

SWH Solar Racking Ground Mount Installation Guide



Installer responsibility

The installer is solely responsible for:

- Complying with all local or national building codes, including any that may supercede this manual.
- Ensuring that UniRac and other products are appropriate for the particular installations and installation environment.
- Ensuring safe installation of all electrical aspects of the PV array.

SWH GROUND MOUNT SYSTEM COMPONENTS

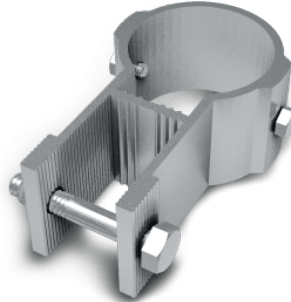
COMPONENTS

SWH PIPE TO RAIL ADAPTOR
MFG-PN: MR-SW-PR2, MR-SW-PR2B



Pipe to rail adaptor material:
6005-T5 extruded aluminum alloy
Finish: Clear or black anodized
Bolt & nut material: 304 stainless steel
Pipe to rail adaptor weight: 0.37 lbs
(without hardware)

SWH SLIDER BRACKET
MFG-PN: MR-SW-SL-02



Slider bracket material:
6005-T5 extruded aluminum alloy
Finish: Clear or black anodized
Bolt & nut material: 304 stainless steel
Slider bracket weight: 0.20 lbs
(without hardware)

SWH EXTENSION LEG
MFG-PN: MR-SW-EL-120



Extension leg material:
6005-T5 extruded aluminum alloy
Finish: Clear or black anodized
Bolt & nut material: 304 stainless steel
Ext. Leg weight: 0.265lbs / foot
(without hardware)

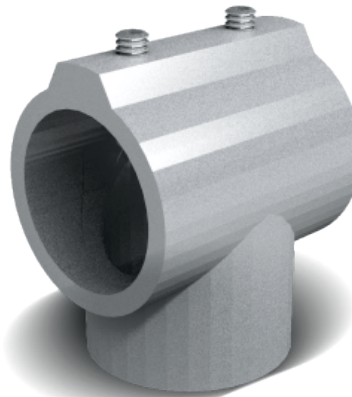
SWH PIPE COUPLER
MFG-PN: MR-SW-SC-02



Pipe coupler material:
6005-T5 extruded aluminum alloy
Finish: Clear anodized
Bolt & nut material: 304 stainless steel
Pipe Coupler weight: 0.60 lbs
(without hardware)

