Why Have Surge Protection?

Photovoltaic, wind and hydroelectric systems usually have long runs of exposed wire that can pick up surges from lightning, even if the lightning strike is not nearby. These power surges can damage sensitive electronic components in meters, charge controllers and inverters. Surges can also damage telephone, audio and video equipment connected to the power system. It is a good idea to install surge protection on all incoming wires in the system, including incoming PV, wind or hydroelectric power lines, AC generator lines, telephone and antenna leads. Proper grounding is absolutely necessary for lightning protection to be effective. In the event of a direct strike, damage may occur, even with surge protectors installed. Type 1 heavy duty surge protectors are recommended when a direct lightning strike is possible on the installation.

Delta

Lightning Arrestors

Delta lightning arrestors have a maximum current rating of 60,000 amps and 2,000 joules per line. Response time is 25 ns to clamp 50,000 amps. Mounts easily in a 1/2" knockout.

Install the DC version for surge protection on wires coming from a PV array, DC wind generator or DC hydroelectric turbine. Use the 600VDC unit for high-voltage grid-tie PV arrays. Lightning protection can be installed in a combiner box, DC load center or grid-tie inverter.

The AC versions can be mounted in your AC load center to protect 120/240 VAC equipment and on AC wiring running outside of the building, to generators, pumps or outbuildings. All units are waterproof.

Delta model	Description	Item code	Price
LA302DC	Arrestor for up to 300 VDC	**053-04115**	**$40**
LA602DC	Arrestor for up to 600 VDC	**053-04109**	**$42**
LA302R	Arrestor for up to 300 VAC	**053-04112**	**$40**
LA303R	Arrestor for up to 300 VAC 3-Phase	**053-04118**	**$50**
Mounting bracket for surge arrestors		**053-04138**	**$3**

NEW! Citel

Surge Protection Products

Citel PV surge protectors are DIN mount and are ideal for placement inside combiner boxes.

DS210DC Off-Grid Surge Arrestor

The Citel DS210DC series is designed to protect 12V, 24V, 48V and 150V DC power lines for an off-grid PV system. The surge protectors protect the charge controller and other system electronics. DS210DC automatically reset after each lightning surge or electrical transient. These surge arrestors clamp at much lower voltage than Delta surge arrestors at left so they offer much better protection for charge controllers and inverters in low-voltage DC systems.

DS50PV Grid-Tie Surge Arrestor

The DS50PV is designed to protect the solar panel array at the solar PV array combiner box for a utility-interactive PV system. The DS50PV is designed to withstand 40kA (8/20us) induced transient surges and is designed with replaceable modules. Use the DS50PV-500 for systems with inverters that have an upper limit of 500 volts. Use the DS50PV-800 for inverters that allow arrays over 500 VDC. For use with grounded arrays.

DS60PV Grid-Tie Surge Arrestor

DS60PV are Type 1 heavy duty surge protectors, recommended when a direct lightning strike is possible on the installation. They are available in 500- and 1000-VDC operating voltages. The use of Type 1 surge protector is recommended at both ends of the DC power supply line (solar panel side and inverter/converter side). The DS60PV is made with a monobloc enclosure and mounts on DIN rail.

Citel model	Nominal volts	Maximum DC volts	Discharge current	Width in (mm)	Item code	Price
DS210-12DC	12	15	1 kA	0.7 (18)	**053-04201**	**$52**
DS210-24DC	24	30	1 kA	0.7 (18)	**053-04203**	**$52**
DS210-48DC	48	56	1 kA	0.7 (18)	**053-04205**	**$52**
DS210-95DC	95	100	2 kA	0.7 (18)	**053-04207**	**$52**
DS210-130DC	130	150	2 kA	0.7 (18)	**053-04209**	**$52**
DS50PV-500	500	530	20 kA	1.4 (36)	**053-04218**	**$128**
DS50PV-1000	800	840	20 kA	1.9 (48)	**053-04220**	**$164**
DS60PV-500	500	550	40 kA	2.8 (72)	**053-04224**	**$168**
DS60PV-1000	1000	1000	40 kA	2.8 (72)	**053-04226**	**$279**

Suggested retail prices are subject to change; check with us for latest pricing.

Lay-in Lugs for Module Grounding

These tin-plated copper lugs have stainless steel set screws and come with stainless steel thread-forming screws and lock washers. They meet NEC requirements for connecting a continuous ground wire to all modules. Sold in packages of 10. UL Listed.

Description	Item code	Price
Bag of 10 lay-in lugs w/ screws	051-03414	$35

Unirac

Grounding Clip 1 (UGC-1)

For use with Unirac SolarMount or Light Rail mounts. Order one grounding clip for every two top mounting clamps (end clamps and mid clamps) in your installation. Only one of the two rails in each row requires grounding clip. ETL listed.

Unirac #	Item code	Price
980000	051-04055	$1.80

Wiley Electronics

WEEB Grounding Products

WEEB stands for "washer, electrical equipment bonding." WEEB products are used to bond solar modules to aluminum solar mounting rails. The mounts are then grounded, grounding the entire assembly. This eliminates the need to use a lay-in lug and thread-forming screw on each module and it eliminates the need to run a continuous wire to each module.

This saves time and money and it meets the requirements of UL 467. Wire is only needed to connect a lay-in lug on each module rail to an equipment grounding terminal in the inverter or disconnect. ETL listed to UL standards.

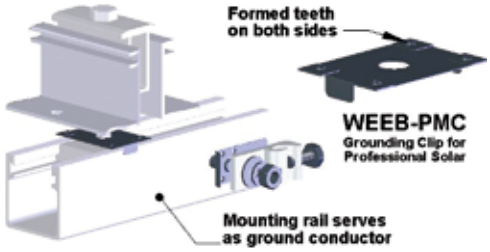
WEEB-9.5

WEEB-9.5

WEEB-9.5 NL

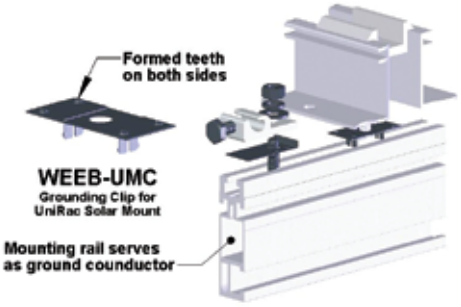
The WEEB-9.5 is used for bonding modules to mounting structures when the modules are directly bolted to the rails using 1/4" bolts through the mounting holes on the rear of the module frames. This type of mounting is typical on DP&W ground and pole mount systems (pages 51-54) and on Wattsun and Zomeworks trackers (page 56-58). The WEEB-9.5NL is used for bonding strong-back structure and legs to the rail where 3/8" bolts are used. Sold in packs of 10.

