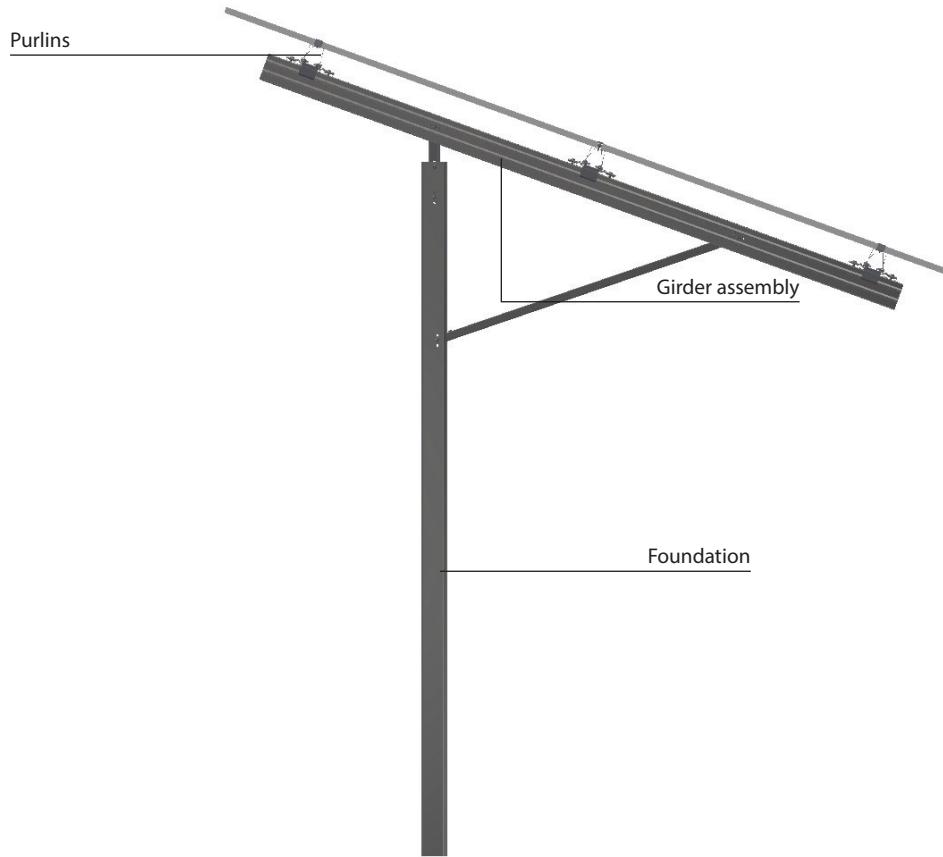


G-Max



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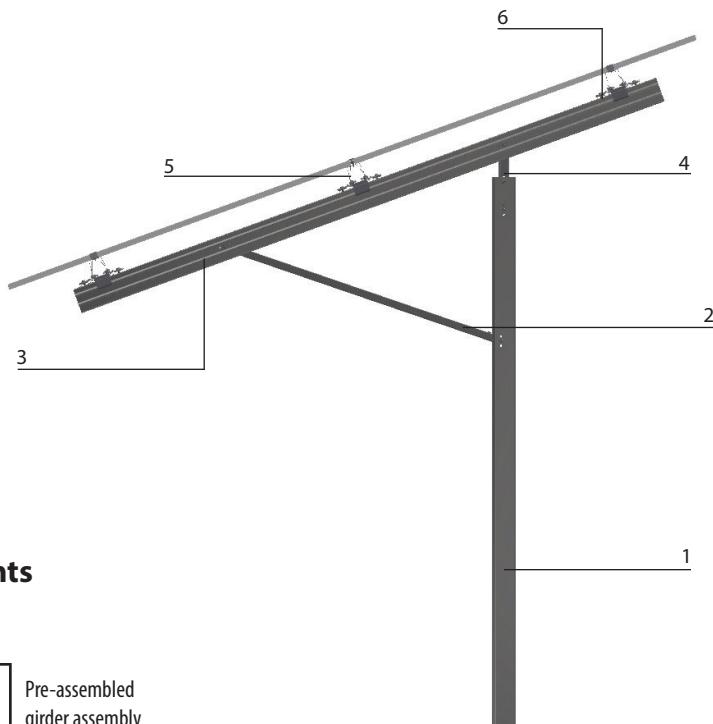
G-Max Ground Mount System

The Schletter G-Max solar mounting system for ground mount photovoltaic (PV) installation is specifically designed to meet or exceed applicable IBC, ASCE, and UL standards.

Features

- Conforms to UL 2703¹
- Certified to ULC/ORD Std C1703
- Electrically bonded unit
- 30 Amp series fuse rating
- Pre-assembled components
- Fully integrated and modular components
- Includes grounding module clamps

The G-Max is capable of accommodating nearly any framed PV module in portrait orientation.² Each G-Max is custom designed to meet specific structural load requirements.³ Included in G-Max are clamps specifically designed to secure and bond frame of a PV module.⁴ In turn, the components and assemblies that comprise G-Max form an electrically bonded unit. While individual components and structural sections will vary between designs, the primary assemblies and installation methods will remain the same. During installation, fully assemble system before securing bolts to the final torque.⁵ The following is a guide to properly install a G-Max in order to meet design and test standards.⁶



Key Components

1. Post
2. Strut*
3. Girder*
4. Head*
5. Purlin
6. Module clamp



Pre-assembled
girder assembly



*Strut, girder, and head make-up
pre-assembled girder assembly

¹The G-Max is evaluated for electrical bonding only. G-Max meets all IBC and ASCE requirements for structural loading; it was not evaluated for loading under UL 2703. G-Max is not to be used in corrosive atmospheres.

