



# CM106BK

Tripod Kit



Revision: 10/19

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# Safety

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**DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.** FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at [www.campbellsci.com](http://www.campbellsci.com) or by telephoning (435) 227-9000 (USA). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

## General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

## Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

## Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

## Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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# CM106BK Tripod Kit

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## 1. Introduction

The CM106BK is a general purpose tripod that can be used for mounting sensors, solar panels, antennas, and instrument enclosures. The CM106BK is constructed from galvanized steel, with individually adjustable legs that allow installation over uneven terrain. Height of the mast is 3 m (10 ft).

The CM106BK includes the tripod body, feet, brackets, grounding clamps, lightning rod, and mounting hardware. The remaining tripod components are user-supplied (see Section 5, *Tripod Installation* (p. 3), for part specifications).

An optional guy kit is recommended for sites that experience high wind speeds (see Allowable Wind Speed Specifications in Section 4, *Specifications* (p. 2)). Instrument enclosures can be purchased with mounting brackets that attach to either the mast or leg section as shown in Section 5.9, *Enclosure Attachment* (p. 17).

The CM106BK can be used for a variety of applications. For meteorological stations, sensors are mounted to the tripod using mounting brackets appropriate for the model of sensor. For non-meteorological applications the tripod can be used to mount instrument enclosures, solar panels, junction boxes, or antennas.

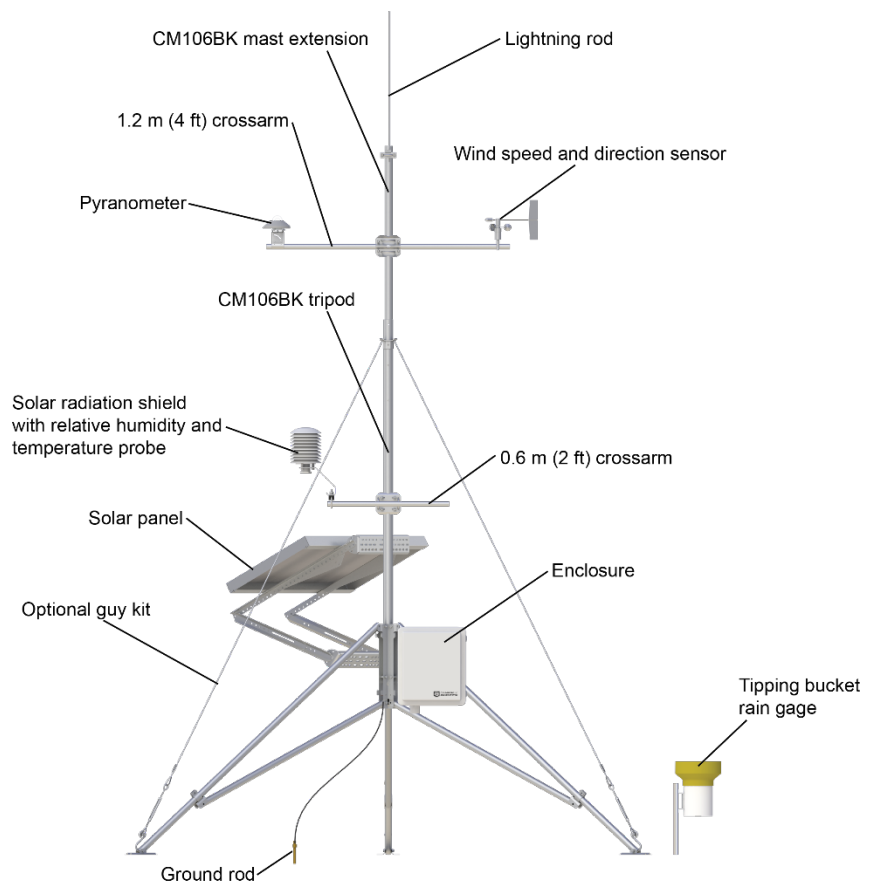


FIGURE 1-1. Typical tripod-based weather station

## 2. Precautions

- READ AND UNDERSTAND the *Safety* section at the front of this manual.
- WARNING — Ensure structural integrity during setup and weather extremes to minimize the chance of damaging the tripod or instruments. Read all instructions carefully. Once the tripod is in full vertical position, securely fasten it to the ground using ground spikes.
- WARNING — For installations where soil structure is questionable or the tripod may experience high wind loads, concrete footings for the tripod feet and guy anchors should be considered.
- Keep the bottom of the tripod legs free of soil, ice, and debris to prevent trapping any moisture inside or around the legs.

## 3. Initial Inspection

### 3.1 Inspect Packaging

Upon receiving the CM106BK, inspect the packaging and contents for damage. Claims for shipping damage must be filed with the shipping company.

Locate the packing slip for the order and compare the items listed on the packing slip to the items that were actually shipped. Report any discrepancies to Campbell Scientific.

### 3.2 Tools List (for tripod, mast, enclosures, and crossarms)

1/2 in. and 7/16 in. open end wrenches  
 adjustable wrench  
 Phillips head screw drivers (medium, small)  
 Straight bit screwdrivers (large, medium)  
 30 cm (12 in) torpedo level  
 side-cut pliers  
 pencil  
 tape measure  
 compass and site declination angle  
 shovel  
 sledge hammer (for driving ground rod and stakes)  
 step ladder

## 4. Specifications

### Mast Height

**Upper Mast Retracted:** 2.1 m (7 ft) to 2.8 m (9.3 ft)  
**Upper Mast Extended:** 3 m (10 ft) to 3.7 m (12.3 ft)

**Vertical Load Limit:** 200 kg (440 lb)

### Mast Outer Diameter

**Main Lower Mast:** 48 mm (1.90 in)  
**Retractable Upper:** 44 mm (1.74 in)



<b>Base Diameter:</b>	2.7 m (8.7 ft) to 3.5 m (11.5 ft)
<b>Leveling Adjustment:</b>	Slide leg clamp on each leg, adjust individually
<b>Leg Base:</b>	4.5 in. by 5.5 in. with four 0.62 in. holes for stakes
<b>Portability:</b>	Collapsible to 8 in. diameter by 6 ft length
<b>Shipping Box Dimensions:</b>	73.66 x 43.18 x 25.4 cm (29 x 17 x 10 in)
<b>Shipping Weight:</b>	4.38 kg (9.65 lb)
<b>Weight with Mast:</b>	24.5 kg (54 lb)
<b>Maximum Slope Angle:</b>	45° or 100% grade

**Allowable Wind Speeds\***

Tripod Configuration	Sustained Wind	Wind Gust
Mast Extended, Unguyed	28 m s <sup>-1</sup> (62 mph)	36 m s <sup>-1</sup> (81 mph)
Mast Retracted, Unguyed	36 m s <sup>-1</sup> (80 mph)	46 m s <sup>-1</sup> (104 mph)
Mast Extended, Guyed	45 m s <sup>-1</sup> (102 mph)	59 m s <sup>-1</sup> (132 mph)
Mast Retracted, Guyed	55 m s <sup>-1</sup> (122 mph)	71 m s <sup>-1</sup> (159 mph)

\*Allowable wind speed values assume:

- Sensors (effective area = 42.7 cm<sup>2</sup> (1.4 ft<sup>2</sup>)) at top of mast
- Solar panel 26.7 x 41.9 cm (10.5 x 16.5 in) at mast base
- ENC14/16 mounted to leg
- Guy wires attached to mast at 1.16 m (3.8 ft) above tripod body
- Adequate ground anchors (stakes alone may not resist foot vertical pullout force)
- See Appendix A, CM106BK Allowable Wind Speeds (p. A-1), for more information on maximum allowable wind speeds.

