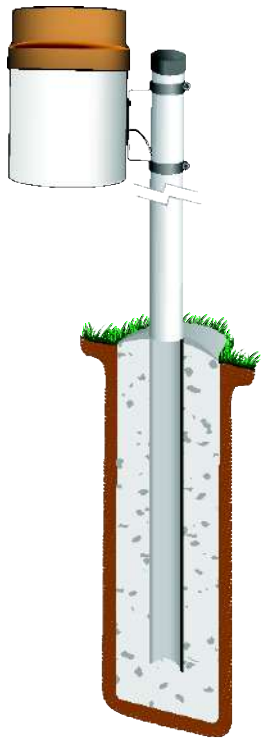
INSTRUCTION MANUAL

TE525 Tipping Bucket Rain Gage

Revision: 12/17



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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.

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Assistance

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

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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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CRBasic Examples

TE525 Tipping Bucket Rain Gage

1. Introduction

The TE525 Tipping Bucket Rain Gage is an adaptation of the standard National Weather Service tipping bucket rain gage. It outputs a switch closure for each bucket tip. Three models are available:

- TE525 6 in. orifice 0.01 in. tip
- TE525WS 8 in. orifice 0.01 in. tip
- TE525MM 24.5 cm orifice 0.1 mm tip

NOTE This manual provides information only for CRBasic dataloggers. It is also compatible with most of our retired Edlog dataloggers. For Edlog datalogger support, see an older manual at *www.campbellsci.com/old-manuals*.

2. Precautions

- READ AND UNDERSTAND the *Safety* section at the front of this manual.
- TE525-series tipping bucket rain gages are precision instruments that must be handled with care.
- Sensor is factory-calibrated and should not require field calibration. Refer to Section 9.2, *Maintenance (p. 10)*, for field calibration check and factory calibration.
- During field installation, ensure that you have removed the small rubber band that secures the tipping mechanism during shipping.
- Debris filters, funnel, and bucket reservoirs should be kept clean.
- Santoprene® rubber, which composes the black outer jacket of the TE525 cable, will support combustion in air. It is used because of its resistance to temperature extremes, moisture, and UV degradation. It is rated as slow burning when tested according to U.L. 94 H.B. and passes FMVSS302. However, local fire codes may preclude its use inside buildings.

3. Initial Inspection

- Check the packaging and contents of the shipment. If damage occurred during transport, immediately file a claim with the carrier. Contact Campbell Scientific to facilitate repair or replacement.
- Check model information against the shipping documents to ensure the expected products and the correct lengths of cable are received (see Section 3.1, *Ships With (p. 2)*). Model numbers are found on each product. On cables and cabled items, the model number is usually found at the connection end of the cable. Report any shortages immediately to Campbell Scientific.

3.1 Ships With

The TE525 ships with:

(1) Calibration sheet
(2) Hose clamps from original manufacturer
(3) Screws from original manufacturer

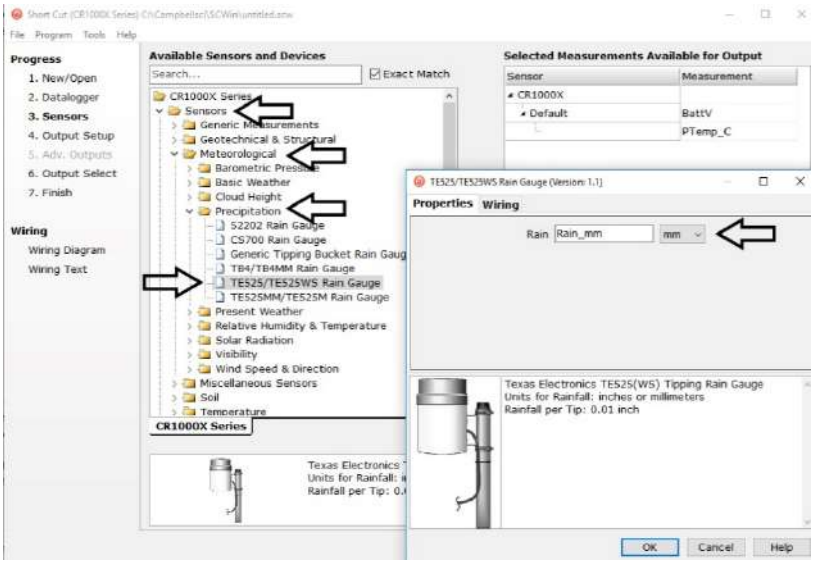
4. QuickStart

Short Cut is an easy way to program your datalogger to measure the TE525 and assign datalogger wiring terminals. *Short Cut* is available as a download on www.campbellsci.com. It is included in installations of *LoggerNet*, *PC200W*, *PC400*, or *RTDAQ*. Use the following procedure to get started.

