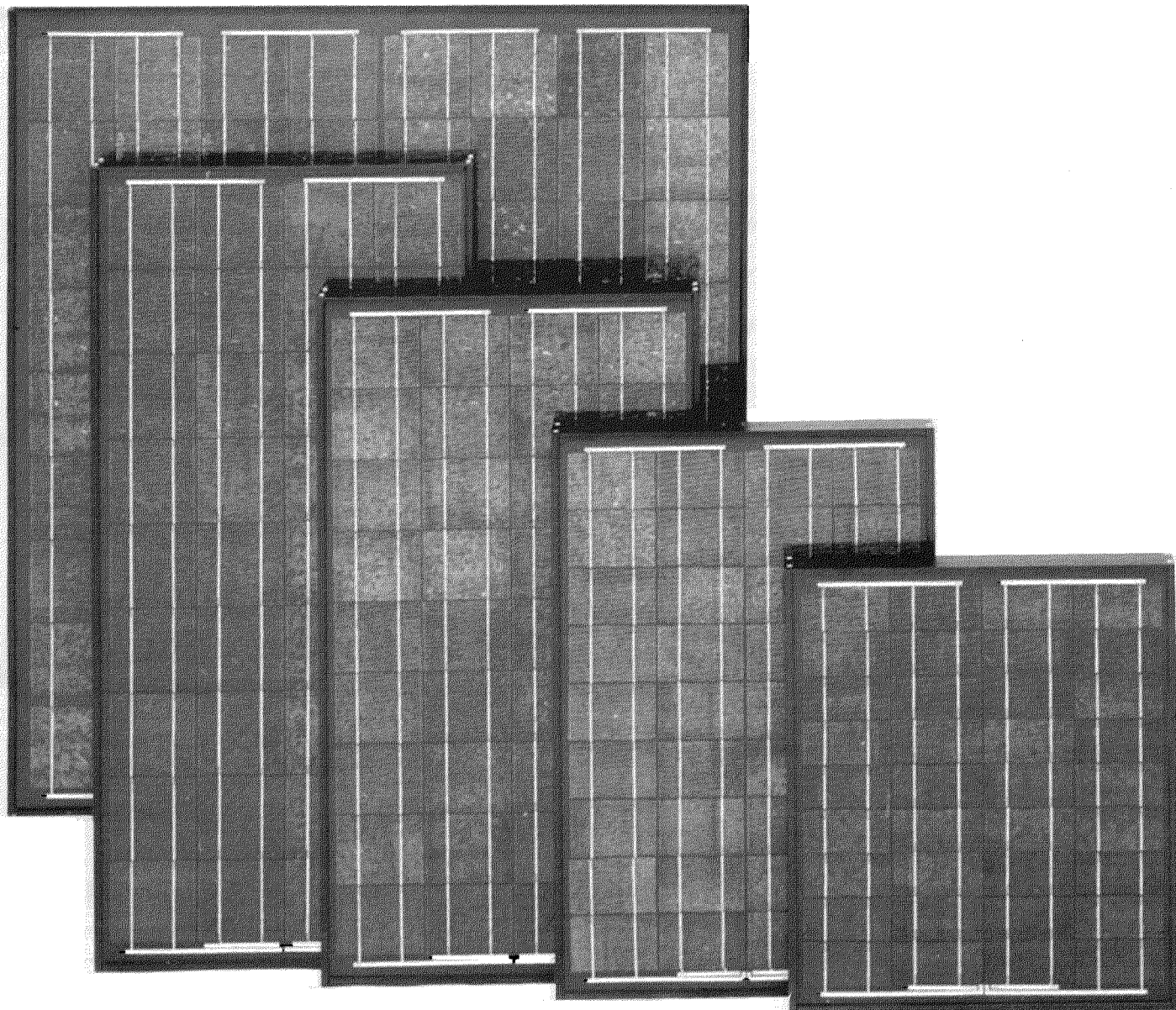


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Information Sheet

Mega™ Modules Over 39 Watts



Warnings and Precautions

General Information

This instruction sheet provides information about Solarex Mega™ photovoltaic modules with outputs above 39 watts.

Before installing, wiring or using a module, it is important to read and understand the instructions in this information sheet. Installers should be familiar with the basic principles of electricity and electric appliances.