## 5. Tripod Installation

### 5.1 Tripod Base Assembly

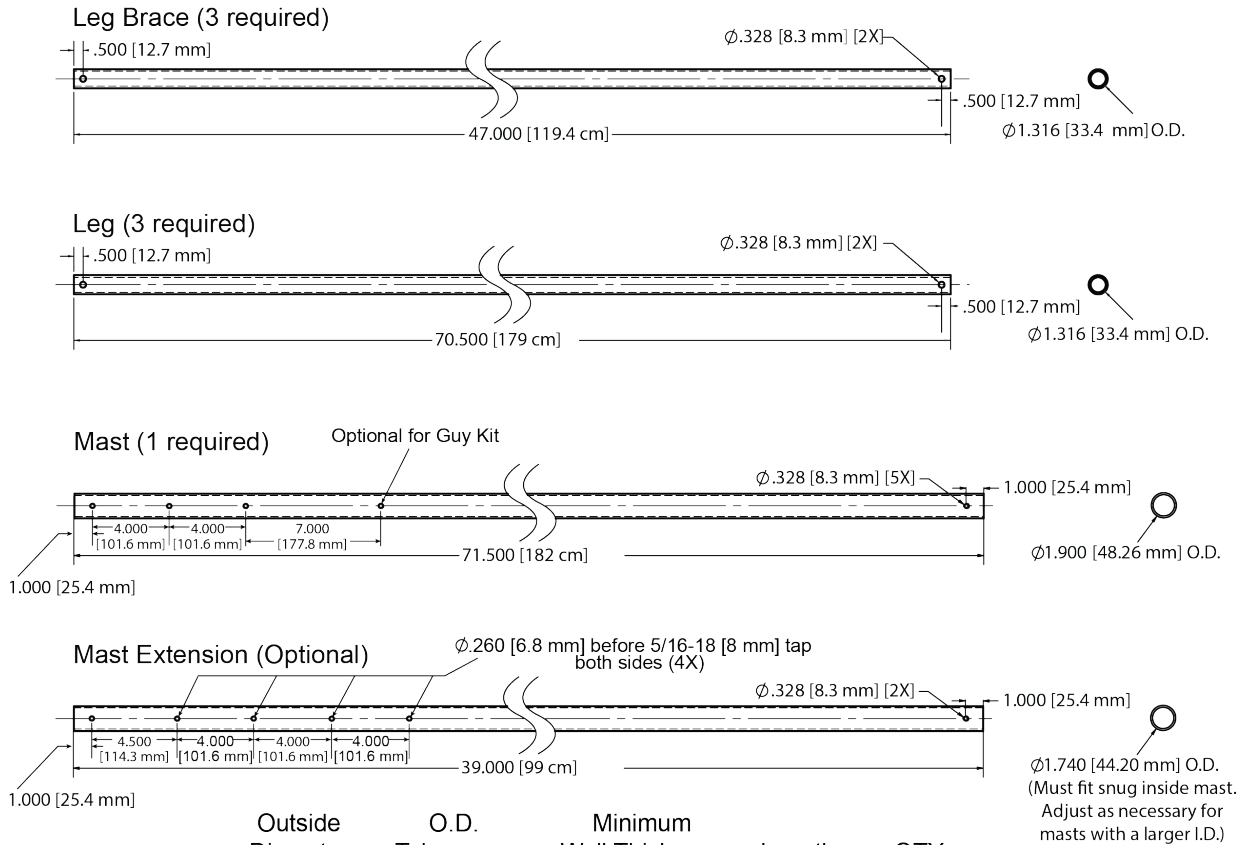
#### 5.1.1 Parts List

Part #	Description	Qty
29762	Tripod Foot	3
29763	Leg Clamp Base	3
29764	Tripod Body	3
19308	Spacer	6
5449	Ground Lug	2
23	Nut	6
19102	5/16-18 x .75 Screw	3

30253	5/16-18 x 1.00 Screw	3
4365	5/16 Flat Washer	3
29844	Leg Clamp	3
29845	Leg Clamp with Weld Nut	3
850	Lightning Rod	1
17589	Lightning Rod Clamp Assembly	1
19175	5/16-18 x 2.25 Screw	6
18126	5/16-18 Nut	6
4366	5/16 Lock Washer	6
19102	5/16-18 x .750 Screw	3
27002	5/16-18 x 2.00 Screw	12
4904	5/16-18 Lock Nut	12

### 5.1.2 Leg Assembly

1. For the following parts, purchase the material and machine the parts as described by FIGURE 5-1.
  - Three (3) Leg Braces
  - Three (3) Legs
  - One (1) Mast



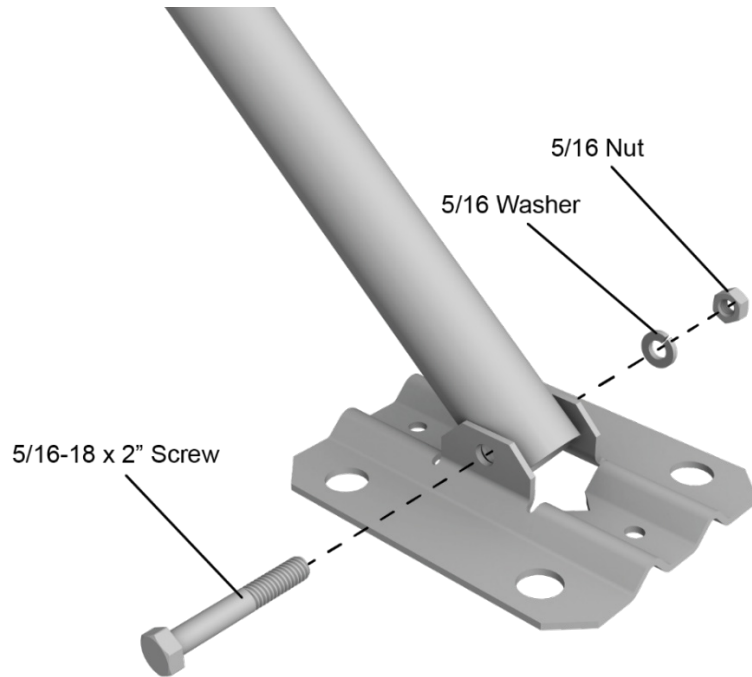
	Outside Diameter	O.D. Tolerances	Minimum Wall Thickness	Length	QTY
Leg Brace	1.316 [33.4 mm]	+4.5 / -0.0%	0.065 [1.65 mm]	47.000 [119.4 cm]	3
Leg	1.316 [33.4 mm]	+4.5 / -0.0%	0.065 [1.65 mm]	70.500 [179 cm]	3
Mast	1.900 [33.4 mm]	+0.0 / -2.0%	0.065 [1.65 mm]	71.500 [182 cm]	1
Mast Extension*	1.740 [44.20 mm]	$\pm 0.010$ [ $\pm 0.25$ mm]	0.065 [1.65 mm]	39.000 [99 cm]	1

\* Optional. Must fit snug inside mast.

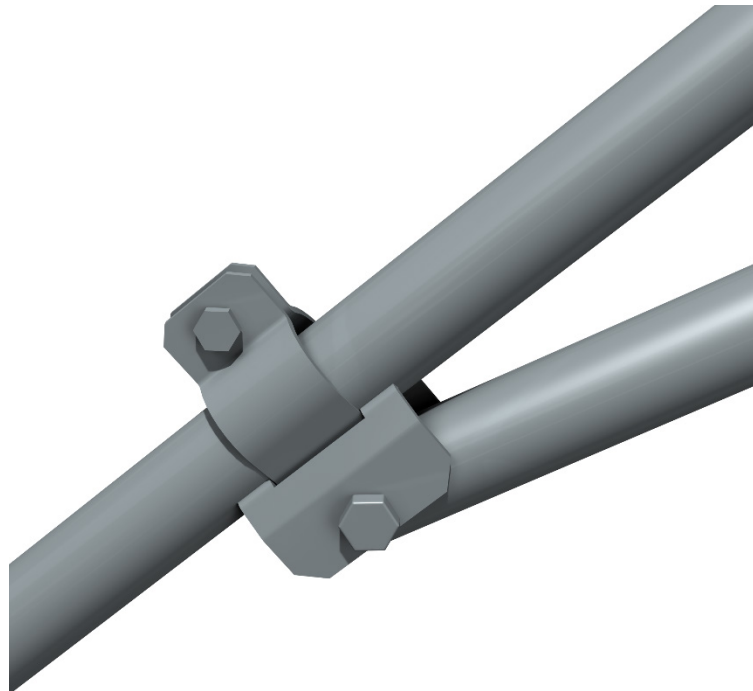
Mast, mast extension, and tripod legs must be made of Galvanized Steel (Minimum yield Strength of 36 ksi [248 MPa])

