



UT6 and UT10

Universal Towers

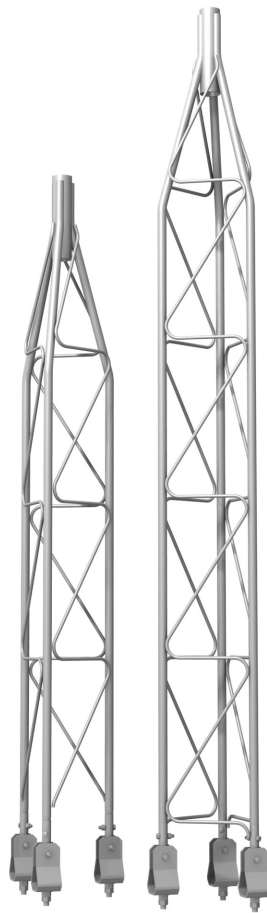


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1. Introduction

The UT6 and UT10 are durable, lightweight instrument towers used for a variety of applications. They support a 1.8 m (6 ft) or 3 m (10 ft) measurement height for wind sensors as well as sturdy attachment points for antennas, solar panels, environmental enclosures, radiation shields, and crossarms.

NOTE:

Throughout the manual, the term "tower" refers to both the UT6 and UT10, unless specified otherwise.

2. Precautions

2.1 Site selection

- Select a safe site to install the tower.
- The distance between any power lines and the installation site should be at least one and one-half times the height of the tower. Make the distance even greater, if possible. Since all overhead lines look somewhat alike, consider them all dangerous and stay well away from them.
- If there are power lines or buried utilities in the area, call the local utility providers for assistance.

2.2 Tower mounting

- NEVER work alone; always have someone near who can summon help.
- Certain clothing may provide a degree of safety, but do not depend on it alone to preserve life (for example, rubber boots or shoes, industrial rubber gloves, or a long shirt or jacket).
- Check local weather conditions. Be sure it has not rained recently, and the ground is not wet or muddy. Make sure rain or thunderstorms are not predicted for the day the tower is to be installed.

- To avoid having the tower being blown into nearby power lines, do not install or remove towers in moderate or heavy winds.
- If it is necessary to use a ladder, choose a ladder made of non-conductive, non-metallic materials.
- Have someone present who has been trained in electric shock first aid, if possible.

2.3 Tower installation

- Properly assemble the tower according to the instructions in this manual (do this in the location the tower is to be installed).
- Once the tower is in its full vertical position, securely fasten the tower to the base.
- Ground the tower in accordance with all applicable local electrical codes.
- Keep the bottom of the tower legs free of soil, ice, and debris to prevent trapping any moisture inside or around the tower legs.

3. Initial inspection

3.1 Indoors

Immediately upon receipt of the tower:

- Inspect the shipping cartons for visible damage. Report any damage to the shipping company.
- Open all shipping cartons.
- Check the contents of the cartons against the invoice. Contact Campbell Scientific immediately if any parts are missing.

3.2 Outdoors

- Locate a suitable site for the tower ([Siting and exposure](#) (p. 3)).
- Prepare the tower base ([Tower installation](#) (p. 9)).
 - Raise the tower ([Tower installation](#) (p. 9)).

- Install the instrumentation enclosure ([Tower installation](#) (p. 9)).
- Install sensors.

3.3 Tools required

Tools required to install and maintain a Campbell Scientific tower:

- Shovel
- Rake
- Open end wrenches: 3/8 in, 7/16 in, 1/2 in, (2) 9/16 in
- Socket wrench set
- Magnetic compass
- Tape measure
- Nut driver (3/8 in)
- Level
- Sledgehammer
- Pliers
- Straight bit screwdrivers
- Phillips screwdrivers

4. Siting and exposure

DANGER:

If any part of the weather station comes into contact with power lines, death or serious injury could occur. Contact local utilities for the location of buried utility lines before digging or driving ground rods.

Selecting an appropriate site for the weather station is critical to obtain accurate meteorological data. In general, the site should be representative of the area being studied, and away from the influence of obstructions such as buildings and trees.

Do not place the weather station where sprinkler irrigation water will strike the sensors or instrument enclosure.

The general guidelines for site selection given here were condensed from these sources: Environmental Protection Agency (EPA) (2000)¹, World Meteorological Organization (WMO) (2010)², and American Association of State Climatologists (AASC) (1985)³.

4.1 Wind speed and direction

As specified by the EPA¹, wind sensors should be located over open, level terrain at a distance at least ten times the height of any nearby buildings, trees, or other obstructions as shown in [FIGURE 4-1](#) (p. 4).

Standard measurement heights:

- 3.0 m \pm 0.1 m recommended (AASC)
- 2.0 m \pm 0.1 m, 10.0 m \pm 0.5 m optional (AASC)
- 10.0 m (WMO and EPA)

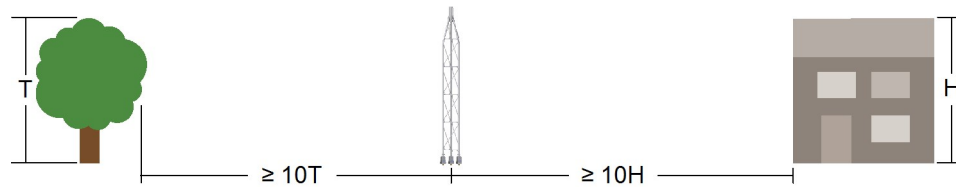


FIGURE 4-1. Effect of a structure on wind flow

4.2 Temperature and relative humidity

Sensors should be located over an open, level area at least 9 m (EPA¹) in diameter. The surface should be covered by short grass, or, where grass does not grow, the natural earth surface. Locate sensors at a distance of at least four times the height of any nearby obstructions and at least 30 m (EPA¹) from paved areas. Sensors must be protected from thermal radiation and adequately ventilated.

Situations to avoid include:

- Industrial heat sources
- Rooftops
- Steep slopes
- Sheltered hollows
- Tall vegetation
- Shaded areas
- Swamps
- Areas where snow drifts occur
- Low places holding standing water after rainstorms

Standard measurement heights:

- 1.5 m ± 1.0 m (AASC)
- 1.25 to 2.00 m (WMO)
- 2.0 m temperature (EPA)
- 2.0 m and 10.0 m for temperature difference (EPA)

4.3 Precipitation

Rain gages must be sited on level ground covered with short grass or gravel. In open areas, choose a site where the distance to any obstruction is two to four times (EPA, AASC) the height of the obstruction.

Position the height of the opening as low as possible, but high enough to avoid splashing from the ground. Wind shields, such as Campbell Scientific 260 953 Alter-Type Rain Gage Wind Screen, are recommended for open areas.