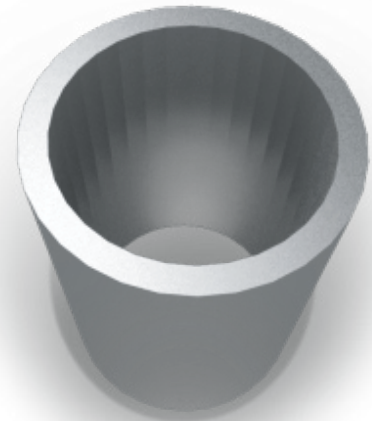
NON - SWH PARTS

HOLLAENDER TEE FITTINGS
MFG-PN: MR-HC-TE-5-1.5



HOLLAENDER #5 TEE FITTINGS

SCHEDULE 40, 21' PIPE
MFG-PN: MR-IM-PP-1521



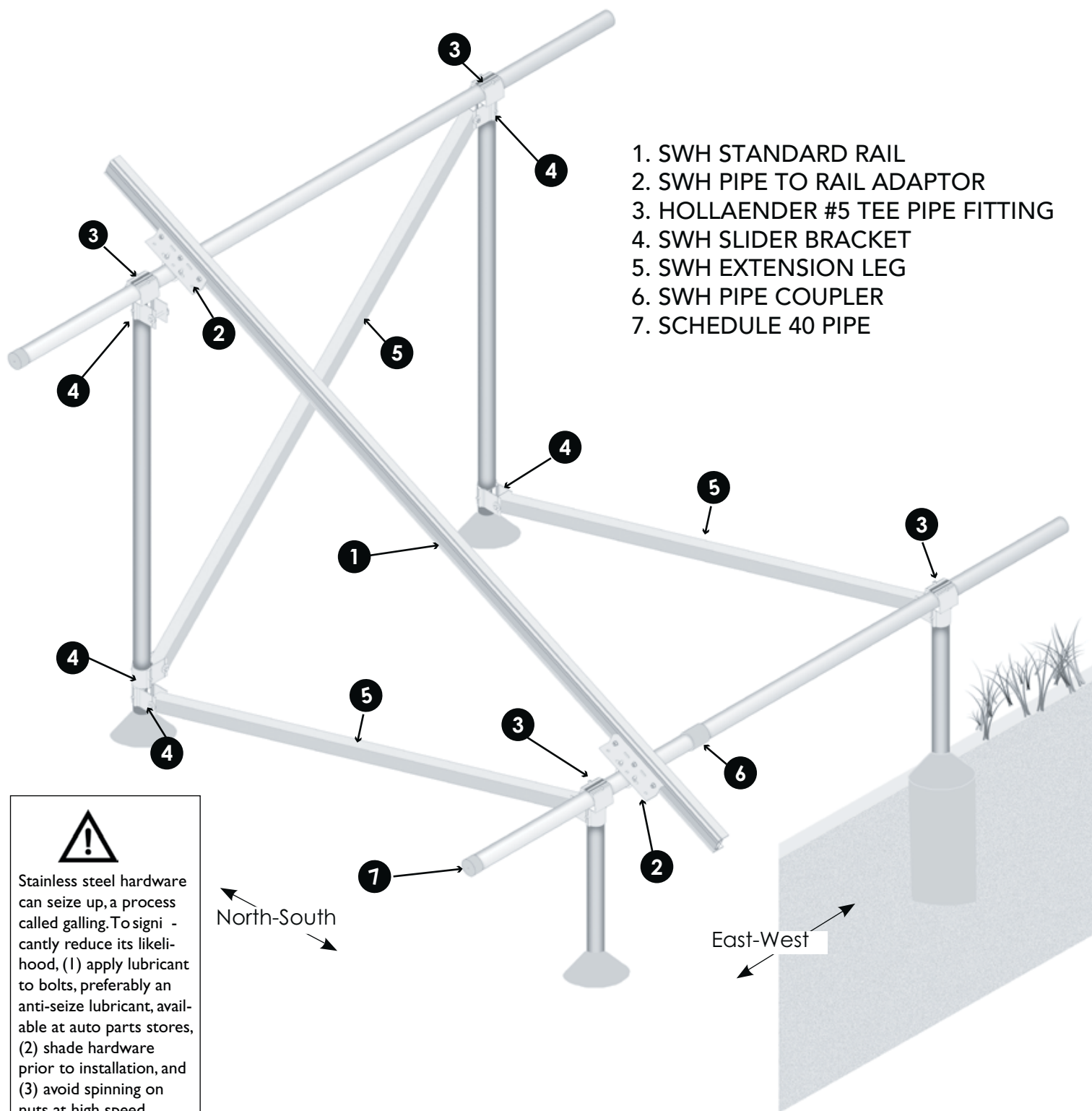
Structural Strength: The following are hold back capacities when attached to galvanized steel pipe, A53:


Pullout Capacity of Fitting Set Screws When Properly Torqued (with 2:1 safety factor)

Std. IPS Size Steel Pipe, A53 Schedule 40

Fitting Size	Torque Ft. Lbs. ^A	No. Set Screws	Set Screw Orientation	Typical Fitting	Capacity ^A
2" IPS	17	1		17-9 bracing fitting, 5-9 Tee	1360
	17	2	IN LINE	47-9 base flange, 17X-9 bracing fitting	1705
	17	2	AT 90 DEGREES	5X-9 Tee	2080
1-1/2" IPS	17	1		5E-8 Tee, 17-8 bracing fitting	1315
	17	2	IN LINE	45-8,46-8,47-8 base flanges	1505
	17	2	AT 90 DEGREES	SEX-8,SEX-8 Tee	2080
1-1/4" IPS	17	1		5E-7 Tee, 17-7 bracing fitting	1265
	17	2	IN LINE	45-7,46-7,47-7 base flanges	1500

SWH GROUND MOUNT SYSTEM ASSEMBLY DRAWING





Stainless steel hardware can seize up, a process called galling. To significantly reduce its likelihood, (1) apply lubricant to bolts, preferably an anti-seize lubricant, available at auto parts stores, (2) shade hardware prior to installation, and (3) avoid spinning on nuts at high speed.