FIGURE 5-1. Tripod component dimensions

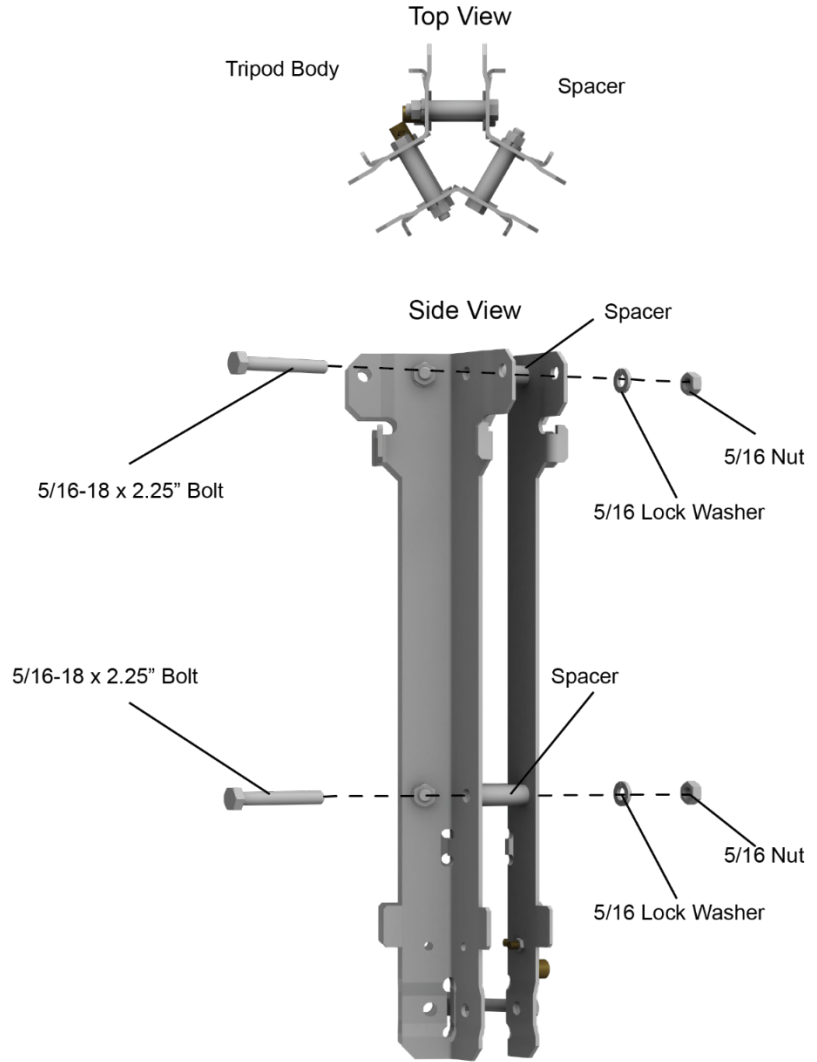
- Using a 5/16-18 x 2 in. screw, 5/16 washer, and 5/16 lock nut, attach a foot to each tripod leg.



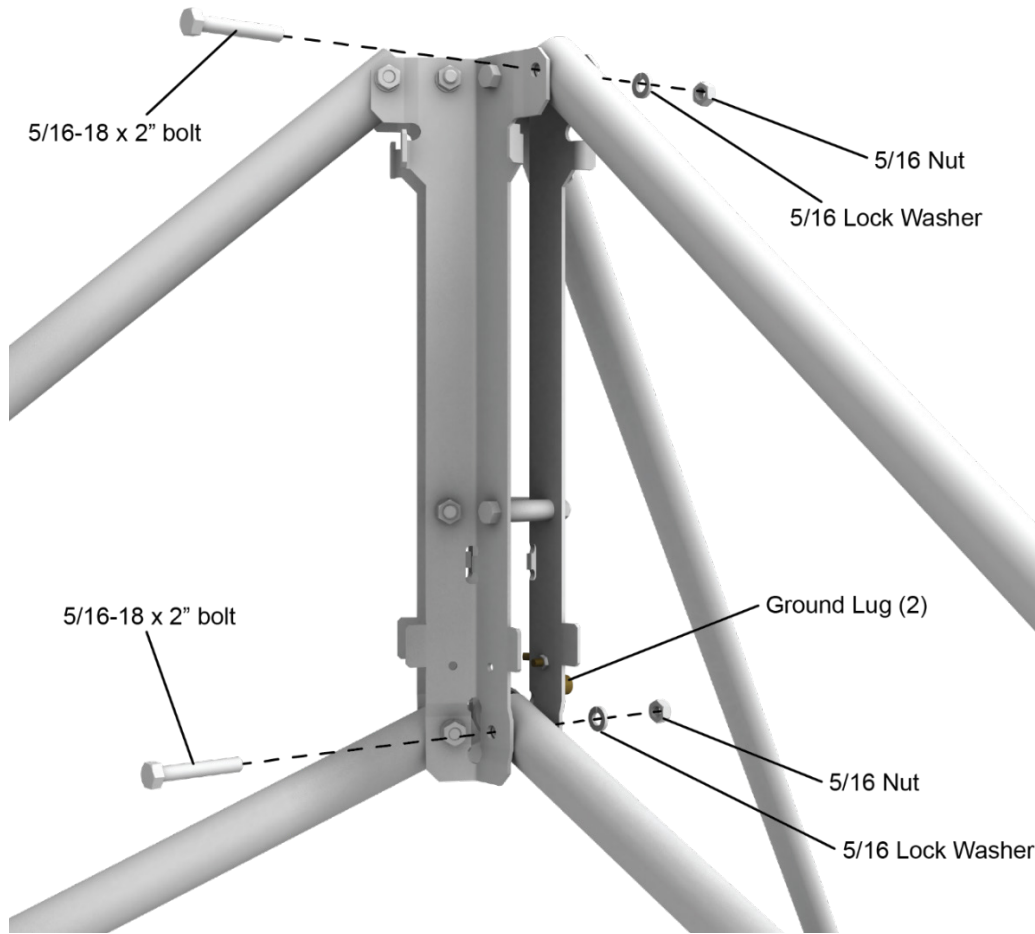
- Loosen the clamping bolt on a leg clamp and slide it over the free end of a tripod leg. Secure one end of a leg brace to the leg clamp using a 5/16-18 x 2 in. screw, a 5/16 washer, and a 5/16-18 lock nut.



- Pass a 5/16-18 x 2.25 in. bolt through a mounting hole in one of the tripod body pieces as shown. Slide a spacer over the bolt. Place a second tripod body piece over the end of the bolt, followed by a 5/16 lock washer. Hand tighten a 5/16-18 bronze nut on the end of the bolt. Repeat this process with the other five 5/16-18 x 2.25 in. bolts to assemble the tripod body.



5. Attach each leg assembly to the tripod body using two 5/16-18 x 2.00 in. bolts and lock nuts. Do not over-tighten the bolts. The tripod legs and leg braces must be able to pivot.



## 5.2 Tripod Base Positioning

### WARNING

**Tripod installation near power lines is dangerous. The minimum safe recommended distance from overhead power lines is 1 1/2 times the height of the tripod and mast combined. Call your local utility providers to locate buried utilities prior to installation.**

The tripod base has three legs, which are individually adjustable, that allow the tripod to be installed over non-level terrain.

Prepare the area where the tripod will be installed. The tripod requires an area approximately 3.4 m (11 ft) in diameter. Natural vegetation and the ground surface should be disturbed as little as possible, but brush and tall weeds should be removed.

Stand the tripod base up on end, and rotate the feet perpendicular to the legs. Each leg has a clamp bracket with a bolt that locks the leg in place when tightened.

### 5.2.1 Mounting on a Relatively Flat Area

Loosen one clamp bracket bolt at a time and extend each leg until the three legs are at the same extension. With the legs extended, orient the tripod so that one of the legs points South (assuming the instrument enclosure with –MM Mast Mount bracket will face North). If the instrument enclosure has the –LM Leg Mount bracket, orient the tripod so that the enclosure will mount to one of the three leg mount positions on the tripod, facing the desired direction. The tripod is typically plumbed after the mast has been installed, as described in Section 5.3, *Mast* (p. 9).

### 5.2.2 Mounting on an Incline

Loosen the bolts on the clamp brackets. With the legs extended, orient the tripod so that one leg points downhill and the other two legs point uphill. The tripod is more stable with only one leg pointed downhill because the mast is closer to the center of the footprint (see FIGURE 5-2). Tighten the bolts on the clamp brackets to lock the legs in place.

The tripod is typically plumbed after the mast has been installed, as described in Section 5.3, *Mast* (p. 9).

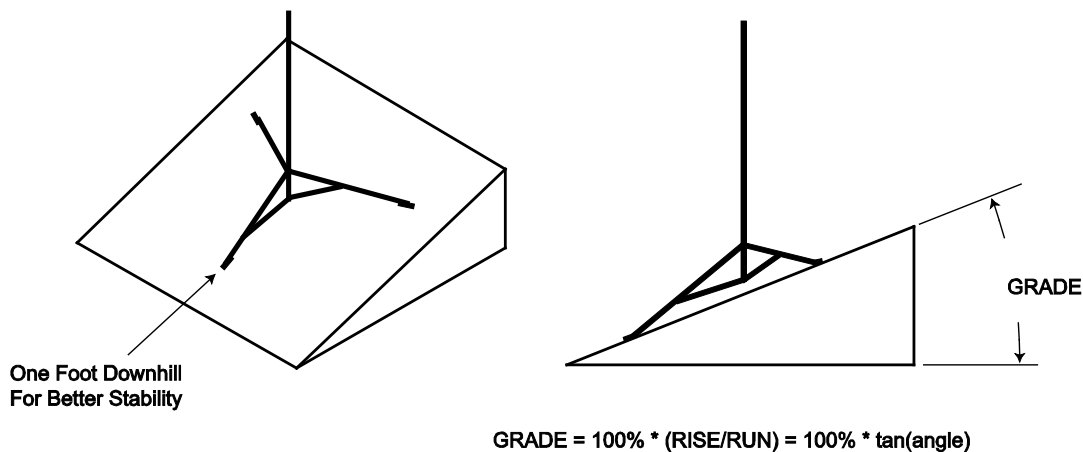



FIGURE 5-2. Tripod with one leg pointing downhill


## 5.3 Mast

For a video demonstrating how to assemble a tripod, see [www.campbellsci.com/videos/tripod](http://www.campbellsci.com/videos/tripod) .

