)	27.5" x 36.5" x 12.8"		
Dimensions w/ Forward Facing Disconnect	27.5" x 46" x 12.8"		
Weight	357 lbs	357 lbs	357 lbs
Enclosure Rating	NEMA 3R		
Enclosure Finish	Polyester powder coated steel; Optional stainless steel		

FEATURES

- True 3-Phase inverter
- Industrial grade
- Transformer isolated
- 208 VAC, 240 VAC, 480 VAC or 600 VAC
- MODBUS communications
- User-interactive LCD display
- Ground or wall mount configurations

OPTIONS

- Integrated DC fused string combiner
- Forward facing disconnects
- Web-based monitoring

SOLECTRIA RENEWABLES

Solectria PVI 50KW, 60KW, 75KW, 82KW, 85KW, 95KW and 100KW Commercial Inverters

The fully customizable full-line of commercial grid-tied PV inverters, the PVI 50-100KW series of Solectria Renewables inverters has been utilized in projects ranging from 30kW to multi-megawatt solar farms. This series of inverters is capable of operating at 208 VAC, 240 VAC, 480 VAC, and 600 VAC and comes standard with AC and DC disconnects, isolation transformer, LCD display and monitoring gateway. Options include an integrated fused subcombiner, forward facing disconnects, stainless steel enclosure and web-based monitoring. AC voltage and frequency settings may be customized according to utility specifications.

Solectria Inverter		PVI 50KW	PVI 60KW	PVI 75KW	PVI 82KW	PVI 85KW	PVI 95KW	PVI 100KW
Part # - 208 V		330-0293	330-0016	330-0296	330-0018	330-0299	330-0020	330-0302
Part # - 240 V		330-0294	330-0280	330-0297	-	330-0300	330-0156	330-0303
Part # - 480 V		330-0295	330-0017	330-0298	330-0019	330-0301	330-0021	330-0304
AC Output								
Continuous Output Power		50 kW	60 kW	75 kW	82 kW	85 kW	95 kW	100 kW
Power Factor		Unity, >0.99						
Nominal Output Voltage		208 / 240 / 480 / 600 VAC, 3-Phase (4 wire option)						
Continuous Output Current	208 V	139 A	167 A	208 A	228 A	236 A	264 A	278 A
	240 V	120 A	145 A	180 A	198 A	205 A	229 A	241 A
	480 V	60 A	73 A	90 A	100 A	102 A	115 A	120 A
	600 V	48 A	58 A	72 A	80 A	82 A	92 A	96 A
Max Backfeed Current		0 A						
Output Frequency Range		59.3 - 60 Hz						
THD		< 3%						
DC Input								
Absolute Max Input Voltage		600 VDC						
MPPT Input Voltage Range		312 - 500 VDC						
MPPT Input Voltage Range-LV Option		296 - 500 VDC						
Max Operating Input Current		169 A	202 A	252 A	278 A	285 A	320 A	334 A
Max Operating Input Current-LV Option		178 A	213 A	265 A	293 A	300 A	337 A	352 A
Efficiency								
Peak Efficiency	208 V / 240 V	96%		96.5%	95.6%	96.5%	95.3%	96.5%
	480 V / 600 V	96.5%		97%	96.5%	97%	96.5%	97%
CEC Efficiency		208 V: 96%						
		480 V: 97%						
Tare Loss		208 V / 240 V: 4 W						
		480 V: 5 W						
		600 V: 7 W						
Subcombiner Options								
Fused		2-8 positions, 40 - 275 A						
Breakers		2-6 positions, 50-300 A						
Temperature								
Ambient / Storage		-40 °F to +122 °F / -40 °F to +131 °F						
Relative Humidity		0 - 95%						
General								
Safety Listings & Certifications		UL 1741/IEEE 1547, IEEE 1547.1, IEEE 62.41.2, IEEE 62.45, IEEE C37.90.2, CSA C22.2#107.1, FCC part 15 B						
Warranty		5-Year (10, 15, 20 Extended)						
Enclosure								
Transformer		Standard, fully integrated (internal)						
AC/DC Disconnects		Standard, fully integrated						
Dimensions (H x W x D)		76" x 54" x 29.25" (208 / 240 VAC)						
Dimensions (H x W x D) Forward Facing Disconnects		76" x 80.75" x 29.25" (480 / 600 VAC)						
Weight		1545 lbs		1765 lbs				
Enclosure Rating		NEMA 3R						

Solectria SGI 225, 250, 266, 300, 500

UTILITY SCALE INVERTERS

Solectria Renewables' SmartGrid 225-500 kW series of inverters boasts an industry leading 97.5% CEC weighted efficiency which translates into significantly greater energy generation per year for utility-scale PV systems. The SGI series of transformer based inverters are rugged and durable with the transformer providing galvanic isolation between the PV array and the grid. The SMARTGRID series features five power classes, 225 kW, 250 kW, 266 kW, 300 kW and 500 kW, and offers utility options such as VAR support, low voltage ride through, controlled ramp rate and remote power control. Such critical utility options, combined with unsurpassed efficiencies and the lowest nighttime tare loss in the industry, earmark the SGI Series as the premier inverter for the next generation of large commercial and utility-scale systems.

Solectria Inverter		SGI 225	SGI 250	SGI 266	SGI 300	SGI 500
Part #		330-0266	330-0267	330-0140	330-0141	330-0142
AC Output						
Nominal Output Voltage		480 or 600 VAC, 3-phase, 3 or 4 wire				
AC Voltage Range		-12% / +10%				
Continuous Output Power		225 kW	250 kW	266 kW	300 kW	500 kW
Continuous Output Current	480 V	271 A	301 A	320 A	360 A	602 A
	600 V	217 A	240 A	256 A	289 A	480 A
Max Backfeed Current		0 A				
Nominal Output Frequency		60 Hz				
Output Frequency Range		59.3 - 60.5 Hz				
Power Factor		Unity, > 0.99				
Total Harmonic Dist (THD)		< 3%				
DC Input						
Absolute Max Input Voltage		625 VDC				
MPPT Input Voltage Range		300 - 500 VDC				
MPPT Input Voltage Range-LV Option		285 - 500 VDC				
Max Operating Input Current		768 A	853 A	908 A	1026 A	1721 A
Max Input Current-LV Option		808 A	898 A	956 A	1080 A	1812 A
Efficiency						
Peak Efficiency		98.0%			97.9%	
CEC Efficiency		97.5%				97.0%
Tare Loss		28 W				32 W
Subcombiner Options						
Fuses or Breakers		6 positions, 225 - 400 A				8 positions, 225 - 400 A
		12 postions, 110 - 200 A				16 positions, 110 - 200 A
Fuses Only		24 positions, 70 - 100 A				32 positions, 70 - 100 A
Temperature						
Ambient Temp Range		-40 °F to +122 °F (full power)				
Storage Temp Range		-40 °F to +158 °F				
Relative Humidity		5 - 95% (non-condensing)				
General						
Safety Listings & Certifications		UL 1741/IEEE1547, IEEE 1547.1, IEEE 62.41.2, IEE 62.45, IEEE C37.90.2, CSA C22.2#107.1, FCC part 15 B				
Warranty		5 year standard / 10, 15, 20 extended				
Enclosure						
Transformer		Standard, fully-integrated (internal); external optional				
AC Breaker / DC Disconnect		Fully-integrated (internal)				
Dimensions (H x W X D)		79" x 109" x 41"				
Weight		5170 lbs	5650 lbs			6980 lbs
Shading Set Back		137" at 30° solar elevation				
Enclosure Rating		NEMA 3R				
Enclosure Finish		Polyester powder coated steel; optional stainless steel				

Commercial Inverter Options

INTEGRATED DC SUBCOMBINER OPTIONS FOR THE PVI 50KW, 60KW, 75KW, 85KW AND 100KW

Part #	For	# of Fuses	Amps	Fuse Size
360-0027	50, 60, 75, 85, 100 kW	2 Fuses	70-100 A	Specify Fuse Size
360-0017	50, 60, 75, 85, 100 kW	2 Fuses	110-200 A	Specify Fuse Size
360-0040	50, 60, 75, 85, 100 kW	2 Fuses	225-250 A	Specify Fuse Size
360-0028	50, 60, 75, 85, 100 kW	3 Fuses	70-100 A	Specify Fuse Size
360-0018	50, 60, 75, 85, 100 kW	3 Fuses	110-200 A	Specify Fuse Size
360-0020	50, 60, 75, 85, 100 kW	4 Fuses	40-60 A	Specify Fuse Size
360-0029	50, 60, 75, 85, 100 kW	4 Fuses	70-100 A	Specify Fuse Size
360-0019	50, 60, 75, 85, 100 kW	4 Fuses	110-200 A	Specify Fuse Size
360-0021	50, 60, 75, 85, 100 kW	5 Fuses	40-60 A	Specify Fuse Size
360-0030	50, 60, 75, 85, 100 kW	5 Fuses	70-100 A	Specify Fuse Size
360-0022	50, 60, 75, 85, 100 kW	6 Fuses	40-60 A	Specify Fuse Size
360-0031	50, 60, 75, 85, 100 kW	6 Fuses	70-100 A	Specify Fuse Size
360-0023	50, 60, 75, 85, 100 kW	7 Fuses	40-60 A	Specify Fuse Size
360-0024	50, 60, 75, 85, 100 kW	8 Fuses	40-60 A	Specify Fuse Size

INTEGRATED DC SUBCOMBINER OPTIONS FOR SGI 225/250/266/300

Part #	For	# of Fuses	Fuse Size Option (Amps)
310-0217	SGI 225-300	6 Fuses or Breakers	Specify 225, 250, 300, 350 or 400 A
310-0212	SGI 225-300	12 Fuses or Breakers	Specify 110, 125, 150, 175 or 200 A
310-0223	SGI 225-300	24 Fuses Only	Specify 70, 80, 90 or 100 A

INTEGRATED DC SUBCOMBINER OPTIONS FOR SGI 500

Part #	For	# of Fuses	Fuse Size Options (Amps)
310-0219	SGI 500	8 Fuses or Breakers	Specify 225, 250, 300, 350 or 400 A
310-0213	SGI 500	16 Fuses or Breakers	Specify 110, 125, 150, 175 or 200 A
310-0364	SGI 500	32 Fuses Only	Specify 70, 80, 90 or 100 A

INTEGRATED STRING COMBINER OPTIONS FOR THE PVI 10/ 13/ 15KW

Part #	# of Fuses	Fuse Size	Solectria Part #
360-0256	8 Fuses	Specify 6, 8, 10, 12, 15, 20 A	OPT-FUSCOM-08X-06A-20A

ADDITIONAL OPTIONS FOR THE SGI 225, 250, 266, 300 AND 500

Part #	Option	For	Solectria Part #
510-0070	Low DC Voltage tap, lowers MPPT window down to 285 VDC	225-500KW	SGI 300 Lo DCV Opt
510-0071	Positive Ground Option (for Sunpower arrays) for any SGI 225/ 250/ 266/ 300/ 500	225-500KW	OPT-POSGROUND-SGI

ADDITIONAL OPTIONS FOR PVI 10-100KW COMMERCIAL INVERTERS

Part #	Options	For
360-0138	Low DC Voltage tap, lower MPPT window down to 296 VDC	50, 60, 75, 85, 100 kW
360-0137	Fused AC Disconnect	50, 60, 75, 85, 100 kW
360-0172	Forward Facing AC Disconnect, 208 VAC	50, 60, 75, 85, 100 kW
330-0138	Forward Facing AC Disconnect, 480 VAC	50, 60, 75, 85, 100 kW
360-0113	Forward Facing AC/DC Disconnect	50, 60, 75, 85, 100 kW
330-0271	Forward Facing AC/DC Disconnect, 208 VAC	50, 60, 75, 85, 100 kW
360-0116	Forward Facing AC/DC Disconnect, 480 VAC	50, 60, 75, 85, 100 kW
360-0007	Positive Ground Option	13 kW
360-0011	Positive Ground Option	60 kW

DISCONNECT COMBINER BOXES

These disconnect combiner boxes come in NEMA 4 powder coated steel enclosures. They include a 600VDC rated disconnect switch and come with string fuses preinstalled. Please contact your sales representative for stainless steel or fiberglass (NEMA 4X) enclosures.

Part #	Description	Max Current	Dimensions	Solectria Part #
510-0210	8x15A fused inputs	100 A	20" x 16" x 6"	DISCOM-PS-08X
510-0211	12x15A fused inputs	200 A	20" x 16" x 6"	DISCOM-PS-12X
510-0212	16x15A fused inputs	225 A	24" x 20" x 6"	DISCOM-PS-16X
510-0213	20x15A fused inputs	225 A	24" x 20" x 6"	DISCOM-PS-20X
510-0214	24x15A fused inputs	400 A	30" x 24" x 8"	DISCOM-PS-24X
510-0215	30x15A fused inputs	400 A	30" x 24" x 8"	DISCOM-PS-30X

COMBINER BOXES

Part #	Description
510-0134	4 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0109	6 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0033	8 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0008	10 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0009	12 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0016	13 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0010	14 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0023	15 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0011	16 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0024	17 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0012	18 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0025	19 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0013	20 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0026	21 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0014	22 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0027	23 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0015	24 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A
510-0163	30 Circuits, 600 VDC, NEMA 4, Specify Fuses, 8-20 A

SOLECTRIA RENEWABLES

RESIDENTIAL & COMMERCIAL MONITORING

SOLRENVIEW

Solectria Renewables' SolrenView web-based monitoring solution is available for use with residential, commercial or SMARTGRID Inverters, allowing for real-time, seamless recording and reporting of PV system production. The SolrenView gateway hardware provides data via Ethernet (standard) or cellular modem. The required hardware comes standard and fully-integrated within all commercial and SMARTGRID inverters. A stand alone version is available for residential use with LCD or LITE gateway systems. The complete SolrenView system features inverter direct monitoring, revenue grade monitoring, agency reporting, SolZone sub-array current monitoring, a Kiosk View (flash view) and a weather station.

RES. AND COMM. SRV INVERTER - DIRECT MONITORING

SolrenView™ Inverter Direct monitoring allows customers to see detailed operational inverter data (DC and AC) using a web browser. This standard package allows customers to view daily, weekly, monthly, and annual graphs up to 5 years in the past viewing single events or long-term performance trends. The package includes e-mail and cell phone alerts with detailed descriptions of system issues and recommended course of action. This service is only available for the industry leading Solectria PVI and SGI series inverters.

INVERTER DIRECT MONITORING FOR MULTIPLE PVI 1800-7500

Part #	Item Description	Solectria Part #
570-0860	With LCD, PVI 1800-7500, NEMA 1	SRV-ID-LCD
570-0861	With LCD, PVI 1800-7500, NEMA 4	SRV-ID-LCD-OUT

INVERTER DIRECT MONITORING FIRMWARE FOR 3 PHASE INVERTERS

Part #	Item Description	Solectria Part #
570-0873	for PVI 10-15KW, order with each inverter	OPT-SRV-ID-COM1
570-0874	for PVI 60-95KW, order with each inverter	OPT-SRV-ID-COM2
570-0875	for SGI 225-500, order with each inverter	OPT-SRV-ID-COM3

METER SOCKETS

Part #	Item Description	Solectria Part #
570-0855	1-Ph, 135 A, 240 VAC, 4 terminal for ABB meter, NEMA 3R	SRV-MET-SKT-1PH
570-0856	3-Ph, 200 A, 208/ 240/ 480 VAC, 7 terminal for GE kv2c meter, NEMA 3R	SRV-MET-SKT-3PH

REVENUE GRADE MONITORING

SolrenView™ Revenue Grade Energy Production monitoring package option keeps an accurate count of every kWh produced by a customer's PV system. The energy produced is automatically reported to a solar program agency for convenience. This package option also includes e-mail alarms with detailed descriptions of system problems and a recommended course of action. This package option is available for systems any Solectria inverter model 1.8 kW to 2 MW.

Part #	Item Description	Solectria Part #
570-0930	135 A, 1-Ph, 240 VAC (max 32 kW), meter used GE kV2C, NEMA 3R	SRV-MET-GL-1PH
570-0867	200 A, 3-Ph, 208 VAC (max 72 kW), meter used GE kV2C, NEMA 3R	SRV-MET-GL-3PH
570-0864	300 A, 1-Ph, 240 VAC (max 72 kW), 3-Ph, 208 VAC (max 108 kW), 480 VAC (max 294 kW), meter used Veris H8035-0300-2, no box	SRV-MET-CT-0300A
570-0865	400 A, 1-Ph, 240 VAC (max 96 kW), 3-Ph, 208 VAC (max 144 kW), 480 VAC (max 332 kW), meter used Veris H8035-0400-2, no box	SRV-MET-CT-0400A
570-0868	800 A, 3-Ph, 208 VAC (max 288 kW), 480 VAC (max 665 kW), meter used VerisH8025-0800-2, no box	SRV-MET-CT-0800A
570-0866	1600 A, 3-Ph, 208 VAC (max 576 kW), 480 VAC (max 1330 kW), meter used H8035-1600-2, no box	SRV-MET-CT-1600A

ADDITIONAL GATEWAY

Additional Gateways are to be used if a Revenue Grade Meter cannot connect to the factory installed SolrenView Gateway on commercial inverters.

Part #	Item Description	Solectria Part #
570-0858	Indoor, NEMA 1	SRV-LCD-INDOOR
570-0859	Outdoor, NEMA 4	SRV-LCD-OUTDOOR

FACTORY INSTALLED REVENUE GRADE MONITORING FOR SGI INVERTERS

Part #	Item Description	Solectria Part #
570-0878	400 A, 3-Ph, 480/ 600 VAC int. in 225/ 250/ 266/ 300 kW inverters, meter used Veris H035-0400-2	OPT-SRV-RG-0400A

SOLRENVIEW MONITORING SUBSCRIPTION FEES

SolrenView subscription fees are based on total inverter system power rating. Monitoring for residential inverters < 10 kW is free.

Part #	Item Description	Solectria Part #
575-0206	Solectria, SolrenView Monitoring Subscription, 10-30 kW, 5 years	SRV-SERVICE-30kW-5Y
575-0207	Solectria, SolrenView Monitoring Subscription, 10-30 kW, 10 Years	SRV-SERVICE-30kW-10Y
575-0215	Solectria, SolrenView Monitoring Subscription, 10-30 kW, 10 Years	SRV-SERVICE-2000kW-10Y
575-0210	Solectria, SolrenView Monitoring Subscription, 31-100 kW, 5 years	SRV-SERVICE-100kW-5Y
575-0211	Solectria, SolrenView Monitoring Subscription, 31-100 kW, 10 Years	SRV-SERVICE-100kW-10Y
575-0208	Solectria, SolrenView Monitoring Subscription, 101-500 kW, 5 years	SRV-SERVICE-500kW-5Y
575-0209	Solectria, SolrenView Monitoring Subscription, 101-500 kW, 10 Years	SRV-SERVICE-500kW-10Y
575-0212	Solectria, SolrenView Monitoring Subscription, 501-1000 kW, 5 years	SRV-SERVICE-1000kW-5Y
575-0213	Solectria, SolrenView Monitoring Subscription, 501-1000 kW, 10 Years	SRV-SERVICE-1000kW-10Y
575-0214	Solectria, SolrenView Monitoring Subscription, 1001-2000 kW, 5 years	SRV-SERVICE-2000kW-5Y
575-0216	Solectria, SolrenView Monitoring Subscription, 2001-4000 kW, 5 years	SRV-SERVICE-4000kW-5Y
575-0217	Solectria, SolrenView Monitoring Subscription, 2001-4000 kW, 10 Years	SRV-SERVICE-4000kW-10Y
575-0218	Solectria, SolrenView Monitoring Subscription, 4001-7000 kW, 5 years	SRV-SERVICE-7000kW-5Y
575-0219	Solectria, SolrenView Monitoring Subscription, 4001-7000 kW, 10 Years	SRV-SERVICE-7000kW-10Y

SOLZONE SUB-ARRAY MONITORING

SolrenView™ web-based monitoring provides customers with the ability to view the total performance of a PV system. SolZone™ sub-array monitoring, an option for SolrenView™, provides customers an extra level of granularity to view zone-by-zone production performance. SolZone™ compares individual PV array zones against each other, allowing for the detection of underperforming strings via a web browser. Performance and maintenance alarms are sent to customers via e-mail or text message. SolZone™ is also compatible with many third party monitoring systems.

Part #	Item Description	Solectria Part #
570-0869	2-fuse, PVI 50/ 60/ 75/ 85/ 100KW	OPT-SRV-SOLZONE-PVI-2X
570-0870	3-fuse, PVI 50/ 60/ 75/ 85/ 100KW	OPT-SRV-SOLZONE-PVI-3X
570-0871	4-fuse, PVI 50/ 60/ 75/ 85/ 100KW	OPT-SRV-SOLZONE-PVI-4X
570-0872	5-fuse, PVI 50/ 60/ 75/ 85/ 100KW	OPT-SRV-SOLZONE-PVI-5X
570-0936	6-fuse, PVI 225/ 250/ 266/ 300/ 500	OPT-SRV-SOLZONE-SGI-6X
570-0907	8-fuse, PVI 225/ 250/ 266/ 300/ 500	OPT-SRV-SOLZONE-SGI-8X

AGENCY REPORTING

An ideal option for customers that require Revenue Grade reporting to be sent to an agency such as PTS, SCE, CCSE and PGE. A report is generated from SolrenView Revenue Grade outputs and sent directly to the agency of choice.

Part #	Item Description	Solectria Part #
575-0898	5-Yr, List Agency, Must Order with Rev-Grade Monitoring	SRV-AGENCY-5Y
575-0205	10-Yr, List Agency, Must Order with Rev-Grade Monitoring	SRV-AGENCY-10

WEATHER STATION

The real-time weather station allows customers to view accurate readings for crucial environmental information. The weather station contains a solar irradiance sensor and temperature sensors for ambient and module measurements. Wind speed and wind direction sensors are options that may be added. The weather station is a great educational tool and compatible with many third party monitoring systems.

Part #	Item Description	Solectria Part #
570-0876	Basic Weather Station, Ambient and Module Temps and Irradiance Sensor	SRV-WTHR
570-0877	Full Weather Station, with Wind direction and speed sensors	SRV-WTHR-WIND

SOLRENVIEW AIR

SolrenView™ AIR allows customers to take advantage of SolrenView™ web-based monitoring features when standard internet access is not readily available or in environments where network security is critical. The SolrenView™ solution provides inverter direct monitoring, revenue grade monitoring, agency reporting, SolZone sub-array monitoring, kiosk view (flash view) and weather station integration. The SolrenView™ gateway to provide data to the SolrenView server via a fully-integrated 3G access point. Multi-MW solar fields, banks, government, schools, and agricultural locations are a few examples where a cellular link is preferred. Solectria Renewables has partnered with Verizon Wireless to provide the most comprehensive cellular coverage in the nation.

Part #	Item Description	Solectria Part #
570-0857	Installed 3G cell modem / phone service for PVI 60/ 82/ 95KW and SGI 225/ 250/ 266/ 300/ 500, 5-yrs only	OPT-SRV-AIR-1X

DAISY CHAIN CABLE

Part #	Item Description	Solectria Part #
570-0853	for PVI 1800-2500	WIH-020075
570-0854	for PVI 3000-7500	WIH-020081

Schneider Electric

SCHNEIDER ELECTRIC GT100 & GT250

Schneider Electric Inverter	GT100-208	GT100-480	GT250-480
Part # (Neg Gnd)	330-0031	330-0032	330-0034
Part # (Pos Gnd)	330-0254	330-0033	330-0035
General Specifications			
Max Continuous Output Power	100 kW	100 kW	250 kW
Nominal Output Voltage	208 VAC	480 VAC	480 VAC (line to line, +10%-12%)
Nominal Output Frequency	60 Hz	60 Hz	60 Hz (+0.5 Hz / -3.0 Hz)
Nominal Output Current	278 A rms	121 A rms	301 A rms
Max Output Fault Current	1100 A peak	1100 A peak	1400 A peak (duration of 0.008 sec)
Power Factor	> 0.99	> 0.99	> 0.99
DC Input Voltage Range	300-600 VDC	300-600 VDC	300-600 VDC
MPPT Operating Range	300-480 VDC	300-480 VDC	300-480 VDC
Max Input Current	347 A	347 A	867 A
Max Input Short-Circuit Current	460 A	460 A	1214 A
Max Backfeed Current	0 A	0 A	0 A
Peak Inverter Efficiency	96.20%	96.70%	96.80%
CEC Efficiency	95.00%	96.00%	96.00%
Night-Time Power Consumption	< 100 W	< 100 W	< 100 W
Max Output Over-Current Protection	400 A	200 A	400 A
Mechanical Specifications			
Operating Temp Range	5 °F to 122 °F (-15 °C to 50 °C)		
Enclosure Rating	NEMA 3R (outdoor rating)		
Enclosure	Zinc-coated and powder coated steel enclosure		
Unit Weight	3000 lbs (1361 kg)		4450 lbs (2018 kg)
Inverter Dimensions (H x W x D)	73.3" x 67.0" x 46.1"		86.3" x 90.0" x 46.1"
	1862 x 1702 x 1171 mm		2192 x 2286 x 1171 mm (Removable air intake reduces depth by 12" for fitting through doors)
Noise	< 70 dBA		
Altitude	up to 6600 (2012 m) without de-rating		
Relative Humidity	0 to 95% non-condensing		
Features & Options			
Cooling Method	Forced convection cooling/ sealed design		
AC/DC Disconnect	Standard and integrated within the inverter enclosure		
Isolation Transformer	Standard and integrated within the inverter enclosure		
User Display	Standard bright fluorescent green Vacuum display		
Ground-Fault Detection/Interruption	Standard and integrated within the inverter enclosure		
Communications	Optional RS485/ Modbus and RS232 communications		
Sub-Array Combiner	Optional and integrated within the inverter enclosure, 100 A circuits, other sizes available		
Regulatory Approvals			
Compliance	Certified to UL 174 (2005 Edition) and CSA 107.1-01		
Tested to IEEE 1547	✔		
FCC Part 15 Class A	✔		

FEATURES

- Ultra-efficient design with industry-leading CEC efficiency of 96%, including isolation transformer
- Integrated design with isolation transformer in one unit
- Includes AC and DC disconnects
- Integrated ground fault detection and interruption
- Soft-start circuit to reduce nuisance trips
- Sensitive components are protected from the environment while heat generating components are in the cooling airflow
- Back and sides of unit designed for zero clearance installations to minimize inverter space requirements
- Wiring access points on bottom, sides and back of inverter
- Removable air outlet allows inverter to be mated with venting duct work
- Designed for fork lift or sling transportation
- Zinc primed and powder coated steel enclosure for maximum corrosion resistance
- Designed to help maximize reliability with film-type capacitors and bus bars in the power path
- Bright fluorescent green Vacuum display with UV cover for ease of reading in sunlight
- RS485/Modbus and RS232 communications
- Ontario FIT Compliant (most models)
- Five-year standard warranty

SUB-COMBINER FUSE OPTIONS

Part #	Description	Schneider Part #
360-0067	GT100 100 A Input Fusing (6 x 100 A)	RNW115350901
360-0068	GT100 150 A Input Fusing (4 x 150 A)	RNW115351001
360-0069	GT100 200 A Input Fusing (3 x 200 A)	RNW115351101
360-0070	GT250 100 A Input Fusing (15 x 100 A)	RNW115351401
360-0071	GT250 150 A Input Fusing (10 x 150 A)	RNW115351301
360-0072	GT250 200 A Input Fusing (7 x 200 A)	RNW115351401

Schneider Electric
Conext™ SW Inverter / Charger

The Conext™ SW delivers new value and a new price point to the marketplace. Conext SW is a pure sine wave, inverter/charger system with switchable 50/60 Hz functionality available for both 120/240 VAC or 230 VAC models.

North American units feature split-phase input and output without the need for an external transformer. The companion DC and AC breaker panels simplify system wiring. Xanbus devices such as the display control panel (SCP), Conext ComBox communication device, and automated generator control (AGS) accessories present even more value. Stacking Conext SW units will double the power. Current solar charge controllers, such as the MPPT-60-150 or MPPT-80-600, allow for the integration of solar modules as required.

SCHNEIDER ELECTRIC CONEXT™ SW INVERTERS / CHARGERS

Schneider Electric Inverter/Charger	SW 2524	SW 4024
Part #	320-0094	320-0094
Schneider Electric Part #	RNW8652524	RNW8654024
Electrical Specifications - Inverter		
Continuous Output Power	2500 W	3400 W
Peak Current	24.3 A	41 A
Output Frequeny	50 / 60 Hz	
Output Voltage	120 / 240 VAC	
Output Wave Form	True Sine Wave	
Optimal Efficiency	91.5%	92%
Idle Consumption Search Mode	< 8 W	
Input DC Voltage Range	20 - 34 VDC	
AC Connections	Single / Split Phase	
Electrical Specifications - Charger		
Output Current	65 A	90 A
Nominal Output Voltage	24 VDC	
Output Voltage Range	12 - 32 VDC	
Charge Control	3 Stage	
Charge Temperature Compensation	Yes - BTS Included	
Optimal Efficiency	90%	
AC Input Power Factor	> 0.98	
Input Current	9 A	13 A
Input AC Voltage	120 / 240 VAC Split Phase	
Input AC Voltage Range Line To Neutral	95 - 135 VAC Single Phase 135 - 270 VAC Split Phase	
General Specifications		
Compatible Battery Types	FLA, Gel, AGM, Custom	
Transfer Relay Rating	30 A	
Transfer Time (AC to Inverter and Inverter to AC)	< 1 Cycle (16.7 ms)	
Product Weight	50.6 lbs. (23 kg)	67.1 lbs (30.5 kg)
Product dimensions (H x W x D)	16.5" x 13.4" x 7.6"	
Operating Temperature Range	-20 °C to 60 °C (-4 °F to 140 °F)	
Storage Temperature Range	-40 °C to 85 °C (-40 °F to 185 °F)	
System Network and Remote Monitoring	Available	
Warranty	2-year standard	
Regulatory Approval		
Safety	c(CSA) us mark, CSA C22.2 No. 107.1-01, UL 1741 Ed. 2	

PRODUCT APPLICATIONS

- Residential Backup Power
- Off-Grid Solar

FLEXIBLE

- All models support both 50 Hz and 60 Hz output
- Support stackable power up to 8 kW

EASY TO SERVICE

- Remote monitoring and configuration
- Global support

EASY TO INSTALL

- Configures quickly into compact wall mounted system
- Companion breaker panels integrate inverter with battery bank and solar charge controllers

SCHNEIDER ELECTRIC CONEXT™ SW ACCESSORIES

341-0102

341-0101

Part #	For # of Inverters	Schneider Part #
341-0101	DC Breaker Panel	RNW8651016
341-0102	AC Breaker Panel, 120 V / 240 V	RNW8651017

*More Schneider Electric accessories are on page 137.

Schneider Electric XW Inverter/Charger

The XW System is an ideal solution for homes that are connected to the utility grid, where owners want to incorporate a renewable energy system with backup power. Most applications use solar arrays, but a wind generator, micro-hydro generator, and/or a fuel generator can also be incorporated into the system. The grid-interactive functionality allows excess energy that is generated to be exported to the grid, and allows the grid to act as an additional energy source to charge the system's batteries. If the grid should fail, the inverter will automatically go into backup power mode, supplying energy from the batteries and energy inputs to support the home's electrical needs.

BACKUP POWER

Grid-connected homes can also benefit from the use of a XW System as the inverter will automatically detect a grid failure and instantly switch to backup power stored in the battery bank. When the grid is active, the XW System will monitor and regulate battery charging to ensure the batteries are ready to supply backup power when the grid fails.

OFF-GRID POWER

The XW System can process multiple forms of incoming power, making it a popular choice for off-grid applications (those not connected to the utility grid), as it provides homes with a completely autonomous supply of electricity. Most applications use solar arrays, but a wind generator, micro-hydro generator, and/or a fuel generator can also be incorporated into the system.

THE MODULAR XW SYSTEM DELIVERS THE POWER, EFFICIENCY, AND FLEXIBILITY TO MEET YOUR UNIQUE NEEDS IN A BATTERY-BASED RENEWABLE ENERGY SYSTEM. ALL XW COMPONENTS NETWORK VIA XANBUS™ TO SYNCHRONIZE OPERATIONS.

1. XW HYBRID INVERTER/CHARGER

- True sine wave AC output; high surge capability
- Dual AC inputs: grid and generator
- High current, multi-stage, PF corrected battery charger
- 120/ 240 VAC 60 Hz; Parallel units for more power
- Convertible to 120 VAC 60 Hz operation
- Configurable for 120/ 208 VAC three-phase operation

2. XW POWER DISTRIBUTION PANEL

- Houses AC and DC breakers and wiring for code-compliant installation
- Wiring is labeled and ready to connect to inverter
- Expansion room accommodates additional AC and DC breakers for system customization and/or expansion
- Provides convenient mounting for solar charge controllers

3. XW SOLAR CHARGE CONTROLLER

- Dynamic Maximum Power Point (MPPT) algorithm
- 600 VDC maximum array input voltage (80 A model only)
- Convection cooled (60 A model only)
- User-friendly interface (60 A model only)
- Integrated ground fault protection

*See page 90-91 for XW Specifications
*XW Accessories are on page 137.

Sunny Island Family

The Sunny Islands offer you first-class possibilities in the installation of self-sufficient energy systems. In conjunction with a battery pack the devices form a self-sufficient AC voltage grid, which meets top quality standards. In the Sunny Island System, electricity generators and loads are integrated in equal measure. PV and wind energy systems, diesel devices, water or CHP (Combined Heat and Power) can be coupled on the AC side.

Thus the Sunny Islands offer you two decisive advantages: enjoy the highest degree of flexibility in system planning, and complex DC cabling is not required during installation. The Sunny Island 5048-US makes commissioning within minutes possible. All required operational settings can be made in just a few easy steps. The Sunny Island 5048-US is versatile, extendable and takes on all control processes. Its first-class battery management ensures maximum battery life. It also features impressive efficiency, a rugged die-cast aluminum enclosure and the OptiCool™ active cooling system.

The new SMA Sunny Island 4548-US and 6048-US inverters are based on the proven off-grid technology in the Sunny Island 5048-US but now feature 20 percent more power output. A maximum efficiency of 96 percent ensures peak production, which results in reduced diesel usage in rural communities. More flexible sizing allows for simplified system planning. And, with multicluster technology, up to 12 Sunny Islands can be integrated into off-grid power systems up to 100 kW in size.

SMA Part #	SI 4548-US	SI 5048-US	SI 6048-US
Part #	311-0039	311-0012	311-0040
Output Data			
Nominal AC Voltage (Adjustable)	120 V (105 - 132 V)	120 V (105 - 132 V)	120 V (105 - 132 V)
Nominal Frequency (Adjustable)	60 Hz (55 - 65 Hz)	60 Hz (55 - 65 Hz)	60 Hz (55 - 65 Hz)
Continuous AC Output at 77°F / 113 °F	4500 W	5000 W / 4000 W	5750 W
Continuous AC Output at 77°F for 30 min / 1 min / 3 sec	5300 W / 8400 W / 11000 W	6500 W / 8400 W / 11000 W	7000 W / 8400 W / 11000 W
Nominal AC Current	37.5 A	41.7 A	48 A
Max AC Current	180 A (for 60 ms)	180 A (for 60 ms)	180 A (for 60 ms)
THD Output Voltage	3%	< 3%	3%
Power Factor at Rated Power	-	-1 to +1	-
Input Data			
Input Voltage (Range)	120 V (80 - 150 V)		
Input Frequency	60 Hz (54 - 66 Hz)		
Max AC Input Current (Adj)	56 A (0 - 56 A)		
Max Input Power	6.7 kW		
Battery Data			
Battery Voltage (Range)	48 V (41 - 63 V)		
Max Battery Charging Current	100 A	120 A	100 A
Continuous Charging Current @ 75 °F	85 A	100 A	85 A
Battery Capacity	100 - 10,000 Ah		
Charge Control	IUoU process		
Efficiency / Power Consumption			
Max Efficiency / CEC Efficiency	96% / 94.5%	95%	96% / 94%
Consumption with No Load (Standby)	25 W / 4 W		
Protection Rating	NEMA 1		
Certification	www.sma-solar.com		
Mechanical Data			
Dimensions (W x H x D)	18" x 24" x 9"		
Weight	139 lbs		
Warranty	5-Year Included / Extended Optional		
Temperature			
Operating Temp Range	–13 °F to +140 °F		

SMARTFORMER

The Smartformer is the complete solution for off-grid and battery back-up systems up to eight kilowatts. It acts simultaneously as AC distribution and a 120 V/240 V autoformer. The autoformer provides step-up and step-down options to supply loads with 120 V and 240 V using a Sunny Island and a Sunny Boy, with high efficiency over the entire power spectrum. Thanks to the pre-wired bypass function, the PV system can be easily bridged via a robust switch for maintenance. The optimized transformer overload protection and a load shedding relay provide extra protection to the system. The Smartformer makes the stand-alone power supply simple and reliable.

Part #	For # of Inverters	SMA Part #
560-0059	Pre-wired AC distribution box for Sunny Island inverters	SI-TD-BOX-10

*SMA accessories are on pages 136-137.

MAGNUM ENERGY

MM SERIES INVERTER/CHARGER

The MM Series Inverter is designed to accommodate entertainment systems and small appliances in smaller RVs and boats. Available in 600 and 1200 watt models- the MM series in an all new design is the most cost effective inverter available from Magnum Energy.

MM-AE SERIES INVERTER/CHARGER

The MM-AE Series inverter is smaller, lighter and less expensive. The built in chargers are PFC (Power Factor Corrected), which is 85% efficient, and the same charger topology used in all Magnum charger models. These are designed to accommodate smaller loads and appliances in cabins and off-grid homes.

MS SERIES INVERTER/CHARGER

Pure Sine wave power for your stereo, plasma screens, and other sensitive equipment. MS Series is designed to provide 120 volt 60 Hz output power.

MS-PAE SERIES INVERTER/CHARGER

Pure sine wave power for your stereo, plasma screens, and other sensitive electronics. The MS-PAE Series is designed to provide 120 and 240 volt output in one unit, eliminating the need to stack two units together to get 240 volts.

RD SERIES INVERTER/CHARGER

Designed for renewable energy applications. The RD Series uses the same construction as the ME Series without a neutral bonding relay.

Magnum inverters do not include GFIC protection. If required in your jurisdiction, order separately.

Part #	Sine Wave	Watts	Input Voltage (VDC)	Output Voltage (VAC)	Frequency	Magnum Part #
320-0045	Pure	1000 W	12	120	60 Hz	MMS1012
320-0064	Pure	2000 W	12	120	60 Hz	MS2012
320-0066	Pure	2000 W	12	120	60 Hz	MS2012-15B
320-0065	Pure	2000 W	12	120	60 Hz	MS2012-20B
320-0063	Pure	2000 W	12	120	60 Hz	MS2000-15B
320-0061	Pure	2000 W	12	120	60 Hz	MS2000
320-0062	Pure	2000 W	12	120	60 Hz	MS2000-20B
320-0067	Pure	2800 W	12	120	60 Hz	MS2812
320-0068	Pure	4000 W	24	120	60 Hz	MS4024
320-0083	Parallel	4000 W	24	120/ 240	60 Hz	MS4024PAE
320-0084	Parallel	4400 W	48	120/ 240	60 Hz	MS4448PAE
320-0058	Modified	600 W	12	120	60 Hz	MM612AE
320-0093	Modified	1200 W	12	120	60 Hz	MM1212
320-0085	Modified	1500 W	12	120	60 Hz	MM1512AE
320-0060	Modified	1500 W	24	120	60 Hz	MM1524AE
320-0070	Modified	1800 W	24	120	60 Hz	RD1824
320-0040	Modified	2200 W	12	120	60 Hz	RD2212
320-0071	Modified	2800 W	24	120	60 Hz	RD2824
320-0072	Modified	3900 W	24	120	60 Hz	RD3924
European 230 VAC / 50 Hz						
321-0173	Pure	900 W	9 to 17	230	50 Hz	MMS912E
320-0073	Pure	3700 W	48	120/ 240	50 Hz	MS3748AE/J
321-0175	Pure	4100 W	18 to 34	230	50 Hz	MS4124E
320-0076	Modified	1000 W	12	230	50 Hz	MM1012E
320-0077	Modified	1300 W	24	230	50 Hz	MM1324E
320-0042	Modified	4000 W	24	230	50 Hz	RD4024E

LED REMOTES

The MM-R Remote Control allows easy on/off control and provides a quick indication of the inverter operation. This remote is recommended for the MM Series inverters without the battery charger feature. The MM-RC remote is recommended for the MM and MMS Series that include the battery charger.

Part #	Description	Magnum Part #
500-0079	3 LED Remote with 25' Cable-use with MM 612 only	MM-R25
500-0080	6 LED Remote with 25' Cable-use with MM 612AE, MM 1212 and MM 1212AE	MM-RC25

ADVANCED REMOTE CONTROL

Part #	Description	Magnum Part #
360-0039	Digital LCD Display Remote Panel with 50' Cable, Flush Mount	ME-RC50
360-0166	Advanced Digital LCD Display Remote Panel with 50' Cable, Flush Mount	ME-ARC50
500-0109	Digital LCD Display and Router required for parallel stacking of the MS-PAE models	ME-RTR

CONDUIT BOX (WHITE)

Part #	Description	Magnum Part #
500-0071	for AC/DC Wiring required to be in Conduit	ME-CB

FUSE BLOCKS

Helps protects the battery bank and cables from damage caused by short circuits and overloads.

Part #	Description	Magnum Part #
540-0074	125 Amp Fuse Block Assembly/ Class ANL	ME-125F
540-0071	200 Amp Fuse Block Assembly/ Class ANL	ME-200F
540-0072	300 Amp Fuse Block Assembly/ Class T	ME-300F
540-0073	400 Amp Fuse Block Assembly/ Class T	ME-400F

AUTO GENERATOR START MODULE

Can automatically start your generator based on battery voltage or inside temperature.

Part #	Description	Magnum Part #
341-0086	Automatic Generator Start Module 2-Relay with Voltage and Temp Start/ Stand Alone Version	ME-AGS-S
341-0087	Automatic Generator Start Module 3-Relay with Voltage and Temp Start/ Network Version ME-AGS-N	ME-AGS-N

ADDITIONAL ACCESSORIES

Part #	Description	Magnum Part #
500-0072	DC Load Disconnect-Pigtail Adapter for 12 Volt	ME-DCLD
500-0073	Ignition Switch Lockout-Pigtail Adapter for 12 Volt	ME-ISW
500-0074	Pigtail Adapter-Auto Gen Start and 12 volt input	ME-PT1-AGS
500-0075	Pigtail Adapter-Auto Gen Start 2 Contact Remote	ME-PT2
500-0077	Remote Switch Adapter-Pigtail Adapter, Momentary	ME-RSA-M
500-0076	Remote Switch Adapter-Pigtail Adapter, SPST	ME-RSA
500-0078	Series Stacking Interface, Fits MS4024 Only	ME-SSI

MAGNUM ENERGY

MINI MAGNUM PANEL (MMP)

The MMP – Mini Magnum Panel is an inclusive, easy-to-install panel designed to work with one Magnum MS-AE, MS-PAE, MS, RD or other non-Magnum inverter/ charger.

Part #	Description	Magnum Part #
500-0095	With 250 A Breaker and 60 A Single Pole AC Input Breaker, 120 VAC	MMP250-60S
500-0097	With 175 A Breaker and 60 A Single Pole AC Input Breaker, 120 VAC	MMP175-60S
500-0110	With 250 A Breaker and 30 A Dual Pole AC Input Breaker, 120/ 240 VAC	MMP250-30D
500-0112	With 175 A Breaker and 30 A Dual Pole AC Input Breaker, 120/ 240 VAC	MMP175-30D
500-0108	Panel Hood Only (Included in MMP, MPSL)	MP-HOOD

MAGNUM PANEL, SINGLE ENCLOSURE, LOW CAPACITY (MPSL)

The MPSL – Magnum Panel, Single Enclosure, Low Capacity – is designed to accommodate a maximum of two inverters. Expandable: start with the enclosure and just one inverter and in the future expand to two inverters with ease, using the MPX.

Part #	Description	Magnum Part #
500-0098	Magnum Panel Single Enclosure, Low Power for 1-2 Inverters w/ 30 A Dual Pole AC Input Breaker	MPSL-30D
500-0099	Magnum Panel Single Enclosure, Low Power for 1-2 Inverters with 60 A Single Pole AC Input Breaker	MPSL-60S

MAGNUM PANEL, SINGLE ENCLOSURE, HIGH CAPACITY (MPSH)

The MPSH – Magnum Panel, Single Enclosure, High Capacity – is designed to accommodate a maximum of three inverters.

Part #	Description	Magnum Part #
500-0100	Magnum Panel Single Enclosure, High Power for Max 3 Inverters with 30 A Dual Pole AC Input Breaker	MPSH-30D

MAGNUM PANEL, DUAL ENCLOSURE, HIGH CAPACITY (MPDH)

The MPDH – Magnum Panel, Dual Enclosure, High Capacity – is designed to accommodate a maximum of four inverters with two enclosures – one for AC connections and one for DC connections.

Part #	Description	Magnum Part #
500-0101	Magnum Panel Dual Enclosure, High Power for Max 4 Inverters, with 30 A Dual Pole AC Input Breaker	MPDH-30D

MAGNUM PANEL EXTENSION BOX

Part #	Description	Magnum Part #
500-0149	For MPSL-30D or MPSH-30D with 250 A Breaker with 30 A Dual Pole AC Input Breaker, Left Side	MPXS-30D-L
500-0102	For MPSL-30D or MPSH-30D with 250 A Breaker with 30 A Dual Pole AC Input Breaker, Right Side	MPXS-30D-R
500-0103	For MPSL-60S with 250 A Breaker with 60 A Single Pole AC Input Breaker, Right Side	MPXS-60S-R
500-0152	For MPHD-30D with 250 A Breaker with 30 A Dual Pole AC Input Breaker, Left Side	MPXD-30D-L
500-0151	For MPHD-30D with 250 A Breaker with 30 A Dual Pole AC Input Breaker, Right Side	MPXD-30D-R
500-0107	Magnum Panel Extension Conduit Box Only, without AC, DC Breakers or Wiring	MPX-CB

BACK PLATES

Part #	Description	Magnum Part #
500-0106	Back Plate for 1 Mini Magnum Panel (Fits 1-MMP Only)	BP-MMP
500-0104	Back Plate Single (Fits 1-MMP, MPSL)	BP-S
500-0105	Back Plate Double (Fits 1 MP-DH)	BP-D

SMART BATTERY COMBINER

Part #	Description	Magnum Part #
330-0194	Combines two battery banks for charging	ME-SBC

BATTERY MONITORING KIT

Gives you the "percentage of charge" for the battery bank. This monitor reports state of charge, real time amps, amp hours in/out, and min/ max DC volts. The kit includes the sense module, sense and communication cables, and a 500 amp shunt.

Part #	Description	Magnum Part #
570-0332	Battery Monitoring Kit-State of Charge Meter includes a 500 amp DC shunt	ME-BMK
570-0959	Battery Monitoring Kit-State of Charge Meter does not include a 500 amp DC shunt	ME-BMK-NS

OutBack Power Systems

ALTERNATIVE ENERGY INTEGRATION HARDWARE

An elite class of inverters and related products

Uncompromised performance, quality and reliability. OutBack Power Systems has re-written the book on DC to AC inverters and balance of system components.

Inverter power where you need it, when you need it

Whether you're bringing power into the most isolated village on the planet, providing clean reliable power for your RV, boat or cabin, or feeding power back through your electric meter with solar or wind energy, OutBack inverters have your needs more than covered.

Engineered without compromise

Under the inverter's tough, cast aluminum skin you'll find more muscle than a Schwarzenegger movie and the latest in microprocessor based brains to deliver that raw power with the precision of a perfect sine wave, which is what your equipment was meant to run off of in the first place.

You won't find any square waves here

Only the latest technological advances went into these high quality, high power DC to AC inverters that have been ruggedized to meet the demands of the real world. OutBack Power spared no expense in bringing you the finest quality, longest lasting components available on the planet.

Unbeatable service, support and price

Match all of this performance, quality and reliability with superior service, support and pricing and you've got a deal that can't be beat.

FX Sealed Inverter/ Chargers

The FX Sealed Inverter Series is designed to survive in environments that would normally destroy other inverters. Protection for internal components is provided by a die-cast aluminum chassis with a powder coated finish to prevent corrosion. Internal and external cooling fans allow for passive heat transfer, enabling peak operating efficiencies as high as 93%.

FX Vented Inverter/ Chargers

The FX Vented Inverter Series inverters utilize a fan allowing filtered air through the inverter, giving higher ratings then the sealed versions.

GRID-INTERACTIVE INVERTERS

With the OutBack grid-interactive system, backup AC power is made available 24 hours a day in the event of a utility outage, providing reliable power and peace-of-mind. At night, the inverter's automatic power save mode ensures that energy is not wasted by needlessly charging your batteries from the utility grid. An average conversion efficiency of 91% using the California Energy Commission (CEC) test protocol, provides greater savings and a shorter time period for system payback.

OutBack's grid-interactive technology provides you more than a typical solar inverter, they also have the ability to utilize solar, wind and hydropower sources.

OFF-GRID INVERTERS

Solar. Wind. Hydro. Generator. No matter what your energy source OutBack's products are engineered to provide your home or business with reliable electricity day in and day out. The OutBack modular system architecture allows your system to grow along with your power needs up to 36,000 watts. Power hungry appliances like washing machines, air conditioning and power tools are easily started by the inverter's substantial surge power capability. When not being used, the inverter enters a power save mode, which consumes as little as 3 watts, saving your battery power for when you need it the most. OutBack's innovative Maximum Power Point Tracking (MPPT) technology gets the most from your solar array or can also control hydro or wind turbine charging sources. Complete system status and control is easily monitored by a single control, instead of requiring the user to keep an eye on multiple displays and status indicators.

*OutBack accessories are on page 128-129.

OutBack POWER™

Up to 10 inverters can be stacked. Contact your sales representative for details.