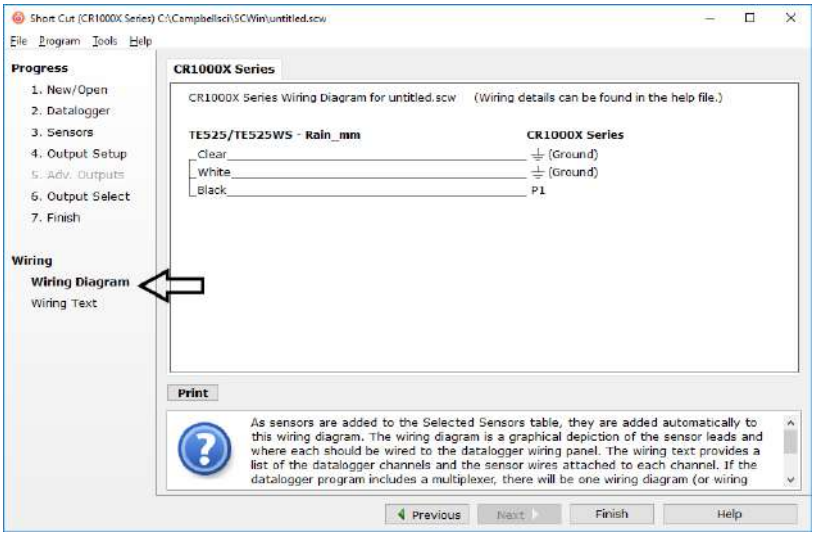
1. Open *Short Cut* and select to create a new program.

2. Double-click the datalogger model.

3. Under the **Available Sensors and Devices** list, select the **Sensors** | **Meteorological** | **Precipitation** folder. Double-click **TE525/TE525WS Rain Gauge** or **TE525MM/TE525M Rain Gauge**, depending on which model you have. Data defaults to millimeters. This can be changed by clicking the **mm** box and selecting **inch**.



4. After selecting the sensor, click **Wiring Diagram** to see how the sensor is to be wired to the datalogger. The wiring diagram can be printed now or after more sensors are added.



5. Select any other sensors you have, then finish the remaining *Short Cut* steps to complete the program. The remaining steps are outlined in *Short Cut Help*, which is accessed by clicking on **Help | Contents | Programming Steps.**

6. If *LoggerNet*, *PC400*, *RTDAQ*, or *PC200W* is running on your PC, and the PC-to-datalogger connection is active, you can click **Finish** in *Short Cut* and you will be prompted to send the program just created to the datalogger.

7. If the sensor is connected to the datalogger, as shown in the wiring diagram in step 4, check the output of the sensor in the datalogger support software data display to make sure it is making reasonable measurements.

5. Overview

TE525-series Tipping Bucket Rain Gages funnel precipitation into a bucket mechanism that tips when filled to a calibrated level. A magnet attached to the tipping mechanism actuates a switch as the bucket tips. The momentary switch closure is counted by the pulse-counting circuitry of Campbell Scientific dataloggers.

The TE525-series Tipping Bucket Rain Gages are manufactured by Texas Electronics and cabled by Campbell Scientific.

5.1 Wind Screen

Campbell Scientific offers the 260-953 Wind Screen to help minimize the effect of wind on rain measurements. This wind screen consists of 32 freely hanging leaves that swing as wind moves past them. Refer to the *260-953 manual* for siting information and the installation procedure.

5.2 Snowfall Adapter

Campbell Scientific's CS705 Snowfall Conversion Adapter uses antifreeze to melt snow, allowing the TE525WS to measure the water content of snow. The CS705 cannot be used with either the TE525 or TE525MM. However, both the TE525 and TE525MM can be converted to a TE525WS by returning them to Campbell Scientific (see *Assistance* page at the beginning of this document). Refer to the *CS705 manual* for siting information and the installation procedure.

6. Specifications

Features:

- High precision
- Compatible with all Campbell Scientific dataloggers
- TE525WS conforms to the National Weather Service recommendation for an 8-inch funnel orifice.
- TE525WS is directly compatible with the CS705 Snowfall Adapter, allowing it to measure the measure the water content of snow.

Sensor Type:	Tipping bucket/potted magnetic momentary-contact reed switch
Operating Temperature Range:	0 to 50 °C
Storage Temperature Range:	–40 to 70 °C
Switch Ratings:	30 Vdc at 2 A 115 Vac at 1 A
Closure Time:	135 ms
Bounce Settling Time:	0.75 ms
Resolution:	1 tip
Accuracy:	1.0% up to 2 in/hour (50 mm/hr)
Materials	
Bucket:	white powder-coated spun aluminum
Funnel Collector:	gold anodized spun aluminum
Screen:	gold anodized spun aluminum
Locking Snap Ring:	stainless steel
Tipping Mechanism:	UV protected black ABS plastic with hardened stainless steel jewel bearings and pivot
Cable:	2-conductor shielded cable (length must be specified for all –L options at time of order)
Cable Weight:	0.1 kg (0.2 lb) per 10 ft
Mounting:	Gold anodized aluminum side bracket with adjustable pipe clamps for pole or mast mounting

