



NRG INSTRUCTIONS

Solar Tower Installation | Pad Mount

Concrete Pad-Mounted Baseplate for Solar Monitoring

Authors:
Technical Services



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INTRODUCTION

Overview

The Solar Tower from NRG Systems is designed for the solar PV professional looking for quick and repeatable deployments as well as reliable autonomous operation. This tower is available in two configurations:

- A temporary, guyed configuration for pre-construction Solar Resource Assessment (SRA) campaigns
- With a permanent, pad-mount configuration for post-construction Solar Resource Monitoring (SRM) campaigns.
- A permanent, steel I-beam pile-mount configuration for post-construction Solar Resource Monitoring (SRM) campaigns in locations not suited for concrete pads.

An array of accessories are available to tailor the system to these different applications. Please see our website or contact the NRG Sales Team for more information.

About These Instructions

These instructions deal with the assembly of the NRG Solar Tower using the concrete pad mount. This baseplate is designed to be used on a poured concrete pad with anchors pre-installed in the pattern outlined in these instructions. Due to the strength of the concrete anchors and baseplate when installed correctly, no guy wires are needed for the tower in this configuration.

Typographic Conventions



Notes throughout the document.

Warnings throughout the document.

Technical Support

NRG Systems offers a variety of support options to help you get the most from your NRG Systems products. If you have questions, first look in the published product documentation. The best places to find information and documents are on the respective product pages of the NRG Systems website.

If you cannot find the answer, contact your Salesperson or NRG Systems Technical Support for assistance using the information below. Customer support is available 8:30 AM to 5:00 PM EST, Monday through Friday.

Telephone: 802-482-2255

Email: support@nrgsystems.com



Safety Considerations



READ ALL INSTRUCTIONS AND WARNINGS BEFORE BEGINNING ANY TOWER INSTALLATION. EVERY INSTALLATION CREW MEMBER SHOULD CAREFULLY READ AND UNDERSTAND ALL WARNINGS, INSTRUCTIONS AND OTHER INFORMATION IN ALL RELATED AND RELEVANT DOCUMENTATION.



DO NOT INSTALL TOWER NEAR ELECTRICAL POWER LINES. METAL TOWER COMPONENTS EFFICIENTLY CONDUCT ELECTRICAL CURRENT AND CAN RESULT IN SERIOUS INJURY OR DEATH IF THEY COME IN CONTACT WITH HIGH VOLTAGE ELECTRICAL LINES. SURVEY THE PROPOSED INSTALLATION SITE AND DO NOT BEGIN ANY TOWER INSTALLATION IF ANY ELECTRICAL LINES ARE PRESENT. MAINTAIN A DISTANCE OF AT LEAST 100 FEET (30 METERS) BETWEEN THE TOWER AND ANY POWER LINES.



DO NOT BEGIN OR CONTINUE TOWER INSTALLATION DURING AN ELECTRICAL STORM. IF LIGHTNING STRIKES A TOWER OR ITS METAL COMPONENTS, SERIOUS INJURY OR DEATH COULD OCCUR TO THOSE WORKING WITH OR AROUND IT. DO NOT BEGIN AN INSTALLATION, OR CONTINUE ONE, DURING AN ELECTRICAL STORM OR IF ONE IS IMMINENT.



MATERIALS & TOOLS

The materials & tools for this manual pertain to the assembly and setup of a complete Solar Monitoring System (SMS). This includes a SymphoniePRO Data Logger and commonly-used sensors, booms, and wiring.

For complete parts listing and BOM, see Appendix A | Solar Tower Parts List/BOM.

Exact system contents vary depending on customer requirements and requests. Please visit our website or contact our Sales Team with any questions about sensors, SRA System packages, or SRM System accessories.