WEEB-PMC



WEEB-PMC grounding clips are used between modules and AEE Solar and ProSolar rails when front mount clips are used to hold the module to the rails. One clip grounds the frame of two adjoining modules to one of the mounting rails. Two clips are required for each pair of modules so that the modules will be bonded to both rails. Sold in packs of 10.

WEEB-UMC



WEEB-UMC grounding clips are used between modules and Unirac SolarMount Standard Rails or SolarMount Light Rails when front mount clips are used to hold the module to the rails. One clip grounds the frame of 2 adjoining modules to one of the mounting rails. Two clips are required for each pair of modules so that the modules will be bonded to both rails. Sold in packs of 10.

We advise speaking to your building inspector before installing these products to see if they are acceptable in your area.

WEEB L-6.7

The WEEB L-6.7 provides a connection to the mounting system and has lay-in provision for an equipment ground conductor. The WEEB-6.7 kit includes the lay-in lug, matching WEEB washer, bolt, nut flat washer and lock washer. Two WEEB lugs and a short piece of bare wire can be used to connect across a rail splice, or a WEEB splice kit can be used.

WEEB Splice

WEEB Splice kit is used to bond two Unirac Solarmount or DP&W PowerRails together at a splice.

Wiley part #	Description	Item code	Price
WEEB-9.5	Bonding washer for 1/4" bolted connections - pack of 100	051-04007	$140
WEEB-9.5NL	Bonding washer for 3/8" bolted connections - pack of 100	051-04008	$140
WEEB-UMC	Clip for use with Unirac SolarMount Standard Rail and SolarMount Light Rail - pack of 100	051-04003	$180
WEEB-PMC	Clip for use with ProSolar rails - pack of 100	051-04001	$180
WEEB-6.7	Lay-in lug with mounting hardware and WEEB washer - each	051-04015	$6
WEEB-Splice Kit	Splice kit for Unirac SolarMount Standard Rail and SolarMount Light Rail - each	051-04018	$9

Pulse

PCB10 Combiner Box

The PV array combiner box from Pulse Energy is designed to combine the output of multiple PV source circuits. The PCB10 has 10 fused circuits in a NEMA 3R lockable enclosure. Each circuit can accept up to 15 amps of PV input current up to a total maximum of 64 amps. The PCB10 may be used with 12-, 24- and 48-VDC PV systems and can handle a maximum 125VDC input and includes built-in lightning protection. UL Listed. Use type ABC fuses. Comes with ten 15-amp fuses. Dimensions: 8"W x 10"H x 4"D.

Model	Description	Weight lbs	Item code	Price
PCB10	Combiner box - 10 circuit	8	**053-02709**	**$150**

Type ABC Fuses for Combiner Boxes

These fuses can be used with the combiner box above. Use a fuse equal to or less than the series fuse rating of the modules being protected.

Fuse part #	ABC fuse sizes	Item code	Price
ABC-5	5-amp fuse for combiner	**053-02721**	**$1.20**
ABC-6	6-amp fuse for combiner	**053-02724**	**$1.20**
ABC-8	8-amp fuse for combiner	**053-02727**	**$1.20**
ABC-10	10-amp fuse for combiner	**053-02730**	**$1.20**
ABC-15	15-amp fuse for combiner	**053-02733**	**$1.20**

OutBack

NEW! FLEXware PV Combiners

The FLEXware PV8 and FLEXware PV12 accommodate overcurrent protection requirements for off-grid and grid-connected applications. The DIN rail can be fitted with 150VDC circuit breakers for low-voltage PV arrays or 600VDC fuse holders for grid-tie arrays. These combiners replace the PSPV.

Rated for NEMA-3R rainproof, the powder-coated aluminum chassis can be mounted on a wall, a sloped roof, or a pole.

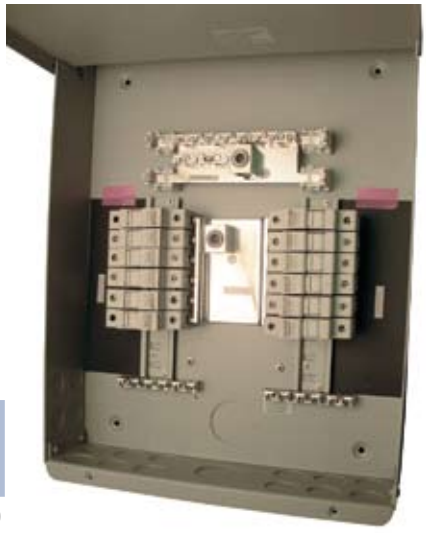
Dual output lugs allow connection for up to 2/0 AWG wire. An easily removable flame-retardant polycarbonate deadfront panel prevents accidental contact with live terminals. FWPV8 has one circuit and FWPV12 can be configured to have one or two circuits. Negative and ground terminal bus bars are included.

OutBack model	# of breakers	# of fuse holders	Dimensions in	Weight lbs	Item code	Price
FWPV8	8	6	15.2 x 9.2 x 3.9	4.4	**053-03012**	**$139**
FWPV12	12	8	15.2 x 12.7 x 3.9	5.9	**053-03014**	**$199**

MidNite Solar

MNPV Combiners

These powder-coated aluminum, NEMA-3R rainproof array combiners will accept 150VDC DIN-rail mounted fuse holders for 600VDC arrays or 150VDC DIN-rail mounted breakers for low-voltage arrays. Dead front. Two sizes. ETL Listed. Negative busbar and ground bar are included. Breakers and fuse holders are not included. Breakers and fuses are available on page 147.



