Earth Anchor
(Ground Screws and Augers)
Installation Guidelines
Earth Anchor Installation: Introduction

Installation Methods:

Ground Screws and Blade Augers can be installed quickly in a wide variety of soil conditions using a variety of methods. These Earth Anchors are ready for loading immediately after installation which makes them ideal for one day PV installations. This document is intended to provide guidance on the methods we have used to drive SunModo Ground Screws and Blade Augers into the ground.

In remote areas where heavy equipment cannot be driven to the installation site, Ground Screws, and a little manual labor, can be used to get the job done. This manual offers two options for installing Ground Screws without the use of heavy equipment. This document is intended to provide guidance in selection of the method which is best for your specific project:

1. **BY HAND:** Manual installation using a Tee Handle made of pipe fittings is one option when using a tractor is not a possibility. All of the components needed can be purchased at your local hardware store. In good spoil the “By Hand” method allows you the ability to set the Ground Screws to a depth of 6 to 7 feet.

2. **HAND HELD ROTATOR:** These two man hole diggers are available for rent or purchase at local hardware stores such as Home Depot and Lowe’s. Generating 190 ft. lbs. of torque, these hole diggers are easy to carry into hard to reach construction sites.

   Both hand methods are limited to Ground Screw installations.

3. **MACHINE OPERATED ROTATOR:** Hydraulic attachable equipment can be used with all sorts of loaders, excavators, tractors and even self-propelled drilling rigs. With this installation method it is possible to drive either the Ground Screw or the Blade Auger into the ground.
# Earth Anchor Installation:
## Product Specification

<table>
<thead>
<tr>
<th>BASIC INFORMATION</th>
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<tbody>
<tr>
<td>Kit Number</td>
<td>K10414-079</td>
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<tr>
<td>Description</td>
<td>10” Helix Blade Auger</td>
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<td>Lengths (-079)</td>
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<td>Auger Diameter</td>
<td>2.72” [69mm] ID 2.99” [76mm] OD</td>
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<tr>
<td>Attachment Hardware</td>
<td>3X M16 Set Screws</td>
</tr>
<tr>
<td>Material</td>
<td>#45 Structural Carbon Steel</td>
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<tr>
<td>Finish</td>
<td>Hot Dip Galvanized</td>
</tr>
<tr>
<td>Approximate Weight</td>
<td>18.1 lbs [8,2 kg] 23.1 lbs [10,5 kg]</td>
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<tr>
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<tbody>
<tr>
<td>Kit Number</td>
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<tr>
<td>Description</td>
<td>Screw Anchor</td>
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<td>Lengths (-063</td>
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<td>Auger Diameter</td>
<td>2.72” [69mm] ID 2.99” [76mm] OD</td>
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Earth Anchor Installation:
Product Specification

A21178-XXX

A21147-XXX
Earth Anchor Installation: Best Practice

These anchors are used for securing installer-supplied 2-inch Schedule 10 or 40 galvanized steel pipe. Our anchors are popular because they are strong, economical, and easily to install. Our newest anchors are supplied with M16 Cone-tipped Set Screws which provides a superior grip onto the post.

Installation Guidelines for A21146-XXX and A21147-XXX:

• Determine the anchor locations per SunModo project requirements. Build two pairs of batter boards to hold the mason’s lines: one pair for the front posts and the other for the rear posts.
• Make sure the top ends of the front and rear Anchors are at the same height (within 1” high difference).
• Install the front/rear Post to the Anchors as shown and secure using 3X M16 Set Screws; torque to 44 ft. lbs. (60 Nm).
• Install M16 Bolt and Flange Nut if required in the 4X corner posts of the array.
1. THESE INSTALLATION INSTRUCTIONS ARE OF A GENERAL NATURE AND COVER THE MOST COMMON CONDITIONS AND SITUATIONS.

2. FOLLOW THE SAFETY PRECAUTIONS PROVIDED BY EQUIPMENT MANUFACTURERS BEFORE ATTEMPTING TO INSTALL THE EARTH ANCHORS.

3. THESE SAFETY PRECAUTIONS ARE INTENDED TO DEAL PRINCIPALLY WITH COMMON PRACTICES AND CONDITIONS ENCOUNTERED IN THE USE OF THE GROUND SCREW AND ARE NOT INTENDED TO BE ALL INCLUSIVE. PROPER LEVELS OF INSTALLATION EXPERIENCE, SKILL AND COMMON SENSE ARE ESSENTIAL FOR SAFE AND EFFICIENT INSTALLATION.