When necessary, use heated collectors to properly measure frozen precipitation. The gage must be mounted above the average level of snow accumulation in areas that experience significant snowfall.

Standard measurement heights:

- 1.0 m ± 1.0 cm (AASC)
- 30.0 cm minimum (WMO, EPA)

4.4 Solar radiation

Mount pyranometers in locations that avoid shadows on the sensor at any time. Mounting the sensor on the Southernmost (Northern Hemisphere) or Northernmost (Southern Hemisphere) portion of the weather station will minimize the chance of shading from other weather station structures. Reflective surfaces and sources of artificial radiation must be avoided.

Heated pyranometers, such as the SP230-L from Campbell Scientific, are available for use in areas where snow, frost, or dew may accumulate.

The height the sensor is mounted is not critical.

4.5 Soil temperature

Prepare a site for soil temperature measurements at least one square meter and typical of the surface of interest. The ground surface must be level to the immediate area (10 m radius).

Standard measurement depths:

- 10 cm ± 1.0 cm (AASC)
- 5.0 cm, 10.0 cm, 50.0 cm, 100.0 cm (WMO)

4.6 Siting references

¹ EPA, (2000). Meteorological Monitoring Guidance for Regulatory Modeling Applications, DPA-454/R-99-005. Office of Air Quality Planning and Standards, Research Triangle park, NC. 27711

² WMO, (2008 edition, updated in 2010). Guide to Meteorological Instruments and Methods of observation. World Meteorological Organization No 8, 2008 edition, Geneva Switzerland.

³ The State Climatologist, (1985). Publication of the American Association of State Climatologists: Height and Exposure Standards for Sensors on Automated Weather Stations, v. 9, No. 4, October 1985.

5. Overview

The UT6 and UT10 towers provide a versatile mount for sensors, antennas, solar panels, environmental enclosures, radiation shields, and mounting crossarms. The 2m (6 ft) height of the UT6 and 3m (10 ft) height of the UT10 allows for wind measurements at each height.

The main tower frame ([FIGURE 5-1](#) (p. 7)) is built from 2.5 cm (1 in) OD (outside diameter) corrosion-resistant aluminum tubing. It includes an adjustable mast, increasing the available area and height to mount sensors.

Enclosures purchased for use with this tower must be ordered with the tower mount option. This provides the necessary bracketing to mount the enclosure to the tower.

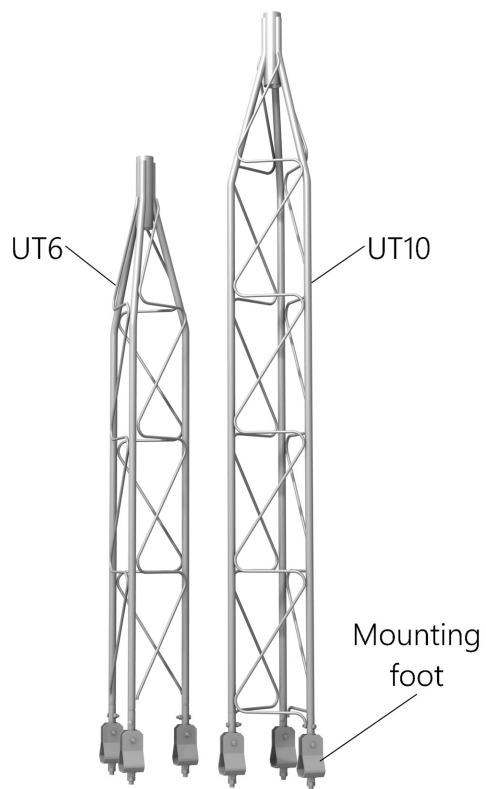


FIGURE 5-1. UT6 and UT10 towers with mounting feet

6. Specifications

	UT6	UT10
Required concrete pad dimensions (note 1)	61 x 61 x 61 cm (24 x 24 x 24 in)	
Crossarm height (attached to mast)		
Standard	1.8 m (6 ft)	3 m (10 ft)
Maximum (mast fully extended)	2.4 m (~8 ft)	3.7 m (~12 ft)
Minimum	1.5 m (~5 ft)	2.7 m (~9 ft)
Adjustable mast length	1.4 m (4.5 ft)	
Pipe outside diameter (OD)		
Adjustable mast	4.8 cm (1.9 in)	
Vertical	2.5 cm (1 in)	
Cross support	0.953 cm (0.375 in)	
Leg spacing	26 cm (10.25 in) between legs (center to center)	
Material	Aluminum	
Shipping weight	9.5 kg (21 lb)	11.8 kg (26 lb)
Wind load recommendation (note 2)	177 km/h (110 mph) for gusts	

Notes:

1. The concrete pad requirements assume heavy soil. Light, shifting, or sandy soils require a bigger concrete pad.
2. The wind load recommendation assumes proper installation, proper anchoring, adequate soil, and total instrument projected area of less than 2 square feet. The amount of wind load that this mount can withstand is affected by the quality of anchoring and installation, soil type, and the number, type, and location of instruments fastened to the tower.

7. Tower installation

7.1 Installing the tower

The tower provides a support structure for mounting the weather station components. [FIGURE 7-1](#) (p. 9) shows a typical tower equipped with an instrumentation enclosure, meteorological sensors, and a solar panel.

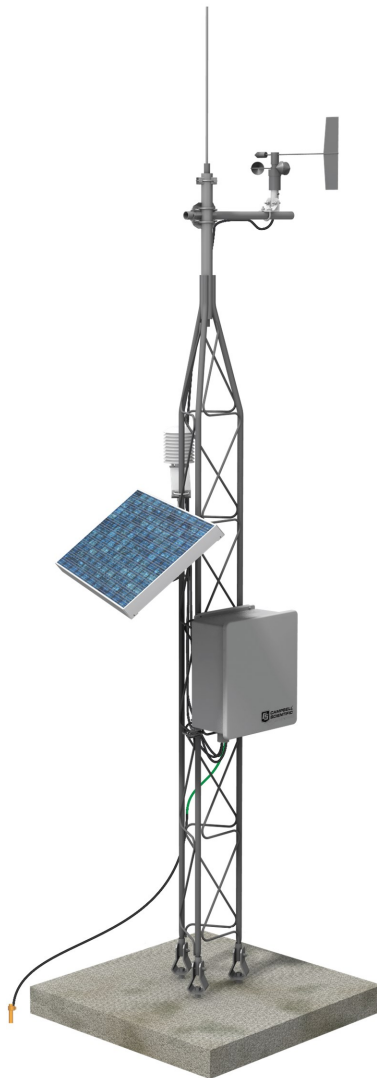


FIGURE 7-1. Weather tower

7.1.1 Base installation

The tower attaches to a user-supplied concrete foundation as shown in [FIGURE 7-1](#) (p. 9). The mounting feet are included with the tower. The optional J-bolt kit includes the template used to install the J-bolts.