MidNite model	# of breakers	# of fuse holders	MNPV combiner dimensions	Weight lbs	Item code	Price
MNPV3	3	N/A	10.5" x 5" x 3.5"	2	**053-03017**	**$89**
MNPV6	6	4	13" x 8" x 3.5"	4	**053-03018**	**$109**
MNPV12	12	8	14" x 9" x 3.5"	6	**053-03015**	**$139**
MNPV16	N/A	16	17" x 13" x 3.5"	12	**053-03016**	**$499**

Suggested retail prices are subject to change; check with us for latest pricing.

Pass-Thru Wiring Box

These ETL listed Pass-Thru Wiring Box are intended to provided

a robust, secure, and code compliant method of transferring the Multi-Contact USE-2 type conductor coming from the PV array to THHN/THWN-2 type conductor. The PTWB also provides a convenient location to begin the necessary conduit run from the PV array to the power conditioning equipment. The NEMA 4 enclosure dimensions are 8" x 6" x4". It has two cord grips for array wire entry and a hole on the opposite side for a 1/2" conduit fitting. There are two terminal blocks for positive and negative conductors and one for ground. It is designed to be mounted directly on the side of the module mounting rail.

Description	Item code	Price
Pass Thru Wiring Box	**053-00271**	**$172**

SolaDeck

PV Roof-Mount Enclosure/Combiner

This weather tight NEMA 3R enclosure is made from 18 gauge galvanized steel with a powder coated finish provides a professional look.

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. It built-in flashing is guaranteed seal to roof. Since it is only 2.5" deep it can be under the array.

Model	Description	Item code	Price
SD-780	SolaDeck Enclosure Combiner	**053-00225**	**$86**

Wiley Electronics

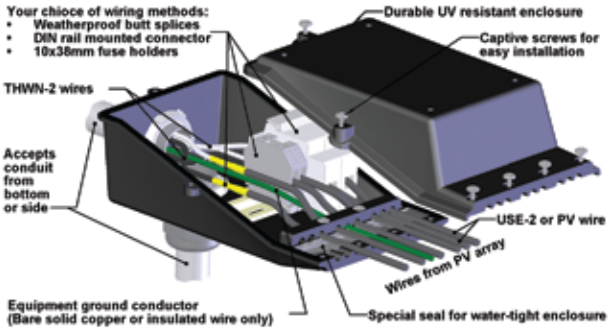
NEW! Acme Conduit Entry

This transition box to go from MC cables to conduit is made from corrosion resistant anodized aluminum. It accepts conduit from the bottom or side and has a seal for entry of USE-2 or PV wire.

The optional mounting bracket makes it easy to mount on any module mounting structure.

ACE -PT is for pass-through and has no terminals or DIN rail.

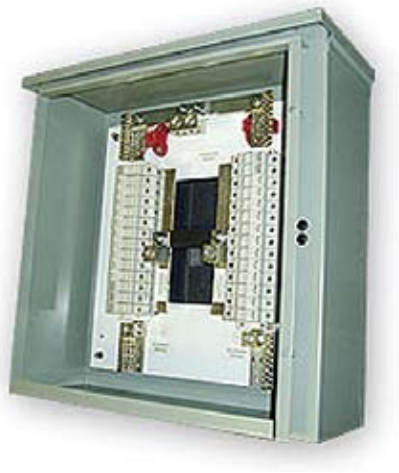
ACE-1P has a DIN rail that will accommodate up to 4 fuse holders and two terminal blocks. Other configurations are coming. Call for information and pricing. Order fuse holders and fuses on page 147.



Model	Description	Item code	Price
ACE-PT	Pass through - use butt splices or wire nuts	**053-00305**	**Call**
ACE-1P	1 string pass through with 2 DIN rail mounted terminal blocks	**053-00308**	**Call**

SMA

Combiner Boxes



These 600VDC-rated array combiners are in NEMA 3R enclosures and feature DIN Rail mounted touch-safe fuse holders for use with KLKD fuses. Input terminals take wire from 10 AWG to 6 AWG. Output terminals take wire from 6 AWG to 300 MCM. SBCB6 has one output circuit. Larger combiners have two output circuits.

SMA model	Input circuits	Max input fuse	Max output current	Dimen-sions (In)	Weight (lb.)	Item code	Price
SBCB 6	6	15 Amp	72 Amps	10 x 8 x 6	11	**053-03003**	**$440**
SCCB 28	28	15 Amp	336 Amps	20 x 20 x 8	56	**053-03005**	**$1,240**
SCCB 52	52	8 Amp	333 Amps	42 x 30 x 8	70	**053-03009**	**$2,233**

Combi-Switch

This 600VDC-rated disconnect has a built-in 4-input fused array combiner. Four 10-amp 600VDC fuses are included. Bring up to 8 module strings together, two into each fuse holder. Maximum fuse size: 10 amps. NEMA 3R outdoor enclosure. 5-year warranty. ETL Listed.

Description	Item code	Price
SMA DC disconnect & combiner	**030-03181**	**$580**

AEE Solar

NEW! NEMA 4X 12 Circuit Array Combiners

These 12 circuit array combiners are available in fiberglass, powder-coated steel and stainless steel versions. The NEMA 4X enclosure allows them to be mounted in any position. Hole for conduit and cord grips are not provided. They can be punched by the installer as needed. Combiners feature DIN Rail mounted touch-safe fuse holders for use with KLKD fuses. Input terminals take wire from 10 AWG to 6 AWG. A single output terminals take wire from 6 AWG to 300 MCM.

Model	Enclosure type	Dimensions (In)	Item code	Price
CB-12F	NEMA 4X Fiberglass	16 x 14 x 6	**053-00033**	**$950**
CB-12PC	NEMA 4X Powder coated steel	24 x 20 x 6	**053-00035**	**$1,150**
CB-12SS	NEMA 4X Stainless steel	24 x 20 x 6	**053-00039**	**$1,400**

Suggested retail prices are subject to change; check with us for latest pricing.

DIN Rail Mount Fuse Holders and Fuses

Fuse holder and fuses below and breakers at right fit MidNite MNPV and OutBack FlexPV combiners. Use the fuses and fuse holder below for 600VDC array combiners. Fuses are KLKD for 600 VDC.

