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Installation Guide

Photovoltaic Modules

SERAPHIM USA

UL 1703 & ULC 1703

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1. Introduction

This manual provides important safety and installation instructions for Seraphim USA photovoltaic modules that have been Certified and Listed by TUV to UL 1703. The following model numbers along with their associated electrical ratings are within the scope of this manual. All modules have a Type 2 fire classification as defined by UL 1703. The System Fire Class Rating is determined by the mounting system to which these modules are installed. Check with the racking system manufacturer for their system ratings when using Type 2 modules. The electrical characteristics are within +/- 10% of the indicated values of I_{sc} , V_{oc} , and $+4.99\%/-0.0\% P_{max}$ under standard test conditions (irradiance of 1000 W/m^2 , AM 1.5 spectrum, and cell temperature of 25°C (77°F)).

Model Number	Wmp	Voc	Isc	Vmp	Imp	Vsmax
SRP-345-6QA-40	345	46.56	9.22	38.14	8.95	1500
SRP-345-6QA-50	345	46.56	9.22	38.14	8.95	1500
SRP-350-6QA-40	350	47.45	9.35	38.48	9.13	1500
SRP-350-6QA-50	350	47.45	9.35	38.48	9.13	1500
SRP-355-6QA-40	355	48.33	9.49	38.86	9.15	1500
SRP-355-6QA-50	355	48.33	9.49	38.86	9.15	1500
SRP-360-6QA-40	360	48.03	9.62	39.07	9.24	1500
SRP-360-6QA-50	360	48.03	9.62	39.07	9.24	1500
SRP-365-6QA-40	365	48.26	9.76	38.92	9.31	1500
SRP-365-6QA-50	365	48.26	9.76	38.92	9.31	1500
SRP-370-6QA-40	370	47.10	9.89	38.08	9.64	1500
SRP-370-6QA-50	370	47.10	9.89	38.08	9.64	1500
SRP-375-6QA-40	375	47.60	10.03	38.56	9.73	1500
SRP-375-6QA-50	375	47.60	10.03	38.56	9.73	1500
SRP-380-6QA-40	380	48.00	10.16	38.56	9.85	1500
SRP-380-6QA-50	380	48.00	10.16	38.56	9.85	1500
SRP-345-6MA-40	345	47.18	9.49	38.32	9.00	1500
SRP-345-6MA-50	345	47.18	9.49	38.32	9.00	1500
SRP-340-6MA-40	340	45.82	9.44	38.07	8.93	1500
SRP-340-6MA-50	340	45.82	9.44	38.07	8.93	1500
SRP-335-6MA-40	335	45.75	9.38	37.88	8.84	1500
SRP-335-6MA-50	335	45.75	9.38	37.88	8.84	1500
SRP-330-6MA-40	330	43.75	9.32	37.61	8.78	1500
SRP-330-6MA-50	330	43.75	9.32	37.61	8.78	1500
SRP-325-6MA-40	325	43.05	9.25	37.41	8.69	1500
SRP-325-6MA-50	325	43.05	9.25	37.41	8.69	1500
SRP-330-6PA-40	330	46.68	9.89	38.76	8.55	1500
SRP-330-6PA-50	330	46.68	9.89	38.76	8.55	1500
SRP-325-6PA-40	325	46.36	9.78	38.40	8.47	1500
SRP-325-6PA-50	325	46.36	9.78	38.40	8.47	1500
SRP-320-6PA-40	320	45.99	9.72	38.19	8.38	1500
SRP-320-6PA-50	320	45.99	9.72	38.19	8.38	1500
SRP-315-6PA-40	315	45.68	9.62	37.79	8.30	1500
SRP-315-6PA-50	315	45.68	9.62	37.79	8.30	1500
SRP-310-6PA-40	310	45.33	9.56	37.52	8.20	1500
SRP-310-6PA-50	310	45.33	9.56	37.52	8.20	1500
SRP-305-6PA-40	305	44.99	9.47	37.21	8.11	1500
SRP-305-6PA-50	305	44.99	9.47	37.21	8.11	1500