Electric Shocks and Burn Hazard

Photovoltaic modules generate direct current (DC) when exposed to sunlight or other sources of light. Even though single modules produce low voltage and current, shocks and burns can still result from contact with module output wiring. These hazards are increased when multiple modules are connected together to provide higher system voltage or current levels.

PV modules do not have to be "connected" (i.e., powering a load) to generate electricity. Since modules produce electricity whenever light is present, the module front surfaces should be completely covered by an opaque cloth or other material before electrical connections to the modules or other system components are handled.

Storage Batteries

When using a storage battery with photovoltaic modules, battery manufacturer's safety recommendations should be followed.

Local Codes

In some areas, local codes govern the installation and use of photovoltaic modules. In particular, these codes may specify requirements for module installation on rooftops, exterior walls, boats or motor vehicles.

National Electrical Code (NEC) for U.S.A.

The United States NEC addresses the installation of photovoltaic devices and should be consulted for recommendations, especially when installing multiple module systems.

General Handling and Use

- Even though the module is rugged, handle it with care. Impact on the front or rear surface can damage the module.
- Do not bend the module.
- Do not attempt to disassemble the module.
- Do not concentrate light on the module in an attempt to increase its power output.
- When working with modules, use properly insulated tools and wear rubber gloves.

Preventive Maintenance

Inspect the module twice a year for overall integrity. Make certain that connections to the load and/or battery are tight and free of corrosion.

Cleaning

Dirt accumulation on the module's front surface can reduce the light energy collected by the module, decreasing its power output.

If the module surface is dirty, gently clean it with a soft cloth or sponge using water and a mild detergent. Do not use a scrub brush; it may damage the module front surface. Wear rubber gloves to protect against possible electric shock.

Disclaimer of Liability

Since the conditions or methods of installation, operation, use and maintenance of PV modules are beyond its control, Solarex does not assume responsibility and expressly disclaims liability of loss, damage, or expense arising out of or in any way connected with such installation, operation, use, or maintenance.

Underwriters Laboratories

Listing Information

To satisfy the conditions of the UL Listing when these modules are installed in a system, be sure to:

- Protect module and array interconnections wiring. Wiring should either be placed in a conduit that is sunlight resistant and conforms to Article 351 of the NEC, or the wiring should be stranded copper single conductor type UF cable rated sunlight resistant.
- Mount members using the standoff or rack methods when installing on a building. The module listing does not cover modules mounted integral with the roof or wall of the building and does not cover marine or vehicle application, where additional requirements may apply.

Electrical Characteristics

The modules described in the Electrical Characteristics Table (see page 2) are listed by and have obtained a Class C Fire Rating from Underwriters Laboratories.

Application Information

Solarex Mega Modules produce DC electricity. They may be used in single-module and multiple-module systems to meet the current or voltage requirements of a great range of applications.

Mechanical/Electrical Specifications

See the appropriate data sheet for general mechanical and electrical characteristics of the module. Specific electrical characteristics of each module are listed on its label.

Under normal conditions, a photovoltaic module may experience conditions that produce more current

Electrical Characteristics

Module	Maximum Power (watts)	Open Circuit Voltage (Voc)	Short Circuit Current (Isc) (Amps)	Voltage at Load (Volts)	Current at Load (Amps)
MSX-120	120	42.6	3.80	34.2	3.50
MSX-83*	83	21.2	5.27	17.1	4.85
MSX-77*	77	21.0	5.00	16.9	4.56
MSX-64	64	21.3	4.00	17.5	3.66
MSX-60	60	21.1	3.80	17.1	3.50
MSX-56	56	20.8	3.60	16.8	3.35
MSX-53	53	20.6	3.40	16.7	3.20
MSX-50	50	21.1	3.17	17.1	2.92
MSX-40	40	21.1	2.53	17.1	2.34

Note: Rated Electrical Characteristics are within 10% of measured values at Standard Test Conditions of 1000 W/m², 25°C cell temperature, and solar spectral irradiance per ASTM E 892.

*UL Listed only when equipped with factory installed bypass diodes.

and/or voltage than reported at Standard Test Conditions. Accordingly, the values of I_{SC} and V_{OC} marked on UL listed modules should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes and size of controls connected to the module output. Refer to Section 690-8 of the National Electric Code for an additional multiplying factor of 1.25 which may be applicable.