Slide the mast into the tripod base orienting the end with the hole upwards, making sure that it extends below the lower bolts and rests on the tripod body tabs. Tighten the six 5/16-18 x 2.25 in. bolts to secure the mast.

Plumb the tripod by adjusting the northeast and south facing legs (use the downhill leg and one of the uphill legs when the tripod is installed on a slope). With a level on the East side of the mast, adjust the Northeast leg for plumb. With the level on the South side of the mast, adjust the South leg for plumb. Tighten the 5/16 bolt on each clamp bracket after the adjustments have been made.

## 5.4 Installing the Optional Guy Kit

For a video showing how to attach the optional guy wire kit to a tripod, see [www.campbellsci.com/videos/tripod3](http://www.campbellsci.com/videos/tripod3) .

The CM106B Guy Kit can be ordered separately for areas that experience high wind speeds (Section 4, *Specifications* (p. 2)). Install the guy ring collar on the mast as shown in FIGURE 5-3. Attach the three guy wires to the guy ring and slide the ring over the mast so the collar rests on top of the guy ring collar. Using the center duckbill anchor kit (see Section 5.5, *Center Duckbill Anchor Kit* (p. 12)) will also add additional stability to the tripod.

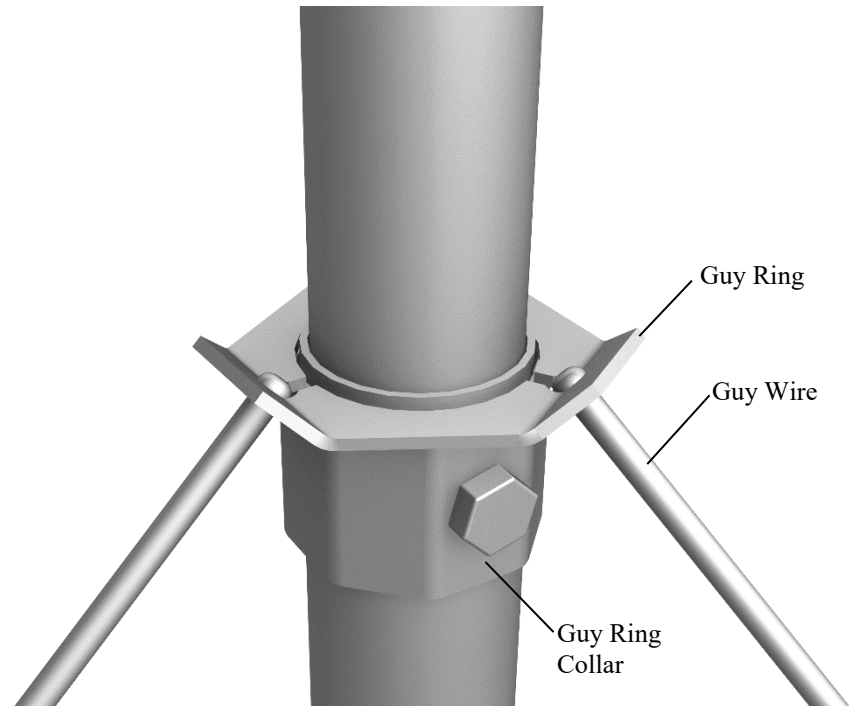


FIGURE 5-3. Guy kit

On the end of each guy wire is a case and hardware to attach to the turnbuckles. Unscrew the turnbuckles so that only 1/2 in. of thread extends beyond the inside of the turnbuckle body. Attach the case and turnbuckle to the tripod leg as shown in FIGURE 5-4. Loosen the two clamp nuts, and remove the slack in the guy wire by feeding the load end of the guy wire through the case while pulling up on the free end.

After the slack has been removed from the guy wires, tighten the clamp nuts, and then tighten the turnbuckles to the desired tension.



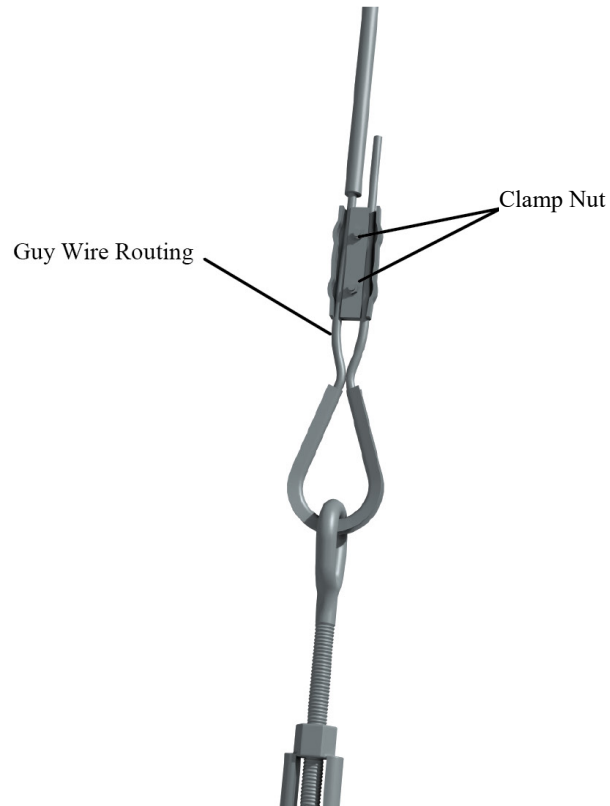
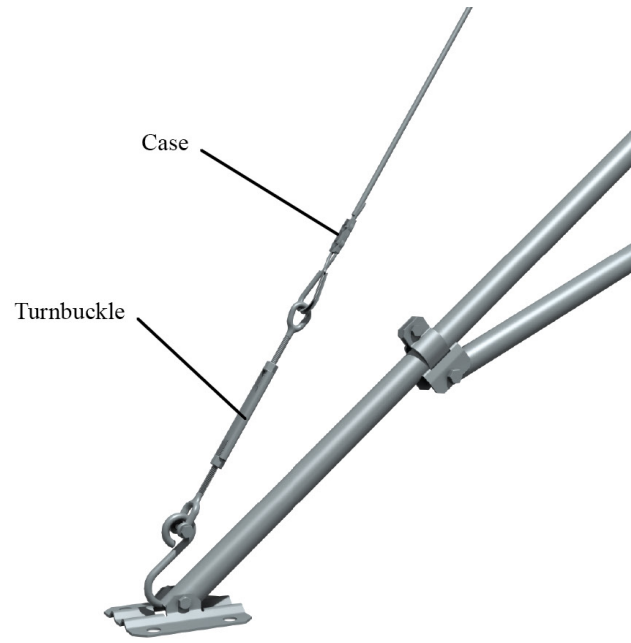


FIGURE 5-4. Leg attachment

## 5.5 Center Duckbill Anchor Kit

The Center Duckbill Anchor Kit is used to provide additional stability to the tripod. By providing an anchor directly under the center of the tripod, it can be firmly secured to the ground.

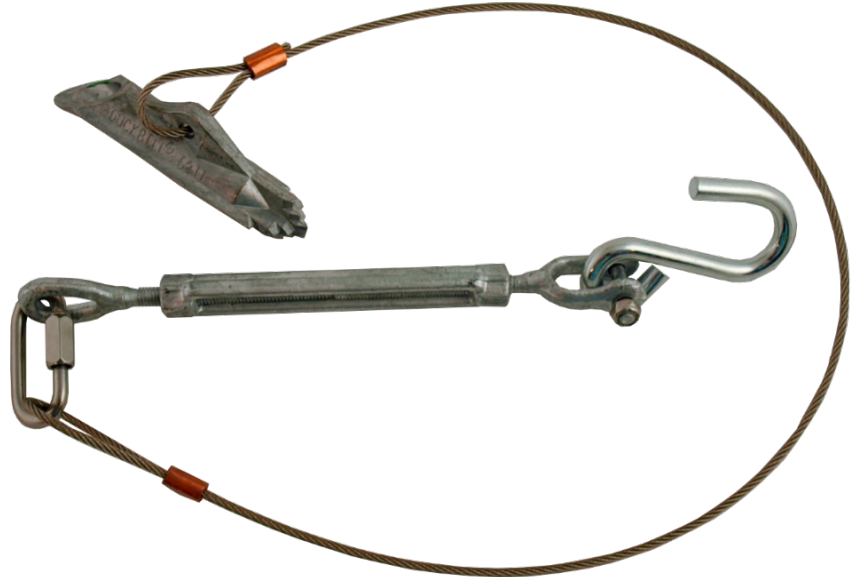
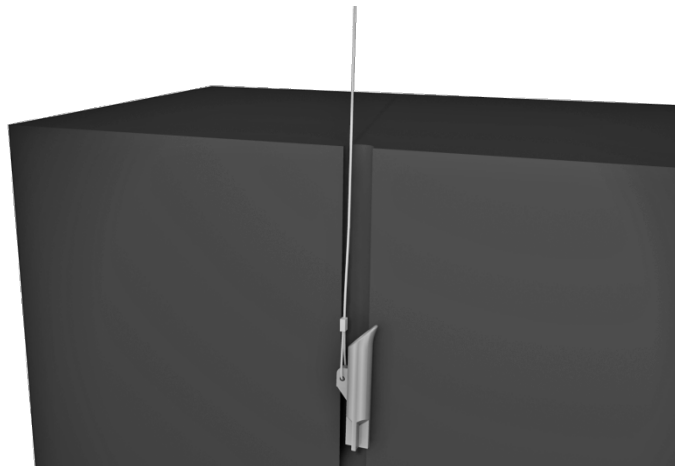


FIGURE 5-5. Center Duckbill Anchor Kit

### 5.5.1 Installation

1. Locate the position on the ground directly below the tripod mast. It is recommended to perform this procedure prior to driving the ground stakes through the tripod feet. This allows the tripod to be moved to one side to provide clearance when driving the duckbill anchor into the ground.
2. Insert a steel drive rod into the duckbill and drive the anchor straight down into the ground using a fence post pounder or sledgehammer until only the top half of the cable loop remains above ground.