1. Dig a hole 61 cm x 61 cm (24 in x 24 in) deep. Lighter soils will require a deeper hole.
2. Assemble the J-bolt template as shown in [FIGURE 7-2](#) (p. 10). Begin by threading two 5/8-inch nuts onto each J-bolt, followed by a 5/8-inch washer. Next, place a template piece over the J-bolt, followed by another 5/8-inch washer and a 5/8-inch split lock washer. Thread a third 5/8-inch nut onto the J-bolt just until the bolt is even with the top of the bolt. Once all three J-bolts are assembled, slide them together as shown in [FIGURE 7-2](#) (p. 10). Align each J-bolt so the angled portion is pointing outward and tighten the lower nuts to secure the assembly.

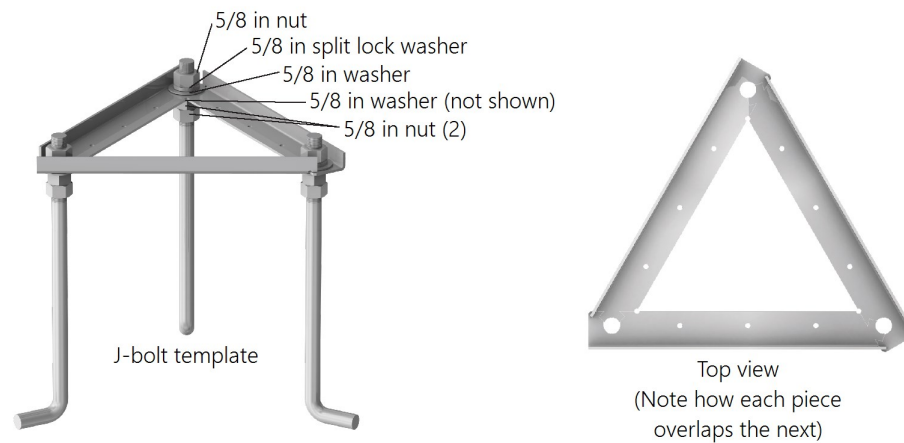


FIGURE 7-2. J-bolt template assembly

- Construct the concrete form shown in [FIGURE 7-3](#) (p. 11) out of 2 x 4 nominal lumber 61 cm (24 in) square (inside dimensions). Construct the template frame out of 1 x 2 nominal lumber and set it aside. Center the form over the hole and drive a stake at both ends of each 1.1 m (42 in) piece of the form. Level the form by driving nails through the stakes and into the form while holding the form level.

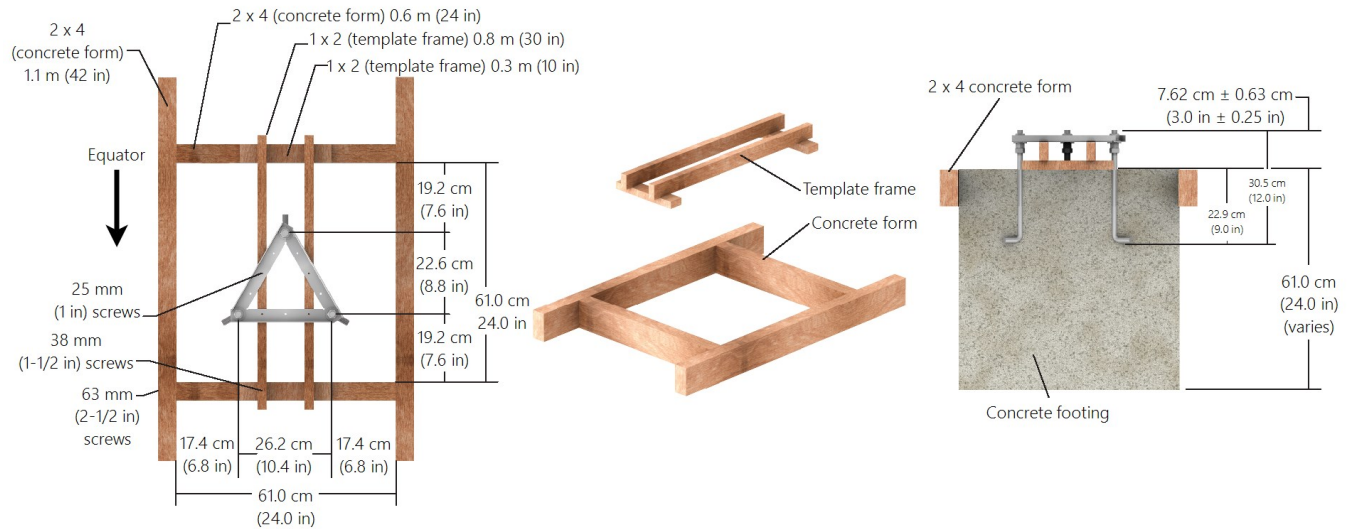


FIGURE 7-3. Positioning the J-bolt in concrete

- Position the template frame as shown in [FIGURE 7-4](#) (p. 12). The arrangement with two tower legs parallel to the equator is preferred for mounting a solar panel facing the equator. In instances where a crossarm needs to run perpendicular to the equator, such as precision pyranometer measurements, rotate the template and template frame 90° and mount the frame on the East and West sides of the concrete form. This lines up two tower legs perpendicular to the equator. The top of each bolt will be $7.6 \text{ cm} \pm 0.6 \text{ cm}$ ($3 \text{ in} \pm 0.25 \text{ in}$) above the level of the form. Level the tops of the J-bolts in all directions using a small level and secure the J-bolt template to the template frame with 25 mm (1 in) screws where holes in the template overlap the wooden frame.