Planning the array prior to installation

On a SWH ground mount structure, leg caps, rail brackets, and cross pipe couplers must be offset from one another in the east-west direction. If you are using top mounting clamps, any conflicts among these components can be dealt with easily on site, so there is never the need to deviate from the average east/west leg spacing listed on your Specs Sheet. Go on to "Lay out and excavate leg positions," below.

Make a scale drawing to identify potential component conflicts (see Fig. 3 or Fig. 4). If one occurs, use one or more of these solutions:

- Select a different set of module holes to mount your modules (an option available for bottom mounting clips only).
- Shift the position of conflicting pair of legs without exceeding maximum leg spacing listed on your Specs Sheet.
- Shift all cross pipes and rails relative to the legs without exceeding maximum cross pipe overhang listed on your Specs Sheet.

Cross pipe coupler conflicts and minor conflicts between leg caps and rail brackets, where offsets are near but not below the minimums listed in Figure 3 or 4, can be dealt with easily on site.

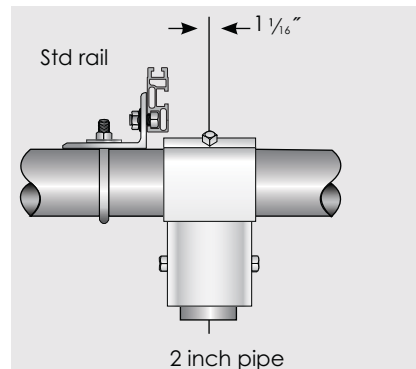
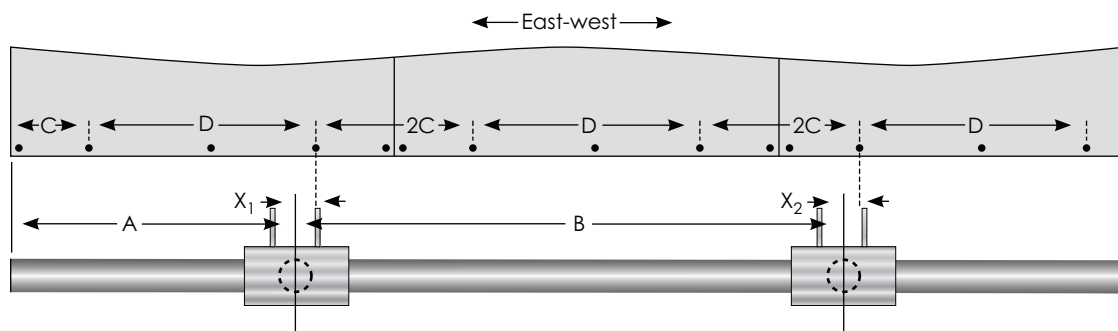


Figure 3.
Planning
installs



Create a dimensional drawing that lists overhang (A) and average leg spacing (B), which are listed under "Design Parameters" on page 2 of your Specs Sheet. Determine east-west offsets between vertical legs (dotted circles) to the module mounting holes you

intend to use. C and D depend on your specific modules. Determine your offsets (X_1 , X_2 , etc.). If the offsets are less than the applicable minimum offset below, you will need to slightly shift leg positions. Be sure to keep within maximum allowable spacing.

Lay out and excavate leg positions

Once the grid of leg positions has been established, verify that all angles are square.

Dig leg holes to the "Footing diameter" and "Footing depth" listed on page 2 of your Specs Sheet. If you need to promote drainage, go a few inches deeper and fill the difference with gravel.

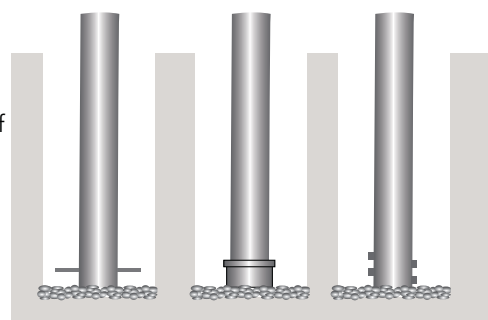


Figure 6. A length of rebar, a threaded cap, or bolts must be installed at the foot of the vertical pipes to prevent withdrawal of the footing.