Amps	Description	Item code	Price
	USM1 Fuse Holder - 600V 30A Max - DIN mount	053-03040	$20
1	1 amp 600 VDC KLKD fuse	053-03155	$12
2	2 amp 600 VDC KLKD fuse	053-03052	$12
4	4 amp 600 VDC KLKD fuse	053-03051	$12
6	6 amp 600 VDC KLKD fuse	053-03050	$12
8	8 amp 600 VDC KLKD fuse	053-03048	$12
10	10 amp 600 VDC KLKD fuse	053-03046	$12
12	12 amp 600 VDC KLKD fuse	053-03044	$12
15	15 amp 600 VDC KLKD fuse	053-03043	$12
20	20 amp 600 VDC KLKD fuse	053-03042	$12
30	30 amp 600 VDC KLKD fuse	053-03041	$12

Safety Labels for PV Installations

These labels are manufactured using ultraviolet (UV) resistant ink, permanent acrylic adhesive and base material designed to withstand environmental elements. A laminate is added to further add protection against prolonged UV exposure. They are recommended for use in identification of DC disconnects and inverters. For use on both painted smooth metal and textured metal surfaces. All labels are 4.12" wide. Labels are sold in packs of 10 labels.

Label description	Item code	Price
DC Disconnect warning 2-piece label - 10 pack	053-00013	$18
Solar Disconnect warning 2-piece label - 10 pack	053-00015	$18
Warning - Dual Power Sources - 10 pack	053-00017	$6
Warning - Electric Shock Hazard - 10 pack	053-00019	$6

DIN Rail Mount Combiner Breakers

Fuse holder and fuses below and breakers at right fit MidNite MNPV and OutBack PSPV combiners. Use breakers for arrays with maximum voltage of 150 or less. Use the fuses and fuse holder below for 600VDC array combiners.

Amps	OutBack number	MidNite Solar #	Item code	Price
1	OBB-1-150VDC-DIN	MNEPV1	053-03033	$13
2	OBB-2-150VDC-DIN	MNEPV2	053-03034	$13
3	OBB-3-150VDC-DIN	MNEPV3	053-03024	$13
4	OBB-4-150VDC-DIN	MNEPV4	053-03020	$13
5	OBB-5-150VDC-DIN	MNEPV5	053-03025	$13
6	OBB-6-150VDC-DIN	MNEPV6	053-03021	$13
8	OBB-8-150VDC-DIN	MNEPV8	053-03022	$13
9	OBB-9-150VDC-DIN	MNEPV9	053-03023	$13
10	OBB-10-150VDC-DIN	MNEPV10	053-03026	$13
12	OBB-12-150VDC-DIN	MNEPV12	053-03027	$13
15	OBB-15-150VDC-DIN	MNEPV15	053-03029	$13
20	OBB-20-150VDC-DIN	MNEPV20	053-03030	$13
30	OBB-30-150VDC-DIN	MNEPV30	053-03032	$13
40	OBB-40-150VDC-DIN	MNEPV40	053-03039	$13
50	OBB-50-150VDC-DIN	MNEPV50	053-03035	$13
60	OBB-60-150VDC-DIN	MNEPV60	053-03037	$13
63	OBB-63-150VDC-DIN	MNEPV63	053-03038	$13

Square-D

240V and 600V NEMA 3R Safety Switch Disconnects

According to the National Electric Code, section 690.15, PV arrays must have a disconnecting means to isolate the inverter from the PV power source. Utility grid-tie inverters that utilize PV arrays with voltages above 250VDC require a disconnect rated for 600VDC to perform this function. The Square-D 600VDC 30-amp 3-pole safety switches are UL Listed to handle 13A at 600VDC per pole. They can be used for disconnecting up to three PV arrays for three grid-tie inverters. It has wiring lugs that are rated to accept two #14 to #10 wires in each lug.

This allows the disconnect switch to also act as a string combiner in systems that utilize two strings of PV modules per inverter. The 600VDC 60-amp 3-pole safety switches are UL Listed to handle 38A at 600VDC per pole. All other Square-D 600VDC disconnects are rated for disconnecting one string at full rated power.

Many utilities require an AC disconnect between a grid-tie inverter and the AC load center, close to the AC service entrance, with a visible and lockable handle. A 30-amp 240-volt disconnect is good for up to 5kW at 240 VAC and the 60-amp disconnect is good for up to 11kW. For connection of multiple inverters to one of these disconnects, use an AC load center, with a circuit breaker for each inverter installed, as an AC combiner box between the inverters and the disconnect switch. The breakers can be back-fed with the inverter outputs and the load center main lugs will handle the combined outputs to be connected to the AC disconnect.

