



SX-40 SX-50

Photovoltaic Modules

SX-40 and SX-50 photovoltaic modules are part of Solarex's new SX™ module series, providing cost-effective photovoltaic power for DC loads with many energy requirements. With 36 polycrystalline cells in series, they charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.



Top:
DirectMount™ frame.
Center:
MultiMount™ frame.
Bottom:
Universal frame.

Typical commercial applications of these modules, which generate peak power of 40 watts and 50 watts respectively, include remote telemetry, instrumentation systems, security sensors, and land-based navigation aids. They are also well-suited to providing subsistence power to homes in remote areas without utility (mains) service. They are available in three configurations: the **M** configuration, which includes the versatile MultiMount™ frame and a 15-foot output cable; the **D** configuration, which mounts directly to many surfaces without additional hardware; and the **U** configuration, which includes the heavy-duty Universal frame and a high-volume junction box with dual-voltage output.

The SX-40M and SX-50M

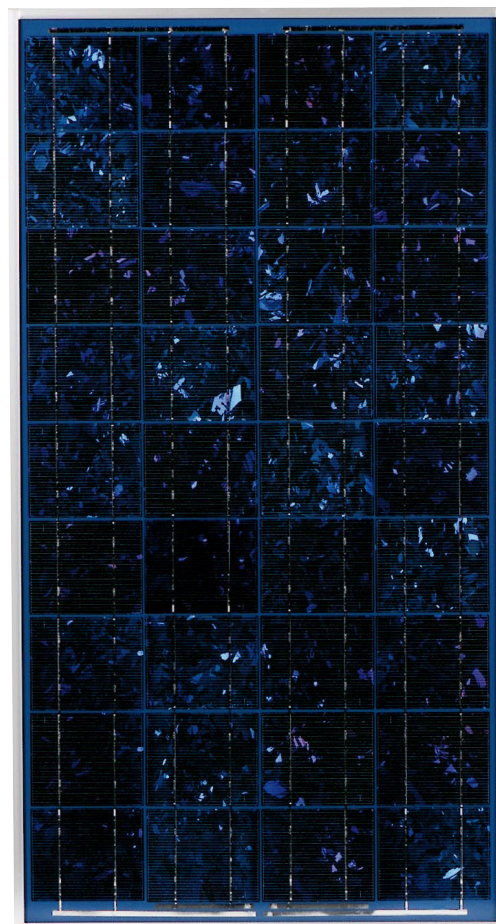
The SX-40M and -50M are general-purpose PV modules suitable for applications compatible with the MultiMount™ frame and the modules' electrical characteristics. They are for use in single-module applications with DC system voltage not exceeding 30 volts.

MultiMount™ Frame

The MultiMount™ frame of the SX-40M and -50M provides tremendous flexibility in mounting approach. Oriented parallel to the edge and back of the module, its dual channels accept the heads of 5/16" or 8mm hex bolts, allowing the module to be mounted from the side or back. Bolts may be located anywhere along the channels (shown at left with end caps removed), a configuration which prevents them from turning during tightening and allows installation with just one wrench.

Complete, Factory-Wired

Output of the **M** configuration is via a 15-foot (4.6m) PVC-jacketed AWG 14-2 cable which terminates in a low-profile junction box on the module back. Epoxy-potted in the box, module electrical connections are sealed against corrosion and effectively strain-relieved. Output voltage is compatible with 12VDC systems.



SX-50U

The Natural Source for Electricity™

Solarex SX-40 and SX-50 modules are ideally suited for modest power requirements in remote areas such as this home lighting system in Nepal.



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The SX-40D and SX-50D

The DirectMount™ frame of the SX-40D and -50D enables these modules to be mounted on many surfaces (roofs, walls, etc.) with no need for mounting hardware beyond four fasteners appropriate for the surface and material. They are easily and inexpensively installed on remote dwellings to provide limited electric power. Their electrical output circuitry and limitations are identical to the **M** configuration modules.

The SX-40U and SX-50U

The SX-40U and -50U are designed primarily for industrial use and other particularly demanding applications. Their rugged Universal frame is suitable for severe duty, exceeds the requirements of all certifying agencies, and is fully supported by Solarex's IntegraSystem™ system integration concept, which ensures full compatibility with other Solarex subsystems (support hardware, regulators, etc.). These modules are suitable for single- or multiple-module applications with DC system voltage not exceeding 600 volts.

Dual Voltage Capability

All SX-40 and -50 modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. In the SX-40U and -50U junction box, the strings may be field-wired in series (providing 12V nominal output) or in parallel (providing 6V nominal output.)

High-Capacity Versatile Junction Box

The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts 1/2" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm²); standard terminals accept up to AWG #10 (6mm²);
- a Solarstate™ charge regulator.

The SX-40U and -50U are certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC. They are approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.



Performance and Workmanship Warranted

The materials, workmanship and performance of every SX-40 and SX-50 module are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating).



Quality Certified

SX-40 and -50 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between -40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics⁽¹⁾

| | SX-40 | SX-50 |
|--|--|-------|
| Maximum power (P_{\max}) | 40W | 50W |
| Voltage at P_{\max} (V_{mp}) | 16.8V | 16.8V |
| Current at P_{\max} (I_{mp}) | 2.37A | 2.97A |
| Guaranteed minimum P_{\max} | 36W | 45W |
| Short-circuit current (I_{sc}) | 2.58A | 3.23A |
| Open-circuit voltage (V_{oc}) | 21.0V | 21.0V |
| Temperature coefficient of I_{sc} | $(0.065 \pm 0.015)\%/^{\circ}\text{C}$ | |
| Temperature coefficient of V_{oc} | $-(80 \pm 10)\text{mV}/^{\circ}\text{C}$ | |
| Temperature coefficient of power | $-(0.5 \pm 0.05)\%/^{\circ}\text{C}$ | |
| NOCT ² | $47 \pm 2^{\circ}\text{C}$ | |

Notes

1. These specifications represent the performance of typical 12V modules as measured at their output terminals (or cable termination), and do not include the effect of such additional equipment as diodes. The specifications are based on measurements made in accordance with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:

- illumination of $1 \text{ kW}/\text{m}^2$ (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
- cell temperature of 25°C .

For characteristics of modules in 6V configuration, divide the 12V voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.

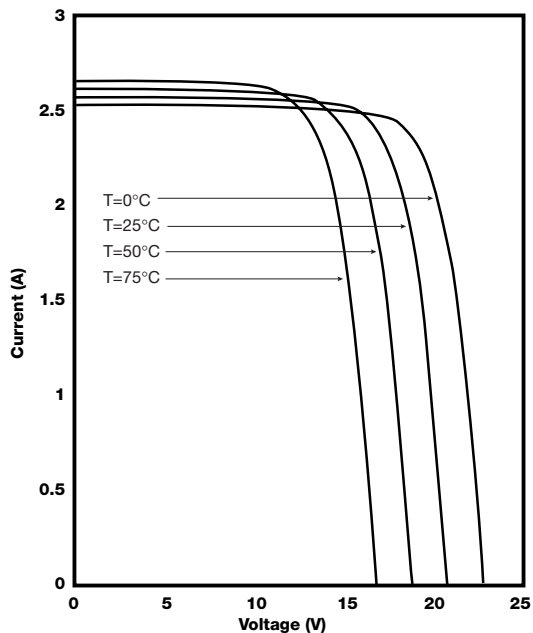
2. When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C , solar irradiation of $0.8 \text{ kW}/\text{m}^2$, and wind speed of 1 m/s .
3. These specifications do not include the effect of light-induced degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

Mechanical Characteristics

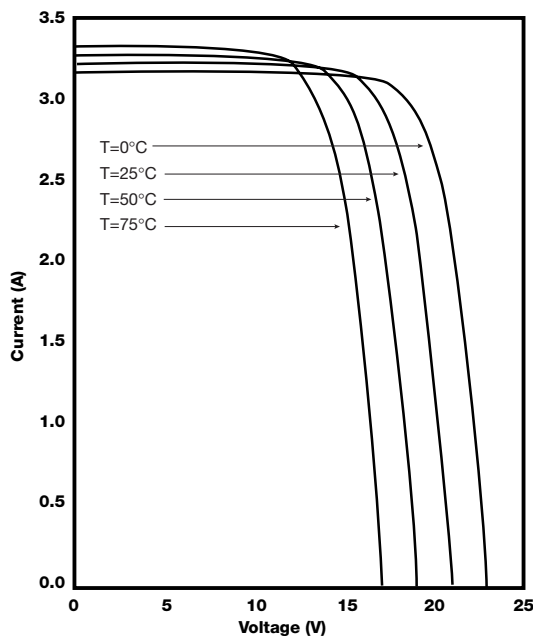
Weight

| | |
|----------------|----------------------|
| SX-40M, SX-40D | 10.6 pounds (4.9 kg) |
| SX-40U | 11.8 pounds (5.4 kg) |
| SX-50M, SX-50D | 12.5 pounds (5.7 kg) |
| SX-50U | 13.9 pounds (6.3 kg) |

SX-40 I-V Curves

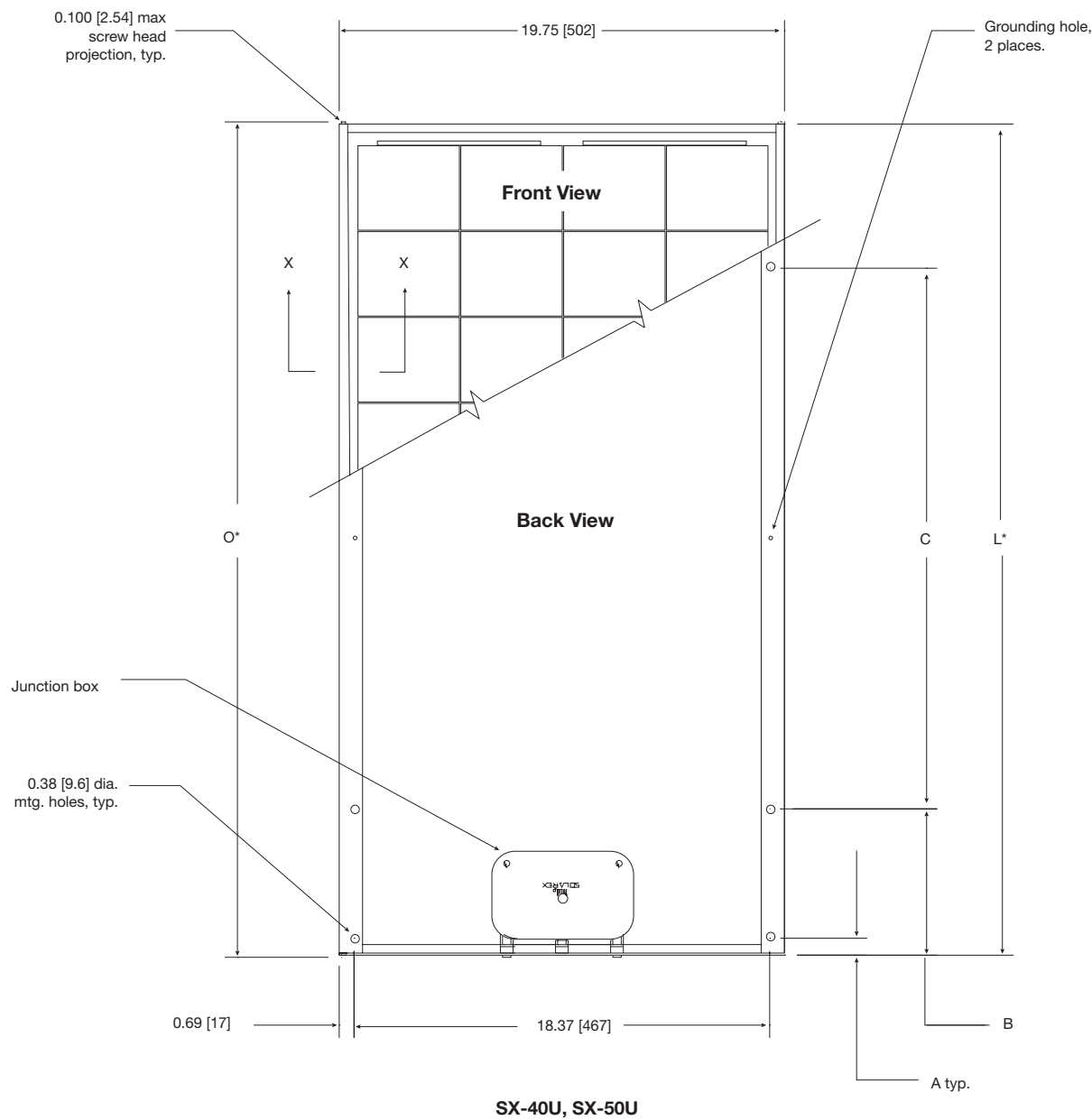


SX-50 I-V Curves



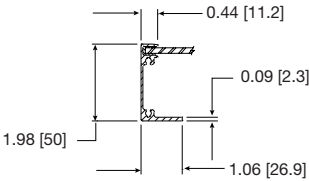
Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances ±1/8" (3mm)



| | O* | L* | A | B | C |
|--------|-------------------------|-------------------------|----------------------|-----------------------|-----------------------|
| SX-40U | $\frac{30.20^*}{[767]}$ | $\frac{30.00^*}{[762]}$ | $\frac{7.00}{[178]}$ | $\frac{15.00}{[381]}$ | — |
| SX-50U | $\frac{36.97^*}{[939]}$ | $\frac{36.77^*}{[934]}$ | $\frac{0.69}{[17]}$ | $\frac{6.39}{[162]}$ | $\frac{24.00}{[610]}$ |

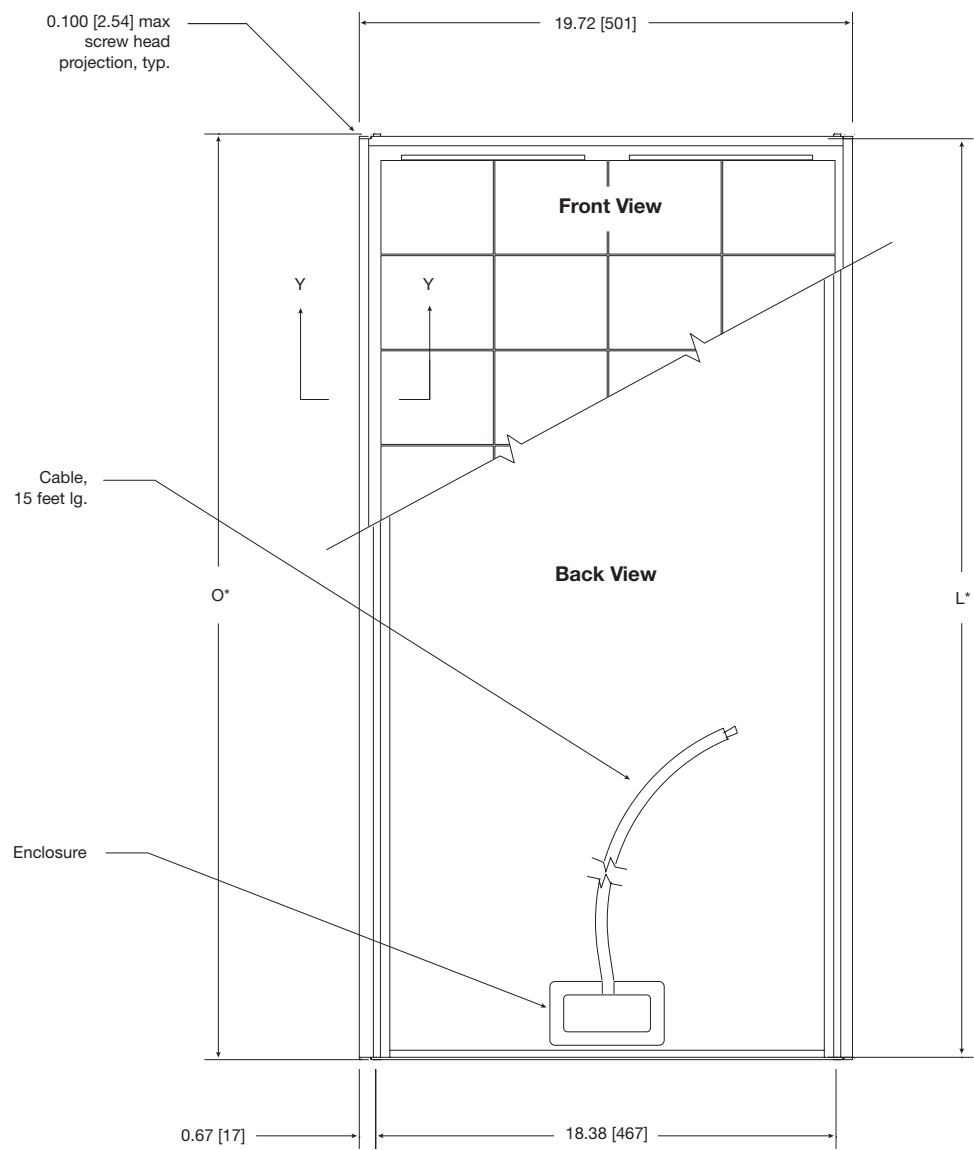
Note:
* "O" dimensions include 0.100 [2.54] max. screw head projection on each end.
"L" dimensions do not include screw head projection.