Installation

Mounting Dimensions

As shown in the drawings below, MSX-50 through MSX-120 modules

have eight mounting holes in the back flange of their frames. Mount the module using fasteners through at least four of these holes, selecting holes which provide appropriate fastener spacing. For greatest strength, use the four middle holes (on 24-inch centers.)

MSX-40 modules have six mounting holes. Use the two center holes for mounting the MSX-40 to a pole.

Mounting Hardware

A broad range of pre-engineered mounting kits and hardware for these modules is available from Solarex. Contact your Solarex Distributor or Representative for information on these kits, which facilitate

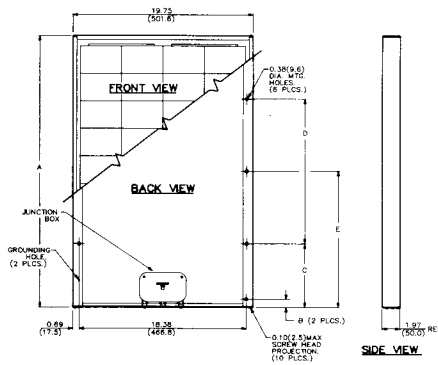
mounting modules vertically, horizontally, and in multiple-module arrays.

Orientation

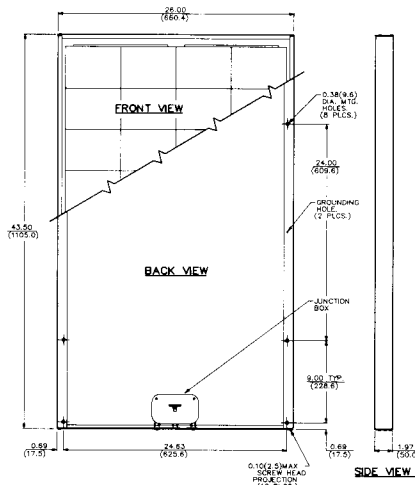
When installing photovoltaic modules, be aware that they generate maximum power when facing the sun directly. The fixed position which approximates this ideal over the course of the year, thus maximizing annual energy production, is facing due South (in the Northern Hemisphere) or due North (in the Southern Hemisphere) at the angle listed in the table on page 3. Note that these orientations are **true, not magnetic** North and South.

	DIM. A	DIM. B	DIM. C	DIM. D	DIM. E
MSX-64*	43.50 (1105.0)	0.69 (17.5)	9.75 (247.6)	24.00 (609.6)	—
MSX-50	36.78 (934.2)	0.69 (17.5)	6.39 (162.0)	24.00 (609.6)	—
MSX-40	30.00 (762.0)	—	7.00 (177.8)	16.00 (406.4)	15.00 (381.0)

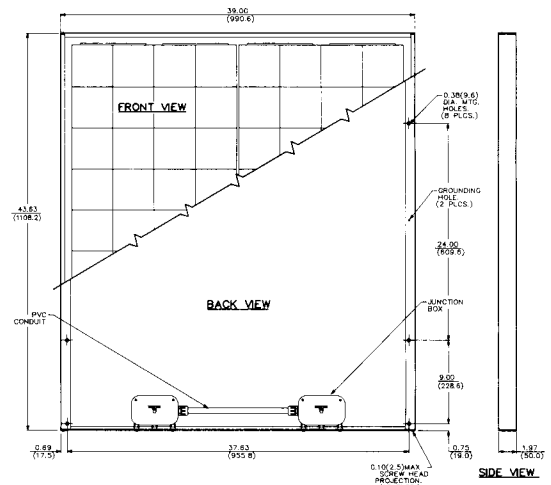
*same dimensions for MSX-53, 56, and 60



MSX-40 through MSX-64

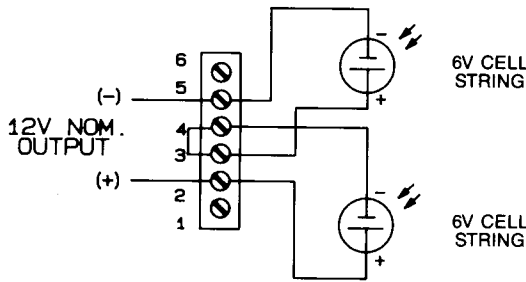


MSX-83/77

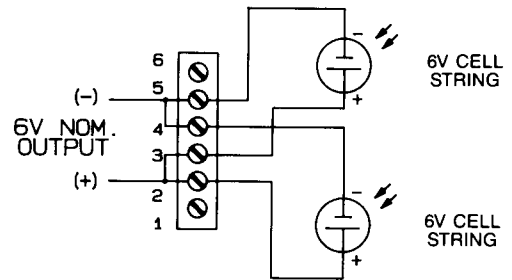


MSX-120

Dimensions given in inches and Millimeters (Millimeters shown in parenthesis)