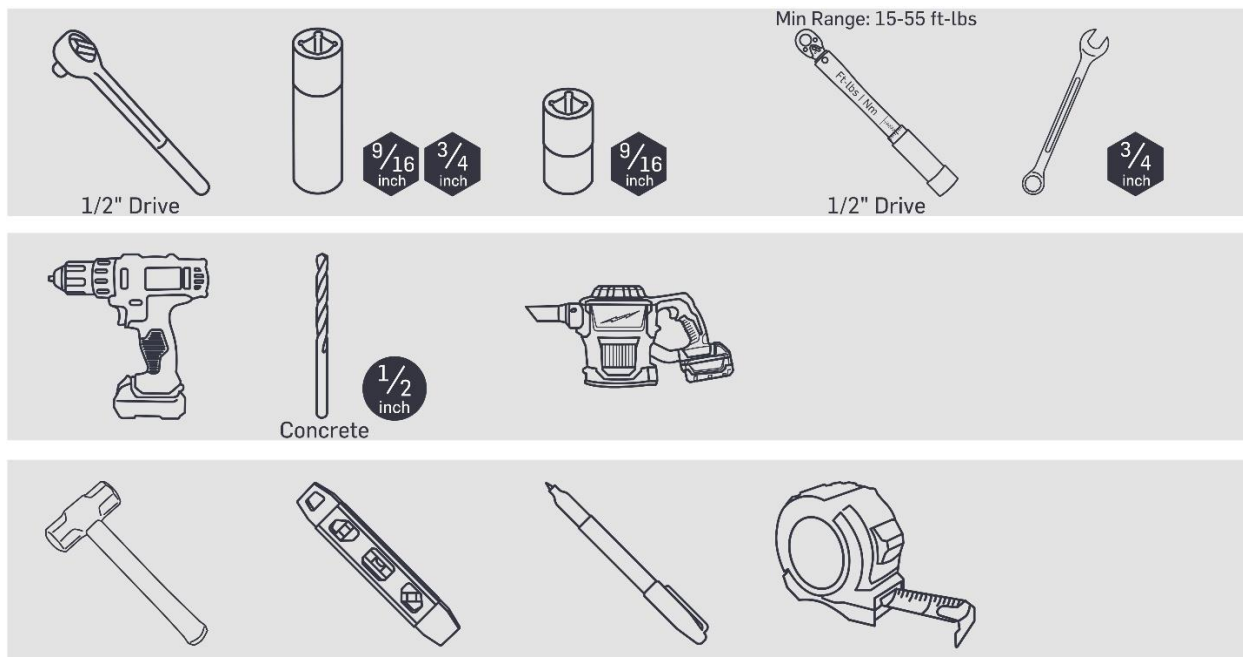
Personal Protective Equipment

- Gloves
- Safety Glasses
- Safety toe boots
- Hard hat
- Sunscreen

Recommended Additional Documentation

- SymphoniePRO manual
- Individual sensor & accessory manuals, depending on configuration

Required Tools





SITE PLANNING

Pre-Installation Preparation

Planning your solar measurement system prior to field deployment is an important part of the installation process and will help move the process along smoothly. Several aspects of the planning process that are highlighted below.

Logger & iPack

Learn and understand the features and functions of the SymphoniePRO logger and accompanying SymphoniePRO Desktop Application software before deployment. To make the installation process go more smoothly, pre-configure your logger and iPack and test that they work properly.

Site Security

Securing your tower and equipment is important. It is up to you to determine the best security measures to employ. Fencing, cameras, and frequent site visits are all recommended ways to help protect the site.



TOWER ASSEMBLY

Solar Tower Tube Heights

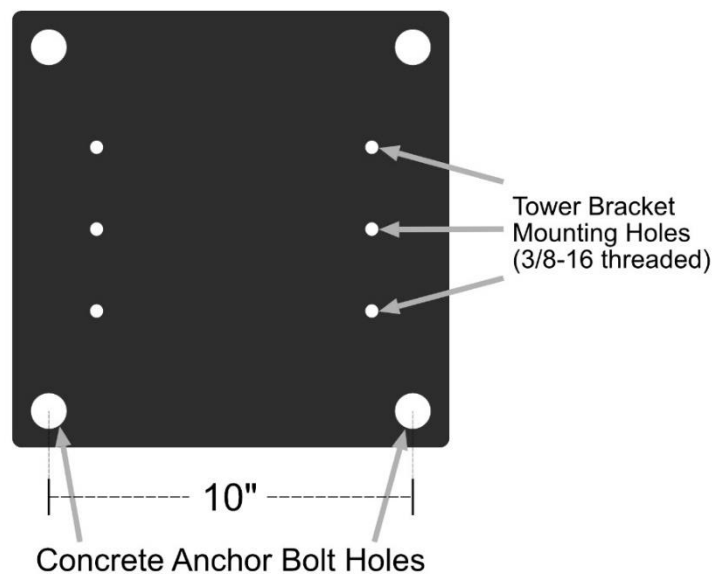
The Solar Tower is available in multiple heights. Unless otherwise noted, this procedure applies to all 1-piece NRG Solar Tower models that have 3.5" diameter tube.