TABLE 6-1. Specification Comparisons			
	TE525	**TE525WS**	**TE525MM**
Volume per Tip[1]	4.73 ml (0.16 fl. oz)	8.24 ml (0.28 fl. oz)	4.73 ml (0.16 fl. oz)
Rainfall per Tip	0.01 in (0.254 mm)	0.01 in (0.254 mm)	0.1 mm (0.004 in)
Funnel Collector Diameter[2]	15.4 cm (6.060 in)	20.3 cm (8 in)	24.5 cm (9.7 in)
Height	24.1 cm (9.5 in)	26.7 cm (10.5 in)	29.2 cm (11.5 in)
Tipping Bucket Weight	0.9 kg (2 lb)	1 kg (2.2 lb)	1.1 kg (2.4 lb)

[1]The volume of water required to cause a tip in the TE525 and the TE525MM is the same. The difference in calibration is strictly due to funnel size.

[2]If the CS705 Snowfall Adapter or other eight-inch funnel is installed on these gages, refer to TABLE 7-2 for the multiplier. See Appendix D, *Changing Funnels with a Different Size* ***(p. D-1)***, before replacing funnels on any TE525 tipping bucket rain gage with a different size funnel.

7. Installation

If you are programming your datalogger with *Short Cut*, skip Section 7.1, *Wiring to Datalogger* ***(p. 5)***, and Section 7.2, *Datalogger Programming* ***(p. 5)***. *Short Cut* does this work for you. See Section 4, *QuickStart* ***(p. 2)***, for a *Short Cut* tutorial.

7.1 Wiring to Datalogger

TABLE 7-1. Wire Color, Wire Function, Datalogger Connection			
Wire Color	**Wire Function**	**Datalogger Connection Terminal for Pulse Channel Input**	**Datalogger Connection Terminal for Control Port Input**[1]
Black	Rain Signal	**P**, **P_SW**, or **U**[1] (pulse channel)	**C** (control port)
White	Rain Signal Reference	⏚ (analog ground)	**5 V** (on datalogger)
Clear	Shield	⏚ (analog ground)	⏚ (analog ground)

[1]U channels are automatically configured by the measurement instruction.

7.2 Datalogger Programming

Short Cut is the best source for up-to-date datalogger programming code. Programming code is needed when:

- Creating a program for a new datalogger installation
- Adding sensors to an existing datalogger program

If your data acquisition requirements are simple, you can probably create and maintain a datalogger program exclusively with *Short Cut*. If your data acquisition needs are more complex, the files that *Short Cut* creates are a great source for programming code to start a new program or add to an existing custom program.

NOTE *Short Cut* cannot edit programs after they are imported and edited in *CRBasic Editor*.

A *Short Cut* tutorial is available in Section 4, *QuickStart* *(p. 2)*. If you wish to import *Short Cut* code into *CRBasic Editor* to create or add to a customized program, follow the procedure in Appendix A, *Importing Short Cut Code Into CRBasic Editor* *(p. A-1)*. Programming basics for CRBasic dataloggers are provided in the following sections. Complete program examples for select dataloggers can be found in Appendix B, *Example Programs* *(p. B-1)*. Programming basics and programming examples for Edlog dataloggers are provided at *www.campbellsci.com/old-manuals*.

The **PulseCount()** instruction programs CRBasic dataloggers to measure the TE525 rain gage.

```
PulseCount(Dest,Reps,PChan,PConfig,POption,Mult,Offset)
```

- Choose Switch Closure for the ***PConfig*** parameter. For the CR6 and CR1000X, choose Switch Closure with pull up.
- The ***Multiplier*** parameter determines the units in which rainfall is reported (TABLE 7-2).

TABLE 7-2. Multipliers for Rain Measurement

Rain Gage	inches	millimeters
TE525	0.01	0.254
TE525WS	0.01	0.254
TE525MM	0.00394	0.1
TE525 or TE525MM w/8 in funnel	0.0057	0.1459

7.3 Siting

Mount the rain gage in a relatively level spot representative of the surrounding area. Ensure that the lip of the funnel is horizontal, at least 30 cm above the ground, and higher than the average snow depth.

Place the rain gage away from objects that obstruct the wind. The distance should be 2- to 4-times the height of the obstruction.

7.4 Mounting

The TE525 includes hose clamps to mount the gage to a 1- to 2-inch pipe. As an alternative for added stability and for better leveling capabilities, the CM270 leveling base could be used instead (FIGURE 7-3). This leveling base is

included with the CM705 Snowfall Adapter but can also be purchased separately. For more information, see Appendix C, *CM270 Installation* *(p. C-1)*.