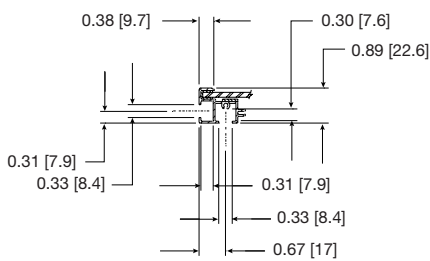
Section X-X

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches.
Overall tolerances ±1/8" (3mm)



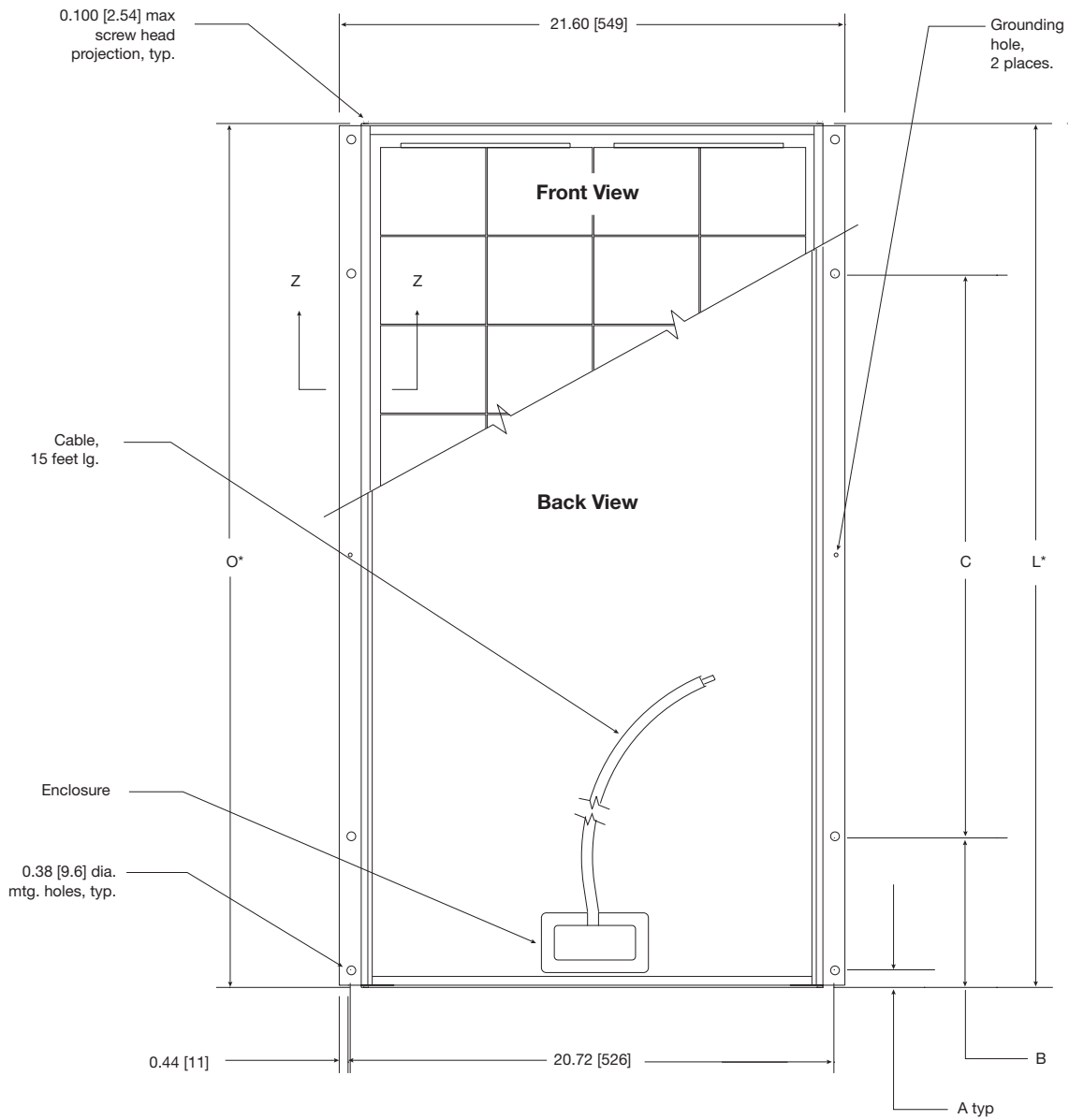
SX-40M, SX-50M



Section Y-Y

| | O* | L* |
|--------|-------------------------|-------------------------|
| SX-40M | $\frac{30.08^*}{[764]}$ | $\frac{29.88^*}{[759]}$ |
| SX-50M | $\frac{36.93^*}{[938]}$ | $\frac{36.73^*}{[933]}$ |

Note:
* "O" dimensions include 0.100 [2.54] max. screw head projection on each end. "L" dimensions do not include screw head projection.



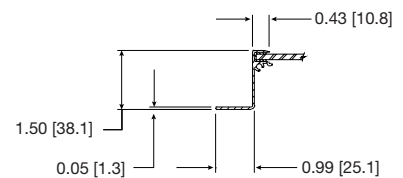
SX-40D, SX-50D

| | O* | L* | A | B | C |
|--------|-------------------------|-------------------------|----------------------|-----------------------|-----------------------|
| SX-40D | $\frac{30.11^*}{[765]}$ | $\frac{29.91^*}{[760]}$ | $\frac{6.96}{[177]}$ | $\frac{14.96}{[380]}$ | — |
| SX-50D | $\frac{36.95^*}{[938]}$ | $\frac{36.75^*}{[934]}$ | $\frac{0.68}{[17]}$ | $\frac{6.38}{[162]}$ | $\frac{24.00}{[610]}$ |

Note:

* "O" dimensions include 0.100 [2.54] max. screw head projection on each end.

"L" dimensions do not include screw head projection.



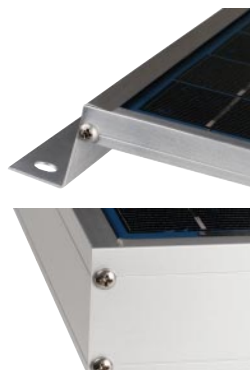
Section Z-Z



SX-55, SX-60 and SX-65

Photovoltaic Modules

SX-55, SX-60 and SX-65 photovoltaic modules are part of Solarex's new SX™ module series, providing cost-effective photovoltaic power for general use. They operate DC loads directly or, in an inverter-equipped system, AC loads. They are suitable for single or multiple-module systems and, with 36 polycrystalline cells in series, charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.



Top:
DirectMount™ frame.
Bottom:
Universal frame.

Applications of these modules, which generate peak power of 55 watts, 60 watts and 65 watts respectively, encompass virtually all applications where photovoltaics are a feasible energy source, including telecommunication systems, pumping and irrigation, cathodic protection, remote villages and homes, and land-based navigation aids. They are available in two configurations: the **D** configuration, which mounts directly to many surfaces without additional hardware; and the **U** configuration, which includes the heavy-duty Universal frame and a high-volume junction box with dual-voltage output.

The SX-55D, SX-60D and SX-65D

The DirectMount™ frame of the SX-55D, -60D, and -65D enables these modules to be mounted on many surfaces (roofs, walls, etc.) with no need for mounting hardware beyond fasteners appropriate for the surface and material. They are easily and inexpensively installed on remote dwellings to provide limited electric power.

Complete, Factory-Wired

Output of the **D** configuration is via a 15-foot (4.6m) PVC-jacketed AWG 14-2 cable which terminates in a low-profile junction box on the module back. Epoxy-potted in the box, module electrical connections are sealed against corrosion and effectively strain-relieved. Output voltage is compatible with 12VDC systems, and the module is suitable for use in systems with system DC voltage up to 30 volts.

The SX-55U, SX-60U and SX-65U

The **U** configuration modules are designed primarily for industrial use and other particularly demanding applications. Their rugged Universal frame is suitable for severe duty, exceeds the requirements of all certifying agencies, and is fully supported by Solarex's IntegraSystem™ system integration concept, which ensures full compatibility with other Solarex subsystems (support hardware, regulators, etc.). These modules are suitable for single- or multiple-module applications with system DC voltage not exceeding 600V (U.S. NEC rating) or 1000V (per TÜV Rheinland.)



SX-60U

The Natural Source for Electricity™

Solarex's polycrystalline silicon modules require much less energy to manufacture than comparable monocrystalline products, giving a significantly faster energy payback and larger lifetime contribution of green energy.



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Dual Voltage Capability

All SX-55, -60, and -65 modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. In the SX-55U, -60U and -65U junction box, the strings may be field-wired in series (providing 12V nominal output) or in parallel (providing 6V nominal output.)

High-Capacity Versatile Junction Box

The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts 1/2" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm²); standard terminals accept up to AWG #10 (6mm²);
- a Solarstate™ charge regulator.

The SX-55U, -60U and -65U are certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC. They are approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.



Performance and Workmanship Warranted

The materials, workmanship and performance of the SX-55, -60 and -65 are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating).



Quality Certified

SX-55, -60, and -65 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between -40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics⁽¹⁾

| | SX-55 | SX-60 | SX-65 |
|-------------------------------------|--|-------|-------|
| Maximum power (P_{\max}) | 55W | 60W | 65W |
| Voltage at P_{\max} (V_{mp}) | 16.5V | 16.8V | 17.2V |
| Current at P_{\max} (I_{mp}) | 3.33A | 3.56A | 3.77A |
| Guaranteed minimum P_{\max} | 50W | 55W | 60W |
| Short-circuit current (I_{sc}) | 3.69A | 3.87A | 4.06A |
| Open-circuit voltage (V_{oc}) | 20.6V | 21.0V | 21.5V |
| Temperature coefficient of I_{sc} | $(0.065 \pm 0.015)\%/^{\circ}\text{C}$ | | |
| Temperature coefficient of V_{oc} | $-(80 \pm 10)\text{mV}/^{\circ}\text{C}$ | | |
| Temperature coefficient of power | $-(0.5 \pm 0.05)\%/^{\circ}\text{C}$ | | |
| NOCT ² | $47^{\circ} \pm 2^{\circ}\text{C}$ | | |

Notes

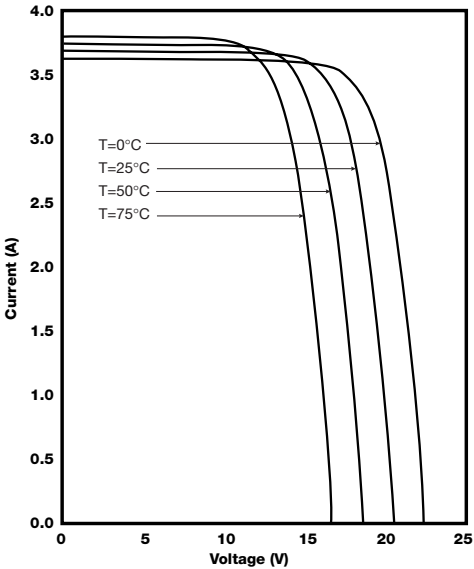
- These specifications represent the performance of typical 12V modules as measured at their output terminals (or cable termination), and do not include the effect of such additional equipment as diodes. The specifications are based on measurements made in accordance with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:
 - illumination of $1\text{ kW}/\text{m}^2$ (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
 - cell temperature of 25°C .For characteristics of modules in 6V configuration, divide the 12V voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.
- When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C , solar irradiation of $0.8\text{ kW}/\text{m}^2$, and wind speed of 1 m/s .
- These specifications do not include the effect of light-induced degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

Mechanical Characteristics

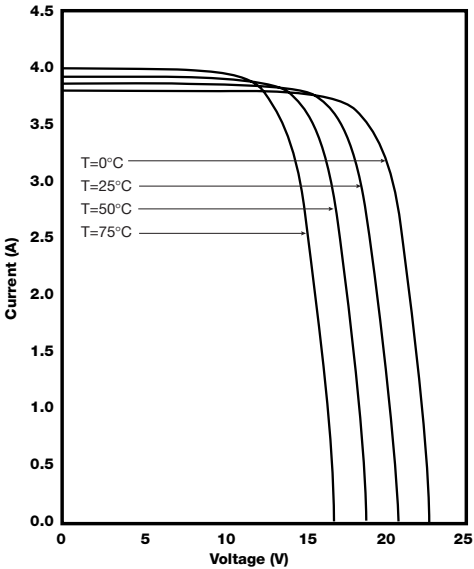
Weight

| | |
|------------------|----------------------|
| D configurations | 14.4 pounds (6.5 kg) |
| U configurations | 15.9 pounds (7.2 kg) |