²Maximum number of modules shall not exceed maximum system voltage.

³Individual parts and components will vary from system-to-system. Please reference system specific drawings.

⁴This mounting system may be used to ground and/or mount a PV module complying with UL1703 only when specific module has been evaluated for grounding and/or mounting in compliance with included manual.

⁵Project drawings supersede installation instructions; see project drawings for all measurements, torques, and tolerances.

⁶Installer is responsible for verifying that system meets applicable NEC and CSA standards.

Tools Needed to Install G-Max Mounting System

Ensure all tools on checklist are assembled before starting installation.

Installation Tools		<input checked="" type="checkbox"/>
	String line with wood line blocks for foundation post installation and purlin alignment	
	Permanent marker	
	Tape measure	
	Two (2) foot carpenter's square for girder-to-purlin connection	
	Bubble level	
	A 9 mm, 16 mm, and 19 mm wrench and/or socket is required for all bolted connections	
	<p>Torque wrench and Socket Extension A 9 mm deep socket is required for module installation using an M8 bolted connection or bottom-up clamp.</p> <p>16 mm wrench and/or deep socket is required for all flanged M12 bolted connections at purlin clamps.</p> <p>19 mm wrench and or deep socket required for all non-flanged M12 bolted connections at posts and purlin splice.</p>	
	Ratchet and/or rechargeable power drill with controlled speeds	
	Torx® bit (TX40) for Rapid5K™ module clamps	
	Purlin Alignment Jig	

G-Max Configuration Options

The G-Max Ground Mount System can be configured in a variety of ways based on project requirements. Below are some of the most common configurations and site designations.

- Direct Bolt Connection (Figure 1)
- **Rapid5K™** clamps (Figure 2)
- Bottom Up Clamp (Figure 3)



Note:

First Solar Module — see supplement for detailed information.

Figure 1a. — Direct Bolt

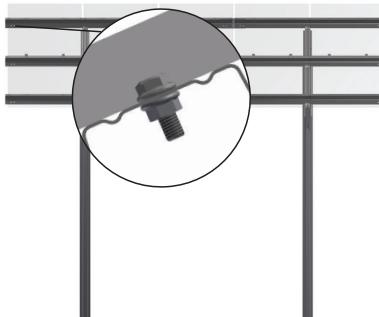


Figure 1b. — Direct Bolt



Direct bolt connection using bolts on first and third purlins and Schletter's Rapid5K clamp on the middle purlin

Purlin includes small slots for direct bolt connection (shown as O)

Figure 2a. — Rapid5K Clamp

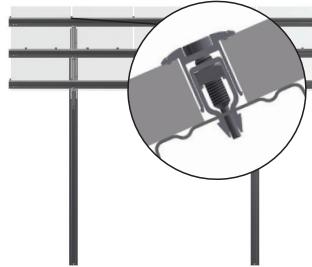


Figure 2b. — Rapid5K Clamp



Rapid5K clamp may be used to install all modules

Purlin includes long slots for Rapid5K clamp connection (shown as □)

Figure 3a — Bottom Up Clamp

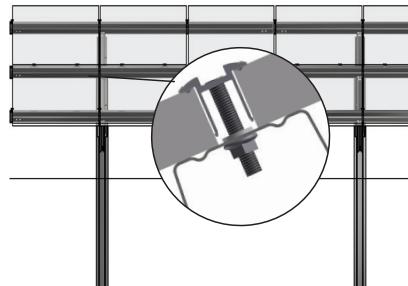
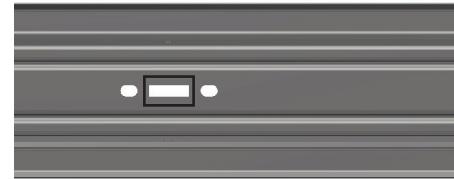


Figure 3b — Bottom Up Clamp



Bottom up clamp may be used to connect modules from the bottom

Bottom up clamp, top down view in the long slot of the purlin (shown as □)

Foundation Post Installation

1. Survey Proposed Site

- Review final drawing. Drawing will include information vital to proper installation of foundation posts.
- Refer to project drawing for tolerances for:
 - Embedment depth (Figure 6)
 - Support distance (Figure 7)
 - Lateral cantilever (Figure 7)
 - Post height variation (Figure 8)
 - Post verticality (Figure 9)
 - Post rotation (Figure 10)
- For longer racks, intermediate stakes may be required.
- Posts are installed vertically.
- For East-West slopes greater than 5.7° (10% slope) (Figure 11), contact your Schletter representative to discuss custom rack options. Racks can be designed for slopes up to 40° (84% slope).



Note:

For G-Max Duo post, please see the supplemental instructions for additional installation instructions.