Model Number	Wmp	Voc	Isc	Vmp	Imp	Vsmax
SRP-280-6QB-40	280	38.9	9.22	31.3	8.95	1000
SRP-280-6QB-50	280	38.9	9.22	31.3	8.95	1000
SRP-285-6QB-40	285	39.1	9.33	31.5	9.05	1000
SRP-285-6QB-50	285	39.1	9.33	31.5	9.05	1000
SRP-290-6QB-40	290	39.3	9.44	31.7	9.15	1000
SRP-290-6QB-50	290	39.3	9.44	31.7	9.15	1000
SRP-295-6QB-40	295	39.5	9.56	31.9	9.25	1000
SRP-295-6QB-50	295	39.5	9.56	31.9	9.25	1000
SRP-300-6QB-40	300	39.7	9.65	32.1	9.35	1000
SRP-300-6QB-50	300	39.7	9.65	32.1	9.35	1000
SRP-305-6QB-40	305	39.9	9.76	32.3	9.45	1000
SRP-305-6QB-50	305	39.9	9.76	32.3	9.45	1000
SRP-310-6QB-40	310	40.2	9.82	32.6	9.51	1000
SRP-310-6QB-50	310	40.2	9.82	32.6	9.51	1000
SRP-315-6QB-40	315	40.4	9.92	32.8	9.61	1000
SRP-315-6QB-50	315	40.4	9.92	32.8	9.61	1000
SRP-285-6MB-40	285	39.79	9.46	31.84	8.92	1000
SRP-285-6MB-50	285	39.79	9.46	31.84	8.92	1000
SRP-280-6MB-40	280	38.13	9.39	31.59	8.85	1000
SRP-280-6MB-50	280	38.13	9.39	31.59	8.85	1000
SRP-275-6MB-40	275	36.46	9.32	31.34	8.78	1000
SRP-275-6MB-50	275	36.46	9.32	31.34	8.78	1000
SRP-270-6MB-40	270	34.78	9.26	31.09	8.70	1000
SRP-270-6MB-50	270	34.78	9.26	31.09	8.70	1000
SRP-265-6MB-40	265	33.11	9.19	30.84	8.62	1000
SRP-265-6MB-50	265	33.11	9.19	30.84	8.62	1000
SRP-275-6PB-40	275	38.88	9.85	32.29	8.52	1000
SRP-275-6PB-50	275	38.88	9.85	32.29	8.52	1000
SRP-270-6PB-40	270	38.59	9.77	32.00	8.44	1000
SRP-270-6PB-50	270	38.59	9.77	32.00	8.44	1000
SRP-265-6PB-40	265	38.27	9.69	31.77	8.34	1000
SRP-265-6PB-50	265	38.27	9.69	31.77	8.34	1000
SRP-260-6PB-40	260	38.00	9.60	31.42	8.28	1000
SRP-260-6PB-50	260	38.00	9.60	31.42	8.28	1000
SRP-255-6PB-40	255	37.71	9.51	31.14	8.19	1000
SRP-255-6PB-50	255	37.71	9.51	31.14	8.19	1000
SRP-250-6PB-40	250	37.41	9.42	30.86	8.11	1000
SRP-250-6PB-50	250	37.41	9.42	30.86	8.11	1000

Installers must read and understand this guide prior to installation. For any questions, please contact Seraphim USA for further information. Installers should follow all safety precautions described in this guide as well as local codes when installing a module.

Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

2. Safety Precautions

General Safety

- The module is considered to be in compliance with UL 1703 only when the module is mounted in the manner specified by the mounting instructions below.
- A module with exposed conductive parts is considered to be in compliance with UL 1703 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.
- Any module without a frame (laminated) shall not be considered to comply with the requirements of UL 1703 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by a field inspection certifying that the installed module complies with the requirements of UL 1703.
- These modules are not to be used with any type of artificially concentrated sunlight.
- Modules that fall under this application class may be used in system operating at more than 50V DC or 240W, where general contact access is anticipated. Modules qualified for safety under IEC 61730-2 and within this application class are considered to meet the requirements for Safety Class II.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, the values of I_{sc} and V_{oc} marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.
- Installing solar photovoltaic systems requires specialized skills and knowledge.
- Installation should only be performed by qualified persons.
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single module may generate more than 30V DC when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Do not disconnect under load.

