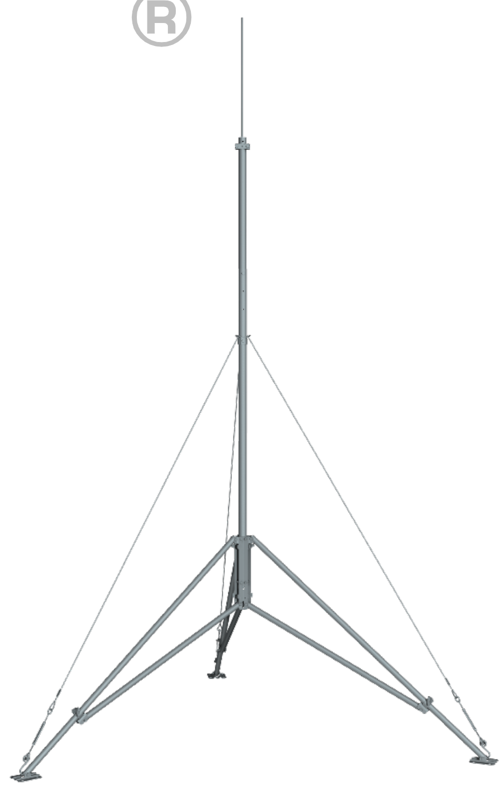
INSTRUCTION MANUAL

CM106B Tripod

Revision: 8/15



WARRANTY AND ASSISTANCE

This equipment is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. (“CSC”) to be free from defects in materials and workmanship under normal use and service for **twelve (12) months** from date of shipment unless specified otherwise. ***** **Batteries are not warranted.** ***** CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.

CAMPBELL® SCIENTIFIC

Campbell Scientific (Canada) Corp.
14532 131 Avenue NW | Edmonton AB T5L 4X4
780.454.2505 | fax 780.454.2655 | campbellsci.ca

Assistance

Products may not be returned without prior authorization. The following contact information is for Canadian and international clients residing in countries served by Campbell Scientific (Canada) Corp. directly. Affiliate companies handle repairs for clients within their territories. Please visit *www.campbellsci.ca* to determine which Campbell Scientific company serves your country.

To obtain a Returned Materials Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., phone (780) 454-2505. After a measurement consultant determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC (CANADA) CORP.
RMA#_____
14532 131 Avenue NW
Edmonton, Alberta T5L 4X4
Canada

For all returns, the client must fill out a "Statement of Product Cleanliness and Decontamination" form and comply with the requirements specified in it. The form is available from our web site at *www.campbellsci.ca/repair*. A completed form must be either emailed to *repair@campbellsci.ca* or faxed to (780) 454-2655. Campbell Scientific (Canada) Corp. is unable to process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the client at the client's expense. Campbell Scientific (Canada) Corp.f reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Precautions

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.ca or by telephoning (780) 454-2505 (Canada). 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 personnel (e.g. 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.
- 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, 6 meters (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 CLIENT 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.

PLEASE READ FIRST

About this manual

Please note that this manual was originally produced by Campbell Scientific Inc. (CSI) primarily for the US market. Some spellings, weights and measures may reflect this origin.

Some useful conversion factors:

Area:	1 in^2 (square inch) = 645 mm^2
Length:	1 in. (inch) = 25.4 mm
	1 ft (foot) = 304.8 mm
	1 yard = 0.914 m
	1 mile = 1.609 km
Mass:	1 oz. (ounce) = 28.35 g
	1 lb (pound weight) = 0.454 kg
Pressure:	1 psi (lb/in2) = 68.95 mb
Volume:	1 US gallon = 3.785 litres

In addition, part ordering numbers may vary. For example, the CABLE5CBL is a CSI part number and known as a FIN5COND at Campbell Scientific Canada (CSC). CSC Technical Support will be pleased to assist with any questions.

About sensor wiring

Please note that certain sensor configurations may require a user supplied jumper wire. It is recommended to review the sensor configuration requirements for your application and supply the jumper wire is necessary.

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Figures

Table

CM106B Tripod

1. Introduction

The CM106B is a general purpose tripod that can be used for mounting sensors, solar panels, antennas, and instrument enclosures. FIGURE 1-1 shows the CM106B being used in a typical weather station configuration.

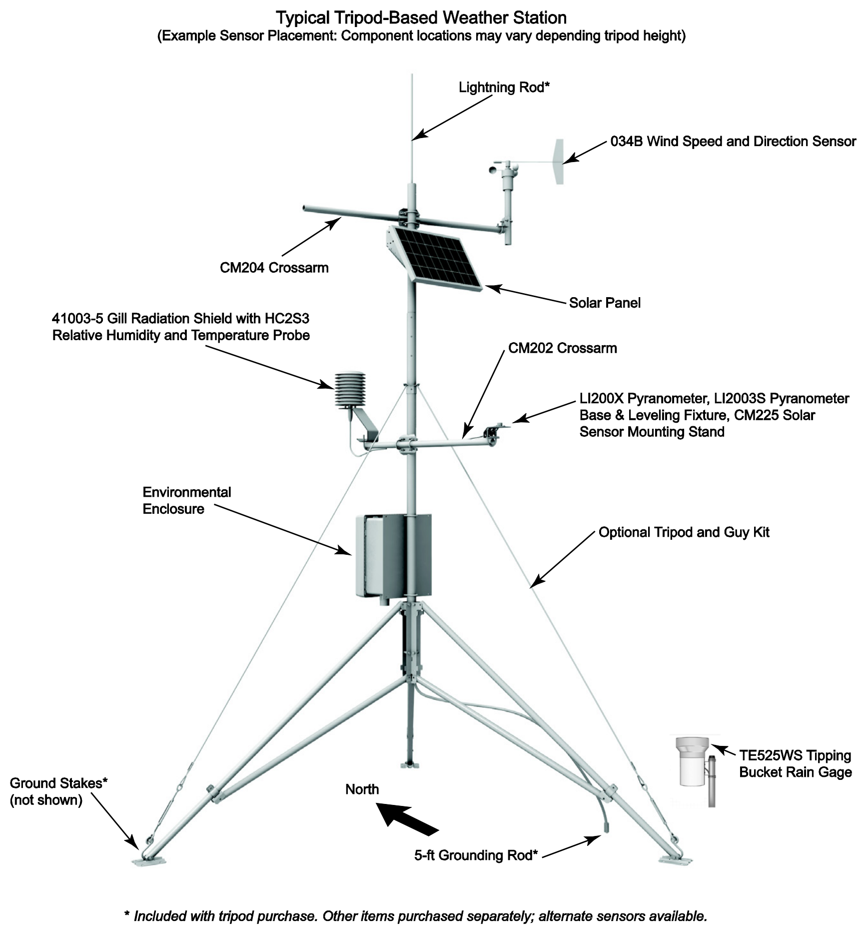


FIGURE 1-1. Typical tripod-based weather station

2. Cautionary Statements

- READ AND UNDERSTAND the *Precautions* 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.

3. Initial Inspection

3.1 Inspect Packaging

Upon receiving the CM106B, 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 Tripod Components

FIGURE 3-1 shows the tripod components. The tripod base is packaged with the mast, mast extension, ground rod, lightning rod, and (6) stakes. The ground rod clamp, lightning rod, lightning rod clamp, cable ties, and ground wires are enclosed in a bag. The optional guy kit is packaged separately.