GRID-INTERACTIVE INVERTERS

INTERNATIONAL

	Sealed Models						Vented Models			
OutBack Part #	GTFX2524	GTFX3048	GFX1424	GFX1424E	GFX1448E	GFX1548	GVFX3024E	GVFX3048E	GVFX3524	GVFX3648
Part #	311-0005	311-0006	311-0036	311-0038	311-0032	311-0037	311-0033	311-0034	311-0007	311-0008
Nominal DC Input Voltage	24 VDC	48 VDC	24 VDC	24 VDC	48 VDC	48 VDC	24 VDC	48 VDC	24 VDC	48 VDC
Continuous Power Rating @ 25 °C	2500 VAC	3000 VAC	1400 VAC	1400 VAC	1400 VAC	1500 VAC	3000 VAC	3000 VAC	3500 VAC	3600 VAC
AC Voltage/ Frequency	120 VAC / 60 Hz			230 VAC / 50 Hz	230 VAC / 50 Hz	120 VAC / 60 Hz	230 VAC / 50 Hz		120 VAC / 60 Hz	
Continuous AC RMS Output @ 25 °C	20.8 amps AC	25.0 amps AC	11.66 amps AC	6.09 amps AC	6.09 amps AC	12.5 amps AC	13.0 amps AC		29.2 amps AC	30.0 amps AC
Idle Power										
Full	≈ 20 Watts		≈ 18 Watts				≈ 20 Watts	≈ 23 Watts	≈ 20 Watts	
Search	≈ 6 Watts									
Typical Efficiency	92%	93%	92%	92%	93%	93%	92%	93%	92%	93%
Total Harmonic Distortion										
Inverting	2%									
Selling	5%									
Output Voltage	± 2%									
Max Output Current										
Peak	70 amps AC		56 amp AC	28 amp AC		56 amp AC	35 amps AC		70 amps AC	
RMS	50 amps AC		40 amps AC	20 amps AC		40 amps AC	25 amps AC		50 amps AC	
AC Overload Capability										
Surge	6000 VA		4600 VA	4600 VA			6000 VA		6000 VA	
5 Seconds	4800 VA		2900 VA	2900 VA			4800 VA		5000 VA	
30 Minutes	3200 VA		2000 VA	2000 VA			3300 VA	3000 VA	4000 VA	
AC Input Current Max	60 amps AC		60 amps AC	30 amps AC		60 amps AC	30 amps AC		60 amps AC	
AC Input Voltage Range	80 to 150 VAC		70 to 140 VAC	140 to 280 VAC		70 to 140 VAC	140 to 280 VAC		80 to 150 VAC	
AC Input Freq Range	58 to 62 Hz		54 to 66 Hz	45 to 55 Hz		54 to 66 Hz	45 to 55 Hz		58 to 62 Hz	
DC Input Range	21.0 to 34.0 VDC	42.0 to 68.0 VDC	21.0 to 34.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC		21.0 to 34.0 VDC	42.0 to 68.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC
Continuous Battery Charge Output	55 amps DC	35 amps DC	40 amps DC	40 amps DC	20 amps DC		80 amps DC	40 amps DC	85 amps DC	45 amps DC
Warranty	Standard 5-yr									
Weight										
Unit	62 lbs (28 kg)		49.6 lbs (22.5 kg)				61 lbs (27.7 kg)			
Shipping	67 lbs (30 kg)		56.4 lbs (25.6 kg)				64 lbs (29 kg)			
Dimensions (H x W x L)										
Unit	13" x 8.25" x 16.25" (33 x 21 x 41 cm)						12" x 8.25" x 16.25" (30 x 21 x 41 cm)			
Shipping	21.75" x 13" x 22" (55 x 33 x 56 cm)						21.75" x 13" x 22" (55 x 33 x 56 cm)			

Sealed Model

Vented Model

OFF-GRID INVERTERS

	Sealed Models			Vented Models		
OutBack Part #	FX2012T	FX2524T	FX3048T	VFX2812	VFX3524	VFX3648
Part #	320-0002	320-0007	320-0009	320-0011	320-0016	320-0018
Nominal DC Input Voltage	12 VDC	24 VDC	48 VDC	12 VDC	24 VDC	48 VDC
Continuous Power Rating @ 25 ° C	2000 VAC	2500 VAC	3000 VAC	2800 VAC	3500 VAC	3600 VAC
AC Voltage/Frequency	120 VAC / 60 Hz					
Continuous AC RMS Output @ 25 ° C	17A AC	20.8A AC	25.0A AC	23.3A AC	29.2A AC	30.0A AC
Idle Power						
Full	≈ 20 Watts		≈ 23 Watts	≈ 20 Watts		≈ 23 Watts
Search	≈ 6 Watts					
Typical Efficiency	90%	92%	93%	90%	92%	93%
Total Harmonic Distortion:	2%					
Typical	2%					
Max	5%					
Output Voltage	± 2%					
Max Output Current						
Peak	56A AC	70A AC	70A AC	56A AC	70A AC	70A AC
RMS	40A AC	50A AC	50A AC	40A AC	50A AC	50A AC
AC Overload Capability						
Surge	4800 V	6000 V	6000 V	4800 V	6000 V	6000 V
5 Seconds	4000 V	4800 V	4800 V	4000 V	5000 V	5000 V
30 Min	2500 V	3200 V	3200 V	3200 V	4000 V	4000 V
AC Input Current Max	60 amps AC					
AC Input Voltage Range (MATE Adj)	80 to 150 VAC					
AC Input Freq Range	54 to 66 Hz					
DC Input Voltage Range	10.5 to 17.5 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC	10.5 to 17.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC
Continuous Battery Charge Output	80A DC	55A DC	35A DC	125A DC	85A DC	45A DC
Warranty	Standard 5-yr					
Weight						
Unit	62.6 lbs (25 kg)			61 lbs (25 kg)		
Shipping	67 lbs (30 kg)			64 lbs (28 kg)		
Dimensions (H x W x L)						
Unit	13" x 8.25" x 16.25" (33 x 21 x 41 cm)			12" x 8.25" x 16.25" (30 x 21 x 41 cm)		
Shipping	21.75" x 13" x 22" (55 x 33 x 56 cm)			21.75" x 13" x 22" (55 x 33 x 56 cm)		

*OutBack accessories are on page 128-129.

INTERNATIONAL INVERTERS

Engineered to provide your home or business with reliable 50 Hz AC power. The inverters high surge power capability starts the most demanding of 230 volt appliances and the modular system architecture makes expanding a system's power capacity or switching to three-phase output power simple and trouble free. Both sealed (FX) and vented (VFX) models are available with 50 Hz output to match your installation's environmental conditions. The inverter/ charger's low weight (as low as 27 kilograms) and compact dimensions allow easy transport and installation in less than ideal locations. Their field serviceable design eliminates the need to ship inverters if repair or upgrades are required. Export inverters are 230 VAC and 50 Hz.

	Sealed Models			Vented Models		
OutBack Part #	FX2012ET	FX2024ET	FX2348ET	VFX2612E	VFX3024E	VFX3048E
Part #	320-0000	320-0003	320-0005	320-0010	320-0013	320-0015
Nominal DC Input Voltage	12 VDC	24 VDC	48 VDC	12 VDC	24 VDC	48 VDC
Continuous Power Rating at 25 °C	2000 VA		2300 VA	2600 VA	3000 VA	
AC Voltage/ Frequency	230 VAC 50 Hz					
Continuous AC RMS Output at 25 °C	8.7 amps AC		10.0 amps AC	11.3 amps AC	13.0 amps AC	
Idle Power						
Full	≈ 20 Watts		≈ 23 Watts	≈ 20 Watts		≈ 23 Watts
Search	6 Watts					
Typical Efficiency	90%	92%	93%	90%	92%	93%
Total Harmonic Distortion						
Typical	2%					
Max	5%					
Output Voltage Regulation	± 2%					
Max Output Current						
Peak	28 amps AC	35 amps AC		28 amps AC	35 amps AC	
RMS	20 amps AC	25 amps AC		25 amps AC	25 amps AC	
AC Overload Capability						
Surge	4600 VA	5750 VA		4600 VA	5750 VA	
5 Seconds	4000 VA	4800 VA		4000 VA	4800 VA	
30 Minutes	2500 VA	3100 VA		2500 VA	3300 VA	
AC Input Current Max	30 amps AC					
AC Input Voltage Range (MATE Adj)	160 to 300 VAC					
AC Input Frequency Range	44 to 56 Hz					
DC Input Voltage Range	10.5 to 17.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC	10.5 to 17.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC
Continuous Battery Charge Output	100 amps DC	55 amps DC	35 amps DC	120 amps DC	85 amps DC	45 amps DC
Warranty	Standard 5-yr			Standard 5-yr		
Weight						
Unit	62.6 lbs (25 kg)			62 lbs (25 kg)		
Shipping	67 lbs (30 kg)			64 lbs (28 kg)		
Dimensions (H x W x L)						
Unit	13" x 8.25" x 16.25" (33 x 21 x 41 cm)			12" x 8.25" x 16.25" (30 x 21 x 41 cm)		
Shipping	21.75" x 13" x 22" (55 x 33 x 56 cm)			21.75" x 13" x 22" (55 x 33 x 56 cm)		

CARIBBEAN INVERTERS

Designed for the particular electrical configurations common in the Caribbean.

Part #	Description	Watts	Input Voltage	Output Voltage	Frequency	OutBack Part #
320-0054	FX2024JT Sealed Inverter	2000 W	24 VDC	120 VAC	50 Hz	FX2024JT
320-0055	FX2024WT Sealed Inverter	2000 W	24 VDC	230 VAC	60 Hz	FX2024WT
320-0053	FX2348WT Sealed Inverter	2300 W	48 VDC	230 VAC	60 Hz	FX2348WT
320-0052	VFX3024J Vented Inverter	3000 W	24 VDC	120 VAC	50 Hz	VFX3024J
320-0056	VFX3024W Vented Inverter	3000 W	24 VDC	230 VAC	60 Hz	VFX3024W
320-0057	VFX3048W Vented Inverter	3000 W	48 VDC	230 VAC	60 Hz	VFX3048W

*OutBack accessories are on page 128-129.

MOBILE AND MARINE INVERTER/CHARGERS

OutBack's Mobile and Marine inverter/ charger models provide the high performance and reliability you need no matter where your travels take you. Their die-cast metal construction allows mounting in any position, even upside down. The required AC input neutral/ ground switching is taken care of by a fully integrated 30 amp AC transfer switch for shore cord or generator hook-up. Three circuit boards and a simple design make field servicing the unit easy no matter where you are. Rigorous testing at the factory ensures that each inverter/ charger works the first time as well as for many years to come.

	Sealed Models				Vented Models			
OutBack Part #	FX2012MT	FX2524MT	FX2532MT	FX2536MT	VFX2812M	VFX3524M	VFX3232M	VFX3236M
Part #	320-0001	320-0006	320-0038	320-0079	320-0012	320-0017	320-0051	320-0078
Nominal DC Input Voltage	12 VDC	24 VDC	32 VDC	36 VDC	12 VDC	24 VDC	32 VDC	36 VDC
Continuous Power Rating at 25 °C	2000 VA	2500 VA	2500 VA	2500 VA	2800 VA	3500 VA	3200 VA	3200 VA
AC Voltage / Frequency	120 VAC / 60 Hz							
Continuous AC RMS Output at 25 °C	17.0 amps AC	20.8 amps AC			23.3 amps AC	29.2 amps AC	26.6 amps AC	
Idle Power								
Full	≈ 20 Watts		≈ 21 Watts		≈ 20 Watts		≈ 21 Watts	
Search	≈ 6 Watts							
Typical Efficiency	90%	92%			90%	92%		
Total Harmonic Distortion								
Typical	2%							
Max	5%							
Output Voltage Regulation	± 2%							
Max Output Current								
Peak	56 amps AC	70 amps AC	56 amps AC			70 amps AC	56 amps AC	
RMS	40 amps AC	50 amps AC	40 amps AC			50 amps AC	40 amps AC	
AC Overload Capability								
Surge	4800 VA	6000 VA	4800 VA			6000 VA	4800 VA	
5 Seconds	4000 VA	4800 VA	4000 VA			5000 VA	4000 VA	
30 Minutes	2500 VA	3200 VA	2500 VA		3200 VA	4000 VA	2000 VA	4000 VA
AC Input Current Max	30 amps AC							
AC Input Voltage Range (MATE Adj)	80 to 150 VAC							
AC Input Frequency Range	54.0 to 66.0 Hz							
DC Input Range	10.5 - 17.0 VDC	21.0 - 34.0 VDC	28.0 - 45.3 VDC	31.5 - 51.0 VDC	10.5 - 17.0 VDC	21.0 - 34.0 VDC	28.0 - 45.3 VDC	31.5 - 51.0 VDC
Continuous Battery Charge Output	80 amps DC	55 amps DC	35 amps DC		125 amps DC	85 amps DC	45 amps DC	
Warranty	Standard 2-yr / Optional 5-yr							
Weight								
Unit	56 lbs				54 lbs			
Shipping	67 lbs				62.2 lbs			
Dimensions (H x W x L)								
Unit	13" x 8.25" x 16.25"				12" x 8.25" x 16.25"			
Shipping	21.75" x 13" x 22"				21.75" x 13" x 22"			

FLEXpower ONE

The new FLEXpower ONE System accommodates all of the essential protective devices in the smallest possible space at the lowest installed cost making it ideal for applications with modest power requirements such as cabins, chalets, homes, remote communication sites and back-up power systems. Utilizing an extremely compact design and an easy-to-install mounting bracket, the fully pre-wired and factory tested FLEXpower ONE System is designed for a quick installation, saving both time and money.

FLEXpower ONE includes a single inverter, AC and DC wiring boxes, a single FLEXmax Charge Controller, MATE, HUB, FLEXnet DC and Surge Protector while maintaining a small system footprint. The FLEXpower ONE System is also equipped with battery and PV array breakers, a PV GFDI breaker, an Input-Output-Bypass Assembly, mounting locations for both AC GFCI Type B and EU Type F style outlets and additional AC breakers. FLEXpower ONE components carry all of the necessary ETL Certifications allowing for a code compliant installation that saves both time and money while still looking great.

Part #	Description	For	OutBack Part #
348-0001	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 250 A Breaker, VFX3524, GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-1
348-0002	Pre-wired AC/DC Boxes with 175 VAC Bypass, Type B Outlet, 175 A Breaker, VFX3648, GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-2
348-0003	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 250 A Breaker, GVFX3524GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-3
348-0004	Pre-wired AC/DC Boxes with 120 VAC Bypass, Type B Outlet, 175 A Breaker, GVFX3648 GFDI, 80 A Charge Controller Breaker	120 V, 60 Hz	FP1-4
348-0005	Pre-wired AC/DC Boxes with 230 VAC Bypass, Type B Outlet, 250 A Breaker, VFX3024E GFDI, 80 A Charge Controller Breaker	230 V, 50 Hz	FP1-5
348-0006	Pre-wired AC/DC Boxes with 230 VAC Bypass, Type B Outlet, 175 A Breaker, VFX3048E GFDI, 80 A Charge Controller Breaker	230 V, 50 Hz	FP1-6

FLEXpower TWO

The new FLEXpower TWO System accommodates all of the essential protective devices in an easy-to-install, fully pre-wired and factory tested dual inverter system. The FLEXpower TWO is ideal for applications with medium sized power requirements such as homes, light commercial or larger back-up power systems. Utilizing a compact design and an easy-to-install mounting plate, the FLEXpower TWO System can be mounted in either a horizontal or vertical orientation to allow installation in more space-limited locations and is designed for a quick installation, saving both time and money.

FLEXpower TWO includes two inverter/ chargers, AC and DC wiring boxes, a MATE2, HUB, and Surge Protector while maintaining a small system footprint.

The FLEXpower TWO System is also equipped with an Input-Output-Bypass Assembly, mounting locations for AC GFCI Type B style outlets and additional AC breakers. FLEXpower TWO components carry all of the necessary ETL Certifications allowing for a code compliant installation that saves both time and money while still looking great.

Part #	Description	OutBack Part #
348-0007	5 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 250 A breakers, two FX2524T inverter/chargers, MATE2, HUB10, RTS, X-240 and surge protector for 120 V / 240 V 60 Hz applications	FP2-32
348-0008	6 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 175 A breakers, two FX3048T inverter/chargers, MATE2, HUB10, RTS, X-240 and surge protector for 120 V / 240 V 60 Hz applications	FP2-31
348-0009	7.2 kW Pre-wired AC and DC boxes with 120 VAC Bypass , two 175 A breakers, two VFX3648 inverter/chargers, MATE2, HUB10, RTS, X-240 and surge protector for 120 V /240 V 60 Hz applications	FP2-10
348-0010	7 kW Pre-wired AC and DC boxes with 120 VAC Bypass, two 250 A breakers, two VFX3524 inverter/chargers, MATE2, HUB10, RTS, X-240 and surge protector for 120 V/ 240 V 60 Hz applications	FP2-12
348-0013	6 kW Pre-wired AC and DC boxes with 230 VAC Bypass, two 175 A breakers, two VFX3048E inverter/chargers, MATE2, HUB10 and RTS for 230 V 50 Hz applications	FP2-22
348-0014	6 kW Pre-wired AC and DC boxes with 230 VAC Bypass, two 250 A breakers, two VFX3024E inverter/chargers, MATE2, HUB10 and RTS for 230 V 50 Hz applications	FP2-24

OutBack POWER™

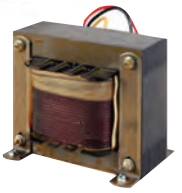
BRACKETS FOR FLEXWARE CHARGE CONTROL

Includes brackets, screws and conduit bushings.

Part #	Brackets	OutBack Part #
500-0023	Side Bracket for 1 FM series charge controllers	FW-CCB
500-0024	Side Bracket for 2 FM series charge controllers	FW-CCB2
500-0025	Top Bracket for 2 FM series charge controllers	FW-CCB2-T

AUTO TRANSFORMERS

The OutBack PSX-240 auto transformer can be used for step-up, step-down, generator and split phase output balancing or as a series stacked inverter to load balancing auto-former. Incorporating a transformer with 120 volt/ 30 amp primary and secondary side, a temperature activated cooling fan and a 25 amp dual breaker in a steel enclosure, the PSX-240 is ready to install in your custom application. Use for 120 or 240 VAC 60 Hz systems only.



Part #	Description	OutBack Part #
560-0021	With Enclosure, Relay Assembly 4000 W	PSX-240-RELAY
560-0000	Without Enclosure 4000 W	FW-X240
560-0001	With Enclosure 6000 W	PSX-240

INVERTER-SPECIFIC MONITORING

BATTERY REMOTE TEMPERATURE SENSOR

The OutBack Remote Temperature Sensor (RTS) is a necessary tool for proper battery charging. All OutBack products with integrated battery charging have a temperature compensation system built-in which benefits from the installation of the optional RTS. The RTS ensures that your OutBack system knows the precise ambient temperature so that it can recharge your batteries safely and efficiently. Systems with multiple OutBack products connected to a HUB4 or HUB10 require only a single RTS to be installed.

Part #	Description	OutBack Part #
570-0116	Battery Remote Temp Sensor with FX Inverters	RTS

COMMUNICATIONS HUB

The HUB system communications managers are the backbone of your networked OutBack power conversion system. The OutBack HUB communicates stacking, load share and power save off/on signals. Interconnection cabling is standard Ethernet CAT5 with RJ45 modular jacks. Through the use of a HUB, your system is completely coordinated and managed by the MATE.

Part #	Description	OutBack Part #
570-0009	Communications Hub, 10 ports	HUB10
570-0108	Communications Hub, 4 ports	HUB4
570-0113	Communications Cable, CAT5e Cable, 300 V, 3'	OBCATV-3
570-0114	Communications Cable, CAT5e Cable, 300 V, 50'	OBCATV-50
570-0115	Communications Cable, CAT5e Cable, 300 V, 6'	OBCATV-6

POWER PANEL ACCESSORIES

COMMUNICATIONS CONTROLLER FOR FLEXWARE MATE

The MATE system display and controllers are complete management tools for your OutBack Power system. Through the use of a single MATE you can remotely manage and monitor multiple inverter/ chargers, FM60s and any future OutBack power conversion and control products.

Part #	Description	OutBack Part #
570-0830	FLEXWare MATE3, White Case	MATE3
550-0358	FLEXWare MATE3, Flat Mount Wall Plate-with Screws and Bushing	FW-MB3-F
550-0357	FLEXWare MATE3, Side Mount Bracket-with Screws and Bushing	FW-MB3
550-0359	FLEXWare MATE3, Surface Mount Wall Bracket-with Screws and Bushing	FW-MB3-S
570-0110	FLEXWare MATE, Black Flush Mount Case	MATE2
550-0442	FLEXWare MATE2, Mounting Bracket-with Screws and Bushings	FW-MB2
570-0112	FLEXWare MATE, Black Oval Case	MATE-B
570-0109	FLEXWare MATE, White Oval Case	MATE
500-0057	FLEXWare MATE Mounting Bracket with Screws and Bushings	FW-MB1

FLEXNET DC SYSTEM MONITOR

The OutBack Power Systems FLEXnet DC is the ultimate in DC System monitoring devices. The integrated networked communications make valuable, usable data available from your system, viewable on an OutBack MATE communications device, providing you with the answers you need concerning your system's health, performance and efficiency.

Part #	Description	OutBack Part #
570-0103	FLEXnet DC System Monitor	FN-DC

FLEXWARE 250 ENCLOSURE

For applications with modest power requirements such as cabins and remote communication sites. Utilizing an extremely compact design and unique mounting features, at the lowest installed cost. One or two FLEXWare 250 enclosures can be mounted on each end of a single FX Series Inverter/ Charger.

Part #	Description	For # of Inverters	OutBack Part #
500-0018	FLEXWare 250 AC/ DC Disconnect Box	1	FW250

FLEXWARE 500 ENCLOSURE

For applications with medium power requirements such as homes, light commercial or larger back-up power systems. The FLEXWare 500 system architecture can support up to two OutBack FX Series Inverter/ Chargers, up to two OutBack charge controllers and all the associated AC and DC components. Thanks to a very compact design, FLEXWare 500 AC and DC enclosures mount with a FLEXWare MP in either a horizontal or vertical orientation to allow installation in more space-limited locations for a fast and professional looking wall-mounted installation. The FLEXWare 500 accommodates all of the essential protective devices in two enclosures.

Part #	Description	For # of Inverters	OutBack Part #
500-0019	FLEXWare 500 AC Disconnect Box with Ground Bar and DIN Rail	1 to 2	FW500-AC
500-0020	FLEXWare 500 DC Disconnect Box with Ground Bar and DC Shunt	1 to 2	FW500-DC

FLEXWARE 1000 ENCLOSURE

For applications with large power requirements such as large residential, commercial or village power systems. The FLEXWare 1000 system architecture is capable of supporting up to four OutBack FX Series Inverter/ Chargers, four OutBack charge controllers, and all the required AC and DC components and wiring. Utilizing a compact design, FLEXWare 1000 AC and DC enclosures accommodate all of the essential protective devices with lots of room for additional breakers and large cable connections and can be mounted either vertically or horizontally.

Part #	Description	For # of Inverters	OutBack Part #
500-0016	FLEXWare 1000 AC Disconnect Box with Ground Bar and DIN Rail	1 to 4	FW1000-AC
500-0017	FLEXWare 1000 DC Disconnect Box with Ground Bar and DC Shunt	1 to 4	FW1000-DC

FLEXWARE MOUNTING PLATE

The FLEXWare Mounting Plate is designed for indoor mounting only with appropriate fasteners and a secure mounting surface that can handle the full weight of an assembled system.

Part #	For # of Inverters	OutBack Part #
500-0033	2 (Use 2 plates for 4 inverters)	FW-MP

RADIAN ENCLOSURE

Part #	For # of Inverters	OutBack Part #
341-0100	Prewired GS Load Center with 175 A inverter disconnects, GFDI and PV disconnects for two charge controllers, FLEXnet DC w/ 3 shunts, 120/ 240 VAC inverter bypass, dual AC inputs	GSLC175-PV-120/240

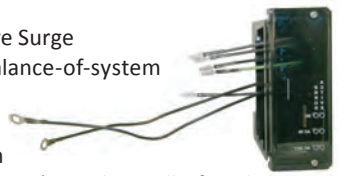
CONDUIT ADAPTERS

341-0000 341-0001

Allows connection of the FX and VFX Series Inverter/ Chargers to FLEXWare 500 and FLEXWare 1000 enclosures, one ACA and DCA required per FX Series Inverter/ Charger.

Part #	Type	OutBack Part #
341-0000	AC, with 2" Fitting	ACA
341-0001	DC, with 2" Fitting	DCA

SURGE PROTECTORS



The OutBack Power Systems FLEXWare Surge Protector is a seamlessly integrated balance-of-system component for the FX Series Inverter/ Charger. The sophisticated design allows for both AC and DC protection on multiple circuits (two AC and one DC) via thermally fused Metal Oxide Varistors (MOVs). LED visual indicators provide at-a-glance status monitoring allowing system users to determine FLEXWare Surge Protector operational status in real-time. UL1741 requirement for grid tied inverters.

Part #	Surge Protector For	OutBack Part #
501-0032	FLEXWare 250	FW-SP-250
570-0107	Replacement Board for FW-SP-250 or FW-SP-ACA	FW-SP-R
570-0106	FLEXWare Power Panel with AC Adapter	FW-SP-ACA

FLEXWARE INPUT/OUTPUT/BYPASS ASSEMBLIES

FLEXWare 250

- Single inverter Input-Output-Bypass for FW250-Field installable kit with color coded wire, all required ring terminals and sliding interlock plate.

FLEXWare 500

- Dual inverter Input-Output-Bypass for FW500-Field installable kit with color coded wire, all required terminal bus bars and sliding interlock plate.

FLEXWare 1000

- Field installable kit with color coded wire, all required terminal bus bars and sliding interlock plate.

Part #	For FW Panels	Description	OutBack Part #
500-0031	250	Kit, Single Phase, 230 VAC	FW-IOB-S-230VAC
500-0030	250	60 A, 120 VAC for Single Inverter	FW-IOB-S-120VAC
500-0026	500	60 A, 120 VAC for Dual Inverter	FW-IOB-D-120
500-0027	500	60 A, 120/ 240 VAC for Dual Inverter	FW-IOB-D-120/240
530-0035	500	60 A, 230 VAC	FW-IOB-D-230
500-0056	1000	30 A, 230/ 400 VAC for Triple Inverter	FW-IOB-T230/400
500-0032	1000	60 A, 120/ 208 VAC for Triple Inverter	FW-IOB-T120/208
500-0029	1000	60 A, 120/ 240 VAC for Quad Inverter	FW-IOB-Q120/240
500-0054	1000	Quad Inverter Input/ Output/ Bypass Kit, Single Phase, 230 VAC	FW-IOB-Q-230VAC

samlexamerica

Samlex DC-AC power inverters convert DC voltage provided by a 12, 24 or 48 volt battery into AC current. Pure or Modified Sine Wave power inverters provide AC power for your solar system or stand-alone battery.

PST SERIES

These high efficiency pure sine wave inverters convert 12 or 24 VDC to 120 VAC at 60 Hz. Models ranging from 120-300 W come with a 12 V cigar plug adapter.

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0008	150 W	12 VDC	120 VAC	PST-15S-12A
321-0009	300 W	12 VDC	120 VAC	PST-30S-12A
321-0015	300 W	24 VDC	120 VAC	PST-30S-24A
321-0010	600 W	12 VDC	120 VAC	PST-60S-12A
321-0016	600 W	24 VDC	120 VAC	PST-60S-24A
321-0011	1000 W	12 VDC	120 VAC	PST-100S-12A
321-0017	1000 W	24 VDC	120 VAC	PST-100S-24A
321-0012	1500 W	12 VDC	120 VAC	PST-150S-12A
321-0018	1500 W	24 VDC	120 VAC	PST-150S-24A
321-0134	2000 W	12 VDC	120 VAC	PST-200S-12A
321-0019	2000 W	24 VDC	120 VAC	PST-200S-24A

PSE SERIES

Reliable and durable, PSE modified sine wave inverters converts 12 or 24 VDC to 115 VAC at 60 Hz. Models ranging from 1250-2750 W come with a set of battery cable lugs. The larger PSE models can be hardwired directly into a utility panel.

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0061	1250 W	12 VDC	120 VAC	PSE-12125A
321-0062	1750 W	12 VDC	120 VAC	PSE-12175A
321-0065	1750 W	24 VDC	120 VAC	PSE-24175A
321-0063	2750 W	12 VDC	120 VAC	PSE-12275A
321-0066	2750 W	24 VDC	120 VAC	PSE-24275A

TN SERIES

This high efficiency UL-458 approved micro-controller based pure sine wave inverter charger provides an AC output of 100/110/115/120 V at 50/60 Hz at 1500 Watts (rated) from the battery input. The TN-1500 series inverter chargers have a built-in solar battery charger and UPS functionality.

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0105	1500 W	12 VDC	100, 110, 115, 120 VAC	TN1500-112F

SAM SERIES

SAM Series modified sine wave inverters are powerful and affordable. They convert 12 VDC to 115 VAC at 60 Hz. Models ranging from 100-800 W models also come with a USB charging port. Optional remote available for 1000-3000 W models. All SAM series inverters are ETL safety listed.

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0156	100 W	12 VDC	115 VAC	SAM-100-12
321-0157	250 W	12 VDC	115 VAC	SAM-250-12
321-0158	450 W	12 VDC	115 VAC	SAM-450-12
321-0159	800 W	12 VDC	115 VAC	SAM-800-12
321-0160	1000 W	12 VDC	115 VAC	SAM-1000-12
321-0161	1500 W	12 VDC	115 VAC	SAM-1500-12
321-0162	2000 W	12 VDC	115 VAC	SAM-2000-12
321-0163	3000 W	12 VDC	115 VAC	SAM-3000-12

SA SERIES

These high efficiency, microprocessor controlled pure sine wave inverters convert 12, 24 or 48 VDC to 120 VAC at 60 Hz. Models ranging from 150-1500 W are UL Safety Listed. Optional remote controls are available for models ranging from 1000-3000 W. Model numbers containing "K" indicate high surge capability.

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0148	150 W	12 VDC	120 VAC	SA-150-112
321-0149	150 W	24 VDC	120 VAC	SA-150-124
321-0150	300 W	12 VDC	120 VAC	SA-300-112
321-0151	300 W	24 VDC	120 VAC	SA-300-124
321-0152	600 W	12 VDC	120 VAC	SA-600R-112
321-0153	600 W	24 VDC	120 VAC	SA-600R-124
321-0033	1000 W	12 VDC	120 VAC	SA1000K-112
321-0038	1000 W	24 VDC	120 VAC	SA1000K-124
321-0036	3000 W	12 VDC	120 VAC	SA3000K-112
321-0143	3000 W	24 VDC	120 VAC	SA3000K-124
321-0154	1500 W	12 VDC	120 VAC	SA-1500-112
321-0155	1500 W	24 VDC	120 VAC	SA-1500-124
321-0146	2000 W	12 VDC	120 VAC	SA-2000K-112
321-0147	2000 W	24 VDC	120 VAC	SA-2000K-124

S AND SK SERIES

These high efficiency microprocessor controlled pure sine wave inverters convert 12, 24 or 48 VDC to 120 VAC at 60 Hz. Models range from 700 to 3000 Watts. Models are also available with an output of 230 VAC by special order. S and SK Series inverters are FCC compliant.

S SERIES

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0108	300 W	12 VDC	220 VAC	S300-212
321-0028	600 W	48 VDC	120 VAC	S600R-148
321-0029	1500 W	48 VDC	120 VAC	S1500-148

SK SERIES

Part #	Description	Input Voltage	Output Voltage	Samlex Part #
321-0174	350 W	12 VDC	220 VAC	SK350-212
321-0042	1000 W	48 VDC	120 VAC	SK1000-148
321-0035	2000 W	12 VDC	120 VAC	SK2000-212
321-0176	3000 W	48 VDC	120 VAC	SK3000-148

MONITORING

Part #	Description	Samlex Part #
570-0514	Battery Watch Battery Monitor, 12 V / 24 V Programmable System	BW-01

SURESINE INVERTERS

The SureSine is a pure sine wave inverter for off-grid PV applications requiring AC power. Applications include rural electrification, telecom, remote homes, RV/ caravans and boats.

- **Improved Load Operation** – Pure sine wave provides quality AC equivalent to grid power. Toroidal transformer design generates good wave form throughout the range of input voltages. Handles 200% surge up to 600 watts.
- **High Reliability** – No internal cooling fan or other moving parts prone to failure. Uses epoxy encapsulation, conformal coating, stainless steel hardware, and an anodized aluminum enclosure to protect against harsh tropical and marine environments.
- **More Power Available** – High efficiency and low self consumption maximizes power to the loads. Automatic stand-by reduces consumption during no load conditions.

Part #	Watts	Input Voltage	Output Voltage	Frequency	Morningstar Part #
321-0097	300 W	12 VDC	220 VAC	50 Hz	SI-300-220V
321-0002	300 W	12 VDC	115 VAC	60 Hz	SI-300-115V-UL

POWER PANEL COMPONENTS

E-PANELS

Part #	Description	Amps	Voltage	MidNite Solar Part #
500-0082	Export Stretched Gray Steel for Outback	250 A	230 VAC	MNE250STSE -L
500-0070	Gray Steel for Magnum MM	125 A	120 VAC	MNE125STMM -L
580-0078	Gray Steel for Magnum MS4448-AE/ right hand door	175 A	120/ 240 VAC	MNE175STM -R-240
500-0051	Gray steel for Magnum MS4024-MS2812, Left hand door	250 A	120 VAC	MNE250STM -L
500-0155	Narrow Gray Steel for Outback, Right hand door	125 A	125 VDC	MNE125ST-R
500-0005	Narrow Gray Steel for Outback, Left hand door	125 A	120 VAC	MNE125ST-L
500-0008	Narrow Gray Steel for Outback	175 A	120 VAC	MNE175ST-L
500-0012	Narrow Gray Steel for Outback	250 A	120 VAC	MNE250ST-L
580-0080	Gray Steel for single XW	175 A	120/ 240 VAC	MNE175XW
500-0085	Gray Steel for Xantrex/ Samlex/ TR	175 A	120 VAC	MNE175DR/ TR/SAMLEX-L
500-0004	Gray Steel for Xantrex	125 A	120 VAC	MNE125LT

E-PANELS CONTINUED

Part #	Description	Amps	Voltage	MidNite Solar Part #
500-0007	Gray Steel for Xantrex	175 A	120 VAC	MNE175LT
500-0011	Gray Steel for Xantrex	250 A	120 VAC	MNE250LT
500-0086	Gray Steel for Xantrex TR	250 A	120 VAC	MNE250DR/ TR/SAMLEX-L
500-0049	Gray Steel for Xantrex XW	250 A	120/ 240 VAC	MNE250XW
500-0065	Narrow Aluminum for Outback UltraLite	125 A	120 VAC	MNE125ALU Lite-L
500-0066	Narrow Gray Steel for Outback UltraLite	175 A	120 VAC	MNE175STU Lite-L
500-0083	Narrow Gray Steel for Outback UltraLite	250 A	120 VAC	MNE250STU Lite-L
500-0062	Stretched Aluminum for Outback/ Charge Controller	250 A	120 VAC	MNE250AL -PLUS
500-0087	Stretched Aluminum for Outback/ Charge Controller	125 A	120 VAC	MNE125AL -PLUS
500-0061	Stretched Aluminum for Outback/ Charge Controller	175 A	120 VAC	MNE175AL -PLUS
500-0050	Stretched Gray Steel for Magnum	175 A	120 VAC	MNE175STM -L
500-0156	Stretched Gray Steel for Outback, Left hand door	125 A	125 VDC	MNE125STS -L
500-0157	Stretched Gray Steel for Outback, Right hand door	125 A	125 VDC	MNE125STS -R
500-0009	Stretched Gray Steel for Outback	175 A	120 VAC	MNE175STS -L
500-0046	Stretched Gray Steel for Outback, Left hand door	250 A	120 VAC	MNE250STS -L
500-0158	Stretched Gray Steel for Outback/ right hand door	250 A	120 VAC	MNE250STS -R
500-0067	Stretched Magnum steel Left hand UltraLite E-Panel	250 A	120 VAC	MNE250STMU Lite-L
500-0052	White Aluminum for MS4024-MS2812	250 A	120 VAC	MNE250ALM -L
500-0003	White Aluminum for Outback	125 A	120 VAC	MNE125ALT
500-0006	White Aluminum for Outback	175 A	120 VAC	MNE175AL-L
500-0010	White Aluminum for Outback	250 A	120 VAC	MNE250AL-L
500-0060	White Aluminum for Outback	125 A	120 VAC	MNE125AL-L
500-0063	White Aluminum for Outback	175 A	125 VDC	MNE175ALT
500-0064	White Aluminum for Outback	250 A	125 VDC	MNE250ALT
500-0047	White Steel for Magnum PAE	175 A	120/ 240 VAC	MNE175STM -L-240
500-0176	White Steel for Magnum PAE	250 A	120/ 240 VAC	MNE250STM-R-240
500-0048	White Steel for Magnum PAE	250 A	120/ 240 VAC	MNE250STM-L-240

E-PANEL ACCESSORIES

Part #	Description	MidNite Solar Part #
500-0068	16 gauge gray steel plate for 1 or 2 E-Panels wide or narrow	BACKPLATE
500-0053	Gray Steel Right Hand Hinge Door with Left Hand Charge Control Bracket for wide Chassis	MNErightdoorSTM

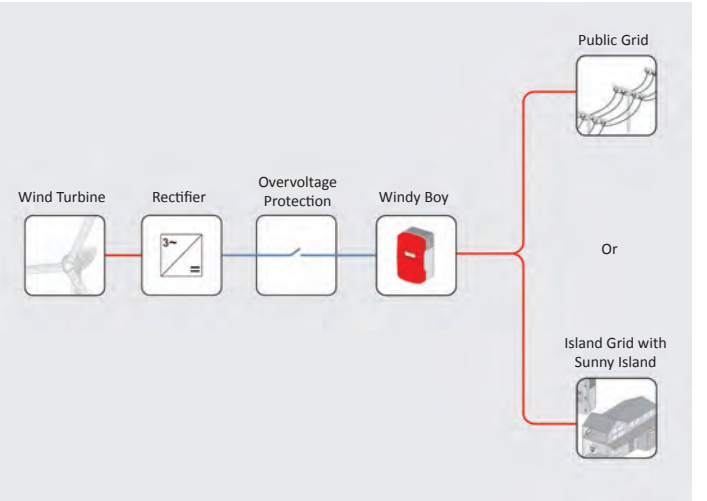
A wind power system is only as good as its inverter. It converts direct current from the turbine to grid-compliant alternating current. Its quality determines the yield; it is the heart of the wind power system.

SMA's Windy Boy Inverters

The grid-coupling of small wind energy plants is simpler than ever - with the Windy Boy from SMA. It converts the variable frequency voltage from wind generators into grid conforming AC voltage. The Windy Boy works perfectly together with the Sunny Island in stand-alone grids for the electrification of remote areas.

The Windy Boys are suitable for wind generators from a wide variety of manufacturers and power classes. They guarantee an optimal power adjustment and very high energy yields.

They are also best suited for flexible and worldwide use - ensured by the robust housing, the SMA Grid Guard disconnection device, the electric separation to the grid along with an automatic 50 or 60 Hz recognition.



Windy Boy 3000-US

- Certified to the new UL 1741 / IEEE 1547
- 10-year limited warranty standard
- Comprehensive SMA communications and data collection options
- Rugged stainless steel enclosure
- Exceptional reliability and energy capture ratio
- Easy to install three-point mounting system
- Modular design is easily expandable

Windy Boy 5000-US, 6000-US, 7000-US, 8000-US

- Certified to the new UL 1741 / IEEE 1547
- 10-year limited warranty standard
- CEC efficiency of up to 96%
- Sealed electronics enclosure and OptiCool
- Comprehensive SMA communications and data collection options
- Rugged cast aluminum outdoor rated enclosure

*SMA accessories are on pages 136-137.

*SMA accessories are on pages 136-137.

Windy Boy Family

SMA Part #	Windy Boy 3000-US	Windy Boy 5000-US	Windy Boy 6000-US	Windy Boy 7000-US	Windy Boy 8000-US
Part #	312-0003	312-0009	312-0000	312-0010	312-0008
Input Data (DC)					
Max Recommended DC Input Power	3200 W	5300 W	6380 W	7450 W	8600 W
Max DC Voltage	500 V	600 V			
Peak Power Tracking Voltage	208 V: 180 – 500 V	250 - 600 V			300 - 600 V
	240 V: 200 – 500 V				
DC Max Input Current	17 A	21 A	25 A	30 A	30 A
# of Fused String Inputs	4				
DC Start Voltage (Adjustable)	228 V	300 V	300 V	300 V	300 V
Output Data (AC)					
AC Nominal Power	3000 W	5000 W	6000 W	7000 W	240 V: 7680 W
					277 V: 8000 W
AC Max Output Power	3050 W	5100 W	6100 W	7100 W	240 V: 7680 W
					277 V 8100 W
AC Max Output Current	208 V: 15 A	208 V: 27.9 A	208 V: 33.3 A	208 V: 34.0 A	208 V: N/A
	240 V: 15 A	240 V: 24.1 A	240 V: 28.9 A	240 V: 34.0 A	240 V: 32.0 A
	277 V: N/A	277 V: 20.9 A	277 V: 25.0 A	277 V: 32.0 A	277 V: 32.0 A
AC Nominal Voltage / Range	208 V: 183 - 229 V				208 V: N/A
	240 V: 211 - 264 V				
	277 V: N/A	277 V: 244 - 305 V			
AC Frequency / Range	60 Hz / 59.3 - 60.5 Hz				
Power Factor	1				
Efficiency					
Peak Inverter Efficiency	96.6%	96.8%	97.0%	97.1%	96.5%
CEC Weighted Efficiency	208 V: 95.0%	208 V: 95.5%	208 V: 95.5%	208 V: 95.5%	208 V: N/A
	240 V: 95.5%	240 V: 95.5%	240 V: 95.5%	240 V: 96.0%	240 V: 96.0%
	277 V: N/A	277 V: 95.5%	277 V: 95.0%	277 V: 96.0%	277 V: 96.0%
Mechanical Data					
Dimensions (W x H x D)	18” x 14” x 9”	18” x 24” x 9”			
Weight / Shipping Weight	88 lbs / 97 lbs	143 lbs / 148 lbs			143 lbs / 152 lbs
Ambient Temp Range	-13 °F to +113 °F				
Power Consumption (Standby / Night)	< 7 W / (0.1 W)				
Topology	Low Frequency Transformer, True Sine Wave				
Cooling Concept	OptiCool™, Forced Active Cooling				
Mounting Location In-/Outdoor	Included (NEMA 3R)				
Features					
Communication: RS485 / Wireless	Optional				
Warranty	5-Year Included / 10-Year Optional				
Compliance	IEEE-929, IEEE-1547,UL 1741, UL 1998, FCC Part 15 A & B				

WINDY BOY PROTECTION BOX

Part #	Description	SMA Part #
125-0163	600 VDC	WBP-BOX 600

POWER-ONE WIND INVERTERS

Part #	Description	Power-One Part #
310-0263	PVI-10 kW Wind Inverter, HiFreq Isolated, Dual Input, 208V, 3-ph, with DC disconnect	SSWI-10.0-I-OUTD-W-208
310-0264	PVI-10 kW Wind Inverter, HiFreq Isolated, Dual Input, 480V 3-ph, with DC disconnect	SSWI-10.0-I-OUTD-W-480

POWER-ONE WIND ACCESSORIES

Part #	Description	Power-One Part #
570-0483	Wind Interface Box, 7200 W, NEMA 4X, 3-ph input, 40-400 VAC/ 0-600 Hz	PVI-AEC-BASIC-ANALOG

INVERTER-SPECIFIC MONITORING

WEBCONNECT

Part #	Description	SMA Part #
570-1050	Webconnect Data Module for TL-22 Inverters	SWDM-US-10

SUNNY BEAM BLUETOOTH
Wireless Monitoring Systems

Part #	Description	SMA Part #
570-0635	Sunny Beam with Bluetooth, Monitor up to 12 Inverters (Add Card for Each), USB Port	Sunny Beam-BT
570-0636	Sunny Beam Bluetooth Communication Card	BTPBINV-NR
500-0150	Bluetooth Communication Piggyback Plus Card with External Antenna	BTPB-EXTANT-NR/ US
570-0678	Sunny Beam Bluetooth Repeater	BTREP-IN
575-0199	Sunny Beam Power Supply	BEAM-BT-SUPPLY

SUNNY SENSORBOX
Connects to the Sunny WebBox using RS485 communication. The SensorBox includes a 120 V power supply to feed the SensorBox using the RS485 cabling.

Part #	Description	SMA Part #
570-0127	With Irradiance and Module Temp Sensors	SUNNY SENSORBOX

SENSOR OPTIONS

Part #	Optional Sensors	SMA Part #
570-0117	Ambient Temp Sensor	TEMP SENSOR AMB
570-0129	Anemometer Wind Speed Sensor	WIND SENSOR
570-0146	Additional Module Temperature Sensor	TEMP SENSOR MODULE
330-0258	Power Balancer Set Upgrade Kit For The Power Balancer Function	PBL-SBUS-10-NR
580-0074	Power Injector and Mounting Plate	POWER INJ + MP
570-0908	Power Injector with Bluetooth	BT-485-CON-DEV

SUNNY CENTRAL STRING MONITOR CONTROLLER

Part #	Description	SMA Part #
360-0223	With 2 hubs	SCSMC-2
360-0224	With 3 hubs	SCSMC-3
360-0225	With 4 hubs	SCSMC-4

COMMUNICATION CARD

Part #	Description	Communication Type	SMA Part #
570-1033	Communication Card for Sunny Island Inverters	RS-485 Module	SI-485PB-NR
570-0028	Communication Card for Sunny Boy invertes	RS-485 Module	SB RS 485-N

MULTICLUSTER COMMUNICATIONS CARD

Part #	Description	SMA Part #
500-0116	Piggy-Back Card, One for Each SI Cluster Master	MC-PB

MULTICLUSTER BOX

Part #	Description	SMA Part #
500-0115	3-Phase for 12 x 230 V, 50 Hz, SI5048, Includes 4 MC-PB Cards	MC-BOX-12.3-3-EN
500-0084	3-Phase for 6 x 230 V, 50 Hz, SI5048, Includes 2 MC-PB Cards	MC-BOX-6.3-1-EN
500-0114	3-Phase for 12 x 120 V, 60 Hz, SI5048U, UL Listed for Off-Grid Only	MCB-12U

COMMISSIONING

Part #	Description	SMA Part #
570-0609	Commissioning of PV-MEAS Hardware	PVMEAS-COMM
570-0734	On site Commissioning of SC250U	SC250U-CMG
570-0735	On-Site Commissioning of SC500-US	LSTG57 CMG
570-0736	On site Commissioning of SC500HE-US	SC500HE-US-CMG
570-0743	On-Site Commissioning of SC500HE-US-XFMR	SC500HE-US-XFMR-COMM

COMMUNICATION CABLE
Interconnects inverters.

Part #	Description	SMA Part #
570-0123	50' Cable for RS-485	RS 485 CABLE
570-0776	RS485 interface upgrade for SMC	485BP-SMC-NR

SERVICE CABLE
Used by installers to perform software configuration of inverter parameters.

Part #	Description	SMA Part #
570-0147	Sunny Boy PC Service Cable	SB 232 SERV USB

SMART WEB SERVER FOR MODBUS INTERFACE

Part #	For	SMA Part #
570-0610	Modbus Interface	MODBUS-GATEWAY

WEB BOX FOR DIAL UP MODEM

Part #	Power Supply	Size H/W/D	For
570-0168	115 – 230 V	8.85" x 5.11" x 2.25"	Ethernet

SUNNY WEBBOX
Web-Enabled Monitoring Systems
Complete System Access-anywhere in the world. Connects to Sunny Boy, Windy Boy and Sunny Island inverters (RS485 card is required in each).

Part #	Description	SMA Part #
570-0128	Web Box	SUNNY WEBBOX
570-0829	WebBox with Bluetooth	WEBBOX-BT-20
570-0677	For SunnyTower 208/ 120	SUNNY WEBBOX-208

COMBINER BOX

Part #	# of Circuits	Voltage	NEMA Rating	SMA Part #
510-0017	6 Circuits	600 VDC	NEMA 3R	SBCB 6
510-0133	Dual 6 Circuit	600 VDC	NEMA 3R	SBCBTL6-10
510-0018	12 Circuits	600 VDC	NEMA 3R	SCCB 12
510-0042	12 Circuits	600 VDC	NEMA 4	SCCB 12 NEMA 4
510-0019	28 Circuits	600 VDC	NEMA 3R	SCCB 28
510-0032	28 Circuits	600 VDC	NEMA 4	SCCB 28 NEMA 4
510-0103	52 Circuits	600 VDC	NEMA 4	SCCB-52 NEMA 4

COMBINER DISCONNECT SWITCH

Part #	Description	SMA Part #
580-0047	600 VDC, 30 A, with (4) 10 A Fuses Included	COMBO-SWITCH-10

SUNNY BOY 2000HF-US/2500HF-US/3000HF-US ACCESSORIES

Part #	Description	SMA Part #
575-0195	Communication Quick Module RS485 interface and multi-function relay	485QMUS-10-NR
370-0070	Flush Mount Kit	MOUNT KIT-10-NR
590-0081	Plug-In Grounding Stick Replacement	PLUGIN-GRD-10-NR

SUNNY BOY 3000TL-US/4000TL-US/5000TL-US ACCESSORIES

Part #	Description	SMA Part #
570-1048	RS485 Interface Card	DM-485CB-10

INTERNATIONAL INVERTERS

SMA manufacturers inverters for 230 V/ 50 Hz power systems used in the Rest of the World (ROW).

ROW-SUNNY ISLAND FAMILY

Part #	Description	Volts AC	Frequency
311-0018	3324 Inverter, 3300 W, Battery Back-up	230 V	50 Hz
311-0020	4248 Inverter, 4200 W, Battery Back-up	230 V	50 Hz
311-0011	4248U Inverter, 4200 W, Battery Back-up	120 V	60 Hz
311-0019	5048 Inverter, 5000 W, Battery Back-up	230 V	50 Hz
311-0042	6.0H Inverter, 6000 W, Battery Back-up	230 V	50 Hz
311-0043	8.0H Inverter, 8000 W, Battery Back-up	230 V	50 Hz

ROW-SUNNY BOY FAMILY

Part #	Description	Volts AC	Frequency
313-0006	2500HF-ROW High Frequency Inverter	230 V	50 Hz
313-0004	3000HF-ROW High Frequency Inverter	230 V	50 Hz
313-0008	3000-ROW Inverter	230 V	50 Hz
313-0009	3300-ROW Inverter	230 V	50 Hz
313-0011	3800-ROW Inverter	230 V	50 Hz

ROW-SUNNY MINI CENTRAL FAMILY

Part #	Description	Volts AC	Frequency
313-0013	5000TL-ROW Inverter, Transformerless	230 V	50 Hz
313-0016	6000TL-ROW Inverter, Transformerless	230 V	50 Hz
313-0019	8000TL-ROW Inverter, Transformerless	230 V	50 Hz
313-0020	9000TL-ROW Inverter, Transformerless	230 V	50 Hz
313-0028	10000TL-ROW Inverter, Transformerless	230 V	50 Hz
313-0022	11000TL-ROW Inverter, Transformerless	230 V	50 Hz

SUNNY TRIPOWER

Part #	Description	Volts AC	Frequency
313-0012	8000 TL-10, Grid-tied, 3-Ph, DC Disconnect	230 V	50 Hz

SUNNY TRIPOWER

Part #	Description	Volts AC	Frequency
313-0021	10000 TL-10, Grid-tied, 3-Ph, DC Disconnect	230 V	50 Hz
313-0026	12000TL-10, Grid-tie, 3-Ph, DC Disconnect	230 V	50 Hz
313-0027	15000TL-10, Grid-tied, 3-Ph, DC Disconnect	230 V	50 Hz
313-0025	17000TL-10, Grid-tied, 3-Ph, DC Disconnect	230 V	50 Hz
313-0024	20000TL-10, Grid-tie, 3-Ph, DC Disconnect	230 V	50 Hz

SCHNEIDER ELECTRIC XW POWER DISTRIBUTION PANEL (XW PDP)

The XW PDP is factory-wired and labeled to support a code-compliant single-inverter installation. It has plenty of room to add wiring and breakers to expand up to three inverters, four charge controllers, or other equipment to support 120/240-volt, three-wire, single-phase systems. The XW PDP can be configured to mount on either side of the inverter/ charger. It is designed to save significant time and money during installation, taking less than 25% of the time to install. A mounting plate and XW CB conduit box is supplied with each XW PDP.