Amps	AC / DC	Fused	Poles	Neutral kit	Ground kit	Dimensions (inches) H x W x D	Weight (lbs)	Square-D model	Item code	Price
600-Volt AC or DC 3-Pole NEMA 3R Heavy Duty Switches										
30	Yes	No	3*	SN03	GTK03	14.88 x 6.63 x 4.88	9.3	HU361RB	**053-02312**	**$175**
30	Yes	Yes	3*	SN03	GTK03	14.88 x 6.63 x 4.88	9.8	H361RB	**053-02313**	**$270**
* Uses 2 poles in series for 600VDC, except for PV where all 3 poles may be used for 600VDC at 13 amps per pole										
60	Yes	No	3**	SN0610	GTK0610	17.50 x 9.00 x 6.38	16	HU362RB	**053-02339**	**$380**
60	Yes	Yes	3**	SN0610	GTK0610	17.50 x 9.00 x 6.38	16	H362RB	**053-02341**	**$480**
100	Yes	No	3**	SN0610	GTK0610	21.25 x 8.50 x 6.38	24	HU363RB	**053-02357**	**$530**
100	Yes	Yes	3**	SN0610	GTK0610	21.25 x 8.50 x 6.38	24	H363RB	**053-02355**	**$750**
200	Yes	No	3**	SN20A	PKOGTA2	29.25 x 17.25 x 8.50	44	HU364RB	**053-02364**	**$640**
00	Yes	Yes	3**	SN20A	PKOGTA2	29.25 x 17.25 x 8.50	44	H364RB	**053-02374**	**$884**
** Uses 2 poles (and 2 fuses) in series for 600VDC										
240-Volt AC / 125-Volt DC* NEMA 3R Heavy Duty Switches**										
30	Yes	Yes	3	included	GTK03	14.88 x 6.63 x 4.88	9.8	H321NRB	**053-02315**	**$314**
60	Yes	Yes	3	included	GTK03	14.88 x 6.63 x 4.88	10	H322NRB	**053-02336**	**$503**
100	Yes	Yes	3	included	GTK0610	21.25 x 8.50 x 6.38	19	H323NRB	**053-02351**	**$722**
200	Yes	Yes	3	included	PKOGTA2	29.25 x 17.25 x 8.50	43	H324NRB	**053-02363**	**$988**
*** Switches are rated for 250VDC but available fuses are only rated for 125VDC										
240-Volt AC Only NEMA 3R General Duty Switches										
30	AC only	No	2	N/A	PK3GTA1	9.63 x 7.25 x 3.75	4.4	DU221RB	**053-02318**	**$83**
30	AC only	Yes	2	included	PK3GTA1	9.63 x 7.25 x 3.75	4.5	D221NRB	**053-02326**	**$90**
30	AC only	No	3	N/A	PK3GTA1	9.63 x 7.25 x 3.75	4.7	DU321RB	**053-02319**	**$139**
30	AC only	Yes	3	included	PK3GTA1	9.63 x 7.25 x 3.75	5.1	D321NRB	**053-02329**	**$139**
60	AC only	Yes	2	included	GTK03	14.88 x 6.63 x 4.88	9.7	D222NRB	**053-02334**	**$141**
60	AC only	No	3	N/A	PK3GTA1	9.63 x 7.25 x 3.75	5	DU322RB	**053-02342**	**$222**
60	AC only	Yes	3	included	GTK03	14.88 x 6.63 x 4.88	9.8	D322NRB	**053-02343**	**$210**
100	AC only	Yes	2	included	GTK0610	17.50 x 8.50 x 6.50	16	D223NRB	**053-02358**	**$227**
100	AC only	No	3	N/A	GTK0610	17.50 x 8.50 x 6.50	15	DU323RB	**053-02359**	**$386**
100	AC only	Yes	3	included	GTK0610	17.50 x 8.50 x 6.50	16	D323NRB	**053-02361**	**$386**
200	AC only	Yes	2	included	PKOGTA2	29.25 x 17.25 x 8.25	29	D224NRB	**053-02371**	**$513**
200	AC only	Yes	3	included	PKOGTA2	29.25 x 17.25 x 8.25	30	D324NRB	**053-02372**	**$853**

Use Class R fuses of the proper amperage for fused disconnects. Use the hubs on the next page to connect conduit or a kWh meter socket to the top of the disconnect. Disconnects are raintight (NEMA 3R) for outdoor use. Order a neutral busbar and ground busbar if you need to land these conductors in the disconnect switch box. See next page for accessories.

Suggested retail prices are subject to change; check with us for latest pricing.

Square-D Disconnect Accessories

Field-installable service ground and neutral busbars and hubs for the safety disconnect switches on the previous page. See table to determine which neutral and ground to use.

Neutral and ground accessories	Item code	Price
SN03 Neutral busbar	053-02389	$52
SN0610 Neutral busbar	053-02381	$71
SN20A Neutral busbar	053-02383	$133
GTK03 Ground busbar	053-02387	$8
PK3GTA1 Ground busbar	053-02395	$8
GTK0610 Ground busbar	053-02386	$13
PKOGTA2 Ground busbar	053-02388	$38
Conduit hubs	**Item code**	**Price**
Top mount hub 3/4"	053-02305	$22
Top mount hub 1"	053-02306	$22
Top mount hub 1-1/4"	053-02307	$22
Top mount hub 1-1/2"	053-02308	$22
Top mount hub 2"	053-02309	$40

Class R Fuses

These Class R fuses can be used in AC circuits up to 250V or DC circuits up to 125V. They have the high amp interrupting capacity (AIC) required for fusing circuits powered by batteries and for protecting Square-D brand circuit breakers. They can be used to protect wiring to small inverters (100-700 watts) and wiring from charging sources. Use these fuses in fused safety disconnect switches on the previous page and in the fuse blocks at right. UL Listed

Amps	250VAC/125VDC		600VAC/VDC	
	Item code	Price	Item code	Price
10	053-02441	$5	053-02442	$11
15	053-02444	$5	053-02447	$11
20	053-02450	$5	053-02453	$11
30	053-02456	$5	053-02459	$11
40	053-02462	$8	053-02463	$24
50	053-02465	$8	053-02466	$24
60	053-02468	$8	053-02471	$24
70	053-02469	$18	053-02470	$46
80	053-02475	$18	053-02472	$46
90	053-02476	$18	053-02473	$46
100	053-02474	$18	053-02477	$46
125	053-02478	$48	053-02481	$80
150	053-02479	$48	053-02482	$80
200	053-02480	$48	053-02483	$80




Class R Fuse Blocks

Use these fuse blocks with the Class R 250-volt fuses. Bare wire ends fit into the screw terminals on each end of the fuse block. The small fuse block holds 10-30A fuses and accepts up to #2 wire. The medium size block holds 40-60A fuses and accepts up to #2 wire also. The large size block holds a 100A fuse and accepts up to #1/0 wire. Small and medium size blocks are available in one-pole and two-pole versions.

Description	Item code	Price
Class R fuse block 0.1-30A, 1-pole	053-02423	$5
Class R fuse block 0.1-30A, 2-pole	053-02426	$12
Class R fuse block 31-60A, 1-pole	053-02429	$9
Class R fuse block 31-60A, 2-pole	053-02432	$16
Class R fuse block 61-100A, 1-pole	053-02435	$25

Inline ATC Fuse Holder

The waterproof cover makes this an excellent choice to fuse a single circuit, indoors or out. Cut wire loop and splice into the line to be protected. We recommend these with 1-amp fuses below in the positive power line for Trimetric, Link and Trace TM500A meters. Low-voltage DC use only.

Description	Item code	Price
ATC Inline holder 18 AWG	053-02663	$3
ATC Inline holder 10 AWG	053-02669	$3

ATC Fuses

ATC blade-type fuses were designed for low-voltage DC circuits for the automotive industry. They are very popular in autos and RVs. They are not approved by the National Electric Code (NEC) for use in homes, but they are often used to provide circuit protection in remote cabin power systems. They are sold in boxes of 10 fuses.