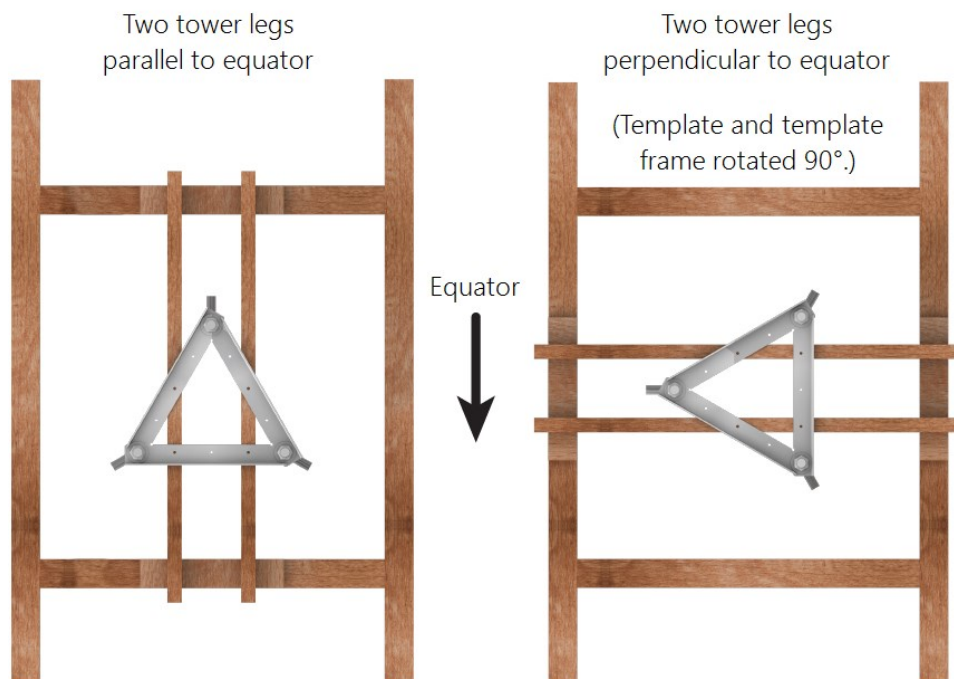


FIGURE 7-4. Template frame orientation

- Fill the hole and form with concrete. Screed the concrete level with the top of the form as shown in [FIGURE 7-3](#) (p. 11). Smooth the concrete around the three J-bolts and allow the concrete to cure.

CAUTION:

It is common for air to be trapped behind the knee portion of a J-bolt. Use a stick or rod to stir and tamp around each J-bolt to ensure proper anchoring.

- Remove the top nuts, washers, and J-bolt template pieces. Leave the two bottom nuts and one flat washer on each J-bolt. Remove the template frame and the concrete form.

7.1.2 Tower installation

1. Install the mast as shown in [FIGURE 7-5](#) (p. 13). Attach the 3/4-inch x 10-inch nipple to the mast using the bell reducer. Loosen the two mast mounting bolts at the top of the tower and insert the mast. For the UT6 at a 1.8 m mounting height, or the UT10 at 3 m, rest the bell reducer against the top of the tower. Tighten the two bolts to secure the mast.

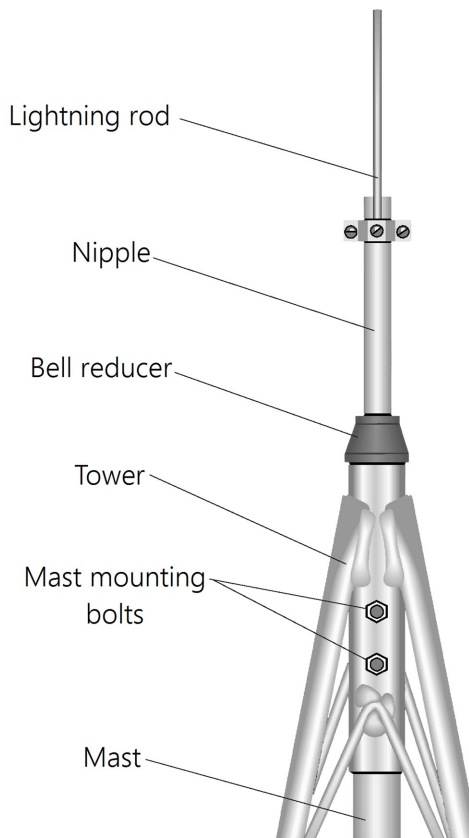


FIGURE 7-5. Install the mast

2. Remove the three 5/16-inch bolts, nuts, and fender washers from the tower mounting brace ([FIGURE 7-6](#) (p. 14)).

3. Pivot the three mounting feet to the vertical position.

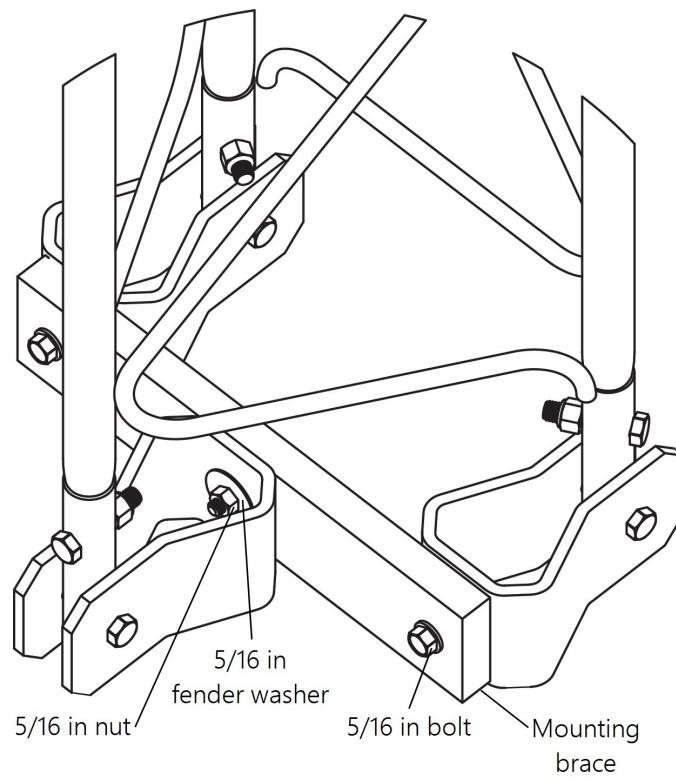


FIGURE 7-6. Tower mounting brace removal

4. Align the tower so the openings in the mounting feet are angled in one of the positions shown in [FIGURE 7-7](#) (p. 15). Images A and B show the recommended placement when a solar panel is to be mounted to the tower. This positioning allows a solar panel to be firmly attached to two tower legs while providing easy access to sensors at the top of the tower. Image C shows the tower section positioned to allow the tower to tilt toward the equator. Image D is used when it is necessary to mount a crossarm running perpendicular to the equator for precision pyranometer measurements.