SCHNEIDER ELECTRIC XW SYSTEM CONTROL PANEL (XW SCP)

The XW SCP is a Xanbus™ enabled device featuring a graphical, backlit LCD screen that displays system configuration and diagnostic information for all devices connected to the network. When installed as a XW Series accessory, the XW SCP eliminates the need for separate control panels for each device and gives a single point of control to set up and monitor an entire XW system.

SCHNEIDER ELECTRIC XW AUTO GENERATOR START (XW AGS)

The XW AGS is a Xanbus™ enabled device that can automatically activate a generator to provide an XW Series Inverter/ Charger with power to recharge depleted batteries or assist with heavy loads. Compatible with popular generators, it adds intelligence to power management and eliminates time spent monitoring batteries and inverter loads. It can be configured to start the generator in response to low battery voltage, thermostat operation, or load size on the inverter battery. A quiet-time setting prevents the generator from starting at inconvenient times. The LCD display shows the status of the XW AGS, while all user-defined settings are programmed through the XW SCP.

Part #	Description	Schneider Electric Part #
341-0029	XW Connection Kit for 2nd Inverter	RNW8651020
341-0026	XW CB - Conduit Box	RNW8651025
341-0030	XW PDP	RNW8651015
341-0027	XW SCP	RNW8651050
341-0028	XW AGS	RNW8651060
570-0479	XW Configuration Tool	RNW8651155

INVERTER-SPECIFIC MONITORING

SOLAR INVERTER MONITOR

570-1052

Inverter-Direct Base Systems connect directly to the inverter to capture inverter performance data as well as event codes (such as faults). Can be used alone or in combination with revenue-grade Base Systems. Outdoor-rated NEMA 4 enclosure.

Part #	For	Schneider Electric Part #
570-0141	GT Series, GT-MON	RNW8640203
570-1052	COMBOX Communication Device	RNW8651058

Let's do the math.

Yup. A longer warranty is better.

Magnum has you covered with our five-year warranty.

The Magnum Panel (MP) and Mini Panel (MMP) systems make ordering and installing inverters and balance of system equipment easy and convenient.

And now, MP and MMP systems come with extended peace of mind. Extend our three-year warranty to five years simply by installing your MS / MS-PAE on an MP or MMP panel system. The five-year warranty also covers Magnum accessories, including the Magnum ME-ARC and ME-RC Remotes, the Magnum Router (ME-RTR), Battery Monitor Kit (ME-BMK), and Auto Gen Start (ME-AGS-N) installed on MP and MMP systems.

To learn more about Magnum products visit www.magnumenergy.com

MAGNUM ENERGY

Monitoring

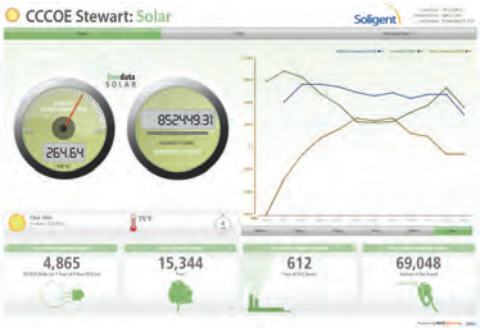
Soligent

DECK Monitoring

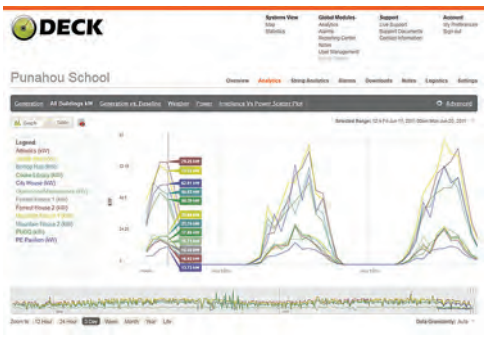
DECK MONITORING SOLUTION FOR PV SYSTEMS

DECK Monitoring combines advanced energy monitoring software with a full commitment to customer service and support. DECK's web-based software includes powerful system management tools in a secure private Admin Panel, plus an attractive public-facing Dashboard. DECK provides a streamlined process to order, deploy and install, along with responsive and knowledgeable support to help you get the most out of your PV system.

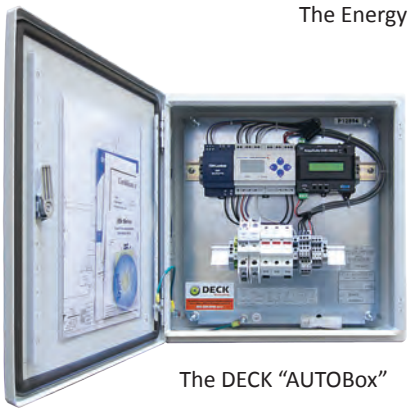
DECK provides a wide range of product and service offerings so you can find a monitoring solution to fit your project specs and budget. You may purchase software only, or start with a "basic package" of software bundled with essential hardware devices. Then consider additional products and services that add value and expanded functionality to your monitoring system.



The DECK Dashboard



The Energy Intelligence Admin Panel



The DECK "AUTOBox"

BUILD YOUR MONITORING SYSTEM:

Start with Basic Monitoring Hardware: all systems require a meter, CTs, and a gateway device. DECK sources revenue-grade meters from Veris and Elkor and will source the more appropriate meter to meet your project specs. DECK will provide split-core CTs to match your system size. DECK sources the AcquiSuite 8810 gateway from Obvius.

Choose Among Several Basic Monitoring Hardware Packages: you may choose to receive these hardware items packed separately and execute all wiring and configuration tasks yourself. Other DECK packages provide the meter and gateway pre-wired and mounted in a weatherproof enclosure for a simplified installation experience.

Get Inverter Data: Inverter communications let you examine inverter performance side by side with other system data and avoids the necessity of site visits to get inverter readings. DECK can communicate with most major inverter brands… consult a Soligent agent for details.

Weather Stations Provide Valuable Irradiance Data: environmental sensors greatly increase the analytic power of your monitoring system by providing irradiance data. This information accounts for cloud cover to enable the most accurate assessment of your system's performance in all weather conditions.

Consider Granular Monitoring Options: you may choose to expand your analytic capabilities by purchasing sub-array or string level monitoring on the DC side of your system. Granular monitoring can detect isolated performance issues in your array that may go unnoticed with just AC side monitoring. Detect smaller performance issues before they add up to big financial losses… then locate the problem areas quickly and efficiently.

Consider Wireless Communication Needs: avoid costs associated with digging trenches and running wires by using paired ModHopper transceivers. DECK can also provide cellular modems for project locations without access to a wired web network.

Choose Interactive Display Monitors: DECK can provide touchscreen displays for building lobby areas. Choose among desktop, wall mount, or kiosk-style displays.

DECK OFFERS A FULL SUITE OF MANAGED SERVICES TO HELP YOU ACHIEVE A SUCCESSFUL MONITORING EXPERIENCE:

OTIS (On-site Technical Installation Service): DECK will send an experienced support technician to your project site to provide oversight and advice for your monitoring installation.

Full Installation Service: DECK can provide full installation service anywhere in the continental U.S.

DECK Monitoring was founded by former solar integrators with the core mission of providing a better customer experience for integrators and installers. From system planning to installation and beyond, DECK solutions help you achieve a smooth project workflow, saving you time and money.

DECK Monitoring

"AUTOBOX" PACKAGES (5 YEARS SOFTWARE AND SUPPORT)

Part #	Description	DECK Part #
570-0991	Commercial Monitoring ("AUTOBox" 100 A: hardware in enclosure w/ auto-activation, 100 A CT size)	A277C100
570-0992	Commercial Monitoring ("AUTOBox" 200 A: hardware in enclosure w/ auto-activation, 200 A CT size)	A277C200
570-0993	Commercial Monitoring ("AUTOBox" 300 A: hardware in enclosure w/ auto-activation, 300 A CT size)	A277C300
570-0994	Commercial Monitoring ("AUTOBox" 400 A: hardware in enclosure w/ auto-activation, 400 A CT size)	A277C400
570-0995	Commercial Monitoring ("AUTOBox" 600 A: hardware in enclosure w/ auto-activation, 600 A CT size)	A277C600
570-0996	Commercial Monitoring ("AUTOBox" 800 A: hardware in enclosure w/ auto-activation, 800 A CT size)	A277C800

"ALL-IN-ONE-BOX" PACKAGES (5 YEARS SOFTWARE AND SUPPORT)

Part #	Description	DECK Part #
570-0989	Commercial Monitoring ("All-in-One Box" standard: hardware in enclosure, 100–277 VAC PS)	CM5YE111
570-0997	Commercial Monitoring ("All-in-One Box" high voltage: hardware in enclosure, 480–600 VAC PS)	CM5YE114
570-0998	Commercial Monitoring ("All-in-One Box" GSM: hardware in enclosure, includes GSM modem)	CM5YE112
570-0999	Commercial Monitoring ("All-in-One Box" CDMA: hardware in enclosure, includes CDMA modem)	CM5YE113

BASIC PV MONITORING PACKAGES (5 YEARS SOFTWARE AND SUPPORT)

Part #	Description	DECK Part #
570-0586	Commercial Monitoring (software and hardware / support) Do-it-yourself wiring and configuration	CM5YP001
570-0919	Commercial Solar Monitoring Software-only Package	CM5YS001
570-0613	Residential Revenue Grade Solar Monitor Equipment & 5-Yr Monitor Service, 120 / 240 V	RM5YP001
570-0974	Residential Monitoring Software Only Package	RM5YS001

INVERTER COMMUNICATIONS (5 YEARS SOFTWARE AND SUPPORT)

DECK software communicates with many inverter models.

Contact your sales representative for inverter specific communications options.

WEATHER STATIONS (5 YEARS SOFTWARE AND SUPPORT)

Part #	Description	Deck Part #
570-0970	Basic Weather Station (includes pyranometer plus sensors for ambient & cell temperature)	WS5YP012
570-0971	Advanced Weather Station (includes pyranometer plus sensors for ambient & cell temperature and wind speed & direction	WS5YP013
570-0972	Weather Station Tripod - 3'	WS5YP010
570-0973	Weather Station Wall Mount	WS5YP011
570-0806	Weather Station SMA Software Only	WSSMA002

GRANULAR MONITORING OPTIONS (DC MONITORING)

Planning a granular monitoring solution involves many variables for system size and configuration.

Contact your sales representative for more information on these options.

COMMUNICATION HARDWARE

Part #	Description	Deck Part #
570-0851	ModHopper Wireless Modbus Data Transceiver (sold individually – minimum 2 necessary)	WP2PP005
570-0598	GSM Cellular Modem (Customer must find and purchase a cellular data plan)	CMG00001
570-1000	Verizon CDMA Cellular Modem (customer will be contacted by Astral Communications to set up data plan)	CMG00002

VISUAL DISPLAY OPTIONS WITH PRE-CONFIGURED PC

Part #	Description	Deck Part #
570-0593	Kiosk Indoor with 19" Touchscreen	KTSIP001
570-0803	Touchscreen Flat Panel 19", desk mount	HPTSP000
570-0629	Touchscreen Flat Panel 22", desk mount	HPTSP001
570-0805	Touchscreen Flat Panel 32", wall mount	HPTSP003
570-0906	Touchscreen Flat Panel 42", wall mount	HPTSP004

AGENCY REPORTING

Part #	Description	Deck Part #
570-0961	Third Party Reporting to CSI-PG&E for 5 Years	EDI5YA002
570-0962	Third Party Reporting to CSI-SDGE for 5 Years	EDI5YA003
570-0963	Third Party Reporting to CSI-SCE for 5 Years	EDI5YA004
570-0964	Third Party Reporting to CSI-IID for 5 Years	EDI5YA005
570-0965	Third Party Reporting to MassCEC-PTS for 5 Years	EDI5YA006
570-0966	Third Party Reporting to NEPOOL-GIS for 5 Years	EDI5YA007
570-0967	Third Party Reporting to PJM-EIS for 5 Years	EDI5YA008
570-0968	Third Party Reporting to WREGIS for 5 Years	EDI5YA009
570-0969	Third Party Reporting to CSI-PMRS for 5 Years	EDI5YA010

ADDITIONAL SERVICES

Part #	Description	Deck Part #
570-1019	DECK On-Site Technical Installation Support- On-site help to smooth out the installation process (first day)	INSTL005
570-1020	OTIS Additional day	INSTL006

SOFTWARE CONTRACT EXTENSIONS (5 YEAR EXTENSIONS)

DECK offers 5-year extensions to their monitoring services.

Contact your sales representative for more information on these options.

The LGate 101 and LGate 310 can monitor nearly any type of solar energy system. Regardless of inverter or panel type, it can measure energy production with a high degree of accuracy. As a datalogger, the LGate 101 has a variety of digital and analog inputs enabling direct communication with third-party devices such as inverters and meteorological sensors. The LGate 310 features a digital, polyphase socket meter paired with an industrial-grade datalogger and Internet gateway. The meter is installed with standard socket base and connects via RS485 to the datalogger. Performance data for both meters are aggregated and uploaded automatically to the Locus Energy Smart Monitoring website which provides custom tools and analytics to all project stakeholders.

570-0933

570-0951

DATA COLLECTION

The LGate 101 uses a hard-wired voltage reference and current transformers (CTs) to measure power. There are inputs for up to three CTs allowing the LGate to measure both solar energy generation and whole-house electrical consumption. It can also gather data from up to 16 third-party devices simultaneously which is collected via RS485 and Modbus RTU protocols. All data feeds are stored in non-volatile memory and then uploaded with unique identifiers to provide maximum flexibility as to how the data is presented online.

Energy data from the LGate 310 is collected from the Itron Sentinel® meter and passed digitally to the datalogger. Additional system performance data can be collected directly from meteorological sensors and supported inverters. All data feeds are stored in non-volatile memory and then uploaded with unique identifiers to provide maximum flexibility as to how the data is presented online.

NETWORK CONNECTIVITY

The LGate 101 and LGate 310 are plug and play devices supporting a multitude of connectivity options. The LGate 101 and LGate 310 can communicate over Ethernet or cellular networks. Additionally, the LGate 101 can communicate over powerline carrier (PLC). Hard-wired Ethernet is the preferred connection method, but if this is unavailable, the LGate 101 features a built in 110 V outlet for easy installation of a PLC adapter.

Data from both meters are transmitted only in outbound sessions over open ports requiring no additional network or firewall configuration. The connection and commissioning process is further simplified by the LGate's LED lights which indicate communication status without installers having to log in or call home.

CORE PACKAGE HARDWARE

Part #	Description	Locus Energy Part #
570-0933	LGate 101, Revenue-grade Monitoring Equipment w/ 5 Yr Service, 1-Ph, 120 / 240 VAC, 200 A CT, NEMA 3R, includes access to portfolio application for installer	SPPVB5-101
570-0951	LGate 310, Revenue-grade Monitoring Equipment w/ 5 Yr Service, 3-Ph, 208/ 240/ 277 VAC, 200 A, Includes Itron SENTINEL meter and LGate 101	TPPVB5-310

MISCELLANEOUS ADD-ONS

Part #	Description	Locus Energy Part #
570-0940	Automated single phase production reporting for California PBI, initial 5 years	R-PBI-5YR
570-0941	Automated single phase production reporting for California PBI, additional 5 years	R-ADD-PBI-5YR
570-0938	Automated single phase production reporting for Massachusetts CEC, initial 5 years	R-CEC-5YR
570-0942	Automated single phase production reporting for Massachusetts CEC, additional 5 years	R-ADD-CEC-5YR
570-0945	Automated three phase production reporting for California PBI, initial 5 years	C-PBI-5YR
570-0946	Automated three phase production reporting for California PBI, additional 5 years	C-ADD-PBI-5YR
570-0947	Automated three phase production reporting for Massachusetts CEC, initial 5 years	C-CEC-5YR
570-0948	Automated three phase production reporting for Massachusetts CEC, additional 5 years	C-ADD-CEC-5YR
570-0949	LGate 101, Consumption monitoring add-on, Includes two 200 A split core CTs, single phase, 120 / 240 VAC	SP-ADD-CONS-5YR
570-0950	LGate 101, Consumption monitoring add-on, Includes two 600 A split core CTs, single phase, 120 / 240 VAC	SP-ADD-CONS-600-5YR

INCREASE YOUR MONITORING POWER

Part #	Description	Locus Energy Part #
570-0952	Weather Station Basic, with irradiance and cell temperature, Order with LGate 310	WIS114-101
570-0953	Weather Station Deluxe, with irradiance, cell and ambient temperature, and wind-speed, Order with LGate 310	F-IMT

DISPLAY OPTIONS

Part #	Description	Locus Energy Part #
570-0954	Kiosk PC, Lenovo Windows 7 PC pre-configured to automatically run the Locus kiosk software interface, plug-and-play factory configured and drop-shipped	KPC
570-0944	Kiosk Software, Web-based software application customized to show solar performance data and educational content for an installation or group of installations	KSOF-001

MONITORING EXTENSION OPTIONS

Part #	Description	Locus Energy Part #
570-0987	LGate 101, additional 5 years of hosting and software license for PV and Consumption monitoring	R-ADM-5YR
570-0939	LGate 101, additional 5 years of hosting and software license for PV monitoring	R-PDM-5YR
570-0943	LGate 310, additional 5 years of hosting and software license for PV monitoring	C-PVM-5YR

POWER-ONE MONITORING SOLUTIONS

The Aurora Vision portal delivers the tools needed to monitor, operate and market solar solutions to residential and commercial customers. Each installation comes with web based tools that provide the information needed for installers and homeowners to maximize success including fleet wide portfolio view, plant view, asset view, and reports. The installers can also set up a single web page share for each residential plant. Home owners can also register for the free Aurora Easy View portal.

Power-One's plant solutions include an affordable residential data logger solution for Power-One's single phase inverters and several commercial solutions for our three phase string and central inverters.

RESIDENTIAL MONITORING DATA LOGGER

The Aurora Residential Data Logger solution is limited to three (3) Power-One single phase inverters. It comes without an enclosure in order to lower the cost. 10 years of monitoring services through Aurora Easy View is included. A 120 V AC wall adapter power supply is included.

Part #	Description	Power-One Part #
570-1005	Aurora Residential Data Logger	VSN-MGR-RES-P1-US

COMMERCIAL MONITORING DATA LOGGER

The Aurora Commercial Data Logger solution is limited to ten (10) Power-One single or three-phase string inverters and up to one (1) Aurora Environmental weather station. It comes without an enclosure in order to lower the cost. 10 years of monitoring services through Aurora Easy View is included. A 120 V AC wall adapter power supply is included.

Part #	Description	Power-One Part #
570-1028	Aurora Commercial Data Logger	VSN-MGR-CMML-P1-US

COMMERCIAL MONITORING SOLUTIONS

The Aurora Universal Industrial monitoring solutions come standard with a NEMA 4X painted stainless steel enclosure and a 120 W DIN rail mounted 24 V power supply.

Aurora Universal Commercial adds a revenue grade energy meter to Aurora Universal Industrial. Note that you will have to order a set of Current Transformers to complete the system.

Part #	Description	Power-One Part #
570-1007	Aurora Universal Industrial (energy meter not included)	VSN-MGR-M0-1E-0-1P-PS
570-1008	Aurora Universal Commercial (revenue grade energy meter included)	VSN-MGR-M1-1E-0-1P-PS

Monitoring Accessories

AURORA ENVIRONMENTAL

Part #	Description	Power-One Part #
570-1011	Aurora Environmental Entry weather station with irradiance, ambient temperature and back-of-panel temperature sensors.	VSN-ENVIRO-ENTRY
570-1012	Aurora Environmental Commercial weather station: adds an additional irradiance and a wind speed/wind direction sensor.	VSN-ENVIRO-CMML

AURORA UNIVERSAL REVENUE GRADE METER

Part #	Description	Qty	Power-One Part #
570-1027	Veris 208 / 480 VAC with display, NEMA 4X Box	1	VSN-NET-MTR1-PS-US

CURRENT TRANSFORMERS FOR AURORA UNIVERSAL COMMERCIAL

Part #	Description	Power-One Part #
570-1013	CT 100 A, 1% acc, 1 in. ID, solid core	VSN-MGR-AUX-CT100
570-1014	CT 200 A, 1% acc, 1 in. ID, solid core	VSN-MGR-AUX-CT200
570-1015	CT 200 A, 1% acc, 1 in. ID, split-core	VSN-MGR-AUX-CT200SC
570-1016	CT 400 A, 1% acc, 1 in. ID, split-core	VSN-MGR-AUX-CT400SC
570-1017	CT 600 A, 1% acc, 1 in. ID, split-core	VSN-MGR-AUX-CT600SC
570-1018	CT 800 A, 1% acc, 1 in. ID, split-core	VSN-MGR-AUX-CT800SC

INVERTER COMMUNICATION ACCESSORIES

Part #	Description	Power-One Part #
570-1021	Cable, Adapter RS485 to USB & RS232 for PC interface, includes power supply	PVI-USB-RS485-232
570-1022	Communication adapter, RS485 to Modbus for Power-One string inverters.	PVI-RS485-MODBUS-CENTRAL
570-1032	Communication adapter, RS485 to Modbus for Power-One central inverters.	PVI-RS485-MODBUS-STRING

PVI INVERTER ACCESSORIES

Part #	Description	Power-One Part #
570-0647	Portable Monitor, wireless, touchscreen display	PVI-DESKTOP-US
570-0843	Portable Monitor, Bluetooth and wireless, touchscreen display	PVI-DESKTOP-BT-US
570-0738	Radio Module, Radio transceiver for string inv PVI- 3.0/ 3.6/ 4.2/ 5000/ 6000, 915Mhz, antenna	PVI-RADIOMODULE-US

MAGNUM ENERGY

MAGWEB MONITORING KITS

Part #	Description	Magnum Part #
570-0333	MagWeb Web Based Wireless Monitoring Kit	ME-MW-W
570-0334	MagWeb Web Based Ethernet Monitoring Kit	ME-MW-E

NEW from the Industry Leaders in Commercial PV Monitoring

DECK Monitoring

The Ultimate Quick and Easy PV Monitoring Solution:

AUTOBOX

- Available off-the-shelf for absolute fastest lead time in the industry.
- Each kit comes with an exclusive activation code for quick and easy self-deployment of your monitoring web pages.
- Choose a kit with CTs sized to match your system: 100A, 200A, 300A, 400A, 600A, or 800A.

Includes basic monitoring hardware mounted and wired inside:
- AcquiSuite A8810 DAS
- Veris e51 series revenue grade meter

Fused & standard terminal blocks for power and CTs

UL-listed NEMA type 4 enclosure

90-304 VAC to 24VDC power supply included (2-wire with no ground)

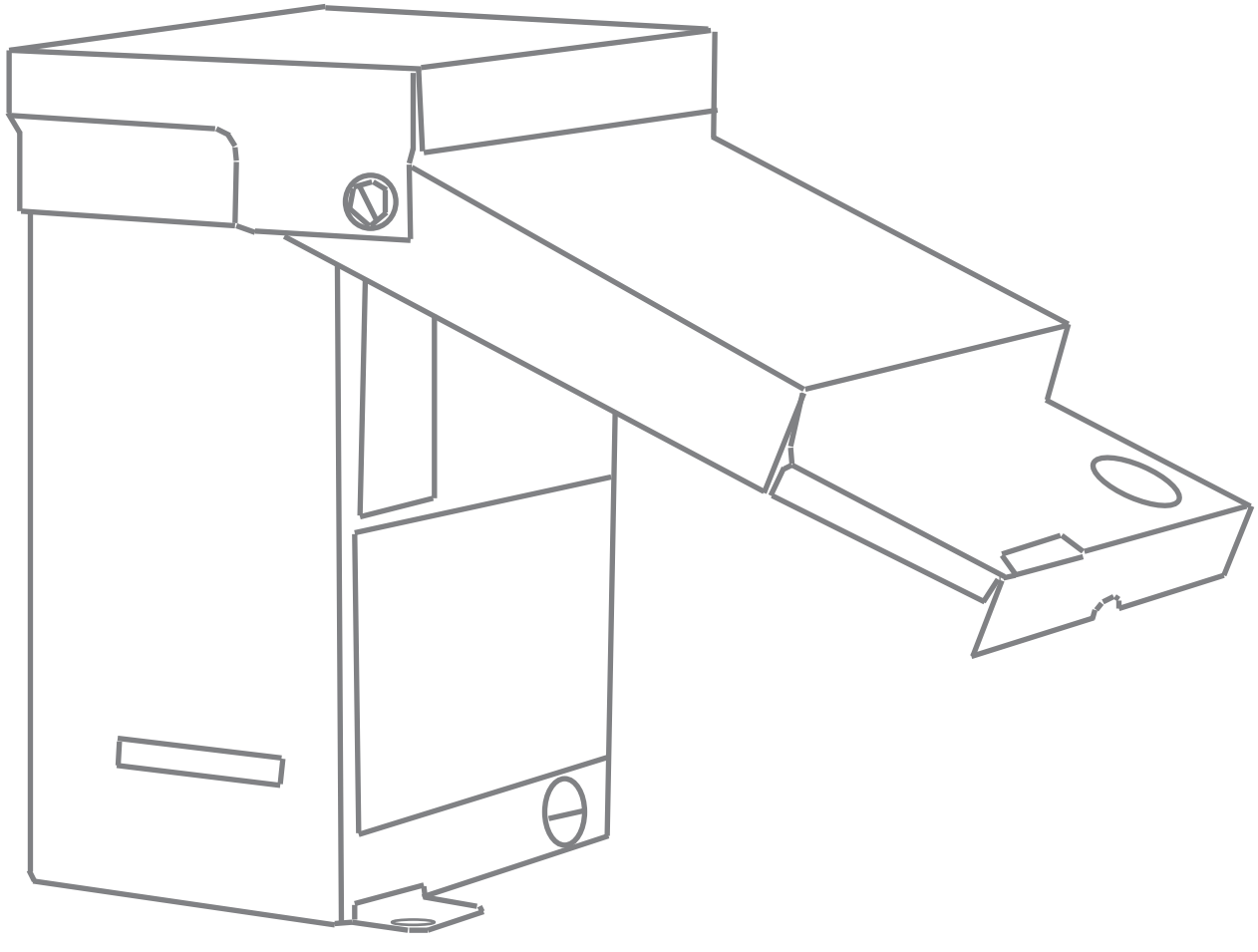
Quick connects for easy external connections

15.75" (W) x 15.75" (H) x 5.875" (D)

The fastest and easiest monitoring solution in the marketplace.

DECK Monitoring | 830 SW 10th Ave Ste 200 | Portland, OR 97205 | 503.224.5546 | www.deckmonitoring.com

Switch Gear, Cables & Service Equipment



Soligent

COMBINER BOXES

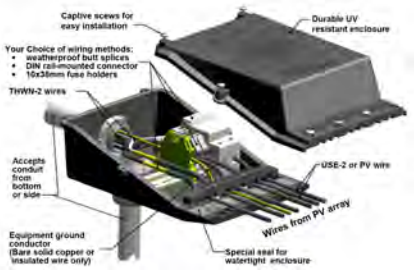
BURNDY®

Experience. Technology. Answers.™

wiley

ACME CONDUIT ENTRY (ACE)

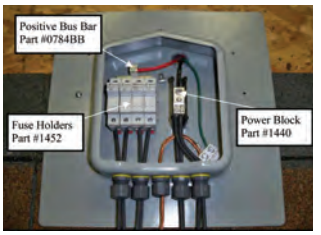
- Simple array to conduit transition
- Compatible with any conduit type
- Protective enclosure for connecting USE-2 or PV wire to THWN-2 wires
- ACE can be configured as Pass-through (P) or Combiner Box (C)

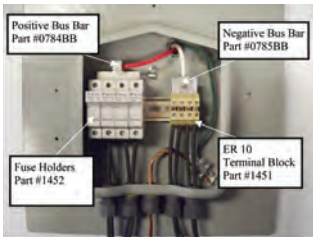


Part #	Description	Wiley Part #
570-0525	DIN Rail with 2 terminal blocks	ACE-1P/2C
570-0526	DIN Rail with 4 terminal blocks	ACE-2P
570-0529	DIN Rail with 3 fuse holders, 3 terminal blocks and 2 bus bars	ACE-3C
570-0527	DIN Rail with 6 terminal blocks	ACE-3P
570-0530	DIN Rail with 4 fuse holders, 4 terminal blocks and 2 bus bars	ACE-4C
570-0528	DIN Rail with 8 terminal blocks	ACE-4P
570-0524	No DIN Rail	ACE-PT

SolaDeck
PV ROOF-MOUNT ENCLOSURE

ROOF WIRING BOX





This weather tight NEMA 3R enclosure is made from 18 gauge galvanized steel with a powder coated finish. It has dual ground lugs, a universal DIN rail to mount fuse holders or terminal blocks, a wire strain relief clip and 1/2", 3/4" & 1" knockouts for running wires through the roof. Built in flashing for mounting on composition shingle roofs. Since it is only 2.5" deep it can mount under the array. Models 0783-41 and 0786-41 are ETL listed and labeled to the UL STD 1741 for PV Combiner Enclosures.

FLASHED COMBINERS

Part #	Description	Size	SolaDeck Part #
510-0197	Flashed Combiner/Wire Entry Box for Comp Roofs, AC/DC, with 7" DIN rail & UL, 5-position ground bar	15" x 15"	SD-0760-41 AD
510-0043	Flashed Combiner/ Wire Entry Box for Comp Roofs, with 3" DIN rail & UL	15" x 15"	SD-0783-41
510-0044	Flashed Combiner/ Wire Entry Box for Comp Roofs, with 6" DIN rail & UL	15" x 15"	SD-0786-41
510-0201	Flashed Enclosure Pass Thru Box for Comp Roofs, AC/DC, with 6" DIN rail, ground block, NEMA 3R	15" x 15"	SD-0786-3R

SOLADECK KITS

Part #	Description	SolaDeck Part #
510-0053	4 String Kit, with 4 Terminal Blocks, 4 Fuse Holders, 2 Bus Bars	SD0786-41, 0786K
510-0052	4 String Pass Through Kit, with 8 ER10 Terminal Block	SD0786-41
510-0051	4 String Combiner Kit, with Power Block, 4 Fuse Holders, Bus Bar	SD0783-41, 0783K

DIN MOUNT TERMINAL BLOCKS

Part #	Description	SolaDeck Part #
510-0050	End Plate Cover for ER6 & ER10	1453
510-0048	ER10, 600 VDC, 65 A, #6-16 AWG	1451
510-0049	ER6, 600 VDC, 50 A, #8-26 AWG	1450

SOLADECK ACCESSORIES

Part #	Description	SolaDeck Part #
510-0047	Lisco 4 Way Power Block Rated to 600 V, 175 A, Main (1) #2/0-14, Tap (4) #4-14 Cu Wire	1440
510-0046	SolaDeck Combiner Bus bar for 4 ER10 Terminal Blocks, 120 A, with Lug for #2-14 CU Wire	0785BB
510-0045	SolaDeck Combiner Bus Bar for 4 Fuse Holders, 120 A, with CA4-SP Lug for #2-14 CU Wire	0784BB

Bentek SOLAR

COMBINER BOXES

Bentek's line of string combiner boxes are designed to meet your specific needs for each specific job.

- With the flexibility of adding monitoring capabilities and/or integrated disconnects into the combiner.
- There is ample internal space for ease of installation and plenty of wire bending space per NEC requirements.
- Flexibility in manufacturing configure-to-order combiners.
- Ratings from 75 A to 400 A for both 600 VDC and 1000 VDC.

Part #	Description	# of Poles	Bentek Part #
510-0085	75 A, Fiberglass NEMA 4X, 600/ 1000 VDC, 8" x 8"	4 Pole	BTK610-04x-F
510-0086	175 A, Fiberglass NEMA 4X, 600/ 1000 VDC, 12" x 12", add fuse	8 Pole	BTK610-08x-F
510-0078	100 A, Steel NEMA 3R/4, 600 VDC, 20" x 16", add fuse	9 Pole	BTK6-0915-D100
510-0087	175 A, Fiberglass NEMA 4X, 600/ 1000 VDC,12" x 12", add fuse	12 Pole	BTK610-12x-F
510-0153	200 A, NEMA 3R, 600 VDC, wall-mounted enclosure	5 Pole	BTK6-5200
510-0088	200 A, Fiberglass NEMA 4X, 600/ 1000 VDC,16" x 14", add fuse	16 Pole	BTK610-16x-F
510-0154	400 A, NEMA 3R, 600 VDC, wall-mount enclosure	5 Pole	BTK6-5400
510-0089	400 A, Steel NEMA 3R/4, 600/ 1000 VDC, 24" x 20", add fuse	24 Pole	BTK610-24x-S
510-0090	400 A, Steel NEMA 3R/4, 600/ 1000 VDC, 30" x 24", add fuse	42 Pole	BTK610-42x-S

COMBINER BOXES CONTINUED

DISCONNECT COMBINER

Combiners with integrated UL 600 VDC load-break disconnects. Reduce costs by eliminating installation time and wiring. Flexible design for customization and ease of installation. Enhanced level of user safety.

- Rated for continuous duty
- 3 to 36 input circuits
- 90 °C output terminals, ≥ 200 A
- Protective covers all on live parts
- Max fuse size = 30 A
- Configured for either positive or negative ground
- UL1741 listed, CSA 22.2 certified

Part #	Description	# of Poles	Bentek Part #
510-0091	55 A, Fiberglass NEMA 4X, 600 VDC, 14" x 12", add fuse	6 Pole	BTK6-06x-D55-F
510-0129	100 A, Fiberglass NEMA 4X, 600 VDC, 20" x 16", add fuse	8 Pole	BTK6-08x-D100-F
510-0092	100 A, Steel NEMA 3R/4, 600 VDC, 20" x 16", add fuse	8 Pole	BTK6-08x-D100-S
510-0149	100 A, Fiberglass NEMA 3R, 600 VDC, 20" x 16", add fuse	12 Pole	BTK6-12x-D100-F
510-0150	100 A, Fiberglass NEMA 4, 600 VDC, 20" x 16", add fuse	12 Pole	BTK6-12x-D100-F
510-0151	100 A, Steel NEMA 3R, 600 VDC, 20" x 16", add fuse	12 Pole	BTK6-12x-D100-S
510-0152	100 A, Steel NEMA 4, 600 VDC, 20" x 16", add fuse	12 Pole	BTK6-12x-D100-S
510-0093	100 A, Steel NEMA 3R/4, 600 VDC, 20" x 16", add fuse	16 Pole	BTK6-16yy-D100-S
510-0124	200 A, Steel NEMA 3R/4, 600 VDC 24" x 20", add fuse	16 Pole	BTK6-16yy-D200-S
510-0191	200 A, Fiberglass, 600 VDC 24" x 20", add fuse	16 Pole	BTK6-16yy-D200-FB
510-0080	400 A, Steel NEMA 3R/4, 600 VDC 30" x 24", add fuse	21 Pole	BTK6-2115-D400
510-0094	200 A, Steel NEMA 3R/4, 600 VDC, 24" x 20", add fuse,	24 Pole	BTK6-24yy-D200-S
510-0179	400 A, Fiberglass NEMA 4X, 600 VDC, add fuse	24 Pole	BTK6-24YY-D400-FB
510-0165	400 A, Steel NEMA 3R/4, 600 VDC, add fuse	30 Pole	BTK6-3015-D400
510-0095	400 A, Steel NEMA 3R/4, 600 VDC, 30" x 24", add fuse	36 Pole	BTK6-36x-D400-S

DISCONNECT COMBINERS

Part #	Description	MidNite Part #
510-0180	4 input 80 A busbar (Add fuses & holders), 600 VDC, NEMA 3R	MNPV4HV Disco 3R-Basic
510-0181	4x15A Fused inputs, 80 A, 600 VDC, NEMA 3R, w/ SPD600, Birdhouse Compatible	MNPV4HV Disco 3R-Deluxe

DISCONNECT COMBINERS CONTINUED

Part #	Description	MidNite Part #
510-0147	Comes w/ disconnect handle, use w/ 150VDC, 300 VDC, 600VDC or 120/240VAC DIN mount breakers	MNPV6 DISCO
510-0182	With disconnect handle & 3 breaker busbar, Add 300VDC or 120/240VAC DIN mount breakers	MNPV6-250 DISCO
510-0183	6 x 15 A fused inputs, 100 A, 600 VDC, with SPD600, Birdhouse Compatible	MNPV6HV Disco 4X
510-0184	Dual 4x15A fused input, Dual 80A busbars field config, 600VDC, w/SPD600, Birdhouse Compatible	MNPV8HV Disco 3R
510-0185	Dual 4x15A Fused input, Dual 80A busbars field config, 600VDC, w/SPD600, Birdhouse Compatible	MNPV8HV Disco 4X
510-0186	Dual 8x15A fused input, Dual 100A busbars field config, 600VDC, w/SPD600, Birdhouse Compatible	MNPV16HV Disco 4X
570-0932	Birdhouse, remote solar disconnect control switch, w/ power supply & battery backup, NEMA 3R	MNBirdhouse
580-0096	Required trip circuit power supply board for combiner box used with the Birdhouse	MNPS1

COMBINER BOXES

The MidNite range of PV combiner boxes are all NEMA 3R rated in gray aluminum enclosures with an included front plastic covers. They will accept DIN mount breakers or touch safe fuse holders. They include PV negative bus bar, ground bus bar, and PV positive bus bar for combining breaker or fuse holder outputs together.

Part #	Description	MidNite Part #
510-0005	60 A for 3 PV breakers or 2 fuse holders	MNPV3
510-0006	120 A for 6 PV breakers or 4 fuse holders	MNPV6
510-0055	200 A for 12 PV breakers or 10 fuse holders	MNPV12
510-0130	Pre-wired with 4 Panel mount MC4 connectors and fuse holders	MNPV4-MC4
510-0132	120 A for 3 x 300 VDC Breakers	MNPV6-250
510-0198	Pre-wired with 2 x 4 String Panel mount MC4 connectors, fuse holders, 15 A fuses, & 200 A bus	MNPV8-MC4
510-0096	168 A for 6 x 300 VDC Breakers	MNPV12-250

MINI DC DISCONNECT BOX

Part #	Description	MidNite Part #
500-0170	With 2 DIN rails & Dual 125 A panel mount breakers, 125 VDC, 3/8" by 1.5" studs	MNDC125-X2
500-0171	With 2 DIN rails & Dual 175 A panel mount breakers, 125 VDC, 3/8" by 1.5" studs	MNDC175-X2
510-0196	With 2 DIN rails & Dual 250 A panel mount breakers, 250 VDC, 3/8" by 1.5" studs	MNDC250-X2

COMBINER BUS BAR

Part #	Description	MidNite Part #
510-0040	For 4 Fuse Holders, with Box Lug for 14-1/0 AWG Wire	MNPV6 FUSE BUSBAR

COMBINER BOXES CONTINUED

OutBack POWER™

FLEXWARE PV COMBINER BOX

The FLEXware PV Combiner series is designed to survive outdoor environments. Its rainproof, NEMA 3R powder coated aluminum chassis can be mounted on a wall, sloped roof or pole. The unique angled negative terminal bus bar design makes wiring fast and easy without the larger output conductors blocking access to the smaller input terminals. Dual output lug terminals are included for up to 2/0 AWG conductors.

Part #	# of Breakers or Fuse Holders	OutBack Part #
510-0036	12 Breakers or 8 Fuse Holders	FWPV-12
510-0035	8 Breakers or 6 Fuse Holders	FWPV-8
500-0059	Reversible Combiner Bus Bar for (12) 150 VDC Breakers or (8) 600 VDC Fuse Holders	FW-CBUS-12
500-0058	Reversible Combiner Bus Bar for (8) 150 VDC Breakers or (6) 600 VDC Fuse Holders	FW-CBUS-8

SOLECTRIA RENEWABLES

COMBINER BOXES

These combiner options are for commercial and utility-scale grid-tied PV inverters. Optional integrated string combiners may be added to the PVI 10/13/15KW inverters, eliminating the need for external string combiner boxes. Subcombiners for the PVI 50/60/75/85/100KW inverters, may be ordered, eliminating the need for an external sub-array combiner. The SGI 225/250/266/300/500 inverters allow multiple customized subcombiner options. Solectria Renewables' string combiners combine 4 to 30 array strings with fuse values from 6 A to 20 A.

Part #	# of Inputs	Max Current	Rating	Fuse Rating
510-0033	8	60-180 A	NEMA 4	Specify Fuses 6-20 A
510-0008	10	60-180 A	NEMA 4	Specify Fuses 6-20 A
510-0009	12	60-180 A	NEMA 4	Specify Fuses 6-20 A
510-0016	13	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0010	14	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0023	15	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0011	16	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0024	17	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0012	18	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0025	19	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0013	20	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0026	21	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0014	22	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0027	23	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0015	24	195-360 A	NEMA 4	Specify Fuses 6-20 A
510-0163	30	375-400 A	NEMA 4	Specify Fuses 6-15 A

LOAD CENTERS

SQUARE D™ by Schneider Electric

HOMELINE LOAD CENTER

Part #	Spaces /Brkr	Bus Rating	Max Voltage	NEMA Rating	Main Type	Square D Part #
560-0048	6/12	100 A	120/240 VAC	3R	Lug	HOM612L100RB
560-0051	8/16	125 A	120/240 VAC	3R	Lug	HOM816L125RB
560-0052	12	125 A	120/240 VAC	3R	Lug	HOM12L125RB
560-0049	30	200 A	120/240 VAC	3R	Lug	HOM30L200RB

QO LOAD CENTER

Designed to meet residential, commercial and industrial requirements to protect electrical systems, equipment and people.

Part #	Spaces /Brkr	Bus Rating	Max Voltage	NEMA Rating	Main Type	Square D Part #
560-0008	2/4	70 A	120/240 VAC	3R	Lug	QO24L70RB
560-0010	6/12	100 A	120/240 VAC	1	Lug	QO612L100DS
560-0011	6/12	100 A	120/240 VAC	3R	Lug	QO612L100RB
560-0012	8/16	100 A	120/240 VAC	3R	Lug	QO816L100RB
560-0023	12/24	125 A	120/240 VAC	3R	Lug	QO11224L125GRB
560-0017	12	125 A	208/240 VAC 3ph	3R	Lug	QO312L125GRB
560-0041	20	125 A	208/240 VAC 3ph	3R	Lug	QO320L125GRB
560-0024	30	150 A	120/240 VAC	3R	Lug	QO130L150GRB
560-0050	30	200 A	208/240 VAC 3ph	3R	Lug	QO330L200GRB
560-0019	42	225 A	208/240 VAC 3ph	3R	Main Brkr	QO342MQ225RB
560-0020	42	225 A	208/240 VAC 3ph	3R	Lug	QO342L225GRB
560-0007	42	225 A	120/240 VAC	3R	Lug	QO142L225GRB

DISCONNECTS AND SWITCHES

SQUARE D™ by Schneider Electric

DC DISCONNECTS

Visible blade heavy duty-safety switches are designed for applications where maximum performance and continuity of service are required. All heavy-duty safety switches feature a quick-make, quick-break operating mechanism, a dual cover interlock, and a color coded indicator handle. They are suitable for use as service equipment when equipped with a field- or factory-installed neutral assembly or equipment grounding kit. Safety switches are UL Listed.

SQUARE D DC DISCONNECTS

Part #	NEMA Rating	Max Current	Max Voltage	Poles	Features	Square D Part #
580-0031	NEMA 3R	30 A	600 V	3-Fused	Hub	H361RB
530-0191	NEMA 3R	30 A	600 V	3-Fused	Neutral Bar, Hub	H361NRB
580-0037	NEMA 3R	30 A	600 V	3-Unfused	Hub	HU361RB
530-0192	NEMA 3R	30 A	600 V	3-Unfused	View Window, Hub	HU361RBVW
580-0032	NEMA 3R	60 A	600 V	3-Fused	Hub	H362RB
580-0038	NEMA 3R	60 A	600 V	3-Unfused	Hub	HU362RB
530-0193	NEMA 3R	60 A	600 V	3-Unfused	View Window, Hub	HU362RBVW
580-0033	NEMA 1	100 A	600 V	3-Fused	-	H363
580-0034	NEMA 3R	100 A	600 V	3-Fused	Hub	H363RB
580-0039	NEMA 3R	100 A	600 V	3-Unfused	Hub	HU363RB
530-0188	NEMA 3R	100 A	600 V	3-Unfused	View Window, Hub	HU363RBVW
580-0036	NEMA 3R	200 A	600 V	3-Fused	Hub	H364RB
580-0040	NEMA 3R	200 A	600 V	3-Unfused	Hub	HU364RB
580-0035	NEMA 3R	200 A	600 V	3-Fused	Neutral Bar, Hub	H364NRB
580-0006	NEMA 3R	400 A	600 V	3-Fused	Neutral Bar	H365NR

DISCONNECTS AND SWITCHES CONTINUED

SQUARE D™ by Schneider Electric

AC DISCONNECTS

AC Disconnects provide durability and corrosion resistance. They also have flexible enclosure knockouts that make installation easy. Metallic and non-metallic enclosures are available in fusible and non-fusible styles. Both the enclosed molded case and the pull-out type switches are UL listed for copper or aluminium conductors, HP rated for motor disconnect applications, and meet NEC requirements for single-phase residential and commercial air conditioning installations. The metallic pull-out devices are CSA certified.

Part #	NEMA Rating	Max Current	Max Voltage	Poles	Features	Square D Part #
580-0018	NEMA 3R	30 A	240 V	2-Fused	Neutral Bar, Hub	D221NRB
580-0025	NEMA 3R	30 A	240 V	2-Unfused	Hub	DU221RB
580-0062	NEMA 3R	30 A	240 V	3-Fused	Neutral Bar, Hub	D321NRB
580-0027	NEMA 3R	30 A	240 V	3-Unfused	Hub	DU321RB
530-0184	NEMA 1	60 A	240 V	2-Fused	Neutral Bar	D222N
580-0019	NEMA 3R	60 A	240 V	2-Fused	Neutral Bar, Hub	D222NRB
580-0026	NEMA 3R	60 A	240 V	2-Unfused	Hub	DU222RB
580-0021	NEMA 3R	60 A	240 V	3-Fused	Neutral Bar, Hub	D322NRB
580-0059	NEMA 3R	60 A	240 V	3-Unfused	Hub	DU322RB
580-0020	NEMA 3R	100 A	240 V	2-Fused	Neutral Bar, Hub	D223NRB
580-0060	NEMA 3R	100 A	240 V	3-Fused	Neutral Bar, Hub	D323NRB
580-0028	NEMA 3R	100 A	240 V	3-Unfused	Hub	DU323RB
580-0029	NEMA 1	200 A	240 V	3-Unfused	-	DU324
580-0022	NEMA 3R	200 A	240 V	3-Fused	Neutral Bar, Hub	D324NRB
580-0030	NEMA 3R	200 A	240 V	3-Unfused	Neutral Bar, Hub	DU324RB
580-0023	NEMA 3R	400 A	240 V	3-Fused	Neutral Bar	D325NR

TRANSFER SWITCH

The photovoltaic disconnect switch solution encompasses all of the quality, durability and ease of use you have come to expect. The product offering spans 60-200 A, 2-pole and 3-pole fusible and non-fusible heavy-duty safety switches.

Part #	NEMA Rating	Max Current	Max Voltage	Poles	Features	Square D Part #
580-0051	NEMA 1	60 A	240 VAC	2-Unfused	-	DTU222
580-0050	NEMA 3R	100 A	240 VAC	2-Unfused	Hub	DTU223RB
580-0024	NEMA 3R	200 A	240 VAC	2-Unfused	Neutral Bar	DTU224NRB

DISCONNECT ACCESSORIES

The ground kit for products, 3 terminal, max 4 AWG is used for heavy duty safety switches. The neutral assembly kit for AC/DC disconnects are used with safety switches. The QO handle interlock is used for interlocking the handles of 2 adjacent circuit breakers so that only 1 circuit breaker can be on at a time.

Part #	Description	Max Current	Square D Part #
590-0049	Ground Bar, 3 Conductors, 1 Mount Screw	-	PK3GTA
590-0008	Ground Kit, 3 Terminal, Max 4 AWG	-	GTK03
590-0044	Safety Switch Equipment Grounding Kit, Copper ground bar, 4 x #1/0	600 A	PKOGTC3
560-0013	Neutral Assembly Kit for AC/DC Disconnects	30 A	SN03
560-0009	QO Handle Interlock	-	QO2DTI

MidNite Solar, inc

MINI DC DISCONNECT BOXES

Part #	Description	Voltage	MidNite Part #
530-0022	Comes with 125 A breaker & din rail	125 VDC	MNDC125
530-0023	Comes with 175 A breaker & din rail	125 VDC	MNDC175
530-0024	Comes with 250 A breaker & din rail	125 VDC	MNDC250
530-0819	Comes with 250 A breaker & 10 Din rail or 6 panel mount breakers	125 VDC	MNDC250 Plus

TRANSFER SWITCH

Part #	Description	Voltage	MidNite Part #
580-0097	Dual 30 A in a Big Baby. 9" x 5" x 4"	240 VAC	MNT-30
580-0065	Dual 60 A in a Big Baby 9" x 5" x 4"	240 VAC	MNT-60

NOTTAGUTTERS

Part #	Description	MidNite Part #
500-0118	Nottagutter-2, Wiring Box, AC & DC Busbars, Dual 60 A bypass, 2-60 A single breakers	Nottagutter - 2
500-0119	Nottagutter-4, Wiring Box, AC & DC Busbars, Dual 60 A bypass, 4-60 A single breakers	Nottagutter - 4
500-0120	Nottagutter-6, Wiring Box, AC & DC Busbars, Dual 60 A bypass, 6-60 A single breakers	Nottagutter - 6
500-0121	Nottagutter-8, Wiring Box, AC & DC Busbars, Dual 60 A bypass, 8-60 A single breakers	Nottagutter - 8

SMA

COMBINER DISCONNECT SWITCH

This combi-switch is ETL Listed to UL 1741. It provides the code-required external, lockable, visible DC disconnect and fuse protection for inverters and allows for up to 4 PV strings to be landed on individual Touch Safe™ fuse holders. 10 A fuses (max allowable) are provided for PV string over-current protection.

Part #	Fuses	SMA Part #
580-0047	Fused with 4 x 10 A Fuses, NEMA 3R	COMBO-SWITCH-10

ELECTRICAL BOXES

MidNite Solar, inc

BABY BOX & BIG BABY BOX ENCLOSURE

For 1-4 MNEPV or MNEAC DIN rail breakers. General use enclosures for retrofits, small inverter disconnect, PV disconnect, AC or DC distribution with 3/4" & 1" knockouts each end.

Part #	Description	MidNite Part #
510-0004	Baby Box Enclosure for 1-4 DIN Mount Breakers	BBE
510-0054	Big Baby Box Enclosure for 4 DIN Mount Breakers	BBBE

QUAD BOX

The MidNite quad box is furnished with four breaker knockouts. This enclosure is made of 16 gauge powder coated steel. There are conduit knockouts on each end of this product.

Part #	Description	MidNite Part #
510-0041	80 A - Holds up to 4 Panel Mount Breakers	MNEDC quad

CIRCUIT BREAKERS

Schneider Electric

SCHNEIDER XW SERIES CIRCUIT BREAKERS

These items are designed for most solar charge controllers and inverters for residential and commercial applications.

Part #	Max Current	Voltage	Qty	Schneider Part #
530-0162	60 A	160 VDC	1	RNW8651075
530-0163	80 A	125 VDC	1	RNW8651070
530-1088	100 A	125 VDC	1	RNW8651080
530-0160	250 A	160 VDC	1	RNW8651065

OutBack POWER™

CIRCUIT BREAKERS

DIN rail mount breakers come with set-screw compression terminals. Panel mount breakers come with stud terminals and require wired ring terminals. All breakers are continuous current rated.