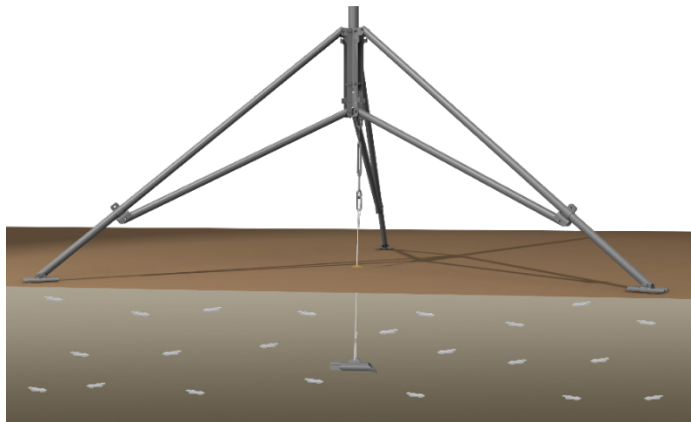
3. Attach a high-lift jack to the loop and jack the anchor up about 6 inches to rotate the anchor into the load-lock position.



4. Move the tripod back into position. Loosen the turnbuckle evenly at both ends until the hook at the top end can be slipped over one of the leg mounting bolts at the bottom of the tripod base.



5. Tighten the turnbuckle until the tripod is firmly secured to the anchor.



6. Install the ground spikes in the tripod feet as described in Section 5.6, *Staking the Tripod Feet* (p. 14).

## 5.6 Staking the Tripod Feet

The tripod must be firmly secured to the ground. Depending on the installation location, ground stakes may be sufficient for securing the tripod. Stakes are not included in the tripod kit. Campbell Scientific offers ground stakes for purchase. Use one or two ground stakes per tripod foot as shown in FIGURE 5-6.

Stakes may not be adequate depending on soil structure, maximum wind speeds experienced at the site, mast height, or wind load from the instrumentation. For questionable situations, additional stakes or even concrete footings for the tripod feet and guy anchors should be considered.

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**CAUTION**

Keep the bottom of the tripod legs free of soil, ice, and debris to prevent trapping any moisture inside or around the legs.

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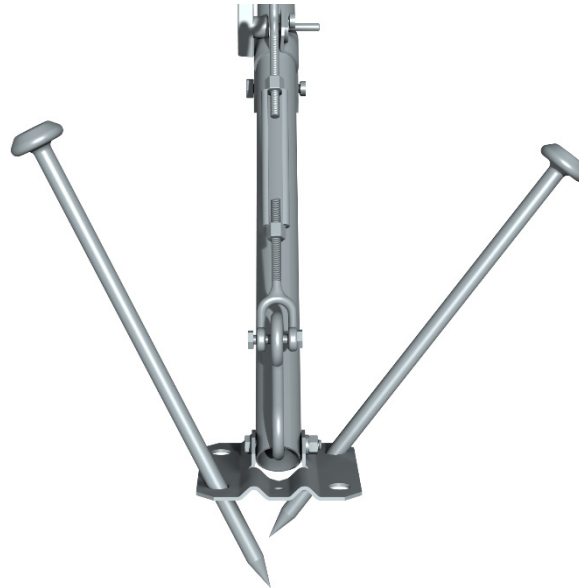


FIGURE 5-6. Staking the tripod feet

## 5.7 Tripod Grounding

The tripod must be properly grounded using a user-supplied grounding rod. Place the clamp over the ground rod and drive the rod (close to the center of the tripod) using a sledge hammer or fence post driver. Strip 12.7 mm (1/2 in) of insulation from both ends of a 4 AWG ground wire. Insert one end of the ground wire between the clamp and ground rod and tighten the bolt on the clamp. Attach the other end of the ground wire to the lug on the tripod base as shown in FIGURE 5-7.

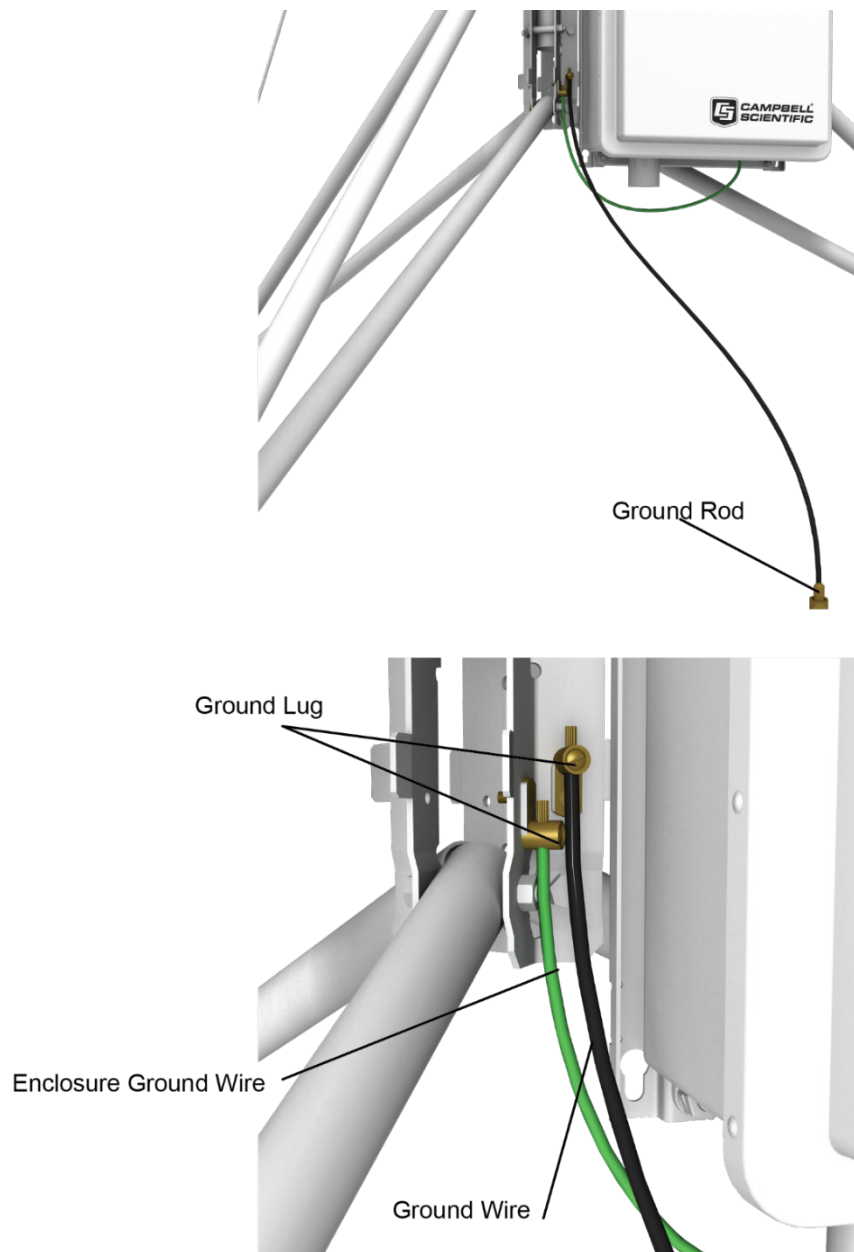
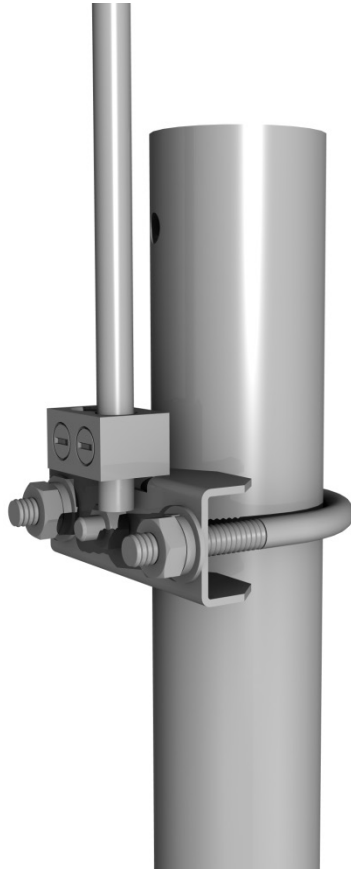


FIGURE 5-7. Ground rod and clamp


Strip 12.7 mm (1/2 in) of insulation from the ends of a 12 AWG wire. Attach one end of the wire to the tripod ground lug, and the other end to the enclosure ground lug as shown in FIGURE 5-7.