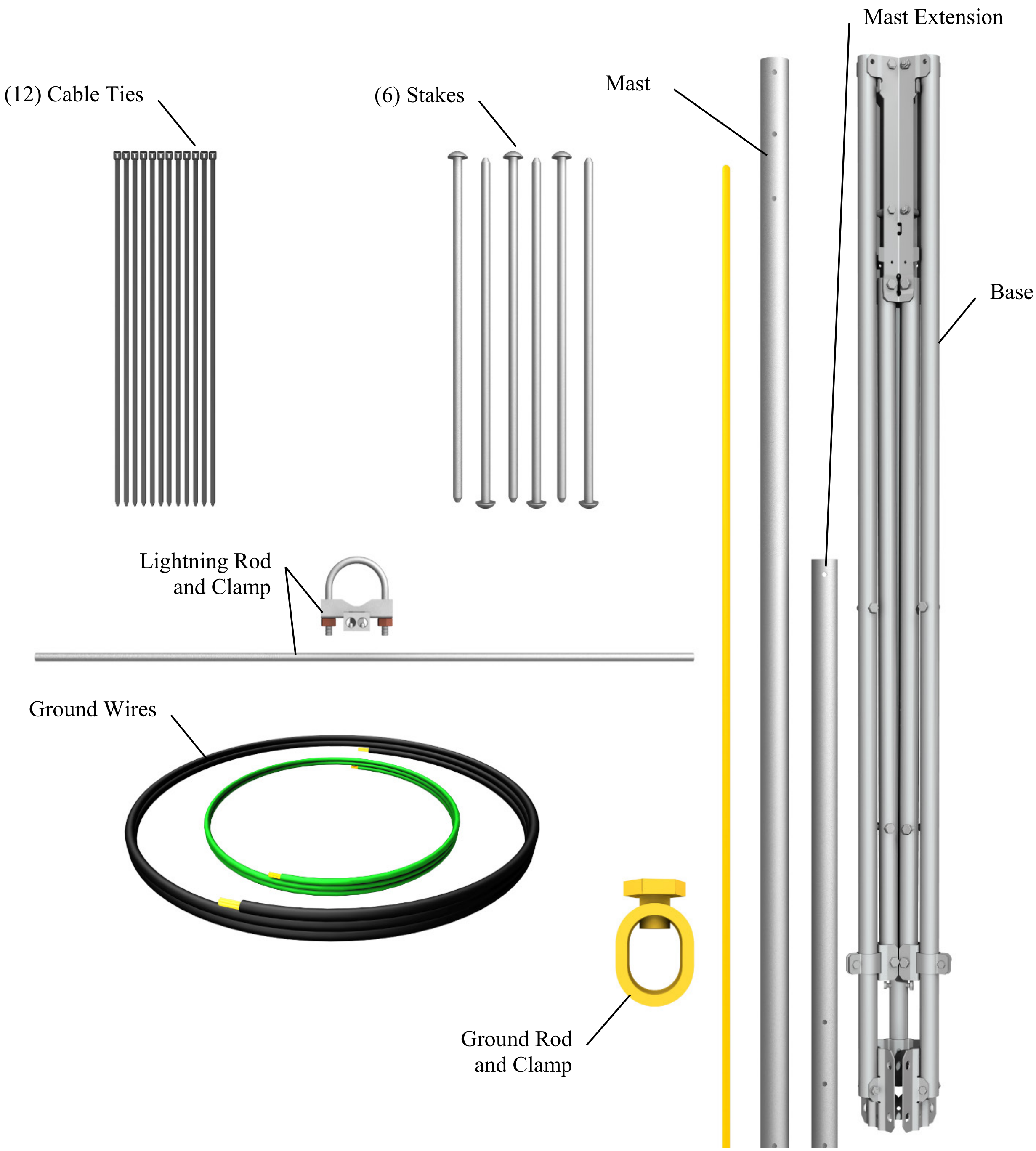


FIGURE 3-1. Tripod components

3.3 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)
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. Overview

The CM106B (FIGURE 4-1) is constructed from galvanized steel, with individually adjustable legs that allow installation over uneven terrain.

The CM106B includes lightning and ground rods, ground cables, UV resistant cable ties, and stakes for securing the tripod feet to the ground. An optional guy kit is recommended for sites that experience high wind speeds (see Section 5, Specifications *(p. 5)*). Instrument enclosures can be purchased with mounting brackets that attach to either the mast or leg section as shown in Section 6.1.7, *Enclosure Attachment (p. 15)*.

The CM106B 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.

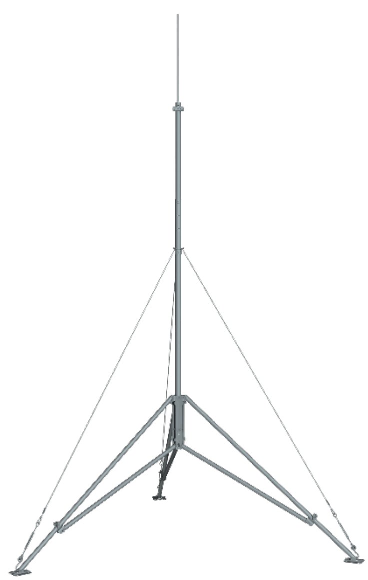


FIGURE 4-1. CM106B tripod with lightning rod and guy wires

5. 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)

Base Diameter: 2.7 m (8.7 ft) to 3.5 m (11.5 ft)

Leveling Adjustment: Slide collars on each leg, adjust individually

Leg Base: 4.5 in. by 5.5 in. with four 0.62 in. holes for stakes

Portability: Collapsible to 8 in. diameter by 6 ft length

Weight with Mast: 24.5 kg (54 lb)

Maximum Slope Angle: 45° or 100% grade

Allowable Wind Speeds*

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

**Allowable wind speed values assume:*

- *Sensors (effective area = 1.4 ft^2) at top of mast*
- *Solar panel (10.5 in x 16.5 in) at mast base*
- *Enclosure (14 in x 16 in) mounted to leg*
- *Guy wires attached to mast at 3.8 ft above tripod body*
- *Adequate ground anchors (stakes alone may not resist foot vertical pullout force)*
- *See Appendix A, CM106B Allowable Wind Speeds (p. A-1), for more information on maximum allowable wind speeds.*

6. Installation

6.1 Tripod Installation

6.1.1 Tripod Base

The tripod base has three independently adjustable legs allowing the tripod to be installed over non-level terrain.

Prepare the area where the tripod will be installed. The tripod requires an area approximately 2.7 to 3.5 m (8.7 to 11.5 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 leg clamp and clamping bolt as shown in FIGURE 6-1.

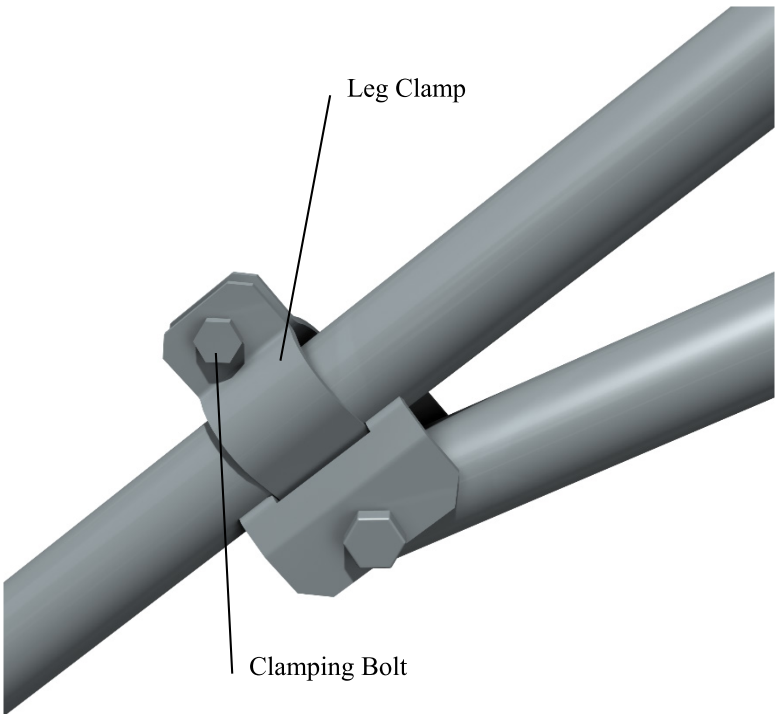


FIGURE 6-1. Tripod leg, leg clamp components

6.1.1.1 Mounting on a Relatively Flat Area

Loosen the tension bolt and extend each leg. 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 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 6.1.2, *Mast* (p. 8).

6.1.1.2 Mounting on an Incline

Loosen the tension bolt and extend each leg. 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 6-2).

The tripod is typically plumbed after the mast has been installed, as described in Section 6.1.2, *Mast* (p. 8).

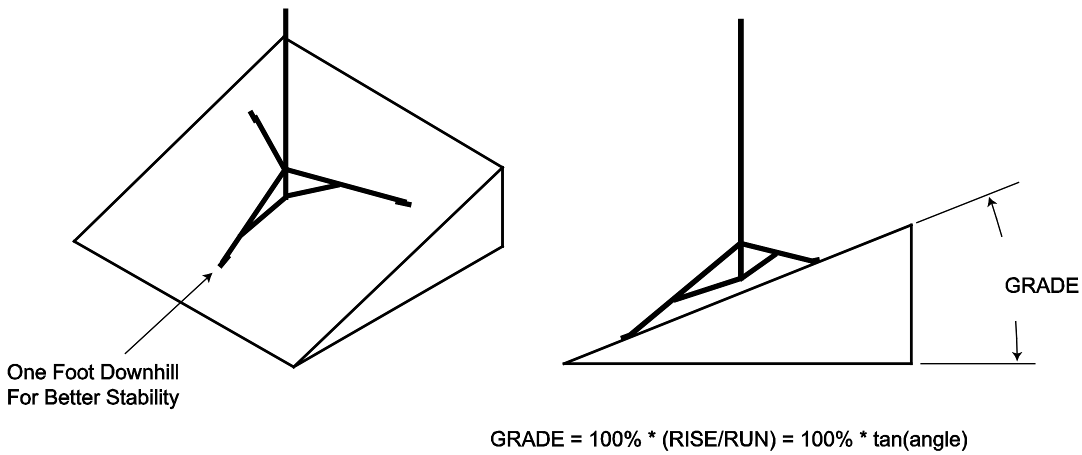


FIGURE 6-2. Comparison of one leg pointing downhill (right) versus two legs pointing downhill

6.1.2 Mast

The CM106B includes a mast extension that can be fully extended for a 3 m (10 ft) height, or partially extended for a 2.1 m (7 ft) height. Remove the bolts in the extension, align the holes in the insert with holes in the mast, and install the four bolts previously removed. Two additional holes make it possible for the extension to extend 8 in. or 12 in., or 20 in., 24 in., or 28 in. above the mast depending on which end is inserted in the mast.