Part #	Continuous Current	Volts	# of Poles	In. Wide	Mount	OutBack Part #
530-0045	1 A	125 VDC	1	0.5"	DIN	OBB-1-125VDC-DIN
530-0052	2 A	150 VDC	1	0.5"	DIN	OBB-2-150VDC-DIN
530-0058	3 A	150 VDC	1	0.5"	DIN	OBB-3-150VDC-DIN
530-0060	4 A	150 VDC	1	0.5"	DIN	OBB-4-150VDC-DIN
530-0068	5 A	150 VDC	1	0.5"	DIN	OBB-5-150VDC-DIN
530-0071	6 A	150 VDC	1	0.5"	DIN	OBB-6-150VDC-DIN
530-0073	8 A	150 VDC	1	0.5"	DIN	OBB-8-150VDC-DIN
530-0074	9 A	150 VDC	1	0.5"	DIN	OBB-9-150VDC-DIN
530-0038	10 A	277 VAC	-	0.5"	DIN	OBB-10-277VAC-DIN
530-0041	15 A	120/ 240 VAC	2	1"	DIN	OBB-15D-240VAC-DIN
530-0040	15 A	120 VAC	1	0.5"	DIN	OBB-15-120VAC-DIN
530-0096	15 A	277 VAC	1	0.5"	DIN	OBB-15-277VAC-DIN
530-0046	20 A	120 VAC	1	.5"	DIN	OBB-20-120VAC-DIN
530-0047	20 A	120/ 240 VAC	2	1"	DIN	OBB-20D-240VAC-DIN
530-0049	20 A	125 VDC	1	0.5"	DIN	OBB-20-125VDC-DIN
530-0051	25 A	120/ 240 VAC	2	1"	DIN	OBB-25D-240VAC-DIN
530-0053	30 A	277 VAC	1	0.5"	DIN	OBB-30-277VAC-DIN
530-0054	30 A	277/ 480 VAC	2	1"	DIN	OBB-30D-480VAC-DIN
530-0066	50 A	125 VDC	1	0.75"	DIN	OBB-50D-125VDC-DIN
530-0061	50 A	277 VAC	1	0.5"	DIN	OBB-50-277VAC-DIN
530-0063	50 A	277/ 480 VAC	2	1"	DIN	OBB-50D-480VAC-DIN
530-0116	50 A	277/ 480 VAC	3	1.5"	DIN	OBB-50T-480VAC-DIN
530-0070	60 A	125 VDC	1	0.5"	DIN	OBB-60-125VDC-DIN
530-0097	60 A	277 VAC	1	0.5"	DIN	OBB-60-277VAC-DIN
530-0133	60 A	277/ 480 VAC	2	1"	DIN	OBB-60D-480VAC-DIN
530-0098	1 A	150 VDC	-	0.75"	Panel	OBB-1-150VDC120VAC-PNL

OUTBACK POWER SYSTEMS CIRCUIT BREAKERS CONTINUED

Part #	Continuous Current	Volts	# of Poles	In. Wide	Mount	OutBack Part #
530-0067	5 A	150 VDC	1	0.75"	Panel	OBB-5-150VDC120VAC-PNL
530-0037	10 A	150 VDC	-	0.75"	Panel	OBB-10-150VDC120VAC-PNL
530-0042	15 A	150 VDC	1	0.75"	Panel	OBB-15-150VDC120VAC-PNL
530-0048	20 A	150 VDC	1	0.75"	Panel	OBB-20-150VDC120VAC-PNL
530-0056	30 A	150 VDC	1	0.75"	Panel	OBB-30-150VDC120VAC-PNL
530-0059	40 A	150 VDC	1	0.75"	Panel	OBB-40-150VDC12VAC-PNL
530-0065	50 A	150 VDC	1	0.75"	Panel	OBB-50-150VDC120VAC-PNL
530-0069	60 A	150 VDC	1	0.75"	Panel	OBB-60-150VDC120VAC-PNL
530-0092	80 A	150 VDC	1	0.75"	Panel	OBB-80-150VDC-PNL
530-0036	100 A	125 VDC	-	1"	Panel	OBB-100-125VDC-PNL
530-0039	125 A	125 VDC	-	1"	Panel	OBB-125-125VDC-PNL
530-0044	175 A	125 VDC	-	1.5"	Panel	OBB-175-125VDC-PNL
530-0050	250 A	125 VDC	1	1.5"	Panel	OBB-250-125VDC-PNL

DIN MOUNT ACCESSORIES

Part #	Description	OutBack Part #
260-0255	Din Rail End Clamp	FW-EC-DIN
500-0132	FLEXware Amp Maximum 30 VDC/ 250 VAC	OBR-16-DIN

SQUARE D™ by Schneider Electric

CIRCUIT BREAKERS FOR QO LOAD CENTERS

Square D's brand QO® miniature circuit breakers are plug-in products for use in QO load centers, NQOD panel boards, NQOD OEM interiors or Speed-D® switchboard distribution panels. Bolt-on QOB circuit breakers are for use in NQOD panel boards or interiors.

The Square D exclusive Qwik-Open® mechanism, with a trip reaction within 1/60 of a second, is standard on all 1P 15 A and 20 A circuit breakers. These breakers are rated to trip at the trip current listed. The circuit rated current can be no more than 80% of that value per NEC.

Part #	Description	Breaker	Current	# of Poles	Square D Part #
530-0001	Circuit Breaker	QO	10 A	1-Pole	QO110
530-0002	Circuit Breaker	QO	15 A	1-Pole	QO115
530-0008	Circuit Breaker	QO	15 A	2-Pole	QO215
530-0115	Circuit Breaker	QO	15 A	3-Pole	QO315
530-0003	Circuit Breaker	QO	20 A	1-Pole	QO120
530-0009	Circuit Breaker	QO	20 A	2-Pole	QO220
530-0821	Circuit Breaker	QO	20 A	3-Pole	QO320
530-0129	Circuit Breaker	QO	25 A	2-Pole	QO225
530-0004	Circuit Breaker	QO	30 A	1-Pole	QO130
530-0010	Circuit Breaker	QO	30 A	2-Pole	QO230
530-0130	Circuit Breaker	QO	35 A	2-Pole	QO235

CIRCUIT BREAKERS CONTINUED

SQUARE D by Schneider Electric

CIRCUIT BREAKERS FOR QO LOAD CENTERS CONTINUED

Part #	Description	Breaker	Current	# of Poles	Square D Part #
530-0005	Circuit Breaker	QO	40 A	1-Pole	QO140
530-0011	Circuit Breaker	QO	40 A	2-Pole	QO240
530-0114	Circuit Breaker	QO	40 A	3-Pole	QO340
530-0006	Circuit Breaker	QO	50 A	1-Pole	QO150
530-0012	Circuit Breaker	QO	50 A	2-Pole	QO250
530-0007	Circuit Breaker	QO	60 A	1-Pole	QO160
530-0013	Circuit Breaker	QO	60 A	2-Pole	QO260
530-0093	Circuit Breaker	QO	80 A	2-Pole	QO280
530-0094	Circuit Breaker	QO	100 A	2-Pole	QO2100
530-0014	Circuit Breaker	QO Mini	15 A	1-Pole	QOU115
530-0015	Circuit Breaker	QO Mini	60 A	1-Pole	QOU160
530-0017	Circuit Breaker	QO Mini	60 A	2-Pole	QOU260

CIRCUIT BREAKERS FOR HOMELINE LOAD CENTERS

Part #	Description	Breaker	Current	# of Poles	Square D Part #
530-0147	Mini Circuit Breaker	HOM	15 A	2-Pole	HOM215
530-0150	Mini Circuit Breaker	HOM	20 A	2-Pole	HOM220
530-0149	Mini Circuit Breaker	HOM	20 A	1-Pole	HOM120
530-0151	Mini Circuit Breaker	HOM	40 A	2-Pole	HOM240
530-0152	Mini Circuit Breaker	HOM	50 A	2-Pole	HOM250
530-0153	Mini Circuit Breaker	HOM	60 A	2-Pole	HOM260
530-0155	Mini Circuit Breaker	HOM	80 A	2-Pole	HOM280

MidNite Solar Inc

DC RATED CIRCUIT BREAKERS

DIN rail mount breakers come with set-screw compression terminals. Panel mount breakers come with stud terminals and require wired ring terminals. The circuit rated current can be up to the continuous rated current listed. They will trip at a current approximately 25% higher.

Part #	Mount	# of Poles	Continuous Current	Volts	MidNite Part #
530-0099	DIN	1	1 A	150 VDC	MNEPV1
530-0100	DIN	1	2 A	150 VDC	MNEPV2
530-0101	DIN	1	3 A	150 VDC	MNEPV3
530-0102	DIN	1	4 A	150 VDC	MNEPV4
530-0103	DIN	1	5 A	150 VDC	MNEPV5
530-0104	DIN	1	6 A	150 VDC	MNEPV6
530-0105	DIN	1	7 A	150 VDC	MNEPV7
530-0091	DIN	1	8 A	150 VDC	MNEPV8
530-0106	DIN	1	9 A	150 VDC	MNEPV9
530-0030	DIN	1	10 A	150 VDC	MNEPV10
530-0107	DIN	1	12 A	150 VDC	MNEPV12
530-0031	DIN	1	15 A	150 VDC	MNEPV15
530-0820	DIN	1	15 A	300 VDC	MNEPV15-300
530-0032	DIN	1	20 A	150 VDC	MNEPV20

DC RATED CIRCUIT BREAKERS CONTINUED

Part #	Mount	# of Poles	Continuous Current	Volts	MidNite Part #
530-1085	DIN	1	20 A	300 VDC	MNEPV20-300
530-0033	DIN	1	30 A	150 VDC	MNEPV30
530-0113	DIN	1	50 A	300 VDC	MNEPV50-300
530-0207	DIN	1	30 A	300 VDC	MNEPV30-300
530-0108	DIN	1	40 A	150 VDC	MNEPV40
530-0109	DIN	1	50 A	150 VDC	MNEPV50
530-0170	DIN	1	50 A	300 VDC	MNEPV50-300
530-0034	DIN	1	63 A	150 VDC	MNEPV63
530-1089	Panel	1	16 A	600 VDC	MNEPV16-600
530-1090	Panel	1	20 A	600 VDC	MNEPV20-600
530-0210	Panel	1	60 A	150 VDC	MNEDC60
530-0168	Panel	1	70 A	150 VDC	MNEDC70
530-0028	Panel	1	80 A	150 VDC	MNEDC80
530-0209	Panel	1	80 A	300 VDC	MNEDC80-300
530-0169	Panel	1	90 A	150 VDC	MNEDC90
530-0166	Panel	1	100 A	150 VDC	MNEDC100
530-0025	Panel	1	125 A	125 VDC	MNEDC125
530-0026	Panel	1	175 A	125 VDC	MNEDC175
530-0027	Panel	1	250 A	125 VDC	MNEDC250

AC RATED CIRCUIT BREAKERS

Part #	Mount	# of Poles	Continuous Current	Volts	MidNite Part #
530-0110	DIN	1	10 A	120 VAC	MNEAC10
530-0018	DIN	1	15 A	120 VAC	MNEAC15
530-0019	DIN	1	20 A	120 VAC	MNEAC20
530-0117	DIN	2	20 A	120/240 VAC	MNEAC20-2P
530-0020	DIN	1	30 A	120 VAC	MNEAC30
530-0111	DIN	1	40 A	120 VAC	MNEAC40
530-0021	DIN	1	50 A	120 VAC	MNEAC50
530-0118	DIN	2	50 A	120/240 VAC	MNEAC50-2P
530-0112	DIN	1	60 A	120 VAC	MNEAC60
530-0165	DIN	2	60 A	277 VAC	MNEAC60QZD2P

MAGNUM ENERGY

CIRCUIT BREAKERS

Part #	Description	Voltage Type	Amps	Magnum Part #
530-0134	Dual pole QOU	AC	30 A	BR-AC30D
530-0135	Single pole QOU	AC	60 A	BR-AC60S
530-0136	Back mount	DC	75 A	BR-DC75-BM
530-0137	Back mount	DC	100 A	BR-DC100-BM
530-0138	Front mount 3/8 bolt	DC	175 A	BR-DC175
530-0139	Front mount 3/8 bolts	DC	250 A	BR-DC250

SolaDeck PV ROOF-MOUNT ENCLOSURE

CIRCUIT BREAKERS

Part #	Mount	# of Poles	Continuous Current	Volts	SolaDeck Part #
530-1087	DIN	2	15 A	120/ 240 VAC	1455.15
530-1086	DIN	2	20 A	120/ 240 VAC	1455.2

GROUND FAULT PROTECTION

GROUND FAULT PROTECTION

MidNite Solar ground fault protection breakers come in 63 A for smaller systems (FM60 or XWMPPT-60) and in 80 A for larger systems (FM80 or T80). Both are UL listed and occupy two breaker slots. There is a 0.5 A trip mechanism that connects between battery negative and ground.

Part #	Circuit Breaker	Mount	Max Current	Max Voltage	MidNite Part #
500-0178	Ground Fault	Panel	50 A	300 VDC	MNDC-GFP50-300
500-0002	Ground Fault	DIN	63 A	150 VDC	MNDC-GFP63
500-0069	Ground Fault	Panel	80 A	150 VDC	MNDC-GFP80

PANEL MOUNT CIRCUIT BREAKERS

General purpose hydraulic-magnetic breakers for reliable overcurrent protection and accurate circuit control in a variety of amperages. Ideal for branch circuit protection of DC loads, such as panel boards and lighting controls, as well as charging sources.

Part #	Continuous Current	Max DC Voltage	Max AC Voltage	Rainshadow Part #
530-0081	75 A	125 VDC	240 VAC	CD75

PV GROUND-FAULT DETECTOR INTERRUPTER

Part #	Continuous Current	Volts	# of Poles	Mount	OutBack Part #
530-0119	80 A	150 VDC	1	Panel	OBB-GFDI-80-150VDC-PNL
530-0120	80 A	150 VDC	2	Panel	OBB-GFDI-80D-150VDC-PNL
530-0121	80 A	150 VDC	4	Panel	OBB-GFDI-80Q-150VDC-PNL

FUSES

CLASS T FUSE BLOCK

Part #	Description	OutBack Part #
540-0106	10 A	OBF-10-600VDC
540-0068	300 A	OBTFB-300
540-0069	400 A	OBTFB-400

CLASS T FUSE BLOCK

Part #	Description	Square D Part #
540-0121	175 A, Clamp Style	CFB1-175
540-0120	175 A, Lug Style	FB1-175T

FUSES FOR SQUARE D DISCONNECTS

One of the industry's most popular fuse for motor circuit protection. Tri-Onic® SmartSpot® TR fuses now provide a visual open fuse indicator. With advanced material technology added to the existing product line, the TR current limiting time delay fuses are engineered for overcurrent protection of motors and transformers, service entrance equipment, feeder and branch circuits.

Part #	Size	Max Current	Max Voltage	Ferraz Part #
540-0058	TR	15 A	250 VAC	TR15R
540-0021	TR	20 A	250 VAC	TR20R
540-0022	TR	30 A	250 VAC	TR30R
540-0024	TR	40 A	250 VAC	TR40R
540-0025	TR	60 A	250 VAC	TR60R
540-0060	TR	80 A	250 VAC	TR80R
540-0018	TR	100 A	250 VAC	TR100R
540-0019	TR	125 A	250 VAC	TR125R
540-0020	TR	150 A	250 VAC	TR150R
540-0059	TR	200 A	250 VAC	TR200R
540-0167	TR	250 A	250 VAC	TR250R
540-0066	TR	300 A	250 VAC	TR300R
540-0067	TR	350 A	250 VAC	TR350R
540-0023	TR	400 A	250 VAC	TR400R
540-0032	TRS	4 A	600 VDC / 600 VAC	TRS4R
540-0035	TRS	8 A	600 VDC / 600 VAC	TRS8R
540-0036	TRS	9 A	600 VDC / 600 VAC	TRS9R
540-0027	TRS	10 A	600 VDC / 600 VAC	TRS10R
540-0029	TRS	12 A	600 VDC / 600 VAC	TRS12R
540-0031	TRS	30 A	300 VDC / 600 VAC	TRS30R
540-0054	TRS	40 A	300 VDC / 600 VAC	TRS40R
540-0125	TRS	50 A	300 VDC / 600 VAC	TRS50R
540-0033	TRS	60 A	300 VDC / 600 VAC	TRS60R
540-0051	TRS	75 A	300 VDC / 600 VAC	TRS-75R
540-0034	TRS	80 A	300 VDC / 600 VAC	TRS-80R
540-0026	TRS	100 A	600 VDC / 600 VAC	TRS100R
540-0028	TRS	125 A	600 VDC / 600 VAC	TRS125R
540-0030	TRS	150 A	600 VDC / 600 VAC	TRS150R
540-0055	TRS	200 A	600 VDC / 600 VAC	TRS200R
540-0123	TRS	300 A	300 VDC / 600 VAC	TRS300R
540-0063	TRS	400 A	600 VDC / 600 VAC	TRS400R

FUSES CONTINUED

Ferraz Shawmut

FUSE REDUCER

Fuse reducers allow the use of lower rated fuses in existing equipment having clips with higher ampere ratings. For example, a fused disconnect that is line-side connected must be rated 60 A. If protecting a small inverter, a fuse reducer would allow a 30 A fuse to be installed.

Part #	Fuse	Max Current	Max Voltage	Ferraz Part #
540-0075	Fuse Reducer	60-30 A	250 VDC	R632

FUSES FOR SOLECTRIA SUBCOMBINER

Amp-trap 2000® SmartSpot™ A6D fuses now provide a visual open fuse indicator. A6D fuses provide IEC Type "2" (no damage) protection to main, feeder, and branch circuits, for all types of loads. A6D's time delay characteristics for handling harmless in-rush currents, its current limiting ability and wide range of ratings (from 1 to 600 A) give excellent protection for all your applications.

Part #	Size	Max Current	Max Voltage	Ferraz Part #
540-0079	R	100 A	600 VDC	A6D100R
540-0077	R	150 A	600 VDC	A6D150R

MIDGET FUSES

Amp-trap midget fast-acting ATM fuses are rated 600 VDC, with a 100 kA Interrupting Rating. These ratings give the ATM a wide range of applications not covered by other midget fuses.

Part #	Size	Max Current	Max Voltage	Ferraz Part #
540-0010	ATM	3.5 A	600 VDC / 600 VAC	ATM3.5
540-0070	ATM	20 A	600 VDC / 600 VAC	ATM20A
540-0076	ATMR	10 A	600 VDC / 600 VAC	ATMR10

Littelfuse

IDSR SERIES - TIME DELAY FUSE WITH INDICATION

The Littelfuse IDSR Indicator™ fuse is the first indicating power fuse ever. Just a simple glance at the IDSR Indicator's window tells which circuit is open. The circuit can be tested and any problem corrected without unnecessary delay. No time wasted finding the faulted circuit, no system damage and no costly down time. Min. 75 volts AC/DC required for indication.

Part #	Description	Max Current	Voltage	Littelfuse Part #
540-0013	For Square D DC Disconnect	15 A	600 VDC / VAC	IDSR-15
540-0014	For Square D DC Disconnect	20 A	600 VDC / VAC	IDSR-20
540-0015	For Square D DC Disconnect	30 A	600 VDC / VAC	IDSR-30
540-0052	For Square D DC Disconnect	35 A	600 VDC / VAC	IDSR-35
540-0016	For Square D DC Disconnect	40 A	600 VDC / VAC	IDSR-40
540-0017	For Square D DC Disconnect	60 A	600 VDC / VAC	IDSR-60

FUSE HOLDER

Part #	Description	Fuse	Littelfuse Part #
540-0168	Fuse holder DIN mount for ATM, KLM & KLKD midget fuse (10 x 38 mm), 600 VAC / 600 VDC	30 A	LPSM0001Z CH

MidNite Solar, Inc

FUSE HOLDER

Part #	Description	Fuse	MidNite Part #
540-0104	Touch Safe Fuse Holder DIN Mount for 10 x 38 mm fuses, 600 VDC	30 A	MNTS

Cooper Bussmann

MIDGET FUSES

Part #	Max Current	Max Voltage	Dimensions	Cooper Bussmann Part #
540-0081	1 A	1000 VDC	10mm x 38mm	PV-1A10F
540-0092	1 A (Fast Acting)	600 VDC	10mm x 38mm	KLM-1
540-0082	2 A	1000 VDC	10mm x 38mm	PV-2A10F
540-0083	3 A	1000 VDC	10mm x 38mm	PV-3A10F
540-0084	4 A	1000 VDC	10mm x 38mm	PV-4A10F
540-0085	5 A	1000 VDC	10mm x 38mm	PV-5A10F
540-0086	6 A	1000 VDC	10mm x 38mm	PV-6A10F
540-0087	8 A	1000 VDC	10mm x 38mm	PV-8A10F
540-0088	10 A	1000 VDC	10mm x 38mm	PV-10A10F
540-0089	12 A	1000 VDC	10mm x 38mm	PV-12A10F
540-0090	15 A	1000 VDC	10mm x 38mm	PV-15A10F
540-0101	15 A (Fast Acting)	600 VDC	10mm x 38mm	KLM-15
540-0165	20 A	1000 VDC	10mm x 38mm	PV-20A10F

FUSE HOLDER

Part #	Description	Fuse	Cooper Bussmann Part #
540-0091	Touch-Safe Fuse Holder DIN Mount for PV-A10F, ATM, KLM & KLKD Midget Fuses, 600 VAC / 600 VDC	30 A	CHM1DU
540-0164	Touch-Safe Fuse Holder DIN Mount for PV Midget Fuses, 1000 VDC	30 A	CHPV1U

TERMINAL CONNECTORS & BUS BARS

MidNite Solar, Inc

BIG BUS BARS

Part #	Description	MidNite Part #
540-0133	Bus Bar Big, plus or minus, 280A, Five studs and Aux bar for Six #10 to 1/0 wires	BIG BUSBAR
500-0141	Big breaker bus 8 stud for multiple battery strings	BIG BREAKER PLUS

TERMINAL CONNECTORS & BUS BARS CONTINUED

COMBINER BUS BARS

Part #	Description	MidNite Part #
540-0135	Bus Bar for combining breakers 6 finger #14-1/0	MNPV6 BREAKER BUSBAR
540-0134	Bus Bar with 3 fingers box lug #14-1/0	MNPV3 BREAKER BUSBAR

TERMINAL BUS BARS

Part #	Description	Wire Slots	MidNite Part #
500-0123	Ground Bus Bar with Green screws	(2) 1/0 & (7) #6	MNGBB
500-0090	Short version, Black, 200 A	(2) 1/0 & (4) #6	MNSBBB
500-0092	Short version, Red, 200 A	(2) 1/0 & (4) #6	MNSBBR
500-0091	Short version, White, 200 A	(2) 1/0 & (4) #6	MNSBBW
500-0159	Long version, Black	(2) 1/0 & (4) #6	MNSBBB-B
500-0161	Long version, Red	(2) 1/0 & (4) #6	MNSBBB-R
500-0160	Long version, White	(2) 1/0 & (4) #6	MNSBBB-W

BUS BAR INSULATOR COVER

Part #	Description	Qty	MidNite Part #
500-0162	Long version, Black	Box of 12	MN1/0LBBC-BLK
500-0166	Long version, Green	Box of 12	MN1/0LBBC-G
500-0168	Long version, Red	Box of 12	MN1/0LBBC-R
500-0164	Long version, White	Box of 12	MN1/0LBBC-W
500-0163	Short version, Black	Box of 12	MN1/0SBBC-BLK
500-0167	Short version, Green	Box of 12	MN1/0SBBC-G
500-0169	Short version, Red	Box of 12	MN1/0SBBC-R
500-0165	Short version, White	Box of 12	MN1/0SBBC-W

TERMINAL BUS BARS

Three #1/0 to 14 AWG and eight #6 to 14 AWG screw type compression terminals, mounting screws included. Rated at 180 A. Ground/Neutral terminal bus bar with mounting screws (no insulators).

REVERSIBLE COMBINER BUS BAR

Combiner Bus connects up to eight DIN mounted breakers or four DIN mounted fuse holders - includes one 1/0 set screw lug - plated copper rated for 200 A.

SHUNT BUS

Allows up to four high current cable connections on same side of DC shunt - includes two 3/8" bolts and mounting screws - solid brass rated for 1000 A.

BREAKER BUS

Breaker Bus allows connection of two 175-250 A, three 100-125 A, four 1-80 A DC breakers or three 500 A DC current shunts - plated copper rated for 500 A.

Part #	Description	Color	Max Current	OutBack Part #
500-0040	Terminal Bus Bar with Colored Insulators	Black	180 A	TBB-BLACK
500-0041	Bus Bar	Blue	180 A	TBB-BLUE
500-0088	Bus Bar	Brown	180 A	TBB-BROWN
500-0042	Bus Bar, no Insulator	Ground	180 A	TBB-GROUND
500-0043	Bus Bar, with Insulator	Red	180 A	TBB-RED
500-0044	Bus Bar, with Insulator	White	180 A	TBB-WHITE
500-0034	Shunt Bus	-	1000 A	FW-SBUS
500-0021	Breaker Bus	-	500 A for DC Breakers	FW-BBUS

SHUNTS

SHUNTS

Part #	Description	MidNite Part #
570-0774	500 A shunt includes mounting screws	SHUNT
570-0775	Bus Bar to mount on 500 A shunt (Shunt sold separately)	SHUNT BUSBAR

SHUNTS CONTINUED

OutBack POWER™

500 A/50 mV DC current shunt with attached terminal bus bar for mounting on top of a FX Series Inverter/Charger. Includes bus bar for connection to inverter's DC negative terminal.

Part #	Description	Max Current	Comes With	OutBack Part #
570-0104	Shunt for FlexWare 250, DC Current	500 A	Terminal Bus Bar	FW-SHUNT250
570-0105	Shunt for FlexWare 500 or 1000	500 A	Terminal Bus Bar & White Insulator	FW-SHUNT500

Bogart Engineering

BOGART ENGINEERING SHUNT

The shunt is almost always installed between the negative terminal of the battery and all the loads and charging sources. It is located near the batteries, since the high current carrying wires must be kept short. The Tri-Metric measures the current ("amps") by measuring the very small voltage drop across this shunt.

Part #	Description	Max Current	Bogart Part #
500-0134	100 mV	100 A	SH-100-100
570-0040	50 mV	500 A	SH-500-50

RECONDITIONED UTILITY METERS

Soligent

KILOWATT-HOUR METER

For use on 120 or 120/240 VAC systems. Maximum current 100 amps.

Part #	Description	Max Current	Voltage	NEMA Rating
570-0031	Kilowatt Hour Reconditioned Utility Meter with EZ Read	100 A	120/240 VAC	-

NEMA 3R kWH SOCKETROUND kWH METER

There are two meter bases to chose from. The cast, low-cost round base has 1-1/2" threaded holes in the top and bottom.

Part #	Description	Max Current	Voltage	NEMA Rating
570-0032	Kilowatt Hour Meter Socket - Cast Round	100 A	120/240 VAC	NEMA 3R

SHEET METAL BASE

This product is 8" W x 11.5" H. It is rain tight, NEMA 3R rated for outdoor use. Both are for single phase 2 or 3 wire 100 A service and come with sealing ring.

Part #	Description	Max Current	Voltage	NEMA Rating
570-0034	Kilowatt Hour Meter Socket - Sheet Metal Box 8" x 11.5"	100 A	120/240 VAC	NEMA 3R

STRAIN RELIEF

Strain Reliefs have solid membranes that may be penetrated as needed, up to the maximum number of holes listed. Use 2-hole strain relief with 1-penetration for 1-wire applications.

Part #	Description
550-0139	3-Hole Strain Relief, 3/4", 7.7 mm holes for use with PV Wire
550-0347	5-Hole Strain Relief, 1", 7.7 mm holes for use with PV Wire
550-0348	9-Hole Strain Relief, 1-1/4", 7.7 mm holes for use with PV Wire

SURGE ARRESTORS & CAPACITORS

Delta Lightning Arrestors

LIGHTNING ARRESTORS

LA302R

The Delta LA Series of lightning arrestors handles the big surges, up to 50,000 A, passing them harmlessly to ground.

Part #	# of Wires	Volts	Description	Delta Part #
501-0019	3	120/240 VAC	Split Phase - Heavy Duty	LA302
501-0056	4	120/208 VAC	3-Phase - Heavy Duty	LA303
501-0021	3	120/240 VAC	Split Phase	LA302R
501-0020	3	300 VDC	For Battery-Based Systems	LA302DC
501-0022	3	600 VDC	For Grid-Tied Systems	LA602DC
501-0026	4	600 VDC	For Heavy Duty, Metal Oxide Varister	MO603

MidNite SOLAR, INC

SURGE PROTECTOR DEVICE

All of the new MidNite Solar Surge protectors are listed as Type 1 devices per UL1449 rev3. All 3 models can handle multiple surges up to 115,000 amps. They feature bright blue LEDs to indicate proper operation, and are repairable. The SPD's carry a 5 year warranty against failure for any reason. Even Lightning! 50 Hz "Export" versions with appropriate wire colors available for all 3 SPDs. The MNSPD 115 will offer protection for circuits up to 90 VAC, and 150 VDC. The MNSPD 300 is designed for use with 150-250 volt P/V controllers, off grid P/V combiners, and 120/240 VAC circuits. The MNSPD 600 offers maximum protection for grid-tied PV combiners, string inverter input circuits, and 480 VAC circuits.

Part #	Description	# of Wires	Voltage	MidNite Part #
501-0092	For 12 to 48 VDC Battery Systems	3-Wire	150 VDC/ 100 VAC	MNSPD115
501-0093	For 120/ 240 VAC Grid-Tied Systems	3-Wire	385 VDC/ 300 VAC	MNSPD300
501-0094	For PV Array & 480 VAC Grid-Tied Systems	3-Wire	600 VDC/ 480 VAC	MNSPD600

BURNDY AND WILEY

BURNDY® is recognized as a global leader for innovation in engineering and manufacturing of high quality compression connectors, grounding products and installation tooling for the solar industry. As the solar industry has grown – so has Burndy's involvement. Burndy brings over 85 years of experience in engineering and manufacturing of quality connectors and tooling to the electrical industry. Today, we supply products and services that span the entire scope of the solar industry (array, inverter, transformer, collector system). Their proven, safe and reliable connector solutions stand up to the most challenging application requirements and also maximize performance and network reliability.

WILEY is most widely recognized for the invention of the WEEB (Washer, Electrical Equipment Bond). The WEEB family of products are used to bond solar modules to solar mounts. The mounts are then grounded so the entire assembly is grounded. WILEY is dedicated to developing and providing innovative, high-quality solutions that revolutionize the solar industry. The WILEY engineers work closely with solar manufacturers and installers to develop products that address the evolving needs of the PV industry in bonding, grounding, and wire management. These products enable customers to install PV systems safely, efficiently, and cost effectively. BURNDY now offers the complete line of WILEY's unique solutions for Balance of System components for photovoltaic applications.

CABLE MANAGEMENT CLIPS

WILEY CABLE CLIPS

ACME Cable Clips simplify wire management and create a cleaner aesthetic to solar PV arrays. The clips are made of corrosion resistant stainless steel and are designed to prevent damage to cable insulation. The ACC and ACC-PV Cable Clips attach to modules. The ACC-R2 and ACC-R4 Cable Clips attach to mounting rails.

Part #	Description	Finish	Qty.	Wiley Part #
550-0031	Module Cable Clip, holds 1 or 2 USE-2 wires or 1 PV Wire	Stainless Steel	100	ACC
550-0063	Module Cable Clip, holds 1 or 2 PV Wires	Stainless Steel	100	ACC-PV
550-0338	Rail Cable Clip, for one (9-14 mm) wire or two (9-11 mm) wires	Stainless Steel	100	ACC-R2
550-0339	Rail Cable Clip, for 1 to 4 (6.8-7.2 mm) wires	Stainless Steel	100	ACC-R4

GROUNDING EQUIPMENT

BURNDY GROUNDING LUGS

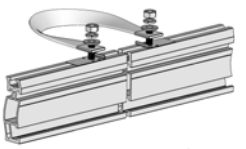
Part #	Description	Qty.	Burndy Part #
590-0007	Burndy Electrical Aluminum Grounding Lugs	100	BGBL-4
590-0006	Grounding Lay-in Lugs with Hex Screw, lock washer, Tin Plated Copper	10	CL50-1TNMWSST

WEEB GROUNDING LUG

The WEEB lug consists of a WEEB (Washer, Electrical Equipment Bond), lay-in lug, and hardware. It's used with one solid or stranded copper wire (6AWG to 14AWG), or two copper wires (10AWG to 12AWG) to provide a continuous ground on roof or ground mounted solar systems. Unlike traditional lay-in lugs, the WEEB Lug does not require surface preparation on rail or module to install. The WEEB lug is installed using a stainless steel screw which tightens the WEEB, allowing the specialized teeth to embed into anodized aluminum, galvanized steel, or any electrically conductive metal to establish a gas tight electrical connection. The tin-plated lug assures minimum contact resistance and protection against corrosion. The copper wire is clamped by a 1/4-28 stainless steel screw, which is horizontal to the tang for easy access when mounted under a PV module. The low profile of the lug allows it to be installed in a variety of positions and comes with hardware to mount it to a rail or through a clearance hole.

Part #	Description	Wiley Part #
590-0011	WEEB Grounding Lug 6.7 with 1/4" mounting hardware	WEEB-LUG-6.7
590-0072	WEEB Grounding Lug 8.0 with WEEB-8.0 no hardware	WEEB-LUG-8.0
590-0080	WEEB Grounding Lug 15.8 with WEEB-15.8, mounting hardware	WEEB-LUG-15.8
590-0043	WEEB Replacement Washer for 6.7 Ground Lug	WEEB-6.7

WEEB BONDING JUMPER FOR SPLICING



The WEEB Bonding Jumper is used to create an electrical connection between two pieces of anodized aluminum, galvanized steel, or any electrically conductive metal which has been mechanically spliced. Long spans of mounting rails are sometimes constructed from two shorter rail sections. Manufacturers may recommend that a floating splice be used to allow for thermal expansion. A floating splice is rigidly attached to only one rail, and allows the rails to expand and contract in line with each other. In such cases, via NEC code, it is also necessary to make an electrical splice, which can be done with a WEEB Bonding Jumper. The Bonding Jumper is constructed of tin plated, braided copper wire with a WEEB attached at each end of the Jumper. The WEEBs provide a reliable, gas tight electrical connection, and the braided copper wire allows for thermal expansion.

Part #	Description	Wiley Part #
590-0013	WEEB Bonding Jumper 6.7 for Splicing	WEEB-BNDJMP6.7
590-0062	WEEB Bonding Jumper 8.0 for Splicing	WEEB-BNDJMP8.0

BURNDY® wiley

WEEB, WASHER ELECTRICAL EQUIPMENT BOND

The WEEB line of products is designed to bond solar PV modules to mounting structures and create an electrical path to ground. WEEBs eliminate the need for older, more costly grounding methods and greatly reduce the amount of labor and materials used in installations. The innovative WEEB design removes the need to run a ground wire to each individual module and eliminates the need for surface preparation on anodized aluminum components. To install, WEEBs are placed between PV modules and mounting rails at clamping points or at bolted connections. When anti-seize is applied and the hardware is tightened down to the appropriate torque spec, the WEEB's specialized teeth embed into anodized aluminum, galvanized steel, or any electrically conductive metal to establish a gas tight electrical connection.

Part #	Description	Wiley Part #
590-0010	WEEB Grounding clip for Direct Power and IronRidge	WEEB-DMC
590-0012	WEEB Grounding clip for ProSolar	WEEB-PMC
590-0014	WEEB Grounding clip for Unirac	WEEB-UMC
590-0009	WEEB for Pole/Ground Mount	WEEB-9.5
590-0020	WEEB for Pole/Ground Mount with no legs	WEEB-9.5NL
590-0038	WEEB Grounding Clip for DPW PowerTube CRS Rail Brackets	WEEB-11.5
590-0039	WEEB Grounding Clip for DPW PowerTube CRS Module Mounting Brackets	WEEB-DPF
590-0040	WEEB Grounding Clip for DPW PowerTube CRS Ballast Trays, Unistrut 1-5/8"	WEEB-WMC
590-0076	WEEB Grounding clip for Unirac ISYS Roof and Ground Mount Systems and TerraSmart Terra Farm	WEEB-UIR
590-0074	WEEB Grounding clip for Renusol VS, S:Flex, Green Sun Rising Mounts4solar, and Haticon Solar	WEEB-CCR
590-0078	WEEB Grounding clip for Array Technologies Wattsun Micro MW Horizontal Beam Tracker	WEEB-ADC
590-0079	WEEB Grounding clip for Array Technologies Wattsun Micro MW Horizontal Beam Tracker	WEEB-ADR
590-0073	WEEB Grounding clip for Schuco ezFlatRoof, Terrafix Solarpark, and T.R.A Mage Tegra	WEEB-SMC-2
590-0084	WEEB Grounding clip for Orion Solar ORI-R Rail	WEEB-OCR

WEEB DMC
For use with Direct Power & Water PowerRail and MPM, IronRidge XRS and XRL rails, and low-lipped modules with Unirac SolarMount.

WEEB PMC
For use with ProSolar RoofTrac rails.

WEEB UMC
For use with Unirac SolarMount rails.

WEEB 9.5
For use with DPW GM, Power Fab CRS, Top of Pole, Unirac RapidRac.

WEEB 9.5NL
With no legs, for use with DPW Top of Pole Mount.

WEEB 11.5
For use with DPW PowerFab CRS connection from the mid clamp to the PowerBeam.

WEEB DPF
For use with DPW PowerFab CRS connection from the mid clamp to the module and DPW P6 rail.

WEEB WMC
For use with DPW PowerFab CRS connection from the ballasted tray to the PowerBeam.

WEEB UIR
For use with Unirac ISYS Roof and Ground Mount Systems and TerraSmart Terra Farm.

WEEB CCR
For use with Renusol VS, S:Flex, Green Sun Rising Mounts4solar, and Haticon Solar.

WEEB ADC
For use with Array Technologies Wattsun Micro MW Horizontal Beam Tracker.

WEEB ADR
For use with Array Technologies Wattsun Micro MW Horizontal Beam Tracker.

WEEB SMC 2
For use with Schuco ezFlatRoof, Terrafix Solarpark, and T.R.A Mage Tegra.

WEEB OCR
For use with Orion Solar ORI-R Rail.

HellermannTyton

PRE-PRINTED SOLAR INSTALLATION LABELS

HellermannTyton offers a line of commonly used regulatory Solar Identification labels for small or large scale PV installations. Designed to meet NEC and IFC standards for printed text, character height, color and outdoor UV stability, they come pre-printed with common legends to meet the requirements of the AHJ. The labels use UV stable inks and materials for long lasting and weather resistant identification. Labels are supplied with an aggressive adhesive designed to adhere to both baked enamel and powder coat painted surfaces. These labels are protected by a UV stable clear laminate that allow variable printing using the HellermannTyton TT230SM thermal transfer printer. Also, an optional hand-applied UV stable laminate is available to protect the printed text. Labels are reflective where required by the IFC 2012. All labels tested to UL 969 to meet the California Department of Forestry and Fire standards.

Part #	Description	Pkg Qty*	HellermannTyton Part #
501-0096	WARNING - ELECTRICAL SHOCK HAZARD, 3.75" x 2.0"	1	596-00233
501-0110	WARNING - ELECTRICAL SHOCK HAZARD W/DC, 3.75" x 2.5"	1	596-00232
501-0111	WARNING - GROUNDED CONDUCTORS MAY BE ENERGIZED, 4.12" x 2"	1	596-00234
501-0112	WARNING - DC CONDUCTORS MAY BE ENERGIZED, 4.12" x 2"	1	596-00258
501-0113	WARNING - TURN OFF PV AC PRIOR WORKING INSIDE PANEL, 4.12" x 2"	1	596-00235
501-0095	WARNING - DUAL POWER SOURCE, 4.12" x .75"	1	596-00231
501-0114	CAUTION - PV SYSTEM CIRCUIT IS BACKFED, 4.12" x .75"	1	596-00236

*Sold individually, but package quantities recommended

PRE-PRINTED REFLECTIVE SOLAR LABELS

Part #	Description	Pkg Qty*	HellermannTyton Part #
501-0124	DO NOT DISCONNECT UNDER LOAD, 6.5" x 1"	1	596-00244
501-0099	CAUTION - SOLAR ELEC SYS CONNECTED, 6.5" x 1"	1	596-00245
501-0100	CAUTION - SOLAR CIRCUIT, 6.5" x 1"	1	596-00247
501-0098	SOLAR DISCONNECT, 6.5" x 1"	1	596-00246
501-0122	MAIN PV SYSTEM DISCONNECT, 5.5" x 1.75"	1	596-00243
501-0123	MAIN PV SYSTEM AC DISCONNECT, 5.5" x 1.75"	1	596-00255
501-0125	PHOTOVOLTAIC POWER SOURCE, 6.5" x 1"	1	596-00206
501-0101	PHOTOVOLTAIC POWER SOURCE SHINGLE Label	1	596-00257

*Sold individually, but package quantities recommended

VARIABLE IMPRINT SOLAR RATING LABELS

These labels require the TT230SM printer or equivalent printer to print variable data for the rating labels. Please contact your sales representative for details.

Part #	Description	Pkg Qty*	HellermannTyton Part #
501-0102	Printer Kit for Labels includes printer, software, ribbon and case	1	556-00256
501-0121	DC MODULE Label, 4" x 2"	1	596-00253
501-0117	DC BACKUP SYSTEM Label	1	596-00240
501-0118	DC RATING Label, 3.75" x 2"	1	596-00241
501-0116	PV AC DISCONNECT RATING, 3.75" x 1"	1	596-00239
501-0115	PHOTOVOLTAIC - AC DISCONNECT, 3.75" x 1"	1	596-00237
501-0097	PHOTOVOLTAIC - DC DISCONNECT, 3.75" x 1"	1	596-00238
501-0119	LAMINATE FOR AC/DC RATING Label, 4.2" x 2.25"	1	596-00242
501-0120	AC MODULE Label, 4" x 2"	1	596-00252
501-0104	1" Red vinyl on continuous roll	1	558-00308
501-0105	2" Red vinyl on continuous roll	1	558-00312
501-0103	4" WHITE VINYL FOR DIRECTORY PLAQUE DESIGN	1	558-00350

*Sold individually, but package quantities recommended

SOLAR LABEL KITS

Part #	Description	Pkg Qty
501-0079	Set of 6 labels: 501-0096, 501-0095, 501-0099, 501-0100, 501-0098, 501-0097 (see our part number above for descriptions)	1 of each label

CAUTION SOLAR CIRCUIT MARKERS

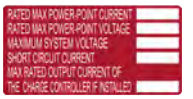
The PHOTOVOLTAIC POWER SOURCE markers are a pre-printed, non-adhesive, coiled marker that can be opened and snapped over the cable for long term, reflective, permanent identification per NEC 2011, Article 690.31(E)(3) and IFC 2012, Article 605.11.1.4. Designed with UV stable vinyl, the coiled markers come 25 per bag and will fit all standard PV cables or EMT conduit. Printed characters are the required 3/8" tall.

Part #	Description	Pkg Qty*	HellermannTyton Part #
501-0106	CAUTION - SOLAR CIRCUIT, 4" x 2", Use on .25" OD PV cables	1	596-00249
501-0107	CAUTION - SOLAR CIRCUIT, 7.2" x 5", For EMT conduits up to 1" in OD	1	596-00251
501-0108	PHOTOVOLTAIC POWER SOURCE, 4" x 2", Use on .25" OD PV cables	1	596-00207
501-0109	PHOTOVOLTAIC POWER SOURCE, 7.2" x 5", For EMT conduit up to 1" in OD	1	596-00208

*Sold individually, but package quantities recommended

596-00234

596-00232



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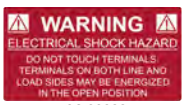

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596-00237

596-00238

596-00206

596-00247

596-00246

596-00255

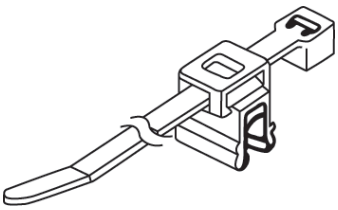
596-00231

596-00236

HellermannTyton

CABLE MANAGEMENT COMPONENTS FOR SOLAR APPLICATIONS

HellermannTyton's high-performance edge clip and UV stabilized cable tie assemblies are designed specifically to route cables by securing them to a metal or plastic frame rail edge, eliminating the need for mounting holes and mechanical fasteners. The clip is easy to secure and the extraction force is high due to the integrated metal clamp that holds the edge clip in place. The cable tie firmly grips the cable, preventing chafing of the cable and ensuring long-term reliability.



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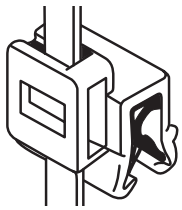

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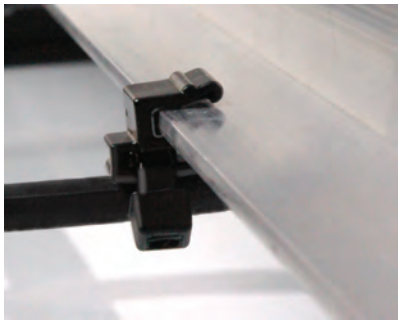

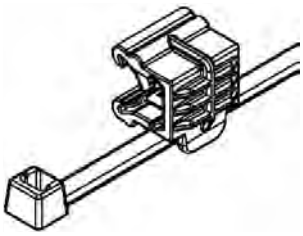

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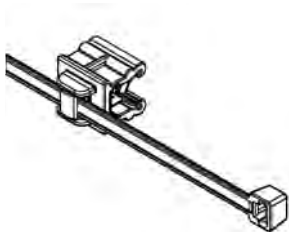


156-00590

Part #	Type	Min. Tensile Strength	Length	Max Bundle	Color	Pkg Qty*	HellermannTyton Part #
1-3 mm Edge Thickness							
550-0389	T50REC4A	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00635
550-0390	T50REC4B	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00588
550-0391	T50REC5A	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00589
550-0392	T50REC5B	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00468
3-6 mm Edge Thickness							
550-0393	T50REC19	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00590
550-0394	T50REC20	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00591
550-0395	T50REC23	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00592
550-0396	T50REC24	50 (225)	7.9 (200)	1.8 (45)	Black	1	156-00593

*Sold individually, but packaged quantities recommended

UV CABLE TIES

Specially designed for the solar industry, HellermannTyton offers cable ties made of UV stabilized PA66UV material. This provides additional protection against UV radiation for long-term outdoor use and is available in various styles, tensile strengths and bundle diameters.

Part #	Type	Min. Tensile Strength	Length	Max Bundle	Color	Pkg Qty*	HellermannTyton Part #
550-0397	T30R	30 (135)	5.9 (150)	1.38 (35)	Black	1	T30ROUVC2
550-0398	T50R	50 (225)	7.9 (200)	1.97 (50)	Black	1	T50ROUVC2
550-0399	T50L	50 (225)	15.35 (390)	4.33 (110)	Black	1	T50LOUVC2
550-0400	T120R	120 (535)	15.24 (387)	4.13 (105)	Black	1	T120ROUVC2

*Sold individually, but packaged quantities recommended

CABLE MANAGEMENT COMPONENTS CONTINUED

Nine Fasteners, Inc. d/b/a QUALITY COMPONENTS

CABLE MANAGEMENT CLIPS

Part #	Description	Qty.
550-0342	Cable Clamp SS, 1 or 2 #10AWG USE-2 Wires	100
550-0345	Cable Clamp SS, 1 or 2 PV Wires	100

SOLAR CABLES

Soligent

Single conductor multi-stranded cable listed and labeled for use in photovoltaic source circuits and module interconnections with 90°C temperature rating for use in dry and wet locations. Sunlight resistant for installation in air, conduit, or other recognized raceways in circuits not exceeding 600 volts.

- Class B stranding conductors (7-Strand) for use allows use with most terminals/lug/connectors.
- USE-2 meets the requirements of UL 854 and UL 44
- RHW-2 meets the requirements of UL 44.
- PV Wire meets the requirements of UL 4703.

PV WIRE CABLES WITH MC4 LATCHING CONNECTORS

Extension cables with 10 AWG cable and MC4 Male / Female ends.

Part #	Length	Gauge	Max Voltage
550-0080	6’	10 AWG	600 VDC
550-0081	15’	10 AWG	600 VDC
550-0082	25’	10 AWG	600 VDC
550-0083	30’	10 AWG	600 VDC
550-0084	50’	10 AWG	600 VDC
550-0085	100’	10 AWG	600 VDC

USE-2 CABLES WITH MC4 LATCHING CONNECTORS

Extension cables with 10 AWG cable and MC4 Male / Female ends.

Part #	Length	Gauge	Max Voltage
550-0055	6’	10 AWG	600 VDC
550-0053	15’	10 AWG	600 VDC
550-0052	25’	10 AWG	600 VDC
550-0051	30’	10 AWG	600 VDC
550-0047	50’	10 AWG	600 VDC
550-0050	100’	10 AWG	600 VDC

USE-2 CABLES WITH MC3 CONNECTORS

Extension cables with 10 AWG cable and MC3 Male / Female ends.

Part #	Length	Gauge	Max Voltage
550-0023	6’	10 AWG	600 VDC
550-0024	15’	10 AWG	600 VDC

CONNECTORS & ADAPTERS

MC

MC3 CABLE CONNECTOR WITH BOOT

Part #	Description	Gauge	Male/ Female	Multi-Contact Part #
550-0015	For USE-2 (OD 3~6 mm)	10 AWG	F	32.0000UR
550-0016	For USE-2 (OD 3~6 mm)	10 AWG	M	32.0001UR

MC4 LATCHING CONNECTOR

Part #	Description	Gauge	Male/ Female	Multi-Contact Part #
550-0061	For PV Wire (OD 6~9 mm)	12/ 10 AWG	F	32.0016P0001-UR
550-0062	For PV Wire (OD 6~9 mm)	12/ 10 AWG	M	32.0017P0001-UR
550-0040	For USE-2 (OD 3~6 mm)	12/ 10 AWG	F	32.0014P0001-UR
550-0041	For USE-2 (OD 3~6 mm)	12/ 10 AWG	M	32.0015P0001-UR
550-0042	Optional Locking Collar	-	-	32.5280
550-0439	Panel Mount Connector	12/ 10 AWG	F	32.0056P0001
550-0440	Panel Mount Connector	12/ 10 AWG	M	32.0057P0001

MC3 TO MC4 ADAPTER CABLE

Part #	Description	Male/ Female
550-0045	MC3 /MC4 Adapter	F
550-0044	MC3 /MC4 Adapter	M

SMART GRID UTILITY-SCALE
INDUSTRY LEADING INVERTERS

Solectria Renewables, LLC is the leading U.S. based grid-tied photovoltaic inverter manufacturer for residential, commercial and utility-scale solar installations. Our versatile line of high efficiency products provide power solutions ranging from 1 kW residential systems to multi-megawatt solar farms. Solectria Renewables' products are backed by more than 20 years of experience in the power electronic and inverter industries and supported by world class warranties. All of our commercial and utility-scale PV inverters are manufactured in the USA, ARRA compliant, Ontario FIT Content Compliant, and listed to UL 1741/IEEE 1547.