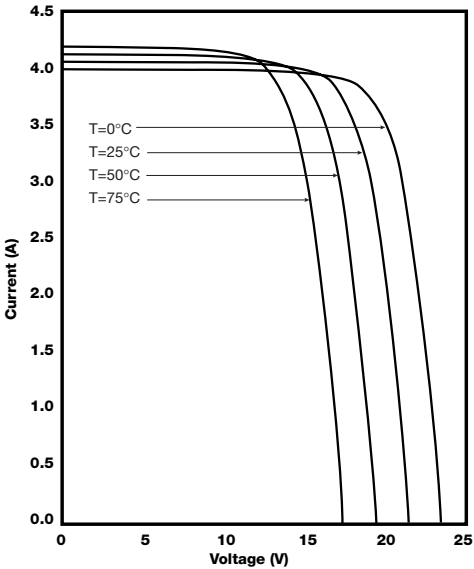
SX-55 I-V Curves



SX-60 I-V Curves

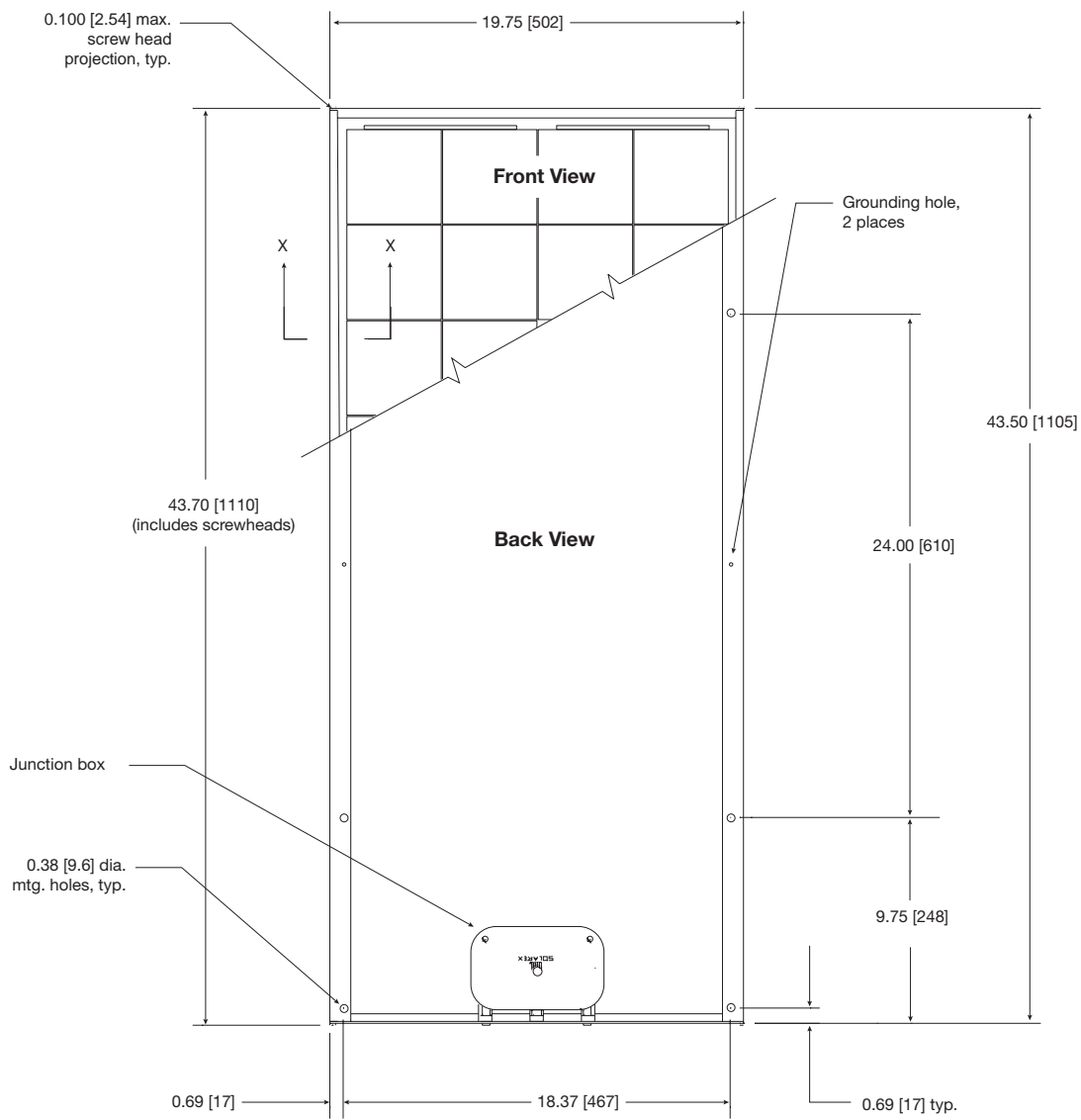


SX-65 I-V Curves

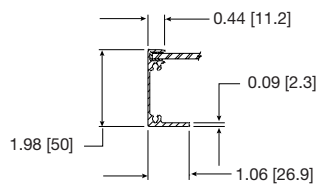


Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances $\pm 1/8"$ (3mm)



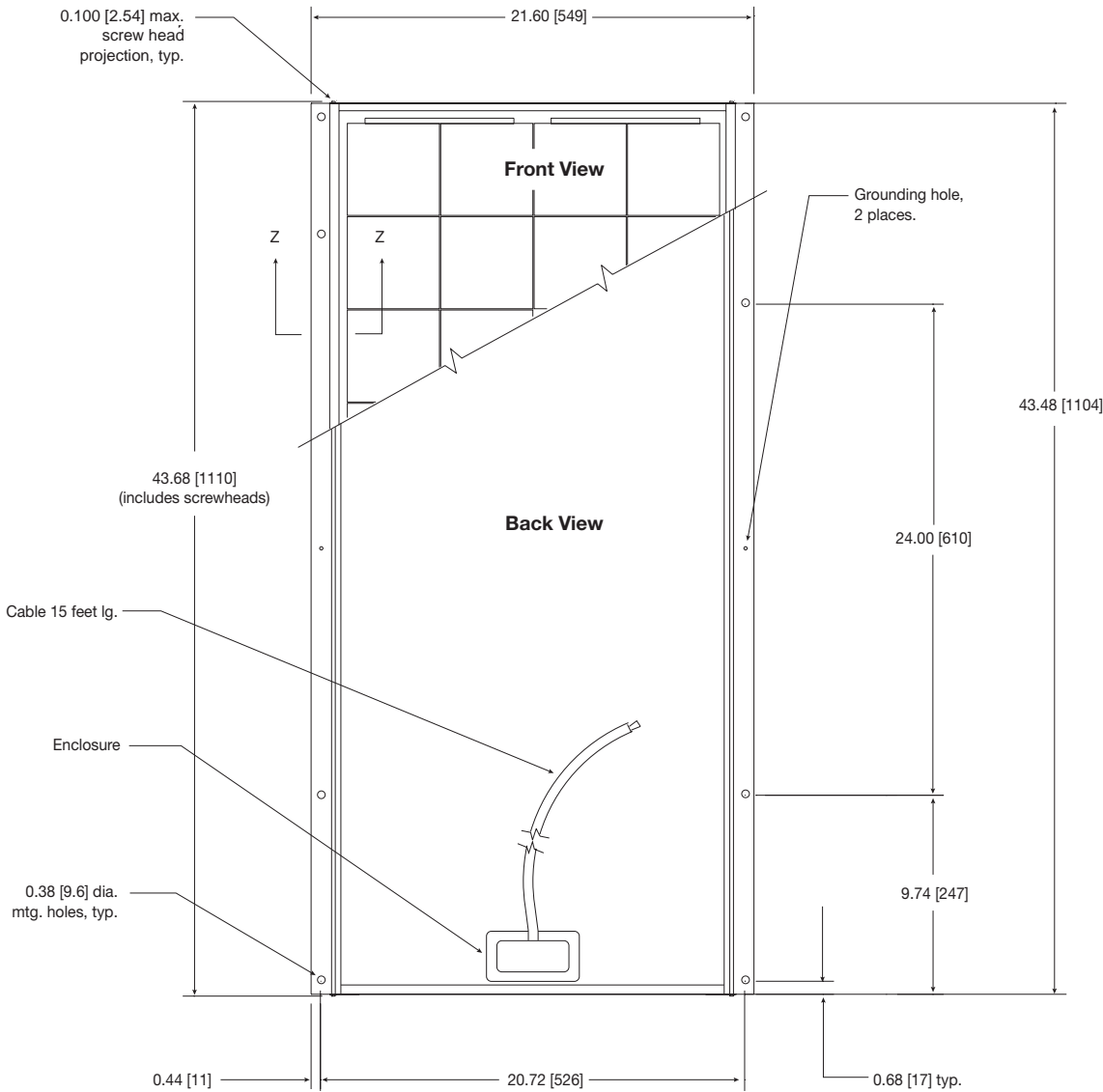
SX-55U, -60U, -65U



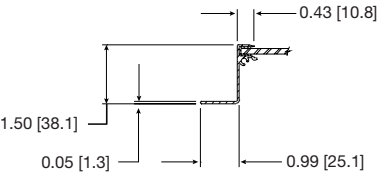
Section X-X

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances $\pm 1/8"$ (3mm)



SX-55D, -60D, -65D



Section Z-Z



SX-75, SX-80 and SX-85

Photovoltaic Modules

SX-75, SX-80 and SX-85 photovoltaic modules are the largest of Solarex's new SX™ module series, providing cost-effective photovoltaic power for general use. They operate DC loads directly or, in an inverter-equipped system, AC loads. They are suitable for single or multiple-module systems and, with 36 polycrystalline cells in series, charge batteries efficiently in virtually any climate. Their materials, design and construction reflect Solarex's quarter-century of experience.



Universal frame.

Applications of these modules, which generate peak power of 75 watts, 80 watts and 85 watts respectively, encompass virtually all applications where photovoltaics are a feasible energy source, including telecommunication systems, pumping and irrigation, cathodic protection, remote villages and homes, and land-based navigation aids. They are engineered under Solarex's IntegraSystem™ system integration concept, which ensures compatibility with other Solarex subsystems and components (support hardware, regulators, etc.) and easy system assembly. Their rugged Universal frame is suitable for industrial use, and exceeds the requirements of all certifying agencies.

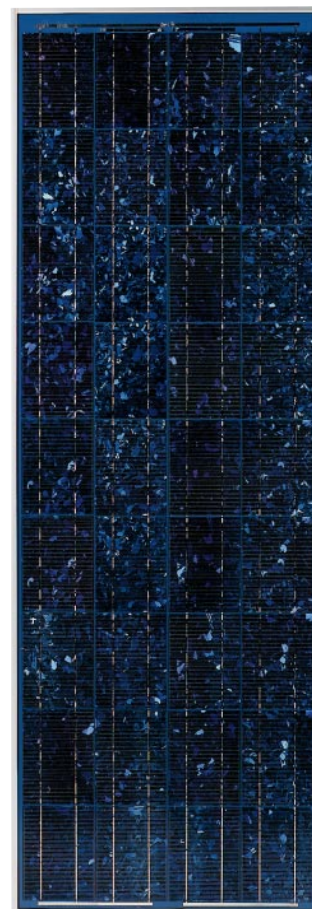
Dual Voltage Capability

These modules consist of 36 polycrystalline silicon solar cells, electrically configured as two series strings of 18 cells each. Shipped in 12V nominal configuration, with cell strings series-wired, the modules may easily be switched to 6V nominal output in the field by moving leads in the junction box.

High-Capacity Versatile Junction Box

The large (25 cubic inches, 411cc) junction box is raintight (IP54 rated) and accepts 1/2" nominal or PG13.5 conduit or cable fittings. With its six-terminal connection block, it enables most system array connections (putting modules in series or parallel) to be made right in the junction box. Optionally, this junction box can be fitted with:

- blocking and bypass diodes;
- an oversize terminal block which accepts conductors up to AWG #4 (25mm²); standard terminals accept up to AWG #10 (6mm²);
- a Solarstate™ charge regulator.



SX-80

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The Natural Source for Electricity™

Solarex's polycrystalline silicon modules require much less energy to manufacture than comparable monocrystalline products, giving a significantly faster energy payback and larger lifetime contribution of green energy.



Performance and Workmanship Warranted

The materials, workmanship and performance of the SX-75, -80 and -85 are covered by Solarex's limited twenty-year warranty. Contact Solarex's Marketing Department for full terms and limitations of the warranty.

Polycrystalline Solar Cells

With square corners, Solarex's polycrystalline solar cells fill the module surface with active photovoltaic area for high power density. Mega™ cells are efficient, stable, and attractive; their cut crystal facets provide a sparkling visual texture that shifts with the viewer's perspective.

Proven Materials and Construction

Solarex's quarter-century of field experience shows in every aspect of these modules' construction and materials:

- Cell strings laminated between sheets of ethylene vinyl acetate (EVA) and tempered glass, a rugged weatherproof package;
- Tempered glass superstrate is highly transmissive (low iron content), impact-resistant;
- Clear anodized frames are strong, corrosion-resistant, compatible with Solarex mounting hardware and other mounting structures, and durably attractive.

Safety Approved

These modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating), certified by TÜV Rheinland as Class II equipment and for use in systems with voltage up to 1000VDC, and approved by Factory Mutual Research for application in NEC Class 1, Division 2, Groups C & D hazardous locations.



Quality Certified

SX-75, -80, and -85 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the requirements of IEC 61215 and IEEE 1262, including:

- repetitive cycling between -40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25mm) hail at terminal velocity;
- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- static loading, front and back, of 50 psf (2400 Pa); front loading (e.g. snow) of 113 psf (5400 Pa).

Typical Electrical Characteristics⁽¹⁾

| | SX-75 | SX-80 | SX-85 |
|---|--|-------|-------|
| Maximum power (P_{max}) | 75W | 80W | 85W |
| Voltage at P_{max} (V_{mp}) | 16.5V | 16.8V | 17.1V |
| Current at P_{max} (I_{mp}) | 4.54A | 4.75A | 4.97A |
| Guaranteed minimum P_{max} | 70W | 75W | 80W |
| Short-circuit current (I_{sc}) | 4.97A | 5.17A | 5.30A |
| Open-circuit voltage (V_{oc}) | 20.7V | 21.0V | 21.3V |
| Maximum system voltage ⁽²⁾ | 600V | | |
| Temperature coefficient of I_{sc} | $(0.065 \pm 0.015)\%/^{\circ}\text{C}$ | | |
| Temperature coefficient of V_{oc} | $-(80 \pm 10)\text{mV}/^{\circ}\text{C}$ | | |
| Temperature coefficient of power | $-(0.5 \pm 0.05)\%/^{\circ}\text{C}$ | | |
| NOCT ⁽³⁾ | $47 \pm 2^{\circ}\text{C}$ | | |

Notes

1. These specifications represent the performance of typical 12 modules as measured at their output terminals, and do not include the effect of such additional equipment as diodes or cables. The specifications are based on measurements made in accordance with ASTM E1036-85 corrected to SRC (Standard Reporting Conditions, also known as STC or Standard Test Conditions), which are:

- illumination of $1 \text{ kW}/\text{m}^2$ (1 sun) at spectral distribution of AM 1.5 (ASTM E892-87 global spectral irradiance);
- cell temperature of 25°C .

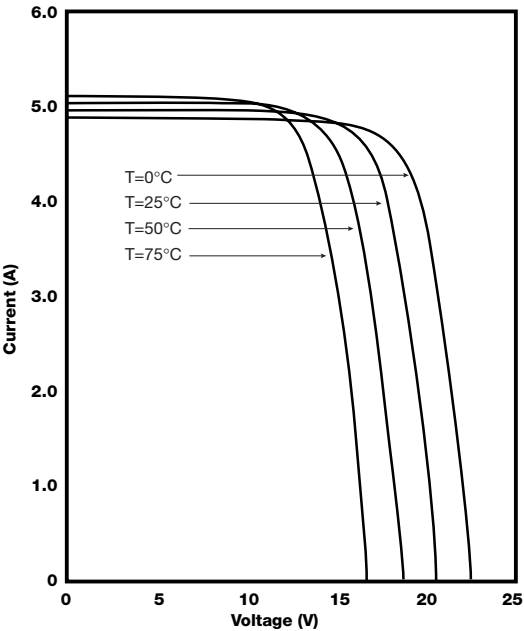
For characteristics of modules in 6V configuration, divide the 12 voltage characteristics by 2 and multiply current characteristics by 2. Power values are unchanged.

2. U.S. NEC rating.

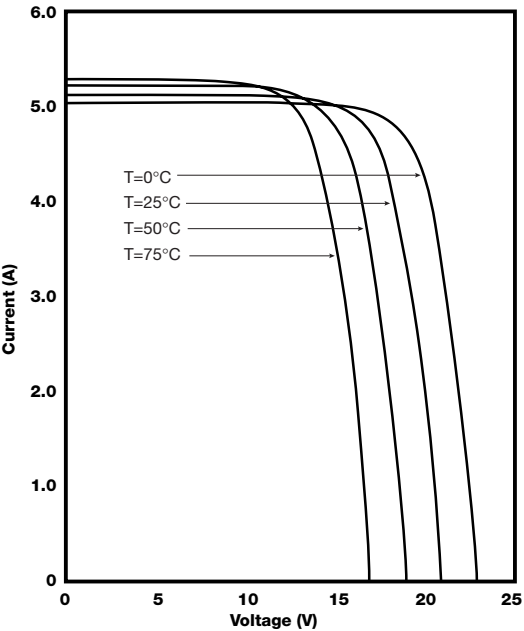
3. When illuminated, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indicator of this temperature differential, and is the cell temperature under Standard Operating Conditions: ambient temperature of 20°C , solar irradiation of $0.8 \text{ kW}/\text{m}^2$, and wind speed of 1 m/s.