Concrete Pad Construction

Prior to setting up the Solar Tower, a concrete pad with anchors is needed. Use procedures recommended by the manufacturer of the concrete you are using when pouring for a pad.

Concrete Pad Size

- Exact concrete pad size is determined by you.
- To remain level, the concrete pad should be deep enough to extend below the frost line.
- When using wedge anchors, the pad edge must be a minimum of five anchor diameters beyond the mounting hole.



IT IS UP TO YOU TO DETERMINE THE APPROPRIATE SIZE OF THE CONCRETE PAD TO ADEQUATELY SUPPORT THE SOLAR TOWER. CONTACT YOUR PREFERRED CIVIL ENGINEER FOR GUIDANCE. DO NOT CONTACT NRG SYSTEMS FOR PAD SIZE SPECIFICATIONS. THESE SPECIFICATIONS VARY DEPENDING ON THE LOCATION AND CLIMATE WHERE THE TOWER IS BEING INSTALLED. FAILURE TO CONSTRUCT A PAD CAPABLE OF SUPPORTING YOUR SOLAR TOWER MAY CAUSE THE TOWER TO FALL AND DAMAGE EQUIPMENT. SUCH TYPES OF DAMAGE ARE NOT COVERED BY WARRANTY.

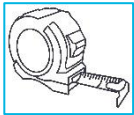


Installing 1/2" Concrete Wedge Anchors & Solar Tower Baseplate

The Solar Tower kit includes 1/2" x 7" galvanized concrete wedge anchors (NRG part #14957).

Wedge anchors are installed by drilling holes into the pad after the concrete has been poured and allowed to adequately cure. For curing times, refer to the manufacturer's recommended practices.

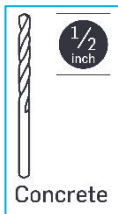
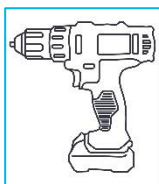
-
- 1 Place the baseplate on the hardened concrete pad in your desired orientation and mark the location of the four wedge anchors.
Remove the baseplate after marking.





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- 2 Drill the holes for the wedge anchors at the locations marked on the concrete pad. Use the appropriately-sized drill and drill bit for your application.



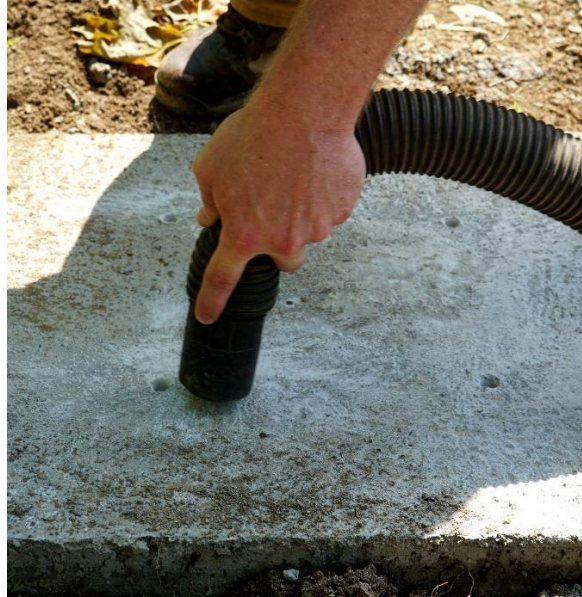
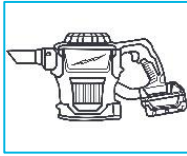
Note: The minimum embedment depth for 1/2" wedge anchors is 2.25 inches, but they **must** be installed deep enough to ensure that only the threaded portion of the anchor is exposed (typically 3" deep).