REAL WORLD SOLUTION:

nationalgrid

Size: 1.01 MW

Installer:

Location: Haverhill, MA

Products: 2, SGI 500; String Combiners; SolrenView Monitoring

Date commissioned: November 2010

"We have partnered with Solectria Renewables on various utility-scale projects – we value our long term relationship and chose the SGI series inverters due to their durability, reliability, and high efficiencies."

– Steve Hopkins, *Project Manager, Fischbach & Moore*

Built for the real world

SOLECTRIA RENEWABLES

www.solren.com | inverters@solren.com | 978.683.9700

power-one®
Renewable Energy Solutions

AURORA®

At Power-One, we aim high so you can too™

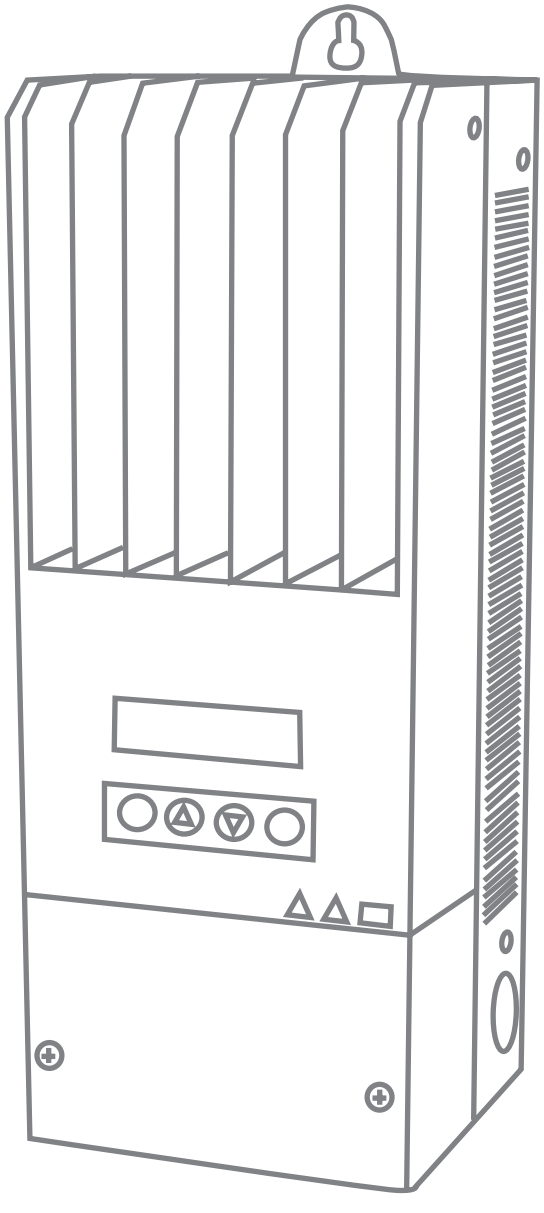
DO YOU AIM HIGH?

Power-One offers the broadest range of photovoltaic and wind power inverter solutions in the industry for residential and utility-scale needs. The Aurora® product line of renewable energy inverters from Power-One features the highest efficiencies from market-leading technology and features top performances to maximize energy harvesting.

www.power-one.com

power-one®
Renewable Energy Solutions

Charge Controllers



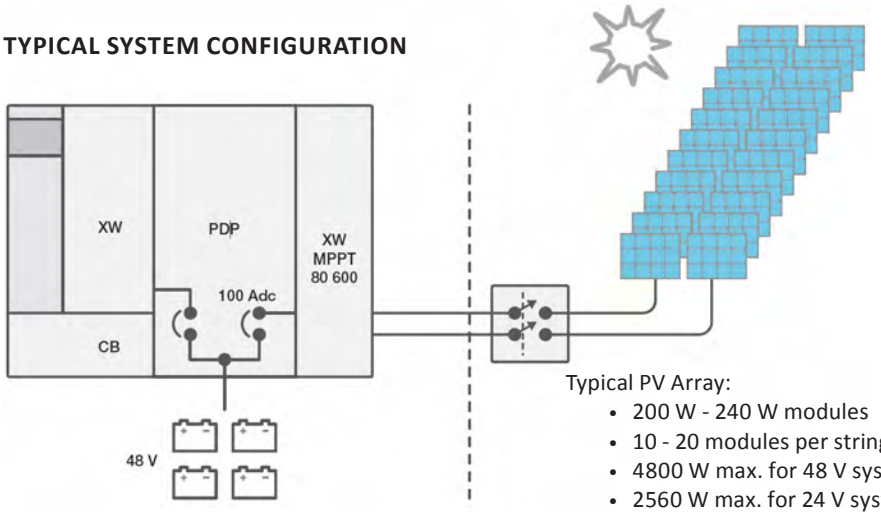
Soligent

Schneider Electric

NEW! Schneider Electric Conext XW MPPT 80 600 Solar Charge Controller

The XW MPPT 80 600 is an innovative solar charge controller that offers an industry-first set of features: high PV input voltage (up to 600 VDC), Maximum Power Point Tracking (MPPT), and 80 A charge current. 600 VDC PV input voltage delivers lower installation costs through fewer PV strings, longer home runs, smaller wiring and conduit, and virtual elimination of PV combiner boxes and circuit breakers. MPPT technology helps harvest the most energy available from the PV array, regardless of environmental conditions. 80 A battery charge current allows for connection of arrays rated at up to 4800 W (48 V battery bank).

TYPICAL SYSTEM CONFIGURATION



Typical PV Array:

- 200 W - 240 W modules
- 10 - 20 modules per string
- 4800 W max. for 48 V systems (2 strings)
- 2560 W max. for 24 V systems (1 string)

Schneider Electric Inverter	XW MPPT 80 600
Part #	520-0119
Schneider Electric Part #	RNW8651032
Electrical Specifications	
Nominal Battery Voltage	24 and 48 V (Default is 48 V)
Max PV array voltage (operating)	195 to 550 V
Max PV array open circuit voltage	600 V
Max PV array input current	35 A
Max and min wire size in conduit	#6 AWG to #14 AWG (13.5 to 2.5 mm2)
Charger regulation method:	Three-stage (bulk, absorption, float) plus manual equalization / Two-stage (bulk, absorption) plus manual equalization
General Specifications	
Power consumption, night time	<1 W
Enclosure material	Indoor, ventilated, aluminum sheet metal chassis with 7/8" and 1" knockouts and aluminum heat sink
Product weight	13.5 kg (29.8 lbs)
Shipping weight	17.4 kg (38.3 lbs)
Product dimensions (H x W x D)	30" x 8.625" x 8.625"
Shipping dimensions (H x W x D)	34.3" x 13" x 10.6"
Device mounting	Vertical wall mount
Ambient air temperature for operation	-20 °C to 65 °C (-4 °F to 149 °F), power derating above 45 °C
Storage temperature range	-40 °C to 85 °C (-40 °F to 185 °F)
Operating altitude	Sea level to 2000 m (6,562 ft)
Warranty	Five-year standard

SCHNEIDER ELECTRIC
XW MPPT 80 600 CHARGE CONTROLLER

FEATURES

- Up to 600 VDC input
- Full Power Range: 230 to 550 VDC
- Operating Range: 195 to 550 VDC
- MPPT Range: 195 to 510 VDC
- PV Array Start Voltage: 230 VDC
- 80 A Output; 48 V or 24 V Battery (nominal)
- Full Power (4,800 W; 2,560 W) up to 45 °C (113 °F)
- Fast Sweep MPPT Algorithm
- Two- or Three-stage Battery Charger, Plus EQ
- Battery Type Settings: FLA, AGM, Gel, Custom
- Battery Temperature Compensation
- High Efficiency: 96% nom @ 48 V; 94% nom @ 24 V
- Low Tare Loss (0.5 W; Xanbus Power Supply Off)
- Built-in GFP and Indicator
- Input Over-voltage and Over-current Protection
- Output Over-current and Back-feed Protection
- Over-temperature Protection
- PV Cell Compatibility: Mono, Poly, String, Thin-Film
- Selectable PV Array Grounding: (+), (-), or ungrounded
- Positive or Negative System Ground
- Xanbus Compatible with AGS, Gateway, SCP, and XW
- AUX Output (dry contact, form "C")
- PDP Mounting Compatible (30" x 8.5" x 8.5")
- Variable Speed Cooling Fans

Part #	Description	Current	System Voltage	Schneider Part #
520-0119	XW MMPT CC	80 A	600 V	RNW8651032

SCHNEIDER ELECTRIC XW MPPT 60 150 CHARGE CONTROLLER

The XW MPPT 60 is a photovoltaic (PV) charge controller that tracks the electrical maximum power point of a PV array to deliver the maximum available current for charging batteries. When charging, the XW MPPT regulates battery voltage and output current based on the amount of energy available from the PV array and state-of-charge of the battery.

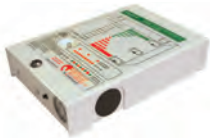
The XW MPPT can be used with 12, 24, 36, 48, and 60-volt DC battery systems and is able to charge a lower nominal-voltage battery from a higher nominal-voltage array up to 150 VDC. For example, the XW MPPT can charge a 12-volt battery from a 36-volt array.

Part #	Description	Current	System Voltage	Schneider Part #
520-0050	C12 CC	12 A	12 VDC	RNWC12
520-0051	C35 CC	35 A	12/24 VDC	RNWC35
520-0052	C40 CC	40 A	12/24/48 VDC	RNWC40
520-0053	C60 CC	60 A	12/24 VDC	RNWC60
520-0000	XW MPPT CC (Built-in GFI)	60 A	12/24/36/48/60 VDC	RNW86510301

SCHNEIDER ELECTRIC
C35 PWM, C40 PWM AND C60 PWM

The C35 PWM, C40 and C60 PWM are the benchmarks of Schneider Electric's pulse width modulation lineup. The C35 PWM and C60 PWM are field configurable for 12 and 24 VDC operation. The C40 PWM may be configured for 12, 24, or 48 VDC operation. All can be used as a charge, diversion, or load controller and come with a standard multi-color charge status LED.

SCHNEIDER ELECTRIC
C12 PWM



The C12 PWM charge, lighting, or load controller is uniquely sophisticated. As a pulse width modulator, it features three-stage charging, user definable voltage parameters, and automatic equalization. Standard in the C12 PWM's load control circuitry are field adjustable low voltage disconnect and reconnect points, along with a five minute low battery disconnect warning. Lighting run time is adjustable from 2 to 8 hours or can be set from dusk to dawn operation.

SCHNEIDER ELECTRIC
C-SERIES DIGITAL DISPLAY

Designed for use with C-Series Charge Controllers, this digital meter mounts onto the front of a charge controller, or as a remote which can be installed up to 100' (31 m) away. It displays volts, amps, and resettable cumulative amp hours for a solar array, DC loads, or diversion loads, depending on the application.

Part #	Description	Schneider Part #
570-0138	Digital Meter, CM for C-Series	RNWCM
570-0139	Remote Digital Meter, for C35, C40, C60, includes 100' cable, 125 VDC	RNWCMR100
570-0140	Remote Digital Meter,for C-Series, includes 50' cable, 125 VDC	RNWCMR50

MORNINGSTAR corporation

SUNGUARD™

Combines all the advantages of the SunSaver charging circuit with less expensive packaging to provide an economical controller for small PV systems.

Part #	Max Current	System Voltage	Morningstar Part #
520-0029	4.5 A	12 VDC	SG-4

SUNKEEPER

Morningstar's SunKeeper solar controller provides a low cost regulated output directly from the solar module to maximize battery life in small solar power applications.

Part #	Max Current	System Voltage	Morningstar Part #
520-0033	6 A	12 VDC	SK-6
520-0032	12 A	12 VDC	SK-12

SUNSAVER CHARGE CONTROLLERS

SunSaver's technology provides:

- PWM battery charging
- Exceptional reliability and consistent high quality
- Some models with Low Voltage Disconnects (LVD)

Part #	Max Current	System Voltage	Features	Morningstar Part #
520-0042	6 A	12 VDC	-	SS6-12V
520-0043	6 A	12 VDC	LVD	SS6L-12V
520-0037	10 A	12 VDC	-	SS10-12V
520-0038	10 A	12 VDC	LVD	SS10L-12V
520-0039	10 A	24 VDC	LVD	SS10L-24V
520-0040	20 A	12 VDC	LVD	SS20L-12V
520-0041	20 A	24 VDC	LVD	SS20L-24V

SUNLIGHT CHARGE / LIGHTING CONTROLLERS

The SunLight solar lighting controller combines the SunSaver design with a micro-controller for automatic lighting control functions. Includes a rotary digital switch with 10 lighting options.

Part #	Max Current	System Voltage	Morningstar Part #
520-0034	10 A	12 VDC	SL-10L-12V
520-0035	10 A	24 VDC	SL-10L-24V
520-0036	20 A	12 VDC	SL-20L-12V

SUNSAVER MPPT BATTERY CHARGER

Morningstar's SunSaver MPPT solar controller with TrakStar Technology™ is an advanced maximum power point tracking (MPPT) battery charger for off-grid photovoltaic (PV) systems. The controller features a smart tracking algorithm that maximizes the energy harvest from the PV and also provides load control to prevent over discharge of the battery.

Part #	Max Current	System Voltage	Morningstar Part #
460-0015	15 A	12/24 VDC	SS-MPPT-15L

SUNSAVER 25 AMP DUO CHARGE CONTROLLER

Morningstar's SunSaver Duo™ is an advanced PWM two battery controller for RV's, caravans, boats and cottages. Rated for 25 amps at 12 volts DC, this product will charge two separate and isolated batteries at the same time, such as a "house" and an engine battery, based on user selectable priorities. This controller also includes a backlit remote meter which may be mounted in or on a wall, and displays digital and pictorial status information about the solar power system.

Part #	Max Current	System Voltage	Features	Morningstar Part #
520-0044	25 A	12 VDC	Remote Meter	SSD-25RM

PROSTAR CHARGE CONTROLLERS

Morningstar's ProStar is the world's leading mid-range solar controller for both professional and consumer applications. This second generation ProStar:

- Adds new features and protections using highly advanced technology
- Provides longer battery life and improved system performance
- Sets new standards for reliability and self-diagnostics

Part #	Features	Max Current	Input Voltage	Morningstar Part #
520-0023	-	15 A	12/24 VDC	PS-15
520-0024	With LCD Monitor	15 A	12/24 VDC	PS-15M
520-0025	With Meter	15 A	48 VDC	PS-15M-48V
520-0026	With Meter, Positive Ground	15 A	48 VDC	PS-15M-48V-PG
520-0027	-	30 A	12/24 VDC	PS-30
520-0028	With LCD Monitor	30 A	12/24 VDC	PS-30M

MORNINGSTAR corporation

TRISTAR CHARGE CONTROLLERS

Morningstar's TriStar Controller is a three-function controller that provides reliable solar battery charging, load control or diversion regulation. The controller operates in one of these modes at a time and two or more controllers may be used to provide multiple functions. It has an optional meter, remote meter and remote temperature sensor. They can operate alone or networked with other Morningstar products.

Part #	Max Current	System Voltage	Morningstar Part #
520-0045	45 A	12/24/48 VDC	TS-45
520-0046	60 A	12/24/48 VDC	TS-60

TRISTAR MPPT CHARGE CONTROLLERS

Morningstar's TriStar MPPT solar controller with TrackStar Technology™ is an advanced power point tracking (MPPT) battery charger for off-grid PV systems up to 3 kW. The TriStar features a smart tracking algorithm that maximizes the energy harvest from the PV by rapidly finding the solar array peak power point with extremely fast sweeping of the entire I-V curve. This product is the first PV controller to include on-board Ethernet for a fully web-enabled interface and includes up to 200 days of data logging.

Part #	Max Current	System Voltage	Features	Morningstar Part #
520-0096	45 A	12 to 48 VDC	w/ RTS	TS-MPPT-45
520-0097	60 A	12 to 48 VDC	w/ RTS & Ethernet	TS-MPPT-60

SHS SOLAR CONTROLLER

The SHS Controller is ideal for rural electrification systems with one to three solar panels. This controller meets World Bank specifications and provides many features and benefits. **Latin America only.**

Part #	Max Current	System Voltage	Morningstar Part #
520-0031	6 A	12 VDC	SHS-6
520-0030	10 A	12 VDC	SHS-10

TRISTAR MPPT DIGITAL METER

Part #	Description	Morningstar Part #
520-0098	Digital Meter for TS and TS-MPPT	TS-M-2
520-0099	Remote Digital Meter w/ 100' cable	TS-RM-2

REMOTE METER

Part #	Description	Morningstar Part #
570-0584	Remote Meter for SS-MPPT, SSDuo and SureSine with 32' cable	RM-1

PC METERHUB

Part #	Description	Morningstar Part #
570-0894	Enables one display to connect to multiple devices, 4 port, NEMA 1	HUB-1

PC METERBUS ADAPTER

Part #	Description	Morningstar Part #
730-0017	Converts to standard RS-232 port	MSC

RELAY DRIVER

Morningstar's RelayDriver™ is a logic module which provides high level system control functions such as high/low voltage alarms, load control and generator start.

Part #	Description	Morningstar Part #
580-0041	Relay Block, Logic Module accessory for TriStar or other controller	RD-1

REMOTE TEMPERATURE SENSOR (RTS)

The RTS provides accurate battery charging in solar systems that experience temperature variations during the year.

Part #	Remote Temperature Sensor	Morningstar Part #
570-0145	For TriStar Controller	RTS

OutBack POWER™

OUTBACK FLEXMAX MPPT CHARGER CONTROLLER

OutBack's industry leading Maximum Power Point Tracking (MPPT) Charge Controllers offer customers the same reliability and durability built into every OutBack product. Innovative solar harvesting and battery charging algorithms allow you to maximize your system's potential. They can operate alone or networked with other OutBack products.

Part #	Charge Controllers	Max Current	System Voltage
520-0078	FM60-150 VDC	60 A	12/24/32/36/48/54/60 VDC
520-0055	FM80-150 VDC	80 A	12/24/32/36/48/54/60 VDC

samlexamerica

PR SOLAR CHARGE CONTROLLER

The fifth generation of charge controller technology with 10 to 30 amp solar charging and load current capacity (up to 900 Wp). The Steca PR Solar Charge Controllers have a customer designed LCD, which shows the accurate State-of-Charge (SOC) in percent and as a battery gauge symbol. The heart of the controller is the integrated circuit called ATONIC®II, which contains the improved regulation software based on a self learning algorithm. Software is based on a self-learning algorithm. The result is an accurate State-of-Charge (SOC) metering of the battery, the best insurance for a long battery lifetime.

Part #	Charge Controllers	System Voltage	Max Current	Samlex Part #
520-0064	PR Series	12/24 VDC	10 A w/ LCD	PR 1010
520-0065	PR Series	12/24 VDC	15 A w/ LCD	PR 1515
520-0066	PR Series	12/24 VDC	20 A w/ LCD	PR 2020
520-0067	PR Series	12/24 VDC	30 A w/ LCD	PR 3030

SOLARIX PRS AND SOLSUM SOLAR CHARGE CONTROLLERS

Simplicity, high performance, modern design and a convenient display are all attractive features of the new Steca Solarix PRS Solar Charge Controller. The Solarix PRS Solar Charge Controllers are universal, which means they can be used with lead-acid batteries or gel batteries without the need for complex configuration settings. Available in 10 to 30 amp solar charging and load current capacity.

Part #	Charge Controllers	System Voltage	Max Current	Samlex Part #
520-0068	Solarix PRS	12/24 VDC	10 A w/ LED	PRS 1010
520-0070	Solarix PRS	12/24 VDC	20 A w/ LED	PRS 2020
520-0071	Solarix PRS	12/24 VDC	30 A w/ LED	PRS 3030
520-0092	Solsum	12/24 VDC	10 A	Solsum 10.10F
520-0093	Solsum	12/24 VDC	8 A	Solsum 8.8f
520-0094	Solsum	12/24 VDC	6 A	Solsum 6.6f

TAROM 440 SOLAR CHARGE CONTROLLER

The Tarom solar charge controller is designed for demanding telecom applications and complex off-grid PV hybrid system architectures. A variety of exiting features allows the user to adapt this controller to the special needs of the specific installation. Multiple Tarom 440 controllers may be connected in parallel for larger PV arrays. It is possible to connect devices like a temperature sensor, a datalogger and a remote switch to configure and monitor the photovoltaic system optimally. An in built Ah counter gives additional energy balance information to the user.

Part #	Charge Controllers	System Voltage	Max Current	Samlex Part #
520-0124	Tarom Series	48 VDC	40 A	Tarom 440

BZ PRODUCTS, INC.

The MPPT series of charge controllers are fully automatic, current boosting, voltage converting solar controller. The MPPT series incorporates an advanced microprocessor design that brings outstanding performance and many new features to the medium power PV systems. The MPPT series includes universal PV input up to 100 volts and up to 500 watts PV input power. Up to 30% current boost is also possible. The MPPT is ideal for campers, recreational vehicles and small cabin systems.

FEATURES

- Digital Metering
- Battery Temperature Compensation
- Auxiliary Battery Trickle Charger (MPPT 250 and MPPT 250HV only)
- 5 Year Warranty

520-0019

520-0021

Part #	Charge Controllers	Max Input Volts	Max Output Current	System Voltage	Description
520-0019	MPPT250	50 V	25 A	12 VDC	Flush Mount, No Enclosure
520-0020	MPPT250HV	100 V	25 A	12 VDC	Flush Mount, No Enclosure
520-0021	MPPT500	100 V	45/22/11 A	12/24/48 VDC	With Enclosure
520-0022	MPPT500HV	100 V	45/22/11 A	12/24/48 VDC	Optimized for 48V, With Enclosure

520-0058

CHARGE CONTROLLER ENCLOSURE

Surface mount enclosure for MPPT250 and MPPT250HV solar controls. Made in USA.

Part #	Description
520-0058	Optional Enclosure for MPPT250 and MPPT250HV MPPT

CLASSIC MPPT CHARGE CONTROLLER

The MidNite Classic charge controller is unique in its ability to be used for a great variety of DC input sources. The Classic is designed to regulate DC input from PV, Hydro, Wind and other DC sources.

The Classic 150, 200 and 250 are designed to work with 12, 24, 36, 48, 60 and 72 volt battery banks.

The Classic 250KS is designed to charge up to a 120V nominal battery bank. The Classic can be installed stand alone or as a multi-unit networked installation.

FEATURES

- Internet ready
- Graphical display
- 20 megs of data logging
- Previous 380 days of operational data logged (10 parameters logged)
- 150, 200 and 250V operating voltages.
- 12-72V battery charging standard with models up to 120V battery bank
- Built in DC-GFP and Arc Fault Detector
- Solar, wind and hydro MPPT modes
- Ethernet, USB and RS232
- Remote and local displays possible

Part #	System Voltage	Max Current	Battery Charge	MidNite Part #
520-0125	150 VDC	96 A	12-93 V	CLASSIC LITE 150
520-0126	200 VDC	79 A	12-93 V	CLASSIC LITE 200
520-0127	250 VDC	63 A	12-93 V	CLASSIC LITE 250
520-0101	150 VDC	96 A	12-93 V	CLASSIC 150
520-0102	200 VDC	79 A	12-93 V	CLASSIC 200
520-0103	250 VDC	63 A	12-93 V	CLASSIC 250

This system uses the Classic 200 and a 3.5kw array. With an Outback GVFX3648 volt grid-tied inverter, this compact system provides grid-tied and Battery back up.

THE MIDNITE CLIPPER

The Midnite Clipper is a sophisticated voltage limiter that has been designed to work with all Classics for wind and Hydro battery charging applications. It provides, for the first time ever, 3 stage battery charging from your wind turbine or hydro generator. Additionally, the Midnite Clipper will protect the turbine from damage during high winds by keeping it properly loaded once the batteries are fully charged. The Midnite Clipper can even automatically shut down the turbine during a storm. This will not only decrease wear and tear, but also minimizes noise in normal operation.

Part #	Description	MidNite Part #
520-0104	1500 W AC limiter for all Classic Charge Controllers	MNCLIP1.5KAC
520-0130	4000 W AC limiter for all Classic Charge Controllers	MNCLIP4KAC
520-0131	4000 W DC limiter for all Classic Charge Controllers	MNCLIP4KDC

This system is a standalone off-grid system and is based on the E-Panel Plus and Classic 150. With the Outback 2524T, this is a solid off-grid package. Other inverter & Classic model numbers available.

For larger off-grid systems with higher voltage arrays, the Classic 250 can be stacked and teamed with a pair of Magnum 4448PAE inverters as shown in this system. Can use Outback inverters as well.

TrakStar™ Technology

TRAKSTAR™
MAXIMUM POWER POINT TRACKING

The Most Advanced MPPT Solar Controllers

Maximizes energy harvest

Fastest sweeping of I-V curve

Recognizes multiple power points

TriStar MPPT

45 or 60 amps
150 volts
open circuit

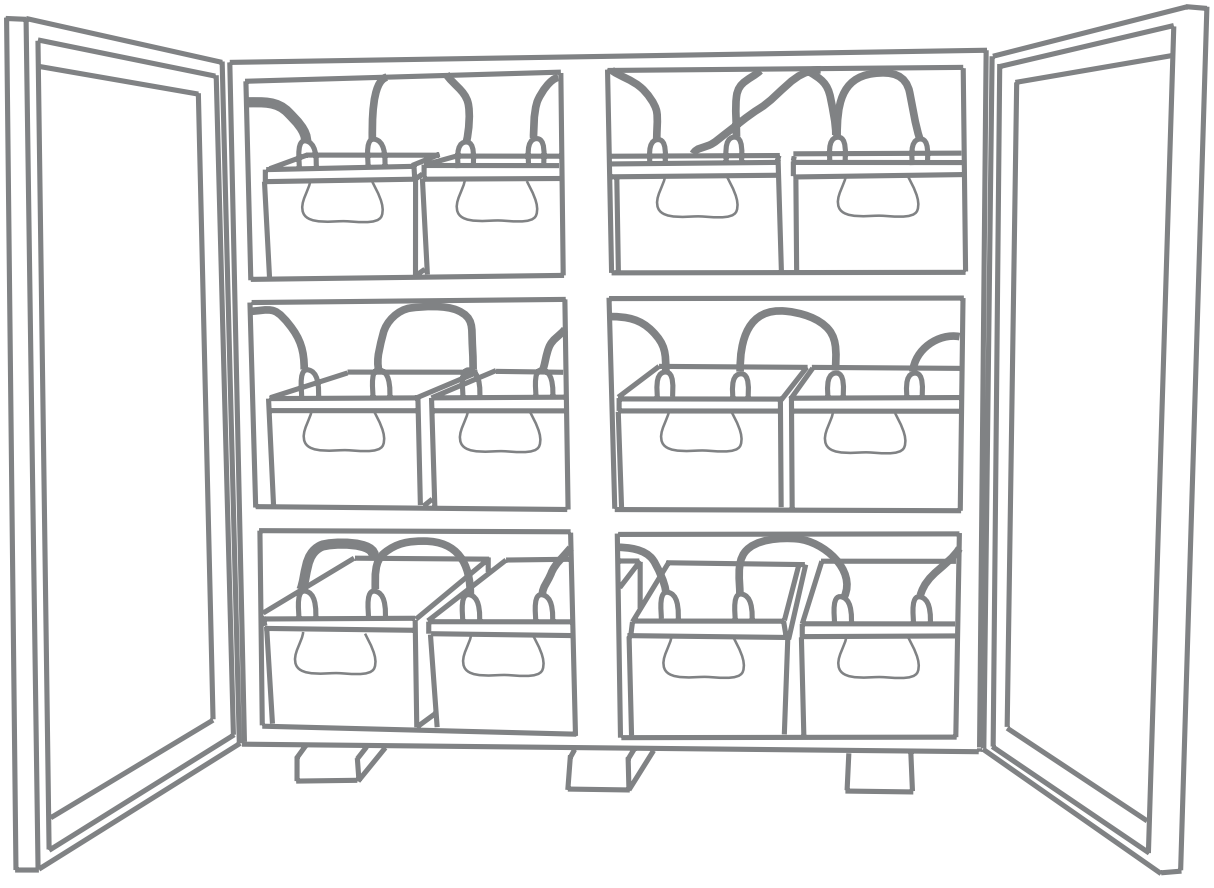
SunSaver MPPT

15 amps
75 volts open circuit

MORNINGSTAR® corporation

PHONE: +1.215.321.4457
www.morningstarcorp.com

Batteries



Soligent

Intro to Batteries

A battery is a storage container for electricity. Does your system need a battery? Not necessarily. Most solar electric systems that feed power to the grid (your friendly local utility company), do so without batteries. But if you're beyond the power lines, or want some emergency or backup power, then you'll need batteries to allow the storage of energy for later use.

Chemistry

There are a wide variety of materials that when properly combined can store and deliver electrons for us. Take common grocery-store AA batteries as an example. Commonly sold varieties are alkaline, nickel-metal-hydride, and lithium battery chemistries. There are dozens of other combos, all with good and bad characteristics. For our power-storage needs, we need a battery chemistry that is reversible. It can deliver electrons on demand, or it can store electrons when there's a surplus. That two-way necessity eliminates about two-thirds of the available chemical combos. For instance, common alkaline AA cells can only deliver electrons; they're really lousy at recharging. We also need a chemistry that can store and deliver large amounts of energy for our household appliances, water pumps, and power tools. Size and weight are not big concerns for household power storage. Once installed, these batteries don't need to be moved around. If you're trying to power a cell phone, laptop computer, or electric vehicle, then size and weight DO matter, so we're seeing different battery chemistries developing for those uses. For household power systems, the best balance of capacity, size, weight, and cost pushes us toward lead-acid batteries. It's a battery chemistry that's been in widespread use for well over 100 years, and still offers the best bang for the buck by a wide margin.

Lead-Acid Batteries

Humans don't have an enviable track record when it comes to recycling and environmental degradation. We're paying the price for that now, and attitudes are changing quickly. Lead-acid batteries are currently the most common recycled item in industrialized countries. We're reclaiming better than 96% of lead-acid batteries. (Car crashes get most of the balance). More than 80% of that new car battery is recycled content. Lead, acid, and plastic cases are all fully recycled.

Within the general family of lead-acid batteries, there's significant fine-tuning, tweaking of chemistries, plate design, cell connections, and sizing to produce batteries that perform better under specific operating conditions. For instance, an automotive starting battery has to deliver a few hundred amps for a few seconds, then the alternator takes over, recharges it quickly, and the battery simply goes along for the ride. A household battery in a remote site will be asked to deliver a steady trickle of amps for lights, with the occasional surge for a water pump or microwave, and it might have to do this for several days without recharging. An automotive battery would suffer a short, ugly life if asked to do this, but a true deep-cycle battery would thrive for years and years. They're both lead-acid batteries, but they're built differently.

Grid-Tied vs. Stand-Alone Systems (or Sealed vs. Wet-Cell Systems)

Here's where we run into the most common battery mistake in the renewable energy business. Stand-alone, or off-grid systems, use deep-cycle, wet-cell (or flooded) batteries. That means they've got caps you can remove to refill with distilled water. This is a battery type that's been developed, fine-tuned, and mass-produced for decades. Life expectancy of the larger electric forklift type batteries routinely exceeds 15, sometimes 20 years. These are the most durable batteries in the industry if they're used as intended. Wet-cell batteries are designed to be cycled – charged and discharged – regularly. Think of this battery type like the muscles of your body. They need regular exercise in order to stay healthy. In an off-grid application this daily exercise comes naturally. The sun shines or the wind blows and we charge the batteries. The sun goes down, folks turn on the lights or other appliances, and we discharge the batteries. Wet-cell batteries are happy doing daily discharges of 20%-30% of their capacity. They can tolerate discharges down to 80% of capacity, but that's the absolute limit, and the fewer truly deep discharges like this the better.

Grid-tied systems don't cycle the batteries regularly. Months or maybe years will go by without a power failure or the need to actually use the emergency backup battery. Sealed batteries have their chemistry tweaked to better tolerate these long periods of inactivity without losing the ability to respond when they're really needed. They still appreciate being cycled and "stretched" occasionally, but it isn't an absolute necessity like with wet-cell types.

AGM vs. Gel

There are two ways to build a sealed battery, and both claim that their way is superior. We sell both kinds, so here's the honest scoop.

Sealed batteries don't have any way to put lost water back into the battery, so charging, particularly as the battery approaches full, has to be very carefully controlled. Excess charging energy breaks water into hydrogen and oxygen. To prevent pressure buildup, sealed batteries all have one-way vent valves that allow this gas to escape. (Exploding batteries just haven't gained popular acceptance). That escaping gas is water we don't have a way of replacing. So we can't be quite as aggressive when charging sealed batteries.

Sealed lead-acid batteries have two production technologies, AGM (Absorbed Glass Mat), or Gel. The AGM type uses a fiberglass-like material with a liquid electrolyte. They're easier (and usually cheaper) to produce, but have less liquid reserves and so are less tolerant of over-charging. Because the electrolyte is liquid and can move around a bit, they can tolerate high charge and discharge rates quite well. What they won't tolerate is high voltage. The charging voltage must never be allowed above 2.35 volts per cell. Higher voltages cause gassing, which vents water vapor, which AGM batteries can't afford to lose, and have no mechanism to replace. Even a single overcharge may damage AGM cells.

Gel type sealed batteries use a jellied electrolyte that's fussier to build, but a bit more tolerant of occasional abuse. They're more difficult to build because no air voids can be allowed when filling the battery with gel. Voids won't simply bubble up and dissipate—they create a dead space on the plate forever. Gel batteries start their life with more moisture, so they're more tolerant of the occasional overcharge. Still, 2.35 volts per cell is usually the recommended maximum charge voltage. Although they're more expensive initially, gel cells typically have a better life expectancy— 20% to 30% longer regardless of the cycle depth.

In all cases, bigger battery cells last longer. Your battery bank will need a certain amp-hours capacity in order to deliver the backup power you need. You could build that bank out of many smaller batteries, or a few larger batteries. The bank with a few large batteries will last longer, be less prone to charging and performance problems, and cost you less per year. Count on it!

The bottom line here is that if you're adding batteries to a grid-tied system, it's important to use sealed lead-acid batteries. They're the right tool for the job. Sealed batteries cost more initially, but will live many times longer in emergency backup service than a comparable wet-cell battery.

RECOMMENDED BATTERY CHARGING VOLTAGES

Wet-Cell Batteries (Hawker PV1, L-16, Golf Cart etc).			
Nominal	Bulk	Float	Equalize
2 V	2.45	2.25	2.55
12 V	14.7	13.5	15.3
24 V	29.4	27.0	30.6
48 V	58.8	54.0	61.2

Sealed Batteries (Concorde, MK, Full River etc.)			
Nominal	Bulk	Float	Equalize
2 V	2.35	2.25	Do NOT Equalize!
12 V	14.1	13.5	NO!
24 V	28.2	27.0	NO!
48 V	56.4	54.0	NO!

These are generally recommended charging voltages that will work well for most lead-acid batteries throughout their life. Rules are made so we can have exceptions. If your battery came with specific instructions, please follow the manufacturer's recommendations.

Battery Sizing Advice

For an off-grid household, the battery should be sized to deliver about 3 to 5 days of power while being discharged to around 50% to 60% of capacity. Less than 3 days capacity means you'll be cycling the battery heavily on a day to day basis, which isn't great for life expectancy. More than 5 days capacity is so expensive that a backup generator or other backup power source might be a better investment.

Why only take 50% to 60% of the battery capacity? The more deeply you cycle a battery, the fewer charge/discharge cycles you'll get out of it. You can cycle your battery to 100% of capacity if you want to, but after a handful of cycles, you'll be buying a new one. True deep-cycle batteries are rated for how many 80% depth of discharge cycles they'll tolerate. (This isn't a written guarantee, it's an average based on destructive testing). For instance, the top-of-the-line Hawker Industrial Batteries are rated for 2,100 cycles. In comparison, the typical Golf Cart type battery does about 225 cycles. If your cycle depth is shallower, say something around 10% to 20%, like we usually aim for on a daily basis, then your Golf Cart type will give you close to 2,000 cycles, and the Hawker Industrial will give in excess of 5,000 cycles.

Battery sizing is the capacity for storing electrons, expressed as amp-hours, not the physical size of the battery.

All lead-acid battery cells deliver approximately 2.0 volts. If you build a bigger cell, then you can store more electrons, which equals more amp-hours, but it's still going to be at 2.0 volts. To raise the voltage, you connect cells in series. To raise the amp-hours, you use bigger cells or you connect in parallel.

Large household-sized battery packs can consist of many small batteries connected in series and parallel to deliver the voltage and amp-hour capacity needed. It can also consist of a few large cells in series. As a general rule, battery packs with a few large cells are going to last longer, be easier and less time-consuming to maintain, have less problems, but cost more initially.

Batteries must all be the same age, same size, and same brand within a pack. Mismatches will cause smaller batteries to work extra hard and cause larger batteries to loaf and sulfate. (Hard sulfur crystals form on the lead surface reducing the available lead area and the amount of sulfur ions to react with the lead).

SOURCE: "Got Sun? Go Solar" Rex A. Ewing and Doug Pratt, 2nd Edition

Personal Safety Working Around Batteries

1. Protect your eyes and skin. Goggles or safety glasses are a must, rubber gloves are optional. Battery acid is slightly dilute sulfuric acid. It will burn your eyes almost immediately, and your skin after a few minutes of exposure. Keep a box or two of baking soda and at least a quart of clean water in the battery area. Flush any battery acid contact with plenty of water. If you get acid in your eyes, flush with clear water for 15 minutes and then seek medical attention.

2. Any tools used on batteries must be plastic-coated. Even small batteries are capable of awesome energy discharges when short circuited. Use electrician's tools with plastic-coated grips. Dip yours so they can't possibly short out between terminals. The large batteries used in household systems can turn a crescent wrench red-hot while melting the battery terminal into a useless puddle, and for the grand finale possibly explode and start a fire. Be prepared and only use plastic-coated tools.

3. Wear old clothes you're willing to get some holes in. No matter how careful you are around batteries, you'll probably still end up with holes in your jeans. An alternate is to wear polyester or latex. These materials are immune to battery acid, and you'll finally have a use for those awful disco-era clothes you've been storing.

4. Now, stop thinking "None of that will happen to me!" The safety stuff is easy, and the potential harm is permanent.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTL.

Trojan BATTERY COMPANY®

Trojan Deep Cycle Batteries

Clean Energy for Life™

The Trojan Difference

As one of the world's leading manufacturer of deep-cycle batteries, Trojan Battery Company supplies energy storage solutions for renewable energy and backup power applications. Having shaped the world of deep-cycle battery technology for over 85 years, they're proud to be able to continue their legacy of leadership and innovation in the global renewable energy market

Trojan Battery offers one of the broadest portfolio of high-quality, deep-cycle flooded, AGM and gel products for a wide range of renewable energy and backup power applications. Trojan believes manufacturing a superior quality product is only the beginning of a successful application; to be a true leader in this field it takes expertise and technical support that goes beyond the necessary.

Trojan Technology

Trojan has two of the largest and most extensive bi-coastal research and development centers dedicated to battery technology in North America. Trojan focuses on designing advanced and innovative products that are specifically engineered to meet the needs of Renewable Energy applications.

Trojan Battery's durability, longevity, and proven technology means you can depend on their batteries for consistent performance in any application-whether it's for energy saving grid-tied backup systems or off-grid power in remote locations.

Trojan Quality

Trojan uses the most rigorous testing procedures in the industry, such as the IEC standard for batteries in photovoltaic energy systems. They also test for capacity, charging performance and physical/mechanical analysis.

Trojan is ISO 9000:2001 certified and their products undergo nearly 200 points of product inspections prior to leaving their manufacturing plants.

Trojan's Premium and Industrial Batteries

Trojan's Premium and Industrial batteries are specifically designed for renewable energy applications taking into account challenging conditions these systems undergo like fluctuating or extreme temperatures, remote locations and the intermittent nature of solar and wind power generation. The Premium and Industrial Series both offer new features and benefits unmatched in the industry including:

- **DuraGrid™** technology provides a 10-year design life and excellent charge performance
- **Maxguard® XL** Advanced Design Separator is 30% thicker and stronger, resists stratification, extends life and lowers overall maintenance costs
- **Alpha Plus®** paste formulation promotes longer life and optimum performance
- **Polyon™** - an ultra-rugged case design that stands up to the harshest of environments

Trojan's Industrial line of deep-cycle batteries is the newest addition to Trojan's lineage of high-quality flooded batteries. The Industrial line is engineered specifically to support renewable energy systems with large daily loads where the batteries are cycled regularly. These high amp-hour capacity batteries are ideal for use in large off-grid photovoltaic (PV) systems, off-grid hybrid PV systems, grid-tied PV systems with battery backup, smart grid peak shifting systems and a variety of other applications.

Trojan BATTERY COMPANY

INDUSTRIAL LINE - DEEP-CYCLE FLOODED BATTERIES - 2,800 CYCLES @ 50% DOD

Part #	Voltage	Ah @ 20 Hr Rate	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
420-0080	2 V	1457 Ah	IND	228 lbs	15-3/8" x 10-1/4" x 24"	IND27-2V
420-0081	2 V	1794 Ah	IND	278 lbs	15-3/8" x 10-1/4" x 24"	IND33-2V
420-0075	4 V	1233 Ah	IND	370 lbs	22-3/8" x 10-1/4" x 24"	IND23-4V
420-0076	4 V	1570 Ah	IND	465 lbs	26-11/16" x 10-1/4" x 24"	IND29-4V
420-0072	6 V	445 Ah	IND	220 lbs	15-3/8" x 10-1/4" x 24"	IND9-6V
420-0073	6 V	673 Ah	IND	315 lbs	22-3/8" x 10-1/4" x 24"	IND13-6V
420-0074	6 V	897 Ah	IND	415 lbs	26-11/16" x 10-1/4" x 24"	IND17-6V

PREMIUM LINE - DEEP-CYCLE FLOODED BATTERIES - 1,600 CYCLES @ 50% DOD

Part #	Voltage	Ah @ 20 Hr Rate	Group Size	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
410-0100	2 V	1110 Ah	903	LT	118 lbs	11-5/8" x 7" x 17-11/16"	L16RE-2V
410-0125	6 V	225 Ah	GCH2	LT	67 lbs	11" x 8" x 12"	T105-RE
420-0029	6 V	325 Ah	903	LT	115 lbs	11-5/8" x 7" x 17-11/16"	L16RE-A
410-0109	6 V	370 Ah	903	LT	119 lbs	11-5/8" x 7" x 17-11/16"	L16RE-B

SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 1,200 CYCLES @ 50% DOD

Part #	Voltage	Ah @ 20 Hr Rate	Group Size	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
410-0099	12 V	150 Ah	N/A	HPT	84 lbs	13-3/16" x 7-1/8" x 11-1/8"	J150
410-0094	6 V	225 Ah	GC2	LPT	62 lbs	10-3/4" x 7-1/4" x 10-3/4"	T-105
420-0069	6 V	240 Ah	GC2	ELPT	66 lbs	10-3/8" x 7-1/8" x 10-7/8"	T125
410-0124	6 V	260 Ah	GC2H	LPT	72 lbs	10-3/8" x 7-1/8" x 11-1/2"	T-145
420-0067	6 V	330 Ah	902	DT	96 lbs	11-5/8" x 7" x 14-3/8"	J305P-AC
420-0066	6 V	360 Ah	902	DT	98 lbs	11-5/8" x 7" x 14-3/8"	J305H-AC
420-0070	6 V	420 Ah	903	ELPT	114 lbs	11-5/8" x 7" x 16-3/4"	L16P
420-0068	6 V	435 Ah	903	ELPT	125 lbs	11-5/8" x 7" x 16-3/4"	L16H
420-0035	12 V	215 Ah	921	DT	128 lbs	15" x 7" x 14-5/8"	J185H-AC
410-0098	12 V	195 Ah	921	DT	114 lbs	15" x 7" x 14-5/8"	J185P-AC

SIGNATURE LINE - DEEP-CYCLE FLOODED BATTERIES - 600 CYCLES @ 50% DOD

Part #	Voltage	Ah @ 20 Hr Rate	Group Size	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
420-0032	12 V	130 Ah	30H	WNT	66 lbs	14" x 6-3/4" x 10-1/4"	30XHS
420-0031	12 V	105 Ah	27	WNT	55 lbs	12-3/4" x 6-3/4" x 9-3/4"	27TMX
420-0030	12 V	85 Ah	24	WNT	47 lbs	11-1/4" x 6-1/4" x 9-3/4"	24TMX
410-0112	12 V	115 Ah	27	WNT	61 lbs	12-3/4" x 6-3/4" x 9-3/4"	27TMH

AGM LINE - VRLA DEEP-CYCLE BATTERIES - 1,000 CYCLES @ 50% DOD

Part #	Type	Voltage	Ah @ 20 Hr Rate	Group Size	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
410-0116	AGM	12 V	110 Ah	31	DT	69 lbs	12-5/16" x 6-13/16" x 9-5/16"	31-AGM
410-0115	AGM	12 V	100 Ah	27	DT	64 lbs	12-1/16" x 6-5/8" x 9-7/16"	27-AGM
410-0114	AGM	12 V	80 Ah	24	DT	52 lbs	10-1/4" x 6-5/8" x 9-1/2"	24-AGM
410-0167	AGM	12 V	33 Ah	U1	IT	27 lbs	8-3/16" x 5-3/16" x 6-13/16"	U1-AGM
410-0168	AGM	12 V	50 Ah	22	IT	40 lbs	9" x 5-8/16" x 8-1/16"	22-AGM

GEL LINE - VRLA DEEP-CYCLE BATTERIES - 1,000 CYCLES @ 50% DOD

Part #	Type	Voltage	Ah @ 20 Hr Rate	Group Size	Terminal	Weight	Dimensions (L x W x H)	Trojan Part #
410-0119	GEL	6 V	189 Ah	GC2	UT	68 lbs	10-1/4" x 7-1/8" x 10-7/8"	6V-GEL
410-0166	GEL	6 V	210 Ah	DIN	AP	69 lbs	9-5/8" x 7-1/2" x 10-7/8"	TE35-GEL
410-0122	GEL	12 V	102 Ah	31	UT	69 lbs	12-15/16" x 6-3/4" x 9-5/8"	31-GEL
410-0121	GEL	12 V	91 Ah	27	UT	63 lbs	12-3/4" x 6-3/4" x 9-1/4"	27-GEL
410-0120	GEL	12 V	77 Ah	24	DT	52 lbs	10-7/8" x 6-3/4" x 9-15/16"	24-GEL
410-0165	GEL	12 V	125 Ah	DIN	AP	85 lbs	13-9/16" x 6-3/4" x 11-1/8"	5SHP-GEL
410-0164	GEL	12 V	225 Ah	8D	LT	157 lbs	21-1/16" x 11" x 10-13/16"	8D-GEL

Trojan BATTERY COMPANY

Terminal Configurations

1 ELPT	2 EHPT	3 EAPT	4 EUT	5 LT	6 DT	7 UT	8 AP	9 WNT	13 IT	14 IND
Embedded Low Profile Terminal	Embedded High Profile Terminal	Embedded Automotive Post Terminal	Embedded Universal Terminal	L-Terminal	Automotive Post & Stud Terminal	Universal Terminal	Automotive Post Terminal	Wingnut Terminal	Insert Terminal	Ind Terminal

CHARGING INSTRUCTIONS

Do not install or charge batteries in a sealed or non-ventilated compartment. Only use a temperature compensated, constant potential, voltage-regulated charger. Do not under or overcharge batteries on a consistent basis. No matter what type of battery you are charging, it will damage the battery and shorten its life.

Flooded Batteries Charge Voltage Settings (at 77 °F / 25 °C)					
System Voltage	6 V	12 V	24 V	36 V	48 V
Daily Charge	7.2 – 7.35	14.4 – 14.7	28.8 – 29.4	43.2 – 44.1	57.6 – 58.8
Float	6.6	13.2	26.4	39.6	52.8
Equalize	7.75	15.5	31.0	46.5	62.0

Gel Batteries Charge Voltage Settings (at 77 °F / 25 °C)					
System Voltage	6 V	12 V	24 V	36 V	48 V
Daily Charge	7.0 – 7.2	14.1 – 14.4	28.2 – 28.8	42.3 – 43.2	56.4 – 57.6
Float	6.6	13.2	26.4	39.6	52.8

AGM Batteries Charge Voltage Settings (at 77 °F / 25 °C)					
System Voltage	6 V	12 V	24 V	36 V	48 V
Daily Charge	7.2 – 7.4	14.4 – 14.7	28.8 – 29.4	43.2 – 44.1	57.6 – 58.8
Float	6.9	13.8	27.6	41.4	55.2

TORQUE VALUES IN - LBS (NM)

Terminal Type	Torque Values In - Lbs (Nm)
DT	50 – 70 (6 – 8)
LPT, HPT, WNT, DWNT, UT	95 – 105 (11 – 12)
LT	100 – 120 (11 – 14)

OPERATIONAL DATA

Operating temperature range: -4 °F to 113 °F (-20 °C to 45 °C). At temperatures below 32 °F (0 °C) maintain a state of charge greater than 60% to prevent freezing.

Batteries	Self-Discharge (per month depending on storage temperature conditions)
Flooded	5% – 15%
Gel	3% – 5%
AGM	3% – 5%

DISPLAY / DEMO BATTERIES

Part #	Description
440-0075	Trojan Battery L16RE-2V, 2 Volt Deep Cycle Display Battery
440-0076	Trojan Battery L16RE-B, 6 Volt Deep Cycle Display Battery
440-0074	Trojan Battery J185G, 12 Volt Deep Cycle Display Battery
440-0077	Trojan Battery J185P, 12 Volt Deep Cycle Display Battery

HAWKER®

A top-of-the-line industrial battery that's optimized for deep-cycle photovoltaic service. Rated for 2,100 cycles to 80% depth of discharge and 4,000 cycles at 50% depth of discharge. In an off-grid renewable energy homestead with reasonable attention and care, these batteries can be expected to deliver trouble-free service for 15 to 20 years.

Packaged with six propylene-clad cells in a steel tray. Features include heat sealed cell covers, thick plate grids, maximum density paste, with a multi-layer retention system that's wrapped horizontally and vertically to help hold active paste material onto the grids. Hawker offers removable, or non-removable cells.

PV1 SOLAR INDUSTRIAL BATTERIES WITH NON-REMOVABLE CELLS

The non-removable cells, with soldered, molded, plastic-encased cell interconnects are recommended, and are less expensive, so long as you can deal with the weight of these 6-packs. Interconnect cables are only needed between 12-volt trays with either cell version. Order multiple trays as needed for voltage and amp-hour capacity. Does not include cable.

Part #	Cycles	Voltage	Ah @ 20 Hr	Dimensions (L x W x H)	Weight (lbs)	Hawker Part #
420-0003	2100	12	632	30.75" x 7.75" x 25"	468	085F13-FN
420-0004	2100	12	735	35.25" x 6.94" x 25"	564	085F15-FN
420-0005	2100	12	845	38.25" x 6.94" x 25"	666	085F17-FN
420-0006	2100	12	950	38.25" x 7.69" x 25"	738	085F19-FN
420-0007	2100	12	1055	38.25" x 8.44" x 25"	816	085F21-FN
420-0008	2100	12	1160	38.25" x 9.19" x 25"	888	085F23-FN
420-0009	2100	12	1270	38.25" x 9.94" x 25"	966	085F25-FN
420-0010	2100	12	1375	38.25" x 10.19" x 25"	1044	085F27-FN
420-0011	2100	12	1482	38.25" x 11.44" x 25"	1116	085F29-FN
420-0012	2100	12	1585	38.25" x 12.19" x 25"	1194	085F31-FN
420-0013	2100	12	1690	38.25" x 12.94" x 25"	1272	085F33-FN

PV1 SOLAR INDUSTRIAL BATTERIES WITH REMOVABLE CELLS

Batteries with removable cells come with bolted bus bar connectors between cells.