Mount the lightning rod and clamp to the tripod mast with pointed tip up, and notch at bottom, as shown in FIGURE 5-8.



*FIGURE 5-8. Lightning rod and tripod grounding lug*

## 5.8 Crossarm Attachment

For a video demonstrating how to attach a crossarm to a tripod, see [www.campbellsci.com/videos/tripod5](http://www.campbellsci.com/videos/tripod5) .

Attach the CM202 (0.6 m, 2 ft), CM204 (1.2 m, 4 ft), or CM206 (1.8 m, 6 ft) crossarm to the tripod mast as shown in FIGURE 5-9. For wind sensors, the crossarm should be approximately 261.6 cm (103 in) above the ground. Typically the crossarm is oriented East/West for wind sensors, North/South for pyranometers.

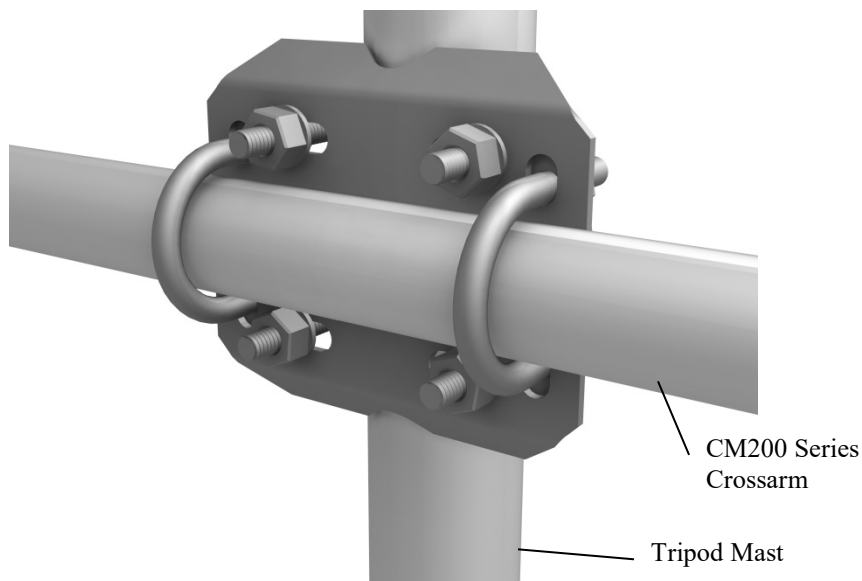



FIGURE 5-9. CM204 Crossarm

## 5.9 Enclosure Attachment

The ENC10/12, ENC12/14, ENC14/16, and ENC16/18 enclosures can be ordered with mounting brackets for the CM106BK tripod. All enclosure models can be mounted to the tripod mast (above the legs) with the –MM Mast Mount bracket option. The –LM Leg Mount bracket option allows all enclosure models to be mounted to the tripod base. Two enclosures with the –LM brackets can be mounted in a “back to back” configuration.

### 5.9.1 Enclosure Mounting to Tripod Mast

For a video showing how to mount an enclosure to the tripod mast, see [www.campbellsci.com/videos/tripod4](http://www.campbellsci.com/videos/tripod4) .

An enclosure ordered with the –MM bracket has a three-piece top and bottom brackets with a U-bolt for each bracket.

Attach an enclosure with the –MM mounting bracket to the tripod mast as follows:

Remove the U-bolts, washers, and nuts from the brackets.

Position the enclosure against the tripod mast (North side recommended).

Install the U-bolts, flat washers, lock washers, and nuts. Tighten the nuts until the lock washers are compressed.

Route the 14 AWG wire from the grounding lug on the bottom side of the enclosure to the grounding lug on the base of the tripod (FIGURE 5-7). Strip 12.7 mm (1/2 in) of insulation from each end of the wire. Insert wire ends into the grounding lugs and tighten.

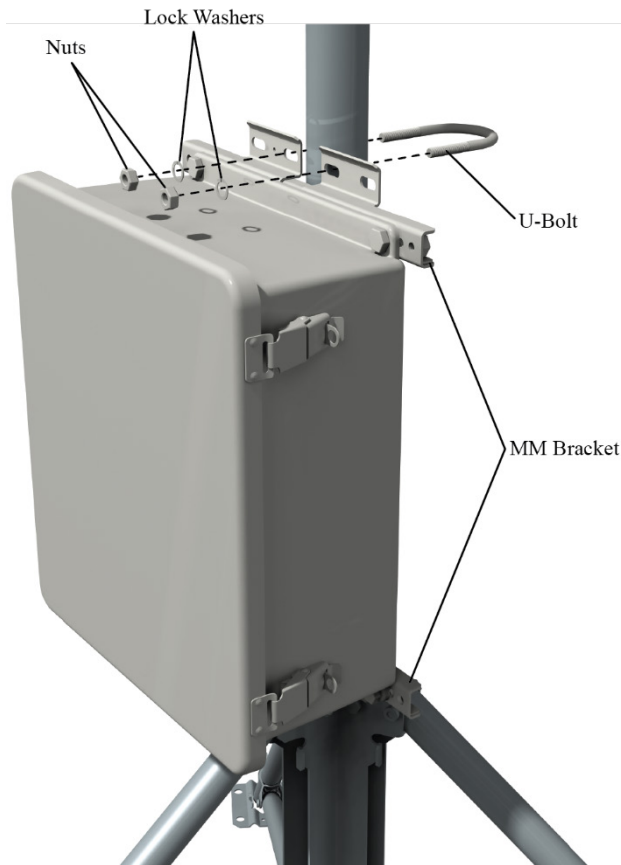



FIGURE 5-10. Enclosure with the –MM Bracket

### 5.9.2 Enclosure Mounting to Tripod Leg

For a video showing how to mount an enclosure to a tripod leg, see [www.campbellsci.com/videos/tripod9](http://www.campbellsci.com/videos/tripod9) .

An enclosure ordered with the –LM bracket has a bracket on each side of the enclosure, and a U-bolt bracket for securing the enclosure to a tripod leg.

Attach an enclosure with the –LM mounting bracket to the tripod base as follows:

Slide the keyhole notch in upper corner of the –LM bracket over the hook located on the tripod base as shown in FIGURE 5-11, and engage the notch in the lower corner of the –LM bracket with the enclosure tab.



Remove the washers, nuts, and U-bolt from the U-bolt bracket. Install the bracket as shown in FIGURE 5-11 (bottom) with the U-bolt capturing the tripod leg. Tighten the nuts on the U-bolt until the lock washers are compressed.

Route the 14 AWG wire from the grounding lug on the bottom side of the enclosure to the grounding lug on the base of the tripod (FIGURE 5-7). Strip 12.7 mm (1/2 in) of insulation from each end of the wire. Insert wire ends into the grounding lugs and tighten.