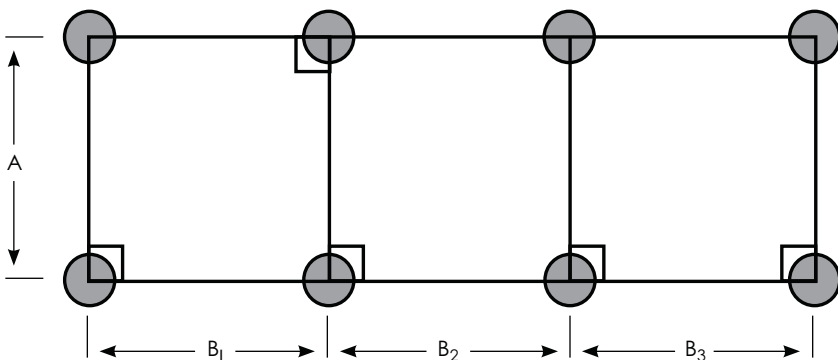


Figure 5. North-south leg spacing is fixed. East-west spacing (B_1 , B_2 , etc.) is identical in most installations; see "Average leg spacing e-w" (Nominal Values under "Design Parameters") on page 2 of your Specs Sheet. However, if you needed to shift leg positions, follow the east-west spacing you set during your planning session.

Select an assembly sequence

The assembly sequence depends on installer preference and the size of the installation. Either of these options may be followed:

- If a ground mount structure has just a few pairs of legs, installers may prefer to assemble the full truss structure prior to pouring concrete. Figure 7 details this approach.
- On the larger structures with many pairs of legs, installers may prefer to place the vertical leg pipes, pour the concrete, and let it cure overnight before proceeding. Figure 8 details this approach.

In either case, when mounting rails be sure to center them on the horizontal pipes, which will leave about 20 percent overhang on north and south sides.

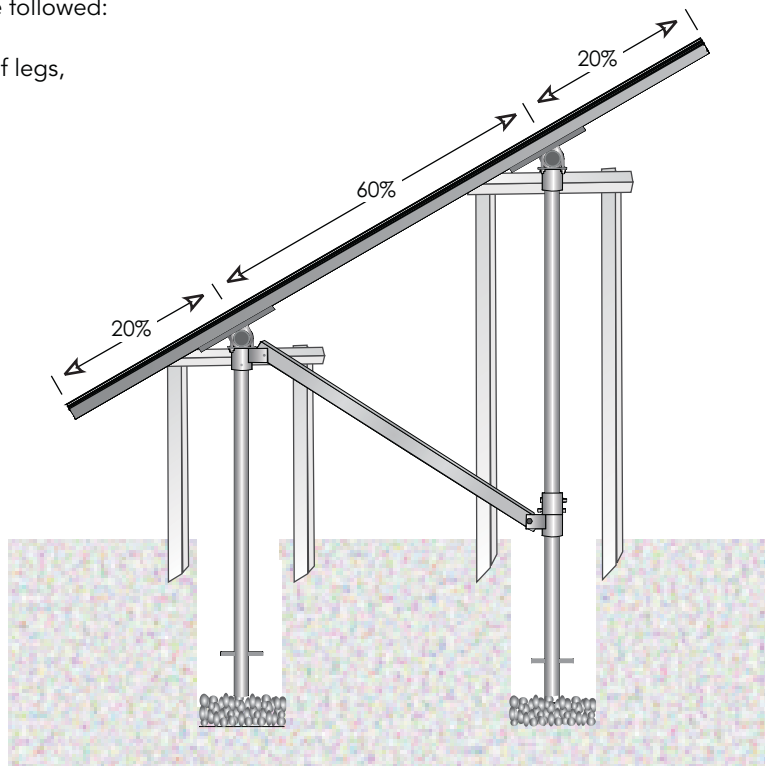


Figure 7. FULL-TRUSS OPTION Footing holes should extend below the frost line. You may elect to use a few inches of gravel at the base of the holes to promote drainage. Loosely assemble the full truss structure, using wood supports to stabilize vertical and horizontal pipes. When cross braces and rails are in place, square up the array and tighten fasteners. Pour concrete after array is fully assembled, save for the modules themselves. See page 8 of this manual for installation notes.