Description	Item code	Price
ATC fuse 1A	053-02629	$0.40
ATC fuse 3A	053-02631	$0.40
ATC fuse 5A	053-02633	$0.40
ATC fuse 10A	053-02635	$0.40
ATC fuse 15A	053-02637	$0.40
ATC fuse 20A	053-02639	$0.40
ATC fuse 30A	053-02641	$0.40

Square-D

QO Load Centers

Square-D brand load centers can be used for multiple purposes, for wiring that meets the National Electric Code (NEC). All of these can be used as AC load centers or sub-panels. Panels using QO plug in breakers are rated up to 50 VDC for use as 12V or 24V DC load centers. They can also be used to combine the AC output from multiple inverters feeding the grid. When used as DC load centers they should be protected by a high interrupt capacity fuse or circuit breaker between the load center and the battery. Use one of the Class T or Class R fuses, or the DC breakers used in the OutBack and Xantrex DC power centers.

Spaces (single)	Bus amp rating	Outdoor	Cover	Max wire in main lug	Ground kit for this unit	Dimensions (inches) H x W x D	Weight lbs	Square-D model	Item code	Price
120/240-volt AC Single-Phase Main Lug Load Centers										
2	70	Yes	INCL.	# 4	PK4GTA	9.38 x 4.88 x 4	5.0	QO24L70RB	**053-02141**	**$60**
2	70	No	INCL.	# 4	PK4GTA	9.30 x 4.81 x 3.19	3.8	QO24L70S	**053-02144**	**$50**
6	100	Yes	INCL.	# 1	PK7GTA	12.62 x 8.88 x 4.27	9.7	QO612L100RB	**053-02147**	**$54**
6	100	No	INCL.	# 1	PK7GTA	12.57 x 8.88 x 3.8	8.3	QO612L100DS	**053-02153**	**$46**
12	125	Yes	INCL.	# 2/0	INCL.	19 x 14.25 x 4.5	23	QO112L125GRB	**053-02163**	**$190**
12	125	No	Add	# 2/0	INCL.	18 x 14.25 x 3.75	15	QO112L125G	**053-02162**	**$85**
12	200	Yes	INCL.	250 kcmil	INCL.	26.25 x 14.25 x 4.5	27	QO112L200GRB	**053-02165**	**$320**
12	200	No	Add	250 kcmil	PK15GTA	29.86 X 14.25 X 3.75	18	QO112L200G	**053-02164**	**$177**
Uses QO plug in breakers										
120/208-volt AC Three-Phase Main Lug Load Centers										
12	125	Yes	INCL.	# 2/0	INCL.	19.00 x 14.25 x 4.52	22	QO312L125GRB	**053-02181**	**$323**
12	125	No	Add	# 2/0	INCL.	19.00 x 14.25 x 3.75	11	QO312L125G	**053-02183**	**$221**
18	200	Yes	INCL.	250 kcmil	INCL.	30.00 x 14.25 x 4.52	31	QO318L200GRB	**053-02185**	**$412**
18	200	No	Add	250 kcmil	INCL.	30.00 x 14.25 x 3.75	17	QO318L200G	**053-02187**	**$295**
Uses QO plug in breakers										
277/480-volt AC Three-Phase Main Lug Load Centers										
12	125	Yes	INCL.	250 kcmil	PK9GTA	26.00 x 20.00 x 6.50	36	NF412L1 (MH26WP)	**053-02191**	**$2,319**
12	125	No	INCL.	250 kcmil	PK9GTA	26.00 x 20.00 x 5.75	22	NF412L1 (MH26,NC26S)	**053-02193**	**$1,264**
30	250	Yes	INCL.	350 kcmil	PK18GTA	38.00 x 20.00 x 6.50	42	NF430L2 (MH38WP)	**053-02195**	**$2,556**
30	250	No	INCL.	350 kcmil	PK18GTA	38.00 x 20.00 x 5.75	27	NF430L2 (MH38,NC38S)	**053-02197**	**$1,603**
Circuit breaker, single pole, 277-volt, 30-amp continuous duty rated							1	EDB14030	**053-02111**	**$85**

When used to combine the AC output of multiple grid-tie inverters, and meet the requirements of NEC 690.64(B)(2) the bus amp rating for the load center must be larger than the sum of all of the overcurrent devices feeding it, from both the utility and all inverters.

The 277/480V load centers can be used to combine the output from multiple inverters to feed a 277Y/480VAC grid interconnection. One 30A continuous duty breaker is used for each inverter that is set up for 277V hot to neutral.

Load centers are not supplied with any breakers – order conduit hubs for outdoor load centers, page 149, and breakers on next page, separately.

Suggested retail prices are subject to change; check with us for latest pricing.

Square-D Load Center Covers and Ground Busbars for Load Centers on page 150				
Description	**Weight lbs**	**Square-D model**	**Item code**	**Price**
Surface cover for 12-space 125A load centers, 053-02162 & 053-02183	6.0	QOC16US	**053-02159**	**$18.00**
Flush cover for 12-space 125A load centers, 053-02162 & 053-02183	7.0	QOC16UF	**053-02156**	**$21.50**
Surface cover for all 200A indoor load centers, 053-02164 & 053-02187	9.2	QOC30US	**053-02169**	**$58.00**
Flush cover for all 200A indoor load centers, 053-02164 & 053-02187	11	QOC30UF	**053-02170**	**$58.00**
Ground busbar for 2-space load centers		PK4GTA	**053-02390**	**$6.00**
Ground busbar for 6-space load centers		PK7GTA	**053-02391**	**$7.00**
Ground busbar for 12-space load centers		PK9GTA	**053-02392**	**$10.00**
Ground busbar for 12-space 200A load center		PK15GTA	**053-02393**	**$23.00**
Ground busbar for 30-space load centers		PK18GTA	**053-02394**	**$25.00**

QO Circuit Breakers

QO circuit breakers snap into QO load centers on the previous page. They are UL Listed for DC branch circuits up to 48VDC (not for use in 48V systems). They can also be used for 120VAC (1-pole) or 120/240VAC (2-pole) circuits. Circuit breakers in 10A to 30A sizes can handle one or two #14 to #10 wires or one #8 wire. Circuit breakers 40A to 70A will handle #8 to #2 wire sizes.