Earth Anchor Installation:

By Hand

SAFETY

- Do Not Operate Indoors
- Safety Shoes Required
- Call 811 Dig Safe Before Digging
- Gloves Required
Earth Anchor Installation: By Hand

Tee Drive Adaptor:
Earth Anchors can be installed quickly in a wide variety of soil conditions using a variety of readily available components found in your local hardware store.

Tip: We recommend assembling a short and a long Tee Drive Adaptor. The short Tee Drive Adaptor can be used when starting the Ground Screw. The longer Tee Drive Adaptor can be used when the Ground Screw is nearing its fully install depth.
Earth Anchor Installation:  
By Hand

Parts Recommended:
✓ 2" Galvanized Tee
✓ 2" X 12" Galvanized Steel Nipple
✓ 2" X 36" Galvanized Steel Nipple
✓ 1" X 60" Galvanized Steel Pipe
✓ 5/8” Drive Pin
✓ Ground Screws
✓ Hand drill with 1” to 1-1/2” drill bit
✓ Water
Installation:

1. Mark the desired position for installation.

2. We recommend you pre-drill a hole prior to installing your ground screw using a 1-inch (25mm) drill bit. The pre-drilled hole will act as a pilot hole to aid in keeping the Ground Screw vertical during installation.

3. In dry soil conditions we recommend you pour water in and around the pre-drilled hole prior to installing the Ground Screw to soften ground.

4. Using the Tee Driver Adaptor you have created from components available at your local hardware store; insert the drive pin into the Ground Screw.

5. With a long pipe as a handle turn the ground screw into the ground using a little downward pressure to start. Once the Ground Screw has been inserted around 4-inches (100mm) it will begin to pull itself into the ground; less downward force is then necessary.

6. Turn the Tee Driver Adaptor until the Ground Screw is fully installed or until it becomes too difficult to turn.
Earth Anchor Installation:
Hand Held Rotator

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2. FOLLOW THE SAFETY PRECAUTIONS PROVIDED BY THE EQUIPMENT MANUFACTURERS BEFORE ATTEMPTING TO INSTALL THE EARTH ANCHORS.

3. THESE SAFETY PRECAUTIONS ARE INTENDED TO DEAL PRINCIPALLY WITH COMMON PRACTICES AND CONDITIONS ENCOUNTERED IN THE USE OF THE HOLE DIGGER AND ARE NOT INTENDED TO BE ALL INCLUSIVE. PROPER LEVELS OF INSTALLATION EXPERIENCE, SKILL AND COMMON SENSE ARE ESSENTIAL FOR SAFE AND EFFICIENT INSTALLATION.

4. THE ENGINE EXHAUST FROM THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. THIS STATEMENT IS MADE IN COMPLIANCE TO CALIFORNIA PROPOSITION 65.

5. INCORRECT USE OF THE HOLE DIGGER CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR EVEN DEATH. TO REDUCE THIS POSSIBILITY, GIVE COMPLETE AND UNDIVIDED ATTENTION TO THE JOB AT HAND AND FOLLOW ALL SAFETY PRECAUTIONS AS SPECIFIED BY THE EQUIPMENT MANUFACTURER.

Earth Anchor Installation:
Hand Held Rotator

Minimizing Kickback:
Both operators should keep the left side handle as close to their body (left hip and leg areas) as possible to minimize machine "kickback" when a buried obstruction is encountered by the auger. Assume operating positions that allow each to exercise reactive "body english" against the torque sensation created by the digging process. Keep upper arms as close to the upper body as possible to maximize mechanical leverage. Operators should position their backs as vertical as possible by bending the legs as required during the digging process. Positioning the left foot ahead of the right foot will enhance proper body position. Maintaining proper operating positions is one of the most IMPORTANT and EFFECTIVE procedures for controlling kickback. Improper operating positions only aggravate the effects of kickback upon the operators. The image highlighted in green depicts proper operator positions that enhance machine control. The three images highlighted in red depict improper operator positions that reduce machine control.