- Photovoltaic solar modules convert light energy to direct current electrical energy.
- They are designed for outdoor use. Modules can be ground mounted, mounted on rooftops, vehicles or boats. The proper design of support structures lies within responsibility of the system designers and installers.
- Do not use mirrors or other magnifiers to concentrate sunlight onto the modules.
- When installing the system, abide to all local, regional and national statutory regulations. Obtain a building permit if necessary.
- Under standard test conditions, the electrical characteristics are within ± 10 percent of the indicated values of I_{sc} and V_{oc} (irradiance of $100\text{mW}/\text{cm}^2$, AM 1.5 spectrum, cell temperature 25°C (77°F))
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.
- In jurisdictions where applicable, install modules in accordance with CSA C22.1 Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1

Sécurité Générale

- Le module est considéré conforme à la norme UL 1703 uniquement lorsque le module est monté de la manière spécifiée dans les instructions de montage ci-dessous.
- Un module avec des parties conductrices apparentes est considéré conforme à la norme UL 1703 uniquement lorsqu'il est mis à la terre électriquement conformément aux instructions présentées ci-dessous et aux exigences du Code national de l'électricité.
- Tout module sans cadre (stratifié) ne doit pas être considéré conforme aux exigences de la norme UL 1703 à moins que le module ne soit monté avec du matériel testé et évalué avec le module selon la présente norme ou par une inspection sur le terrain certifiant que le module est conforme aux exigences de UL 1703.
- Ces modules ne doivent pas être utilisés avec n'importe quel type de lumière artificielle concentrée.
- Les modules relevant de cette classe d'application peuvent être utilisés dans un système fonctionnant à plus de 50 V CC ou 240 W, où un accès général aux contacts est prévu. Les modules qualifiés pour la sécurité selon la CEI 61730-2 et dans cette classe d'application sont considérés comme répondant aux exigences de la classe de sécurité II.
- Dans des conditions normales, un module photovoltaïque est susceptible de rencontrer des conditions qui produisent plus de courant et / ou de tension que ce qui est rapporté dans des conditions d'essai standard. Les exigences du Code national de l'électricité (NEC) de l'article 690 doivent être respectées pour répondre à ces augmentations de production. Dans les installations ne répondant pas aux exigences du NEC, les valeurs I_{sc} et V_{oc} indiquées sur ce module doivent être multipliées par un facteur de 1,25 lors de la détermination de la tension de composant, de l'intensité des conducteurs, des surintensités et de la taille des commandes.
- L'installation de systèmes solaires photovoltaïques nécessite des compétences et des connaissances spécialisées.
- L'installation ne doit être effectuée que par des personnes qualifiées.
- Les installateurs doivent assumer tous les risques de blessures pouvant survenir pendant l'installation, y compris, mais sans s'y limiter, le risque de choc électrique.

- Un seul module peut générer plus de 30 V CC lorsqu'il est exposé à la lumière directe du soleil. Un contact avec une tension continue de 30V ou plus est potentiellement dangereux.
- Ne pas déconnecter sous charge.
- Les modules solaires photovoltaïques convertissent l'énergie lumineuse en énergie électrique à courant continu.
- Ils sont conçus pour une utilisation en extérieur. Les modules peuvent être montés au sol, montés sur les toits, les véhicules ou les bateaux. La bonne conception des structures de support relève de la responsabilité des concepteurs de systèmes et des installateurs.
- N'utilisez pas de miroirs ou d'autres loupes pour concentrer la lumière du soleil sur les modules.
- Lors de l'installation du système, respectez toutes les réglementations légales locales, régionales et nationales. Obtenir un permis de construire si nécessaire.
- Dans des conditions d'essai standard, les caractéristiques électriques sont à $\pm 10\%$ des valeurs indiquées de Isc et Voc (irradiance de 100 mW / cm², spectre AM 1,5, température de la cellule 25 ° C (77 ° F))
- Utilisez uniquement des équipements, des connecteurs, des câbles et des cadres de support adaptés aux systèmes électriques solaires.
- Dans les provinces et territoires, installer les modules conformément à la norme de sécurité CSA C22.1 pour les installations électriques, Code canadien de l'électricité, Partie 1.

