Sierra-Misco
Telemetry Systems

RAIN GAUGE INSTRUCTION MANUAL FOR MODEL 2501

1.0 INTRODUCTION

1.1 GENERAL DESCRIPTION

The Model 2501 Rain Gauge is made of the highest quality anodized aluminum and stainless steel materials to ensure years of trouble free operation when properly installed and maintained. The basic gauge consists of an outer funnel, tipping bucket assembly, base plate and housing assembly.

1.2 SPECIFICATIONS

Switch:	Proximity switch, 3W, 28 VAC
Accuracy:	+/- 4% over 1" to 6"/hr
Orifice:	8" diameter
Dimensions:	8.4" D x 15" H
Shipping Weight:	8 lbs
Calibrations:	0.01", 1MM, 0.5MM, 0.25MM
Mounting:	3 legs, 1/4" diameter bolt holes on 9 1/2" diameter bolt circle
Construction:	

Funnel	Anodized Aluminum
Base	Aluminum Plate
Body	Aluminum Tube
Bucket Support	Aluminum Formed Plate
Tipping Bucket	Stainless Steel

2.0 INSTALLATION

2.1 SITE REQUIREMENTS

Siting the gauge is important and careful consideration should be given to the quality of precipitation catch prior to installing the gauge.

2.1.1. Protected Sites: when objects which constitute obstructions are numerous and are so extensive that the prevailing wind speed, turbulence and eddy currents have been reduced in the vicinity of the gauge, the presence of such objects is usually beneficial in providing a more accurate catch. The best exposures are often found, therefore, in orchards, openings in a grove of trees, bushes or shrubbery, or where fences and other objects acting together serve as an effective windbreak. As a general rule in such areas, where the heights of the objects and their distance from the gauge is generally uniform, their height above the gauge is generally twice their distance from the gauge. Good exposures are not always permanent. The growth of vegetation, trees and shrubbery, and man made, alternations to the surroundings may change an excellent exposure to an unsatisfactory one in a relatively short time.

2.1.2 Open Sites: in open areas, individual or small groups of isolated objects near a gauge may set up serious eddy currents. As a general rule the height of such objects above the gauge is not always possible to select sites which provide adequate protection from adverse wind effects, an open site away from isolated objects may be the only location available.

2.1.3. Towers: in areas where heavy snowfall occurs, gauges are mounted on supports (towers) at a height well above the average level to which snow accumulates - note however, that this exposure would be better if the tower were located in an area of trees of comparable height.

2.1.4. 2501 Set-up : The 2501 is shipped with the three mounting legs attached upside down on the 1/4-20 bolts. Detach and replace legs in correct position with the legs pointing downwards and the leg end facing away from the gauge. Be sure wingnuts are tight. Remove funnel and carefully remove all packing material and the elastic that keeps the tipping bucket from moving during transit. Verify that the bucket can now move freely between the calibration screws. Put funnel in place at top of gauge. The gauge must be mounted level on a platform or tower. The holes in the mounting legs are sized for 1/4 inch diameter mounting bolts. For the correct measurement of precipitation the open end of the gauge (the funnel) must be in a horizontal plane. This can be checked (with funnel removed) by laying a carpenter's level across the open top of the gauge in two directions; one crossing the other at right angles. If the top is not level in both directions, the condition should be corrected. Washers can be used as leveling shims between the mounting legs on the gauge and the platform or tower.

3.0 OPERATION

Precipitation entering the collection orifice fills the calibrated tipping bucket assembly. When the calibrated amount is collected the bucket tips, causing a momentary closure of the reed switch. This closure is detected by the event recorder or data logger. The precipitation sample is then discharged through the drain holes to the ground below.

4.0 CALIBRATION

The gauge is calibrated at the factory and recalibration should not be necessary unless damage in shipment or mishandling during installation has occurred.

4.1 Check calibration: using a graduated cylinder or calibrated burette. First allow water to flow into the funnel and tipping bucket, wetting gauge. This gauge MUST BE CALIBRATED WET. Allow the correct amount of water AT THE SPECIFIED FLOW RATE (refer to Table 1) to pass through the funnel to the tipping bucket. The bucket should tip within tolerance. If both sides of the buckets tip when the correct amount of water has flowed into the gauge at the proper flow rate, the gauge is in proper calibration. If the buckets do not tip or if they tip too early or late the unit needs to be recalibrated as described in section 4.3.