12V WIRING
SIMPLIFIED MODULE SCHEMATIC
Drawing A



6V WIRING
SIMPLIFIED MODULE SCHEMATIC
Drawing B

Tilt Angle

The table below shows the fixed angle above horizontal at which modules should be installed in order to maximize annual energy output. At some installations, it may be cost-effective to adjust the tilt seasonally. At most latitudes, performance can be improved during the summer by using an angle flatter than the chart's recommendation; conversely, a steeper angle can improve winter performance.

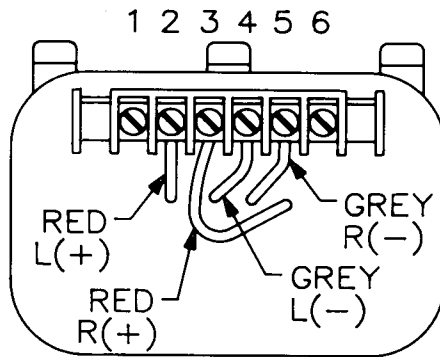
If modules are not cleaned regularly, it is recommended that they not be mounted at an angle flatter than 15°. Flatter angles cannot take full advantage of the cleansing action of rainfall.

Latitude of site	Tilt Angle
0-4°	10°
5-20°	Add 5° to Local Latitude
21-45°	Add 10° to Local Latitude
45-65°	Add 15° to Local Latitude
65-75°	80°

Example: A module mounted in Miami, Florida (latitude 26°) should be tilted at approximately 36° from horizontal, and should be faced due south.

Shading

Locate modules so they are as free as possible from shading during all seasons, particularly during the middle (the most energy-productive) part of the day.



TERMINAL STRIP NUMBERING
Drawing C

Module Wiring

With the exception of the MSX-50CP, Solarex modules are shipped from the factory wired for 12-volt operation, with their internal 6-volt cell strings wired in series, as shown above in Drawing A. They may be rewired for six-volt operation in the field as shown above in Drawing B. Drawing C, shown above, illustrates wire color coding and the internal connection of cell strings to the junction box terminals.

Wiring details of the MSX-50CP are presented in a separate instruction sheet.

Connecting Modules in Series or Parallel

Drawings D and E (see page 4) illustrate the junction box connections for wiring 12V modules in series and in parallel.

Blocking Diodes and Charge Regulation

Depending upon its use, an MSX module may require a blocking diode, which prevents battery discharge during periods of darkness, or a battery charge regulator, which prevents storage batteries from being overcharged and possibly being damaged or destroyed.

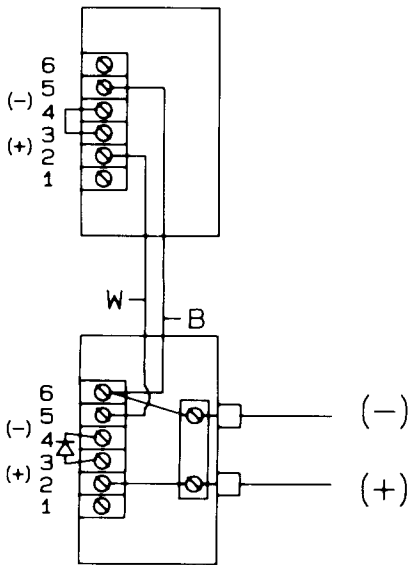
For applications requiring charge regulation, Solarex recommends its Solarstate™ Control, which includes a blocking diode. This regulator is efficient, inexpensive, and easy to install.

The matrix below provides general guidelines for choosing either a blocking diode or regulator.