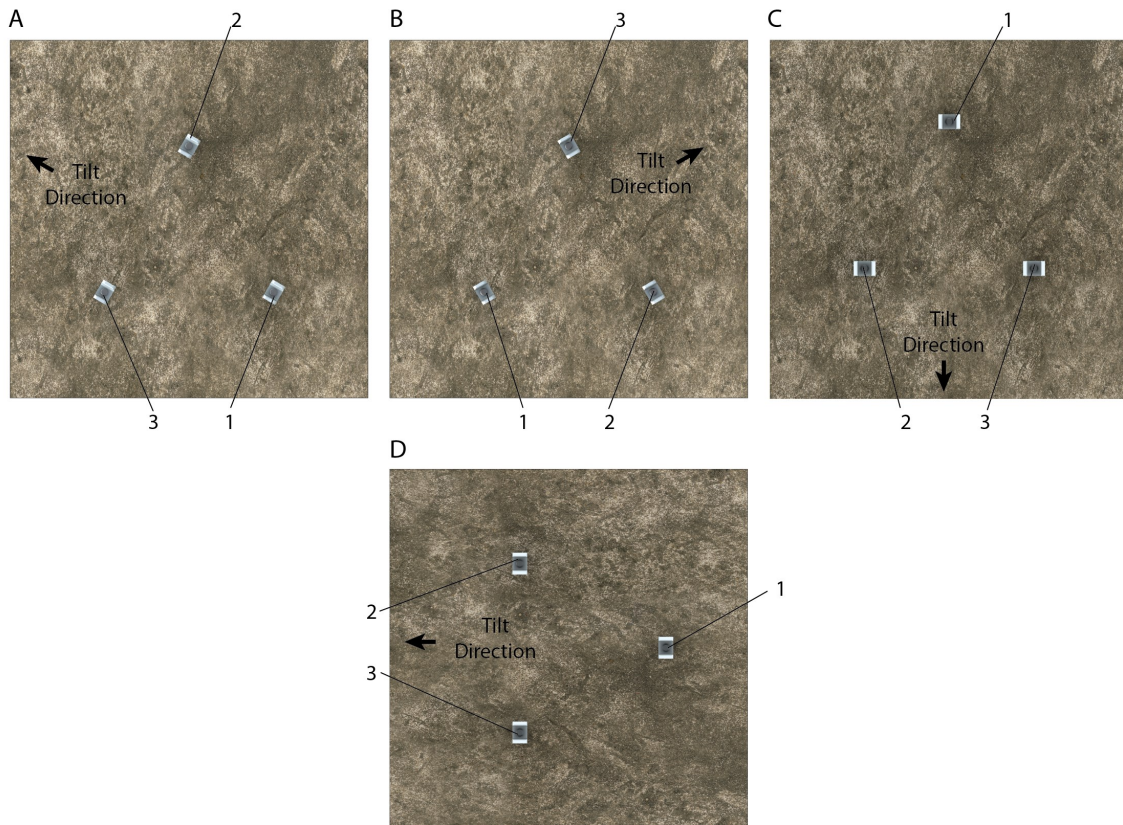


FIGURE 7-7. Mounting feet orientation

Align the hole in the bottom of each mounting foot with one of the J-bolts in the concrete base. Slide the tower onto the J-bolts.

5. Place a 5/8-inch flat washer, a 5/8-inch split washer, and a 5/8-inch nut on each J-bolt. Do not tighten the nut (FIGURE 7-8 (p. 16)).

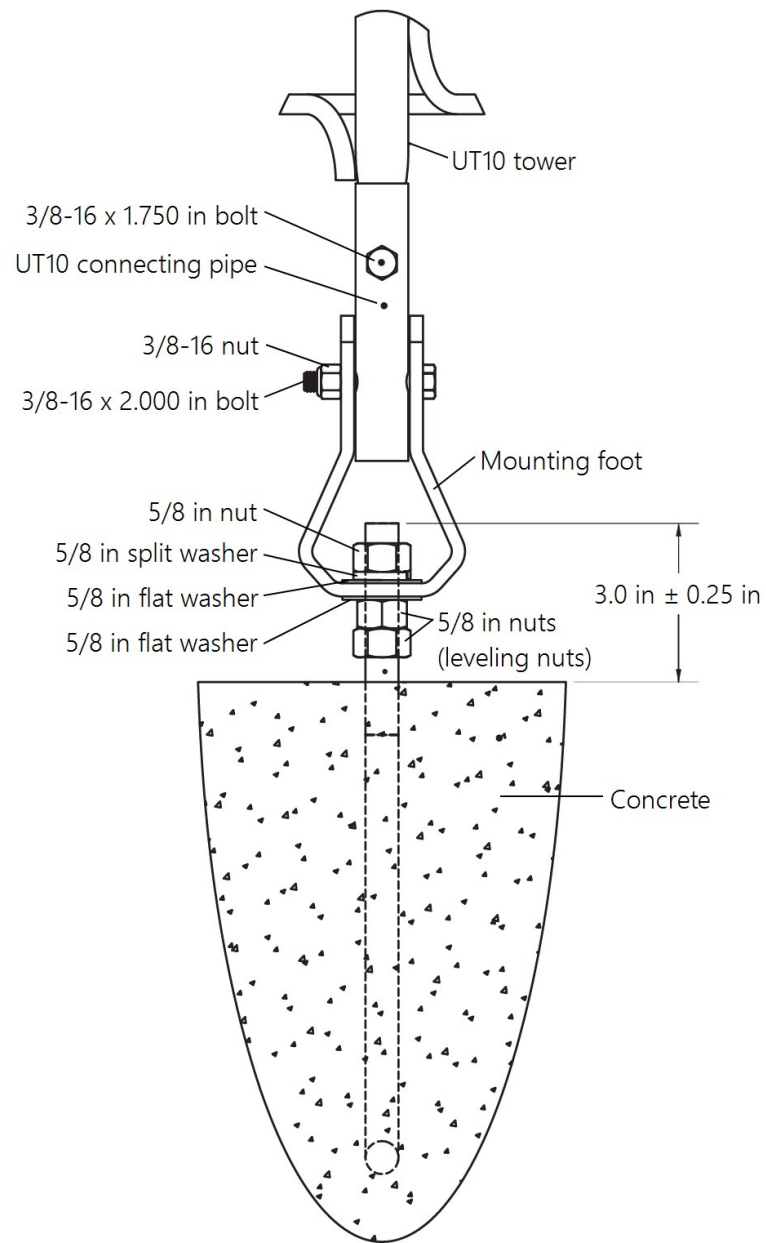


FIGURE 7-8. Tower mounting foot detail view

6. Check the tower for plumb using a level and adjust the leveling nuts below the mounting feet on the J-bolts as required. When the tower is plumb, use two wrenches to lock the lower nuts on each J-bolt together. Tighten the upper nuts to secure the base.

CAUTION:

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

7. Removing the lower 3/8-inch bolt on the rear (West) leg allows the tower to be hinged to the ground. If a step ladder is available, it is easier to leave the tower upright.

7.1.3 Ground rod

DANGER:

If any part of the weather station comes into contact with power lines, death or serious injury could occur. Contact local utilities for the location of buried utility lines before digging or driving ground rods.

Refer to the [Safety](#) section at the end of this manual prior to installing the ground rod. Ensure all local electrical codes are followed by having electrical equipment and grounding installed by a licensed electrician.