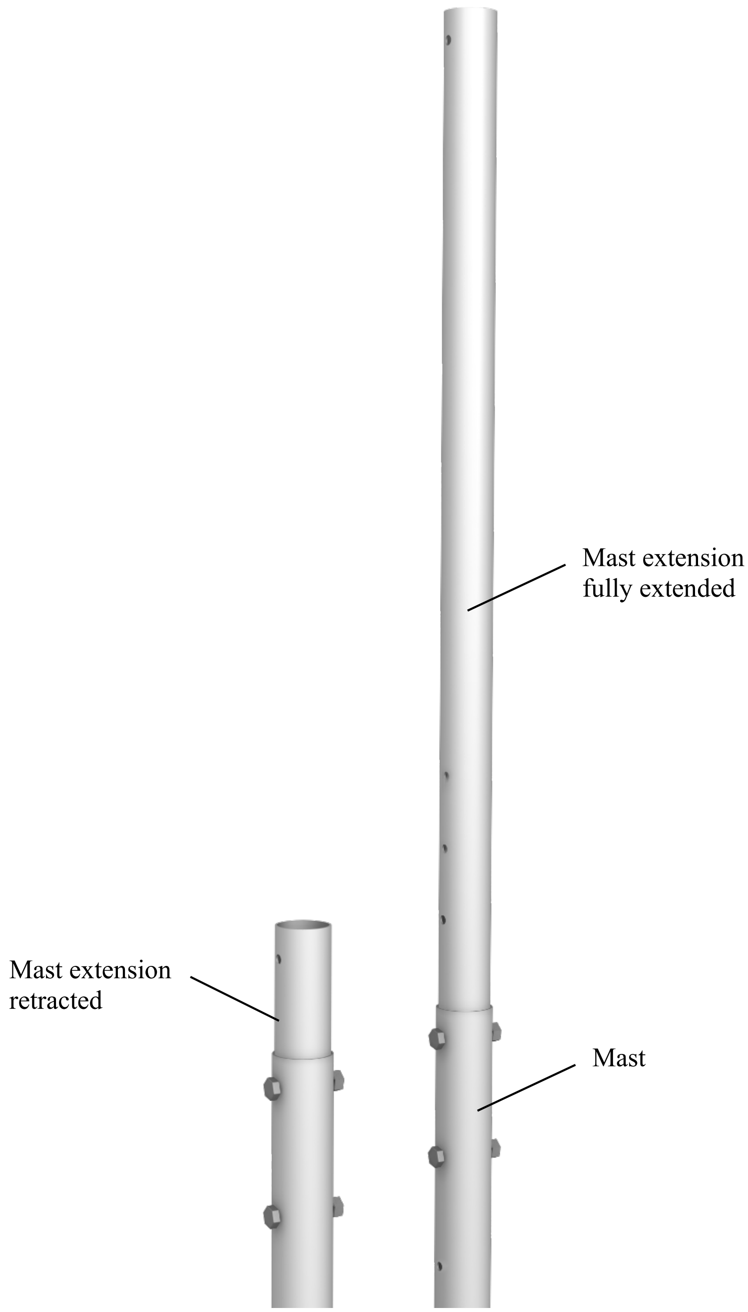


FIGURE 6-3. Tripod mast and insert

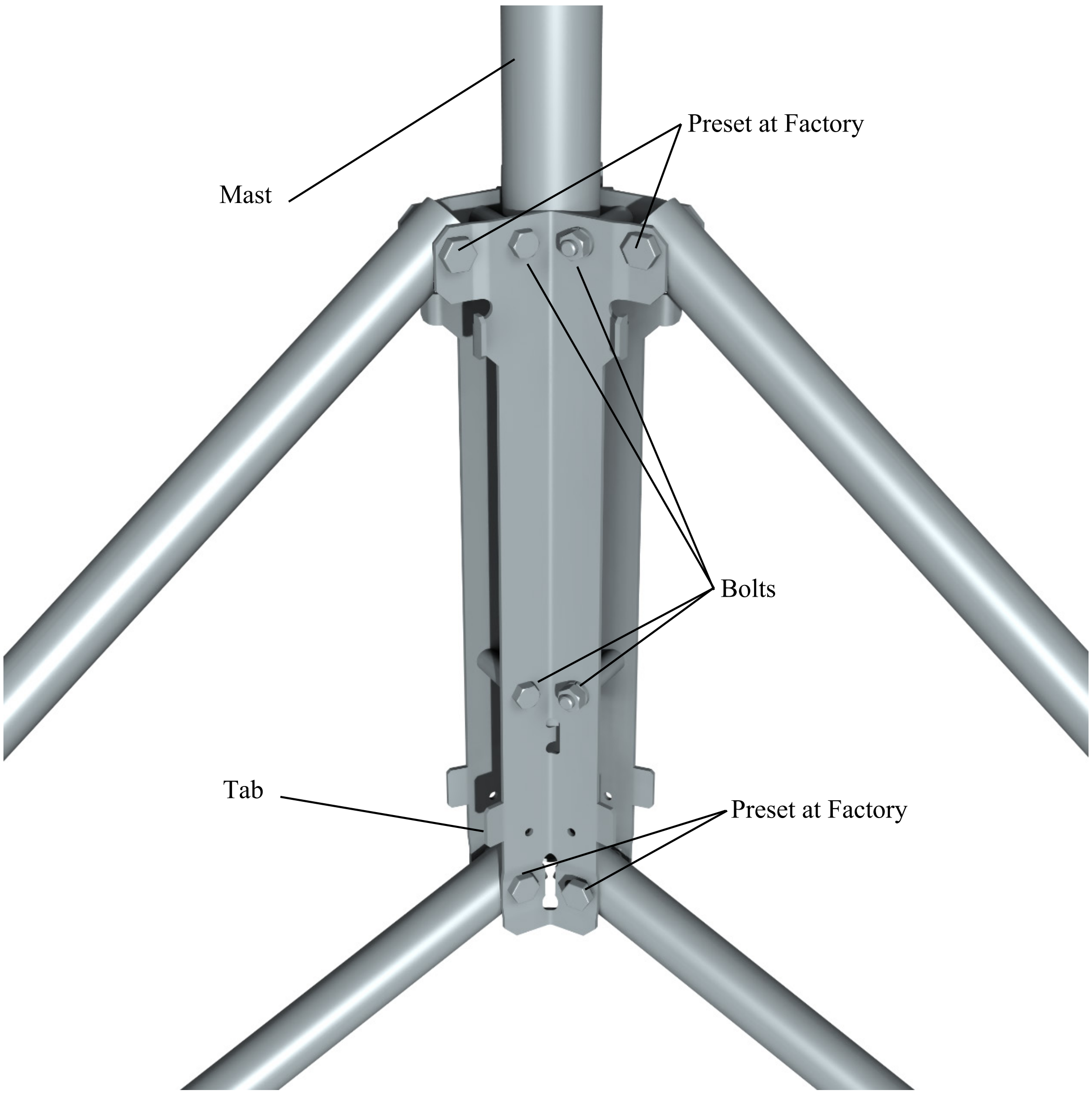


FIGURE 6-4. Mast attachment to tripod base

Loosen the six bolts on the tripod base. FIGURE 6-4 shows the location of four of these bolts. The remaining bolts are in the same position on the third tripod leg. Slide the mast into the tripod base, making sure that it extends below the lower bolts and rests on the tabs. Tighten the six bolts to secure the mast.

Plumb the tripod by adjusting the northeast and south facing legs. 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 tension bolts after the adjustments have been made.

6.1.3 Installing the Optional Guy Kit

Part 29813, *CM106B Guy Kit*, can be ordered separately for areas that experience high wind speeds (Section 5, *Specifications* (p. 5)). Install the guy brackets to the mast as shown in FIGURE 6-5. Attach the three guy wires to the guy collar and slide the collar over the mast so that the collar butts against the brackets.