		Is module connected at night?	
		Yes	No
Does daily current into battery exceed daily current drawn from battery?	Yes	Solarstate	Solarstate
	No	Blocking Diode	No Regulation Required

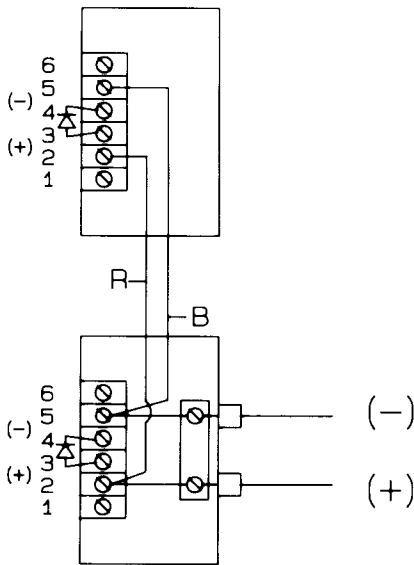
Multiple Module Arrays

Where two or more MSX modules are connected in series, bypass diodes should be installed in parallel across every 18 cells (2 diodes per module). This protects the array from damage due to partial array shading. Partial shading of the array can cause power loss and localized overheating. The diodes are available as an optional accessory on all large MSX modules.



Drawing D (Series)

Note: Modules connected in series must have the same power rating.



Drawing E (Parallel)

If multiple modules or series strings of modules are connected in parallel, each string should include a blocking diode in series with the modules. This prevents shaded parallel strings from absorbing current from illuminated parallel strings, which could reduce the array output and possibly damage the shaded module. Blocking diodes are also available as an optional accessory.

WARNING: When used in a system with an operating voltage greater than 24VDC nominal, each MSX-83/77 series module will require a bypass diode kit rated at or above 6A. This diode will provide protection for each 18 cell string within the module.

CAUTION: Do not overtighten junction box lid screws. Torque should not exceed 5 in-lb.

Limited Warranty

Limited Warranty - One Year

Solarex warrants the MSX-40 through 120 modules to be free from defects in materials and workmanship under normal applications, use and service conditions for twelve (12) months from the date of sale to the original consumer purchaser. If the module becomes inoperable due to a defect in material or workmanship during the twelve (12) month period of this warranty, Solarex will, at its option, either repair or replace the product, or if it is unable to repair or replace the product, refund the purchase price.

This warranty shall apply only while the original consumer purchaser owns the product.

Limited Warranty - Twenty-Year/Ten Year on Power Output

For twenty (20) years from the sale of the product to the original consumer purchaser, Solarex will replace the lost power of any modules that fail to produce at least eighty percent (80%) of the minimum power output specified by Solarex at the time of delivery.

For ten (10) years from the sale of the product to the original consumer purchaser, Solarex will replace the lost power of any modules that fail to produce at least ninety percent (90%) of the minimum power output specified by Solarex at the time of delivery.

Power output shall be measured by Solarex using standard Solarex test conditions. Solarex will replace such

lost power, up to the minimum output originally specified, either by providing the purchaser with additional modules to make up the total wattage lost, or by repairing or replacing the module, at Solarex's option. This warranty shall only apply while the original consumer purchaser owns the product.

What This Warranty Does Not Cover

This warranty does not apply to any of the above modules which have been subject to misuse, neglect or accident, or which has been damaged through abuse, alteration, improper installation or application, or negligence in use, storage, transportation or handling, or which have been repaired by anyone other than Solarex or an authorized Solarex service representative. This warranty does not cover any transportation costs for the return of the module or cost associated with installation, removal, or reinstallation of the MSX module.

Warranty Limitations

THERE IS NO OTHER EXPRESSED WARRANTY ON THESE PRODUCTS. SOLAREX IS NOT RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OR LOSS OF USE OF THE PRODUCT.

ANY WARRANTIES IMPLIED BY LAW, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE TERM OF THIS WARRANTY.

Solarex's maximum liability under any warranty, expressed, implied, or statutory, is limited to the purchase price of the product. The purchaser's exclusive remedy shall be only as stated herein.

SOME JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

Obtaining Warranty Performance

If you feel you have a claim under this warranty, contact the vendor who sold you the product, any authorized Solarex service representative, or Solarex at the address set forth below. You will be advised what you need to do to obtain warranty service.

You should read and follow the installation instructions supplied with the MSX module. If you need to contact Solarex, please write us at the following address:

Solarex

Customer Service Department
630 Solarex Court
Frederick, MD 21703 USA

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

**Manufactured with pride by Solarex.
We welcome your comments or suggestions for improvement.**