For a complete operation instructions see the 300 Series Hole Digger Operator Manual, or the instructions specific to the equipment you are using.
Earth Anchor Installation:
Hand Held Rotator

Additional Information:

The General Equipment 2 Man Hole Digger is designed for a wide range of hole digging projects. Constructed with oversized bearings, heat treated shafts and precision cut gears, the 2 Man Hole Digger is the perfect tool for simple backyard fencing, landscaping, and even soil sampling.

The 2 Man Hole Digger, MTC M330H, is also equipped with Comfort-Flex™ operator handles which flex under load to help absorb vibration and kickback forces. These handles will reduce fatigue, allowing for increased productivity and safety.

The General Equipment Hole Digger has a Honda engine with a simple hand rewind start and totally enclosed, spur gear, oil lubricated transmission.

Hand held rotators are available for purchase or rent at local hardware stores such as Home Depot and Lowe’s.

Two Man Hole Digger Product Description:

- 5.0 HP Honda GXV140, 4-cycle engine
- Totally-Enclosed, Oil-Lubricated Spur Gear Reduction
- All Metal, Oil-Cooled, Automatic Centrifugal, Clutch Slips (does not fully disengage)
- Approximately 190ft. lbs. Drilling Torque
- 1-3/8" Hexagon Drive Shaft Connection
- Weight - 71 lbs.
- Earth Anchors Sold Separately

Earth Anchor Installation:
Hand Held Rotator

Pipe Sleeve Drive Adaptor:
Earth Anchors can be installed quickly in a wide variety of soil conditions using a variety of readily available components found in your local hardware store. We used a 1-1/2 diameter pipe inside a 2” diameter pipe in order to reduce the slop between the Rotator spindle size and the bore size of the Ground Screw.
Earth Anchor Installation: 
Hand Held Rotator

Parts Recommended:
- 300 Series Hole Digger (or equivalent)
- 1-1/2” X 5” Galvanized Pipe
- 2” X 10” Galvanized Pipe
- 3/8” and 5/8” Drive Pin
- Ground Screws
- Hand drill with 1” to 1-1/2” drill bit
- Water
Earth Anchor Installation: 
Hand Held Rotator

Installation:
1. Mark the desired position for installation.

2. We recommend you pre-drill a hole prior to installing your ground screw using a 1-inch (25mm) drill bit. The pre-drilled hole will act as a pilot hole to aid in keeping the Ground Screw vertical during installation.

3. In dry soil conditions we recommend you pour water in and around the pre-drilled hole prior to installing the Ground Screw to soften ground.

4. Using the Pipe Sleeve Driver Adaptor you have created from components available at your local hardware store; insert one drive pin into the Ground Screw and one drive pin into the Rotator spindle.

5. Slowly begin to drive the Ground Screw into the soil using a little downward pressure to start. Once the Ground Screw has been inserted around 4-inches (100mm) it will begin to pull itself into the ground; less downward force is then necessary.

6. Drive the Ground Screw until it is fully installed.
Earth Anchor Installation:
Machine Operated Rotator
Earth Anchor Installation:
Machine Operated Rotator

1. THESE INSTALLATION INSTRUCTIONS ARE OF A GENERAL NATURE AND COVER THE MOST COMMON CONDITIONS AND SITUATIONS.

2. FOLLOW THE SAFETY PRECAUTIONS PROVIDED BY THE EQUIPMENT MANUFACTURERS BEFORE ATTEMPTING TO INSTALL THE EARTH ANCHORS.

3. THESE SAFETY PRECAUTIONS ARE INTENDED TO DEAL PRINCIPALLY WITH COMMON PRACTICES AND CONDITIONS ENCOUNTERED IN THE USE OF THE BOBCAT® (OR SIMILAR EQUIPMENT) AND ARE NOT INTENDED TO BE ALL INCLUSIVE. PROPER LEVELS OF INSTALLATION EXPERIENCE, SKILL AND COMMON SENSE ARE ESSENTIAL FOR SAFE AND EFFICIENT INSTALLATION.