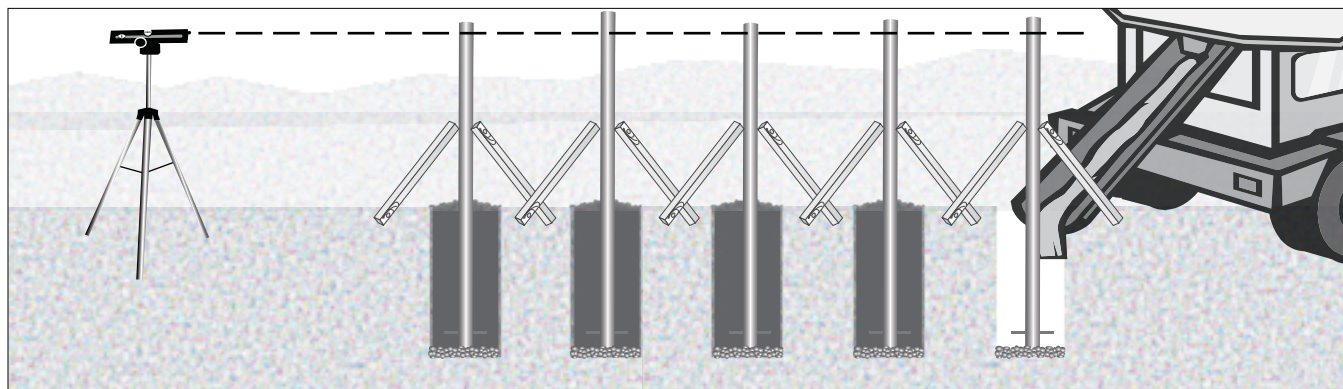


Figure 8. LEGS-FIRST OPTION Footing holes should extend below the frost line. You may elect to use a few inches of gravel at the base of the holes to promote drainage. Using wood supports, level and square vertical leg pipes. Be certain that legs are precisely

aligned and that the front and back rows are parallel. Pour cement and allow to cure overnight before proceeding. Sighting with a laser level, transit, or string line, even the tops of the poles. See page 8 of this manual for installation notes.

Installation notes

Regardless of your assembly procedure, review these notes prior to installation and keep them handy for reference on site.

Shape concrete pillars for drainage

Slope concrete away from the legs to promote drainage. This can be done above ground or slightly below the surface. Be sure footings extend below the frost line.

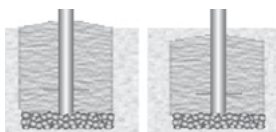


Figure 9. Drainage options.

Recommended torques for fasteners

- Set screws for pipe tee: 15 foot-pounds.
- 3/8-inch serrated flange nuts for U-bolts and rail brackets: 8 foot-pounds.
- 1/4-inch module mounting hardware: 10 foot-pounds

Pipe coupler positions

Remember that cross pipe couplers need to be offset from both leg caps and rail brackets. As a general guideline, place pipe couplers one-quarter to one-third of the way between pipe tees and roughly midway between rail brackets.

Minor conflicts between pipe tee and rail brackets

Rail brackets, rails, and module mounts can go together in several ways. If a pair of rail brackets conflicts with pipe tee positions, consult the table below. For top mounting clips, Figures 3 and 4 (pp. 4–5) illustrates the arrangements allowing the least offset between module mounting holes and pipe tee centers.

Don't forget your Pipe tee fittings!

A forgotten or misplaced pipe tee fitting to anchor your system can result in extensive disassembly. To avoid this needless labor, be sure that all pipe fittings are in place and correctly oriented.

Solutions to minor conflicts between pipe tees and rail brackets

Module mounting style	Solutions (employ one or more as needed)
Top mounting clamps (landscape)	Shift rail toward the end of the module, reversing (if necessary) rail bracket and rail and moving them to the other side of the pipe tee.

*Rail brackets, rails, and module mounts can be configured in several ways. Figures 3 and 4 (pp. 4–5) illustrates the arrangement that permits the least offset between rail brackets and pipe tees.

Attach modules

Top mounting end clamps (four per north-south row) and mid clamps (two at each module abutment within a row) secure PV modules without using module mounting holes. Mounting bolts slide into the top slot of either standard rail. Torque to 10 foot-pounds.

Figure 10. Top mounting employs end clamps and mid clamps. They mount via T-bolts to standard rail and are not dependent on the position of module mounting holes. One inch is required between modules and rails must extend 1½ inches beyond modules on each end.