4.2 Check calibration: field method. First allow water to flow into the funnel and tipping bucket, wetting gauge. This gauge must be calibrated wet. If an accurate liquid measuring device, such as a calibrated burette or a graduated cylinder is not available, the calibration can be checked by pouring a known amount of water at the specified flow rate (refer to Table 1) through the funnel to the tipping bucket. Total number of tips should equal amount poured in (expressed in millilitres; 1 quart = 946.3 millilitres) divided by the calibration quantity indicated in millilitres in Table 1. If the number of tips is incorrect, the unit needs to be recalibrated as described in section 4.3. The accuracy of this method is dependent on the accuracy of the equipment used to measure and control flow of water.

4.3 RECALIBRATION

1. Release the lock nuts on the calibration screws that the bucket rests on. Tip the bucket manually in both directions to empty buckets. Do not wipe buckets dry.

2. Observing the PROPER FLOW RATE, pour water through the funnel into the bucket and note how much water it takes to make the bucket tip. If it takes more than the correct amount of water to tip the bucket then the calibration screw for that side of the bucket needs to be adjusted upwards so that it will take less water to tip the bucket. If it takes less water than the correct amount to tip the bucket then the calibration screw for that side of the bucket needs to be adjusted downwards so that it will take more water to tip the bucket. Do not wipe water from bucket in between tips.

3. Once the correct height for each calibration screw has been determined, carefully tighten the lock nuts without changing the position of the calibration screw.

4. After tightening both calibration screws, check calibration again as outlined in section 4.2.

TABLE I. STANDARD CALIBRATION QUANTITIES

2501 @ 1mm	Cal:	32.43 millilitres
2501 @ .5mm	Cal:	16.215 millilitres
2501 @ .25mm	Cal:	8.11 millilitres
2501 @ .2mm	Cal:	6.48 millilitres
2501 @ .01"	Cal:	8.24 millilitres

Flow rate for calibration: 1/2 mL per second
Accuracy desired is ±4% of volume at 2.2" precipitation per hour.

5.0 MAINTENANCE

1. Most stations are serviced annually; in heavily forested areas or where airborne debris is a consideration, this should be done more often. The bucket assembly and drains should be checked to make sure they are clean and free from obstructions. The tipping bucket and the funnel should be carefully wiped clean.

2. Check calibration. Refer to Section 4.0

3. Check switch closure. The standard switch closure is momentary SPNO contact. Connect an ohmmeter to gauge at the terminal strip. With the bucket at rest on one of the calibration screws, the ohmmeter should read infinite resistance. Slowly move the bucket simulating the tipping motion, until contact closure is made. The resistance of the contacts should be less that 1 ohm. Allow tipping bucket to complete tip to rest on other calibration screw, the ohmmeter should read infinite resistance.

4. In order to maintain the accuracy of the rainfall catch, the rim of the funnel should be protected from dents or other damage that might alter their shape.

6.0 TROUBLESHOOTING

1. Always perform the following first: check the cable connections to ensure a solid connection. Also check to see that the bucket moves freely on the pivots. Ensure that the magnet is securely in place on the bucket. Check to ensure proper contact closure. Refer to section 5.3 of the maintenance section.

2. If the unit registers low or does not register anything during precipitation, check for debris in inlet funnel and drains which can affect bucket movement.

3. If the unit registers high during precipitation, check the level of the orifice to ensure sensor is properly installed and leveled. Recheck calibration.

4. If it becomes necessary to return the instrument to the factory for any reason, call

Sierra-Misco Environment Ltd.
at (604) 381-4452
between 9 a.m. and 3 p.m.
(Pacific Standard Time)
or Fax (604) 381 5414

and ask for a Return Authorization Number to be assigned to your instrument. Carefully pack the instrument so that it will not be damaged in shipment and write the Return Authorization Number on the box and on any paperwork included in the box with the instrument.

It is helpful to also include a short description of the problem. If you are unable to reach us by telephone, please write a detailed description of the problem and under what conditions it failed, or other reason for return, and include it with the instrument.

5. Replacement parts are in stock at the factory. Please quote model number and calibration when ordering parts.

ITEM/DESCRIPTION

Model number	Description
SP2501-1	High power reed switch or proximity switch
SP2501-5	Tipping bucket assembly, with magnet
SP2501-F	8" diameter funnel
SP2501-17	Funnel screen
SP2501-19	Calibration screw, set of two
SP2501-10	Bucket Stops
SP2501-L	Mounting Legs each with Wing nut
SP2501-8	Circular ceramic Magnet

PLEASE SPECIFY MODEL NUMBER, ITEM AND CALIBRATION WHEN ORDERING.

SIERRA-MISCO ENVIRONMENT LTD.
830 D PEMBROKE STREET
VICTORIA, BC
V8T 1H9
CANADA TELEPHONE: (604) 381-4452
FAX: (604) 381-5414