4. These specifications do not include the effect of light-induced degradation, which can result in approximately a 3% reduction in power output after exposure to sunlight.

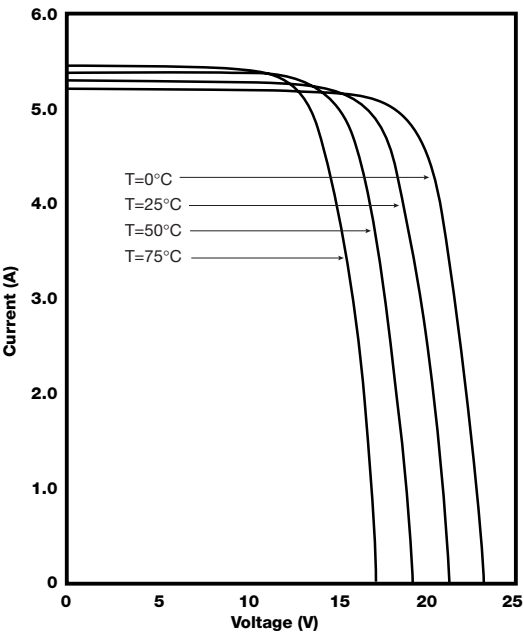
SX-75 I-V Curves



SX-80 I-V Curves



SX-85 I-V Curves

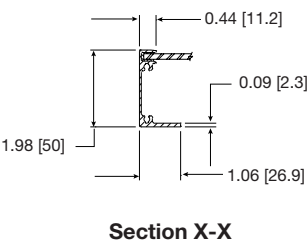
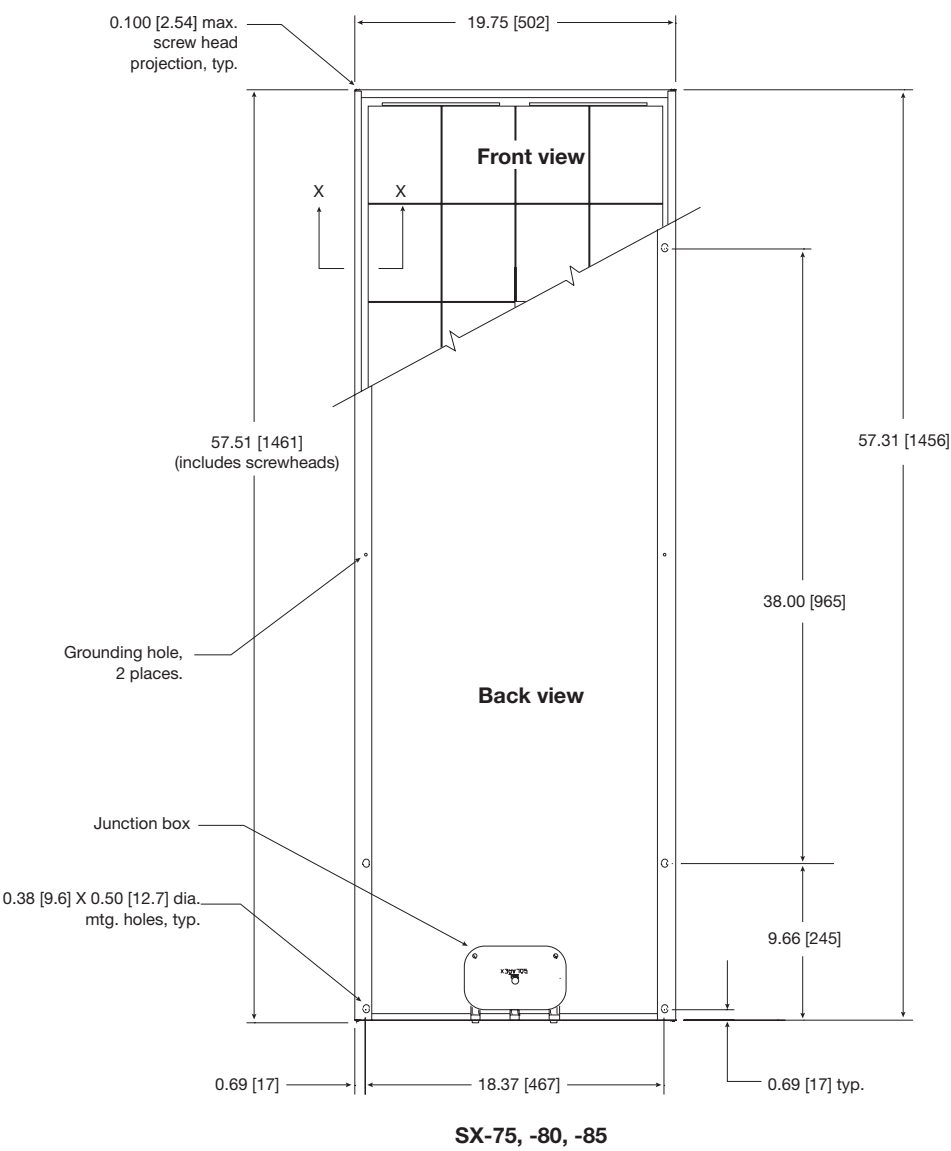


Mechanical Characteristics

Weight
20.9 pounds (9.5 kg)

Dimensions

Dimensions in brackets are in millimeters. Unbracketed dimensions are in inches. Overall tolerances $\pm 1/8"$ (3mm)



MSX-110 and MSX-120 Photovoltaic Modules



The MSX-110 and -120 are large industrial-grade photovoltaic modules, proven to deliver power reliably in virtually any climate. They are designed for large-scale applications which can exploit their high output, precise testing and labeling, and attractive appearance. Typical applications include utility grid-supplemental systems, telecommunications systems, pumping and irrigation, and remote villages and clinics. They are compatible with a range of Solarex subsystems and components.

Individually Tested, Labeled and Warranted

As part of Solarex's final inspection procedure, each of these modules is tested in a solar simulator and labeled with its actual output—voltage, current, and power at maximum power point (P_{max})—at Standard Test Conditions and Standard Operating Conditions. Furthermore, each MSX-110 and -120 module is covered by a Limited Warranty which warrants freedom from defects in materials and workmanship for 5 years; and by Limited Warranties of power output, which warrant:

- at least 90% of the specified minimum P_{max} for twelve years;
- at least 80% of the specified minimum P_{max} for twenty-five years.

Contact Solarex's Marketing Department or your Solarex representative for full terms of these warranties.

Versatile in Application

The MSX-110/120 design provides great versatility:

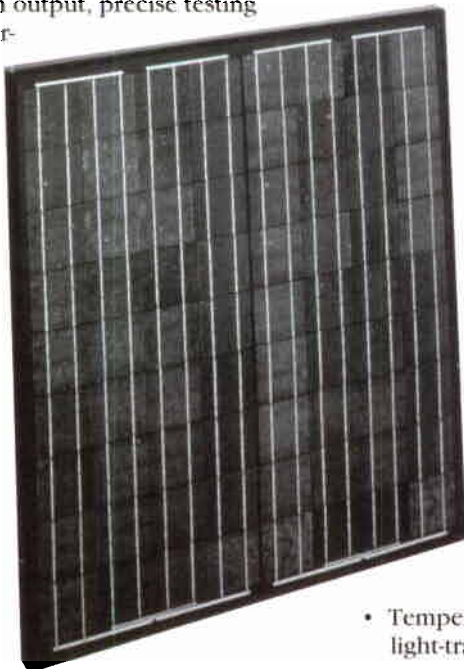
Dual Voltage Capability

These modules consist of 72 polycrystalline silicon solar cells electrically configured as four series strings of 18 cells each. They may be ordered in either 12V or 24V configuration, and may easily be switched between configurations in the field by moving leads in the junction boxes. This design also allows installation of bypass diodes on 18-cell strings, which can improve reliability and performance in systems with nominal voltage 24V and above.

Large Versatile Junction Box

These modules include dual raintight (IP54-rated) junction boxes which accept conduit or cable via 1/2" nominal or PG13.5 metric fittings. They have sufficient space (25 cubic inches/ 411 cc each) not only to connect the module into a system, but to enclose array series/parallel connections and diodes. The standard six-terminal con-

nection block accepts wire as large as AWG #10 (6mm²); an optional terminal block accepts wire up to AWG #4 (25mm²). Both blocks accept bare wire or preformed terminations.



Attractive, Proven Rugged

MSX modules are both attractive and rugged, having proved their reliability over decades of use at thousands of installations in every climate on Earth.

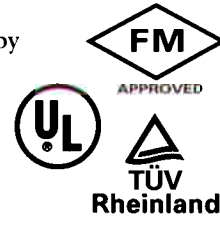
- Polycrystalline silicon solar cells are efficient and attractive, with cut crystal facets providing visual texture. For consistent appearance, they are set in a blue backsheet which closely matches cell color.
- The architectural-grade bronze-anodized extruded aluminum frame is corrosion-resistant, strong, compatible with Solarex mounting hardware and most other mounting structures.
- Cell strings are laminated between sheets of modified ethylene vinyl acetate (EVA) and tempered glass with a durable Tedlar backsheet for long-term weather-resistance.
- Tempered glass superstrate filters UV and is highly light-transmissive and impact-resistant.

Lower Balance of System Costs

With these modules' higher power, fewer modules are needed to serve an application, and many balance-of-system (BOS) costs are reduced accordingly. These include support structures, wiring, and labor-related costs such as assembly, installation, shipping and handling.

Safety Approved

MSX-110 and -120 modules are listed by Underwriter's Laboratories for electrical and fire safety (Class C fire rating), certified by TÜV Rheinland as Class II equipment, and approved by Factory Mutual Research for application in NEC Class 1, Division 2, Group C & D hazardous locations.



Quality certified

MSX-110 and -120 modules are manufactured in our ISO 9001-certified factories to demanding specifications, and comply with the tests and requirements of IEC 61215, (formerly CEC 503) and IEEE 1262, including:

- repetitive cycling between -40°C and 90°C;
- repetitive cycling between -40°C and 85°C at 85% relative humidity;
- simulated impact of one-inch (25 mm) hail at terminal velocity;
- 2700 VDC frame/cell string isolation test;
- performance at low light levels;

- a "damp heat" test, consisting of 1000 hours of exposure to 85°C and 85% relative humidity;
- a "hot-spot" test, which determines a module's ability to tolerate localized shadowing (which can cause reverse-biased operation and localized heating);
- resistance to UV degradation;
- robustness of electrical terminations;
- static loading, front and back, of 50 psf (2400 pascals); front loading (e.g. snow) of 113 psf (5400 pascals).

Options

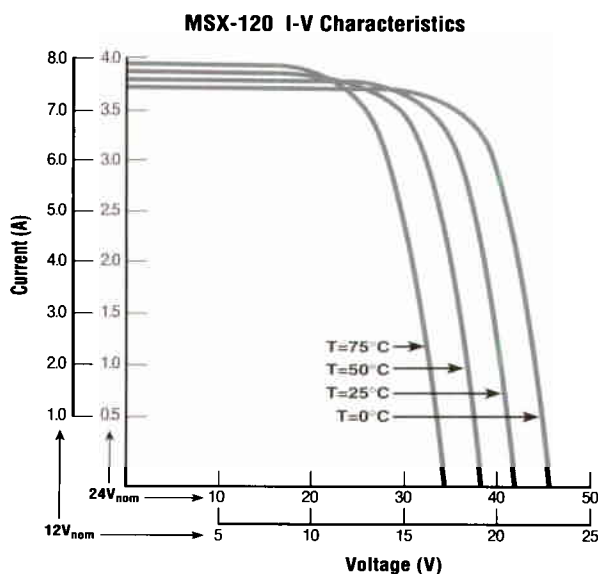
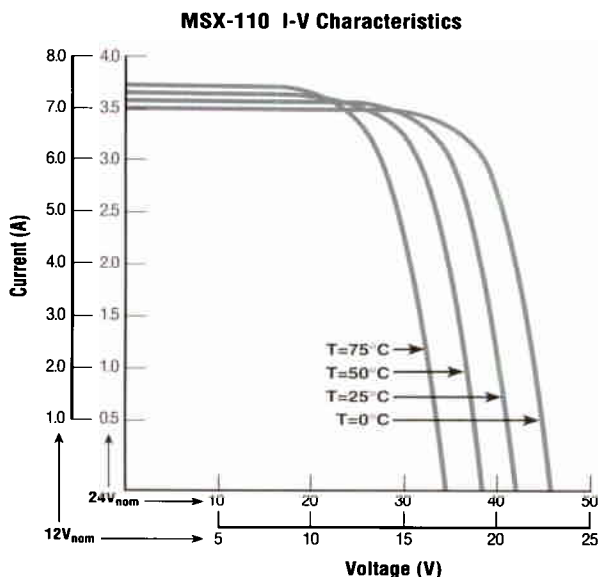
- Blocking and bypass diodes
- Frameless laminate
- Integral Solarstate regulator

Typical Electrical Characteristics¹

| | MSX-110 | MSX-120 |
|-------------------------------------|-------------------|---------|
| Typical maximum power (P_{max}) | 110W | 120W |
| Voltage @ P_{max} (V_{mp}) | 32.9V | 33.7V |
| Current @ P_{max} (I_{mp}) | 3.34A | 3.56A |
| Specified minimum P_{max} | 105W | 114W |
| Short-circuit current (I_{sc}) | 3.69A | 3.87A |
| Open-circuit voltage (V_{oc}) | 41.2V | 42.1V |
| Temperature coefficient of I_{sc} | (0.055±0.015)%/°C | |
| Temperature coefficient of V_{oc} | -(160±20)mV/°C | |
| Temperature coefficient of power | -(0.5±0.05)%/°C | |
| NOCT ² | 47±2°C | |

Notes:

- (1) These data represent the performance of typical modules, wired in 24V configuration, as measured at their output terminals, and do not include the effect of such additional equipment as diodes and cabling. The data are based on measurements made at Standard Test Conditions (STC), which are:
 - Illumination of 1 kW/m² (1 sun) at spectral distribution of AM 1.5
 - Cell temperature of 25°C or as otherwise specified (on curves).
 Electrical characteristics of modules wired in 12V configuration may be found on the 12V I-V curve scales, or by doubling 24V current data and halving 24V voltage data.
- (2) Under most operating conditions, the cells in a module operate hotter than the ambient temperature. NOCT (Nominal Operating Cell Temperature) is an indication of this temperature rise, and is the cell temperature under Standard Operating Conditions (SOC), which are:
 - 20° ambient temperature
 - solar irradiation of 0.8 kW/m²
 - average windspeed of 1 m/s with the wind oriented parallel to the plane of the array, and all sides of the array fully exposed to the wind.
- (3) During the stabilization process which occurs during the first few months of deployment, module power may decrease approximately 3% from typical P_{max} .