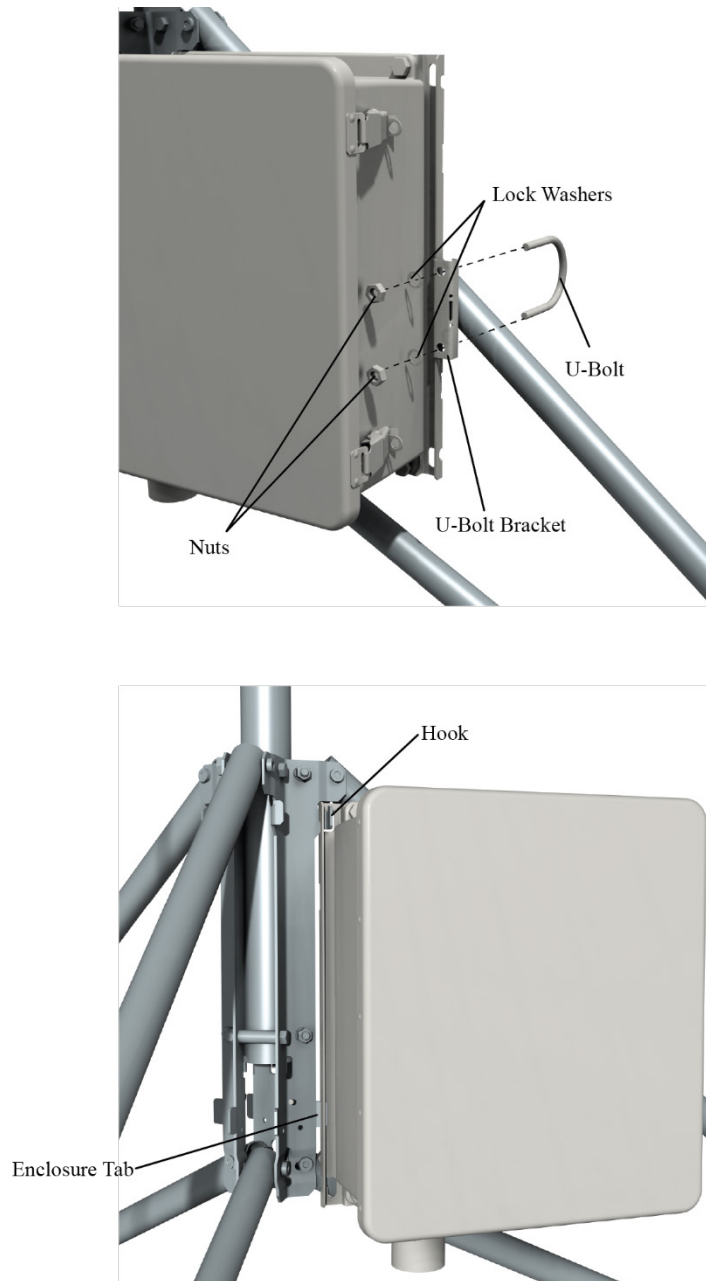


FIGURE 5-11. Enclosure with the -LM Bracket

## 6. Mounting Brackets

Mounting brackets covered in this section have U-bolts that attach to vertical and/or horizontal pipes with the following ranges of outside diameters:

	inches	mm	Nominal Pipe Size (inches)
3.8 cm (1.5 in) U-bolt	1.0 – 1.5	25.4 – 38.1	3/4 – 1
5.1 cm (2 in) U-bolt	1.3 – 2.1	33.0 – 53.3	1 – 1 1/2
5.1 cm (2 in) U-bolt with plastic V-block	1.0 – 2.1	25.4 – 53.3	3/4 – 1 1/2

Some of the brackets (for example, the CM210) include 3.8 cm and 5.1 cm (1.5 in and 2 in) U-bolts to extend the range of pipe diameters that the bracket can accommodate. Brackets with holes for a 3.8 cm (1.5 in) U-bolt will accept a user-supplied 4.4 cm (1.75 in) U-bolt.

### 6.1 CM210 Crossarm Mounting Kit

CM200 series crossarms include a CM210 bracket as shown in FIGURE 6-1. The CM210 can be ordered separately to attach a user-supplied pipe (2.5 to 3.8 cm (1.0 to 1.5 in) OD) to a mast or tower leg (2.5 to 5.3 cm (1.0 to 2.1 in) OD), or to attach a crossarm to two tower legs.

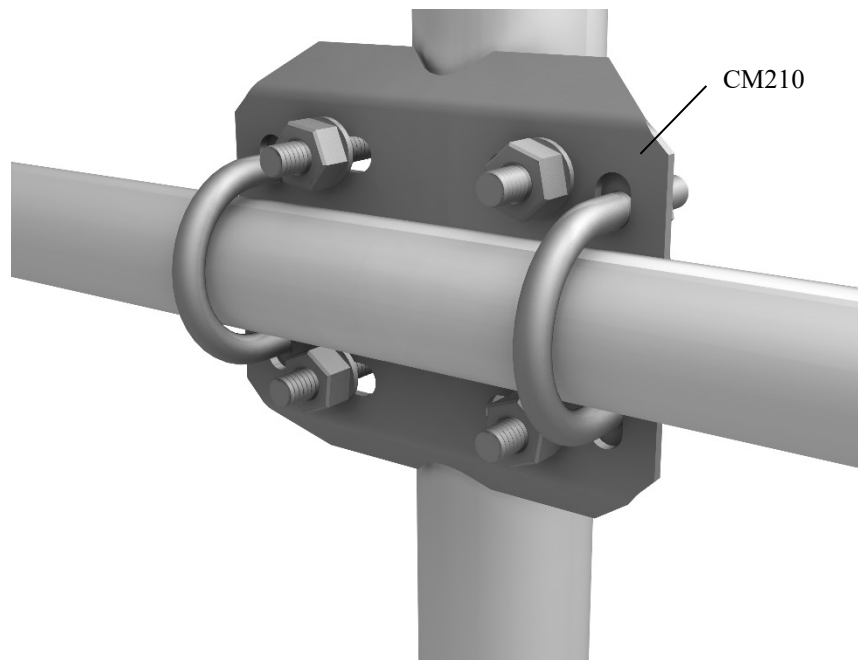


FIGURE 6-1. CM210 Crossarm Mounting Kit (shown with user-supplied pipe)

## 6.2 CM216 Mast Mounting Kit

The CM216 attaches to the top of the mast, and provides a 1.9 cm (0.75 in) or 2.5 cm (1 in) mounting pipe (2.7 cm or 3.4 cm (1.05 in or 1.32 in) OD) that extends 10 cm (4 in) above the mast, as shown in FIGURE 6-2.



FIGURE 6-2. CM216 Mast Mounting Kit

## 6.3 CM220 Right Angle Mounting Kit

The CM220 attaches a vertical pipe (2.5 to 3.8 cm (1.0 to 1.5 in) OD) to the CM200-series crossarms or horizontal pipe (2.5 to 3.8 cm (1.0 to 1.5 in) OD) as shown in FIGURE 6-3.

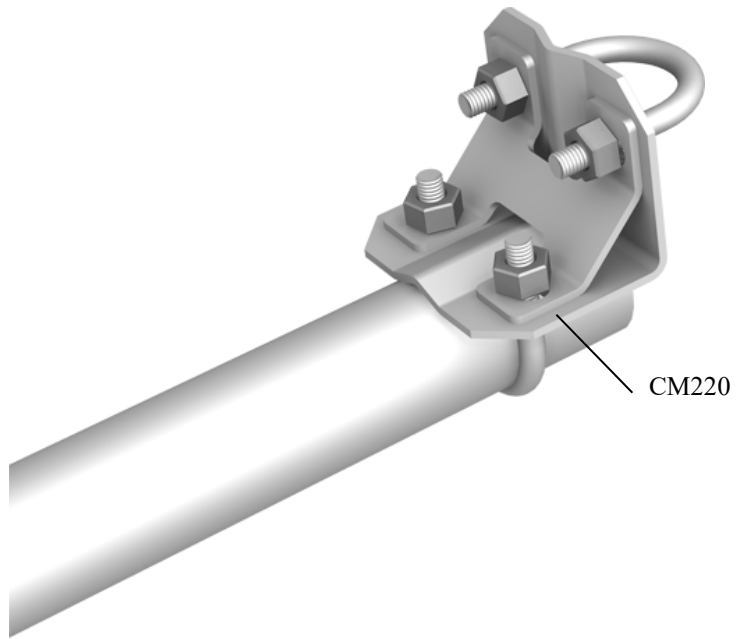


FIGURE 6-3. CM220 Right Angle Mounting Kit

## 6.4 CMB200 Crossarm Brace Kit

### 6.4.1 Overview

The CMB200 Crossarm Brace Kit (FIGURE 6-4) is designed to provide additional stability to crossarms mounted on Campbell Scientific tripods and towers. It provides additional support for crossarms with heavier sensor loads, and added stability in high winds.