Handling Safety

- Do not lift the module by grasping the module's junction box or electrical leads.
- Do not stand or step on the module.
- Do not drop the module or allow objects to fall on the module.
- To avoid glass breakage, do not place any heavy objects on the module.
- Be cautious when setting the module down on to a surface.
- Inappropriate transport and installation may break the module.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
- Do not apply paint or adhesive to the module top surface.
- To avoid damage to the backsheet, do not scratch or hit the backsheet.
- Do not drill holes in the frame. This may compromise the frame strength and cause corrosion of the frame.
- Do not scratch the anodized coating of the frame (except for grounding connection).
- It may cause corrosion of the frame or compromise the frame strength.
- Be careful when setting the panel down onto a surface, particularly when placing it on a corner.
- A panel with broken glass or torn backsheet cannot be repaired and must not be used since contact with any panel surface or the frame can cause a electric shock.
- Work only under dry conditions, and use only dry tools. Do not handle panels when they are wet unless wearing appropriate protective equipment.
- When storing uninstalled panels outdoors for any period of time, always cover the panels and ensure that the glass faces down to stop water from collecting inside the panel and causing damage to exposed connectors.

Manipulation de la Sécurité

- Ne soulevez pas le module en saisissant la boîte de jonction du module ou les fils électriques.
- Ne pas stationner ou marcher sur le module.
- Ne laissez pas tomber le module et ne laissez pas tomber d'objets sur le module.
- Pour éviter les bris de verre, ne placez aucun objet lourd sur le module.
- Soyez prudent lorsque vous placez le module sur une surface.
- Le transport et l'installation inappropriés peuvent casser le module.
- N'essayez pas de démonter les modules et ne retirez aucune plaque signalétique ou composant des modules.
- Ne pas appliquer de peinture ou d'adhésif sur la surface supérieure du module.
- Pour éviter d'endommager la feuille de fond, ne rayez pas et ne heurtez pas la feuille de fond.
- Ne percez pas de trous dans le cadre. Cela peut compromettre la résistance du cadre et provoquer la corrosion du cadre.
- Ne rayez pas le revêtement anodisé du cadre (sauf pour la connexion à la terre).
- Cela peut provoquer une corrosion du cadre ou compromettre la résistance du cadre.
- Soyez prudent lorsque vous placez le panneau sur une surface, en particulier lorsque vous le placez dans un coin.
- Un panneau avec du verre cassé ou une feuille de fond déchirée ne peut pas être réparé et ne doit pas être utilisé car le contact avec n'importe quelle surface de panneau ou le cadre peut causer un choc électrique.
- Ne travaillez que dans des conditions sèches et n'utilisez que des outils secs. Ne pas manipuler les panneaux lorsqu'ils sont mouillés à moins de porter un équipement de protection approprié.
- Lorsque vous rangez des panneaux non installés à l'extérieur pendant une période donnée, couvrez toujours les panneaux et assurez-vous que le verre est orienté vers le bas pour empêcher l'eau de s'accumuler à l'intérieur du panneau et endommager les connecteurs exposés.

Installation Safety

- Never open electrical connections or unplug connectors while the circuit is under load.
- Contact with electrically charged parts of the panels, such as terminals, can result in burns, sparks and lethal shock whether or not the panel is connected.
- Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot; there is a risk of burns and electric shock.
- Do not work in the rain, snow or in windy conditions.
- Avoid exposing cables to direct sunlight in order to prevent their degradation.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic objects while installing or troubleshooting photovoltaic systems.
- Use only insulated tools that are approved for working on electrical installations.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, rechargeable batteries, etc.

- Under normal outdoor conditions the current and voltage generated by the system will differ from those listed on the datasheet. Datasheet values are the values measured under standard test conditions. Accordingly, during system designing phase, current and short-circuit current should be multiplied by a factor of 1.25 to determine components ratings.
- Only use connectors to connect modules to form a string, or connect to another device. Removing the connectors will make the warranty void.