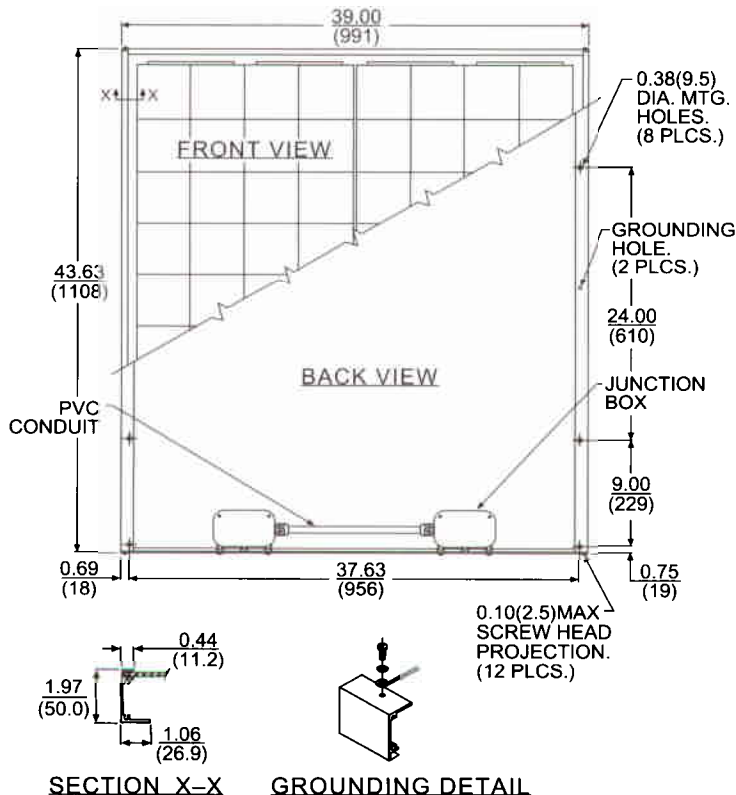


For more information, contact:

Mechanical Characteristics

Weight 28.6 pounds (13.0 kg)

Dimensions Dimensions in brackets are in millimeters
Unbracketed dimensions are in inches
Overall tolerances ± 1/8" (3mm)

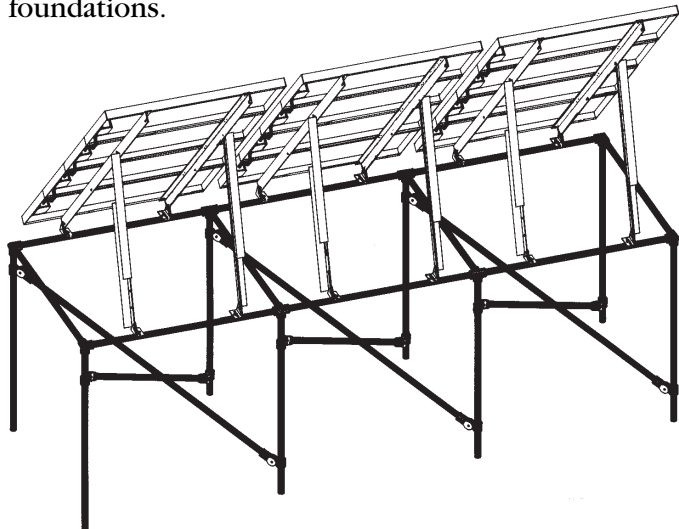


Solarex IntegraSystem™ Photovoltaic Array Support Systems



SOLAREX

This publication describes Solarex's IntegraSystem photovoltaic array support hardware. This hardware is offered in a range of types, capable of mounting arrays as small as one module and as large as several dozen kilowatts to buildings, poles, and ground-based foundations.



IntegraSystem hardware is adaptable, reliable, easy to use, and uses a standardized complement of well-tested components. Its modular design allows it to precisely match your array support requirements and the characteristics of your site. It meets stringent specifications in any of its approved configurations.

Complete Integrated Kits

IntegraSystem hardware kits are complete and fully compatible with Solarex modules, panels and wiring kits. The interfaces between each kit and other array components are clearly identified in this brochure.

A Pre-engineered Support System

IntegraSystem kits are fully documented, easy to assemble, and compatible with other indicated Solarex products. Assembled arrays will withstand winds in excess of 125 mph (200 km/hr).

Engineered for Severe Environments

All kit materials are selected for corrosion resistance in severe climates. The largest mounting kit,

the HPF1 rack structure, uses galvanized steel structural members. The structural members of smaller kits are fabricated from corrosion-resistant aluminum alloys and assembled with stainless steel fasteners.

Tested in the Real World

Twenty years of real-world testing and design development means IntegraSystem array hardware performs well anywhere. Solarex' rigorous material specifications ensure consistent quality.

Adjustable for Any Latitude

Integrasystem kits allow arrays to be adjusted to and securely fixed at the optimum tilt angle for sites at any latitude. The tilt angle range (in degrees of variance from horizontal) is shown in the kit specifications which follow.

The IntegraSystem Concept

The key to the IntegraSystem™ concept is pre-engineering. Every IntegraSystem PV component or subsystem is electrically and mechanically pre-engineered for reliability, compatibility with other IntegraSystem components, ease of installation and compliance with code and safety requirements. This pre-engineering process includes:

- *identifying the subsystem's interfaces with other components and ensuring compatibility;*
- *applying design and selection criteria that assure compliance with NEC requirements and efficient, safe, reliable system operation;*
- *applying economies of scale to the process of system design and component selection and procurement.*

IntegraSystem enables a customer to select PV components with confidence that they will assemble easily into an efficient, reliable, cost-effective power system.

GENERAL SPECIFICATIONS

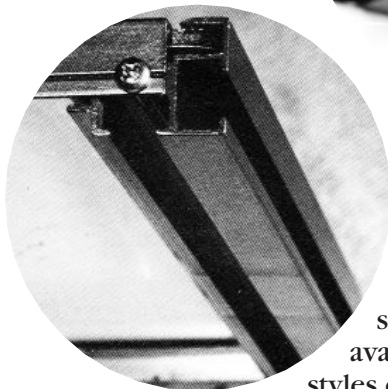
| | |
|--------------|---|
| Wind loading | Minimum 125 mph (200 km/hr) |
| Materials | Hot-dip galvanized Schedule 40 steel pipe 5052 or 6061 (as appropriate) clear anodized structural aluminum alloy Type 316 stainless steel fasteners |

SINGLE-MODULE MOUNTING HARDWARE

IntegraSystem kits are available for mounting single modules to cylindrical or square poles or masts and horizontal, vertical or sloping structural surfaces. These kits include all necessary hardware and fasteners with the exception of the fasteners that attach the completed assembly to the mounting surface; fasteners required for this function vary greatly since mounting surfaces vary greatly. The kits include complete installation instructions and recommendations for attachment hardware

Universal

Multimount



(e.g., hose clamps, U-bolts, lag screws, etc.) for use on common surfaces.

Some of Solarex's small PV modules are available with two styles of frame: the

"Universal" frame and the Multimount™ frame. Mounting kits for each frame style are available.

Mounting Kits for Small Module with Universal Frame

These kits consist of a mounting bracket, a module bracket and required assembly fasteners. They mount one MSX-10, -18, -30 or -40 with universal frame to a vertical pole (cylindrical or square) or a flat structural surface.

- Continuous adjustment of module tilt angle from 0° to 90°.

- Heavy-duty aluminum alloy brackets with clear anodized finish.
- Fits poles with outside diameter 2-7/8" to 12" using hose clamps, 1" to 4" using U-bolts.



Module
MSX-18, -30, and -40
MSX-10

Mounting Kit
HPM18-30
HPM10U

Mounting Kit for Small Module with Multimount Frame

These kits mount one MSX-5, -10, -18, or -30 with Multimount™ frame to a vertical pole (cylindrical or square) or a flat structural surface.

- Continuous adjustment of module to any desired tilt; tilt angles are imprinted on the bracket.
- Fits poles with outside diameter 1" to 4"



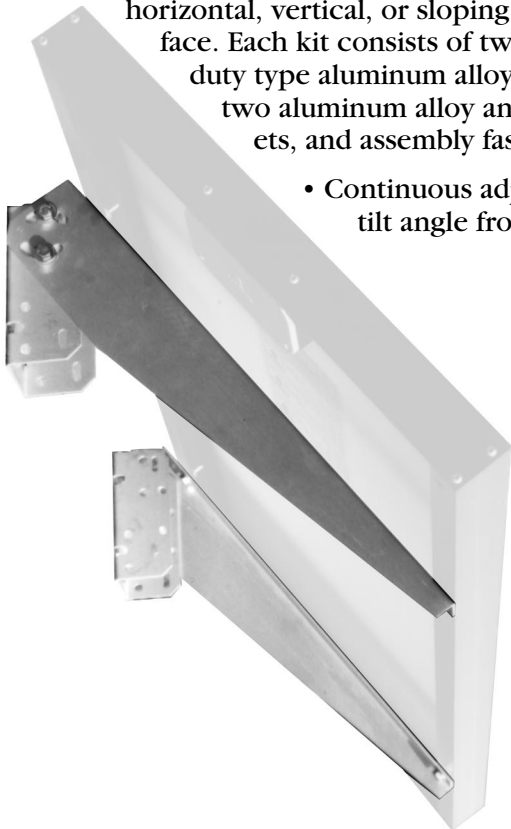
Module
MSX-18 and 30
MSX-5 and 10

Mounting Kit
HPM18-30M
HPM5-10

Large Module Flat-surface Mounting Kits

These kits attach a single large module to a horizontal, vertical, or sloping flat surface. Each kit consists of two heavy-duty type aluminum alloy brackets, two aluminum alloy angle brackets, and assembly fasteners.

- Continuous adjustment of tilt angle from 0° to 90°



Module
MSX-50, -53, -56, -60, and -64
MSX-77, -83

Mounting Kit
HFMH60
HFMH80

Mounting Kits for Large Module with Long Axis Horizontal

These kits consist of a crossarm bracket, two feet, two angle brackets, and required fasteners. They mount a single large Solarex module to a vertical pole or other flat vertical, horizontal or sloping surface, supporting the module with its long axis horizontal.



- Continuous adjustment of tilt angle from 0° to 90°
- Fits poles with outside diameter 2" to 12-3/4"

Module
MSX-50, -53, -56, -60, and -64
MSX-77, -83

Mounting Kit
HPMH53-60
HPMH80

Mounting Kit for Large Module with Long Axis Vertical, Item HPMV53-60

This kit consists of six brackets, a two-section adjustable leg assembly, and assembly fasteners. It mounts a single large Solarex module to a vertical pole or other flat vertical surface, supporting the module with its long axis vertical.

- Applicability: Single MSX-50, -53, -56, -60 or -64 module
- Incremental adjustment of tilt angle from 15° to 70°.
- Fits poles with outside diameter 1" to 4"



Mounting Kit for Marine Modules

These kits consist of two brackets and assembly hardware, and mount an MSX-20MM or -38 MM to a vertical or horizontal beam or a flat structural surface.

- Continuous adjustment of tilt angle from 0° to 90°.
- Fits poles with outside diameter 1" to 2-1/2"



HPMV Kits



HPMH Kits

| Module | Mounting Kit | |
|----------|---------------|-----------------|
| | Vertical Beam | Horizontal Beam |
| MSX-20MM | HPMV20MM | HPMH20MM |
| MSX-38MM | HPMV38MM | HPMH38MM |

MOUNTING HARDWARE FOR MULTIPLE-MODULE ARRAYS

The IntegraSystem modular approach to mounting a multiple-module array considers the support system as three subassemblies, which are described in the remainder of this brochure. When ordering IntegraSystem hardware for a site, ensure that *all three hardware categories* are considered in your design.

Panel assembly kits which combine modules into panels ranging in size from 1 module (a 1X panel) to 6 modules (a 6X panel).

Leg kits which hold panels at the appropriate tilt angle

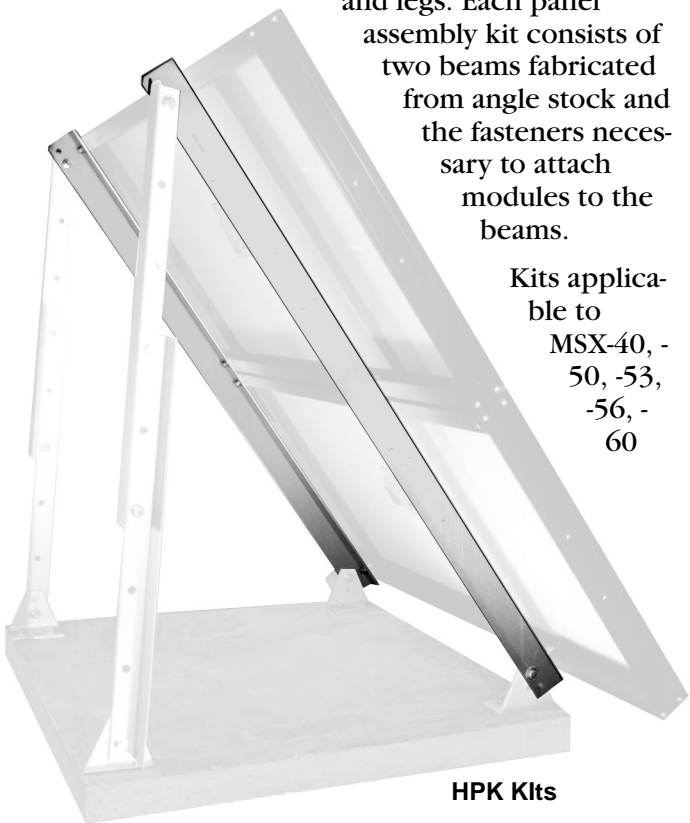
Site structural interface. This must accept the mounting feet of the leg kits and be able to withstand mechanical loading transferred by the array. It may be provided by Solarex or the Customer. Typical Customer-furnished interfaces include poured concrete pads, roof-mounted external beams, and horizontal or vertical poles.

Panel Assembly Kits, Items HPK

IntegraSystem panel assembly kits assemble multiple modules into panels, using longitudinal beams which mechanically integrate the modules, add rigidity to the panel, and accept mounting feet and legs. Each panel

assembly kit consists of two beams fabricated from angle stock and the fasteners necessary to attach modules to the beams.

Kits applicable to
MSX-40, -
50, -53,
-56, -
60



HPK Kits

and -64 modules are identified by item numbers ranging from HPK2X (for a 2-module panel) through HPK6X (for a 6-module panel). The item numbers of most kits for MSX-77, -83, and -120 modules include a module designator suffix, as shown in Table 1.

Table 1
HPK Panel Assembly Kits for
MSX-77, -83 and -120 Modules

| <u>Panel Configuration</u> | <u>HPK Item Number</u> |
|----------------------------|------------------------|
| 2 MSX-77 or -83 modules | HPK2X-80 |
| 4 MSX-77 or -83 modules | HPK4X-80 |
| 1 MSX-120 module | HPK1X-120 |
| 2 MSX-120 modules | HPK4X |
| 3 MSX-120 modules | HPK3X-120 |

Adjustable Leg kits, Items HAFMS

Each leg kit consists of two adjustable two-section legs (adjustable in 4-inch increments), four “feet”, and required assembly hardware. The kits securely support a panel at the desired tilt angle on horizontal, vertical and sloping surfaces. Table 2 provides guidance in selecting the correct leg kit for supporting a panel on a Customer-supplied hori-

zontal foundation or mounting surface. Table 3 (over) provides guidance in selecting the correct leg kit for supporting a panel on a vertical mounting surface.



Note that these kits do not include hardware for attaching the feet to the supporting surface.

Table 2
Selecting HAFMS Leg Kits for
Mounting Panels on Horizontal Surfaces

| <u>Panel Configuration</u> | <u>Leg Kit</u> | <u>Tilt Range</u> |
|--|---|--|
| 2 or 3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module | HAFMS12 HAFMS20 HAFMS28 | 12° to 30° 24° to 63° 35° to 88° |
| 4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules | HAFMS12 HAFMS20 HAFMS28 HAFMS36 | 10° to 22° 19° to 42° 28° to 68° 36° to 89° |
| 5 or 6 MSX-40, -50, -60 (series) modules 4 MSX-77 or -83 modules 3 MSX-120 modules | HAFMS12 HAFMS20 HAFMS28 HAFMS36 HAFMS36 plus 36" extension | 7° to 14° 8° to 26° 10° to 38° 19° to 50° 43° to 77° |

Panel pole mounting kit, Item HPMA

A panel pole mounting kit consists of two crossarm brackets which, in conjunction with the appropriate leg kit and panel kits, support a panel on a vertical pole or flat vertical surface. This kit does not include hardware for attaching the brackets to the supporting surface, since surfaces and appropriate fasteners vary widely.