4. BOBCAT COMPANY OFFERS A VARIETY OF TRAINING AND SAFETY RESOURCES FOR OWNERS, RENTERS AND OPERATORS. BE SURE TO SEE THE OPERATOR TRAINING COURSES THAT ARE AVAILABLE ONLINE. THESE SELF-PACED, INTERACTIVE COURSES ARE FULLY RESPONSIVE SO TRAINEES CAN LEARN ON THE DEVICE OF THEIR CHOICE. 
https://www.bobcat.com/owners/safety-training/resources/courses

[Image of a person operating a machine]

SAFETY

SUNMODO®

- Do Not Operate Indoors
- Safety Shoes Required
- Call 811 Dig Safe Before Digging
- Gloves Required
Bobcat 15C Auger:
This high-torque, heavy-duty hydraulic auger fits directly into the SunModo Ground Screws and Augers without the need for an adaptor.

Weights and Dimensions:

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<th>Description</th>
<th>Item number</th>
<th>Operating weight (kg)</th>
<th>Shipping weight (kg)</th>
<th>Overall length (A) (mm)</th>
<th>Overall width (B) (mm)</th>
<th>Overall height (C) (mm)</th>
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<tr>
<td>Auger 15C Unit Drive</td>
<td>6800442</td>
<td>106.0</td>
<td>106.0</td>
<td>260.0</td>
<td>260.0</td>
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</table>
Earth Anchor Installation:

Auger Adaptors

Auger to Earth Anchor and everything in between:
Auger output shafts come in a variety of shapes and sizes; use dimensions A through D to determine if a drive adaptor is required. SunModo offers a variety of drive adaptor solutions which may work for you.

Auger to Ground Screw:
No adaptor is needed if the output shaft meets these dimensional requirements:
- A: 3.5” or greater
- B: 2-3/8” or less
- C: 2” nominal
- D: 3/4” or greater

If a custom Auger Adaptor is required, please provide us with the following measurements of the auger drive spindle you will be using:
- A: From bottom of the weld to the center of the drive pin hole.
- B: From the center of the drive pin hole to the bottom of the spindle.
- C: From flat to flat of the hex or square.
- D: The size of the drive pin hole.
Earth Anchor Installation: Auger Adaptor Solutions

Skid Steer Output Shaft Dimensions:

Solution 1:
A: 3.5” or greater | B: 2-3/8” or less | C: 2” nominal | D: 3/4” or greater
• No Auger Adaptor is required
• Bobcat 15C fits directly into the SunModo Ground Screws and Augers

Solution 2:
A: 3” or greater | B: 2-3/8” or less | C: 2” nominal | D: 3/4” or greater
• K50237-001 SunModo provided H2-RD Lowe Adaptor and 44159 Fastenal 5/8” Hitch Pin
• H2-RD Lowe Brand Auger Bit Conversion: 2" Hex to 2 9/16" Round Adaptor

Solution 3:
A: 3” or greater | B: 2-3/8” or less | C: 2” or 2.5” Hex | D: 3/4” or greater
• K50237-005 SunModo provided AU-002655 Digga Adaptor and 44159 Fastenal 5/8” Hitch Pin
• AU-002655 Digga Adaptor and 44159 Fastenal 5/8” Hitch Pin

Solution 4:
A: 1.5” or greater | B: 2-3/8” or less | C: 2” nominal | D: 3/4” or greater
• Modify the H2-RD Lowe Adaptor by cutting off the top of the adaptor to fit the output shaft of the skid steer.

Solution 5:
A: 2.5” or greater | B: 2-3/8” or less | C: 2” nominal | D: 3/4” or greater
• Modify the SunModo Ground Screws and Augers by cutting off up to 1” of the anchor. No auger adaptor is required.
Earth Anchor Installation: Machine Operated Rotator

Installation
1. Mark the desired position for installation.
2. Drive the Ground Screw or Auger until it is fully installed.

SunModo Installation Video:
https://www.youtube.com/watch?time_continue=1&v=bzrSjS8oeOM
Earth Anchor Installation:
Machine Operated Rotator

**Parts Recommended:**

- Loader or Excavator
- Bobcat 15C Auger or Auger Adaptor
- Ground Screws or Blade Augers