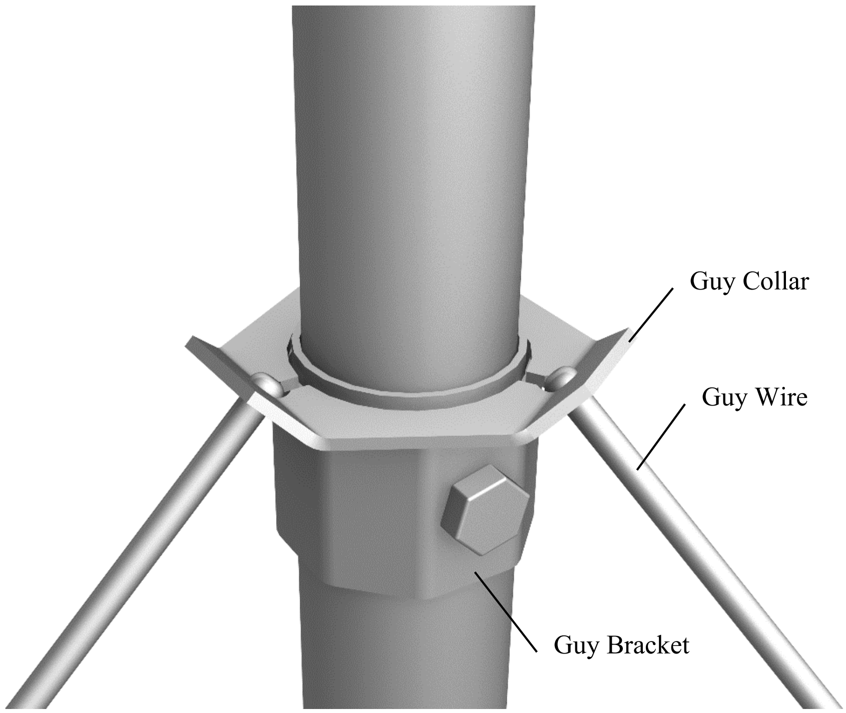


FIGURE 6-5. Guy collar

On the end of each guy line 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 6-6. Loosen the two clamp nuts, and remove the slack in the guy line 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 lines, tighten the clamp nuts, and then tighten the turnbuckles to the desired tension.

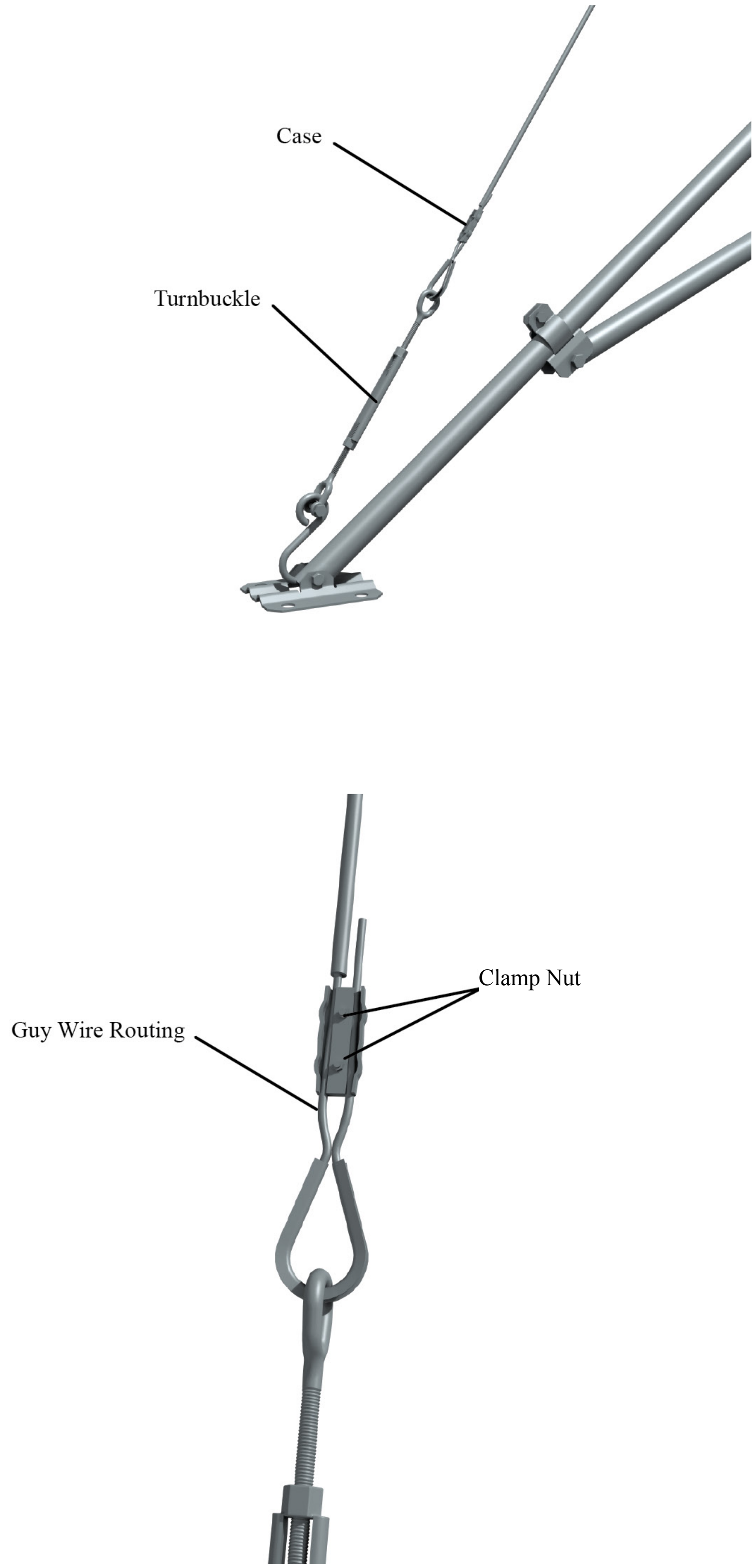


FIGURE 6-6. Leg attachment

6.1.4 Staking the Tripod Feet

Six stakes are provided for securing the tripod feet to the ground. Drive two stakes through holes in each foot at an angle as shown in FIGURE 6-7.

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 (pn 17049) or even concrete footings for the tripod feet and guy anchors should be considered.

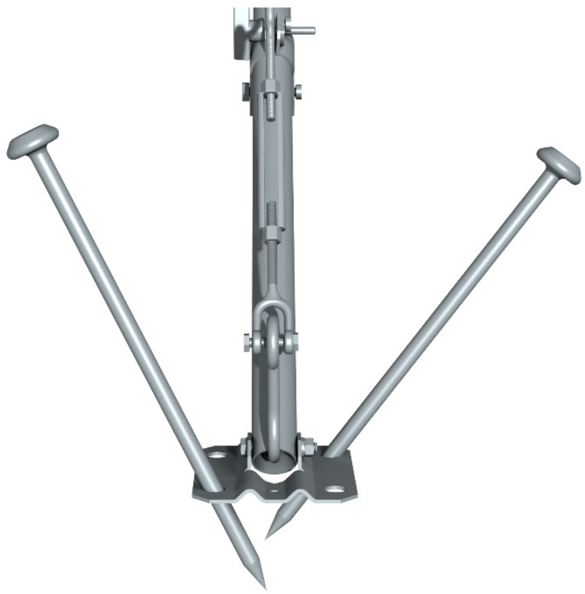
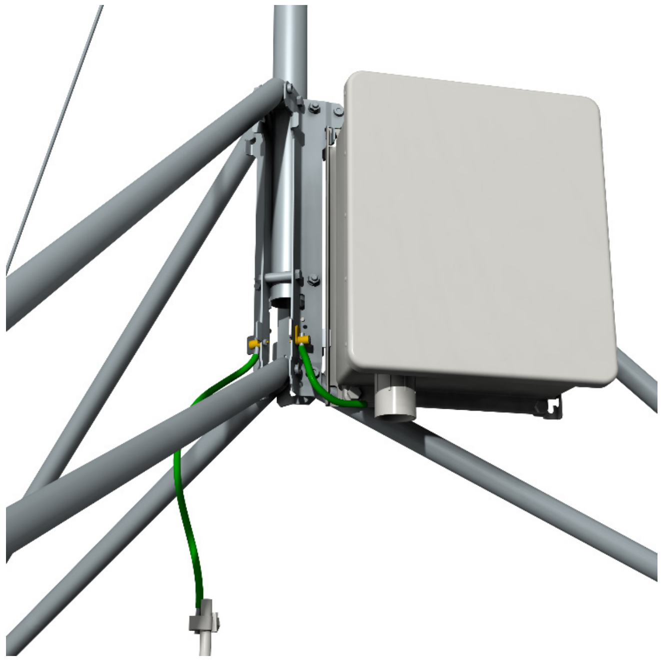


FIGURE 6-7. Staking the tripod feet

6.1.5 Tripod Grounding

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 1/2 in. of insulation from both ends of the black 4 AWG ground wire. Insert one end of the ground wire into 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 6-8.