1. Drive the ground rod close to the tower ([FIGURE 7-10](#) (p. 19)) using a fence post driver or sledgehammer. Drive the rod at an angle if an impenetrable hardpan layer exists. In hard clay soils, a gallon milk jug of water can be used to “prime” the soil and hole to make driving the rod easier.
2. Loosen the bolt that attaches the clamp to the ground rod. Insert one end of the 4 AWG wire between the rod and the clamp and tighten the bolt ([FIGURE 7-9](#) (p. 18)).

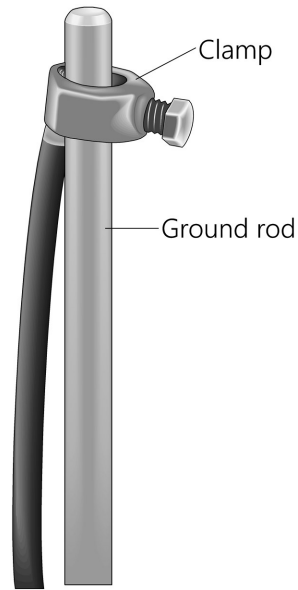


FIGURE 7-9. Ground rod and clamp

3. Attach the tower grounding clamp to a tower leg (FIGURE 7-10 (p. 19)). Route the 4 AWG wire attached to the ground rod up the tower leg to the grounding clamp. Loosen the set screw and insert the 4 AWG wire and the 12 AWG enclosure ground wire into the hole behind the set screw and tighten the set screw. Route the green wire to where the enclosure will be installed.

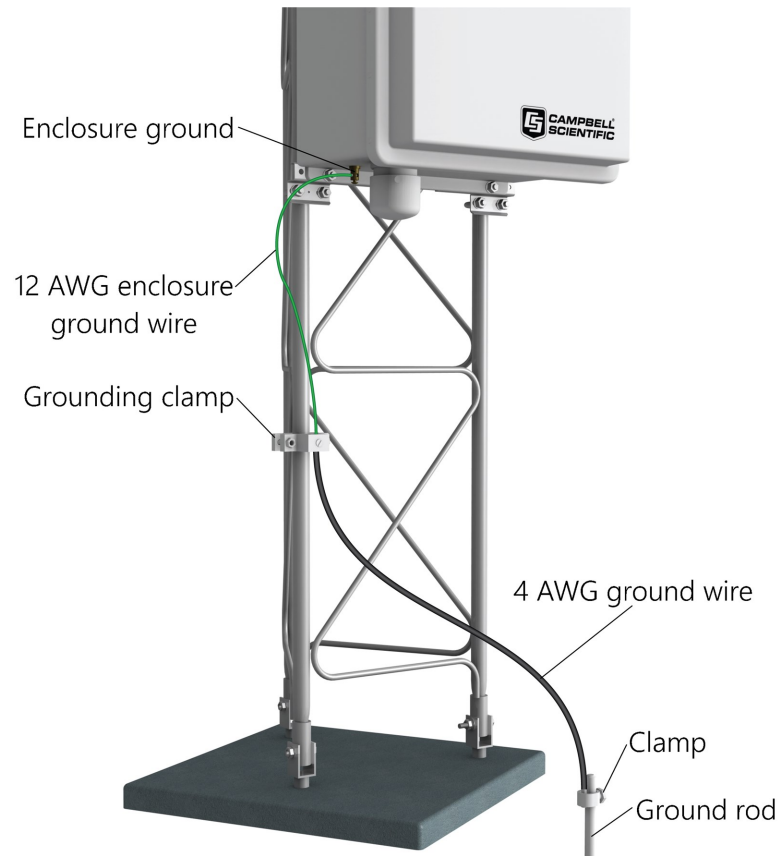


FIGURE 7-10. Tower grounding clamp

7.1.4 Attaching the lightning rod

Attach the lightning rod to the mast as shown in [FIGURE 7-11](#) (p. 20). Loosen the two screws on the lightning rod mounting bracket. Position the mounting bracket 5 cm (2 in) down from the top of the mast and tighten both screws evenly. Make sure the lightning rod set screw is tight.

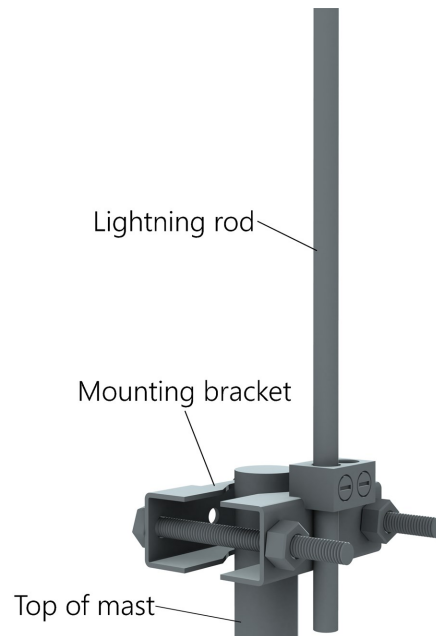


FIGURE 7-11. Lightning rod

7.2 Crossarms and mounting brackets

7.2.1 CM202, CM203, CM204, CM206 Crossarms

Sensors can be mounted directly to the tower, or to crossarms attached to the tower using mounting brackets. Each bracket includes the hardware required to secure the bracket to the tower or crossarm.

The combination of crossarms and brackets provide the flexibility to mount sensors and other equipment at any desired height on the tower. Mounting sensors on a crossarm allows the sensor to be moved away from the midline of the tower, reducing the effects of the mount on the sensor measurement.

Campbell Scientific provides a variety of lengths in aluminum or stainless steel. [Table 7-1](#) (p. 21) shows the different lengths available.

Table 7-1: Crossarm lengths and materials		
Product number	Length	Material
CM202	0.6 m (2 ft)	IPS anodized aluminum
CM202SS	0.6 m (2 ft)	Stainless-steel pipe
CM203	0.9 m (3 ft)	IPS anodized aluminum
CM204	1.2 m (4 ft)	IPS anodized aluminum
CM204SS	1.2 m (4 ft)	Stainless-steel
CM206	1.8 m (6 ft)	IPS anodized aluminum

FIGURE 7-12 (p. 21) shows two typical applications of a mounting bracket.