Part #	Cycles	Voltage	Ah @ 20 Hr	Dimensions	Weight (lbs)	Hawker Part #
420-0078	2100	12	632	30.75" x 7.75" x 25"	486	085F13-FR
420-0079	2100	12	735	35.25" x 6.94" x 25"	564	085F15-FR
420-0015	2100	12	845	38.25" x 6.94" x 25"	666	085F17-FR
420-0016	2100	12	950	38.25" x 7.69" x 25"	738	085F19-FR
420-0017	2100	12	1055	38.25" x 8.44" x 25"	816	085F21-FR
420-0018	2100	12	1160	38.25" x 9.19" x 25"	888	085F23-FR
420-0019	2100	12	1270	38.25" x 9.94" x 25"	966	085F25-FR
420-0020	2100	12	1375	38.25" x 10.19" x 25"	1044	085F27-FR
420-0021	2100	12	1482	38.25" x 11.44" x 25"	1116	085F29-FR
420-0022	2100	12	1585	38.25" x 12.19" x 25"	1194	085F31-FR
420-0023	2100	12	1690	38.25" x 12.94" x 25"	1272	085F33-FR
420-0077	2100	12	2480	38.25" x 12.94" x 34"	1728	125F33-FR

The 10 Commandments of Good Battery Care

1. Add approved water only – never add acid.
2. Keep electrolyte level above separator protectors.
3. Keep battery top clean and dry.
4. Keep flame and metal away from battery top.
5. Keep vent caps tightly in place.
6. Discharge to 80% only.
7. Cool before charging or operating if battery is above 115 ° F.
8. Use only approved charger of correct voltage and current output.
9. Ensure there is adequate ventilation during charging.
10. When in doubt, contact your sales representative.

SEALED GEL - ENVIROLINK™ BATTERIES

No routine maintenance is required, and this battery type thrives on extended periods of float service. Life expectancy is 12 to 15 years with proper care and a charger/ controller that keeps voltage at or below 2.35 V/ cell.

Cycle life expectancy is 1,250 cycles to 80% depth of discharge, not that these cells are likely to get cycled a lot in emergency backup service. Interconnect cables are only needed between 12- or 24-volt trays; cell interconnects are soldered in place at the factory.

Part #	Cycles	Voltage	Ah @ 20 Hr	Dimensions (L x W x H)	Weight (lbs)	Hawker Part #
410-0040	1250	12	369	26.3" x 6.5" x 23"	390	075EL09
410-0041	1250	12	553	31.7" x 7.75" x 23"	564	075EL13
410-0042	1250	12	738	20.2" x 13" x 23"	720	075EL17
410-0043	1250	12	925	31.13" x 13" x 23"	885	075EL21
410-0044	1250	12	1110	29.3" x 13" x 23"	1050	075EL25
410-0036	1250	24	369	25.7" x 11" x 23"	780	075EL09
410-0037	1250	24	553	31" x 12.8" x 23"	1128	075EL13
410-0038	1250	24	925	38.5" x 16.6" x 23"	1770	075EL21
410-0039	1250	24	1110	38.7" x 17" x 23"	2110	075EL25

MK POWERED

Deka SOLAR PHOTOVOLTAIC BATTERIES

DEKA UNIGY II

The DEKA UNIGY II Line features two module designs with a wide range of capacities and sizes to fit the requirements of renewable energy applications. These modules are constructed using the finest quality materials and state-of-the-art manufacturing techniques, enhancing their performance in these demanding applications.

BUILT IN ADVANCED FEATURES SUCH AS:

- "Two-Way" Post design is lead plated solid copper, providing a large contact area with front access bolting for easier installation and maintenance.
- Pure Virgin Lead (99.99%) positive grid alloy is very resistant to corrosion/growth.
- Positive and Negative plates are formed with IPF® technology to ensure plates operate at 100% capacity.
- Collapsible bottom bridge accommodates for normal plate growth, reducing stress on battery post seals.
- Air Gap between cells has been designed to reduce foot print while maintaining required cooling.
- Front safety shield design easily slides on and off without tools for quicker assembly.
- MICROCAT™ VENT improves high temperature performance (standard on 95 models).

DEKA UNIGY II NON-INTERLOCK™ SYSTEM

The DEKA UNIGY II Non-Interlock system utilizes non-interlocking modules which require front and rear access bolts for mounting, providing easy and safe installation. The modules are coated with acid resistant epoxy powder paint. Each module has mounting holes for grounding option. The standard two piece base enables anchors to be drilled and installed in place.

Part #	# of Cells	Voltage	Ah @ 20 Hr Rate	Weight (lbs)	Dimensions (L x W x H)	MK Part #
440-0178	2	4	2367	718	26.60" x 28.63" x 11.91"	2AVR125-33
440-0163	3	6	903	404	21.90" x 27.12" x 9.48"	3AVR95-17
440-0164	3	6	1,016	448	24.15" x 27.12" x 9.48"	3AVR95-19
440-0165	3	6	1,129	491	26.40" x 27.12" x 9.48"	3AVR95-21
440-0166	3	6	1,242	535	28.65" x 27.12" x 9.48"	3AVR95-23
440-0167	3	6	1,355	578	30.90" x 27.12" x 9.48"	3AVR95-25
440-0168	3	6	1,468	618	33.15" x 27.12" x 9.48"	3AVR95-27
440-0169	3	6	1,581	665	35.40" x 27.12" x 9.48"	3AVR95-29
440-0170	3	6	1,694	705	37.65" x 27.12" x 9.48"	3AVR95-31
440-0171	3	6	1,807	749	39.90" x 27.12" x 9.48"	3AVR95-33
440-0158	6	12	339	339	19.00" x 27.12" x 9.48"	6AVR95-7
440-0159	6	12	452	426	23.50" x 27.12" x 9.48"	6AVR95-9
440-0161	6	12	678	600	32.50" x 27.12" x 9.48"	6AVR95-13
440-0162	6	12	791	688	37.00" x 27.12" x 9.48"	6AVR95-15

FEATURES AND BENEFITS	
Container and Cover	Impact- Resistant Polypropylene, 28% L.O.I. (optional)
Separators	Microporous Glass Mat
Tank Formed Plates	Shipped at 100% Capacity
Cycle Life	2400 cycles @20% DOD

FLOODED MAINTENANCE SAVER SYSTEM

Higher voltage systems naturally have greater power requirements. The DEKA SOLAR FLOODED SYSTEM is designed to offer reliable, low maintenance power for renewable energy applications where frequent deep cycles are required and minimum maintenance is desirable.

Single Cell, Steel Box Enclosure

Part #	Cell Type	Ah @ 20 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
420-0036	M100-7	356	75 lbs	3.06" x 6.50" x 30.438"	ICM1007STB
420-0037	M100-9	474	89 lbs	3.81" x 6.50" x 30.438"	ICM1009STB
420-0038	M100-11	593	104 lbs	4.56" x 6.50" x 30.438"	ICM1011STB
420-0039	M100-13	711	119 lbs	5.31" x 6.50" x 30.438"	ICM1013STB
420-0040	M100-15	830	136 lbs	6.06" x 6.56" x 30.438"	ICM1015STB
420-0041	M100-17	948	150 lbs	6.81" x 6.56" x 30.438"	ICM1017STB
420-0042	M100-19	1067	166 lbs	7.56" x 6.56" x 30.438"	ICM1019STB
420-0043	M100-21	1185	180 lbs	8.31" x 6.656" x 30.438"	ICM1021STB
420-0044	M100-23	1304	197 lbs	9.06" x 6.56" x 30.438"	ICM1023STB
420-0045	M100-25	1422	212 lbs	9.81" x 6.56" x 30.438"	ICM1025STB
420-0046	M100-27	1541	227 lbs	10.56" x 6.56" x 30.438"	ICM1027STB
420-0047	M100-29	1659	244 lbs	11.31" x 6.5" x 30.438"	ICM1029STB
420-0048	M100-31	1778	258 lbs	12.06" x 6.56" x 30.438"	ICM1031STB
420-0049	M100-33	1896	275 lbs	12.81" x 6.56" x 30.438"	ICM1033STB

6-Cell, Steel Box Enclosure

Part #	Cell Type	Ah @ 20 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
420-0050	6-M100-7	356	450 lbs	16.81" x 6.44" x 30.50"	I06M1007STB
420-0051	6-M100-9	474	534 lbs	21.44" x 6.44" x 30.50"	I06M1009STB
420-0052	6-M100-11	593	624 lbs	25.94" x 6.44" x 30.50"	I06M1011STB
420-0053	6-M100-13	711	714 lbs	30.56" x 6.44" x 30.50"	I06M1013STB
420-0054	6-M100-15	830	816 lbs	17.69" x 12.75" x 30.50"	I06M1015STB
420-0055	6-M100-17	948	900 lbs	19.94" x 12.75" x 30.50"	I06M1017STB
420-0056	6-M100-19	1067	996 lbs	22.19" x 12.88" x 30.50"	I06M1019STB
420-0057	6-M100-21	1185	1080 lbs	24.44" x 12.88" x 30.50"	I06M1021STB
420-0058	6-M100-23	1304	1182 lbs	26.69" x 12.88" x 30.50"	I06M1023STB
420-0059	6-M100-25	1422	1272 lbs	28.94" x 12.88" x 30.50"	I06M1025STB
420-0060	6-M100-27	1541	1362 lbs	31.19" x 12.88" x 30.50"	I06M1027STB
420-0061	6-M100-29	1659	1464 lbs	33.56" x 12.88" x 30.50"	I06M1029STB
420-0062	6-M100-31	1778	1548 lbs	35.94" x 12.94" x 30.50"	I06M1031STB
420-0063	6-M100-33	1896	1650 lbs	38.06" x 12.94" x 30.50"	I06M1033STB

INNOVATIVE FEATURES

- High capacity flat plate cells
- Long life: 12 to 14 years in shallow cycle service
- Extended watering interval –up to six months because of a large reservoir for electrolyte
- Thermally sealed cover to container
- Long-Lasting epoxy coated steel trays
- Custom design modules

NEW ADVANCEMENTS IN GEL CYCLE SERVICE POWER

Gel batteries are designed to excel in key aspects of battery use like cycling performance, cycle service durability, deep discharge resiliency, and vibration resistance. Large group 4D and 8D Gel batteries handle the most heavy-duty service so they need to be specially reinforced with cycle service enhancements to withstand extreme use.

An Enhanced Cycle Service Technology enables 4D and 8D Gel batteries to excel in the key areas of battery use where smaller, regular Gel batteries might severely underperform.

CYCLING PERFORMANCE:

- Specially deep cycle formulated active material has 2x the cycle life capabilities of standard Gel active material
- Additional power elements extend cycling performance

CYCLE SERVICE DURABILITY:

- A reengineered structural resiliency further withstands the effects of grueling cycle service demands and optimizes the utilization of the gelled electrolyte

DEEP DISCHARGE RESILIENCY:

- Special deep cycle active material and reinforced case withstands deep discharge service

VIBRATION RESISTANCE:

- Reinforced and restructured case design further resists vibration to protect performance

HEAVY-DUTY GEL GROUP 4D & 8D

Part #	Size	Standard Terminal	Voltage	Ah @ 20 Hr Rate	Ah @ 100 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
410-0026	4D	T	12	183	210	137 lbs	20.73” x 8.44” x 10.82”	8G4DLTP-DEKA
410-0034	8D	T	12	225	265	166 lbs	21.03” x 11.00” x 10.82”	8G8DLTP-DEKA

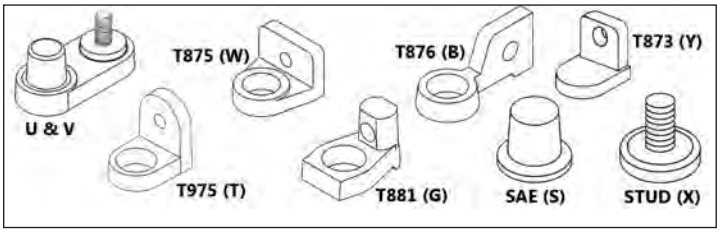
Specifications are subject to change without notice

SEALED GEL BATTERIES

Sealed, Valve-Regulated, Gelled-Electrolyte Batteries for Renewable Energy Applications

The Deka Solar series of valve-regulated, gelled-electrolyte batteries is designed to offer reliable, maintenance-free power for renewable energy applications where frequent deep cycles are required and minimum maintenance is desirable.

TERMINAL INFORMATION



Part #	Size	Standard Terminal	Voltage	Ah @ 20 Hr Rate	Ah @ 100 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
410-0035	U1	Y	12	31.6	36.5	23.4 lbs	7.75" x 5.13" x 7.25"	8GU1-DEKA
410-0129	U1 (w/ handle)	Y	12	31.6	36.5	23.4 lbs	8.31" x 5.13" x 7.25"	8GU1H-DEKA
410-0028	Group 22	G	12	50.9	58.2	37 lbs	9.38" x 5.50" x 9.25"	8G22NF-DEKA
410-0128	Group 24	B	12	73.6	84.5	52 lbs	10.25" x 6.75" x 9.25"	8G24UT-DEKA
410-0150	Group 27	Flag	12	92	100	63 lbs	12.75" x 6.75" x 9.25"	8G27-DEKA
410-0127	Group 31	B	12	97.6	108	70 lbs	12.94" x 6.75" x 9.75"	8G30H-DEKA
410-0031	Group 31	X	12	97.6	108	70 lbs	12.94" x 6.75" x 9.38"	8G31-DEKA
410-0151	-	B	12	125	137	85 lbs	13.58" x 6.62" x 11.01"	8G5SHP-DEKA
410-0033	Golf Cart	G	6	180	198	68.4 lbs	10.25" x 7.13" x 10.88"	8GGC2-DEKA
410-0026	4D	T	12	183	210	137 lbs	20.73" x 8.44" x 10.82"	8G4DLTP-DEKA
410-0152	-	S	6	210	220	69 lbs	9.64" x 7.51" x 10.65"	8GTE35-DEKA
410-0034	8D	T	12	225	265	166 lbs	21.03" x 11.00" x 10.82"	8G8DLTP-DEKA

SEALED AGM BATTERIES

Part #	Size	Standard Terminal	Voltage	Ah @ 20 Hr Rate	Ah @ 100 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
410-0022	Group 27	U	12	92	100	63 lbs	12.75" x 6.88" x 9.25"	8A27-DEKA
410-0023	Group 31	U	12	104	110	69 lbs	12.94" x 6.75" x 9.38"	8A31DT-DEKA
410-0024	4D	T	12	198	210	131 lbs	20.75" x 8.50" x 10.63"	8A4DLTP-DEKA
410-0025	8D	T	12	245	250	161 lbs	20.75" x 11.00" x 10.63"	8A8DLTP-DEKA
410-0138	Golf Cart	DT	6	190	220	68 lbs	10.25" x 7.13" x 11.00"	8AGC2-DEKA
440-0092	Group 24	UT	12	79	91	52	10.20" x 6.80" x 9.24"	8A24UT-DEKA
440-0094	U1 (with handle)	Y	12	32	37	24 lbs	8.31" x 5.18" x 7.22"	8AU1H-DEKA
440-0091	Group 22	G	12	55	63	39 lbs	9.72" x 5.47" x 9.24"	8A22NF-DEKA

FLOODED BATTERIES

Part #	Size	Standard Terminal	Voltage	Ah @ 20 Hr Rate	Ah @ 100 Hr Rate	Weight	Dimensions (L x W x H)	MK Part #
420-0027	L-16 Type	T	6	370	420	113 lbs	11.75" x 7.00" x 6.57"	8L16-DEKA

...the heart of your system®

CONCORDE®

SUN XTENDER

...the heart of your solar system®

SUN XTENDER SEALED AGM BATTERIES

Back up solar battery storage for Solar/PV Power, Wind & Hydro Power can be harnessed with Sun Xtender® battery banks. Featuring robust builds and deep cycle capabilities, Sun Xtender® batteries are sealed and maintenance free – never add water or electrolyte. They are built for safety and reliable service. Sun Xtender® solar batteries are also fully recyclable.

Part #	Voltage	Ah Hrs @ 20 Hr	Size	Dimensions (L x W x H)	Wt. (lbs)	Concorde Part #
410-0076	2	534	G24	12.90" x 6.75" x 8.96"	62	PVX5340T
410-0080	2	648	G31	12.90" x 6.75" x 8.96"	70	PVX-6480T
410-0088	2	915	GC-2Tall	10.28" x 7.06" x 13.02"	94	PVX-9150T
410-0161	2	1215	L16	11.64" x 6.95" x 15.73"	124	PVX-1215HT
410-0066	6	224	Golf Cart	10.28" x 7.06" x 10"	67	PVX-2240T
410-0068	6	305	GC2	10.28" x 7.06" x 12.94"	91	PVX-3050T
410-0162	6	405	L16	11.64" x 6.95" x 15.73"	120	PVX-4050HT
410-0070	12	34	U1	7.71" x 5.18" x 6.89"	25	PVX-340T
410-0072	12	42	U1 Tall	7.71" x 5.18" x 8.05"	30	PVX-420T
410-0074	12	49	22NF	8.99" x 5.45" x 8.82"	36	PVX-490T
410-0078	12	56	22NF	8.99" x 5.45" x 8.82"	40	PVX-560T
410-0082	12	69	G24	10.22" x 6.60" x 8.93"	51	PVX-690T
410-0084	12	84	G24	10.22" x 6.60" x 8.93"	57	PVX-840T
410-0086	12	89	G31	12.90" x 6.75" x 8.96"	62	PVX-890T
410-0060	12	104	G27	12" x 6.60" x 8.93"	63	PVX-1040T
410-0062	12	108	G31	12.90" x 6.75" x 8.96"	65	PVX-1080T
410-0064	12	212	4D	20.76" x 8.70" x 9.77"	127	PVX-2120L
410-0005	12	258	8D	20.76" x 10.89" x 9.77"	159	PVX-2580L

BATTERY CHARGERS

samlexamerica

SEC SERIES

Part #	Amps	Output Voltage	Input Voltage	Frequency	Samlex Part #
460-0018	15 A	12 VDC	120/230 VAC	60/50 Hz	SEC-1215A
460-0020	15 A	24 VDC	120/230 VAC	60/50 Hz	SEC-2415A
460-0017	25 A	24 VDC	120/230 VAC	60/50 Hz	SEC-2425A
460-0019	30 A	12 VDC	120/230 VAC	60/50 Hz	SEC-1230A
460-0024	80 A	12 VDC	120/230 VAC	60/50 Hz	SEC-1280A

IBE
INDUSTRIAL BATTERIES & CHARGERS

GPU LARGE BATTERY CHARGER

All the GPU models are designed with simple and time proven controlled reactance transformers and saturable reactor circuits, which require the least amount of AC power, little or no maintenance and provides a true constantly tapering charge. The IBE charger is regulated by the "ON CHARGE" battery voltage to control the output DC current.

Part #	Battery Voltage	Input Voltage	Max Amps	IBE Part #
460-0011	12 VDC	120 VAC Single-phase	125 A	6GPU125
460-0012	12 VDC	120 VAC Single-phase	170 A	6GPU170
460-0013	12 VDC	120 VAC Single-phase	240 A	6GPU240
460-0000	24 VDC	120 VAC Single-phase	125 A	12GPU125
460-0001	24 VDC	120 VAC Single-phase	170 A	12GPU170
460-0010	48 VDC	120 VAC Single-phase	90 A	24GPU90
460-0002	24 VDC	240 VAC Single-phase	200 A	12GPU200
460-0003	24 VDC	240 VAC Single-phase	240 A	12GPU240
460-0004	48 VDC	240 VAC Single-phase	115 A	24GPU115
460-0005	48 VDC	240 VAC Single-phase	125 A	24GPU125
460-0007	48 VDC	240 VAC Single-phase	150 A	24GPU150
460-0008	48 VDC	240 VAC Single-phase	170 A	24GPU170
460-0009	48 VDC	240 VAC Single-phase	200 A	24GPU200

BATTERY CABLE ASSEMBLY COMPONENTS

QUICKCABLE®
Your Best Connection

MAGNA LUGS

Part #	Description	Size	Qty	Quick Cable Part #
430-0038	6 Straight Lug	1/4"	1	6406-050D
440-0085	1/0 Straight Lug	3/8"	1	6410-050F
440-0025	2/0 Straight Lug	3/8"	1	6420-050F
430-0037	2/0 Straight Lug	3/8"	1	6401-005F
440-0026	4/0 Straight Lug	3/8"	1	6440-F

CLAMP LUGS

Part #	AWG	Polarity	Qty	Quick Cable Part #
430-0034	2/0	Negative	Bag of 5	4020-005N
430-0035	2/0	Positive	Bag of 5	4020-005P

BATTERY CABLE ASSEMBLY COMPONENTS CONTINUED

QUICKCABLE
Your Best Connection

TIN PLATED LUGS

Part #	AWG	Hole Size	Quick Cable Part #
550-0211	1/0 Cable	5/16”	5955-050E
550-0213	2/0 Cable	3/8”	5956-010F
550-0214	4/0 Cable	3/8”	5958-050F

RIGHT SIDE ADD-ON CONNECTOR LUGS

Part #	AWG	Polarity	Qty	Quick Cable Part #
430-0030	2/0	Negative	Bag of 5	3720-005N
430-0031	2/0	Positive	Bag of 5	3720-005P

QUICKHEAT2

Part #	Description	Quick Cable Part #
440-0089	Heat Gun, 115 V/ 1400 W, 500/ 750 °F Output	4272-001

BENCH MOUNTED HEXCRIMP

Part #	Description	AWG	Quick Cable Part #
440-0086	Crimper with rotating dies	6 to MCM	4255-001M

HEAT SHRINK

Part #	Description	Finish	Qty	Quick Cable Part #
440-0083	1/0-250 MCM	Black	1	5615-051B
440-0084	1/0-250 MCM	Red	1	5616-051R
440-0067	4-2/0 AWG	Black	1	5613-051B
440-0066	4-2/0 AWG	Red	1	5614-051R
430-0036	8-2 AWG	Red	1	5669-010R

OutBack POWER™

HEAT SHRINK

Part #	Description	Qty	OutBack Part #
440-0078	White w/ Logo	12	OBHS-W

CODE-APPROVED CABLES

cobra
WIRE & CABLE, INC.

BATTERY CABLES - CODE APPROVED THW CABLE

UL listed THW cable, high quality in assorted colors. Wire sold by the foot. Cobra’s X-FLEX® is designed to meet or exceed test requirements called for by Underwriters Laboratories and the National Electric Code. It is recommended for use in accordance with UL and CSA for internal wiring of power supply equipment, UL Standard 1778. Cobra’s X-FLEX® is also suitable for use in transformers, switchboard panels, controls, electronic circuits and meters. It can be used as battery cable, battery charger cable, motor lead, and power hookup cable. Approved for both the internal and external wiring of appliances.

Part #	AWG	Color	Voltage	Coating	Length	Cobra Part #
430-0059	1/0	Black	600 V	THW	By the Foot	1/0-X-FLEX-B
430-0023	2/0	Black	600 V	THW	By the Foot	2/0-X-FLEX-B
430-0024	2/0	Red	600 V	THW	By the Foot	2/0-X-FLEX-R
430-0025	4/0	Black	600 V	THW	By the Foot	4/0-X-FLEX-B
430-0026	4/0	Red	600 V	THW	By the Foot	4/0-X-FLEX-R

Soligent

CABLES - CODE APPROVED THHN CABLE

UL listed THHN cable, high quality in assorted colors. Wire sold by the foot.

Part #	Description	Color	Voltage	Length
430-0045	Cable # 2 AWG	Red	600 V	1’
430-0065	Cable # 4 AWG	Red	600 V	1’
430-0064	Cable # 6 AWG	Blue	600 V	1’
430-0047	Cable # 6 AWG	Black	600 V	1’
430-0048	Cable # 6 AWG	Green	600 V	1’
430-0046	Cable # 6 AWG	Red	600 V	1’
430-0049	Cable # 6 AWG	White	600 V	1’

BATTERY CABLES - CODE APPROVED THW CABLE

Pre-assembled using UL listed cable, high quality lug ends, and color-coded shrink wrapping.

Part #	Color	Description
430-0017	Black	2/0 x 12"
430-0019	Black	2/0 x 20"
430-0000	Black	2/0 x 24"
430-0002	Black	2/0 x 3’
430-0062	Black	2/0 x 4’
430-0004	Black	2/0 x 5'
430-0006	Black	2/0 x 10'
430-0068	Black	2/0 x 20’
430-0069	Black	2/0 x 25’

CODE-APPROVED CABLES CONTINUED

Soligent

BATTERY CABLES - CODE APPROVED THW CABLE CONTINUED

Part #	Color	Description
430-0021	Black	4/0 x 12"
430-0022	Black	4/0 x 20"
430-0009	Black	4/0 x 24"
430-0008	Black	4/0 x 30"
430-0011	Black	4/0 x 3'
430-0013	Black	4/0 x 5'
430-0015	Black	4/0 x 10'
430-0057	Black	4/0 x 15'
430-0061	Black	4/0 x 20'
430-0018	Red	2/0 x 12"
430-0020	Red	2/0 x 20"
430-0001	Red	2/0 x 24"
430-0003	Red	2/0 x 3'
430-0063	Red	2/0 x 4'
430-0005	Red	2/0 x 5'
430-0007	Red	2/0 x 10'
430-0067	Red	2/0 x 20'
430-0070	Red	2/0 x 25'
430-0071	Red	4/0 x 12"
430-0066	Red	4/0 x 20"
430-0010	Red	4/0 x 24"
430-0012	Red	4/0 x 3'
430-0014	Red	4/0 x 5'
430-0016	Red	4/0 x 10'
430-0058	Red	4/0 x 15'
430-0060	Red	4/0 x 20'

BATTERY MAINTENANCE

Battery Watering Technologies

CENTURION SERIES KIT

Part #	Description	Additional Info	BFS Part #
440-0015	Caps & Tubing	6 cells, Profile Series, 34-44 mm floats	K600TB4
440-0012	Caps & Tubing	12 cells Profile Series, 34-44 mm floats	K1200TB4
440-0013	Caps & Tubing	24 cells, Profile Series, 34-44 mm floats	K2400TB4
440-0014	Caps & Tubing	36 cells, Profile Series, 34-44 mm floats	K3600B4
440-0176	Caps & Tubing	24 cells, Low Profile, 49-59 mm floats, with spark arrestor	K2400TB5S

440-0012

440-0071

440-0005

440-0017

440-0010

BAYONET KITS

Please contact your sales representative and specify what type of battery is being used.

Part #	Description	Additional Info	BFS Part #
440-0079	Caps & Tubing	24 cells, Bayonet Style, 49-54 mm floats	K2400TB5

ACCESSORIES

Part #	Description	Additional Info	BFS Part #
440-0011	Inline Filter	Inline Filter for 10 mm Tubing	09FTR1
440-0010	Deionizer Water Kit	Wall mount with Cartridge, 1000 gallon capacity	PW-1800
440-0016	5 Gallon Tank Shelf	Wall Mount	S2000T
440-0017	Feed Tank	5 gallons, Includes Valve, Flow Indicator & Quick Connect	NT2000GN
440-0003	Flow Indicator	-	09FWM1
440-0072	Tees	6/ 10/ 6 mm	08T616N
440-0071	Tees	6/ 6/ 6 mm	08T666N
440-0006	Quick Connect	Female	09GRF1
440-0007	Quick Connect	Male	09GRM1
440-0005	Hydrometer	Hydrometer with Slender Pickup Tube	09HYCT
440-0090	Replacement Battery Cap	Low Profile for float ranges 33-44 mm	VB-TB4
440-0127	Replacement Battery Cap	Low Profile for float ranges 49-59 mm	VB-TB5
440-0174	Replacement Battery Cap	Low Profile for float ranges 49-59 mm with spark arrestor	VB-TN5S
440-0175	Replacement Tube	For Hydrometer (440-0005)	09HYDE

BATTERY MAINTENANCE CONTINUED

Francis L. Freas Glass Works Inc.

GLASS HYDROMETER

An accurate hydrometer is essential to good battery care. Specific gravity is the best measure of a lead acid battery's state of charge.
The 'basic' Freas No.1 battery hydrometer measures specific gravity from 1.100–1.300. Precisely calibrated. Traceable to NIST.

Part #	Description	Freas Part #
440-0018	Glass Hydrometer	#1 Hydrometer

QUICKCABLE Your Best Connection

BATTERY FILLER JUG

Part #	Description	Capacity	Quick Cable Part #
440-0020	Auto Stop	2 qt.	6440-050F

BATTERY RACKS & ENCLOSURES

DPW | SOLAR
PREFORMED LINE PRODUCTS
POWER-FAB®

BATTERY ENCLOSURES - CHEST STYLE

- Constructed of .125" 5052-H32 aluminum
- White polyester powder-coat finish
- NEMA 3R design
- Screened / filtered louvres
- Ground skids for pad mount
- Stainless steel continuous hinge and padlock hasp

Part #	Size	Dimensions	Insulation	Layout	DPW Part #
450-0006	4 Group 30	16" x 34" x 16"	Non	1 x 4	BB4-GRP30-1X4
450-0007	4 L-16	19" x 39" x 28"	Insulated	1 x 4	BB4-SS530-1X4-INS
450-0004	4 8D	24" x 50" x 16"	Non	1 x 4	BB4-8G8D-1X4
450-0009	8 Golf Cart	25" x 32" x 17"	Non	2 x 4	BB8-6V200
450-0065	8 L-16	29" x 36" x 24"	Non	2 x 4	BB8-SS530
450-0067	16 L-16	29" x 70" x 24"	Non	2 x 8	BB16-SS530-2x8
450-0011	8 L-16	32" x 39" x 28"	Insulated	2 x 4	BB8-SS530-INS
450-0010	8 Group 30	33" x 30" x 16"	Non	2 x 4	BB8-GRP30
450-0087	16 L-16	36" x 56" x 24"	Non	4 x 4	BB16-SS530-4X4
450-0008	8 8D	46" x 50" x 16"	Non	2 x 4	BB8-8G8D
450-0030	8 8D	49" x 53" x 19"	Insulated	2 x 4	BB8-8G8D-INS
450-0124	12 Golf Cart	25" x 51" x 17"	Non	2 x 6	BB12-6V200-2 x 6
450-0132	12 L-16	29" x 53" x 24"	Non	2 x 6	BB12-SS530-2x6
450-0134	16 L-16	32" x 73" x 28"	Insulated	2 x 8	BB16-SS530-2x8-INS

BATTERY ENCLOSURES - POLE MOUNTED

Hand-built, heavy duty enclosures are built for the Concorde, and Deka (MK) batteries, although other batteries will fit within the same form factor. Enclosures don't lose their shape after being loaded with batteries. Ventilation louvers are punched on both sides - low on one side and high on the opposite side to promote convective flow.

450-0002

Part #	Size	Dimensions	Insulation	DPW Part #
450-0002	1 Grp 30	11" x 18" x 22"	Insulated	BB1-8G30H-HC-INS
450-0129	2 Group 27	15" x 24" x 36"	Insulated	BB2-8G8D-HC
430-0078	2 8G8D	15" x 24" x 36"	Insulated	BB2-8G8D-HC-INS
450-0084	4 Grp 27/30	16" x 16" x 20"	Non-Insulated	BB4-8G30H-HC
450-0012	2 4D	12" x 24" x 36"	Non-Insulated	BB2-8G4D-HC
450-0105	1 Grp 30	9" x 16" x 20"	Non-Insulated	BB1-8G30H-HC
450-0131	4 4D	21" x 46" x 16"	Non-Insulated	BB4-8G4D

MidNite SOLAR, inc

MidNite Solar offers indoor gray steel powder coated battery enclosures in five sizes. All include locking doors. When you need a listed enclosure for your sealed AGM or Gel battery bank, consider MidNite Solar. All enclosures are steel except the MNBE-D3R outdoor, which is aluminum.

MNBE-A BATTERY ENCLOSURE

Battery Enclosure with locking door. Holds three group 31 or 27 sealed batteries per shelf side by side or two per shelf end to end. Also holds one 8D per shelf. Remove middle shelf for taller batteries. 2" knock outs on top and sides.

450-0013

MNBE-B BATTERY ENCLOSURE

Battery Enclosure with locking door. Holds eight group 31 or sealed golf cart sized batteries. Gray powder coated steel. Two cabinets can be stacked horizontal or vertical for expansion. Ships knocked down in two cartons.

450-0025

MNBE-C BATTERY ENCLOSURE

MNBE-C Battery Enclosure with locking door. Holds twelve group 31 or sealed golf cart sized batteries and even the 14" tall PVX-3050T from Concorde. Gray powder coated steel. Two cabinets can be stacked horizontal for expansion.

450-0026

BATTERY RACKS & ENCLOSURES CONTINUED

MNBE-D BATTERY ENCLOSURE

MNBE-D Battery Enclosure with locking door and two shelves. MNBE-D holds 8 GVX3050T or 8 golf cart or 8 group 31 batteries. With the optional third shelf, the MNBE-D holds 12 group 31 batteries. The image shows 8 GVX3050T batteries.

450-0098

MNBE-E BATTERY ENCLOSURE

MNBE-E Battery Enclosure with locking door and two shelves. Holds eight L16 batteries. Holds 12 group 31 or golf cart batteries with optional third shelf (MN-Shelf) or use the optional third shelf (MN-Shelf) to hold the charge controller. Gray powder coated steel. Two cabinets can be stacked horizontal for expansion.

450-0097

Part #	Description	NEMA	Dimensions	MidNite Part #
450-0013	(2 shelf) 6 x Group 31 or 2 x 8D	1	29" x 14.5" x 28"	MNBE-A
450-0025	(2 shelf) 8 x Group 31 or 8 x Golf Cart	1	34" x 15.25" x 34"	MNBE-B
450-0026	(3 shelf) 12 x Group 31 or 12 x Golf Cart	1	34" x 15.25" x 55"	MNBE-C
450-0135	(2 shelf) 8 sealed x L-16	1	36.5" x 16" x 55"	MNBE-CL16
450-0130	(4 shelf) 4 x 8D	1	34" x 15.25" x 55"	MNBE-C8D
450-0098	(2 shelf) 8 x Golf Cart or 8 x Group 31	1	34" x 15.25" x 41.1"	MNBE-D
450-0100	(2 shelf) 8 x Golf Cart or 8 x Group 31	3R	43" x 19" x 8"	MNBE-D3R
450-0097	(2 shelf) 8 x L16	1	34" x 14.75" x 47.4"	MNBE-E
450-0096	Extra Shelf for MNBE-C, D, or E	-	32" x 12.75" x 1"	EXTRA SHELF

BATTERY SWITCHES & RELAYS

Part #	Description
580-0010	11 Pin, DIN/ Screw Mounting, 15 A, 300 VAC, 5X853

RELAYS

580-0009 580-0014 580-0011 580-0013 580-0001

Part #	Description
580-0008	Relay, 5 Pin, SPDT, 15 A, 120 VAC, 5X835
580-0009	Relay, 8 Pin, DPDT, 15 A, 120 VAC, 5X838
580-0014	Relay, Socket, 11 Pin, DIN/ Screw Mounting, 15 A, 300 VAC, 6X156
580-0011	Relay, Solid State, 0.2 to 40 A, 200 VDC, 5Z960
580-0013	Relay, Solid State, 40 A, 240 VAC, 6C906
580-0001	Relay, Time Delay for Generator Warm-up, 4E233
580-0012	Relay, Time Delay, DPDT, 10 A, 120 VAC, 6A855

BATTERY TOOLS & ACCESSORIES

BATTERY VENT FAN

- Positive venting of both hydrogen and corrosive gases
- Keeps batteries warmer in cold climates
- Excellent results for over 7 years
- Stops back drafting
- Puts the smell outside
- Uses less than 2 watts

Part #	VDC
440-0000	12
440-0001	24
440-0002	48

BATTERY METER

The new inexpensive, easy to use MidNite Solar Battery Capacity Meter

FEATURES:

- LED's that correspond to battery voltage
- Auto sensing for 12, 24, 36, and 48 volt batteries
- LED indicators show if batteries have received a full charge recently, longer than one week or longer than two weeks
- Ideal for "at a glance" readings for RE systems, golf carts, forklifts, small EVs etc.
- Settings for Gel, AGM, and Flooded Lead acid batteries

Part #	Description	MidNite Part #
570-0757	Capacity Meter, 70 V max, Input 12/ 24/ 36/ 48 V	MNBCM

BATTERY MONITORING & METERING

Schneider Electric

BATTERY TEMPERATURE SENSOR

Part #	Description	Schneider Electric Part #
570-0137	15 ft, for DR, SW & C Charge Controllers	130-0004-01-01

Bogart Engineering

PENTAMETRIC BATTERY MONITORING SYSTEM

The PentaMetric battery monitor system offers a lot more capability than the TriMetric monitor:

- Complete system has 3 parts: input unit (near batteries), display unit and computer interface unit
- Monitor up to 3 shunts — For example: measure total solar input and wind input independently in addition to monitoring battery "state of charge"
- Optional computer interface with (Windows) software to control and read out all data
- Extensive system logged data
- Audible and visual alarms for high and low battery conditions

570-0042

PENTAMETRIC INPUT/BASE UNIT

Part #	Description	Bogart Part #
570-0043	PentaMetric Input/ Base Unit	PM-5000-U

PENTAMETRIC COMPUTER INTERFACE

The Computer Interface offers a more intuitive interface to the PentaMetric, and also provides easy access to the "logged data." The computer needs to be active when reading the data. The "Display Unit" can be added to provide continual access when the computer is not on.

570-0041

570-0958

Part #	Description	Use With	Bogart Part #
570-0041	With RS232 Port	Input/ Base Unit	PM-100-C
570-0958	With Ethernet Connection	Input/ Base Unit	PM-101-CE
570-1026	With USB Port	Input/ Base Unit	PM-102-USB

PENTAMETRIC DISPLAY UNIT

When used with the Computer Interface, the Display Unit can be added at any time to provide continual access when the computer is not on.

Part #	Description	Use With	Bogart Part #
570-0042	PentaMetric Display Unit	Input/ Base Unit	PM-100-D

TEMPERATURE SENSOR

Part #	Description	Bogart Part #
570-0756	For PentaMetric, -20 to +60 °C	TS-1

TRIMETRIC BATTERY MONITOR

570-0852

570-0649

The TriMetric battery monitors are designed to assist in battery care, conservation and system maintenance of battery powered systems that use storage batteries with system voltage from 12-48 volts. They provide the user with information on battery "volts", "amps", "amp hours" and "battery percent full" based on measuring the amp hours. The newer "TM-2025" models also show "watts" and provide some limited logged data. Reliability and accuracy are key product objectives. The TriMetrics require an external shunt located near the batteries to measure "amps" and "amp-hours". The meter readout may be located hundreds of feet away from batteries and is usually connected to the shunt with a 4 wire cable.

- The TM-2020 and TM-2025-A have physically similar panels that mount into an optional double gang electrical box.
- The TM-2025-RV is in a narrower package and comes with its own enclosure for surface mounting.
- The TM-2025 models are functionally identical and work on 12-48 V systems.
- The TM-2020 requires an optional 48 V adapter to operate with 48 volt systems.

Part #	Description	Voltage	With Box	Dimensions	Bogart Part #
570-0852	TriMetric 2025	12/ 24/ 48 V	Yes	3.2" x 4.3"	TM-2025-RV
570-0649	TriMetric 2025 with Extra Data Logging	12/ 24/ 48 V	No	4.5" x 4.75"	TM-2025-A
570-0044	TriMetric 2020	12/ 24 V	No	4.5" x 4.75"	TM2020

48 V ADAPTER & LIGHTNING PROTECTOR FOR TRI-METRIC

The TM-2020 (only) model requires a 48 V adapter/ lightning protector to use on 48 V systems. This adapter also provides a high degree of lightning protection for the TM-2020 at all system voltages. The newer TM-2025 models already include 48 V capability with lightning protection.

Part #	Description	Bogart Part #
570-0045	TM-2020 Adapter and Lightning Protector	TM-48VA

WIREMOLD™ DEEP BOX FOR TRIMETRIC BATTERY MONITOR

The TriMetric battery monitor is designed to be mounted in any standard "dual gang" electrical box. A standard metal box may be used, or if surface mounting is desired, a Wiremold™ surface mount "double gang" plastic box may be used which allows flexible and easy mounting options.

Part #	Description	Bogart Part #
501-0015	Wiremold Deep Box for Surface-Mounting	2348-2
570-0764	Dual Gang Electrical Box	E9802D-Carlon

Manufacturing Quality Products Since 1946

- Operates the largest single-site, lead-acid battery manufacturing facility in the industry
- 520 acre vertically integrated campus
- Quality manufacturing recognized worldwide meeting global requirements of ISO9001 and ISO/TS 16949
- A leader in innovative recycling meeting global environmental requirements of ISO 14001
- Made in the U.S.A.

EAST PENN'S MANUFACTURING CAMPUS

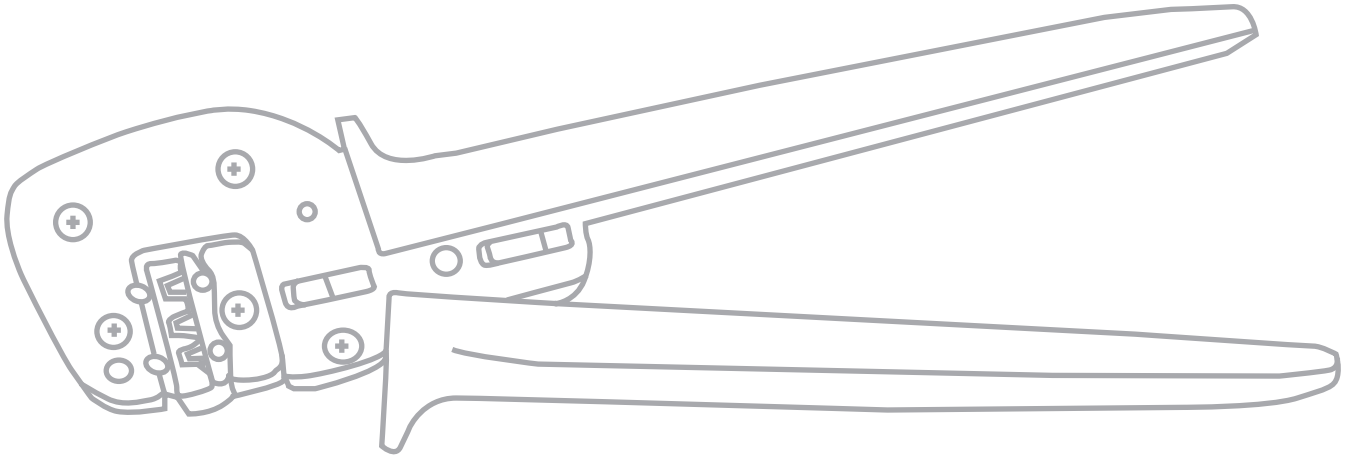
Whatever your energy needs, Deka delivers.

MK POWERED

www.mkbattery.com

MK Battery, An East Penn Manufacturing Co., Inc. Subsidiary

Tools & Supplies



Soligent

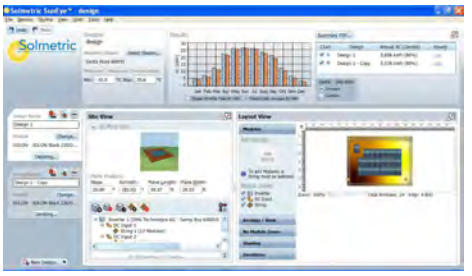
Solmetric

SunEye Hand Held Analysis Tool 210

Professional Site Evaluation

The Solmetric SunEye 210 is the premier solar site assessment tool. It evaluates the impact of shade-causing obstructions and also measures roof pitch and orientation. Operation of the SunEye 210 is quick and simple. With the press of a button, shading data is available for analysis in just seconds. The SunEye 210 is the choice of solar professionals all over the world and has proven to help sell installations to end customers. The precise shading data leads to accurate PV and solar thermal energy production estimates and confident performance guarantees.

Part #	Description
730-0021	SunEye 210, with Integrated GPS and Hard Case
730-0022	SunEye 210 with Hard Case
730-0041	Solmetric SunEye Extension Kit, telescopes from 4.9 to 17.7 feet (for SunEye 210)
730-0045	Solmetric PV Designer Annual Software License



Solmetric SunEye

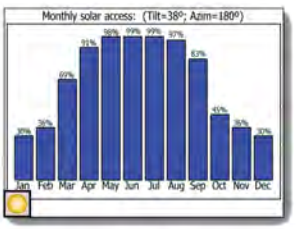
Integrated Hand-Held Tools for Solar Site Evaluation and Shade Analysis

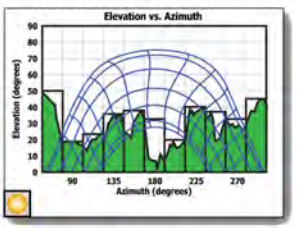
That Means

- Easy, accurate measurements and instant feedback
- Fast estimates lead to quick sales and designs
- Data is automatically stored for later review and design

Key Features

- Electronic Inclinometer
- Electronic Compass
- Single-Handed Operation
- Rugged, Comfortable Design
- 2-Year Warranty Worldwide
- Integrated GPS (Optional)
- Live Survey Mode- View Annual Sunpaths live as you scan the site
- Digital Camera with Fish-Eye Lens
- "What if" editing of sunpath obstructions with new scenario storage





Alternative data views include monthly solar access and obstruction elevation vs. azimuth.

Complete Verification Solution

The Solmetric **PV Analyzer** is a sophisticated electrical test solution for verifying PV system performance. It traces the I-V Curve of a module, string, or sub-array, and compares the results to the I-V characteristics predicted by advanced PV performance models. The PV Analyzer is the preferred tool for PV system performance testing during commissioning, operations & maintenance, and troubleshooting.

Part #	Description
730-0023	Solmetric PVA-600 PV Analyzer, I-V Measurement unit w/case, 20-600 Voc, 1-20 A Isc
730-0042	Solmetric PVA-600 Wireless Sensor Kit for measuring Irradiance and Temperature
730-0043	Solmetric, PVA Module I-V Electrical Test and Data Analysis Tool
730-0044	Solmetric PVA Test Leads, Adapts from MC4 to alligator clips, 5 foot cable

SolarPathfinder

SOLAR PATHFINDER

The Solar Pathfinder™ is used for shade analysis (solar or canopy / habitat studies). Any trees, buildings, or other objects that could cast shadows are reflected in the plastic dome, clearly showing shading patterns at the site. The underlying diagrams are latitude specific and are engineered with data for the entire year. A compass and a bubble level are built into each Pathfinder™, making it easy to keep the instrument level and facing in the right direction. The Solar Pathfinder™ Assistant software allows users to assess total potential solar energy given the shading of a particular site, consolidating the information into a professional data-rich report.

Part #	Description
730-0032	20 Sun Path Charts, for latitudes 18° to 20°
730-0006	25 Sun Path Charts, for latitudes 31° to 37°
730-0003	25 Sun Path Charts, for latitudes 37° to 43°
730-0004	25 Sun Path Charts, for latitudes 43° to 49°
730-0019	Analysis Tool w/ case and tripod, diagram pack for solar/ continental USA
730-0020	Analysis Tool w/ case and diagram pack for solar/ continental USA
710-0005	Assistant Software for PV & Thermal CD

WIRING TOOLS

MC

CRIMPING PLIERS, CONNECTOR DIES, CONNECTOR LOCATORS, LATCHING CONNECTOR DIS-ASSEMBLY TOOL SET

Part #	Description	Multi-Contact Part #
550-0039	Crimping Pliers for MC4 Latching Connectors	32.6002
550-0058	MC3 Connector Die for MC4 Crimping Pliers	PV-ES-CZM-16100
550-0059	MC3 Connector Locator for MC4 Crimping Pliers	PV-LOC-A
550-0056	MC4 Latching Connector Dis-Assembly Tool Set, Red	PV-MS

CRIMPING TOOLS

Rennsteig Tools, Inc.

CRIMPING PLIERS WITH DIE SET AND LOCATOR

Part #	Description	RTI Part #
550-0362	Crimp Tool for MC3 Terminals	R624 194 3 1
550-0109	Crimp Tool for MC4 Terminals	R624 570 3 1
550-0363	Crimp Tool for TE Terminals	R624 817 3 1
550-0365	Crimp Tool for Amphenol H4 Terminals	R624 1194 3 1
550-0364	Crimp Tool for Wieland Terminals	R624 073-1 3 16
550-0445	Crimp Tool for SMK Terminals (10/12/14 AWG)	R624 1188 3 1

MULTIFUNCTION CUT, STRIP, AND CRIMP (CSC) TOOL

Part #	Description	RTI Part #
550-0116	Multifunction Tool for Cutting, Stripping & Crimping of MC4 only 6 mm2 (10 AWG)	R624 006 3 1
550-0367	Multifunction Tool for Cutting, Stripping & Crimping of MC4 only 4 mm2 (12 AWG)	R624 004 3 1

PROFESSIONAL SOLAR WIRING/CRIMPING KITS

Part #	Description	RTI Part #
550-0106	Kit for MC3/MC4 (Crimp Tool, Cutter, Stripper)	R624 105-02
550-0368	Kit for TE (Crimp Tool, Cutter, Stripper)	R624 105-03
550-0369	Kit for MC3/MC4/TE (Crimp Tool, Cutter, Stripper)	R624 105-06
550-0370	Kit for MC3/MC4/H4 (Crimp Tool, Cutter, Stripper)	R624 105-15
550-0371	Kit for MC3/MC4/Wieland (Crimp Tool, Cutter, Stripper)	R624 105-16
550-0372	Kit for MC4/H4/Wieland (Crimp Tool, Cutter, Stripper)	R624 105-17

CRIMPING TOOLS CONTINUED

Rennsteig Tools, Inc.

SOLAR CRIMP SET

Part #	Description	RTI Part #
550-0373	Crimping Pliers and Case Without Dies and Locators	R624 105-12
550-0115	Crimping Pliers and Case With MC3/MC4/TE Dies and Locators	R624 105-13
550-0374	Crimping Pliers and Case With MC4/H4/ Wieland Dies and Locators	R624 105-18
550-0375	Crimping Pliers and Case With MC3/MC4/H4 Dies and Locators	R624 105-20

SINGLE COMPONENTS FOR SOLAR CRIMP SET

Part #	Description	RTI Part #
550-0114	Die Set for MC3	R624 194 3 0
550-0108	Locator for MC3	R624 194 0 01
550-0113	Die Set for MC4	R624 570 3 0
550-0112	Locator for MC4	R624 570 0 01
550-0111	Die Set for TE	R624 817 3 0
550-0110	Locator for TE	R624 817 0 01
550-0378	Die Set for Wieland	R624 073-1 3 0
550-0379	Locator for Wieland	R624 071 0 016
550-0376	Die Set for Amphenol H4	R624 1194 3 0
550-0377	Locator for Amphenol H4	R624 1194 0 01
550-0380	Die Set for SMK	R624 1188-3
550-0447	Locator for SMK	R624 1188 0 01

BOOKS

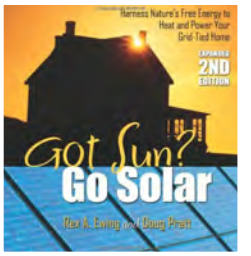
PV DESIGN AND INSTALLATION MANUAL

A textbook manual on how to design, install and maintain a PV system. This manual offers an overview of PV electricity, and a detailed description of PV system components, including PV modules, batteries, controllers and inverters.