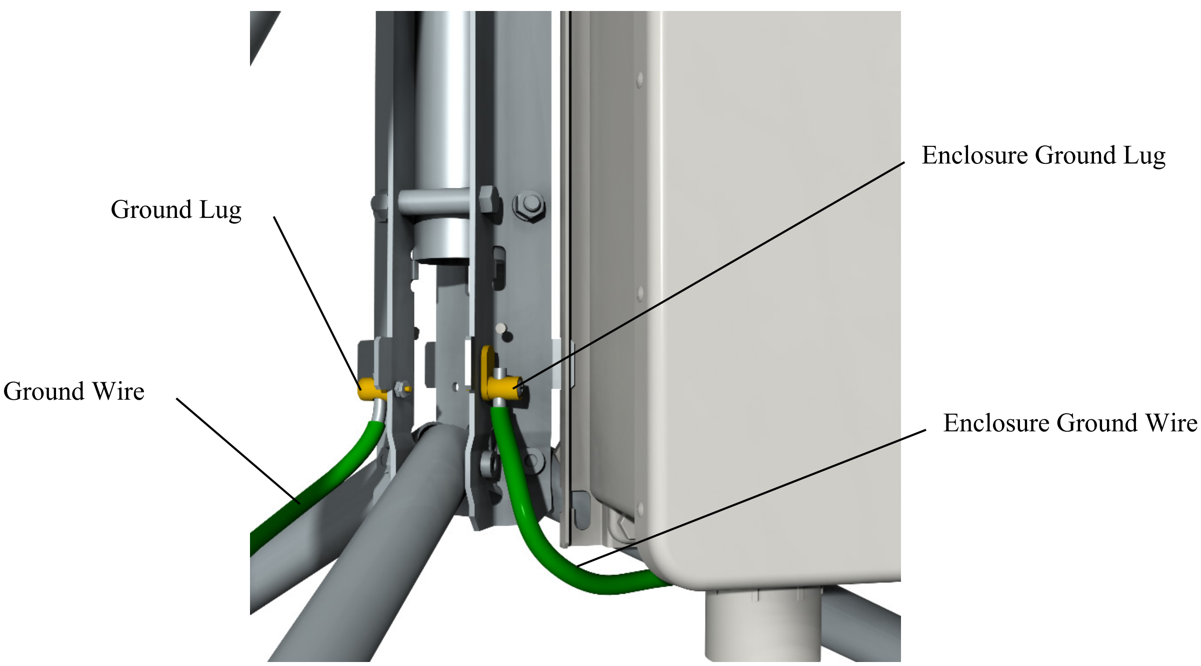


FIGURE 6-8. Ground rod and clamp

Strip 1/2 in. of insulation from the ends of the green 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 6-8.

Mount the lightning rod and clamp to the tripod mast with pointed tip up, and notch at bottom (FIGURE 6-9).

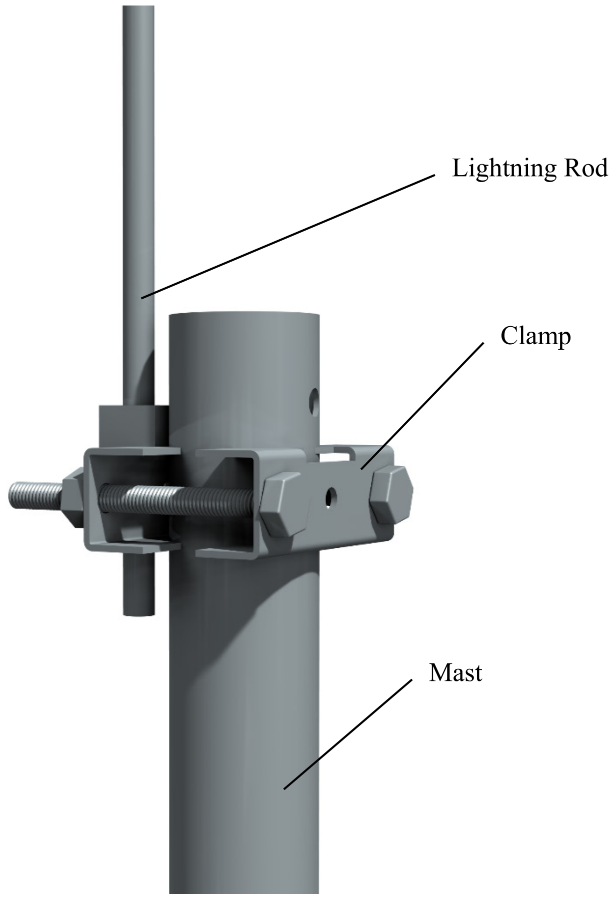


FIGURE 6-9. Lightning rod

6.1.6 Crossarm Attachment

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 6-10. For wind sensors, the crossarm should be approximately 103 in. above the ground for a 3 m mounting height, or 64 in. for a 2 m mounting height. Typically the crossarm is oriented East/West for wind sensors, North/South for pyranometers.

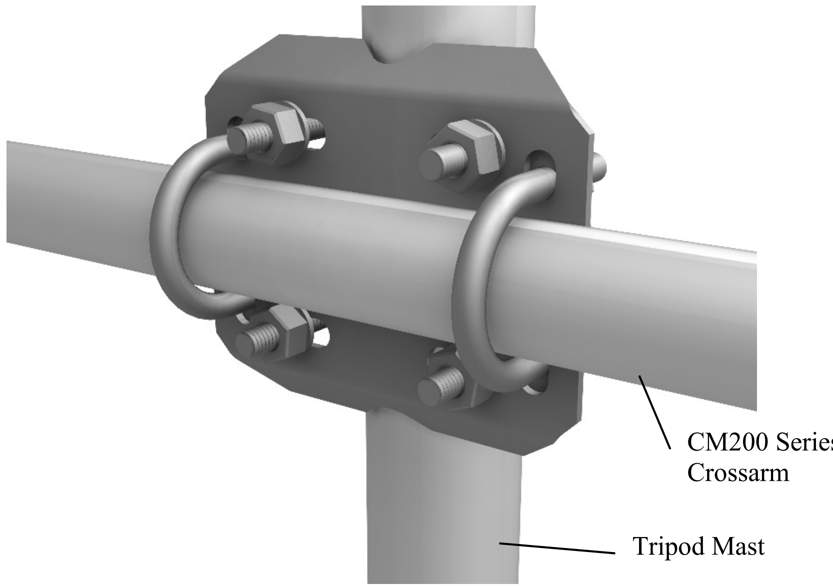


FIGURE 6-10. CM204 Crossarm

6.1.7 Enclosure Attachment

The ENC10/12, ENC12/14, ENC14/16, and ENC16/18 enclosures can be ordered with mounting brackets for the CM106B 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.

6.1.7.1 Enclosure Mounting to Tripod Mast

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’s mast (North side recommended).

Install the U-bolts, flat washers, lock washers, and nuts (FIGURE 6-11). Tighten the nuts until the lock washers are compressed.

Route the 14 AWG wire from the ground lug on the bottom side of the enclosure to the ground lug on the base of the tripod (FIGURE 6-8). Strip 1/2 in. of insulation from each end of the wire. Insert wire ends into the ground lugs and tighten.

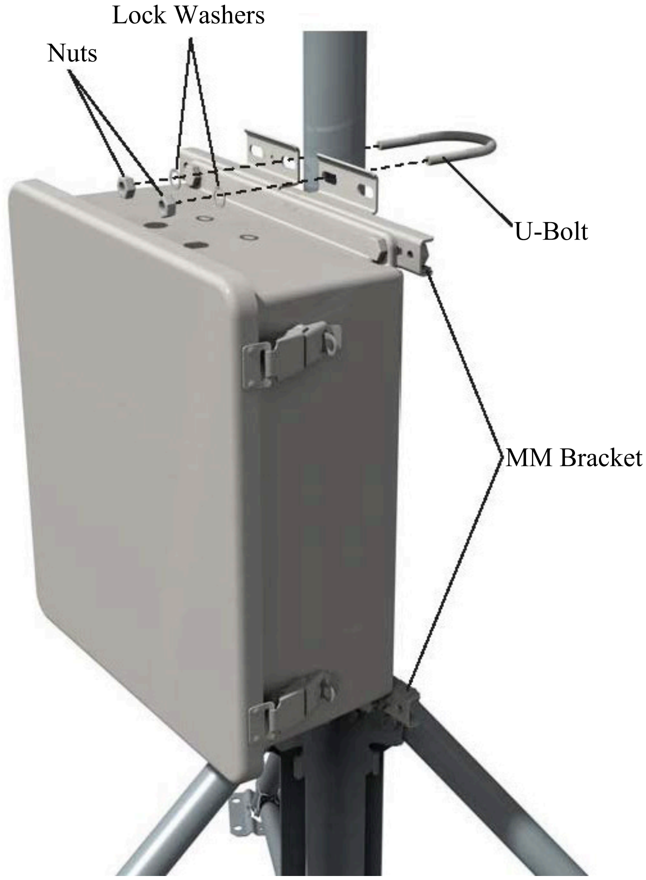


FIGURE 6-11. Enclosure with the –MM bracket

6.1.7.2 Enclosure Mounting to Tripod Leg

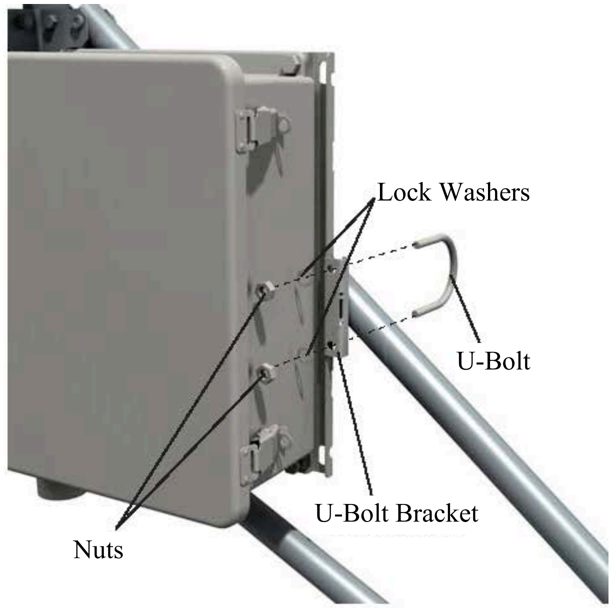
An enclosure ordered with the –LM bracket has a bracket on each side of the enclosure, and a U-bolt bracket for securing the enclosure to a tripod leg.