QOU circuit breakers are designed for surface or DIN rail mounting and are used in the Xantrex T-240 and in SW Plus AC conduit boxes.

	QO Breakers			QOU Breakers		
Description	**Part #**	**Item code**	**Price**	**Part #**	**Item code**	**Price**
10-amp 1 pole	QO110	**053-02063**	**$12**	QOU110	**053-02006**	**$25**
15-amp 1 pole	QO115	**053-02065**	**$12**	QOU115	**053-02009**	**$25**
20-amp 1 pole	QO120	**053-02071**	**$12**	QOU120	**053-02015**	**$25**
30-amp 1 pole	QO130	**053-02075**	**$12**	QOU130	**053-02024**	**$25**
40-amp 1 pole	QO140	**053-02080**	**$12**	QOU140	**053-02030**	**$25**
50-amp 1 pole	QO150	**053-02083**	**$12**	QOU150	**053-02036**	**$25**
60-amp 1 pole	QO160	**053-02086**	**$12**	QOU160	**053-02042**	**$25**
70-amp 1 pole	QO170	**053-02090**	**$28**	QOU170	**053-02048**	**$38**
15-amp 2 pole	QO215	**053-02067**	**$22**	QOU215	**053-02012**	**$50**
20-amp 2 pole	QO220	**053-02073**	**$22**	QOU220	**053-02018**	**$50**
30-amp 2 pole	QO230	**053-02077**	**$22**	QOU230	**053-02027**	**$50**
40-amp 2 pole	QO240	**053-02081**	**$22**	QOU240	**053-02033**	**$50**
50-amp 2 pole	QO250	**053-02084**	**$22**	QOU250	**053-02039**	**$50**
60-amp 2 pole	QO260	**053-02088**	**$22**	QOU260	**053-02045**	**$50**

Class T Fuse Blocks with Fuses

Use these single-pole fuse blocks to fuse inverters or other large loads. Holders with set screw lugs accept up to 2/0 wire in the 110A and 200A sizes and up to 4/0 wire in the 300A and 400A sizes.

On stud mount holders, a 5/16" bolt at each end of the fuse allows connection of a cable with a ring lug terminal end. To connect an inverter, order two cables with lugs on both ends: one to go from the battery to the fuse and one to go from the fuse to the inverter.

Class T fuses exceed the 10,000-amp interrupting capacity (AIC) required to protect Square-D brand circuit breakers in DC load centers. They are UL Listed for up to 160VDC and NEC approved for inverter use. A fuse comes installed in the block. Order spare fuses separately.

Xantrex model	Description	Item code	Price
TFB110C	110A fuse and holder w/screw lug	053-02515	$53
TFB200C	200A fuse and holder w/screw lug	053-02532	$53
TFB300C	300A fuse and holder w/screw lug	053-02550	$75
TFB400C	400A fuse and holder w/screw lug	053-02562	$75
TFB110	110A fuse and holder w/studs	053-02512	$53
TFB200	200A fuse and holder w/studs	053-02526	$53
TFB300	300A fuse and holder w/studs	053-02544	$75
TFB400	400A fuse and holder w/studs	053-02559	$75

Class T Fuses - JJN Series

These Class T fuses are rated for 160 VDC and 300 VAC as protection for circuit breakers, load centers and inverters where high available short circuit currents are possible. These fuses fit the fuse blocks above and the inline holder at right.

Model	Description	Item code	Price
TF110	110A replacement fuse	053-02509	$18
TF200	200A replacement fuse	053-02520	$18
TF300	300A replacement fuse	053-02538	$38
TF400	400A replacement fuse	053-02556	$38

Inline Class T Fuse Receptacle

This is a great way to retrofit an inverter cable with an NEC approved fuse. To install the fuse holder and fuse, just cut the positive cable, remove an inch of insulation from each side of the cut, insert the wire in the terminal blocks, tighten the set screws and tighten the strain relief at each end of the holder. The fuse is not included. It holds 110- to 400-amp fuses. Order fuses on left. Dimensions are 11" x 2.5" x 3".

Description	Item code	Price
Class T inline fuse holder	053-02563	$38

Perko

Battery Selector Switch

This high current switch is designed for battery switching in boats but can be used in land-based units. It permits selection between one of two batteries or the connection of both batteries in parallel. The “off” position also acts as a battery disconnect. Many people are using these to choose between two banks of batteries or between a main battery and a backup battery. The switch surface mounts with a slot for wires to enter from the bottom. Wires connect to 5/16" brass bolts. Capacity is 250 amps continuous and 360 amps intermittent. For use on 6-, 12-, 24- or 32-volt systems. UL Listed for marine use.

Description	Item code	Price
Battery selector switch	053-08267	$48

Suggested retail prices are subject to change; check with us for latest pricing.

Square-D

Inverter Bypass Switch

Wired between any 120VAC inverter/charger, generator and load center, this unit allows you to bypass the inverter in the event of an inverter failure. After the bypass switch is thrown, the generator is connected directly to the load center. The inverter can than be removed for repair. This is designed for inverters with built-in transfer switches. Maximum current is 60 amps. Dimensions: 13.5" x 6.25" x 3.5"

All components are UL Listed.

Description	Weight	Item code	Price
Inverter bypass switch	7 lbs	**053-07819**	**$110**

IOTA

Automatic Transfer Switches

Safely connect an inverter and an AC generator to the same house wiring. These automatic transfer switches can be used with inverters that don't have built-in transfer switch capability. If the generator is not running, then the inverter is connected to the house wiring. When the generator is started, the house wiring is automatically disconnected from the inverter and connected to the generator. A time delay feature allows the generator to warm up before the transfer takes place.

These transfer switches are particularly useful in RV and marine installations where both the hot and neutral terminals must be switched. They can be used between an inverter and a generator, between an inverter and shore power, or a generator and shore power. Two transfer switches can be used if switching between all three power sources is desired.

Indoor-rated housings have conduit knockouts on all four sides. 30A and 50A units have a plastic housing and 100A units have a metal housing. ETL Listed to UL1008.