- Supports panels of two, three or four MSX-50, -53, -56, -60 or -64 modules; two MSX-77 or -83 modules; or one MSX-120 module.



- Incremental adjustment of tilt angle is provided by the separately ordered HAFMS leg kit. Table 3 provides guidance in selecting the leg kit needed for various angles.
- Fits poles with outside diameter 2" to 12-3/4"

Array Support Rack Structure, Items HPF1

The IntegraSystem rack structure is a modular galvanized steel rack which provides a stable elevated base for a PV array. Used in conjunction with the appropriate HAFMS leg kit, it supports panels at any desired tilt angle. The starting point for any rack structure is the HPF101, a single-bay rack which supports one panel consisting of one or more modules. The rack is expanded by adding HPF1E1 extension bays, each of which support an additional panel.

Solarex recommends that each rack structure not be extended beyond a total of ten bays. If the array is larger than ten bays, it should be divided into two subarrays.

- Includes precut Schedule 40 galvanized steel pipe and all required fittings.
- Fittings assemble to pipe with socket-head Allen (hex) screws. Allen wrench is included.
- See Table 4 for guidance in selecting correct HAFMS leg kit.
- Optional HSK support kit available for mounting equipment on rack uprights

Table 3
Selecting HAFMS Leg Kits for
Mounting Panels on Vertical Surfaces

| <u>Panel Configuration</u> | <u>Leg Kit</u> | <u>Tilt Range</u> |
|---|--|--|
| 2 or 3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module | HAFMS28 HAFMS20 HAFMS12 | 10° to 55° 25° to 65° 60° to 75° |
| 4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules | HAFMS36 HAFMS28 HAFMS20 HAFMS12 | 10° to 55° 25° to 65° 50° to 75° 75° to 80° |

Array Support Rack Structure

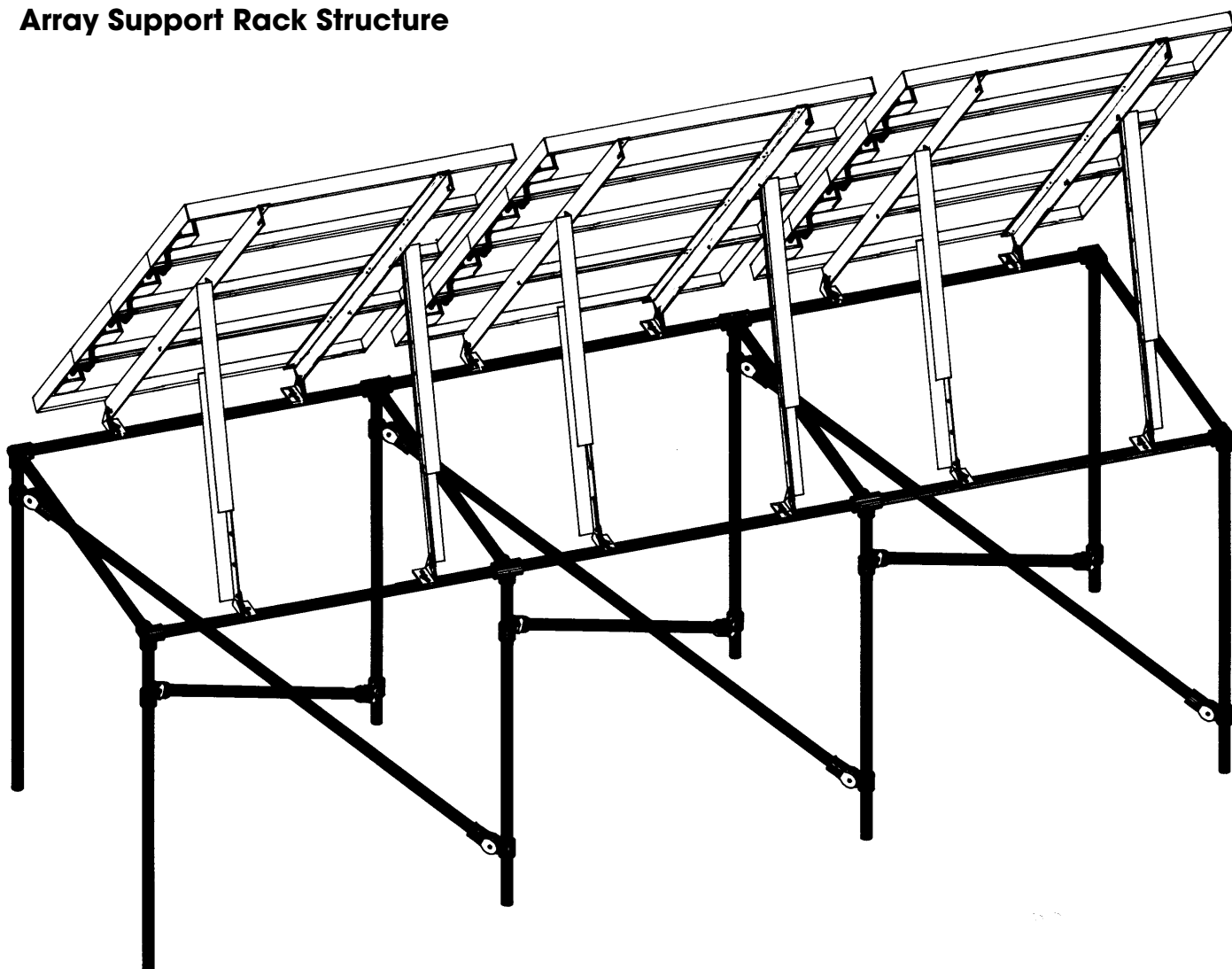
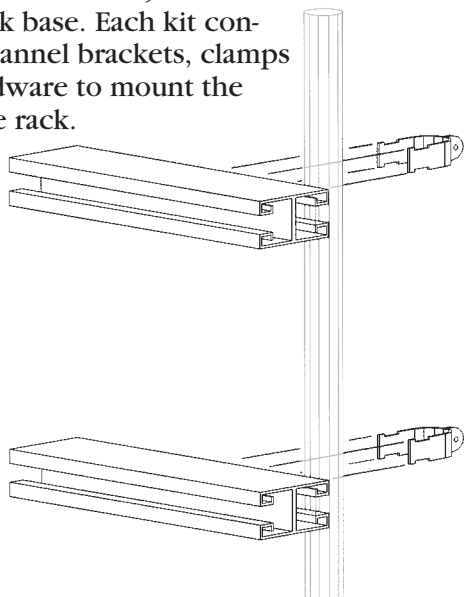


Table 4
Selecting HAFMS Leg Kits for
Mounting Panels on Rack

| <u>Panel Configuration</u> | <u>Leg Kit</u> | <u>Tilt Range</u> |
|--|--|--|
| 3 MSX-40, -50, -60 (series) modules 2 MSX-77 or -83 modules 1 MSX-120 module | HAFMS12 HAFMS20 HAFMS28 | 14° to 22° 22° to 38° 30° to 54° |
| 4 MSX-40, -50, -60 (series) modules 2 MSX-120 modules | HAFMS12 HAFMS20 HAFMS28 HAFMS36 | 15° to 23° 23° to 40° 32° to 57° 40° to 76° |
| 5 or 6 MSX-40, -50, -60 (series) modules 4 MSX-77 or -83 modules 3 MSX-120 modules | HAFMS12 HAFMS20 HAFMS28 HAFMS36 | 13° to 21° 21° to 37° 29° to 54° 37° to 72° |

HSK Enclosure Attachment Kits

HSK attachment kits are designed to support equipment (typically an enclosure containing switchgear or a controller) on a vertical member of the HPF rack base. Each kit consists of two channel brackets, clamps and other hardware to mount the brackets to the rack.



The HSK12 kit includes channel brackets 12" long; the HSK24 kit includes 24" channel brackets.

Selecting a Fixed Tilt Angle

The angle at which an array is tilted affects its ability to collect solar energy. Some arrays are continuously or periodically adjusted to account for the sun's daily or seasonal movement, but at remote sites it is usually more cost-effective for the array to be installed at a fixed angle. This angle varies with site latitude, load characteristics and other factors, and must be known to enable ordering some of the support hardware in this publication.

Accurate design of a PV power system is a complex process, requiring a computer simulation of the on-site interaction between the load and the power system. The optimum array tilt angle is one product of this process, which can be performed by Solarex representatives.

Table 5 provides approximate tilt angle recommendations, by site latitude, for typical installations. These recommendations are based on certain assumptions, most importantly that the electrical load on the system is the same every day of the year. This table is not intended to replace a comprehensive system design process.

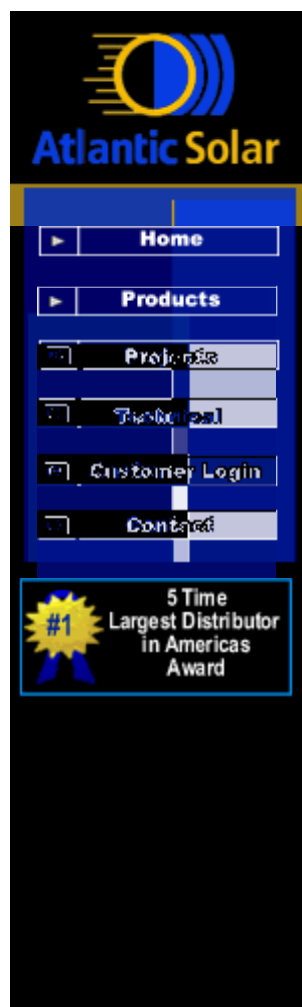
Tilt angle is not critical: variations of up to 5° usually make little difference in an array's ability to support a given load.

If modules are not cleaned regularly, it is recommended that they not be mounted at an angle flatter than 15°. Flatter angles cannot take full advantage of the cleansing action of rainfall.

Table 5
Approximate Array Tilt for Loads
with Consistent Daily Energy Requirements

| <u>Latitude of Site</u> | <u>Recommended Tilt Angle</u> |
|-------------------------|-------------------------------|
| 0-4° | 10° |
| 5-20° | Add 5° to local latitude |
| 21-45° | Add 10° to local latitude |
| 46-65° | Add 15° to local latitude |
| 66-75° | 80° |

For more information, contact:



Atlantic Solar Products, Inc.

9351-J Philadelphia Road, Baltimore, MD 21237 Phone: 410-686-2500



Side of Pole Mounts

Atlantic Solar Products, Inc., offers the following Side of Pole Mounts:



HPM 5-10U

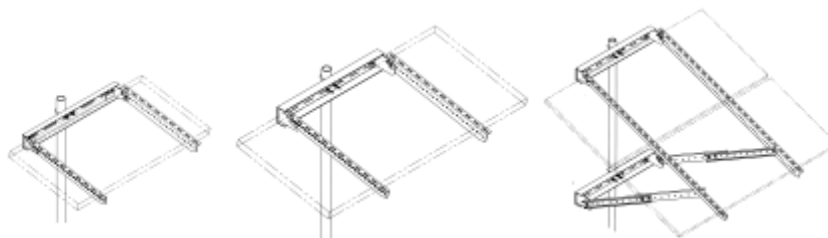


HPM 5-10 Hinge/ HPM 18-30



HPMH 60

| Model | Fits |
|----------------|-----------------------------------|
| HPM 5/10 U | SX-5-M, SX-10-M |
| HPM 5/10 Hinge | SX-5, SX-10 Both U and M Series |
| HPM 18/30 | SX-20, 30, 40 Both U and M Series |
| HPMH-60 | SX-50,55,60,65 |



| UniRac Model Number | Sch.40 Pole Size (in.) | BP Solar | | | | | | | Kyocera | | Siemens | | | | UniSola |
|---------------------------|---------------------------------|---|----------------------|----------------------|----------------|-----------|------------|---------------------------------------|----------------------|-------|----------------|----------------------|-------------------------|---------------|---------|
| | | 270 275 585 590 SX75TU | SX55 SX60 SX65 | SX75 SX80 SX85 | SX110 SX120 | MST 43 | MSX 120 | 2150 3160 4160 5170 SX150 | KC60 KC70 KC80 | KC120 | SM100 SM110 | SP65 SP70 SP75 | SP130 SP140 SP150 | SR90 SR100 | US64 |
| | | U-11 and U-PS Series Side of Pole Racks | | | | | | | | | | | | | |
| U-11/20M | 2.5 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| U-11/20XL | 2.5 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - |
| U-11/24M | 2.5 | 1 | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - |
| U-11/24L | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-11/28M | 2.5 | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - |
| U-11/28L | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/24M | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| U-PS/26M | 2.5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | - | - |
| U-PS/26XXL | 2.5 | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - |
| U-PS/28L | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/30XL | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| U-PS/30XXL | 2.5 | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - |
| U-PS/32M | 2.5 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| U-PS/32XL | 2.5 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| U-PS/40M | 2.5 | - | 2 | - | - | - | 1 | - | - | - | - | - | - | - | - |
| U-PS/40XL | 2.5 | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/44M | 2.5 | 2 | - | - | - | - | - | - | - | - | - | 2 | - | - | - |
| U-PS/44L | 2.5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | 3 | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|-----------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U-PS/48M | | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - |
| U-PS/52M | 3 | - | - | - | - | - | - | - | 2 | - | 2 | - | - | - | - |
| U-PS/52L | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/52XL | 3 | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - |
| U-PS/60M | 3 | - | 3 | - | - | 2 | - | - | - | - | - | - | - | - | - |
| U-PS/60L | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| U-PS/60XL | 3 | - | - | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| U-PS/64M | 3 | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - |
| U-PS/64XL | 3 | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - |
| U-PS/68L | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/72M | 4 | - | - | - | - | - | - | - | - | - | - | - | - | 3 | - |
| U-PS/80M | 4 | - | 4 | - | - | - | 2 | - | 3 | - | 3 | - | - | - | - |
| U-PS/80L | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/80XL | 4 | - | - | 4 | - | - | - | - | - | 3 | - | - | - | - | - |
| U-PS/84M | 4 | - | - | - | - | 3 | - | - | - | - | - | 4 | - | - | - |
| U-PS/88M | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/88L | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| U-PS/96L | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| U-PS/106M | 4 | - | - | - | - | - | - | - | 4 | - | - | - | - | - | - |

Copyright © 2003, Atlantic Solar Products, Inc.



SUNSAVER™
SOLAR CONTROLLER

Morningstar's **SunSaver** is the world's leading small solar controller for both professional and consumer applications.