Sufficient anchor must also be exposed to affix the tower baseplate and leveling system (if it is used).



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- 3 Clean out the holes using compressed air, a vacuum, or other preferred method. The holes must be completely clear of loose concrete dust before installing the anchors.

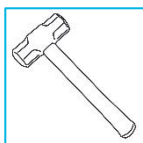


- 4 Put a 1/2" galvanized flat washer onto each wedge anchor. Thread two 1/2"-13 galvanized nuts onto each anchor such that the nuts are butted against each other and covering the outermost threads of their respective anchors.

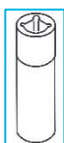
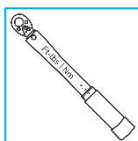




- 5 Using a 5-lb sledgehammer, pound the anchors into the holes to depth marked on the anchors.

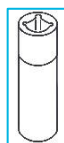
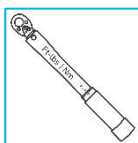


- 6a **If the leveling hardware is being used**, secure the anchors by tightening the nuts to 55 ft-lbs (27 Nm) with a 3/4" deep socket and torque wrench.



With the anchors secured, proceed to **Appendix B | Pad Baseplate Leveling Kit** at the end of these instructions.

- 6b **If the leveling hardware is not being used**, remove the nuts and washers from the anchors, then install the baseplate against the concrete pad. Re-install the flat washers, add 1/2" split-lock washers, and thread the 1/2"-13 nuts onto the anchors. Tighten the nuts to **55 ft-lbs (27 Nm)** with a 3/4" deep socket and torque wrench.



Using Other Concrete Anchors

Other concrete anchors may be used instead of the supplied wedge anchors, provided that the protruding bolts are 1/2"-13 to accommodate the mounting plate.



Assembling the Solar Tower

- 1 Unpack & sort all components. Verify that they are present and undamaged. Refer to **Appendix A | Solar Tower Parts List/BOM** for a complete parts list.
- 2 Use the torpedo level to check that the baseplate is level. If additional leveling is needed, then refer to **Appendix B | Pad Baseplate Leveling** for the procedure.



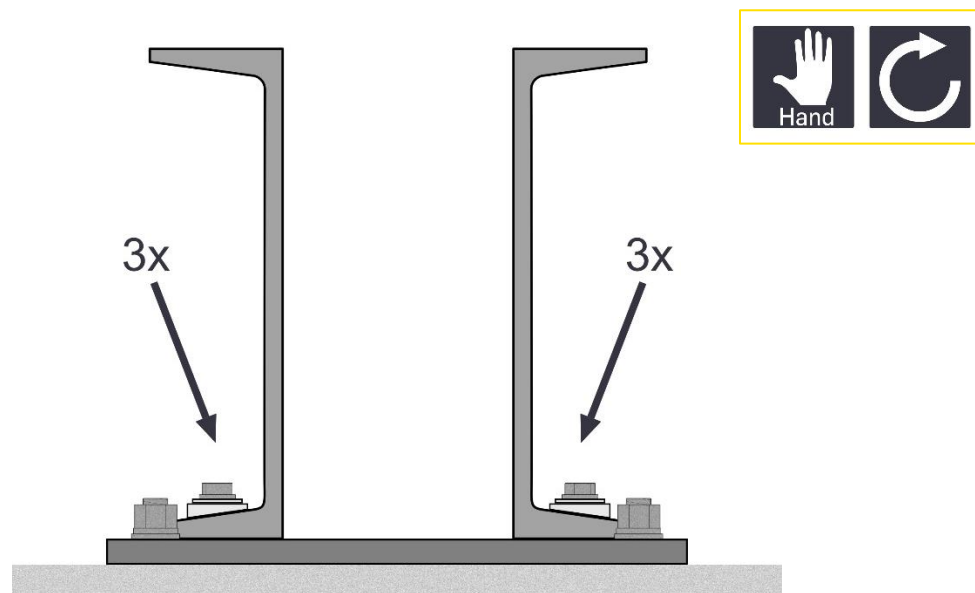
Note: The diagrams below do not show the leveling hardware in use.

3 Mount the base channel pieces to the baseplate.

Place each base channel onto the baseplate, over the rows of the three 3/8"-16 threaded holes.