Figure 6

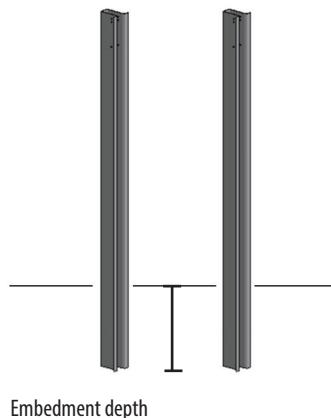


Figure 7

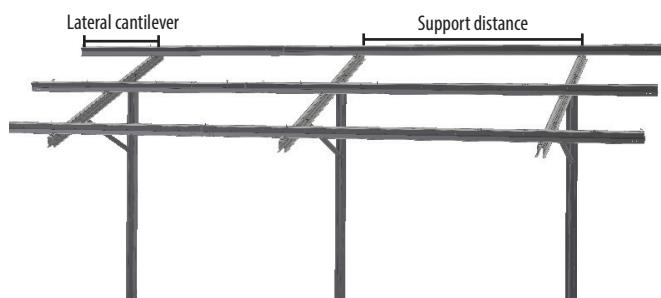


Figure 8

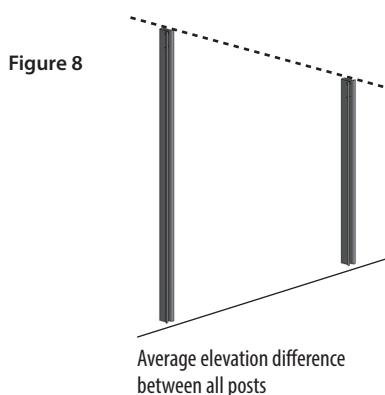


Figure 9

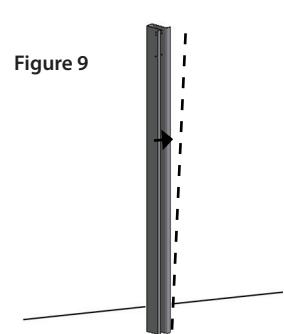


Figure 10

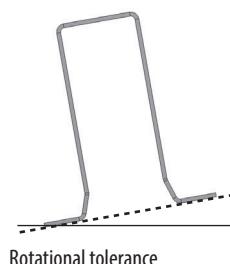
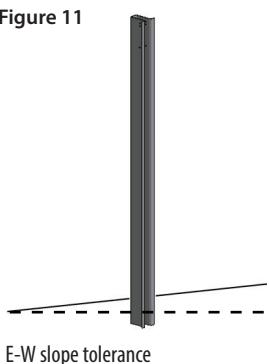


Figure 11



2. Post Installation

- Position each post at respective installation locations based on completed stake-out.
- Advance post to embedment depth as shown on final drawing.
- **Position string lines:** bottom string line is used for correct placement of post; top string line indicates correct embedment depth: string is run from top of first post to top of first post of adjacent rack.
- When installing subsequent posts, ram until hammer head touches top string line.
- Upon completion of post pile drive, check that each post meets appropriate tolerances.
- If posts do not fall within tolerances, contact your Schletter representative.

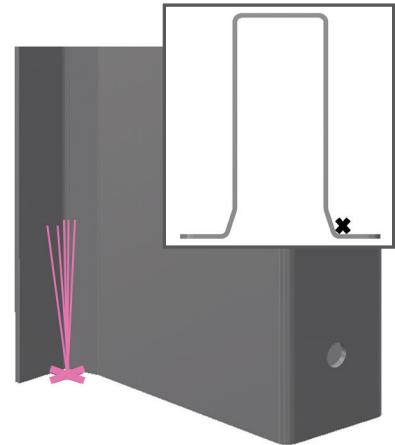


Notes:

- If post splice is required, see *Splice Connection* section for splice installation instructions.
- If after ramming post, there are signs of cracking, use 95% zinc paint to touch up post.



Mark each post location using soil nails with flagging



Position posts on marked locations



Ram two posts at opposite ends of array for string line



Use string line as guide to determine correct placement and depth of posts



Position hydraulic ram and lift post into position beneath ram head



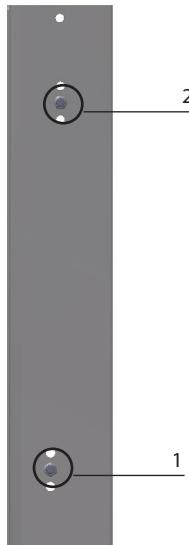
Hammer head touching top string line indicates correct depth is reached

Mounting Individual Assembly Groups

1. Mount Girder Assembly

Girder, strut, and head are pre-assembled for ease of installation and adjustability to ensure that specified tilt angle and clearance tolerances are maintained.

- Install location bolts (**shown as 1 and 2**); hand tighten to allow for installation of girder assembly.
- Position strut onto previously installed lower location bolt.
- Position head onto upper location bolt.
- Pivot girder until head and post align.
- Secure girder assembly in place by installing bolt at upper post hole location (**shown as 3**).
- Check angle of girder and ground clearance; refer to construction drawings for measurement.
- Ground clearance is a reference dimension only and can be affected by adjustment to rack. See project drawings.
- Tighten post bolts using 19 mm socket.