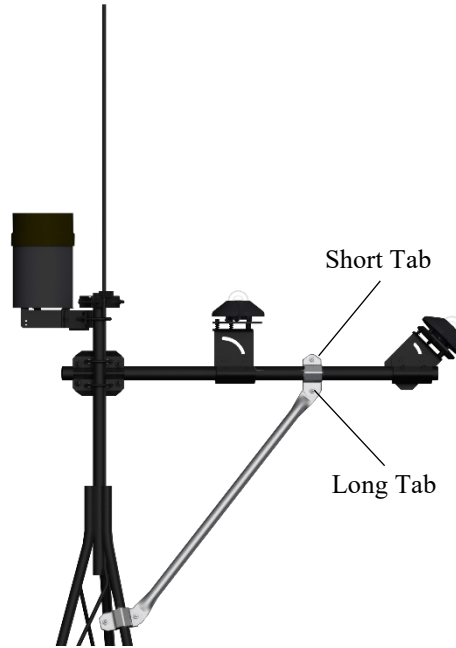


FIGURE 6-4. CMB200 Crossarm Brace Kit

### 6.4.2 Components

The CMB200 ships with the following components (FIGURE 6-5):

- (1) Brace Arm
- (2) Small bracket
- (2) Medium bracket
- (2) Large bracket
- (4) 1/4-20 x 1-inch bolt
- (8) 1/4 flat washer
- (4) 1/4 lock washer
- (4) 1/4-20 nut

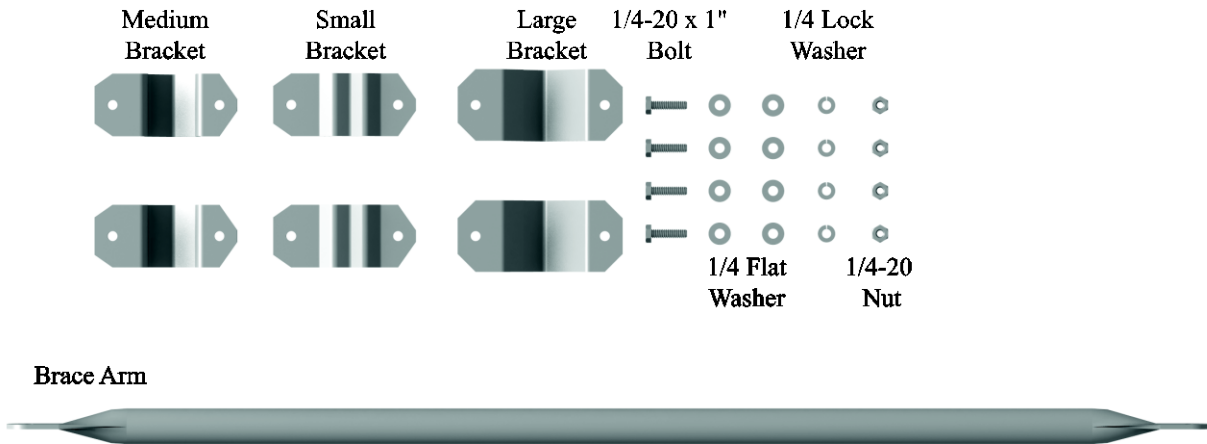


FIGURE 6-5. CMB200 components

### 6.4.3 Assembly

1. Consult FIGURE 6-6 and TABLE 6-1 to determine which brackets are needed at either end of the brace to attach it to the crossarm and tripod mast or tower. The figure also indicates what orientation is needed when the small bracket is used.

**NOTE**

---

Each bracket has a long tab and short tab where the bolts are attached. The brace arm must be attached to the end with the long tab.

---

2. Attach one end of the brace arm to the tripod mast or tower below the crossarm. Leave the bolts finger-tight.
3. Lift the free end of the brace arm to the crossarm and attach it to the crossarm. Again, only finger-tighten the bolts.
4. Adjust the position of the brace arm as needed.
5. Fully tighten the two bolts directly connected to the brace arm, and then tighten the remaining two bolts to clamp the brace arm to the crossarm and tower or tripod mast.

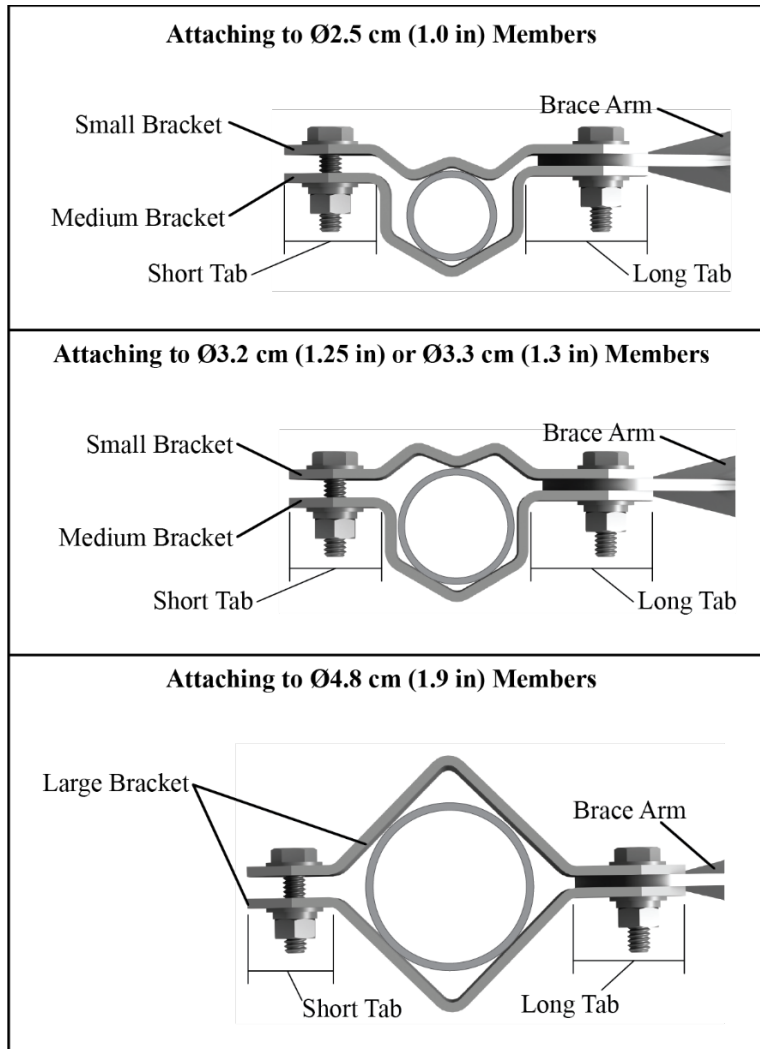


FIGURE 6-6. Bracket selection

TABLE 6-1. Bracket Requirements			
Mast/Crossarm/ Tower Diameter	Example Mast/Crossarm/Tower	Brackets Needed	Small Bracket Orientation
2.5 cm (1 in)	UT10/20/30 Tower Leg (excludes bottom section of UT20/30)	(1) Small Bracket (1) Medium Bracket	Angled toward mast/tripod
3.2 cm (1.25 in) or 3.3 cm (1.31 in)	CM202/3/4/6 Crossarm, UT20/30 Tower Mast, UT20/30 Tower Leg (bottom section only)	(1) Small Bracket (1) Medium Bracket	Angled away from mast/tripod
4.8 cm (1.9 in)	CM110/106B Tripod Mast, UT10 Tower Mast	(2) Large Bracket	N/A

# Appendix A. CM106BK Allowable Wind Speeds

CM106BK load ratings assume:

- Sensors (effective area =  $0.13 \text{ m}^2$  ( $1.4 \text{ ft}^2$ )) at top of mast
- Solar panel ( $26.7 \times 41.9 \text{ cm}$  ( $10.5 \times 16.5 \text{ in}$ )) at mast base
- ENC14/16 mounted to leg
- Guy wires attached to mast at 1.2 m (3.8 ft) above tripod body
- Adequate ground anchors (stakes alone may not resist foot vertical pullout force)

Tripod Footprint Dia.		Mast Height		Mast Configuration	Guy Anchors	Max. Allowable Gust Wind Speed		Max. Allowable Equipment Weight		Foot Vertical Pullout Force at Gust Speed		Guy-Wire Tension at Gust Speed		Ideal Guy-Wire Installation Pre-Tension	
m	ft	m	ft			mph	m/s	kN	lb	kN	lb	kN	lb	kN	lb
3.5	11.5	2.1	7	Retracted	Unguyed	104	46	4.3	964	0.31	70	-	-	-	-
					Attached to legs @ feet, 45deg Zenith	159	71	2.8	639	0.73	163	1.3	300	0.67	150
					Independent anchors @ 45deg Zenith	159	71	2.8	639	0.25	56	1.3	300	0.67	150
2.7	8.7	2.8	9.3	Retracted	Unguyed	104	46	4.3	964	0.71	160	-	-	-	-
					Attached to legs @ feet	159	71	1.9	438	1.57	352	1.8	400	0.89	200
					Independent anchors @ 45deg Zenith	159	71	2.8	639	0.69	155	1.3	300	0.67	150
3.5	11.5	3.0	10	Extended	Unguyed	81	36	4.3	964	0.26	59	-	-	-	-
					Attached to legs @ feet, 45deg Zenith	132	59	2.4	544	0.70	157	1.8	400	0.89	200
					Independent anchors @ 45deg Zenith	132	59	2.4	544	0.08	17	1.8	400	0.89	200



Tripod Footprint Dia.		Mast Height		Mast Configuration	Guy Anchors	Max. Allowable Gust Wind Speed		Max. Allowable Equipment Weight		Foot Vertical Pullout Force at Gust Speed		Guy-Wire Tension at Gust Speed		Ideal Guy-Wire Installation Pre-Tension	
m	ft	m	ft			mph	m/s	kN	lb	kN	lb	kN	lb	kN	lb
2.7	8.7	3.7	12.3	Extended	Unguyed	81	36	4.3	964	0.54	121	-	-	-	-
					Attached to legs @ feet	116	52	1.9	438	1.10	248	1.8	400	0.89	200
					Independent anchors @ 45deg Zenith	132	59	2.4	544	0.31	69	1.8	400	0.89	200



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