Put a 3/8" lock washer, flat washer, and leveling (wedge) washer onto each 3/8"-16 x 1.5" bolt (in that order).

Thread the bolts into each of the threaded holes. Hand-tighten to secure the plate but leave loose enough to shift slightly.





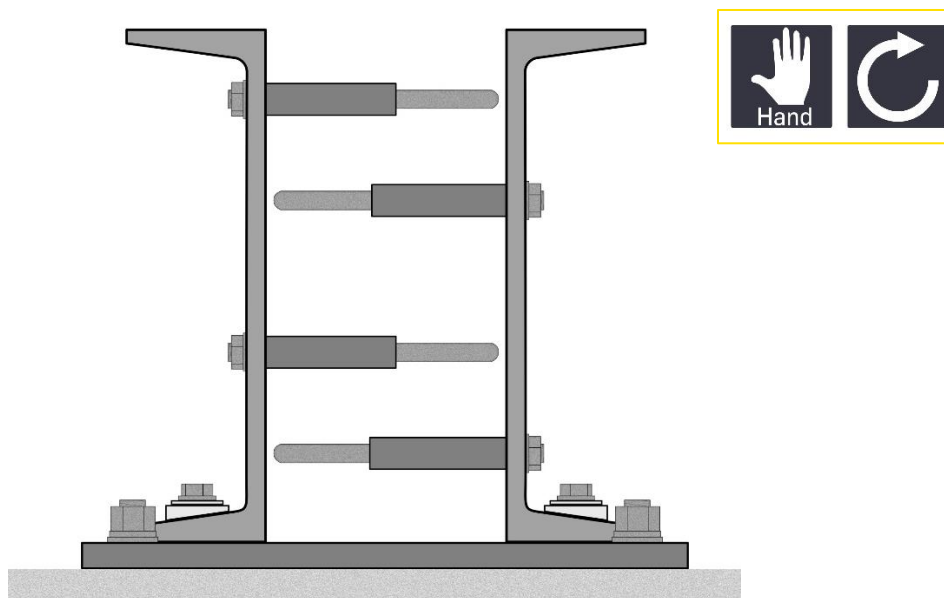
Solar Tower Installation | Pad Mount

4 Attach the U-bolts to the base channel pieces.

Remove the nuts from the 3.5" clamping U-bolts.

Feed a U-bolt through the holes in the side of each base channel in a horizontal orientation. Alternate each U-bolt so that two are fed through each base channel.

Hand-thread the nuts back onto the outermost threads of the clamping U-bolts to keep them in place.

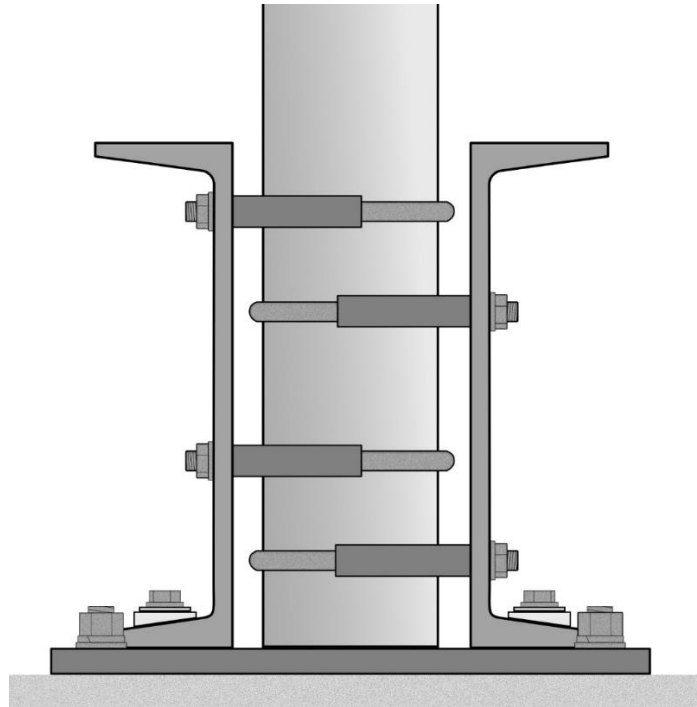
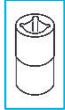
**5 Mount the tower tube.**

Place the tower tube in the center of the clamping U-bolts.