CM300-series mounting poles provide a stainless steel 1.5 IPS vertical pole for mounting the TE525 rain gage. See FIGURE 7-1 for multiple base options.

Model	**Pole Length**
CM300	58 cm (23 in)
CM305	119 cm (47 in)
CM310	142 cm (53 in)

FIGURE 7-1. Mounting pole base options

Mount the gage with its lip at least 5 cm (2 in) above the post or pole (FIGURE 7-2). The mounting pole must be vertical. Use a torpedo level to get the pole as vertical as possible.

The rain gage has a bubble level to ensure it is level. To access the bubble level, loosen the thumbscrews holding the funnel on the bucket and then take the funnel off the top of the bucket. The bubble level is inside the bucket toward the bottom. Center the bubble level while mounting the bucket to the pole.

While the funnel is off the bucket, remove the small rubber band securing the tipping bucket, which protects it during shipping. Seat the funnel back on to the rain gage, and push the funnel all the way down so it is fully seated on the main body. Hand tighten the thumb screws (if present) to secure the funnel to the body.

NOTE Press either end of the bucket down against its stop to make sure the bucket is NOT hung up in the center before hand tightening the thumb screws.

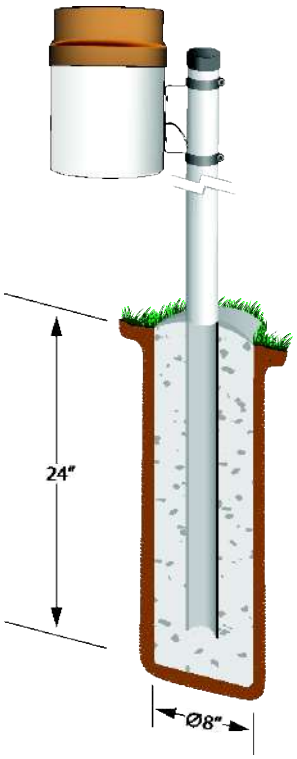


FIGURE 7-2. TE525 Tipping Bucket Rain Gage

FIGURE 7-3. CM270 Rain Gage Mount attaches to the base of a TE525-series rain gage to give added stability

8. Operation

8.1 Sensor Schematic

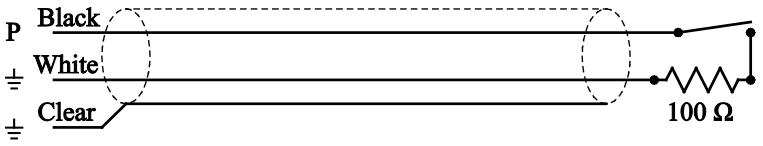


FIGURE 8-1. TE525-series Rain Gage schematic

8.2 Measurement

Campbell Scientific dataloggers measure TE525 rain gages by counting switch closures and converting the total to rainfall. The **PulseCount()** instruction employs dedicated pulse count accumulators, which continuously monitor the input signal, even when the datalogger is between program scans. To create a pulse, an internal 100 kΩ pull-up resistor pulls the pulse input to 5 Vdc when the switch is open, and a switch closure to ground pulls the input to 0 Vdc.

8.3 Long Cable Lengths

Long cables have appreciable capacitance between lines. A built-up charge could cause arcing when the switch closes, shortening switch life. A 100 Ω resistor is connected in series at the switch to prevent arcing by limiting current (FIGURE 8-1). Campbell Scientific installs this resistor on all current rain gages.

9. Troubleshooting and Maintenance

NOTE All factory repairs and recalibrations require a returned material authorization (RMA) and completion of the "Declaration of Hazardous Material and Decontamination" form. Refer to the *Assistance* page at the beginning of this manual for more information.

9.1 Troubleshooting

Symptom: No Precipitation

1. Check that the sensor is wired to the pulse channel specified by the **PulseCount()** instruction.

2. Verify that the ***Configuration Code*** (switch closure) and ***Multiplier*** parameters for the **PulseCount()** instruction are correct for the datalogger type.

3. Disconnect the sensor from the datalogger and use an ohm meter to do a continuity check of the switch. The resistance measured at the terminal block on the inside of the bucket between the black and white leads should vary from infinite (switch open) when the bucket is tipped, to less than an ohm (switch closed) when the bucket is balanced.

9.2 Maintenance

The funnel and bucket mechanism must be kept clean. Routinely check for and remove any foreign material, dust, insects, etc.

9.3 Calibration

A field calibration check is advised every 12 months.

Field Calibration Check:

1. Secure a can or bottle that will hold at least 16 oz of water.

2. Punch a very small hole in the bottom of the can or bottle. If it takes less than 45 minutes for 16 oz of water to run out, the hole in the can is too large.

3. Place the can in the top funnel of the rain gage and pour 16 fluid ounces of water into the can. (A 16 oz soft drink bottle filled to within 2.5 inches of the top may be used for a rough field calibration. An exact volume will allow for a more precise calibration.)