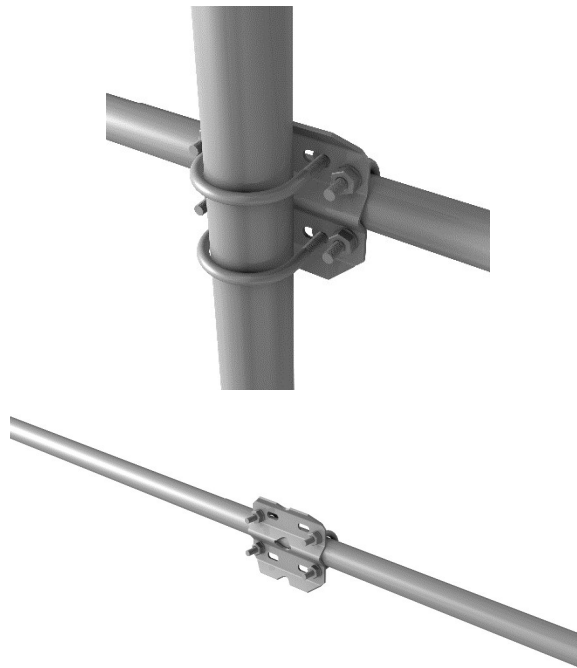


FIGURE 7-12. Crossarm mounting

7.2.2 CMB200 crossarm brace kit

The CMB200 Crossarm Brace Kit (FIGURE 7-13 (p. 22)) 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.

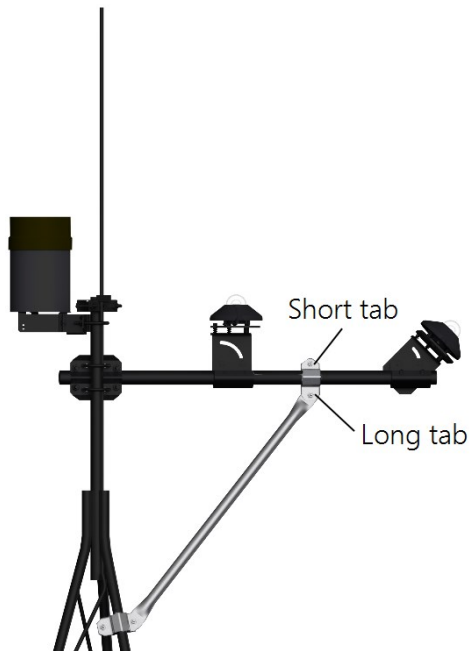


FIGURE 7-13. CMB200 Crossarm Brace Kit

7.2.2.1 Components

The CMB200 ships with the following components (FIGURE 7-14 (p. 23)):

- (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

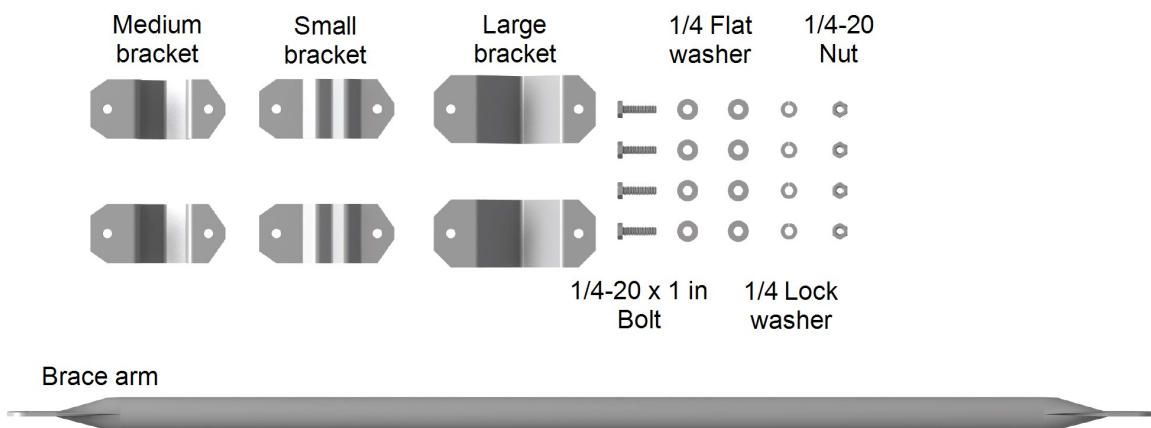


FIGURE 7-14. CMB200 components

7.2.2.2 Assembly

1. Consult FIGURE 7-15 (p. 24) and Table 7-2 (p. 25) to determine which brackets are needed at either end of the brace to attach it to the crossarm and 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 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 tower.

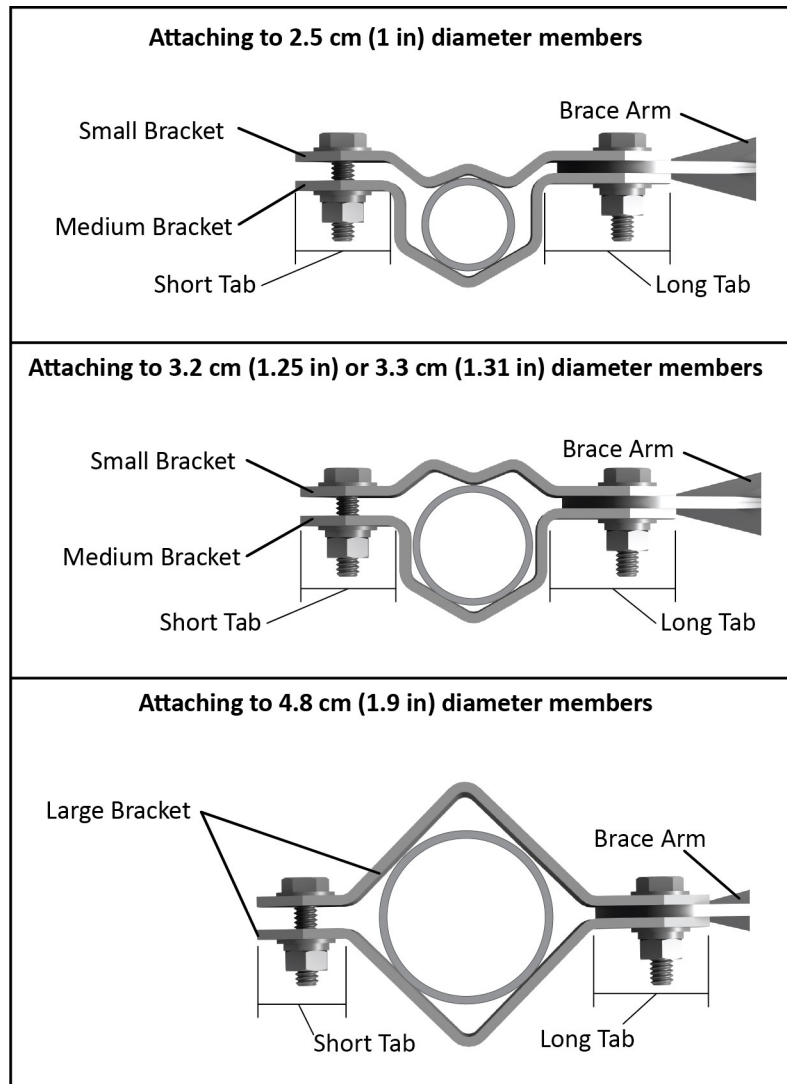


FIGURE 7-15. Bracket selection

Table 7-2: 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)	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

7.2.3 CM230, CM230XL adjustable angle mounting kits

The CM230 and CM230XL adjustable angle mounting kits (FIGURE 7-16 (p. 25)) allow the user to attach an antenna or sensor and change its mounting angle from horizontal to vertical. This allows the component being mounted to be aimed at a specific location. The CM230 is used when mounting the component close to the mast or tower while the CM230XL extends the component away from the mast or tower.