SunSaver's technology provides:

- Exceptional Reliability
- PWM Battery Charging
- Consistent High Quality

The SunSaver's advanced design delivers outstanding performance and value. The SunSaver's low cost is made possible by Morningstar's unique approach to design and manufacturing:

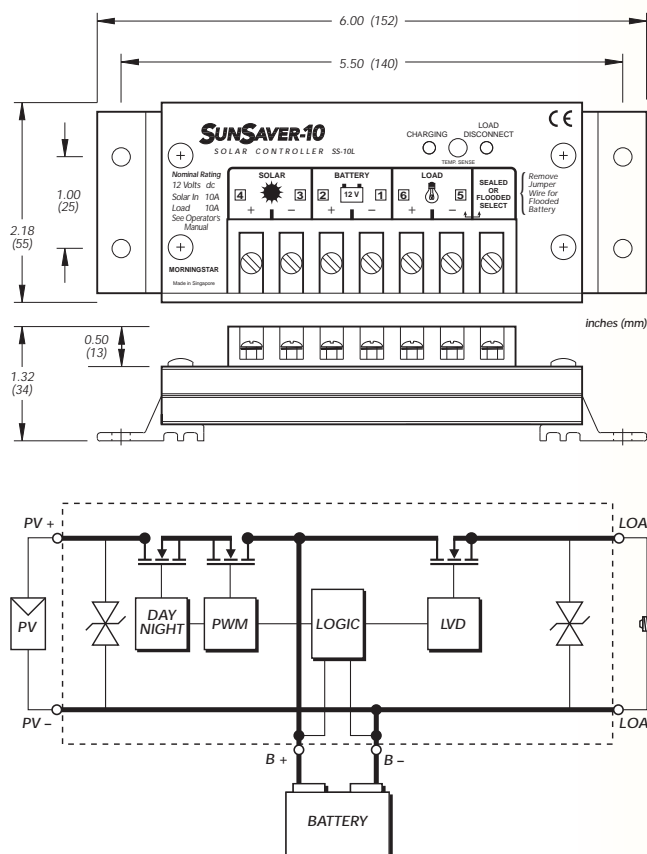
- Automated production
- ISO 9002 quality programs
- Latest power electronic technologies
- Latest control and logic technologies
- High volume manufacturing

Features:

- Eight versions available (see back)
 - 12 and 24 volts
 - 6, 10 and 20 amps
- 100% solid state
- Series design (not shunt)
- True 0 to 100% PWM duty cycle
- Setpoint accuracy to 35 mV
- Rated for 25% overloads
- Fully encapsulated in epoxy potting
- Marine rated terminals / anodized case
- Temperature compensation
- Sealed / Flooded battery select
- No need to derate
- Parallel for 40 amps or more
- Green charging / Red LVD indicators

SunSaver Model Selection Chart

| MODEL NUMBER | SOLAR RATING (Amps) | | | LOAD RATING (Amps) | | | LVD | 12V | 24V |
|--------------|---------------------|--------|--------|--------------------|--------|--------|--------|------|--------|
| | 0 | 10 | 20 | 0 | 10 | 20 | | | |
| • SS-6 | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Yellow | Blue | Yellow |
| • SS-6L | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Blue | Blue | Yellow |
| • SS-10 | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Yellow | Blue | Yellow |
| • SS-10L | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Blue | Blue | Yellow |
| • SS-10-24V | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Yellow | Blue | Blue |
| • SS-10L-24V | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Blue | Blue | Blue |
| • SS-20L | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Blue | Blue | Yellow |
| • SS-20L-24V | Blue | Yellow | Yellow | Blue | Yellow | Yellow | Blue | Blue | Blue |



Mechanical Specifications

Wire size #10 AWG (5.2 mm²)
 Anodized aluminum case
 Marine rated terminals
 Epoxy encapsulated
 Weight is 8 oz (0.23 kg)

Electrical Specifications

| | 12 Volt | 24 Volt |
|----------------------|--------------|---------|
| Rated Solar Input | 6.5/10/20 A | |
| Rated Load | 6/10/20 A | |
| 25% Current Overload | 5 min. | 5 min. |
| Regulation Voltage: | | |
| Sealed Battery | 14.1 V | 28.2 V |
| Flooded Battery | 14.4 V | 28.8 V |
| Load Disconnect | 11.5 V | 23.0 V |
| LVD Reconnect | 12.6 V | 25.2 V |
| Temp. Comp. (mV/°C) | -28 | -56 |
| Self-consumption | 6 to 10 mA | |
| Operating Temp. | -40 to +85°C | |

WARRANTY: Five year warranty period. Contact Morningstar or your authorized distributor for complete terms.

AUTHORIZED MORNINGSTAR DISTRIBUTOR:



1098 Washington Crossing Road
 Washington Crossing, PA 18977 USA
 Tel: 215-321-4457 Fax: 215-321-4458
 E-mail: info@morningstarcorp.com
 Website: www.morningstarcorp.com

SPECIFICATIONS

| | |
|------------------------------|--------------------------------|
| Nominal Voltage (V) | 12V |
| Capacity at C/100 | 106Ah |
| Weight | 63 (28.6 kg) |
| Plate Alloy | Lead Calcium |
| Posts | Forged terminals & bushings |
| Container/Cover | Polypropylene |
| Operating Temperature Range | -40°F (-40°C) – 140°F (60°C) |
| Charge Voltage @ 68°F (20°C) | |
| Cycle | 2.40 - 2.43 VPC |
| Float | 2.25 - 2.30 VPC |
| Vent | Self-sealing (2 PSI operation) |
| Resistance | 3.0 Milliohms (full charge) |
| Terminal | T876 |

Rated non-spillable by ICAO, IATA and DOT

Made in the U.S.A by East Penn Manufacturing

Distributed by:

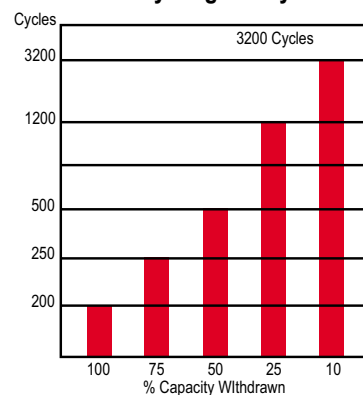
Valve-Regulated, Absorbed Glass Mat Technology



DIMENSIONS

| | |
|-------------|----------------|
| Length (mm) | 12.75 (324 mm) |
| Width (mm) | 6.75 (171 mm) |
| Height (mm) | 9.38 (238 mm) |

Cycling Ability



Number of cycles vs. depth of discharge
at +20°C
discharge with 20 hour rate

MK Battery

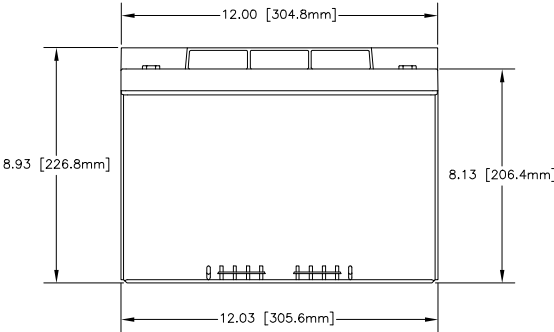
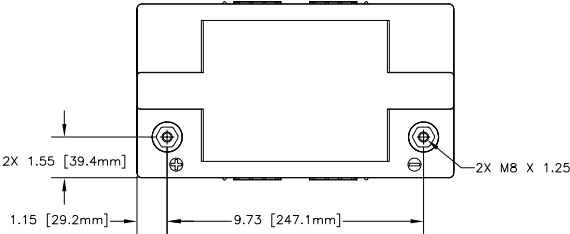
1645 South Sinclair Street • Anaheim, California 92806

Toll Free: 800-372-9253 • Fax: 714-937-0818 • E-Mail: sales@mkbattery.com

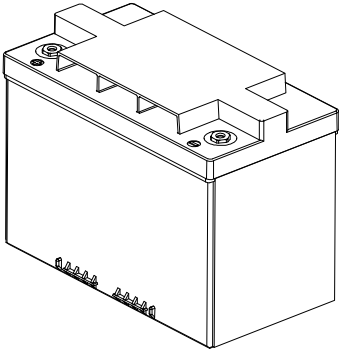


NOTES: UNLESS OTHERWISE SPECIFIED

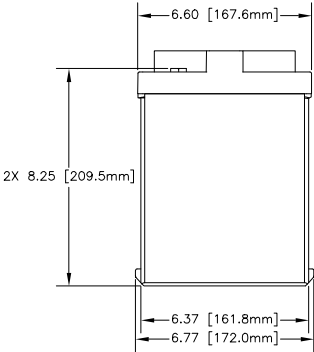
1. SEE DRAWING NO. CB-00285 AND PROCEDURE P-1000 FOR ASSEMBLY AND TEST INSTRUCTION. PROCEDURES AND ASSEMBLY DRAWINGS ARE FOR INTERNAL USE ONLY.
2. ALL TESTING ARE IAW BATTERY COUNCIL INTERNATIONAL STANDARDS.
3. ALL DIMENSIONS ARE IN INCHES [MM].
4. ABBREVIATION USED IN TITLE IS: SEALED LEAD ACID (SLA).



| CAPACITY RATINGS | |
|---|----------------|
| PART NUMBER | PVX-1040T |
| NOMINAL WEIGHT | 66 LBS [30 KG] |
| AMPERE HOUR CAPACITY @ 24 HOUR 1.75 VOLTS/CELL @ 77°F (25°C) | 104 AH |



REFERENCE VIEW

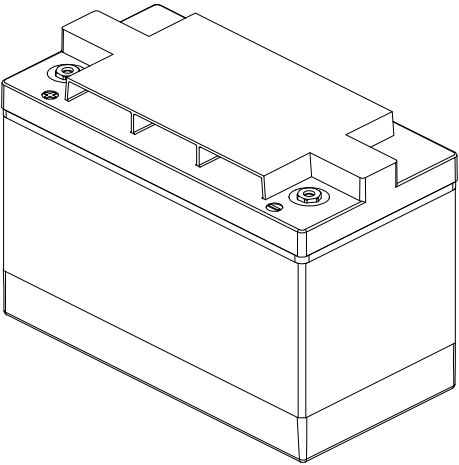
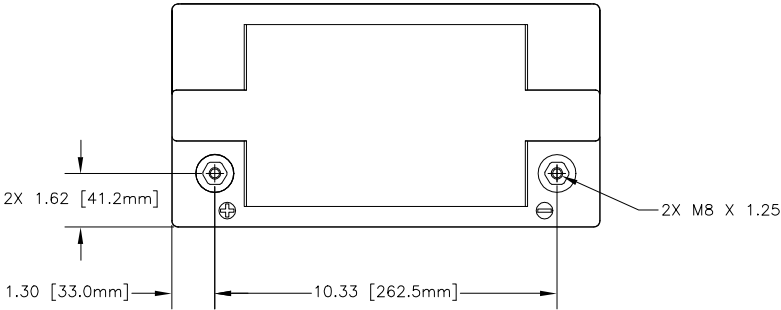


ENVELOPE DRAWING

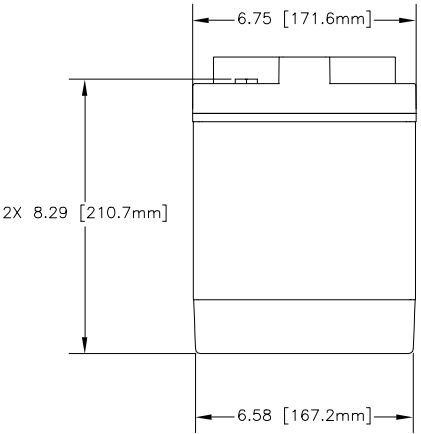
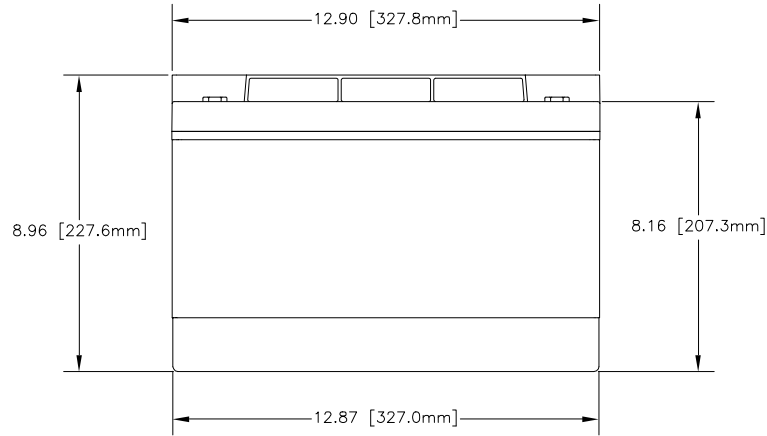
| REV | | CAGE CODE | | PART OR IDENTIFYING NO. | | NOMENCLATURE OR DESCRIPTION | | MATERIAL SPECIFICATION | | ITEM NO. | |
|--|--|-----------|--|-------------------------|--|-----------------------------|--|------------------------|--|----------|-----------|
| UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES TOLERANCES ARE | | | | | | CONTRACT NO. | | | | | |
| FRACTIONS DECIMALS ANGLES | | | | | | NA | | | | | |
| 1/16 32 64 1/8 1/4 3/8 1/2 5/8 3/4 7/8 1 1 1/2 2 3 4 5 6 8 10 12 16 18 20 24 30 36 48 60 72 96 108 120 144 180 216 240 360 | | | | | | APPROVALS | | | | | |
| TREATMENT | | | | | | NONE | | CHECKED | | ELH | DATE |
| FINISH | | | | | | NONE | | APPROVED | | JBT | 8/23/01 |
| SIMILAR TO | | | | | | ACT WIT | | OLD WIT | | ISSUED | DATE |
| | | | | | | NONE | | NONE | | SCALE | NONE |
| | | | | | | NONE | | NONE | | DWG NO. | PVX-1040T |
| | | | | | | NONE | | NONE | | SHEET | 1 OF 1 |

- NOTES: UNLESS OTHERWISE SPECIFIED
1. SEE DRAWING NO. CB-00286 AND PROCEDURE P-1000 FOR ASSEMBLY AND TEST INSTRUCTION. PROCEDURES AND ASSEMBLY DRAWINGS ARE FOR INTERNAL USE ONLY.
 2. ALL TESTING ARE IAW BATTERY COUNCIL INTERNATIONAL STANDARDS.
 3. ALL DIMENSIONS ARE IN INCHES [MM].
 4. ABBREVIATION USED IN TITLE IS: SEALED LEAD ACID (SLA).

| REVISIONS | | | |
|-----------|-------------|------|----------|
| REV | DESCRIPTION | DATE | APPROVED |



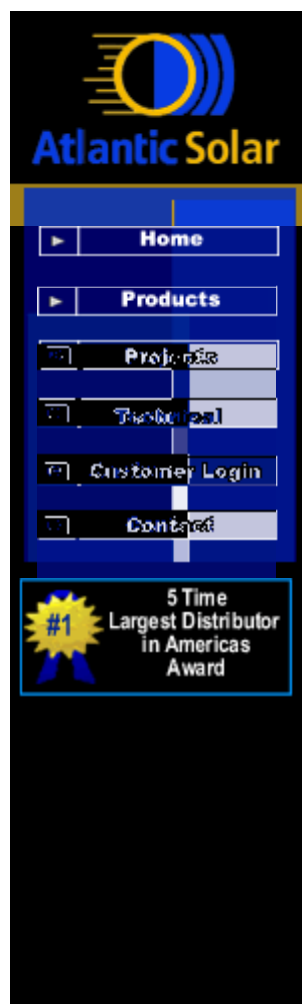
REFERENCE VIEW



| CAPACITY RATINGS | | |
|---|------------------|------------------|
| PART NUMBER | PVX-890T | PVX-1080T |
| NOMINAL WEIGHT | 62 LBS [28.2 KG] | 70 LBS [31.8 KG] |
| AMPERE HOUR CAPACITY @ 24 HOUR 1.75 VOLTS/CELL @ 77°F (25°C) | 89 AH | 108 AH |

ENVELOPE DRAWING

| QTY | REQD | CAGE CODE | PART OR IDENTIFYING NO. | NOMENCLATURE OR DESCRIPTION | MATERIAL SPECIFICATION | ITEM NO. |
|--|------|-----------|-------------------------|-----------------------------|--|---|
| PARTS LIST | | | | | | |
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/32 .XX ± .06 ± 1° .XXX ± .030 | | | | CONTRACT NO. NA | CONCORDE BATTERY CORPORATION 2009 SAN BERNARDINO RD., W. COVINA, CA 91790 | |
| TREATMENT NONE | | | | APPROVALS DRAWN ELH | DATE 8/13/01 | TITLE BATTERY, SLA, 12 VOLT, PVX-1080T SERIES |
| FINISH NONE | | | | CHECKED HRF | 8/21/01 | SIZE C |
| SIMILAR TO NA | | | | APPROVED JBT | 8/23/01 | CAGE CODE 63017 |
| ISSUED AT | | | | 8/24/01 | DWG NO. PVX-1080T | REV |
| SCALE NONE | | | | SHEET 1 OF 1 | | |



Atlantic Solar Products, Inc.