4. The following number of tips should occur:
   TE525, TE525MM 100 ± 3
   TE525WS 57 ± 2

5. Adjusting screws are located on the bottom adjacent to the large center drain hole. Adjust both screws the same number of turns. Rotation clockwise increases the number of tips per 16 oz. of water; counter clockwise rotation decreases the number of tips per 16 oz. of water. One half turn of both screws causes a 2% to 3% change.

6. Check and re-level the rain gage lid.

Factory Calibration:

If factory calibration is required, contact Campbell Scientific to obtain an RMA (see *Assistance* at front of manual).

10. Attributions and References

Santoprene® is a registered trademark of Exxon Mobile Corporation.

Campbell Scientific. 2012. *260-953 alter-type wind screen for tipping bucket rain gages: Instruction manual*. Campbell Scientific. *https://s.campbellsci.com/documents/us/manuals/260-953.pdf*

Campbell Scientific. 2015. *CS705 snowfall adapter: Instruction manual*. Campbell Scientific. *https://s.campbellsci.com/documents/us/manuals/cs705.pdf*

Appendix A. Importing Short Cut Code Into CRBasic Editor

This tutorial shows:

- How to import a *Short Cut* program into a program editor for additional refinement
- How to import a wiring diagram from *Short Cut* into the comments of a custom program

Short Cut creates files, which can be imported into *CRBasic Editor*. Assuming defaults were used when *Short Cut* was installed, these files reside in the C:\campbellsci\SCWin folder:

- .DEF (wiring and memory usage information)
- .CR2 (CR200(X)-series datalogger code)
- .CR300 (CR300-series datalogger code)
- .CR6 (CR6-series datalogger code)
- .CR8 (CR800-series datalogger code)
- .CR1 (CR1000 datalogger code)
- .CR1X (CR1000X datalogger code)
- .CR3 (CR3000 datalogger code)
- .CR5 (CR5000 datalogger code)
- .CR9 (CR9000(X) datalogger code)

Use the following procedure to import *Short Cut* code and wiring diagram into *CRBasic Editor*.

1. Create the *Short Cut* program following the procedure in Section 4, *QuickStart (p. 2)*. Finish the program. On the **Advanced** tab, click the **CRBasic Editor** button. The program opens in CRBasic with the name **noname.CR_**. Now save the program with your desired name in any folder.

NOTE Once the file is edited with *CRBasic Editor*, *Short Cut* can no longer be used to edit the datalogger program. Change the name of the program file or move it, or *Short Cut* may overwrite it next time it is used.

2. The program can now be edited, saved, and sent to the datalogger.
3. Import wiring information to the program by opening the associated .DEF file. Copy and paste the section beginning with heading "-Wiring for CRXXX–" into the CRBasic program, usually at the head of the file. After pasting, edit the information such that an apostrophe (') begins each line. This character instructs the datalogger compiler to ignore the line when compiling.

Appendix B. Example Programs

CRBasic Example B-1. CR1000X Program Measuring the TE525 or TE525WS Using a Pulse Channel

```
'Program records precipitation from one TE525 or TE525WS Rain Gage once a
'second and stores the total every 60 minutes

'Wiring Diagram
'==============
'TE525 or TE525WS

'  Wire
'  Color      Function           CR1000X
'  -----      --------           -------
'  Black      Pulse Output       P1
'  White      Ground             ⏚
'  Clear      Shield             ⏚

'Declare the variables and units for the rain measurement
Public Rain_mm
Units Rain_mm=mm

DataTable(Rain,True,-1)
  DataInterval(0,60,Min,0)
  Totalize(1,Rain_mm,FP2,0)
EndTable

BeginProg
  Scan(1,Sec,1,0)
    PulseCount(Rain_mm,1,P1,1,0,0.254,0)
    'For TE525MM Rain Gage, use multiplier of 0.1 in PulseCount instruction
    'Call Data Table
    CallTable(Rain)
  NextScan
EndProg
```

CRBasic Example B-2. CR200(X) Series Program Measuring a TE525 or TE525WS

```
'Program records precipitation from one TE525 or TE525WS Rain Gage once a
'second and stores the total every 60 minutes

'Declare the variables and units for the rain measurement
Public Rain_mm
Units Rain_mm=mm

'Define Data Tables
DataTable(Rain,True,-1)
  DataInterval(0,60,Min)
  Totalize(1,Rain_mm,0)
EndTable

'Main Program
BeginProg
  Scan(1,Sec)
    'TE525/TE525WS Rain Gage measurement Rain_mm:
    PulseCount(Rain_mm,P_SW,2,0,0.254,0)
    'For TE525MM Rain Gage, use multiplier of 0.1 in PulseCount instruction
    'Call Data Tables and Store Data
    CallTable(Rain)
  NextScan
EndProg
```