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 extended hook located on the tripod base as shown in FIGURE 6-12, and engage the notch in the lower corner of the –LM bracket with the enclosure tab. There are six places on the tripod base with provisions for mounting enclosures with the –LM brackets.

Remove the washers, nuts, and U-bolt from the U-bolt bracket. Install the bracket as shown in FIGURE 6-12 (top). Tighten the nuts on the U-bolt until the lock washers are compressed.

Route the 14 AWG wire from the ground lug on the bottom side of the enclosure to the ground lug on the base of the tripod (FIGURE 6-8). Strip 1/2 in. of insulation from each end of the wire. Insert wire ends into the ground lugs and tighten.



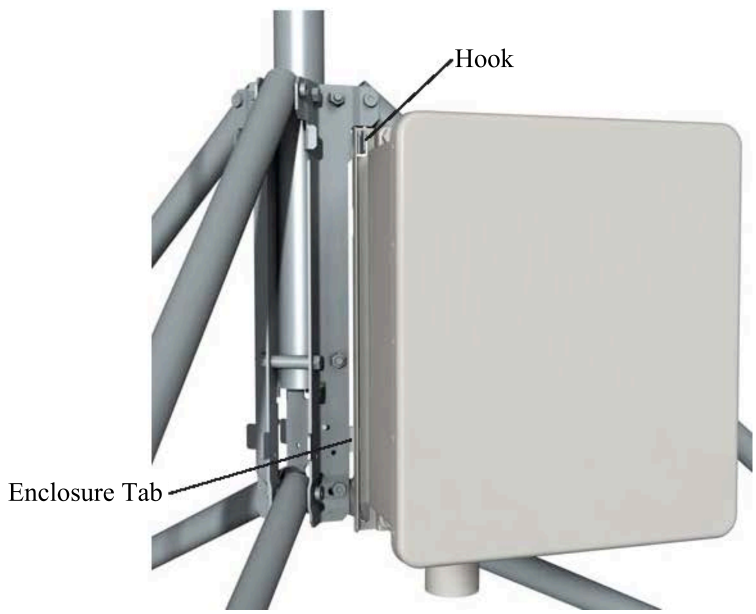


FIGURE 6-12. Enclosure with the –LM bracket

6.2 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)
1.5-in. U-bolt	1.0 – 1.5	25.4 – 38.1	¾ – 1
2-in. U-bolt	1.3 – 2.1	33.0 – 53.3	1 – 1 ½
2-in. U-bolt with plastic V-block	1.0 – 2.1	25.4 – 53.3	¾ – 1 ½

Some of the brackets (for example, the CM210) include 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 1.5-in. U-bolt will accept a user-supplied 1.75-in. U-bolt.

6.2.1 CM210 Crossarm Mounting Kit

CM200 series crossarms include a CM210 bracket as shown in FIGURE 6-13. The CM210 can be ordered separately to attach a user-supplied pipe (1.0-in. to 1.5-in. OD) to a mast or tower leg (1.0-in. to 2.1-in. OD), or to attach a crossarm to two tower legs.

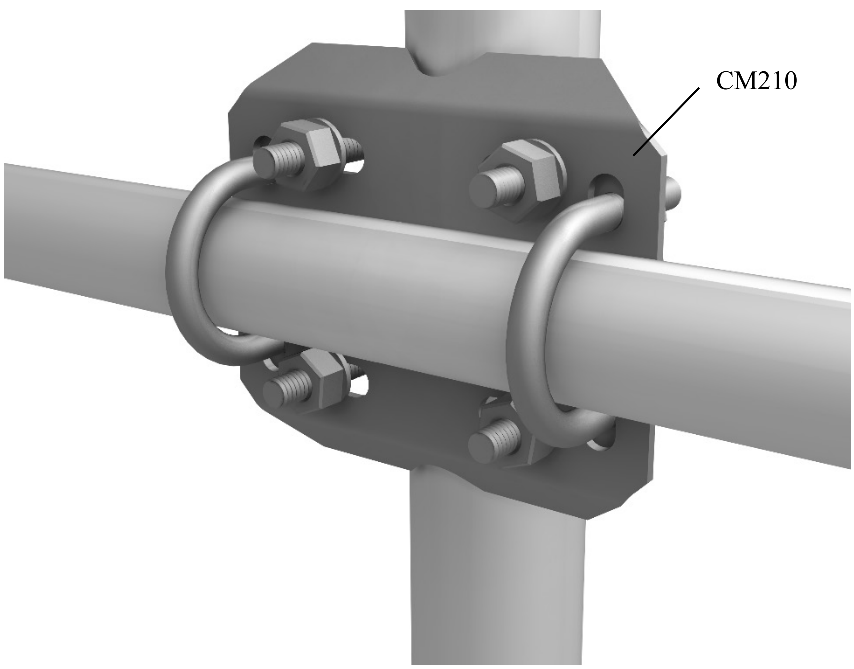


FIGURE 6-13. CM210 Crossarm Mounting Kit (shown with user-supplied pipe)

6.2.2 CM216 Mast Mounting Kit

The CM216 attaches to the top of the mast, and provides a 3/4-in. or 1-in. mounting pipe (1.05-in. or 1.32-in. OD) that extends 4 in. above the mast, as shown in FIGURE 6-14.

FIGURE 6-14. CM216 Mast Mounting Kit

6.2.3 CM220 Right Angle Mounting Kit

The CM220 attaches a vertical pipe (1.0-in. to 1.5-in. OD) to the CM200-series crossarms or horizontal pipe (1.0-in. to 1.5-in. OD) as shown in FIGURE 6-15.

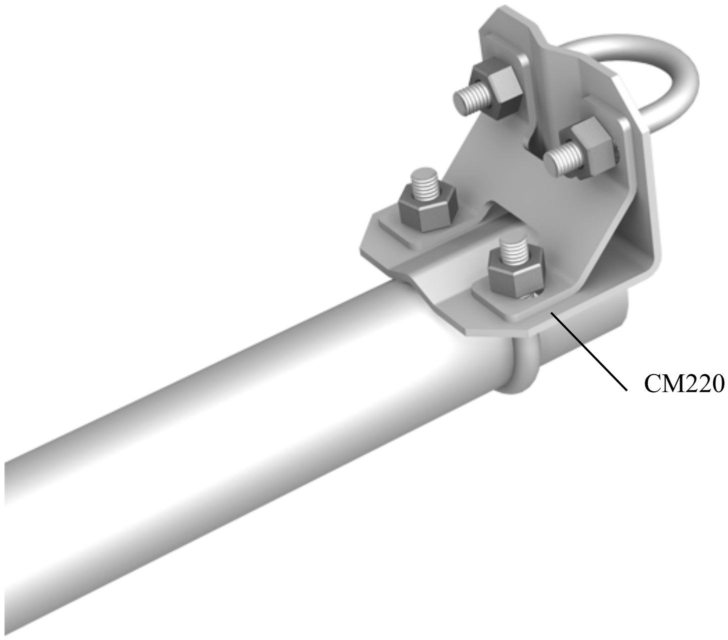


FIGURE 6-15. CM220 Right Angle Mounting Kit

6.2.4 CMB200 Crossarm Brace Kit

6.2.4.1 Overview

The CMB200 Crossarm Brace Kit (FIGURE 6-16) 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.