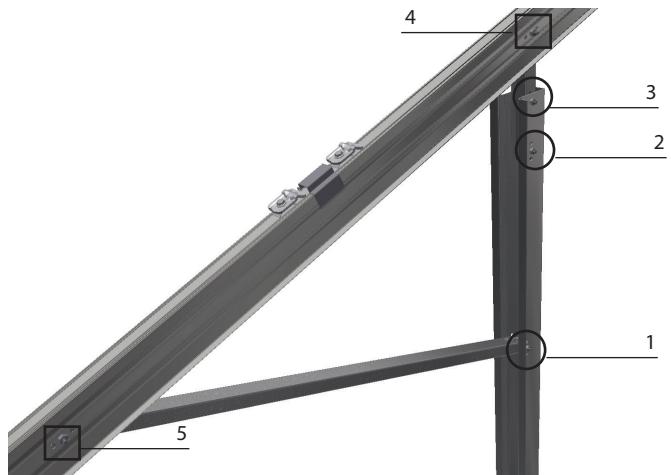
Hand tighten location bolts on post (shown as O)



Connect strut to foundation post



Connect head to foundation post



Overview of Field Installed Bolts and Factory Installed Bolts:
Bolts 1, 2, and 3 (shown as O) are field installed during the girder assembly installation and should be snug tight and NOT torqued. Bolts 4 and 5 (shown as □) are factory installed to snug tight and should NOT be torqued.

⁷Snug-tight is the condition that exists when all of the plies in a connection have been pulled into firm contact by the bolts in the joint, and all the bolts in the joint have been tightened sufficiently to prevent the removal of the nuts without the use of a wrench.

2. Mount Purlins

- Mount purlin to girder assembly starting with top purlin and working toward grade.
- Position purlin into lower purlin clamps.
- Check that purlins are square to girder using a carpenters square.
- Purlin clamps should not be torqued until racking is squared, prior to module installation; adjust as required.
- Tighten and torque purlin clamp to girder, while ensuring purlin stiffener is nested tightly.
- Tighten purlin clamps using 16 mm socket ensuring spring clip is properly oriented.

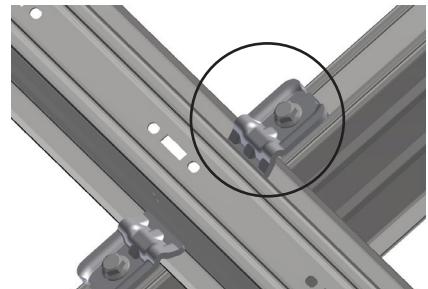


Notes:

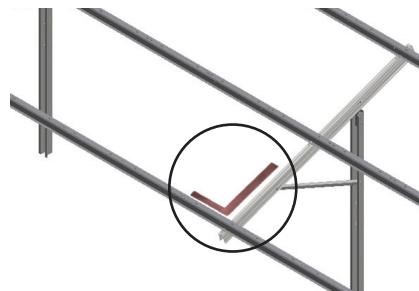
- Purlin must be mounted square to girder.
- The purlin cantilever and distances between purlins must be observed as specified in provided project drawing.
- Please consult project drawings for purlin orientation.



Mount purlin perpendicular to girder



Position purlin in purlin clamps



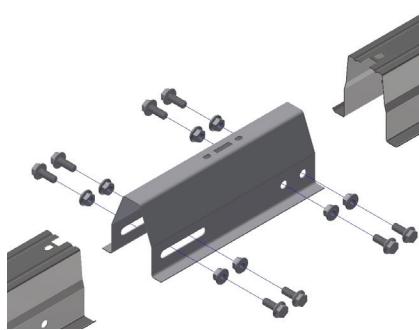
Use a carpenter's square to check that purlins and girder are square



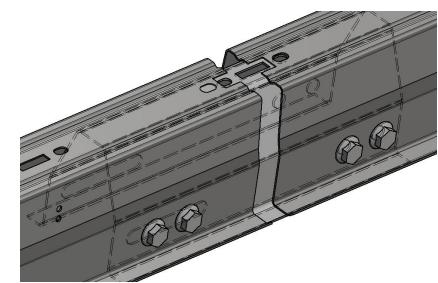
Torque purlin clamps as specified on project drawings using 16 mm socket

3. Splice Connection

- Consult system specific drawings for splice locations.
- Splice sleeve bolts should not be torqued until racking is squared prior to module installation adjust as required.
- Torque to specification with 19 mm socket. Refer to project drawings for torque values.



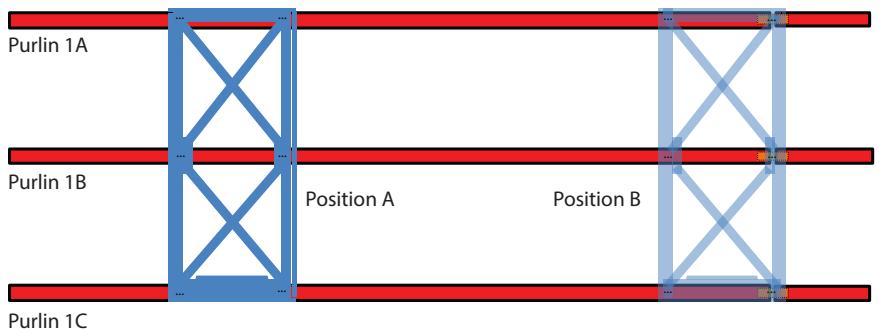
Secure splice connection with M12x30 bolts and nuts



Complete splice

4. Purlin Alignment Jig

- Position purlins 1A — 1C on girder assemblies with accurate cantilever.
- Set jig into all purlins at position A (any clamp locations).
- Mount purlins 1A — 1C to girder assemblies.
- Set jig into all purlins at position B with pins in purlin splices.
- Tighten purlin splice hardware.
- Repeat above steps with remaining purlins.