CRBasic Example B-3. CR1000X Program Measuring the TE525 or TE525WS Using a Control Port

```
'Program records precipitation from one TE525 or TE525WS Rain Gage once a
'second and stores the total every 60 minutes

'Wiring Diagram
'==============
'TE525 or TE525WS
'
'  Wire
'  Color     Function            CR1000X
'  -----     --------            -------
'  Black     Pulse output        C1
'  White     Pull-up voltage     5V
'  Clear     Shield              ⏚

'Declare Public Variables and Units
Public Rain_mm
Units Rain_mm=mm

DataTable (Rain,True,-1)
  DataInterval (0,60,Min,0)
  Totalize (1,Rain_mm,FP2,0)
EndTable

'Main Program
BeginProg
  Scan (1,Sec,1,0)

    PulseCount (Rain_mm,1,C1,2,0,.254,0)
'For TE525MM Rain Gage use multiplier of 0.1 in PulseCount Instruction.
CallTable (Rain)
  NextScan
EndProg
```

Appendix C. CM270 Installation

Tools needed:

- Open-end wrench, 7/16-inch open-ended wrench, or 7/16-inch socket wrench
- Long #2 Phillips Screwdriver

Remove manufacturer's mounting hardware:

1. Remove the three feet mounted on the bottom of the rain gage.

2. Remove the side bracket, but keep the screws.

3. Place the side bracket screws into the rain gage and tighten. This keeps debris out of the threaded holes.

Do the following to assemble the mounting bracket. FIGURE C-1 and FIGURE C-2 show the bracket components and the proper assembly.

1. Remove the components from the shipping bag. To assemble the bracket, you will need the bottom plate, V-shaped plate, S-shaped plate, three bolts, two leveling springs, and cylindrical spacer. The bottom plate should come with three black nylon grommets mounted into it, and the pole mounting hardware attached to it.

2. Place the leveling springs over the bottom plate side grommets.

3. Place the V-shaped plate onto the bottom plate. The V-shaped plate legs should be on the leveling springs and the bubble level should be next to the pole-mounting hardware.

4. Use two bolts to secure the V-plate legs to the bottom plate (with the springs sandwiched between the two plates). Initially finger tighten the bolts and then use a wrench to further tighten them.

CAUTION Do not compress the springs at this time.

5. Place the cylindrical spacer on the bottom plate front grommet.

6. Place the S-shaped plate on the spacer and use the bolt to secure it to the bottom plate. Initially finger tighten the bolt and then use a wrench to further tighten. Leave it a bit loose.