9351-J Philadelphia Road, Baltimore, MD 21237 Phone: 410-686-2500



Concorde Battery

Atlantic Solar Products, Inc., offers the following Concorde Batteries:



**MAINTENANCE-FREE, VALVE-REGULATED,
SEALED LEAD-ACID BATTERIES
DESIGNED FOR DEEP CYCLE / BACK-UP POWER PHOTOVOLTAIC
APPLICATIONS**

SPECIFICATIONS

[Click Here For Battery Service Instructions](#)

| Part Number | Volts | Overall Dimensions | | | Unit Wt lbs (kg) | Nominal Capacity Ampere Hours @ | | | |
|-------------|-------|--------------------|--------------|--------------|---------------------|------------------------------------|---------------|---------------|---------------|
| | | L in (mm) | W in (mm) | H in (mm) | | 8 Hr Rate | 24 Hr Rate | 48 Hr Rate | 120 H Rate |
| PVX-340T | 12 | 7.71 (196) | 5.18 (132) | 6.89 (175) | 25 (11.4) | 30 | 34 | 36 | 38 |
| PVX-420T | 12 | 7.71 (196) | 5.18 (132) | 8.05 (204) | 30 (13.6) | 36 | 42 | 43 | 45 |
| PVX-490T | 12 | 8.99 (228) | 5.45 (138) | 8.82 (224) | 36 (16.4) | 43 | 49 | 52 | 55 |
| PVX-560T | 12 | 8.99 (228) | 5.45 (138) | 8.82 (224) | 40 (18.2) | 49 | 56 | 60 | 63 |
| PVX-690T | 12 | 10.22 (260) | 6.60 (168) | 8.93 (227) | 51 (23.2) | 60 | 69 | 73 | 79 |
| PVX-840T | 12 | 10.22 (260) | 6.60 (168) | 8.93 (227) | 57 (25.9) | 74 | 84 | 90 | 97 |
| PVX-1080T | 12 | 12.90 (328) | 6.75 (172) | 8.96 (228) | 70 (31.8) | 97 | 108 | 118 | 126 |
| PVX-1040T | 12 | 12.03 (306) | 6.77 (172) | 8.93 (227) | 66 (30.0) | 93 | 104 | 112 | 120 |
| PVX-890T | 12 | 12.90 (328) | 6.75 (172) | 8.96 (228) | 62 (28.2) | 79 | 89 | 95 | 102 |
| PVX-2120L | 12 | 20.75 (528) | 8.71 (222) | 10.42 (265) | 138 (62.7) | 194 | 212 | 235 | 253 |
| PVX-2580L | 12 | 20.76 (527) | 10.89 (277) | 9.65 (245) | 165 (75) | 236 | 258 | 285 | 305 |
| PVX-1040HT | 12 | 12.03 (306) | 6.77 (172) | 8.93 (227) | 66 (30.0) | 93 | 104 | 112 | 120 |
| PVX-1380T | 6 | 10.22 (260) | 6.77 (172) | 8.92 (227) | 51 (23.2) | 120 | 138 | 146 | 158 |
| PVX-1680T | 6 | 10.22 (260) | 6.77 (172) | 8.92 (227) | 57 (25.9) | 148 | 168 | 180 | 194 |
| PVX-1780T | 6 | 12.90 (328) | 6.75 (171) | 8.96 (228) | 62 (28.2) | 158 | 178 | 190 | 204 |
| PVX-2080T | 6 | 12.03 (306) | 6.77 (172) | 8.93 (227) | 66 (30.0) | 186 | 208 | 224 | 240 |
| PVX-2160T | 6 | 12.90 (328) | 6.75 (171) | 8.96 (228) | 70 (31.8) | 194 | 216 | 236 | 252 |
| PVX-2240T | 6 | 10.27 (261) | 7.12 (181) | 10.24 (260) | 67 (30.4) | 204 | 224 | 246 | 263 |

Standard Terminals: All "T" batteries now incorporate copper alloy M8 terminals except the PVX-340T & PVX-420T which are M6. All batteries supplied with silicon bronze bolts, nuts, and washers as required for installation. No exposed lead terminals. This change was made to improve environmental safety and health. **Optional Terminals:** L Blade or Automotive post type terminals are available installed by adding the appropriate suffix: "L"

for L Blade or "A" for automotive post. **Handles:** All part numbers include lifting handles except the PVX-490T, PVX-560T, and PVX-2240L. **Ratings:** Capacity ratings are stated at 77F (25 C) to 1.75 volts per cell. **Drawings:** Click on the part number in the table above or contact the factory.

SUN-EXTENDER® BATTERY DESIGN FEATURES

- ✍ Copper Alloy Terminals for improved electrical connections.
- ✍ No exposed lead terminals. This change was incorporated to improve environmental safety and health.
- ✍ Threaded insert terminals are recessed to prevent short circuits across battery connections.¹
- ✍ New cover is flat top design. No protruding or exposed vent valves.¹
- ✍ Built in lifting handles, except PVX-490T, PVX-560T, and PVX-2240L.
- ✍ Reinforced container walls to reduce bulging.
- ✍ High Impact Strength Copolymer Polypropylene Case and Cover.
- ✍ Completely Sealed Valve Regulated Construction.
- ✍ Immobilized Electrolyte Non-Spillable.
- ✍ Maintenance Free Design Never Requires Watering.
- ✍ Absorbed Glass Mat (AGM) Micro-porous Glass Separators retain electrolyte.
- ✍ Flame Arresting Pressure Regulated Safety Valves.
- ✍ UL Recognized Systems Component.
- ✍ Positive Plates - Proprietary Lead Calcium Alloy- Negatives Plates - Lead Calcium.
- ✍ Low Self Discharge Rate Approximately 1 % per month at 25 C (77 F).
- ✍ Operate over a Wide Range of Temperatures from -40 C (-40 F) to +72 C (+160 F).
- ✍ Classified as "Non-Spillable Battery" for Transport.
- ✍ Most Part Numbers comply with DOT HMR49, Non-Hazardous Materials.

¹ Threaded Insert "T" type Features.

CHARGING INSTRUCTIONS

Initial charge or recharge: 2.37 to 2.40 volts per cell at 25 C (77 F). **Float charge:** 2.23 volts per cell at 25 C (77 F). **Equalize charge:** 2.40 volts per cell at 25 C (77 F). Temperature compensation = ± 3.75 mV. per cell per degree C [Reference to 25 C (77 F)]. This is for battery temperature (not ambient temperature) and is useful for battery temperatures from 0 C (32 F) to 40 C (104 F). Contact Concorde Battery Corporation for temperatures that exceed this range.

Specifications subject to change without notice.



Atlantic Solar Products

9351-J Philadelphia Rd., P.O. Box 70060, Baltimore, MD 21237-6060
Phone 410-686-2500 Fax 410-686-6221

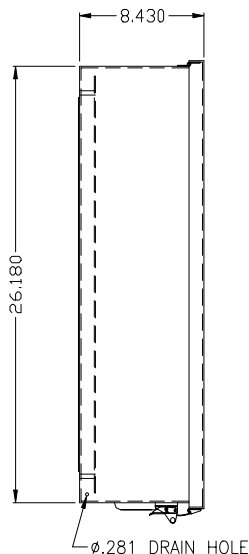
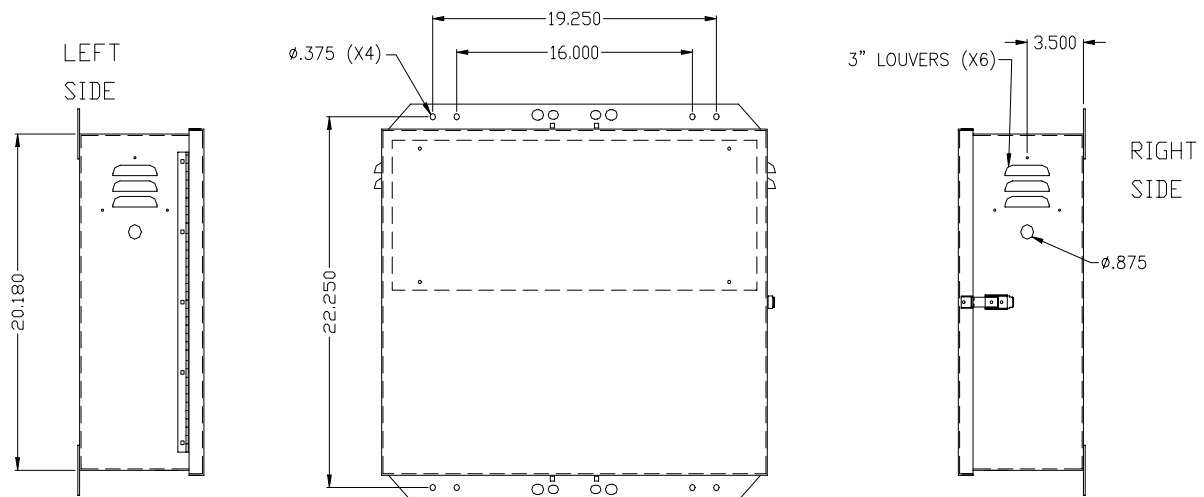
BE 26208 Battery Enclosure

Fits up to two 105Ah Batteries end to end

Mounts on 2"- 4" Schedule 40 Pole

16" Centers

For larger poles use pipe strapping w/Optional Adapter



BOTTOM VIEW

NOTE:

1. 23.000 X 10.000 ALUM. BACK PANEL ON
1/4-20 X 1-1/4 CARRIAGE BOLTS.
2. HINGED DOOR WITH PULL DOWN LATCH WITH A PADLOCKABLE
HASP SOUTHCO P/N 97-50-314-11
3. TOP AND BOTTOM MOUNTING TABS.
4. BACK PANEL NOT SHOWN IN SIDE VIEWS FOR CLARITY.
5. SCREENED LOUVERS
6. USE 1-1/2" X 1/4" CLOSED CELL NEOPRENE GASKET.

| | | | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|--|---|
| <div data-bbox="154 157 186 189" style="border: 1px solid black; padding: 2px; text-align: center;">✖</div> | <div data-bbox="451 157 483 189" style="border: 1px solid black; padding: 2px; text-align: center;">✖</div> | | | | | | | | | | | | |
| <div data-bbox="154 325 186 346" style="border: 1px solid black; padding: 2px; text-align: center;">✖</div> | <div data-bbox="451 304 483 336" style="border: 1px solid black; padding: 2px; text-align: center;">✖</div> | | | | | | | | | | | | |
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| <div data-bbox="154 871 186 903" style="border: 1px solid black; padding: 2px; text-align: center;">✖</div> | | | | | | | | | | | | | |

Sweeping Pulse Technology

Every year millions of lead-acid batteries are prematurely discarded. Sulfation is the leading cause of these disposals and is the most destructive process determining the life of lead-acid batteries. Eight out of ten batteries are discarded as "dead", yet only suffer from this costly problem, a problem that can now be fully reversed and completely prevented.

During the normal discharge of a lead-acid battery, lead sulfate forms on the battery's plates. When recharged, this soft spongy material is converted back into the battery's electrolyte solution. When this material fails to release from the battery's plates, it begins to harden and crystallize. This destructive process is known as sulfation. Equalizing or over charging the battery was the only way, in the past, to remove the sulfation from the battery's plates. The very material that enables lead-acid batteries to release their energy and its out dated cure is what causes most batteries to fail.

Using Sweeping Pulse Technology will enable weak and dead batteries to provide a longer service life.

WHAT IS SWEEPING PULSE TECHNOLOGY?

Sweeping Pulse Technology is a patented, variable frequency, variable boost voltage process guaranteed to dissolve sulfate crystals back into the battery's electrolyte solution. All lead-acid batteries are adversely affected by the buildup of these deposits. As they collect on battery plates they restrict the flow of electrons and "lock away" active material required for normal operation. As this barrier becomes thicker and thicker, the battery's ability to accept a charge or deliver energy is drastically diminished, resulting in the perception that the battery is no longer usable.

Sweeping Pulse Technology allows the user to electronically dissolve sulfation formations back into the electrolyte solution without taking the battery out of service. Most importantly, if a new battery is equipped with Sweeping Pulse Technology it will always remain free and clean of sulfate crystals allowing it to operate unhampered at full capacity. This remarkable process generates no heat and can in no way harm the battery itself.

BENEFITS OF SWEEPING PULSE TECHNOLOGY

The principal benefit of Sweeping Pulse Technology is that it prevents the buildup of sulfate crystals on battery plates. Eliminating the number one cause of battery failure,

Sweeping Pulse Technology will significantly extend battery life.

Since the amount of exposed active plate surface is critical for determining battery output, a battery with clean plates and an unimpeded flow of electrons will accept a full charge and release all of its stored energy. Use of this leading edge technology will maintain battery efficiency.

Sweeping Pulse Technology can save money by reversing the capacity robbing effects of existing sulfation on batteries already in use and save even more by reducing man hours performing routine battery maintenance. Continual use of this technology will reduce battery disposal volumes, increase equipment readiness, and allow long term storage of batteries in a usable condition.

Whether you're a vehicle fleet manager, a solar system owner, or just a weekend marine enthusiast, use of Sweeping Pulse Technology will provide battery owners alike with these wide ranging benefits.

- ✍ Revert existing sulfate deposits
- ✍ Increase battery efficiency
- ✍ Prevent future sulfation
- ✍ Eliminate harmful overcharging
- ✍ Extend battery life
- ✍ Reduce hazardous material disposal
- ✍ Eliminate battery capacity loss
- ✍ Equalize battery using no heat
- ✍ Increase battery dependability
- ✍ Quicker recharge times
- ✍ Offset battery self discharge
- ✍ Increase freeze protection
- ✍ Reduce routine battery maintenance
- ✍ Decrease internal resistance
- ✍ Allow for long term battery storage
- ✍ Eliminate erroneous replacement

| Model Number | Description |
|--------------|--|
| DS-500 | Self-powered conditioner suitable for any type of battery set that is regularly recharged. The unit can be attached to the battery or the charging source output. Unit consumes only 4.8 watts a day. Specify unit voltage when ordering, 12, 24, 36, 48 or 72 volts. Up to 350 Amps Hours. |
| DS-1000 | High output, self-powered conditioner suitable for any type of battery set (with battery capacities higher than 350 amp hours) that is regularly recharged. The unit can be attached to the battery or the charging source output. Unit consumes only 9.6 watts a day. Specify voltage when ordering, 12, 24, 36, or 48 volts. Up to 1000 Amp Hours. |
| T-360 | AC powered, portable unit with heavy duty battery clips; maximum power 200 milliamps. Standard 120V input. 220V, 50Hz export unit available Suitable for RV's, fishing and sport boats. |
| DP-5000 | 120 volt AC input; up to 600 volts output. Suitable for high capacity battery banks.(220V, 50Hz export unit available) |
| S-100 | 12 volt solar powered conditioner/trickle charger. 1 watt solar charger will maintain up to 100 amp hours of battery capacity. |
| | Solar powered conditioner/trickle charger. 2.8 watt solar charger will maintain up to 180 amp hours of battery |

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| S-280 | capacity. Works with 12, 24 & 36 volt battery sets. Suitable or all mobile equipment. |
| S-550 | Solar powered conditioner/trickle charger. 5.5 watt solar charger will maintain up to 360 amp hours of battery capacity. Works with 12 volt battery sets. |
| S-1000 | Solar powered conditioner/charger. 10 watt solar charger will produce an average of 2.3 amp hours per day, maintaining up to 690 amp hours of battery capacity. |
| VC-4 | High output solar charger. 10 watt, 12 volt solar charger will produce an average of 3.76 amp hours per day. |
| VC-5 | High output solar charger. 10 watt, 24 volt solar charger will produce an average of 1.88 amp hours per day. |



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