**6 Secure the tower to the baseplate.**

Use a ratchet & 9/16" socket to tighten the U-bolt nuts first, then tighten the bolts on the tower base to secure the tower in place.



Note: A cordless impact driver and 9/16" impact socket can also be used, provided that the U-bolt nuts and tower base bolts are not over-tightened.



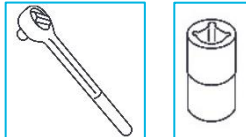


7 Plumb the tower.

Place a magnetic angle finder or a torpedo level against the tower tube to check plumb.



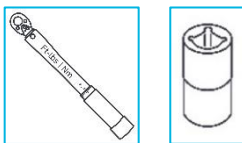
If adjustment is needed, then either use the clamping U-bolts (for minor adjustment) or use the leveling nuts & washers to change the angle of the baseplate (for larger adjustments, if installed).



8 Torque the tower hardware to spec.

Baseplate bolts: 15 ft-lbs (20.3 Nm)

Tower clamping U-bolts: 29 ft-lbs (39.3 Nm)



9 Ground the tower.

Grounding your tower and equipment is extremely important. Failure to ground the tower and equipment may result in damage, which is not covered by NRG's warranty terms.

The tower is now erect and ready to accept instruments, booms, sensors, and other accessories. Please refer to each individual instruction sheet or manual for more information about these.



APPENDIX A | SOLAR TOWER PARTS LIST/BOM

NRG Part Number	Description	Qty
14227	Baseplate Concrete pad mount	1
14957	Concrete anchor 1/2"-13 threaded 7 inch length	4
1588	Nut 1/2"-13 threaded Galvanized	8
14959	Flat washer 1/2" Galvanized	8
12118	Lock washer 1/2" Galvanized	4
14229	Base channel	2
14536	Bolt 3/8"-16 threaded 1.5 inch length Galvanized	6
10523	Lock washer 3/8"	6
2814	Flat washer 3/8" Galvanized	6
14477	Leveling washer 3/8" Galvanized	6
14232	U-bolt 3.625"	4
9013	Tower tube 3.5 inch diameter 2.2m length	1*
14948	Tower tube 3.5 inch diameter 3m length	1**

*Kit #14475 contains a 2.2m tower tube.

**Kit #14949 contains a 3m tower tube.



APPENDIX B | PAD BASEPLATE LEVELING KIT

The Solar Tower includes additional 1/2" nuts & washers in order to level the baseplate, should it be required at the time of installation or at any time in the future.



Procedure

- 1 After the wedge anchors have been installed in the holes and the nuts torqued to **55 ft-lbs** (See *Installing 1/2" Concrete Wedge Anchors*), install the following pieces in order:

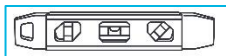
Top

- #1588 | 1/2"-13 Galvanized nut (each anchor)
- #12188 | 1/2" Galvanized lock washer (each anchor)
- #14959 | 1/2" Galvanized flat washer (each anchor)
- #14227 | Baseplate
- #12188 | 1/2" Galvanized flat washer (each anchor)
- #1588 | 1/2"-13 Galvanized nut (each anchor)

Bottom

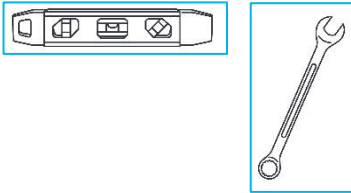
Leave the top nuts loose so the baseplate can be leveled.

- 2 Place a torpedo level onto the baseplate, parallel to two sides of the baseplate.
Use a 3/4" wrench to adjust the nuts below the baseplate and level it along this axis.

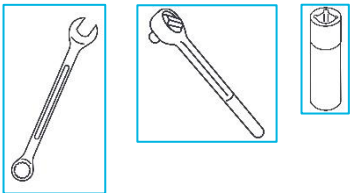




- 3** Rotate the torpedo level 90°. Repeat step 2 along the second axis.



- 4** Tighten the nuts above the baseplate with a 3/4" deep socket & ratchet while holding the lower nuts in place with a 3/4" wrench.



Check that the baseplate is level along both axes again.