Sécurité d'Installation

- N'ouvrez jamais les connexions électriques et ne débranchez pas les connecteurs lorsque le circuit est sous charge.
- Le contact avec les parties chargées électriquement des panneaux, tels que les bornes, peut provoquer des brûlures, des étincelles et des chocs mortels, que le panneau soit connecté ou non.
- Ne touchez pas le module PV inutilement pendant l'installation. La surface de verre et le cadre peuvent être chauds; il existe un risque de brûlures et de choc électrique.
- Ne travaillez pas sous la pluie, la neige ou dans des conditions venteuses.
- Évitez d'exposer les câbles à la lumière directe du soleil afin d'éviter leur dégradation.
- Tenez les enfants à l'écart du système pendant le transport et l'installation des composants mécaniques et électriques.
- Couvrir complètement le module avec un matériau opaque pendant l'installation pour éviter la génération d'électricité.
- Ne portez pas de bagues métalliques, de bracelets de montres, d'oreilles, de nez, de bagues à lèvres ou d'autres objets métalliques lors de l'installation ou du dépannage de systèmes photovoltaïques.
- N'utilisez que des outils isolés approuvés pour travailler sur des installations électriques.
- Suivez les règles de sécurité pour tous les autres composants du système, y compris les fils et les câbles, les connecteurs, les régulateurs de charge, les onduleurs, les batteries d'accumulateurs, les batteries rechargeables, etc.
- Dans des conditions extérieures normales, le courant et la tension générés par le système diffèrent de ceux indiqués sur la fiche technique. Les valeurs de feuille de données sont les valeurs mesurées dans des conditions de test standard. Par conséquent, pendant la phase de conception du système, le courant et le courant de court-circuit doivent être multipliés par un facteur de 1,25 pour déterminer les valeurs nominales des composants.
- Utilisez uniquement des connecteurs pour connecter des modules pour former une chaîne ou pour vous connecter à un autre périphérique. Enlever les connecteurs annulera la garantie.

Fire Safety

- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- This module can be used in conjunction with a UL 2703 mounting system to achieve a Class A, B, or C fire rating as determined by that systems classification when using Type 2 PV modules such as those covered in this certification.
- There are no limitations on inclination of the mounting surface for these modules.
- Consult your local authority for guidelines and requirements for building or structural fire safety.

- Roof constructions and installations may affect the fire safety of a building; improper installation may create hazards in the event of a fire.
- Use components such as ground fault circuit breakers and fuses as required by local authority.
- Do not use panels near equipment or in places where flammable gases may be generated.
- The modules have been rated Fire Class C, and are suitable for mounting onto a Class A roof.
- The presence of these modules on a roof can change the fire performance of that roofing system during a fire event.

La Sécurité Incendie

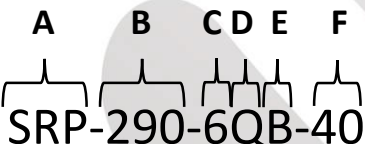
- Le classement au feu de ce module n'est valable que s'il est monté de la manière spécifiée dans les instructions de montage mécanique.
- Ce module peut être utilisé avec un système de montage UL 2703 pour obtenir un indice de résistance au feu de classe A, B ou C tel que déterminé par la classification de ce système lors de l'utilisation de modules PV de type 2 tels que ceux couverts par cette certification.
- L'inclinaison de la surface de montage de ces modules n'est pas limitée.
- Consultez les autorités locales pour connaître les directives et les exigences relatives à la sécurité incendie des bâtiments ou des structures.
- Les constructions et les installations de toiture peuvent affecter la sécurité incendie d'un bâtiment; Une mauvaise installation peut créer des dangers en cas d'incendie.
- Utilisez des composants tels que des disjoncteurs de fuite à la terre et des fusibles comme requis par les autorités locales.
- N'utilisez pas les panneaux près d'équipements ou dans des endroits où des gaz inflammables peuvent être générés.
- Les modules ont reçu la classe de résistance au feu C et peuvent être montés sur un toit de classe A.
- La présence de ces modules sur un toit peut modifier la performance au feu de ce système de toiture lors d'un incendie.

3. Product Identification

Each module has two labels providing the following information:

Nameplate:

The nameplate describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; weight, dimensions etc.; the maximum system voltage of 1000 volts DC. In addition, the nameplate has a model number. Model numbers carry the following information:

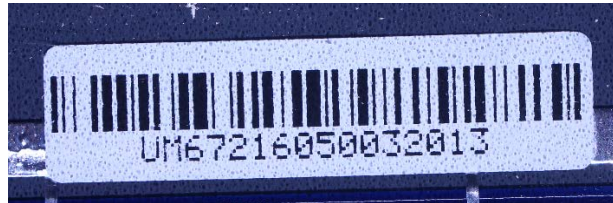
Example Model Number: 

The diagram shows the model number SRP-290-6QB-40 with brackets above it labeled A through F. Segment A is SRP, B is 290, C is 6, D is QB, E is -, and F is 40.