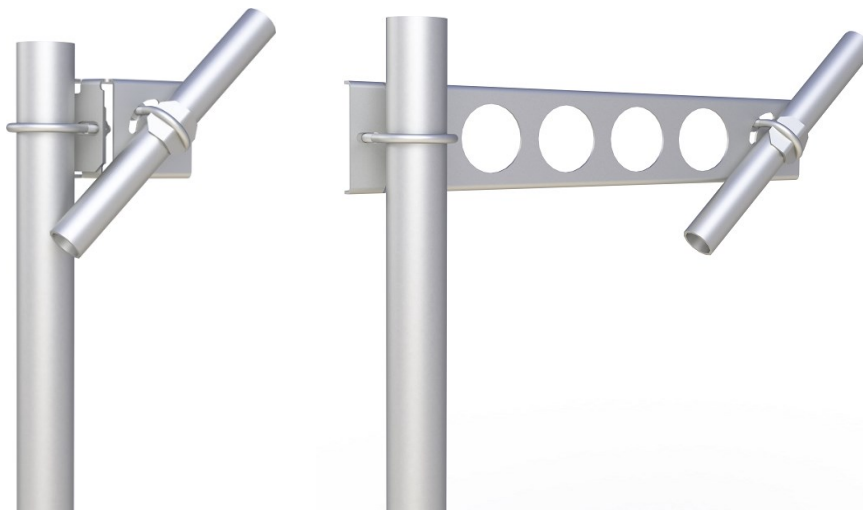


FIGURE 7-16. CM230 and CM230XL adjustable angle mounting kits

The CM230 and CM230XL will accept antennas and sensors with an outer diameter of 2.54 cm to 3.81 cm (1.0 in to 1.5 in). The bracket can be attached to a mast or pipe with an outer diameter of 3.30 cm to 5.33 cm (1.3 in to 2.1 in). The declination of the antenna or sensor is fixed when the U-

bolt attached to the mast or tower is tightened; the inclination of the antenna or sensor is then adjusted with the other U-bolt and nuts.

FIGURE 7-17 (p. 26) is an exploded diagram of the CM230XL showing all the included hardware as well as the curved slots at the end of the bracket used to adjust the angle of the antenna or sensor.

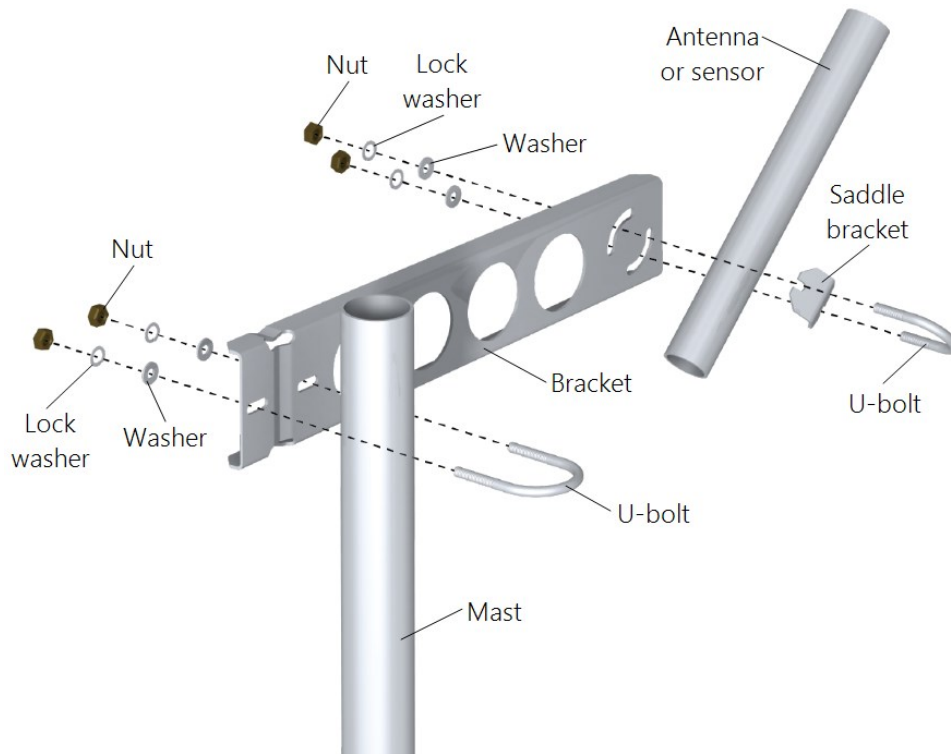



FIGURE 7-17. CM230XL exploded diagram

Limited warranty

Products manufactured by Campbell Scientific are warranted by Campbell Scientific to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified on the corresponding product webpage. See Product Details on the Ordering Information pages at www.campbellsci.com . Other manufacturer's products, that are resold by Campbell Scientific, are warranted only to the limits extended by the original manufacturer.


Refer to www.campbellsci.com/terms#warranty  for more information.

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Assistance

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Products shipped to Campbell Scientific require a Returned Materials Authorization (RMA) or Repair Reference number and must be clean and uncontaminated by harmful substances, such as hazardous materials, chemicals, insects, and pests. Please complete the required forms prior to shipping equipment.

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To obtain a Returned Materials Authorization or Repair Reference number, contact your CAMPBELL SCIENTIFIC regional office. Please write the issued number clearly on the outside of the shipping container and ship as directed.

For all returns, the customer must provide a "Statement of Product Cleanliness and Decontamination" or "Declaration of Hazardous Material and Decontamination" form and comply with the requirements specified in it. The form is available from your CAMPBELL SCIENTIFIC regional office. Campbell Scientific is unable to process any returns until we receive this statement. If the statement is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Safety

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. 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

- Protect from over-voltage.
- Protect electrical equipment from water.
- Protect from electrostatic discharge (ESD).
- Protect from lightning.
- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations.
- 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.
- Only use power sources approved for use in the country of installation to power Campbell Scientific devices.

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.

Internal Battery

- Be aware of fire, explosion, and severe-burn hazards.
- Misuse or improper installation of the internal lithium battery can cause severe injury.
- Do not recharge, disassemble, heat above 100 °C (212 °F), solder directly to the cell, incinerate, or expose contents to water. Dispose of spent batteries properly.

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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