Model	AC volts	Max amps	Generator max kW	Dimensions	Weight	Item code	Price
ITS-30R	120	30A	4kW	7.5"H x 8.5"H x 4"D	2 lbs	**053-08041**	**$80**
ITS-50R	120/240	50A	12kW	7.5"H x 8.5"H x 4"D	3 lbs	**053-08053**	**$180**
ITS-100R	120/240	100A	24kW	10"H x 12"W x 4"D	15 lbs	**053-08056**	**$798**

Flexcharge

Timer

The Flexcharge digital timer is a 7-day, 8-event digital clock based programmable load controller. Eight ON and eight OFF events can be programmed independently, each with its own unique timing pattern. For example: use one ON event to have a light come on at 7 pm every day then use seven OFF events to turn the light off at a different time each day. The replaceable internal

battery maintains the clock and programmed memory in the event of a system power failure (for up to 3 months). Consumes less then 3mA in standby mode. Internal DPST (double-pole-single-throw) relay switch can turn one load on at the same time that it turns another load off. Timer switch can handle up to 8 amps of inductive load or up to 16 amps of resistive load, at 6 to 36VDC or 120VAC. Timer requires 12V DC or AC to operate. Reverse polarity protected. Manual override allows the user to turn the load ON or OFF as desired. Easy to use terminal block for wiring. Dry contacts.

1-year warranty. Dimensions: 3.9"W x 3.8"H x 2"D

Description	Item code	Price
Flexcharge timer	054-07120	$90

Night Watchman 12V Photoswitch

The Flexcharge Night Watchman dusk-to-dawn controller is designed to be mounted outside in a marine salt air environment. It is completely waterproof, and very small (1" x 1" x 1") for mounting in an inconspicuous location.

Because power consumption is always a concern on battery powered systems (sail boats, PV systems, etc.) the Night Watchman is designed to use an extremely small amount of power in standby mode (only 0.00015A or 0.15mA), yet it is capable of supplying up to 10A of load current.

The Night Watchman will turn 12V incandescent or fluorescent lights ON in the evening within a half hour of sunset, and OFF in the morning within a half hour of sun rise.

The Night Watchman's circuitry is designed to prevent flickering therefore it can be used to control 12V fluorescent lamps. 1-year warranty.

Description	Item code	Price
Night Watchman photoswitch	054-07215	$42

RAB

12V Motion Sensor Switch

RAB motion and heat sensing switch is 12-volt DC powered so it works full time even if your inverter is in standby or off. Turns lights on at approach, and holds for adjustable time, 5 seconds to 20 minutes after motion stops. Sensitivity distance is adjustable, up to about 50 feet out, farther in colder weather. Connect directly to any 12-volt light, or use a 12-volt relay to switch 120-volt lights. Set for night only operation, or use as security alarm, by setting for day/night operation. Switches - amp DC, uses only 7 milliamps at idle, 40 milliamps when activating. Switch uses only 7 milliamps at idle. 1-year warranty.

Description	Item code	Price
12V Motion sensor switch	054-07237	$85

Suggested retail prices are subject to change; check with us for latest pricing.

Insulated Cable Connector Blocks

This insulated connector is molded for precise fit and supplied with removable access plugs over the hex screws. Available with 2- to 4-wire entry ports on one side for 4 to 14 AWG wire. This can be used to transition from Multi-Contact cables to conduit wiring on roof to PV arrays or for any parallel wiring connection. UL Listed for 600 volts.

Number of poles	Wire range AWG	Item code	Price
2	4 -14	**054-01142**	**$14**
3	4 - 14	**054-01143**	**$20**
4	4 - 14	**054-01144**	**$26**

Power Distribution Blocks

Use these blocks to split primary power into secondary circuits, or join cables from a solar array to a power lead-in cable. Install cables and tighten set screws. Terminal blocks are made of zinc-plated aluminum for use with aluminum or copper conductors. 2 poles. Primary side accepts one large cable; secondary side accepts 6 smaller cables. UL Recognized for up to 600 volts.

Primary		Secondary		Amp rating	Item code	Price
Wire size	Taps	Wire size	Taps			
2/0 - 8	1	#14 to #6	6	175	**054-01024**	**$72**
6/0 - 6	1	#14 to #4	6	350	**054-01027**	**$79**
500mcm - 4	1	2/0 - 14	4	380	**054-01025**	**$92**
350mcm - 8	1	4 - 14	12	310	**054-01023**	**$190**

Splicer Blocks

Use these blocks to splice wires of up to #2/0 gauge. They are UL Recognized and CSA certified for up to 600 volts. The terminal blocks are made of zinc-plated aluminum, for use with aluminum or copper conductors. 2 pole and 3-pole blocks. One connection on each side.

Wire size (AWG)	Poles	Amp rating	Item code	Price
#8 to 2/0	2	175	**054-01030**	**$20**
#8 to 2/0	3	175	**054-01033**	**$25**

Wall Outlets and Plugs for 12VDC and 24VDC

In our search for an economical, NEC-approved outlet to use for low voltage systems, we have decided upon something that is readily available: a 240-volt, 15-amp receptacle. Our choice of this configuration is based on the assumption that PV-powered remote homes will not normally have appliances that use 240 volts at 15 amps. If you have a large power tool it will usually have a 240-volt 20-amp plug on it. These receptacles are duplex (two outlets) and they fit standard wiring boxes and standard duplex receptacle covers.

Description	Item code	Price
DC outlet - brown	**055-01060**	**$6.00**
DC outlet - ivory	**055-01063**	**$6.00**
Plug - black rubber	**055-01057**	**$5.00**

Barrel Connectors

These UL Listed connectors are tin-plated high strength aluminum alloy. They can be used with copper or aluminum wire. Set screw holds wire in terminal. Single-and double-barrel connectors.

Type	Wire size (AWG)	Hole size	Item code	Price
Single	14 to 2	1/4"	**051-03319**	**$1.84**
Single	14 to 2/0	1/4"	**051-03327**	**$2.69**
Double	14 to 2/0	1/4"	**051-03324**	**$6.50**
Single	6 to 4/0	3/8"	**051-03334**	**$8.25**
Double	6 to 4/0	3/8"	**051-03330**	**$20.00**