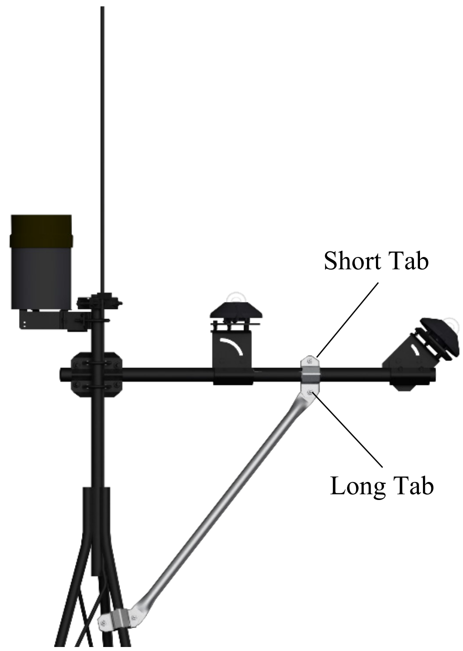


FIGURE 6-16. CMB200 Crossarm Brace Kit

6.2.4.2 Components

The CMB200 ships with the following components (FIGURE 6-17):

- (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

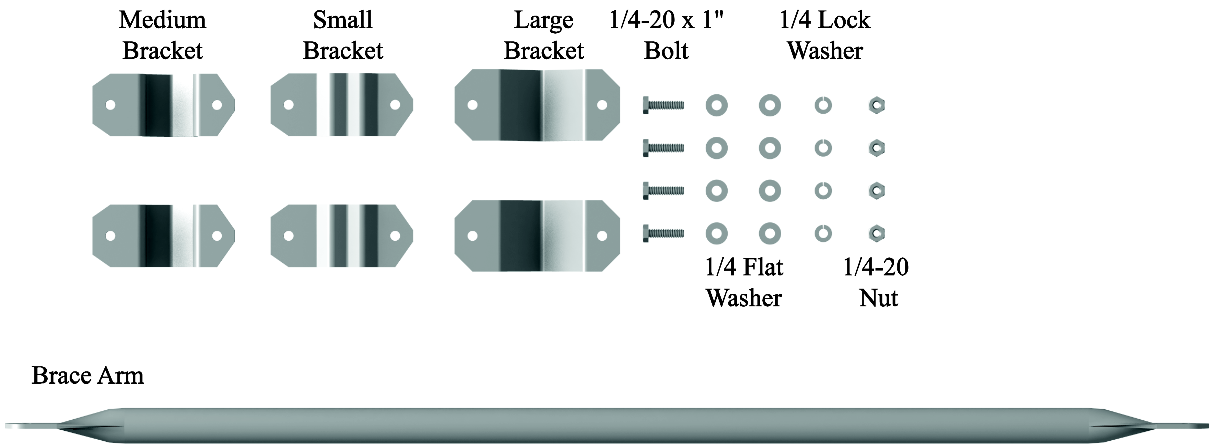


FIGURE 6-17. CMB200 components

6.2.4.3 Assembly

1. Consult FIGURE 6-18 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.

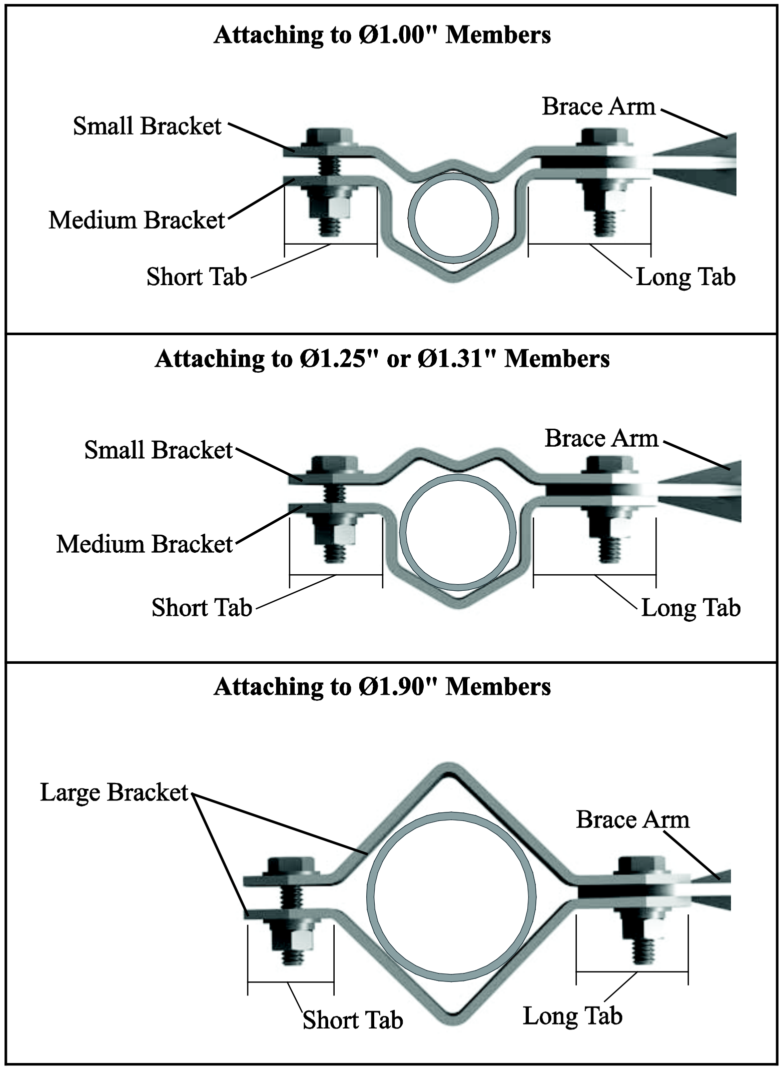


FIGURE 6-18. Bracket selection

TABLE 6-1. Bracket Requirements

Mast/Crossarm/ Tower Diameter	Example Mast/Crossarm/Tower	Brackets Needed	Small Bracket Orientation
Ø1.00 in	UT10/20/30 Tower Leg (excludes bottom section of UT20/30)	(1) Small Bracket (1) Medium Bracket	Angled toward mast/tripod
Ø1.25 in or Ø1.31 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
Ø1.90 in	CM110/106B Tripod Mast, UT10 Tower Mast	(2) Large Bracket	N/A

6.2.5 CM225 and 18098 Pyranometer Mounting Stand

The CM225 is used to attach a pyranometer or quantum sensor to a horizontal pipe (1.0-in. to 2.1-in. OD) or vertical pole (1.0-in. to 2.1-in. OD).

The LI200X pyranometer and LI190SB quantum sensor mount to the CM225 via the LI200S leveling base (see FIGURE 6-19). The CS300 pyranometer mounts to the CM225 via the 18356 leveling base. The CMP3 and LP02 pyranometers include their own bubble level and leveling screws allowing them to mount directly to the CM225.

The 18098 provides a larger surface for mounting a user-supplied Eppley pyranometer.

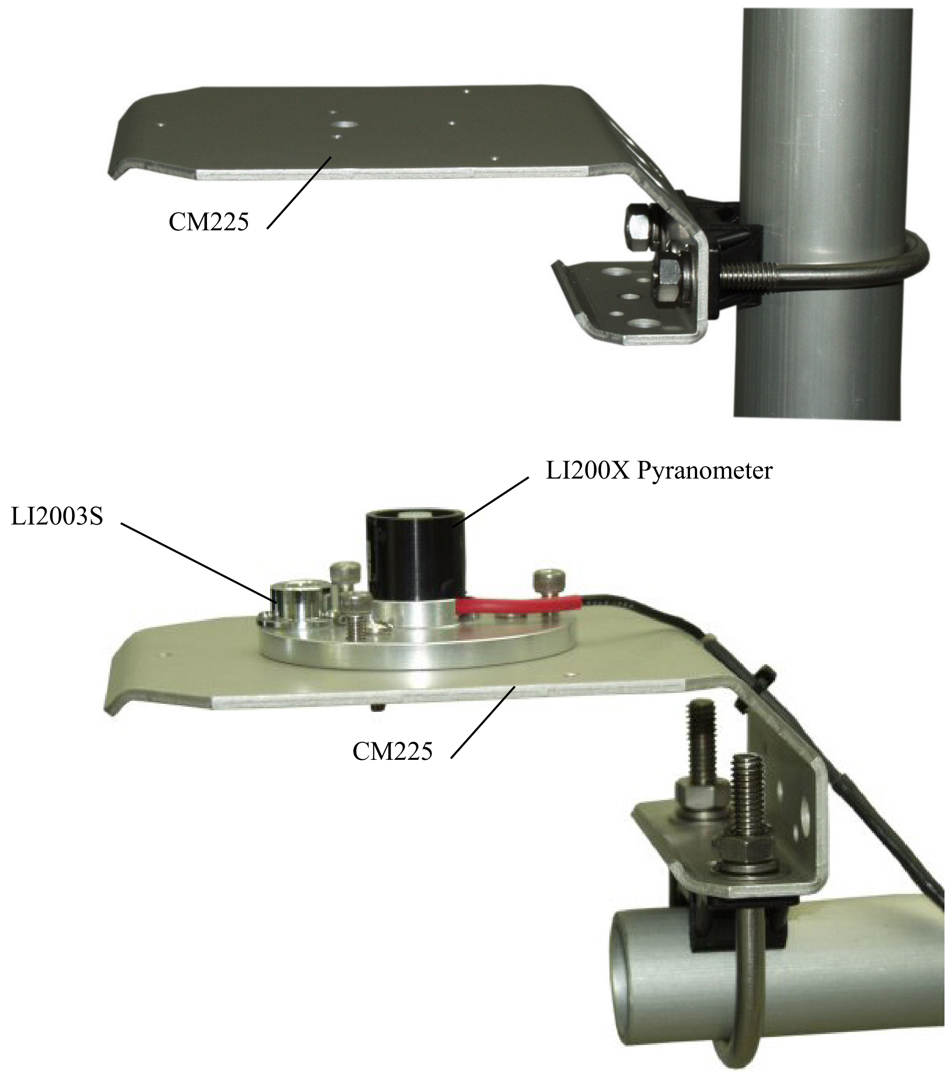


FIGURE 6-19. CM225 Pyranometer Mounting Stand

6.2.6 CM230 and CM230XL Adjustable Angle Mounting Kits

The CM230 mounts an antenna (1.0-in. to 1.5-in. OD) to a mast or vertical pipe (1.3-in. to 2.1-in. OD) as shown in FIGURE 6-20. The bracket allows the antenna to be adjusted for different angles.