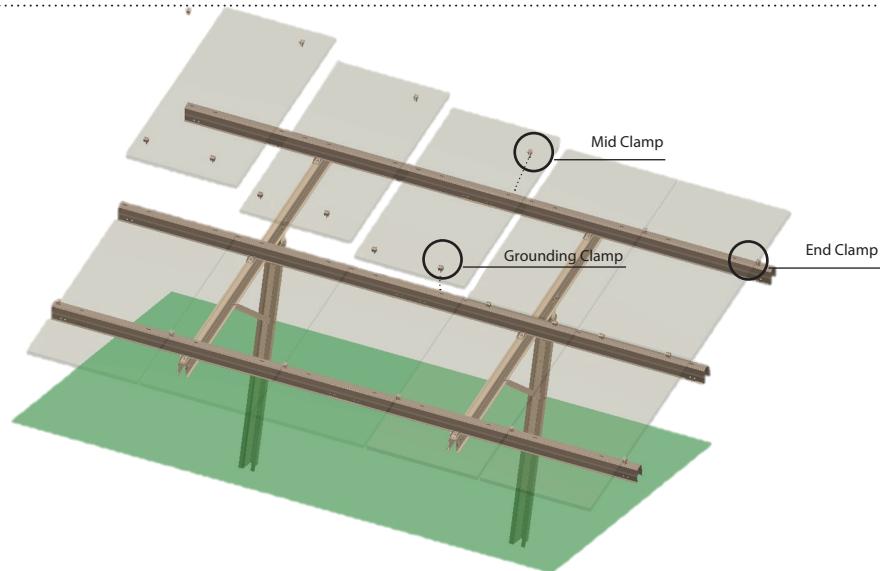


Purlin alignment jig used to keep purlins square, align module clamp slots, and position splices

Module Mounting

1. Position Modules

- Install clamps in purlin slots.
- Purlins are positioned according to module dimensions.
- **Rapid5K™** clamps 2.0 (referred to as Rapid5K clamps) must be used on middle purlins.



Modules are positioned on purlins according to specified dimensions

2. Secure Modules

- **Do NOT** use impact driver.
- Verify that module clamp is fully engaged on purlin and that module clamp is aligned with module frame.
- When mounting modules, please observe clamping points specified by module manufacturer.
- Install module clamps/hardware
- Speed setting on power drill **SHOULD NOT EXCEED** 1,000 rpm. Installation speed exceeding 1,000 rpm may damage clamp hardware.
- Torque clamps and hardware to specification.