- A. Seraphim USA Module Designator
- B. Power Rating
- C. Cell Size
- D. Base Electrical Technology
- E. Form Factor [A=72 cell, B=60 cell]
- F. Frame Wall Thickness

Barcode:

Each individual module has a unique serial number. The serial number has 16 digits. The sixth and seventh digits are the year code, and the eighth and ninth digits are the month code. For example, xxxxx1605xxxxxxx means the module was made in May 2016. Each module has one barcode permanently attached to the interior of the module and is visible from the front of the module. This bar code is inserted prior to laminating.



Do not remove any labels. Removing a label will void the SERAPHIM warranty.

4. Mechanical Installation

Selecting the location

- Select a suitable location for installing the modules.
- The modules should be facing south in northern latitudes and north in southern latitudes.
- For detailed information on the best installation angle, refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator.
- The module should not be shaded at any time.
- Do not use modules near equipment or in locations where flammable gases may be generated or collected.

General Installation

- The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material.
- In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time.
- In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants or trees or damaged by flying sand.
- Modules must be securely attached to the mounting structure.

- Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the frame of the module is generally recommended.
- Always observe the instructions and safety precautions included with the module support frames.
- Do not attempt to drill holes in the glass surface of the modules as this will void the warranty.
- Do not drill additional mounting holes in the module frames of the modules as this will void the warranty.
- Before installing modules on a roof, ensure that the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.
- When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated winds for the area.
- Dust building up on the surface of the module can impair with module performance.
- SERAPHIM recommend installing the modules with a tilt angle of at least 10 degrees, making it easier for dust to be washed off by rain.
- Observe the linear thermal expansion of the module frames (the recommended minimum distance between two modules is 2 cm).
- Always keep the backsheet of the panel free from foreign objects or structural elements, which could come into contact with the panel, especially when the panel is under mechanical load.
- Ensure panels are not subjected to wind or snow loads exceeding the maximum permissible loads, and are not subject to excessive forces due to the thermal expansion of the support structures: See the following paragraph for more detailed information.

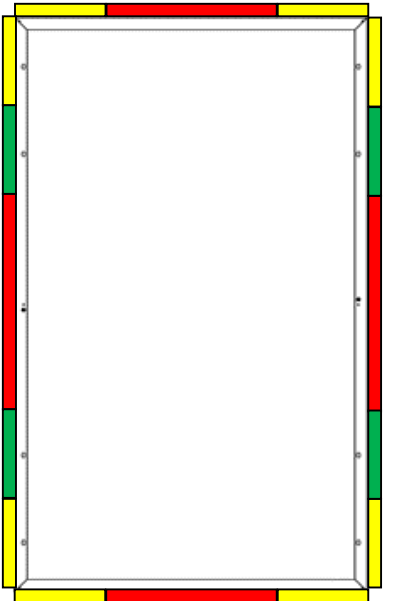
Installation Methods

- Modules can be installed on the frame using mounting holes, clamps or an insertion system. Modules must be installed according to the following examples. Not mounting the modules according to these instructions may void the warranty.
- Module can be installed in both landscape and portrait modes.
- The modules must be properly secured to their support so that they can withstand live load conditions, including wind uplift, to the pressure they have been certified for. It is the installer's responsibility to insure that the clamps used to secure the modules are strong enough.

Attachment Guidelines

These modules are to be mounted only in the prescribed locations with the attachment method defined in the figure below. No other mounting method has been evaluated by TUV. Mounting at any other location or method will void the warranty on the module.

MODULE ATTACHMENT ZONES				
60 CELL				
LONG SIDE	SHORT SIDE	ATTACHMENT METHOD	DESIGN LOAD (PSF)	
205MM-410MM	NA	-TOP CLAMP -END CLAMP -BOLT (MIN ¼")	50	
0-205MM	0-248MM		NOT ALLOWED	
>410MM	>248MM		NOT ALLOWED	
72 CELL				
LONG SIDE	SHORT SIDE	ATTACHMENT METHOD	DESIGN LOAD (PSF)	
245MM-489MM	NA	-TOP CLAMP -END CLAMP -BOLT (MIN ¼")	50	
0-245MM	0-248MM		NOT ALLOWED	
>489MM	>248MM		NOT ALLOWED	
Note: Design loads include a Factor of Safety of 1.5.				