The CM230XL is similar to the CM230, but has a longer mounting arm (see FIGURE 6-20). Its longer length places the antenna or sensor away from the mast or pole.

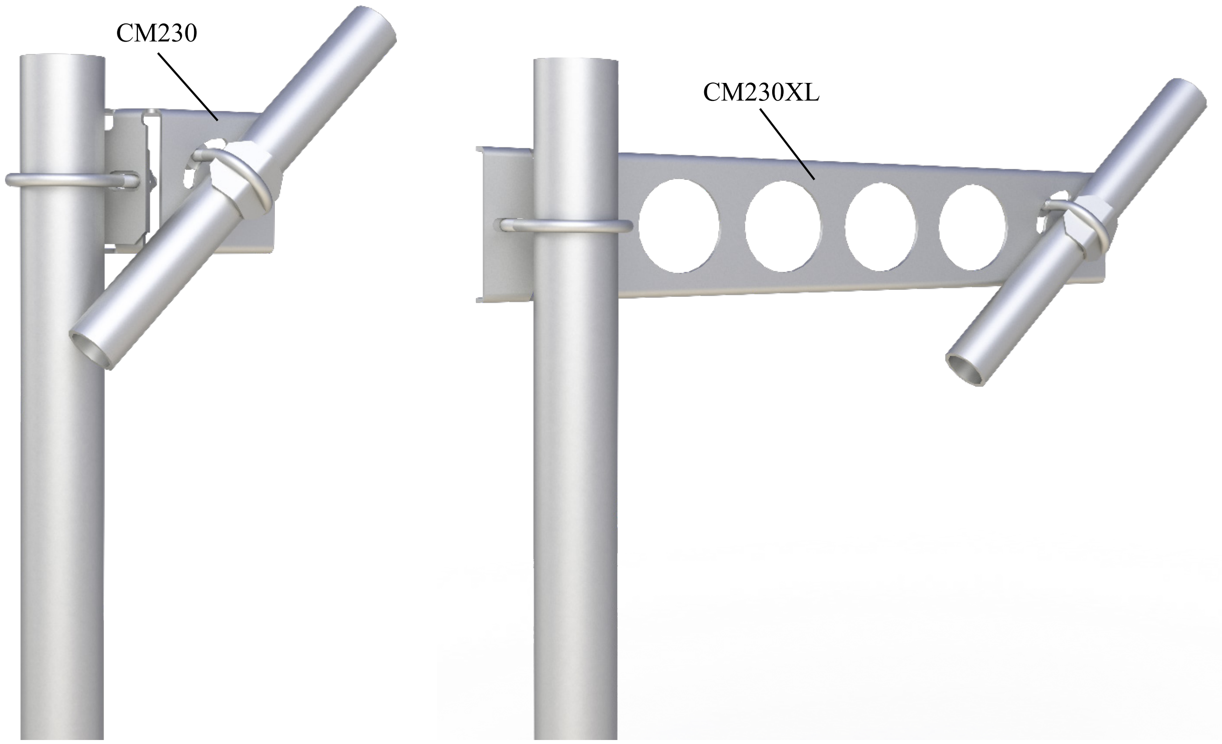


FIGURE 6-20. CM230 and CM230XL Adjustable Angle Mounting Kits

6.2.7 CM235 Magnetic Mounting Stand

The CM235 provides a 8.8 cm (3.5 in) square platform for mounting magnetic base antennas. The CM235 attaches to horizontal or vertical pipes (1.0-in. to 2.1-in. OD) as shown in FIGURE 6-21.

FIGURE 6-21. CM235 Magnetic Mounting Stand

6.2.8 R.M. Young Multi-Plate Radiation Shields

R.M. Young Multi-Plate Radiation Shields are used to house and attach temperature and relative humidity sensors to the tripod mast (1.0-in. to 2.1-in. OD) or crossarm as shown in FIGURE 6-22. Radiation shields ship with the U-bolt configured for attachment to a vertical pipe. To attach the radiation shield to a horizontal pipe, the U-bolt and plastic V-block must be moved to the other set of holes.

FIGURE 6-22. R.M. Young Multi-Plate Radiation Shield

Appendix A. CM106B Allowable Wind Speeds

CM106B load ratings assume:

- Sensors (effective area = 1.4 ft^2) at top of mast
- Solar panel (10.5 in x 16.5 in) at mast base
- Enclosure (14 in x 16 in) mounted to leg
- Guy wires attached to mast at 3.8 ft above tripod body
- Adequate ground anchors (stakes alone may not resist foot vertical pullout force)

<table>
<tr><th colspan="2">Tripod Footprint Dia.</th><th colspan="2">Mast Height</th><th>Mast Config-uration</th><th>Guy Anchors</th><th colspan="2">Max. Allowable Gust Wind Speed</th><th colspan="2">Max. Allowable Equipment Weight</th><th colspan="2">Foot Vertical Pullout Force at Gust Speed</th><th colspan="2">Guy-Wire Tension at Gust Speed</th><th colspan="2">Ideal Guy-Wire Installation Pre-Tension</th></tr>
<tr><td>ft</td><td>m</td><td>ft</td><td>m</td><td></td><td></td><td>mph</td><td>m/s</td><td>lb</td><td>kN</td><td>lb</td><td>kN</td><td>lb</td><td>kN</td><td>lb</td><td>kN</td></tr>
<tr><td rowspan="3">11.5</td><td rowspan="3">3.5</td><td rowspan="3">7</td><td rowspan="3">2.1</td><td rowspan="3">Retracted</td><td>Unguyed</td><td>104</td><td>46</td><td>964</td><td>4.3</td><td>70</td><td>0.31</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Attached to legs @ feet, 45deg Zenith</td><td>159</td><td>71</td><td>639</td><td>2.8</td><td>163</td><td>0.73</td><td>300</td><td>1.3</td><td>150</td><td>0.67</td></tr>
<tr><td>Independent anchors @ 45deg Zenith</td><td>159</td><td>71</td><td>639</td><td>2.8</td><td>56</td><td>0.25</td><td>300</td><td>1.3</td><td>150</td><td>0.67</td></tr>
<tr><td rowspan="3">8.7</td><td rowspan="3">2.7</td><td rowspan="3">9.3</td><td rowspan="3">2.8</td><td rowspan="3">Retracted</td><td>Unguyed</td><td>104</td><td>46</td><td>964</td><td>4.3</td><td>160</td><td>0.71</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Attached to legs @ feet</td><td>159</td><td>71</td><td>438</td><td>1.9</td><td>352</td><td>1.57</td><td>400</td><td>1.8</td><td>200</td><td>0.89</td></tr>
<tr><td>Independent anchors @ 45deg Zenith</td><td>159</td><td>71</td><td>639</td><td>2.8</td><td>155</td><td>0.69</td><td>300</td><td>1.3</td><td>150</td><td>0.67</td></tr>
<tr><td rowspan="3">11.5</td><td rowspan="3">3.5</td><td rowspan="3">10</td><td rowspan="3">3.0</td><td rowspan="3">Extended</td><td>Unguyed</td><td>81</td><td>36</td><td>964</td><td>4.3</td><td>59</td><td>0.26</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Attached to legs @ feet, 45deg Zenith</td><td>132</td><td>59</td><td>544</td><td>2.4</td><td>157</td><td>0.70</td><td>400</td><td>1.8</td><td>200</td><td>0.89</td></tr>
<tr><td>Independent anchors @ 45deg Zenith</td><td>132</td><td>59</td><td>544</td><td>2.4</td><td>17</td><td>0.08</td><td>400</td><td>1.8</td><td>200</td><td>0.89</td></tr>
</table>

Tripod Footprint Dia.		**Mast Height**		**Mast Config-uration**	**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**	
ft	m	ft	m			mph	m/s	lb	kN	lb	kN	lb	kN	lb	kN
8.7	2.7	12.3	3.7	Extended	Unguyed	81	36	964	4.3	121	0.54	-	-	-	-
					Attached to legs @ feet	116	52	438	1.9	248	1.10	400	1.8	200	0.89
					Independent anchors @ 45deg Zenith	132	59	544	2.4	69	0.31	400	1.8	200	0.89

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