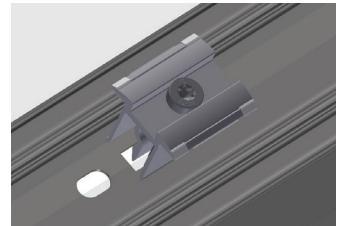
Rapid5K mid clamp



Rapid5K end clamp

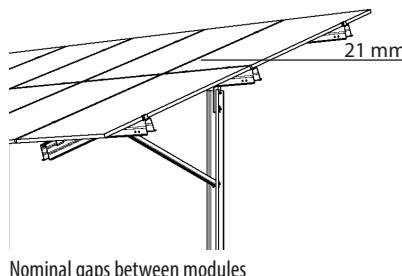


Rapid5K grounding clamp

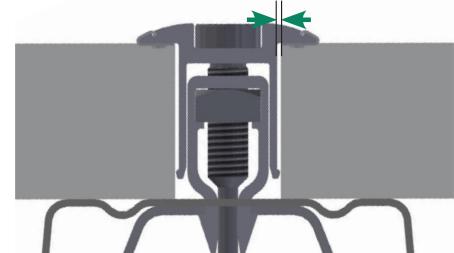


Install clamps in purlin slots to secure modules

1.5 mm maximum middle clamp to module offset



Nominal gaps between modules

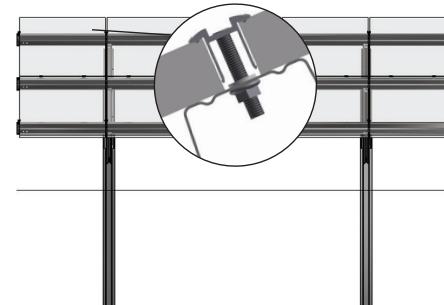


3. Module Mounting Options

- Direct bolt connection
- Bottom up clamp

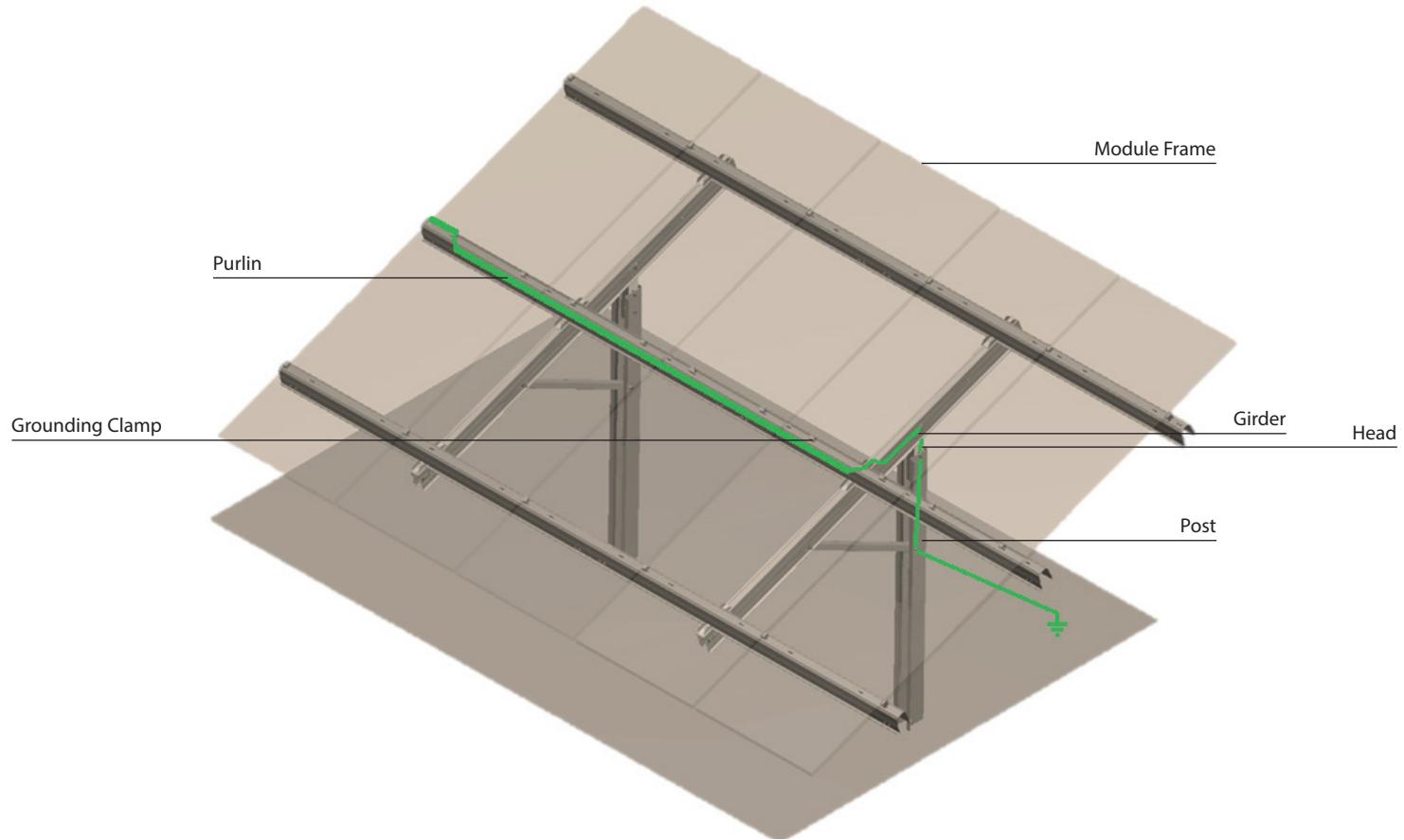


Direct bolt connection using bolts on first and third purlins and Schletter's Rapid5K Clamp on the middle purlin



Bottom up clamp may be used to install clamps from bottom

Grounding Path



Optional Accessories

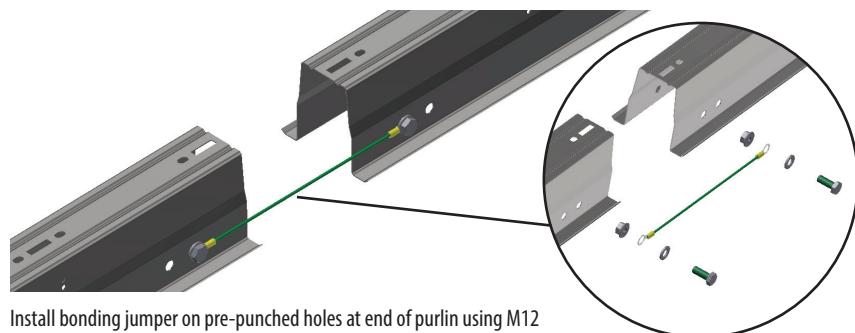
1. Bonding Jumper

- Install bonding jumper on pre-punched holes at end of purlin using M12 bolt, washer, and M12 nut.



Notes:

- Electrically bonds adjacent systems forming a continuous ground path.
- Connects directly to purlin.
- Available in 12-inch lengths (additional lengths available upon request).
- Used for expansion joints or other breaks in solar mounting system.
- See electrical drawings for locations and quantities of bonding jumpers.