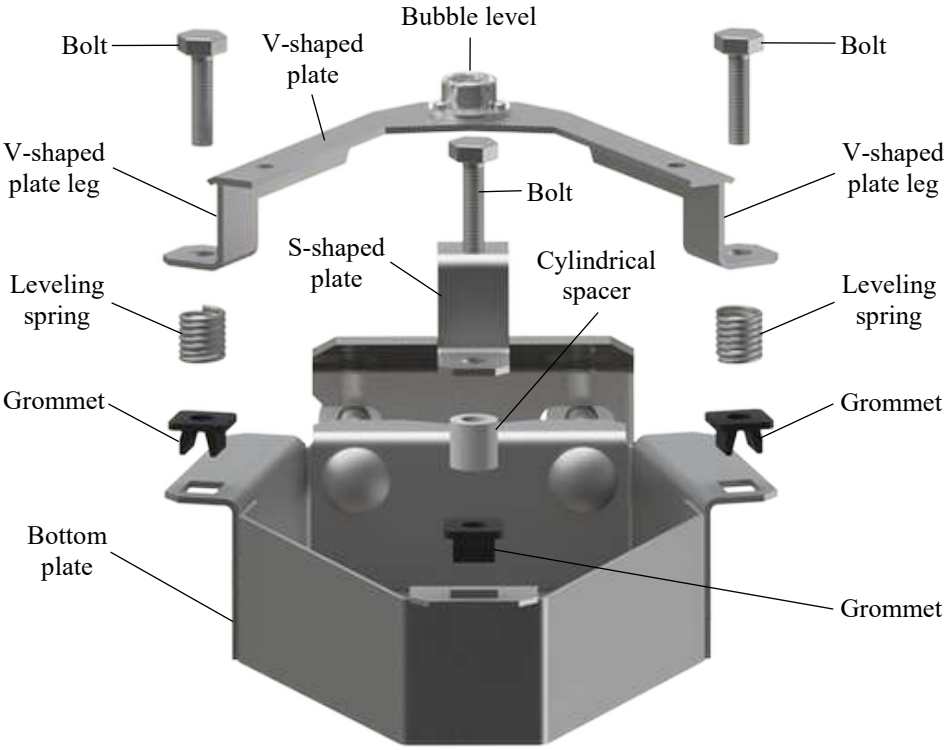


FIGURE C-1. Exploded view of the CM270 Mounting Bracket Kit

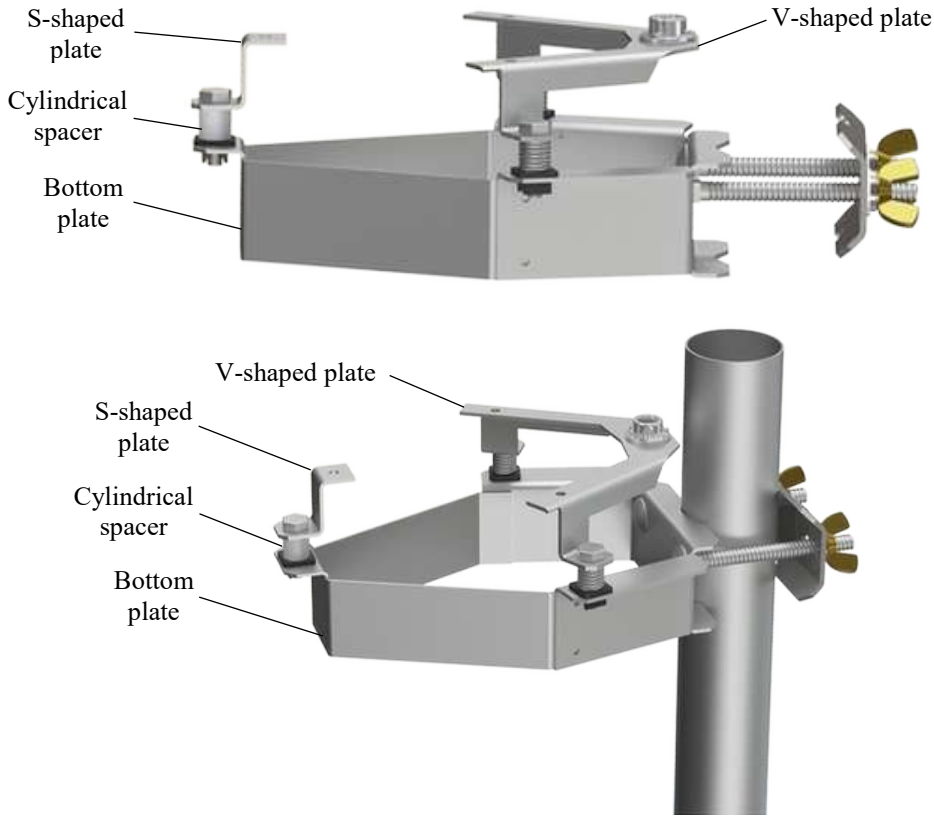


FIGURE C-2. Two views of an assembled CM270

Do the following to mount the tipping bucket rain gage to the CM270 bracket (FIGURE C-3):

NOTE Follow this procedure to ensure that the tipping bucket is mounted correctly. The adjustment screws for the tipping mechanism will not be accessible if it is mounted incorrectly.

1. Turn the rain gage upside down and set it on a hard surface such as a table top.

2. Place the mounting bracket on the bottom of the bucket. Line up the three holes in the mounting bracket with the three holes used for the mounting feet. When positioned correctly, the tipping bucket cable will be near the bubble level and pole mounting hardware.

3. Use the three self-tapping screws and a long Phillips screwdriver to securely fasten the mounting bracket to the bottom of the tipping bucket.

4. Flip the assembly over and tighten the bolt that uses the cylindrical spacer. The bolts securing the leveling springs need to remain loose to allow leveling when the bracket is mounted to the pole or mast.