Part #	Description
720-0000	Photovoltaic Installation Book
720-0003	Photovoltaic Installation Book, Spanish

GOT SUN? GO SOLAR!

Updated 2nd edition! Co-written by our very own designer Doug Pratt, and a great introduction to solar. Answers questions like: How does solar electricity work exactly? Do you need rechargeable batteries? What size does your system need to be? What does it cost? Is there any financial help available?



Part #	Description
720-0001	Got Sun? Go Solar! Book

MARKETING MATERIALS

Sharp Banner

Sharp Floor Mat

Part #	Description
750-0001	Sharp Floor Mat, black with red Sharp logo, 48" x 36"
750-0000	Sharp Banner for Trade Shows

SMA SUNNY BOY AND SUNNY ISLAND DISPLAY UNITS

Use Sunny Boy and Sunny Island Display Units to add a professional touch to your showroom or public office.

Sunny Boy

Sunny Island

Please contact your sales representative for inverter models and more information on these display units.

FRONIUS DISPLAY UNITS

Use Fronius IG and IG Plus Series Display Units to add a professional touch to your showroom or public office. Also available is a Fronius storage bag for the inverter display stand.

Fronius IG

Fronius IG Plus

Please contact your sales representative for inverter models and more information on these display units.

Soligent

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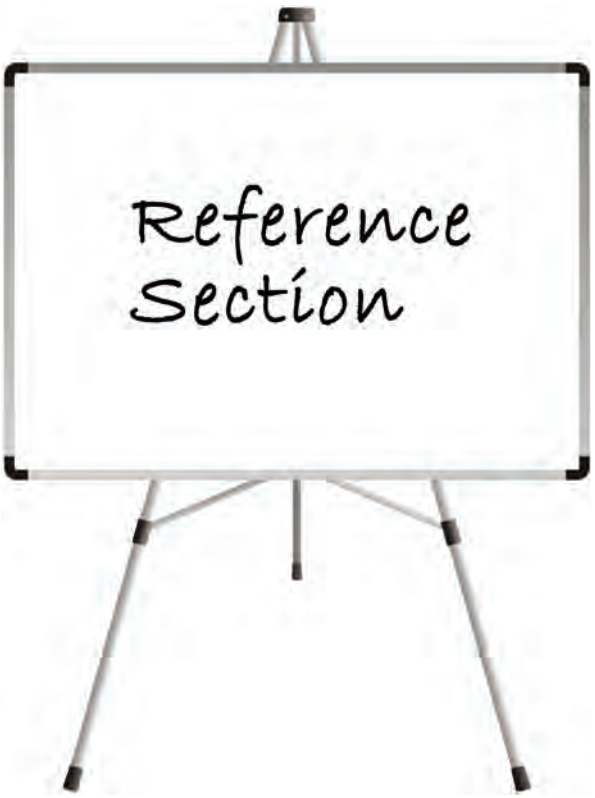


ON-LINE RESOURCES

SOLIGENT'S LINKS TO RENEWABLE ENERGY ORGANIZATIONS
www.soligent.net/solar-installer-resources/renewable-energy-companies-organizations

SOLIGENT'S LINKS TO OTHER RENEWABLE ENERGY TOOLS
www.soligent.net/solar-installer-resources/solar-installer-tools

NATIONAL RENEWAL ENERGY LABORATORY
Provides tools and resources to help with the use of renewable energy including solar maps and weather data.
www.nrel.gov/gis/solar.html

FREE GOVERNMENT SOURCE FOR CALCULATING THE POWER YOUR SYSTEM WILL PRODUCE
The PV Watts Solar Calculator calculates how much energy will be produced by photovoltaic solar panels in a geographical area.
www.pvwatts.net

DEPARTMENT OF ENERGY
ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.
www.energystar.gov

THE DATABASE OF STATE INCENTIVES FOR RENEWABLE ENERGY (DSIRE)
DSIRE is a comprehensive source of information on state, local, utility, and federal incentives and policies that promote renewable energy and energy efficiency.
www.dsireusa.org

SOLAR ENERGY INTERNATIONAL
Solar Energy International provides hands-on workshops and online courses in renewable energy and sustainable building technologies.
www.solarenergy.org

AMERICAN SOLAR ENERGY SOCIETY
The nonprofit American Solar Energy Society (ASES), an association of solar professionals and advocates whose mission is to inspire an era of energy innovation and speed the transition to a sustainable energy economy.
www.ases.org

NORTH AMERICAN BOARD OF CERTIFIED ENERGY PRACTITIONERS (NABCEP)
NABCEP is a volunteer board of renewable energy stakeholder representatives whose mission is to support and work with the renewable energy and energy efficiency industries, professionals, and stakeholders to develop and implement quality credentialing and certification programs for practitioners.
www.nabcep.org

FEDERAL GOVERNMENT WEATHER DATA
The NCDC (National Climatic Data Center) web site provides summaries of weather and climate events.
lwf.ncdc.noaa.gov/oa/climateresearch.html

FREE ON-LINE CALCULATOR FOR AMPS, LOADS AND CAPACITY
NEC 2011 Table 310.15 (B)(16) Conductor Size, OCPD, Voltage Drop, and Equipment Grounding Conductor Size Calculator
www.electrician2.com/calculators/wireocpd_ver_1.html

PV INSPECTOR / INSTALLER NEC CODE SUGGESTED PRACTICES
Provides valuable information on how to connect and install selected PV components into a safe system.
www.nmsu.edu/~tdi/Photovoltaics/Codes-Stds/Codes-Stds.html

CALIFORNIA SOLAR INITIATIVE - ELIGIBLE SOLAR ELECTRIC EQUIPMENT
Links to CSI pages for eligible Modules, Inverters, Performance Meters, and Monitoring and Reporting Service Providers.
www.gosolarcalifornia.org/equipment/index.php

CALIFORNIA SOLAR INITIATIVE INCENTIVE CALCULATOR
The calculator provides an estimated CSI system size and incentive amount of a solar electric system.
www.csi-epbb.com/default.aspx

We have a long history of designing and supplying equipment for systems with batteries. Call us to discuss your needs.

PHOTOVOLTAIC SYSTEM TYPES

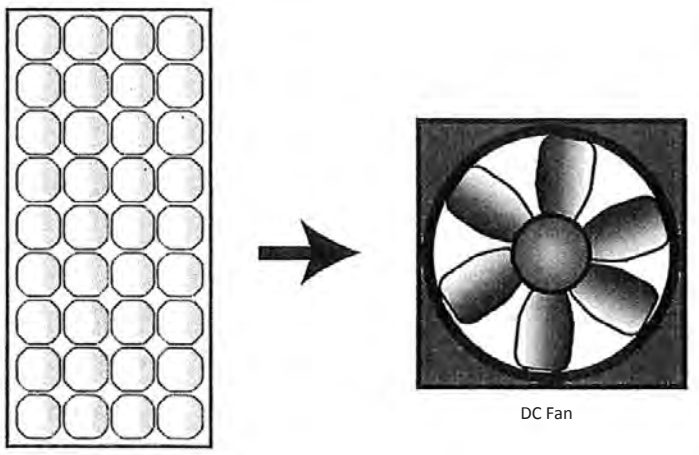
Photovoltaic systems can be configured in many ways. For example, many residential systems use battery storage to power appliances during the night. In contrast, water pumping systems often operate only during the day and require no storage device. A large commercial system would likely have an inverter to power AC appliances, whereas a system in a small cabin would likely power only DC appliances and wouldn't need an inverter. Some systems are linked to the utility grid, while others operate independently.

1. Day Use Systems

The simplest and least expensive photovoltaic systems are designed for day use only. These systems consist of modules wired directly to a DC appliance, with no storage device. When the sun shines on the modules, the appliance consumes the electricity they generate. Higher insolation (sunshine) levels result in increased power output and greater load capacity.

Examples of day use systems include:

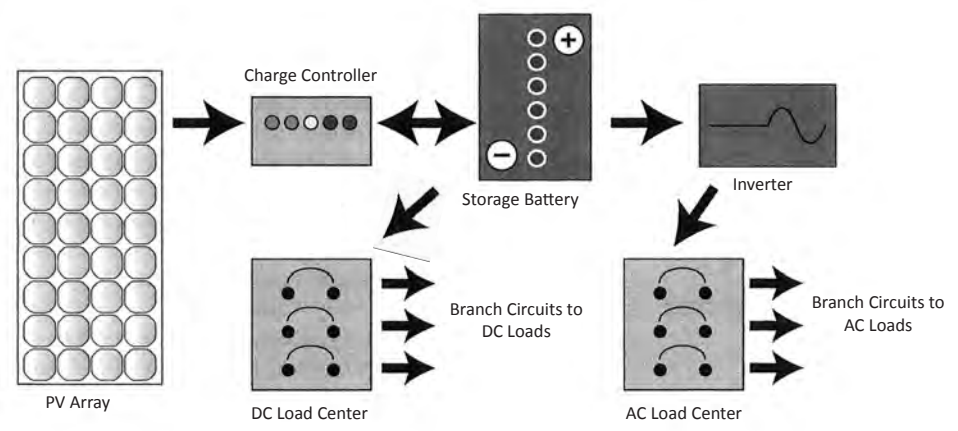
- **Remote water pumping for a storage tank**
- **Operation of fans, blowers, or circulators to distribute thermal energy for solar water heating systems or ventilation systems**



DAY USE SYSTEM

2. Direct Current Systems Powering Alternating Current Loads

Photovoltaic modules produce DC electrical power, but many common appliances require AC power. Direct current systems that power AC loads must use an inverter to convert DC electricity into AC. Inverters provide convenience and flexibility in a photovoltaic system, but add complexity and cost. Because AC appliances are mass-produced, they are generally offered in a wider selection, at lower cost, and with higher reliability than DC appliances. High quality inverters are commercially available in a wide range of capacities.



SYSTEM WITH DC AND AC LOADS

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

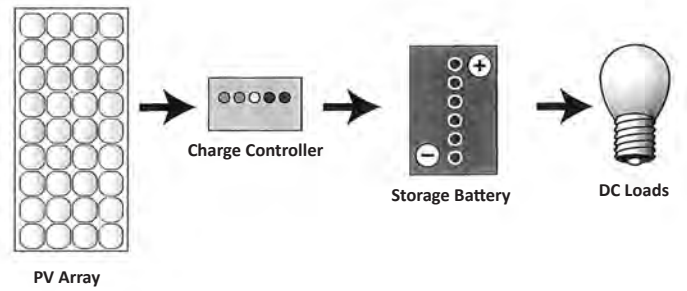
3. Direct Current Systems with Storage Batteries

To operate loads at night or during cloudy weather, PV systems must include a means of storing electrical energy. Batteries are the most common solution. System loads can be powered from the batteries during the day or night, continuously or intermittently, regardless of weather.

In addition, a battery bank has the capacity to supply high-surge currents for a brief period, giving the system the ability to start large motors or to perform other difficult tasks. A simple DC system that uses batteries is illustrated below. This system's basic components include: PV modules, charge controllers storage, batteries, and appliances (the system's electrical load).

A battery bank can range from small flashlight size batteries to dozens of heavy-duty industrial batteries. Deep-cycle batteries are designed to withstand being deeply discharged and then fully recharged when the sun shines. (Conventional automobile batteries are not well suited for use in photovoltaic systems and will have short effective lives). The size and configuration of the battery bank depends on the operating voltage of the system and the amount of nighttime usage. In addition, local weather conditions must be considered in sizing a battery bank. The number of modules must be chosen to adequately recharge the batteries during the day.

Batteries must not be allowed to discharge too deeply or be overcharged - either situation will damage them severely. A charge controller will prevent the battery from overcharging by automatically disconnecting the module from the battery bank when it is fully loaded. Some charge controllers also prevent batteries from reaching dangerously low charge levels by stopping the supply of power to the DC load. Providing charge control is critical to maintaining battery performance in all but the simplest of PV systems.

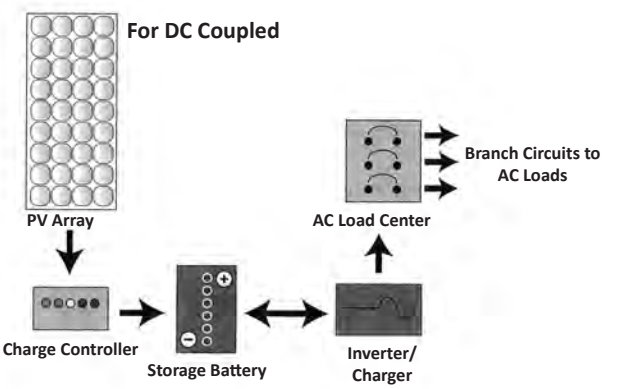


DC SYSTEM WITH BATTERIES

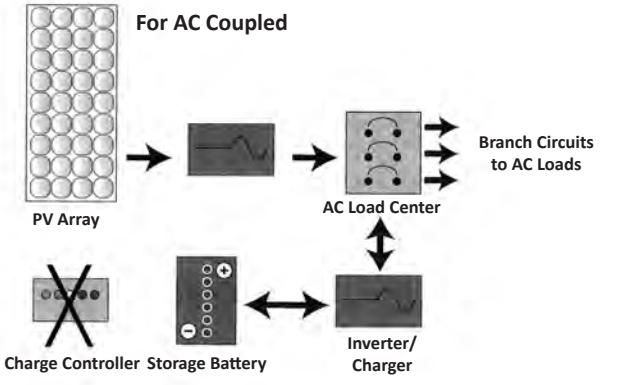
4. Hybrid Systems

Most people do not run their entire load solely off their PV system. The majority of systems use a hybrid approach by integrating another power source. The most common form of hybrid system incorporates a gas or diesel-powered engine generator, which can greatly reduce the initial cost. Meeting the full load with a PV system means the array and batteries need to support the load under worst-case weather conditions. This also means the battery bank must be large enough to power large loads, such as washing machines, dryers, and large tools. A generator can provide the extra power needed during cloudy weather and during periods of heavier than normal electrical use, and can also be charging the batteries at the same time. A hybrid system provides increased reliability because there are two independent charging systems at work.

Another hybrid approach is a PV system integrated with a wind turbine. Adding a wind turbine makes sense in locations where the wind blows when the sun doesn't shine. In this case, consecutive days of cloudy weather are not a problem, so long as the wind turbine is spinning. For even greater reliability and flexibility, a generator can be included in a PV/ Wind system. A PV/ Wind/ Generator system has all of the advantages of a PV/ Generator system, with the added benefit of a third charging source for the batteries.



HYBRID SYSTEMS



SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

PHOTOVOLTAIC SYSTEM TYPES CONTINUED

5. Grid-tied Systems

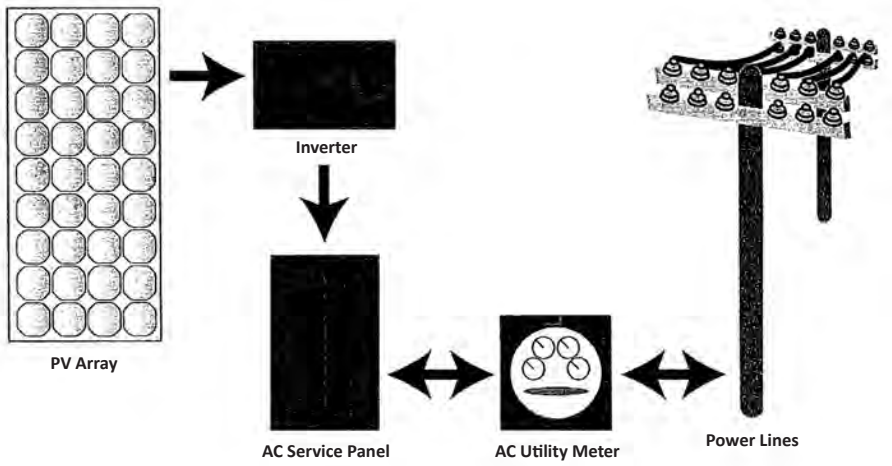
We offer extensive experience and the highest quality components for grid-tied solar systems, a system connected to the electrical grid, allowing the customer to use the electricity from the grid as a back-up. Should your customer's needs be unique, our team can design a system that reflects customer requirements and site specifications.

Photovoltaic systems that are connected to the utility grid (utility-connected, grid-tied, or line-tied systems) do not need battery storage in their design because the utility grid acts as a power reserve. Instead of storing surplus energy that is not used during the day, the homeowner sells the excess energy to a local utility through a specially designed inverter. When homeowners need more electricity than the photovoltaic system produces, they can draw power from the utility grid.

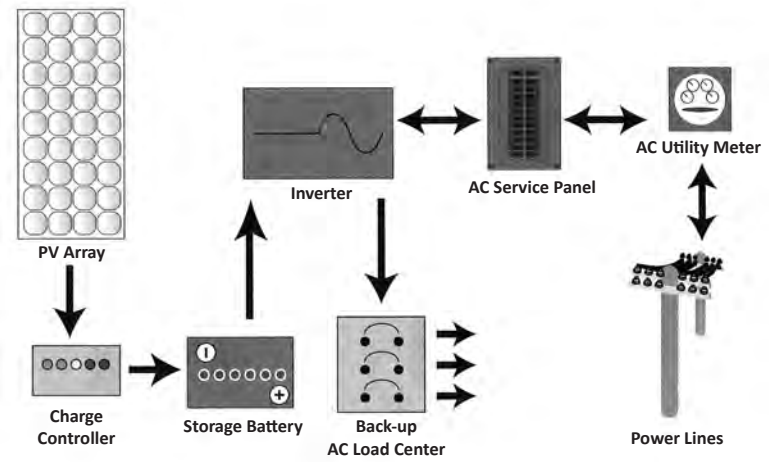
If the utility grid goes down, the inverter automatically shuts off and will not feed solar-generated electricity back into the grid. This ensures the safety of line persons working on the grid. Because utility-connected systems use the grid for storage, these systems will not have power if the utility grid goes down. For that reason, some of these systems are also equipped with battery storage to provide power in the event of power loss from the utility grid.

The Public Utilities Regulatory Policies Act (PURPA) of 1978 requires electric utilities to purchase power from qualified, small power producing system owners. The utilities must pay the small power producers based on their "avoided costs," or costs the utility does not have to pay to generate that power themselves. Additional terms and conditions for these purchases are set by state utility commissions and vary from state to state. While this law allows homeowners in areas with utility power to purchase photovoltaic systems and sell their excess power to an electric utility, people contemplating doing so should remember that this is rarely a profitable venture at the present time.

Some utility companies offer "net metering" to their customers, where a single meter spins in either direction depending upon whether the utility is providing power to the customer or the customer is producing excess power. The customer or independent power producer pays or collects the net value on the meter. Net metering is very desirable to the independent power producer because he/she can sell power at the same retail rate that the utility charges its customers.

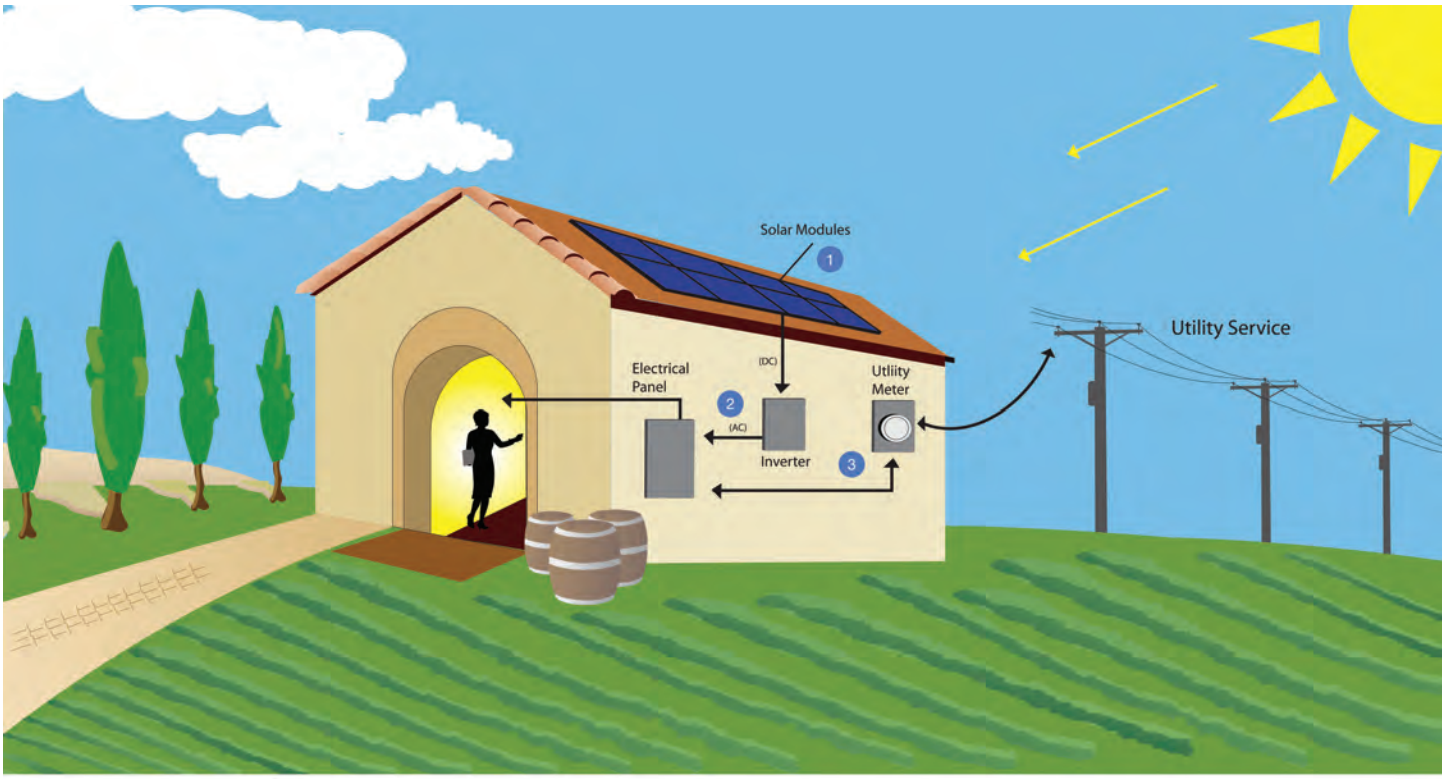


GRID-TIED SYSTEM WITHOUT BATTERIES



GRID-TIED SYSTEM WITH BATTERIES

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.



HOW GRID-TIED SOLAR WORKS

The basic components of a grid-tied solar system are rooftop modules, an inverter and a utility meter.

1 **Solar Modules:**
Solar modules collect the sun's energy and convert it to electricity.

2 **The Inverter:**
The inverter converts the electricity from direct current (DC) to alternating current (AC), which enters the electrical panel. This distributes the electricity load to all lights, appliances etc.

3 **The Utility Meter:**
The utility meter displays the amount of power you use or produce. Any power not used is fed back to the grid.

PHOTOVOLTAIC SYSTEM TYPES CONTINUED

6. Off-Grid

Just as our experience is extensive in grid-tied solar, so it is in off-grid, a stand-alone solar electricity generating system. We provide the knowledge, as well as the components, for off-grid solar systems. We can also design systems that accommodate virtually every type of remote location.

Off-Grid Introduction

By definition an off-grid power system is any system that provides power where utility power is unavailable. Off-Grid systems typically make financial sense any place where the utility would have to run lines more than one half of a mile for grid connection. In addition, the new federal PV incentive does not distinguish between grid-tied and off-grid, so any system should be eligible for a federal tax rebate.

A typical off-grid system typically consists of an off-grid inverter, battery-bank, generator, and a DC power source (PV, Wind, Micro Hydro, etc.). If a PV array is used as a DC power source then a charge controller would also be used to harvest energy from the solar array and protect the batteries from overcharging.

System sizing is much more important on an off-grid system than a grid-tied system. Here are the questions that need to be answered:

- **How many kWh do you expect to consume?**
- **How many hours/ days of autonomy do you want to be able to run without PV (or other energy source)?**
- **What is the largest load that you need to run? How much power is required to start this load?**
- **What is your budget?**

Off-Grid Inverters

There are a number of things to consider when choosing an off-grid inverter:

Tare Losses

Tare losses are the power that is required to run the system in standby mode. Every watt is precious in an off-grid system and reducing power wasted is critical. This is a specification to look at very closely since there is a wide variance among different inverter manufacturers for tare losses. In addition, some inverter companies have the ability to turn off inverters entirely in multiple inverter systems to further reduce tare losses.

Surge Capability

The ability of an inverter to surge to a higher level than its rated output for a short duration to start large loads like well pumps is critical. The specifications that should be looked at are the Maximum Output Current and the AC Overload capability. If there are large loads a good number to look for is a five second surge capability of at least 1.5 times the rated output of the inverter.

System Information

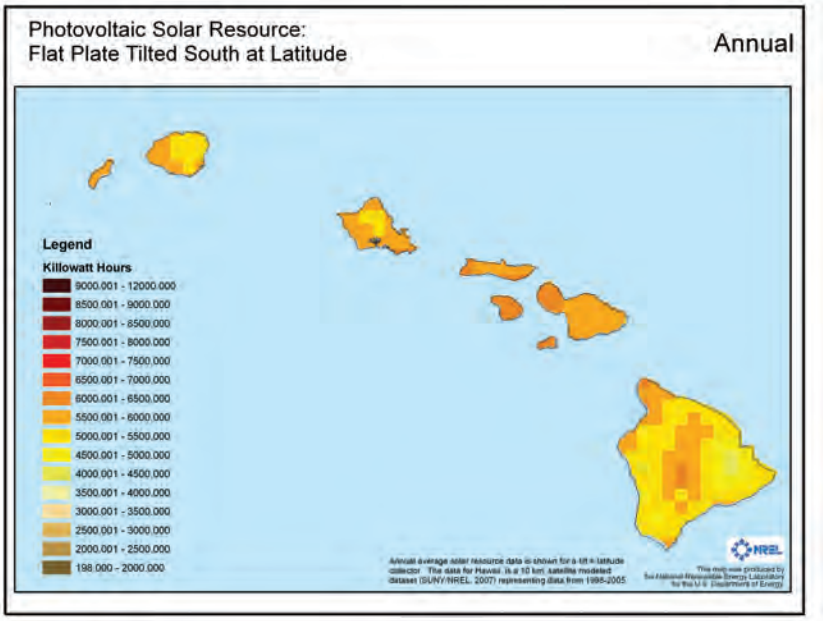
It is very helpful to have good, reliable information about your battery's state of charge. In many systems, generators are started automatically when the batteries get down to a certain state of charge. Usually this is accomplished through an external DC monitor. The best systems give you true battery state of charge which is a more accurate reading of the capacity of your batteries than battery voltage.

Field Serviceability

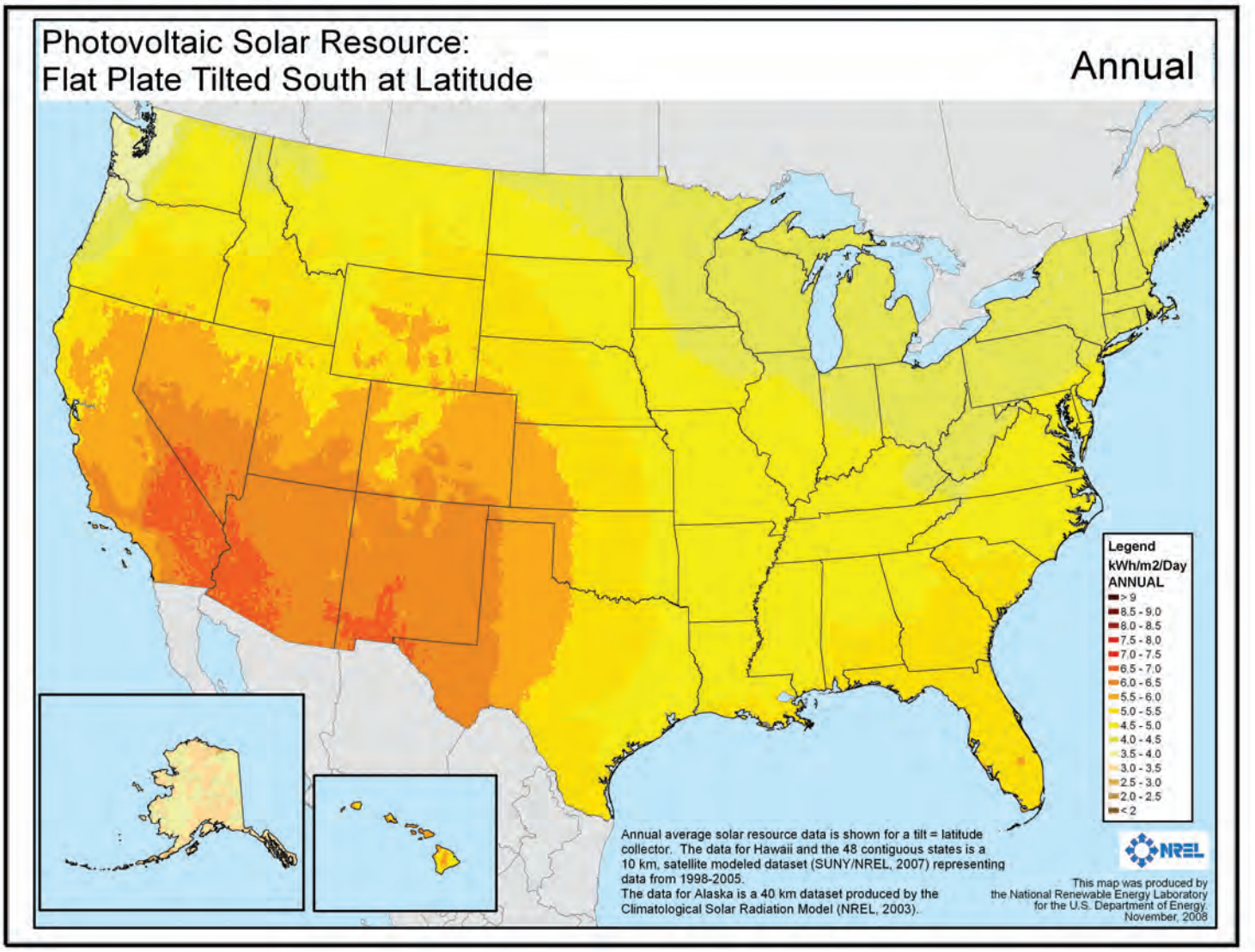
Often systems are installed in very remote locations. The ability to service the product in the field without having to take down the system is very important.

INSOLATION

This is an approximate guide showing the amount of solar radiation reaching the surface of the earth.



This map was developed by the National Renewable Energy Laboratory for the U.S. Department of Energy.



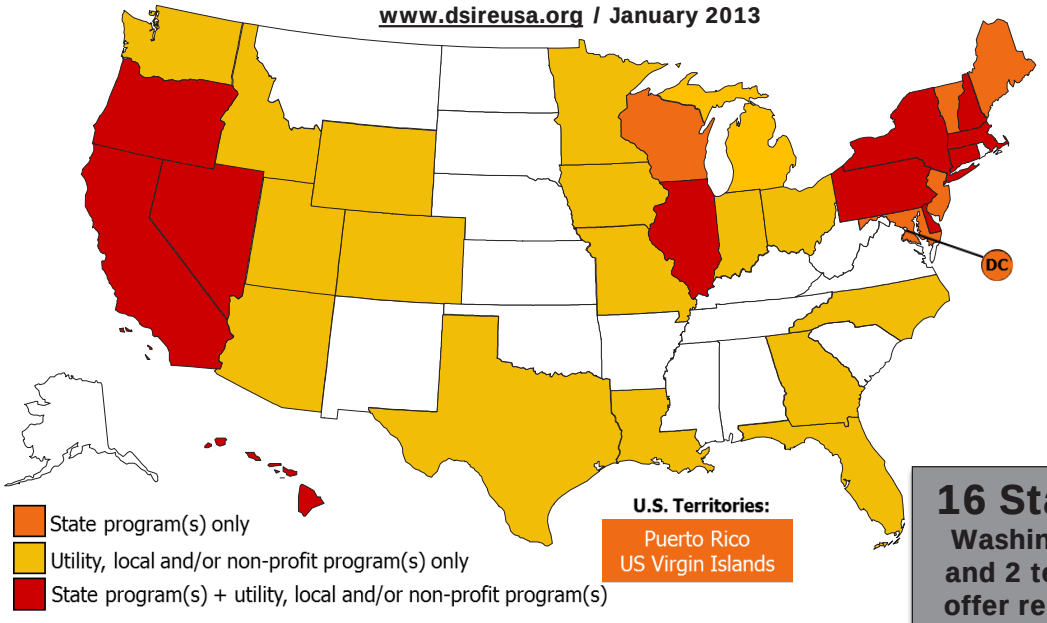
This map was developed by the National Renewable Energy Laboratory for the U.S. Department of Energy.

REBATE PROGRAMS FOR RENEWABLES

DSIRE™ Database of State Incentives for Renewables & Efficiency | U.S. Department of Energy | Energy Efficiency & Renewable Energy | IREC | North Carolina Solar Center

Rebate Programs for Renewables

www.dsireusa.org / January 2013



16 States + Washington DC and 2 territories offer rebates for renewables

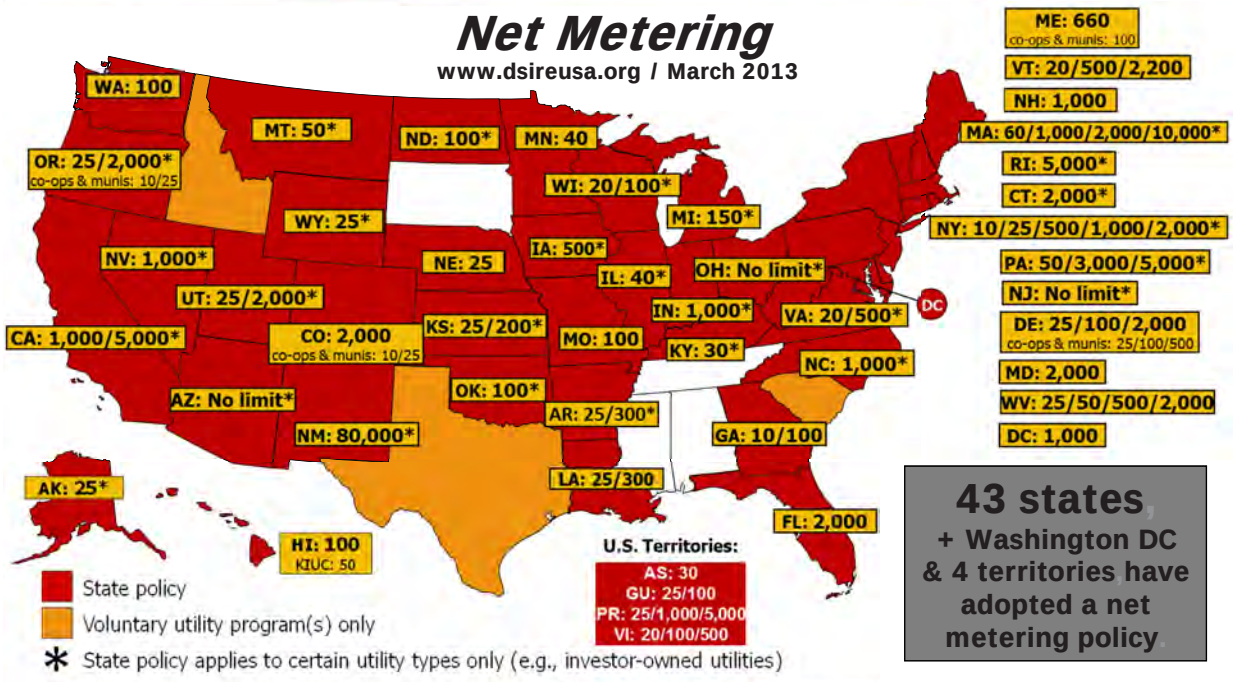
Notes: This map does not include rebates for geothermal heat pumps, daylighting or other energy efficiency technologies.

NET METERING

DSIRE™ Database of State Incentives for Renewables & Efficiency | U.S. Department of Energy | Energy Efficiency & Renewable Energy | IREC | North Carolina Solar Center

Net Metering

www.dsireusa.org / March 2013



43 states + Washington DC & 4 territories have adopted a net metering policy

Note: Numbers indicate individual system capacity limit in kilowatts. Some limits vary by customer type, technology and/or application. Other limits might also apply. This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

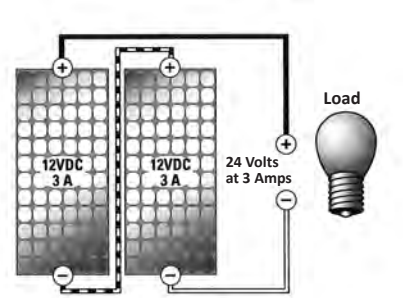
SERIES AND PARALLEL CIRCUITS IN POWER SOURCES

Photovoltaic modules and batteries are a system's building blocks. While each module or battery has a rated voltage or amperage, they can also be wired together to obtain a desired system voltage.

1. Series Circuits

Series wiring connections are made at the positive (+) end of one module to the negative (-) end of another module. When loads or power sources are connected in series, the voltage increases. Series wiring does not increase the amperage produced. The image at right shows two modules wired in series resulting in 24 V and 3 A.

Series circuits can also be illustrated with flashlight batteries. Flashlight batteries are often connected in series to increase the voltage and power a higher voltage lamp than one battery only could power alone.



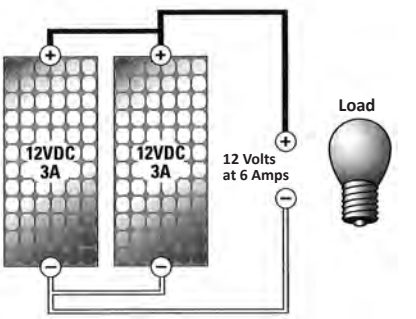
PV MODULES IN SERIES

Question: When four 1.5 VDC batteries are connected in series, what is the resulting voltage?
***Answer**: 6 volts*

2. Parallel Circuits

Parallel wiring connections are made from the positive (+) to positive (+) terminals and negative (-) to negative (-) terminals between modules. When loads or sources are wired in parallel, currents are additive and voltage is equal through all parts of the circuit. To increase the amperage of a system, the voltage sources must be wired in parallel. The image at right shows PV modules wired in parallel to get a 12 V, 6-amp system. Notice that parallel wiring increases the current produced and does not increase voltage.

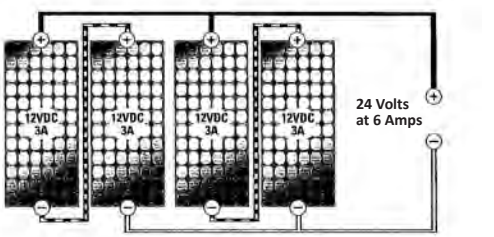
Batteries are also often connected in parallel to increase the total amp-hours, which increases the storage capacity and prolongs the operating time.



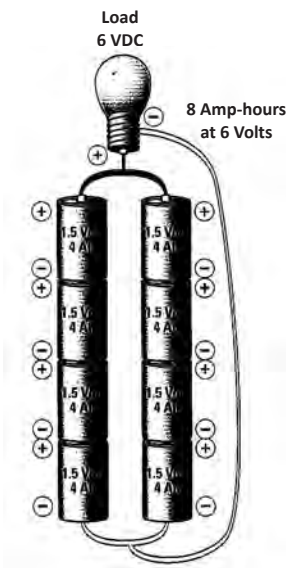
PV MODULES IN PARALLEL

3. Series and Parallel Circuits

Systems may use a mix of series and parallel wiring to obtain required voltages and amperages. The image at right shows four 3-amp, 12 VDC modules wired in series and parallel. Strings of two modules are wired in series, increasing the voltage to 24 V. Each of these strings is wired in parallel to the circuit, increasing the amperage to 6 amps. The result is a 6-amp, 24 VDC system.



PV MODULES IN SERIES AND PARALLEL



4. Batteries in Series and Parallel

The advantages of a parallel circuit can be illustrated by observing how long a flashlight will operate before the batteries fully discharge. To make the flashlight last twice as long, battery storage would have to be doubled.

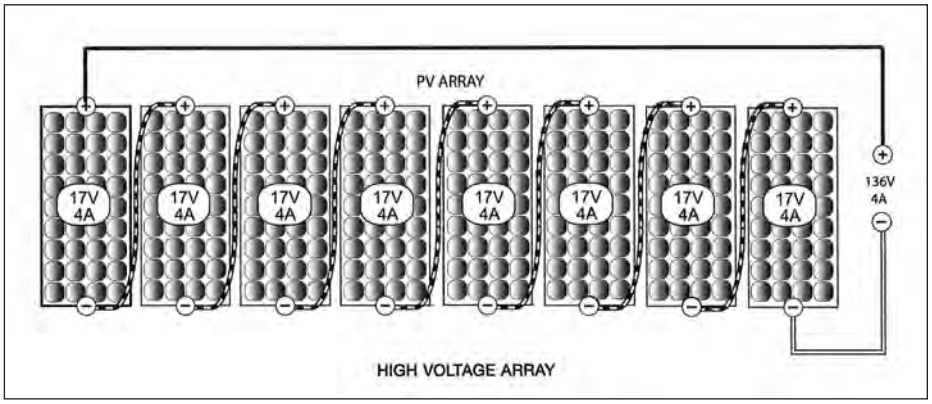
In the picture to the left, a series string of four batteries has been added in parallel to another string of four batteries to increase storage (amp-hours). The new string of batteries is wired in parallel, which increases the available amp-hours, thereby adding additional storage capacity and increasing the usage time. The second string could not be added in series because the total voltage would be 12 volts, which is not compatible with the 6-volt lamp.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

SERIES AND PARALLEL CIRCUITS IN POWER SOURCES CONTINUED

5. High Voltage PV Arrays

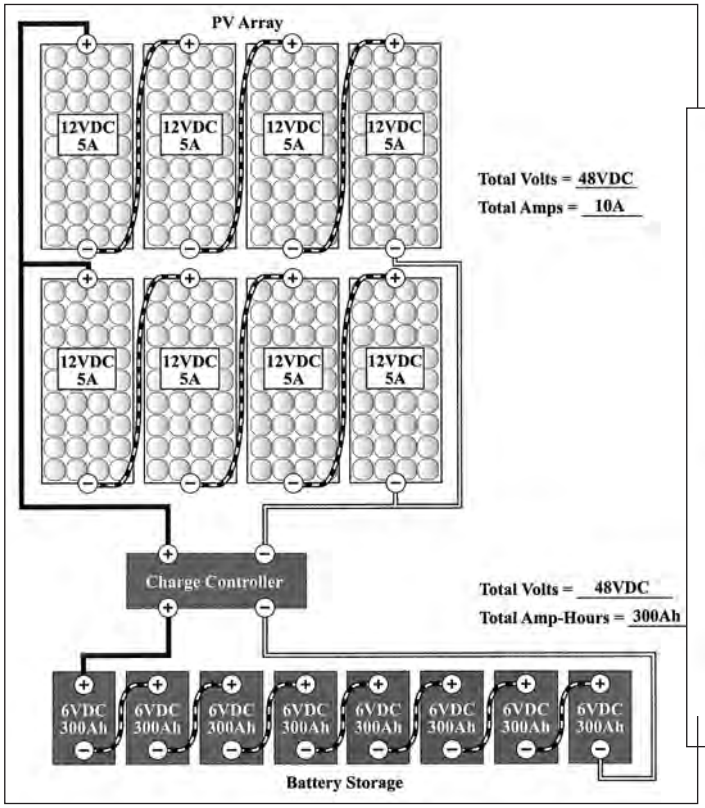
So far in this chapter, we have only discussed input voltages up to 24 V nominal. Today, most battery-less grid-tied inverters on the market require a high voltage DC input. This input window is generally in the range of 350 to 550 VDC. Because of the inverter's high voltage input requirements, PV modules must be wired together in series in order to sufficiently increase the voltage.



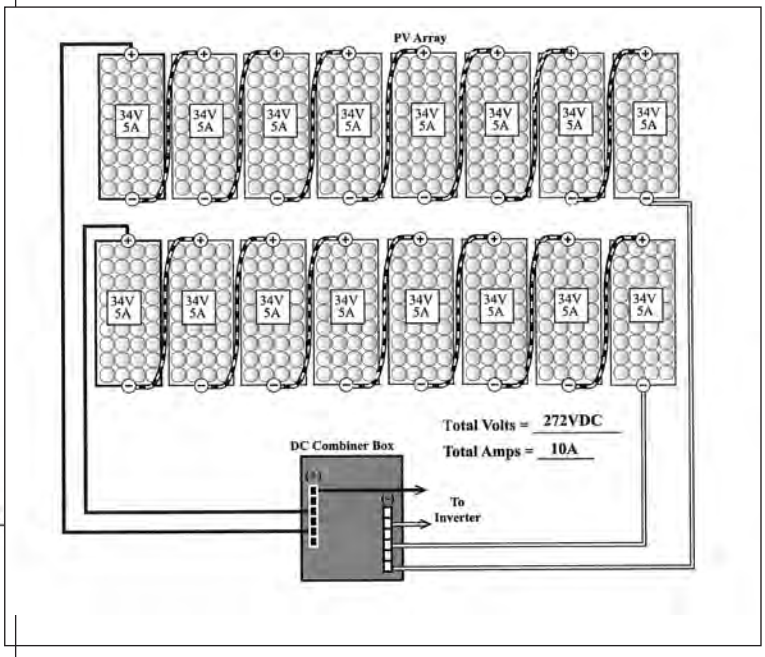
6. Series and Parallel Wiring Examples & Instructions

1. Connect the photovoltaic modules (array) either in series or parallel to get the desired system voltage.
2. Calculate total module output for volts and amps.
3. Connect the array to a charge controller.
4. Connect batteries either in series or parallel to get the desired system voltage.
5. Calculate total battery bank voltage and amp-hour capacity.
6. Connect the battery bank to the charge controller.

48V System with Eight 12V PV Modules



Grid-Tied System with 2 Series-Strings Using Sixteen 34 V PV Modules



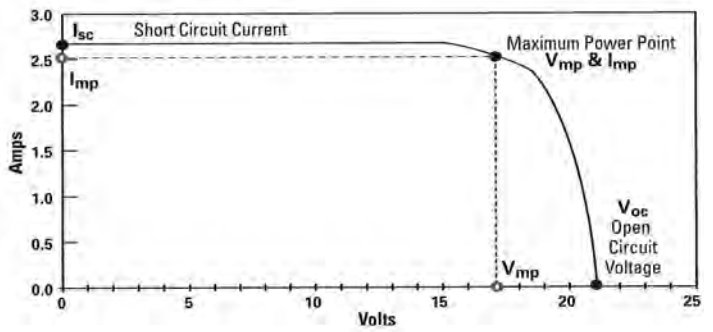
SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

MODULE PERFORMANCE

The total electrical power output (wattage) of a photovoltaic module is equal to its operating voltage multiplied by its operating current. Photovoltaic modules may produce current over a wide range of voltages. This is unlike voltage sources such as batteries, which produce current at a relatively constant voltage.

The output characteristics of any given module are characterized by a performance curve, called an I-V curve, that shows the relationship between current and voltage output. The chart shows a typical I-V curve. Voltage (V) is plotted along the horizontal axis. The current is plotted along the vertical axis. Most I-V curves are given for the standard test conditions (STC) of 1,000 watts per square meter irradiance (often referred to as one peak sun) and 25 °C (07 °F) cell temperature. It should be noted that STC represent the optimal conditions as a consistent means for measuring — rarely are these conditions recreated in outside environments. The IV curve contains three significant points:

- Maximum Power Point (both Vmp and Imp)
- Open Circuit Voltage (Voc)
- Short Circuit Current (Isc)



MODULE (Brand X) I-V CURVE (12 VDC NOMINAL)

1. Maximum Power Point (Vmp & Imp)

This point, labeled Vmp and Imp, is the operating point at which the maximum output will be produced by the module at operating conditions indicated for that curve. In other words, the Vmp and Imp of the module can be measured when the system is under load at 25 °C cell temperature and 1,000 watts per square meter. The voltage at the maximum power point can be determined by extending a vertical line from the curve downward to read a value on the horizontal voltage scale. The example in the chart above displays a voltage of approximately 17 volts at the maximum power (Vmp). The current at the maximum power point can be determined by extending a horizontal line from the curve to the left to read a value on the vertical current scale (Imp). The example above displays a current of approximately 2.5 amps at the maximum power.

The wattage at the maximum power point is determined by multiplying the voltage at maximum power by the current at maximum power. In the chart, the maximum wattage at STC would be approximately 43 watts. This power is represented by the rectangle under the curve.

The power output decreases as the voltage drops. Current and power output of most modules drops off as the voltage increases beyond the maximum power point.

2. Open Circuit Voltage (Voc)

This point, labeled Voc, is the maximum potential voltage achieved when no current is being drawn from the module. Since no current is flowing, the module experiences maximum electrical pressure. The example at left displays an open circuit voltage of approximately 21 volts. The power output at Voc is zero watts. Open Circuit Voltage can be measured in the field in several common circumstances. When buying a module, it is recommended to test the voltage to see if it matches the manufacturers specifications. When testing voltage with a digital multi-meter from the positive to the negative terminal, an open circuit is created by the meter which allows Voc to be measured. It is also common to see a module operating at Voc early in the morning and late in the evening.

3. Short Circuit Current (Isc)

This point, labeled Isc, is the maximum current output that can be reached by the module under the conditions of a circuit with no resistance or a short circuit. The example to the left displays a current of approximately 2.65 amps. The power output at Isc is zero watts. When first purchasing a module, it is recommended to test the short circuit current to see if it matches the specification sheet. The short circuit current can be measured only when making a direct short across the positive and negative terminals of a module. Creating a direct short across more than one module at a time (or a module with voltage greater than 24 V nominal) is not recommended and can be extremely dangerous. All Isc measurements should be taken when the module is not connected to other components in the system. Note: When testing modules with 'quickconnects' it is recommended to use test leads to avoid leaving carbon deposits (which cause high resistance) on the module's leads. Before testing amperage with a digital multi-meter, check to ensure the module's Isc does not exceed the meter's DC amperage rating and always use the appropriate personal protective equipment.

4. Specification Label

All of the values found on the I-V curve to the left are used to create a specification label for each module. All modules are rated under standard test conditions, thereby allowing their values to be compared. The specification label can be found on the back side of the module or through the manufacturer.

Module Brand X
Electrical Ratings at 1000 W/m²
AM 1.5, Cell Temp. 25 °C

Max Power:	43 W
Voc:	21.4 V
Vmp:	17.3 V
Isc	2.65 A
Imp:	2.5 A

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

DISCONNECTS

Each piece of equipment in a PV system, such as inverters, batteries, and charge controllers, must be able to be disconnected from all sources of power (NEC® 2011, Article 690.15). To comply with NEC® code, disconnects must satisfy the following items:

- They can be switches or circuit breakers.
- They need to be accessible.
- They must not have any exposed live parts.
- They must plainly indicate whether they are in the opened or closed position.
- They must be rated for the nominal system voltage and available current (NEC® 2011, Article 690.17)(4).

Circuit breakers designed in the system for overcurrent protection can be used as disconnects. Fuses are not considered disconnects unless they are switched fuses.