Install bonding jumper on pre-punched holes at end of purlin using M12 bolt, washer, and M12 nut

2. Cable Management

- If cable management was ordered with system, connect before installing modules.



G-Hook cable management



Stainless Steel Cable Tie*

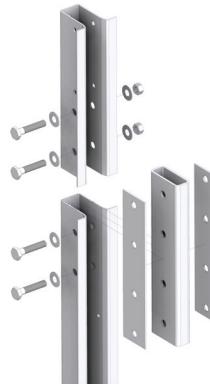
3. Post Splice

- Install shim plates between post and splice tubing using 3/4" bolts, nuts, and washers.



Notes:

- Splices are used to extend length of a post as needed.
- If post splices are required, attach using shim plates and provided hardware.
- Verify torque on all bolts.
- Splice location will vary depending on project.
- Consult project specific drawings.



Install shim plates between post and splice tubing using 3/4" bolts, nuts, and washers (front view of post)

4. Install Overcurrent Protection Device (grounding)

- Shares bolt that connects strut to post.
- Remove serrated flange and install grounding lug, torque to specification. See Project drawings for torque values.
- Accommodates stranded or solid copper wire (14 gauge to 2 gauge).
- Must use bare copper wire to connect to grounding lug. If using insulated grounding wire, remove at least two inches of insulation to expose copper wire.



Loosen or remove top portion of grounding lug and insert grounding wire into appropriate groove

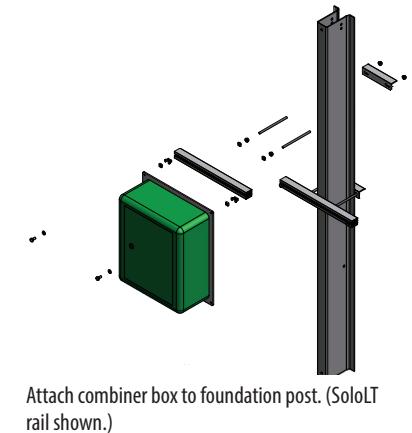


Grounding wire must extend through grounding lug by at least 1/4"

*Image courtesy of Heyco.

5. Combiner Box

- Thread 3/8" serrated flange nut to end of threaded rods with serrations directed toward SoloLT rail.
- Thread 3/8" square nut to end of threaded rods in front of serrated flange nut.
- Slide 3/8" square nuts with threaded rod through square channel of SoloLT rail.
- Hand tighten serrated flange nut to SoloLT rail.
- Attach combiner box mount to post. Threaded rods should straddle post securing aluminum angle to backside. Torque 3/8" serrated flange nuts to secure mount.
- Press M8 Klickin and M8 square nut into Klick Channel of SoloLT rail. Adjust as needed to for specific combiner box.
- Attach combiner box using M8 socket head cap screw. M8 washer must be installed under head of screw.



Torque Specifications and Tolerances

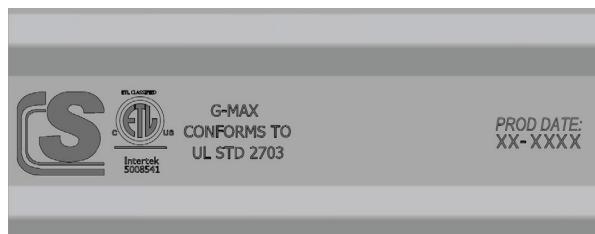
Systems are specifically designed for each project. Please reference specific project drawing for allowable tolerances and recommended torque for each size of bolt used in the system.

In the event of deviation from approved drawings, contact Schletter immediately.

Torx Bolt for Rapid5K Module Clamps	13–15 N·M	10–11 FT-LBS
M6 and 1/4" Bolt	5–7 N·M	4–5 FT-LBS
M8 and 5/16" Bolt	13–15 N·M	10–11 FT-LBS
M12 and 1/2" Bolt	47–53 N·M	35–39 FT-LBS
M20 and 3/4" Bolt	232–256 N·M	171–189 FT-LBS

Listing Requirement

- IMPORTANT!** Listing requires that every girder be labeled.
- If girder has no label, contact your Schletter representative.



Label should appear on girder



Equipment Grounding

- Many installations contain more than one mounting system. Such cases call for electrically bonding each of the different manufacturers systems. Since individual racks are fully bonded units, it is only necessary to connect individual racks together from one single point to another single point.⁸ Only use appropriate hardware when connecting harnesses or jumpers to the mounting system. Take care to prevent copper wires from directly contacting aluminum surfaces as this will cause corrosion. For this purpose, Schletter offers a bonding jumper (see page 11).
- The installer of Schletter's electrically bonded G-Max must provide components necessary for the final connections to grounding electrode system. Typically installation will incorporate a grounding electrode (ground rod), appropriately sized copper wire, rated wire connectors, and grounding lugs which are rated for this purpose. The installer must follow all manufacturers' installation literature. Installation must comply with all applicable NEC/CSA sections including but not limited to; NEC 250 (Grounding and Bonding), NEC 690 (Solar Photovoltaic Systems), CSA 22.1 (Safety Standard for Electrical Installations), and all other applicable state, and local electrical code requirements.
- Installer shall be fully responsible for all connections between Schletter's bonded G-Max and PV grounding electrode system.
- Equipment grounding conductors shall be no less than 14AWG (copper) or 12AWG (aluminum).
- Equipment grounding conductors can be connected to any exposed metallic portion of rack system provided that:
 - connection area is sufficiently sized
 - dissimilar metals are not in direct contact
 - connection does not interfere with other components
 - connection is protected from damage
- Calculation for overcurrent protection device including but not limited to spacing and wire size is the responsibility of installer.