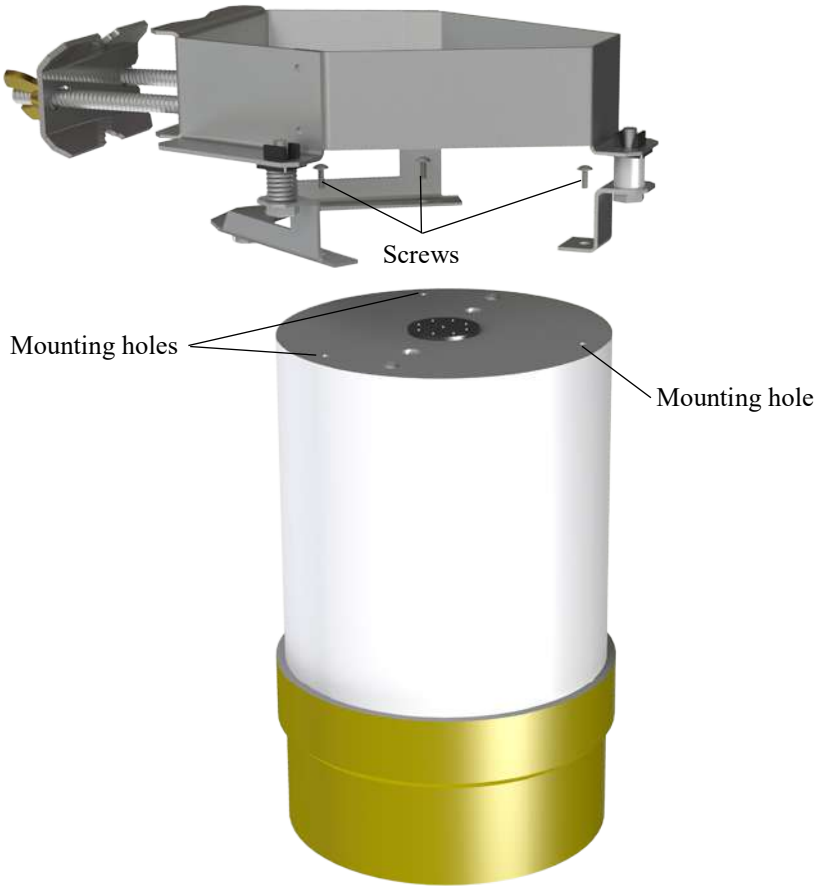


FIGURE C-3. Mounting CM270 to the rain gage

Attach the mounting bracket/tipping bucket assembly to the mounting pipe or mast:

1. Install and level the mounting pipe or mast.

2. Loosen the mounting bracket wingnuts and slide the assembly over the pipe. If necessary, the pole mounting hardware can be removed to get the bolts around the pipe. If this is necessary, to reassemble, put the mast clamp on first followed by the flat washer, lock washer, and wingnut. See FIGURE C-4.

3. Tighten the assembly onto the pipe, while ensuring that nothing is blocking the top of the rain gage.

4. Adjust the two bolts on the leveling springs until the bubble in the level is inside the bullseye.

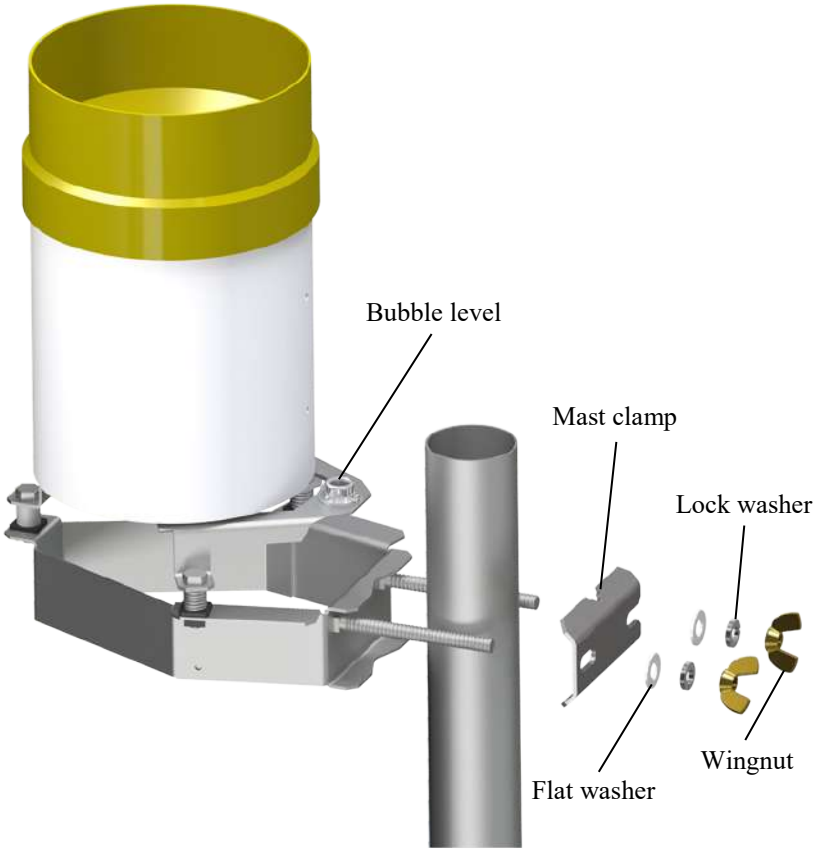


FIGURE C-4. CM270 pipe mounting (exploded view)

Appendix D. Changing Funnels with a Different Size

D.1 TE525 and TE525MM

The TE525 and TE525MM rain gages use the same tipping mechanism that is calibrated to tip with the same amount of water. Changing the funnel does not necessitate changing the tipping mechanism, but it does require changing the multiplier in the datalogger program to match the funnel size. See TABLE 7-2, *Multipliers for Rain Measurement (p. 6)*, for the correct multiplier.

D.2 TE525WS

The TE525WS rain gage uses a different tipping mechanism that is calibrated differently than the TE525 or TE525MM. The tipping mechanism must be replaced to work with a TE525 or TE525MM funnel. Send the rain bucket into the Campbell Scientific repair department for modifications. Contact Campbell Scientific to obtain an RMA (see *Assistance* at front of manual).

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