The total number of disconnecting devices a PV system can have must be six or fewer switches or circuit breakers to shut off all sources of power (NEC® 2011, Article 690.14(c)(4)). These six disconnects must be grouped together and grouped with other disconnecting means for the system (NEC® 2011, Article 690. 14(C)(5)). Refer to NEC® for proper labeling.

GROUNDING

The following list contains the NEC® definitions (NEC® 2011, Article 100) for the grounding terms you should be familiar with.

- **Grounded:** Connected to the earth or to some conducting body that serves as earth.
- **Grounded conductor:** Current carrying conductor that is grounded at one point. Conventionally the white wire.
- **Grounding conductor:** A conductor not normally carrying current used to connect the exposed metal portions of equipment or the grounded circuit to the grounding electrode system. Normally bare copper or green wire.
- **Grounding electrode conductor:** Bare copper wire connecting grounded conductor and/ or equipment grounding conductor to the grounding electrode.
- **Grounding electrode**: Usually a ground rod or bare metal well casing.
- **Ungrounded conductor:** Current carrying conductor not bonded with ground. Conventionally the red, positive wire on DC; conventionally black, any color besides white, gray, green, or bare copper on the AC side.

Why Ground?

The following is a list of the reasons to ground:

- To limit voltages due to lightning, line surges or unintentional contact with higher voltage lines.
- To stabilize voltages and provide a common reference point being the earth.
- To provide a path in order to facilitate the operation of overcurrent devices.

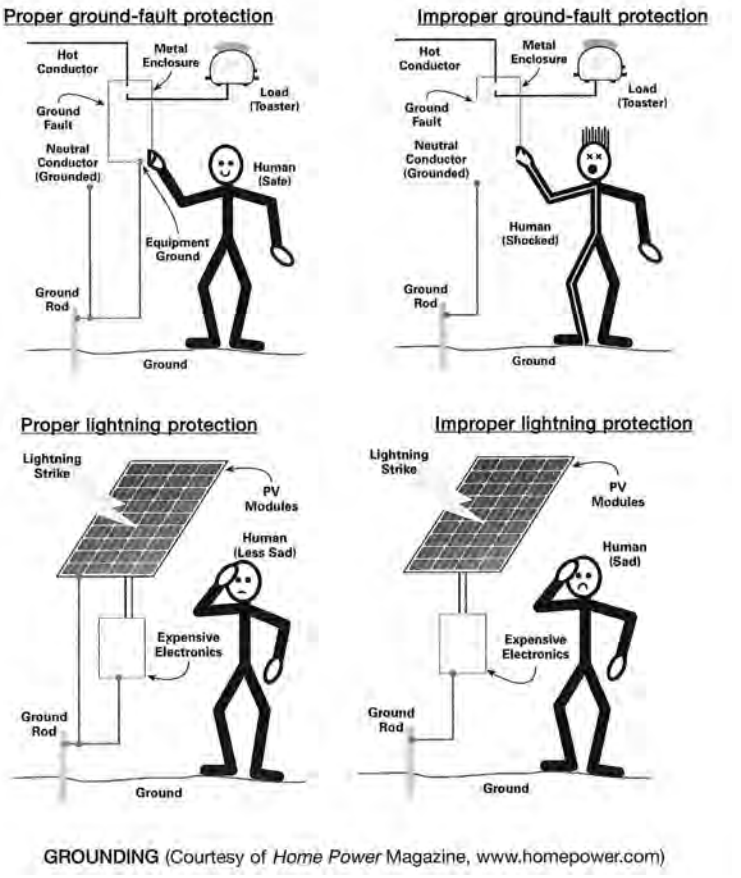
There are two specific ways to group a system: equipment grounding and system grounding. It is important to know the difference between the two. See next page for more info.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

GROUNDING CONTINUED

1. Equipment Grounding

Equipment grounding provides protection from shock caused by a ground fault and is required in all PV systems by the NEC®. A ground fault occurs when a current-carrying conductor comes into contact with the frame or chassis of an appliance or an electrical box. A person who touches the frame or chassis of the faulty appliance will complete the circuit and receive a shock. The frame or chassis of an appliance is deliberately wired to a grounding electrode by an equipment grounding wire through the grounding electrode conductor. The wire does not normally carry a current except in the event of a ground fault. The grounding wire must be continuous, connecting every non-current carrying metal part of the installation to ground. It must bond or connect to every metal electrical box, receptacle, equipment chassis, appliance frame, and photovoltaic panel mounting. The grounding wire is never fused, switched, or interrupted in any way. When metal conduit or armored cable is used, a separate equipment ground is not usually necessary since the conduit itself acts as the continuous conductor in lieu of the grounding wire. Grounding wires are still needed to connect appliance frames to the conduit.



GROUNDING (Courtesy of *Home Power* Magazine, www.homepower.com)

2. System Grounding

System grounding is taking one conductor from a two wire system and connecting it to ground. The NEC® requires this for all systems over 50 volts (NEC® 2011, Article 690.41). In a DC system, this means bonding the negative conductor to ground at one single point in the system (NEC® 2011, Article 690.42). Locating this grounding connection point as close as practical to the photovoltaic source better protects the system from voltage surges due to lightning (NEC® 2011, Article 690.42, FPN). In grounded systems, the negative becomes our grounded conductor and our positive becomes the ungrounded conductor. If you choose not to system ground a PV system under 50 volts, both conductors need to have overcurrent protection (NEC® 2011, Article 240.21), which is often more cumbersome and costly. Most PV installers simply choose to system ground even if the system operates under 50 volts.

3. Ground-fault Protection

Roof-mounted, DC PV arrays located on dwellings must be provided with DC ground-fault protection (NEC® 2011, Article 690.5). Many grid-tied inverters offer built-in ground fault protection. If a system is to be roof-mounted on a dwelling and the system is not using an inverter package with built-in ground-fault protection, ground fault protection must be wired in separately. Ground-fault protection isolates the grounded conductor (in DC, this is the negative wire) from ground under ground-fault conditions, as well as disconnecting the ungrounded conductor (the positive wire).

Size of Equipment Grounding Conductor

The size of the equipment grounding wire for the PV source circuits, such as the PV to battery wire run; or for grid-tied systems with no battery back up, the PV to inverter wire run, depends on whether or not the system has ground-fault protection.

If the system has ground-fault protection, the equipment grounding conductors can be as large as the current carrying conductors, the positive and negative wires, but not smaller than specified in NEC® 2011, Table 250.122. This table is based on the amperage rating of the overcurrent device protecting that circuit. For example, if the circuit breaker protecting the circuit is rated at or between 30 amps and 60 amps, you can use a #10 AWG copper equipment grounding wire. If the positive and negative conductors have been oversized for voltage drop, the equipment grounding wire also must be oversized proportionally (NEC® 2011, Article Proper ground-fault protection 250.122(b)). From the example in the Wire Sizing Exercise, you increase the necessary wire size from #6 AWG to #1/0 AWG to satisfy a 2% voltage drop requirement. Here you would have to increase your equipment grounding wire from #10 AWG to #4 AWG.

If the system does not have ground-fault protection, the equipment grounding wire must be sized to carry no less than 125% of the PV array short circuit current. For example, if your PV array has a short circuit current of 30 amps, the equipment grounding wire would have to be sized to handle at least 37.5 amps (30 amps X 1.25). Similar to the PV systems with ground-fault protection, if the positive and negative conductors have been oversized for voltage drop, the equipment grounding wire also must be oversized proportionally (NEC® 2005. Article 250.122(b)). From the example in the Wire Sizing Exercise, you increase the necessary wire size from #6 AWG to #1/0 AWG to satisfy a 2% voltage drop requirement. Here you would have to also increase the equipment grounding wire from #10 AWG to #4 AWG .

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

GROUNDING CONTINUED

Size of Grounding Electrode Conductor

The DC system grounding electrode conductor, which is the bare copper wire connecting grounded conductor (the negative wire) and/or equipment grounding conductor to the grounding electrode (the ground rod), cannot be smaller than #6 AWG aluminum or #8 AWG copper or the largest conductor supplied by the system (NEC® 2011, Article 250.166). Even though many PV systems have larger conductors in the system (for example, #4/0 inverter cables), they can use #6 AWG copper wire for the grounding electrode conductor if that is the only connection to the grounding electrode (NEC® 2011, Article 250.166(C)).

Grounding Electrodes

Because all PV systems must have equipment grounding, regardless of operating voltage, PV systems must be connected to a grounding electrode. This is usually done by attaching the equipment grounding wire to a ground rod, via a grounding electrode conductor. PV systems often have AC and DC circuits where both sides of the system can use the same grounding electrode. Some PV systems may have 2 grounding electrodes, which is often the case for pole mounted PV arrays. One electrode is for the AC system and one electrode is for the DC system at the array. If this is the case, these 2 grounding electrodes must be bonded together (NEC® 2011, Article 690.47) with a barrier separating the AC conductors from the DC conductors.

Miscellaneous Code Issues

Stand-alone systems must have a plaque or directory permanently installed in a visible area on the exterior of the building or structure used. This sign must indicate that the structure contains a stand-alone electrical power system, and the location of the system's means of disconnection (NEC® 2011, Article 690.56). Alternating current and direct current wiring may be used within the same system, although they may never be installed within the same conduit, or electrical enclosures without some type of physical barrier separating the AC conductors from the DC conductors.

WIRE SIZING CHART/FORMULA

This chart is useful for finding the correct wire size for any voltage, length, or amperage flow in any AC or DC circuit. For most DC circuits, particularly between the PV modules and the batteries, we try to keep the voltage drop to 3% or less. There's no sense using your expensive PV wattage to heat wires. You want that power in your batteries!

Note: This formula doesn't directly yield a wire gauge size, but rather a "VDI" number, which is then compared to the nearest number in the VDI column, and then read across to the wire gauge size column.

1. Calculate the Voltage Drop Index (VDI) using the following formula:

VDI = AMPS x FEET ÷ (% VOLT DROP x VOLTAGE)

- **Amps = Watts divided by volts**
- **Feet = One-way wire distance**
- **% Volt Drop = Percentage of voltage drop acceptable for this circuit (typically 2% to 5%)**

2. Determine the appropriate wire size from the chart below.

- Take the VDI number you just calculated and find the nearest number in the VDI column, then read to the left for AWG wire gauge size.
- Be sure that your circuit amperage does not exceed the figure in the Ampacity column for that wire size. (This is not usually a problem in low-voltage circuits).

Example: *Your PV array consisting of four 75W modules is 60 feet from your 12-volt battery. This is actual wiring distance, up pole mounts, around obstacles, etc. These modules are rated at 4.4 amps x 4 modules = 17.6 amps maximum. We'll shoot for a 3% voltage drop. So our formula looks like:*

$$\text{VDI} = \frac{17.6 \times 60}{3[\%] \times 12[\text{V}]} = 29.3$$

Looking at our chart, a VDI of 29 means we'd better use #2 wire in copper, or #0 wire in aluminum. Hmmm. Pretty big wire.

What if this system was 24-volt? The modules would be wired in series so each pair of modules would produce 4.4 amps.
Two pairs x 4.4 amps = 8.8 amps max.

Wire Size	*Copper Wire*		*Aluminum Wire*	
AWG	*VDI*	*Ampacity*	*VDI*	*Ampacity*
0000	*99*	*260*	*62*	*205*
000	*78*	*225*	*49*	*175*
00	*62*	*195*	*39*	*150*
0	*49*	*170*	*31*	*135*
2	*31*	*130*	*20*	*100*
4	*20*	*95*	*12*	*75*
6	*12*	*75*	●	●
8	*8*	*55*	●	●
10	*5*	*30*	●	●
12	*3*	*20*	●	●
14	*2*	*15*	●	●
16	*1*	●	●	●

Chart developed by John Davey and Windy Dankoff. Used with permission.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

MAXIMUM AMPACITIES FOR WIRE

The table below displays approved ampacities of wires in conduit, raceway, cable or directly buried, based on ambient temperature of 30 °C (86 °F). The NEC code allows rounding up cable ampacity to next size standard fuse or breaker.

Wire Size	Copper Conductor Temp. Rating		Aluminum Cond. Temp. Rating	
	75 °C (167 °F)	90 °C (194 °F)	75 °C (167 °F)	90 °C (194 °F)
*14	20	25	●	●
*12	25	30	20	25
*10	35	40	30	35
8	50	55	40	45
6	65	75	50	60
4	85	95	65	75
2	115	130	90	100
1	130	150	100	115
1/0	150	170	120	135
2/0	175	195	135	150
3/0	200	225	155	175
4/0	230	260	180	205

The overcurrent protection device may not exceed 30A for 10 AWG wire, 20 A for 12 AWG wire and 15 A for 14 AWG wire.

Temperature Range		75 °F Insulation	90 °F Insulation
31-35 °C	87-95 °F	0.94	0.96
36-40 °C	96-104 °F	0.88	0.91
41-45 °C	105-113 °F	0.82	0.87
46-50 °C	114-122 °F	0.75	0.82
51-55 °C	123-131 °F	0.67	0.76
56-60 °C	132-140 °F	0.58	0.71

For ambient temperatures above 30 °C (86 °F), multiply the approved ampacities at left by the correction factor listed under the insulation temperature rating above.

Inverter Voltage	Continuous Watts	Max Inverter Input Amps	Fuse Size (Amps)	Circuit Breaker (Amps)	Wire Size AWG
12-Volt	600	80	80	80	2
	800	107	110	110	2
	1000	134	200	175	2/0
	1500	200	300	250	4/0
	2400	320	400	250	4/0
	2500	334	400	250	4/0
	2800	382	400	250	4/0
	3000	400	400	250	4/0
24-Volt	600	40	50	50	8
	800	54	75	75	4
	1000	67	80	100	2
	1500	100	110	110	2/0
	2400	160	200	175	2/0
	2500	167	200	175	2/0
	3000	200	300	250	4/0
	3500	230	300	250	4/0
	4000	265	300	250	4/0
48-Volt	3000	76	110	110	2/0
	3600	90	110	110	2/0
	4000	148	200	175	2/0
	5500	185	400	250	4/0

Recommended Inverter Cable and Overcurrent Protection

The table at left will help you choose your cable size and fuse or breaker size for a common inverter. Larger cables may be necessary if the distance from the inverter to the battery is greater than 10 feet (not recommended).

WIRE LOSS TABLES - 12 V

Maximum distance one-way in feet of various gauges of two-conductor copper wire from power to source.

12-VOLT SYSTEM - 2% VOLTAGE DROP

AMPS	#14	#12	#10	#8	#6	#4	#2	1/0	2/0	4/0
1	45	70	115	180	290	456	720	●	●	●
2	22.5	35	57.5	90	145	228	360	580	720	1060
4	10	17.5	27.5	45	72.5	114	180	290	360	580
6	7.5	12	17.5	30	47.5	75	120	193	243	380
8	5.5	8.5	15	22.5	35.5	57	90	145	180	290
10	4.5	7	12	18	28.5	45.5	72.5	115	145	230
15	3	4.5	7	12	19	30	48	76.5	96	150
20	2	3.5	5.5	9	14.5	22.5	36	57.5	72.5	116
25	1.8	2.8	4.5	7	11.5	18	29	46	58	92
30	1.5	2.3	3.5	6	9.5	15	24	38.5	48.5	77
40	●	●	2.8	4.5	7	11.5	18	29	36	56
50	●	●	2.3	3.6	5.5	9	14.5	23	29	46
100	●	●	●	●	2.9	4.6	7.2	11.5	14.5	23
150	●	●	●	●	●	●	4.8	7.7	9.7	15
200	●	●	●	●	●	●	3.6	5.8	7.3	11

WIRE LOSS TABLES CONTINUED - 24 V, 48 V AND 120 V

Maximum distance one-way in feet of various gauges of two-conductor copper wire from power to source.

24-VOLT SYSTEM - 2% VOLTAGE DROP

AMPS	#14	#12	#10	#8	#6	#4	#2	1/0	2/0	4/0
1	90	140	230	360	580	912	1440	●	●	●
2	45	70	115	180	290	456	720	1160	1440	2120
4	20	35	55	90	145	228	360	580	720	1160
6	15	24	35	60	95	150	240	386	486	760
8	11	17	24	45	71	114	180	290	360	580
10	9	14	17	36	57	91	145	230	290	460
15	6	9	14	24	38	60	96	153	192	300
20	4	7	9	18	29	45	72	115	145	232
25	3.6	5.6	7	14	23	36	58	92	116	184
30	3	4.8	5.6	12	19	30	48	77	97	154
40	●	●	4.8	9	14	23	36	58	72	112
50	●	●	●	7.2	11	18	29	46	58	92
100	●	●	●	●	5.8	9.2	14.4	23	29	46
150	●	●	●	●	●	●	9.6	15.4	19.4	30
200	●	●	●	●	●	●	7.2	11.6	14.6	22

48-VOLT SYSTEM - 2% VOLTAGE DROP

AMPS	#14	#12	#10	#8	#6	#4	#2	1/0	2/0	4/0
1	180	280	460	720	1160	1824	2880	●	●	●
2	90	140	230	360	580	912	1440	2320	2880	4240
4	40	70	110	180	290	456	720	1160	1440	2320
6	30	48	70	120	190	300	480	772	972	1520
8	22	34	60	90	142	228	360	580	720	1160
10	18	28	48	72	114	182	290	460	580	920
15	12	18	28	48	76	120	192	306	384	600
20	8	14	22	36	58	90	144	230	290	464
25	7.2	11.2	18	28	46	72	116	184	232	368
30	6	9.6	14	24	38	60	96	154	194	308
40	●	●	11.2	18	28	46	72	116	144	224
50	●	●	9.2	14.4	22	36	58	92	116	184
100	●	●	●	●	11.6	18.4	28.8	46	58	92
150	●	●	●	●	●	●	19.2	30.8	38.8	60
200	●	●	●	●	●	●	14.4	23.2	29.2	44

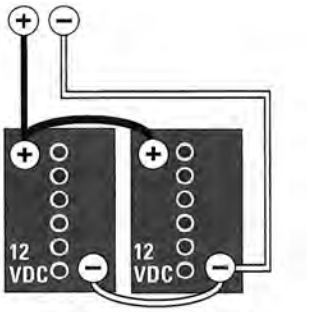
120-VOLT SYSTEM - 2% VOLTAGE DROP

AMPS	#14	#12	#10	#8	#6	#4	#2	1/0	2/0	4/0
1	450	700	1150	1800	2900	4560	7200	0	0	0
2	225	350	575	900	1450	2280	3600	5800	7200	10600
4	100	175	275	450	725	1140	1800	2900	3600	5800
6	75	120	175	300	475	750	1200	1930	2430	3800
8	55	85	150	225	355	570	900	1450	1800	2900
10	45	70	120	180	285	455	725	1150	1450	2300
15	30	45	70	120	190	300	480	765	960	1500
20	20	35	55	90	145	225	360	575	725	1160
25	18	28	45	70	115	180	290	460	580	920
30	15	24	35	60	95	150	240	385	485	770
40	●	●	28	45	70	115	180	290	360	560
50	●	●	23	36	55	90	145	230	290	460
100	●	●	●	18	29	46	72	115	145	230
150	●	●	●	●	●	●	48	77	97	150
200	●	●	●	●	●	●	36	58	73	110

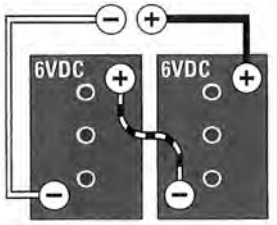
BATTERY WIRING CONFIGURATION

Batteries need to be configured to obtain the desired voltage and amp-hours. Using the design and battery parameters from the example, we can clearly see how a system's batteries should be configured and wired. Two separate six-volt batteries rated at 200 Ah each are wired in series to obtain 12 V direct current and 200 Ah. Two of these series strings are wired in with 12-volt batteries in parallel to achieve 12 V direct current and 400 Ah.

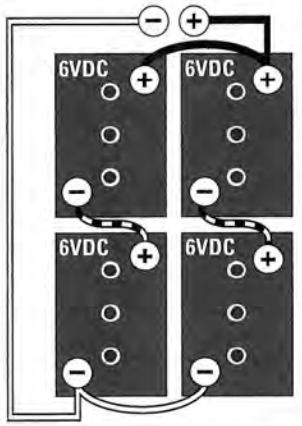
Note: To create an equal path length for electron flow through the batteries, you must wire into opposite sides of the battery bank keeping the cables equal length.



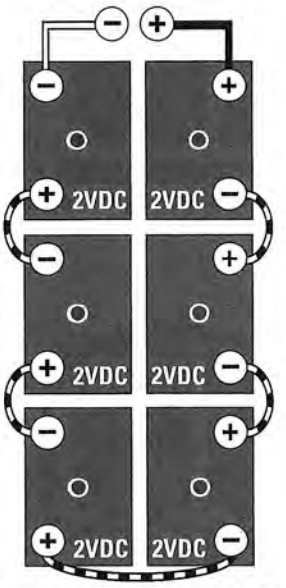
12-VOLT CONFIGURATION
with 12-volt batteries in *parallel*



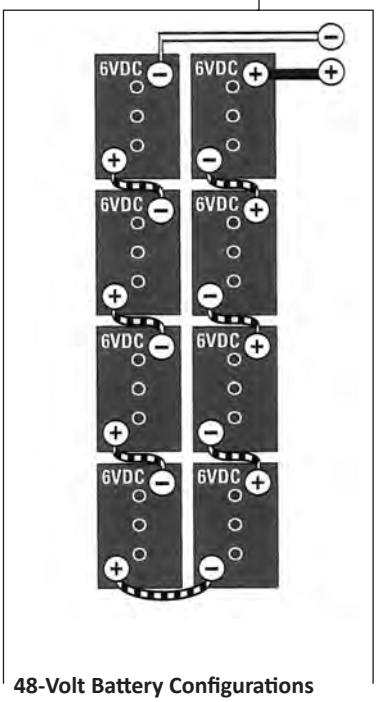
12-VOLT CONFIGURATION
with 6-volt batteries in *series*



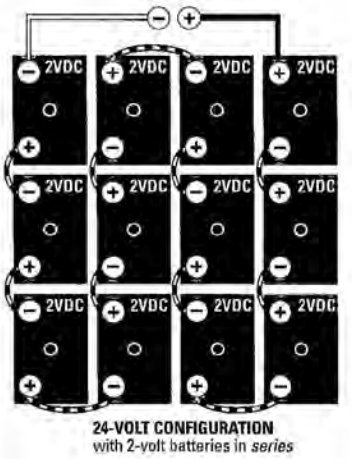
12-VOLT CONFIGURATION
with 6-volt batteries in *series/parallel*



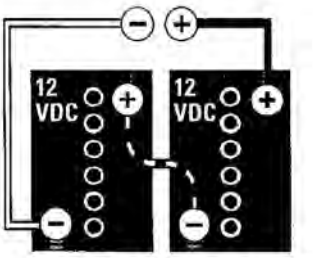
12-VOLT CONFIGURATION
with 2-volt batteries in *series*



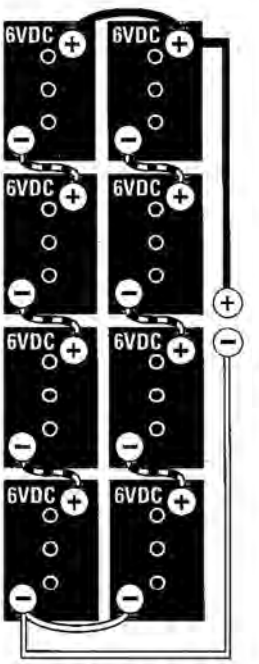
48-Volt Battery Configurations



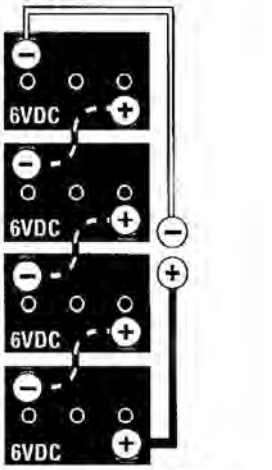
24-VOLT CONFIGURATION
with 2-volt batteries in *series*



24-VOLT CONFIGURATION



24-VOLT CONFIGURATION
with 6-volt batteries in *series/parallel*



24-VOLT CONFIGURATION
with 6-volt batteries in *series*

12-Volt Battery Configurations

24-Volt Battery Configurations

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

BATTERY SIZING EXERCISE

Problem:

Use the table below to specify a battery bank for the following photovoltaic system. The occupants of a remote home near Ojai, California are designing a photovoltaic system to meet their 1,080 watt hours per day AC electrical load. They have decided on a 12-volt direct current system and feel they need two days of autonomy. The maximum depth of discharge they desire over that two-day period is 50 percent. The occupants have tentatively selected the Model A battery from XYZ Manufacturer, a 6-volt battery rated at 200 amp hours. The occupants will keep the battery(s) in a conditioned space that will be maintained at 77 °F.

Battery Sizing Worksheet

AC Average Daily Load	÷	Inverter Efficiency	+	DC Average Daily Load	÷	DC System Voltage	=	Average Amp-hours/ Day
[(	÷		) +		] ÷		=	
Average Amp-hours/day	x	Days of Autonomy	÷	Discharge Limit	÷	Battery AH Capacity	=	Batteries in Parallel
	x		÷		÷		=	
DC System Voltage	÷	Battery Voltage	=	Batteries in Series	x	Batteries in Parallel	=	Total Batteries
	÷		=		x		=	
Battery Specification			**Make:**			**Model:**		

Solution

1. To start, de-rate for inverter efficiency by dividing the AC Average Daily Load (1,080 watts) by the standard inverter efficiency figure (90% or 0.9).

2. Multiply the resulting Average Amp-Hours/Day (100) by the Days of Autonomy (2) and divide by the Discharge Limit or DOD (50% or 0.5) and divide again by the Battery Ah Capacity for the specified battery (200). The resulting figure is the number of batteries in parallel (2).

3. Next determine the number of batteries needed to achieve the system voltage by dividing the DC System Voltage (12) by the Battery Voltage (6). Then multiply this number (2) by the number of batteries in parallel (2) to determine the Total Batteries needed (4).

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

PV SYSTEM INSTALLATIONS FINAL CHECKLISTS

This section contains a system installation checklist that can be used as a final check for a newly installed system or as a maintenance assessment for an existing system. For additional reference material on system installation checklists, refer to NABCEP's "PV Installers Task Analysis" (available on their website: www.nabcep.org).

Before Testing the System

- ☐ Use proper safety procedures and equipment when working with electricity.
- ☐ Verify that all disconnects are locked in the open position with a warning label. (This insures that power can not travel further down the line until properly tested, and warns others that there may be live conductors in the box).

PV Array

- ☐ Make sure all modules are attached securely to their mounting brackets.
- ☐ Visually inspect the array for cracked modules, damaged junction boxes, and loose wires.
- ☐ Visually inspect that all module 'quickconnects' are tight.
- ☐ Open each combiner box and test open circuit voltage on each series string to verify correct voltage and polarity. Recheck torque on all DC terminals.
- ☐ Before powering up the system, at final array breakers, repeat open circuit voltage tests to verify correct voltage and polarity.
- ☐ Verify modules are wired so that they can be removed without interrupting the grounded conductor.
- ☐ Check for labels on the modules. NEC® 2005, Article 690.51: "Modules shall be marked with identification of terminals or leads as to polarity, maximum overcurrent device rating for protection, and with rated 1) open-circuit voltage, 2) operating voltage, 3) maximum permissible system voltage, 4) operating current, 5) short-circuit current, and 6) maximum power." See NEC® 2005, Article 690.52 for AC module requirements.

Wiring

- ☐ Check exposed array wiring for correct rating and sunlight resistant insulation.
- ☐ Check that all wiring and conduit is appropriately rated, neat, and well supported.
- ☐ Check that strain reliefs/cable clamps are properly installed on all cables and cords by pulling on cables to verify (NEC® 2005, Article 300.4, and Article 400.10).
- ☐ Make sure that all grounded conductors are white and equipment grounding conductors are green or bare (NEC® 2005, Article 200.6(A)).
- ☐ Verify that the conductor rating of the PV circuit is at least 156% of the rated short circuit current (1250/0 X 1250/0 = 1560/0).
- ☐ Verify that all junction boxes are accessible.

Page 1

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

Overcurrent Protection

- ☐ Verify that the overcurrent device rating of the PV circuit is at least 156% of the rated short circuit current (125% X 1250/0 = 156%).
- ☐ Make sure DC voltage and current ratings are clearly marked on overcurrent protection.

Charge Controllers

- ☐ Torque all terminations again.
- ☐ Check that all voltage settings are properly set for the appropriate battery type and proper voltage.
- ☐ If the system is connected to a utility interactive inverter, make sure that the settings of the charge controller(s) do not interfere with the proper operation and dispatch of the inverter system.
- ☐ Verify that charge controller operation matches the programmed settings by forcing the system to the set points and making sure that the unit performs the proper control function. You should test the following points:

  - **Low voltage disconnect (LVD)**
  - **Low voltage reconnect (LVR)**
  - **High voltage disconnect (HVD)**
  - **High voltage reconnect (HVR)**

Disconnects

- ☐ Verify that the disconnects are still locked open and the warning label is still intact.
- ☐ Verify that there are means to disconnect and isolate all pieces of equipment in the system.
- ☐ If fuses are used, verify means to disconnect the power from both ends.
- ☐ Ensure switches are accessible and clearly labeled.
- ☐ Check the continuity of fuses and circuit breakers with power off.
- ☐ Check voltage drop across switches while operating.
- ☐ Check individual cell or battery voltages after equalization.
- ☐ Check the specific gravity of all questionable cells with a hydrometer.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

PV SYSTEM INSTALLATIONS FINAL CHECKLISTS CONTINUED

Batteries

- ☐ Store safety gear nearby (eye protection, rubber gloves, baking soda and distilled water).
- ☐ Retorque all battery connections.
- ☐ Coat each terminal with anticorrosive gel.
- ☐ Make sure that access to terminals is limited (NEC® 2005, Article 690.71(B)).
- ☐ Make sure that location provides adequate natural ventilation. Well-vented areas include garages, basements, and outbuildings, but not living areas.
- ☐ If battery contains flooded cells, top off cells with distilled water according to the manufacturers instructions.
- ☐ If battery contains flooded cells, be sure an eyewash station is accessible.
- ☐ Once inverter is operational, "equalize charge" the battery to ensure that the battery is properly connected and functioning correctly.
- ☐ Ideally, run the battery through a few heavy charge-discharge cycles to exercise the battery.

Inverters in Grid-tied Systems

- ☐ While disconnects are open, retorque all electrical terminal connections on the inverter to tighten any connections that may have loosened since the initial installation.
- ☐ Verify in the inverter manual that the array open circuit voltage, under the record lowest temperature, is acceptable to the inverter.
- ☐ Check utility line voltage to verify that it is within the proper tolerances for inverter. If line voltage is above 124 volts AC before starting inverter, verify that the maximum voltage drop for the inverter output circuit is less than two volts.
- ☐ If the inverter measures and reports utility or inverter AC voltage on a display, verify that this voltage agrees with a measurement from a high quality, true-RMS AC volt meter.
- ☐ For non-battery-based inverters, once the inverter has started and is operational, check that the maximum power point tracking (MPPT) circuit is operating. This should be done during clear sky conditions if possible by monitoring array voltage from the open circuit condition until it reaches a point where system power peaks and then starts to drop again. Keep monitoring voltage until you note that the system voltage has been adjusted up and down several times.
- ☐ Verify that the operating voltage is near the expected peak power voltage for the conditions of the test, this can be found in most manufacturers literature.
- ☐ Properly connect the temperature compensation probe to control battery voltage.
- ☐ Follow inverter-starting procedure from the manufacturer's manual.
- ☐ Instruct the homeowner on what to do in the event of an inverter-failure and provide them with an initial start-up test report.

SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

Inverters in Battery-based Systems

- ☐ While disconnects are open, retorque all electrical terminal connections on the inverter to tighten any connections that may have loosened since the initial installation.
- ☐ For battery-based inverters, use the programming features of the inverter to charge the battery, and then connect the battery to the DC source to ensure that these functions are operating properly.
- ☐ Follow inverter-starting procedure from the manufacturer's manual.
- ☐ Instruct the homeowner on what to do in the event of an inverter failure and provide them with an initial start-up test report.

Grounding

- ☐ Verify that only one connection in the DC circuits and one connection in the AC circuits (grounded conductor to grounding conductor) is being used for system grounding referenced to the same point (NEC® 2005, Article 250.21).
- ☐ Check to see that equipment grounding conductors and system grounding conductors have as short a distance as possible to ground.
- ☐ Check that non-current carrying metal parts are grounded properly (array frames, racks, metal boxes, etc).
- ☐ Incorporate ground fault protection on systems required by the NEC®.

  Note: Terminal lugs bolted on an enclosure's finished surface may be insulated because paint/finish at point of contact has not been properly removed.
- ☐ Check resistance of grounding system to earth ground. NEC® allows 25 ohms or less.
- ☐ Verify that the equipment grounding conductor is a green or bare wire and is properly sized.

Safety Labels

- ☐ Label any fuse or breaker that can be energized in either direction (NEC 2011, Article 690.17)
- ☐ Post an "Interactive Point of Connection" label for interactive PC systems (NEC 2011, Article 690.54)
- ☐ Place a label at the point of PC system disconnect listing: rated maximum power point current, rated maximum power point voltage, maximum system voltage, short-circuit current, maximum rated output current of the charge controller (if installed) (NEC 2011, Article 690.53)
- ☐ Label all exposed raceways, wiring methods, covers of enclosures, pull boxes, junction boxes and conduit bodies - every 10 feet - on every section of the wiring system within 1 foot of turns and bends and within 1 foot above or below penetrations that is separated by enclosures, walls, partitions, ceilings or floors with the wording "Photovoltaic Power Source". (NEC 2011, Article 690.31(E)(3) and (E)(4) and IFC 2012 Article 605.11.1.4) NOTE: IFC requires that this label be reflective with 3/8" tall characters.
- ☐ Label each photovoltaic system disconnecting means to identify it as a PV system disconnect. (NEC 2011, Article 690.14(C)(2) and IFC 2012, Article 605.11.3)
- ☐ Label each disconnecting means if the disconnecting means is energized from more than one source. The disconnecting means shall be grouped and identified. (NEC 2011, Article 690.15)
- ☐ Place a label on equipment containing over current devices in circuits supplying power to a busbar or conductor supplied from multiple sources. Dual power source and backfed labels per (NEC 2011, Article 705.12(D)(4)).
- ☐ Place a "No Smoking" sign near the batteries.
- ☐ Provide any additional documentation that would be helpful to the homeowner, inspector, or fire officials per (NEC 2011, Article 690.4(H),690.14(D)(4),690.16(B) and or 690.56(A)(B)).

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SOURCE: "PHOTOVOLTAICS- DESIGN AND INSTALLATION MANUAL" SOLAR ENERGY INTERNATIONAL.

Glossary

-A-

Absorbed glass mat (AGM): A fibrous silica glass mat to suspend the electrolyte in batteries. This mat provides pockets that assist in the recombination of gasses generated during charging back into water.

Air mass: (Sometimes called air mass ratio) — Equal to the cosine of the zenith angle-that angle from directly overhead to a line intersecting the sun. The air mass is an indication of the length of the path solar radiation travels through the atmosphere. An air mass of 1.0 means the sun is directly overhead and the radiation travels through one atmosphere (thickness).

Alternating current (AC): Electric current in which the direction of flow is reversed at frequent intervals, usually 100 or 120 times per second (50 or 60 cycles per second or 50/60 Hz).

Altitude: The angle between the horizon (a horizontal plane) and the sun's position in the sky. Measured in degrees.

Amorphous silicon: A non-crystalline semiconductor material that is often used in thin-film photovoltaic modules.

Ampere (A) or amp: Unit for the electric current; the flow of electrons. One amp is 1 coulomb passing in one second. One amp is produced by an electric force of 1 volt acting across a resistance of 1 ohm. Sometimes this is abbreviated as I for intensity.

Ampere-hour (Ah): Quantity of electrical energy equal to the flow of one ampere of current for one hour. Typically used to quantify battery bank capacity.

Angle of incidence: Angle which references the sun's radiation striking a surface. A "normal" angle of incidence refers to the sun striking a surface at a 90° angle.

Array: Any number of photovoltaic modules connected together to provide a single electrical output at a specified voltage. Arrays are often designed to produce significant amounts of electricity.

Avoided cost: The minimum amount an electric utility is required to pay an independent power producer, under the PURPA regulations of 1978, equal to the costs the utility calculates it avoids in not having to produce that power (usually substantially less than the retail price charged by the utility for power it sells to customers).

Azimuth: Angle between true south and the point directly below the location of the sun. Measured in degrees east or west of true south in northern latitudes.

-B-

Balance of system (BOS): All system components and costs other than the PV modules.

Battery: Two or more "cells" electrically connected for storing electrical energy. Common usage permits this designation to be applied also to a single cell used independently, as in a flashlight battery.

Battery capacity: The total number of ampere-hours that can be withdrawn from a fully charged cell or battery.

Battery cell: A galvanic cell for storage of electrical energy. This cell, after being discharged, may be restored to a fully charged condition by an electric current.

Battery cycle life: Number of discharge-charge cycles that a battery can tolerate under specified conditions before it fails to meet specified criteria as to performance (e.g., capacity decreases to 80% of the nominal capacity).

Battery self-discharge: The rate at which a battery, without a load, will lose its charge.

Battery state of charge: Percentage of full charge or 100 percent minus the depth of discharge.

Blocking diode: A semiconductor device connected in series with a PV module and a storage battery to prevent a reverse current discharge of the battery through the module when there is no output, or low output from the cells. When connected in series to a PV string, it protects its modules from a reverse power flow preventing against the risk of thermal destruction of solar cells.

Bypass diode: A diode connected across one or more solar cells in a photovoltaic module such that the diode will conduct if the cell(s) become reverse biased. Alternatively, a diode connected anti-parallel across a part of the solar cells of a PV module. It protects these solar cells from thermal destruction in case of total or partial shading of individual solar cells while other cells are exposed to full light.

-C-

Cell: The basic unit of a photovoltaic module. This word is also commonly used to describe the basic unit of batteries (ie. a 6-volt battery has (3) 2-volt cells).

Charge controller: A device that controls the charging rate and/or state of charge for batteries.

Charge rate: The current applied to a cell or battery to restore its available capacity.

Concentrator: A PV module that uses optical elements to increase the amount of sunlight incident on a PV cell. Concentrating arrays must track the sun and use only the direct sunlight because the diffuse portion cannot be focused onto the PV cells.

Conversion efficiency: The ratio of the electric energy produced by a photovoltaic device (under full sun conditions) to the energy from sunlight incident upon the cell.

Crystalline silicon: A type of PV cell made from a single crystal or polycrystalline slice of silicon.

Current: The flow of electric charge in a conductor between two points having a difference in potential (voltage).

Current at maximum power (Imp): The current at which maximum power is available from a module. [UL 1703]

Cycle life: ***See 'Battery Cycle Life.'***

-D-

Days of autonomy: The number of consecutive days a stand-alone system battery bank will meet a defined load without solar energy input.

DC to DC converter: Electronic circuit to convert DC voltages (e.g., PV module voltage) into other levels (e.g., load voltage). Can be part of a maximum power point tracker (MPPT).

Deep cycle battery: Type of battery that can be discharged to a large fraction of capacity many times without damaging the battery.

Demand Load: The total power required by a facility.

Depth of discharge (DOD): The amount of ampere hours removed from a fully charged cell or battery. Expressed as a percentage of rated capacity.

Diode: Electronic component that allows current flow in one direction only.

Direct current (DC): Electric current in which electrons flow in one direction only. Opposite of alternating current.

Discharge rate: The rate, usually expressed in amperes over time, at which electrical current is taken from the battery.

Disconnect: Switch gear used to connect or disconnect components of a PV system for safety or service.

Dual-axis tracking: A system capable of rotating independently about two axes and following the sun's orientation and height in the sky (e.g., vertical and horizontal).

Duty cycle: The ratio of active time to total time. Used to describe the

operating regime of appliances or loads.

-E-

Efficiency: The ratio of output power to input power. Expressed as a %.

Electric current: A flow of electricity.

Electrical grid: An integrated system of electricity distribution, usually covering a large area.

Electrolyte: A liquid conductor of electricity in which flow of current takes place by migration of ions. The electrolyte for a lead-acid storage cell is an aqueous solution of sulfuric acid.

Energy: The ability to do work. Stored energy becomes working energy when we use it.

Equalization: The process of mixing the electrolyte in batteries by periodically overcharging the batteries for a short period to "refresh" cell capacity.

-F-

Float charge: Float charge is the voltage required to counteract the self-discharge of a battery at a certain temperature.

Float life: Number of years a battery can keep its stated capacity when it is kept at float charge.

-G-

Gassing current: Portion of charge current that goes into electrolytical production of hydrogen and oxygen from the electrolytic liquid in the battery. This current increases with increasing voltage and temperature.

Gel-type battery: Lead-acid battery in which the electrolyte is composed of a silica gel matrix.

Gigawatt (GW): One billion watts. One million kilowatts. One thousand megawatts.

Grid-connected /Grid-Interaction /Grid-Tied: A PV system in which the PV array acts like a central generating plant, supplying power to the grid.

Grid-interactive: ***See 'grid-connected (PV system).'***

-H-

Hybrid system: A PV system that includes other sources of electricity generation, such as wind, fossil fuel generators, or batteries.

-I-

Insolation: Sunlight, direct or diffuse. From incident solar radiation: usually expressed in watts per square meter. Not to be confused with 'insulation'.

Interconnect: A conductor within a module or other means of connection which provides an electrical interconnection between the solar cells.

Inverters: Devices that convert DC electricity into AC electricity (single or multiphase). Either for stand-alone systems (not connected to the grid) or for utility-interactive systems.

I-V curve: A graphical presentation of the current versus the voltage from a photovoltaic device as the load is increased from the short circuit (maximum current) condition to the open circuit (maximum voltage) condition. Typically measured at 1,000 watts per square meter of solar insolation at a specific cell temperature. The shape of the curve characterizes cell performance.

-J-

Junction box: An electrical box designed to be a safe enclosure in which to make proper electrical connections. On PV modules, this is where PV strings are electrically connected.

-K-

Kilowatt (kW): 1,000 watts.

Kilowatt-hour (kWh): One thousand watt hours. The kWh is a unit of energy. 1 kWh = 3,600 kJ.

-L

Life cycle cost: An estimate of the cost of owning and operating a system for the period of its useful life. Usually expressed in terms of the present value of all lifetime costs.

Load: Anything in an electrical circuit that, when the circuit is turned on, draws power from that circuit.

-M

Maximum power point (MPP): The point on the current-voltage (I-V) curve of a module under illumination, where the product of current and voltage is maximum. For a typical silicon cell, this is at about 0.45 V.

Maximum power point tracker (MPPT): Means of a power conditioning unit that automatically operates the PV generator at its MPP under all conditions.

Megawatt (MW): One million watts. One thousand kilowatts.

Module: See 'photovoltaic module'.

Monocrystalline: A material that is composed of a single crystal.

Multicrystalline: Material that is solidified at such a rate that many small crystals (crystallites) form. The atoms within single crystallites are symmetrically arranged, whereas crystallites are jumbled together. These numerous grain boundaries reduce the device efficiency. A material composed of variously oriented, small individual crystals. (Sometimes referred to as polycrystalline or semicrystalline).

-N-

NEC: An abbreviation for the National Electrical Code® which contains safety guidelines and required practices for all types of electrical installations.

Nominal operating cell temperature (NOCT): The reference cell (module) operating temperature presented on manufacturers literature. Generally, the NOCT is referenced at 25°C, 77°F.

Nominal voltage: A reference voltage used to describe batteries, modules, or systems (ie. a 12-, 24-,or 48-volt battery, module or system).

-O-

Ohm: The unit of resistance to the flow of an electric current.

Open-circuit voltage (Voc): The maximum possible voltage across a photovoltaic cell or module; the voltage across the cell in sunlight when no current is flowing.

Orientation: Placement according to the compass directions - north, south, east, west.

-P-

Parallel connection: A way of joining two or more electricity-producing devices such as PV cells or modules, or batteries by connecting positive leads together and negative leads together; such a configuration increases the current but the voltage is constant.

Peak load; peak demand: The maximum load, or usage, of electrical power occurring in a given period of time, typically a day.

Peak sun hours: The equivalent number of hours per day when solar irradiance averages 1000 w/m^2 (full sun).

Photovoltaic (PV): Pertaining to the direct conversion of photons of sunlight into electricity.

Photovoltaic array: An interconnected system of PV modules that function as a single electricity-producing unit. The modules are assembled as a discrete structure, with common support or mounting. In smaller systems, an array can consist of a single module.

Photovoltaic cell: The smallest semiconductor element within a PV module to perform the immediate conversion of light into electrical energy (DC voltage and current).

Photovoltaic module: The smallest environmentally protected, essentially planar assembly of solar cells and ancillary parts, such as interconnections, terminals, and protective devices such as diodes intended to generate DC power under unconcentrated sunlight. The structural (load carrying) member of a module can either be the top layer (superstrate) or the back layer (substrate).

Photovoltaic peak watt: Maximum rated output of a cell, module, or system. Typical rating conditions are 0.645 watts per square inch (1000 watts per square meter) of sunlight, 68 degrees F (20 degrees C) ambient air temperature and 6.2 x 10^{-3} mi/s (1 m/s) wind speed.

Photovoltaic system: A complete set of components for converting sunlight into electricity by the photovoltaic process, including the array and balance of system components.

Polycrystalline: ***See 'multicrystalline.'***

Power factor: The cosine of the ratio of real and reactive power.

Pulse-width-modulated wave inverter (PWM): PWM inverters are the most expensive, but produce a high quality of output signal at minimum current harmonics. The output voltage is very close to sinusoidal.

PV: Abbreviation for photovoltaic.

-R-

Resistance (R): The property of a conductor which opposes the flow of an electric current resulting in the generation of heat in the conducting material. The unit of resistance is ohms.

-S-

Semiconductor: Any material that has a limited capacity for conducting an electric current. Certain semiconductors, including silicon, gallium arsenide, copper indium dislenide, and cadmium telluride, are uniquely suited to the photovoltaic conversion process.

Series connection: A way of joining electrical equipment by connecting positive leads to negative leads; such a configuration increases the voltage while current remains the same.

Series regulator: Type of battery charge regulator where the charging current is controlled by a switch connected in series with the PV module or array.

Shelf life of batteries: The length of time, under specified conditions, a battery can be stored so it keeps its guaranteed capacity.

Short-circuit current (Isc): The current flowing freely from a photovoltaic cell through an external circuit that has no load or resistance; the maximum current possible.

Shunt regulator: Type of a battery charge regulator where the charging current is controlled by a switch connected in parallel with the PV generator. Overcharging of the battery is prevented by shorting the PV generator.

Silicon (Si): A chemical element, atomic number 14, semi-metallic in nature, dark gray, an excellent semiconductor material. A common constituent of sand and quartz (as the oxide). Crystallizes in face-centered cubic lattice-like a diamond. The most common semiconductor material used in making photovoltaic devices.

Sine wave inverter: An inverter that produces utility-quality sine wave power forms.

Single-axis tracking: A system capable of rotating about one axis, also referred to as one axis. These tracking systems usually follow the sun from east to west throughout the day.

Single-crystal material: ***See 'monocrystalline.'***

Solar cell: ***See 'photovoltaic cell.'***

Solar constant: The strength of sunlight; 1353 watts per square meter in space and about 1000 watts per square meter at sea level at the equator at solar noon.

Solar noon: That moment of the day that divides the daylight hours for that day exactly in half. To determine solar noon, calculate the length of the day from the time of sunset and sunrise and divide by two. The moment the sun is highest in the sky.

Square wave inverter: The inverter consists of a DC source, four switches, and the load. The switches are power semiconductors that can carry a large current and withstand a high voltage rating. The switches are turned on and off at a correct sequence, at a certain frequency. The square wave inverter is the simplest and the least expensive to purchase, but it produces the lowest quality of power.

Stand-alone: An autonomous or hybrid photovoltaic system not connected to a grid. Some stand-alone systems require batteries or some other form of storage. Also called, "stand-alone PV system."

Standard test conditions (STC): Conditions under which a module is typically tested in a laboratory: (1) Irradiance intensity of 1000 W/square meter (0.645 watts per square inch), AM1.5 solar reference spectrum, and (3) a cell (module) temperature of 25°C, plus or minus 2°C (77°F, plus or minus 3.6°F).

State of charge (SOC): The available capacity remaining in a cell or battery, expressed as a percentage of the rated capacity. For example, if 25 amp-hours have been removed from a fully charged 100 amp-hour cell, the state of charge is 75 percent.

Sulfation: A condition that afflicts unused and discharged batteries; large crystals of lead sulfate grow on the plate, instead of the usual tiny crystals, making the battery extremely difficult to recharge.

Surge: The momentary start-up condition of a motor requiring a large amount of electrical current.

Surge capacity: The ability of an inverter or generator to deliver high currents momentarily required when starting a motor.

-T-

Temperature compensation: An allowance made in charge controller set points for changing battery temperatures.

Thin-film: A layer of semiconductor material, such as copper indium diselenide, cadmium telluride, gallium arsenide, or amorphous silicon, a few microns or less in thickness, used to make photovoltaic cells.

Tilt angle: Angle of inclination of collector as measured in degrees from the horizontal. For maximum performance solar collectors/ modules should be set perpendicular to the sun.

Total harmonic distortion (thd): The measure of closeness in shape between a waveform and its fundamental component.

Tracking PV array: PV array that follows the path of the sun to maximize the solar radiation incident on the PV surface. The two most common orientations are (I) one axis where the array tracks the sun east to west and (2) two-axis tracking where the array points directly at the sun at all time. Tracking arrays use both the direct and diffuse sunlight. Two-axis tracking arrays capture the maximum possible daily energy.

Transformer: An electromagnetic device used to convert AC electricity, either to increase or decrease the voltage. It also provides electrical isolation between each side.

Trickle charge: A charge at a low rate, balancing through self-discharge losses, to maintain a cell or battery in a fully charged condition.-***See 'Float Charge.'***

-U-

Uninterruptible power supply (UPS): The designation of a power supply providing continuous uninterruptible service when a main power source is lost.

Utility-interactive inverter: An inverter that can function only when tied to the utility grid, and uses the prevailing line-voltage frequency on the utility line as a control parameter to ensure that the PV system's output is fully synchronized with the utility power.

-V-

VAC: Volts of Alternating Current.

VDC: Volts of Direct Current.

VOC: Open-circuit voltage.

Volt (V): A unit of measure of the force, or pressure given the electrons in an electric circuit. One volt produces one ampere of current when acting against a resistance of one ohm.

Voltage at maximum power (Vmp): The voltage at which maximum power is available from a module.

-W-

Watt (W): The unit of electric power, or amount of work. One ampere of current flowing at a potential of one volt produces one watt of power (joule second).

Watt-hour (Wh): A quantity of electrical energy when one watt is used for one hour.

Waveform: The shape of the curve graphically representing the change in the AC signal voltage and current amplitude, with respect to time.

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Nature provides us with the gift of energy through the sun, but unfortunately, nature's wrath may not be all that friendly to your PV system under stressful conditions. Snow, wind, extreme heat or cold, and seismic activities can wreak havoc on underengineered, underdesigned and insufficiently tested racking structures. Only UNIRAC solar structures have been engineered and third-party tested to withstand the harshest of elements and events for a long and enduring service life. Complies with IBC, IRC, ASCE-7-05, ADM, AISI, AISC, NEC and UL. For the highest level of engineering and construction with the lowest cost of ownership in the business, Unirac is the 24/365 solution for performance in and out of the sun. Visit unirac.com for more information.
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