Maintenance

- Yearly inspection of system should be conducted to maintain optimal performance.
- Visually inspect for signs of damage, wear, corrosion, or movement. Replace any affected components immediately.
- Check for loose wiring.
- Maintenance should only be performed by qualified personnel.
- Check mechanical details of structure:
 - At least 2% of bolted connections must be checked using a calibrated torque wrench. The torque wrench must have a display or be a click type torque wrench.
 - Torque wrench should be set at 50% of intended tightening torque. Check is successful if bolt cannot be loosened.
 - If >10% of checked bolted connections are loose, check has to be increased to 10% of all bolted connections.
 - If more than 10% of connections are still loose, all bolted connections must be checked.
 - Tighten all non-conforming bolts to specified torques
 - Requirements per ASME B107 and AISC



WARNING: Risk of death by electric shock.

AVERTISSEMENT: Danger de mort par secousse électrique.



Safety Precautions

Follow proper installation and safety procedures at all times. Edges of parts may be sharp. Follow proper lifting procedures.

For More Information

For United States, visit www.schletter.us or call 888-608-0234 or for Canada, visit www.schletter.ca or call 519-946-3800 to speak to a Schletter representative for more information.

⁸Schletter recommends two bonding jumpers to connect separate systems for redundancy.

Torx® is a registered trademark of Camcar Corp. division of Textron Industries.

Approved Module Manufacturers for Bonding and Grounding with Rapid5K Clamps

Boviet Solar

BVM6610M-250|255|260|265|270
 BVM6612M-300|305|310|315|320|325|330|335|340
 BVM6610P-245|250|255|260|265|270
 BVM6612P-300|305|310|315|320|325|330

Jinko Solar

JKM275P-60
 JKM330P-72
 Eagle 60|72
 Eagle PERC
 Eagle Black 60|72

Trina

TSM-PD14
 TSM-PD05
 TSM-PD05.08
 TSM-PD05.05
 TSM-DD14A(II)

Canadian Solar

CS6X-310|315|320P
 CS6X-P-FG
 CS6K-P-FG
 CS6K-M
 CS6K-M AB
 CS6P-P

JKM275PP-60-V
 JKM330PP-72-V
 JKM270P-60-V
 JKM320P-72-V
 Eagle MX JK07A|JK07B
 JKM265PP-60

TSM-PEG5
 TSM-PEG5.07
 TSM-PEG14
 TSM-PEG40.07

ET Solar

ET-M660 285|280|275|270|265 BB
 ET-M660 290|285|280|275|270
 WW|WB
 ET-M672 340|335|330|325|320 BB
 ET-M672 345|340|335|330|325
 WW|WB
 ET-P660 265|260|255|250 BB
 ET-P660 270|265|260|255 WW|WB
 ET-P672 315|310|305|300 BB
 ET-P672 320|315|310|305 WW|WB

REC Solar

REC245|250|255|260|265|270PE
 REC245|250|255|260PE BLK2
 REC300|305|310|315|320PE72
 REC265|270|275|280|285TP
 REC330|335|340TP72

Yingli Green Energy

YL300C|295C|290C|285C|280C|275
 C-30b
 YL290D|285D|280D|275D|270D-30b
 L340D|335D|330D|325D|320D|315D-
 36b
 YL275P|270P|265P|260P|255P|250P-
 29b

SolarWorld

Sumodule SW 80 MONO RHA
 Sumodule SW 150 POLY R6A
 Sumodule SW 150 MONO R6A
 Sumodule SW 100 POLY RGP
 Sumodule Plus SW 280-295 MONO
 Sumodule Plus SW 285-300 MONO (5-busbar)
 Sumodule Plus SW 280-290 MONO BLACK
 (5-busbar)
 Sunmodule Plus SW 275-290 MONO BLACK
 Sunmodule Pro-Series SW 260 POLY WOB
 Sunmodule Protect SW 275-280 MONO BLACK
 Sunmodule SW 320-325|340-350 XL MONO

YL260P|255P|250P|245P|240P-29b
 YL325P|320P|315P|310P|305P|300P-
 35b

Hanwha Q Cells

Q.PRO BFR G4|G4.1|G4.3
 Q.PLUS BFR G4.1
 Q.PRO G4
 Q.PLUS G4
 Q.PRO L G4.1
 Q.PLUS L G4.1|G4.2
 Q.PEAK-G4.1|G4.1/MAX
 Q.PEAK BLK G4.1
 Q.PEAK L G4.2

SunPower

SPR-E19-320
 SPR-E20-327
 SPR-P17-355|350|345|340|335|330-COM
 SPR-X21-345
 SPR-X21-335-BLK

First Solar

Note: If using First Solar Modules, please see supplement for additional information.

Series 4

SCHLETTERR

The Solar Mounting Group

SCHLETTERR GMBH (Headquarters)

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