- These modules have been evaluated and listed for the use of bolted connections at the prescribed mounting holes and for both mid and end style top down clamps. The minimum bolt size is ¼-20 for all mounting hardware.
- Torque ¼-20 bolts to 120 in-lbs, 5/16-18 bolts to 132 in-lbs and 3/8-16 bolts to 236 in-lbs.
- Top down clamps must have a minimum contact width of 1.5" and min reach over the top of the module of 0.20".
- The module clamps must not contact with the front glass or deform the frame in any way. The load path must be along the outer edge of the frame wall and not over or through the glass. This could cause the glass to crack and break.
- Avoid shading effects from the module clamps and insertion or mounting systems.
- Drainage holes in the module frame must not be closed or obscured by the clamps.

5. Electrical Installation

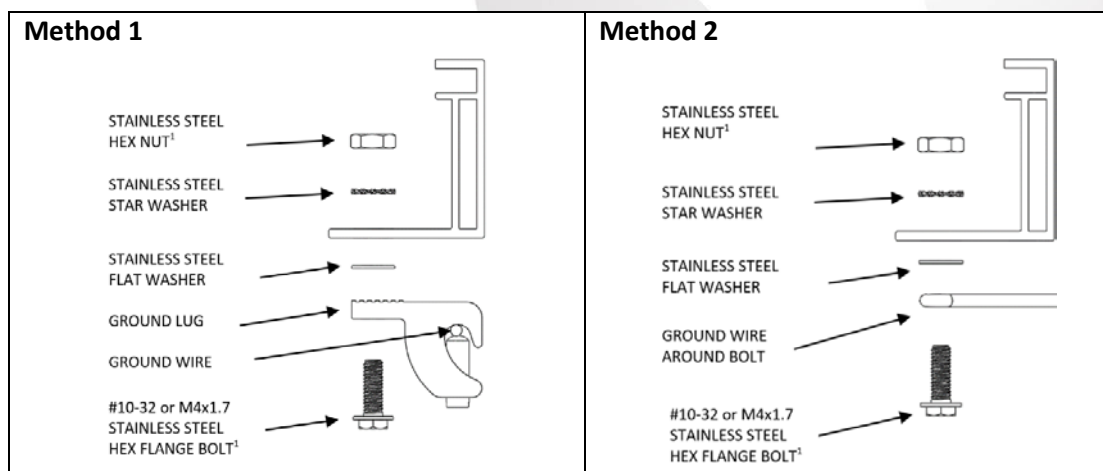
General Installation

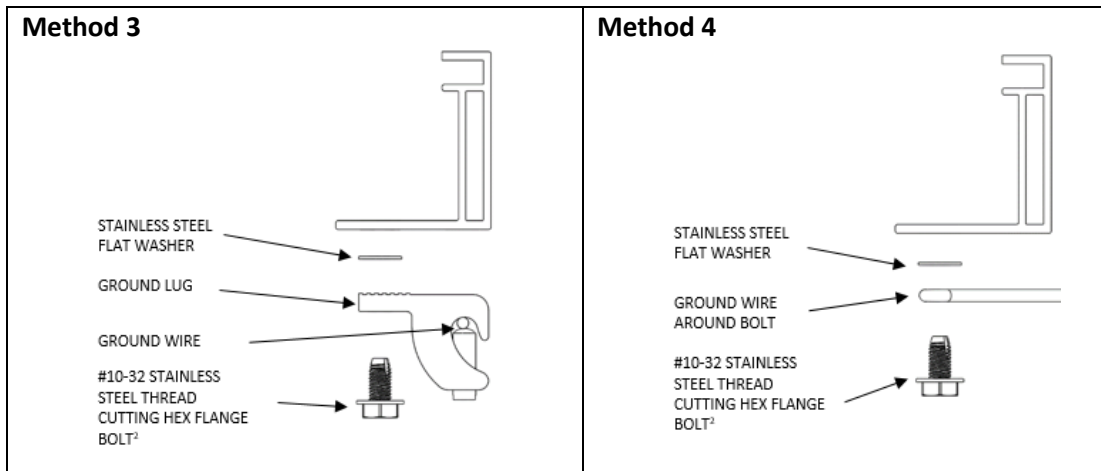
- Any hardware used must be compatible with the mounting structure material to avoid galvanic corrosion.
- It is not recommended to use modules with different configurations (grounding, wiring) in the same system.
- For applications requiring a high operating voltage several modules can be connected in series to form a string of modules; The system voltage is then equal to the sum of the voltage of each module.
- For applications requiring high operating currents several strings of modules can be connected in parallel; the system current is then equal to the sum of the current of each string of modules.

- Our modules are supplied with connectors to be used for system electrical connections. Use only ZJRH 05-6 connectors to connect to these panels.
- The maximum number of series connected modules depends on system design, the type of inverter used and environmental conditions.
- There is no limitation on the number of modules that can be connected in parallel; the number of modules is determined by system design parameters such as current or power output.
- Please refer to local regulations to determine the system wires size, type and temperature.
- To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current (The recommended cable cross section is 4 mm² for a single module and if rated current of a connector is higher than 10A). Please note that the upper limit temperature of cable is 85°C, and that of the connector is 90°C.
- The DC current generated by photovoltaic systems can be converted into AC and fed into a public grid. As local utilities' policies on connecting renewable energy systems to their grids vary from region to region. A qualified system designer or integrator should always be consulted. Building permits, inspections and approvals by the local utility are generally required.

Grounding

- Follow all NEC requirements and guidelines.
- To reduce the risk of electric shock, ground the module frame wall before completing the system's circuit.
- In order to be code compliant and meet the listing requirement of these modules, you must ground them following all NEC guidelines.
- The following grounding methods have been approved by TUV for use with these modules.
 - Copper wire directly attached with bolts (Methods 2 & 4)
 - IlSCO Ground Lug GBL-4DBT (Methods 1 & 3)
 - Burndy Ground Lug CL50-1TN (Methods 1 & 3)
 - Tyco Grounding Bolt 2058729-1
 - Tyco Grounding Clip 1954381-1
 - Tyco Grounding Clip 1954381-2
 - Tyco Grounding Clip 1954381-3





- All hardware for any configuration or method is to be 304, 302, 316 or 18-8 stainless steel.
- Where common grounding hardware (nuts, bolts, star washers, split-ring lock washers, flat washers and the like) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.
- Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in UL 1703, may be used for grounding connections in accordance with the instructions provided with the module.
- Follow all manufacture installation instructions for the lug/clip including the torque values for their provided hardware.
- If hardware is not provided, you can supply your own stainless steel hardware. The following table outlines all approved hardware sizes with their respective required torque specifications.

Fastener	Torque Spec [in-lbs]
#8-32 machine screw	18.5
#10-32 Thread Cutting Self-Tapping Screw [Type 1, 23, D, F, G]	29
M4x0.7 Machine Screw	16.5

- The module comes with 2, 4.2mm ground holes for all bonding the module to ground. It is acceptable to create additional grounding holes in the field so long as they are:
 - 4.2 mm in diameter.
 - Are located along the bottom flange of the module.
 - Have a minimum of 0.25" clearance from any edge or wall of the frame.
- Both through-bolts and self-threading/tapping screws can be used to create the bonding connection. Methods 1 & 2, shown in the table below, use the through bolt approach. Both #8-32 or M4x1.7 bolts with associated hardware can be used for these methods. Methods 3 & 4 are similar, but utilize a #10-32 self-tapping and self-threading screw with any of the following tip types [1, 23, D, F, T, or G].

- For the above methods, a standard bolt with appropriate washer can be used instead of the flange bolt. The washer must be installed such that it is in direct contact with the bolt's head as if it was the washer flange on the flange bolt.

6. Maintenance

- Maintenance is to be performed by qualified personnel only. Damaged modules could be dangerous and pose a significant safety risk and should not be serviced by non-qualified personnel.
- To ensure optimum module performance, SERAPHIM recommends the following maintenance measures:
- Clean the glass surface of the module when required. Always use clean water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent may be used to remove stubborn dirt.
- Check the electrical, grounding and mechanical connections every six months to verify that they are clean, secure, undamaged and free of corrosion.
- If any problem arises, consult a professional for suggestions.
- Caution: observe the maintenance instructions for all components used in the system, such as support frames, charging regulators, inverters, batteries etc.

7. Liability Disclaimer

- As the adherence to this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) products are beyond SERAPHIM's control, SERAPHIM does not accept responsibility and expressly disclaims liability for any loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.
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