



# 360 PRECIPITATION GAUGE OPERATION MANUAL



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### **360 PRECIPITATION GAUGE OPERATION MANUAL**

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## 1.0 General Information

NOTE: Remove screens during winter operation.

### 1.1. Specifications

The Model 360 Precipitation Gauge is an accurate, sensitive and low maintenance sensor designed to measure rainfall on a continuous basis. Water does not collect in the sensor, but is drained each time an internal bucket fills with 0.1mm, 0.2mm or .25mm of rainfall depending on set standard calibration, and a switch closure pulse is also sent to the translator module or data logger for counting. The sensor is calibrated at shipment and requires no adjustments after the mounting.

TABLE 1-1: MODEL 360 PRECIPITATION GAUGE SPECIFICATIONS

<b>Rain Gauges:</b>	<b>360 Rain</b>	<b>362 Rain</b>	<b>364 Rain</b>
Plastic Tip Bucket Model #:	360	362	364
Metal Tip Bucket Model #:	360-1	362-1	364-1
Funnel Area:	200cm <sup>2</sup>	200cm <sup>2</sup>	200cm <sup>2</sup>
Standard Calibration:	.25mm/tip or .01in/tip	.20mm/tip	.10mm/tip
Accuracy:	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%
Switch:	Reed Switch, rated at 10mA, 28VDC	Reed Switch, rated at 10mA, 28VDC	Reed Switch, rated at 10mA, 28VDC
Operating Temperature:	0°C to +60°C	0°C to +60°C	0°C to +60°C
Height/ Weight:	30.5cm / .92kg	30.5cm / .92kg	30.5cm / .92kg

<b>Rain &amp; Snow Gauges:</b>	<b>365 Rain &amp; Snow</b>	<b>367 Rain &amp; Snow</b>	<b>369 Rain &amp; Snow</b>
Plastic Tip Bucket Model #:	365	367	369
Metal Tip Bucket Model #:	365-1	367-1	369-1
Funnel Area:	200cm <sup>2</sup>	200cm <sup>2</sup>	200cm <sup>2</sup>
Standard Calibration:	.25mm/tip or .01in/tip	.20mm/tip	.10mm/tip
Accuracy:	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%	0 to 30mm/hr $\pm$ 1.0% 30 to 120mm/hr $\pm$ 5.0%
Switch:	Reed Switch, rated at 10mA, 28VDC	Reed Switch, rated at 10mA, 28VDC	Reed Switch, rated at 10mA, 28VDC
Operating Temperature:	-25°C to +60°C	-25°C to +60°C	-25°C to +60°C
Thermostat Set Point for Funnel & Base Heater:	4.4°C	4.4°C	4.4°C
Heaters:	Funnel: 24VAC/DC, 75watt Base: 24VAC/DC, 50watt	Funnel: 24VAC/DC, 75watt Base: 24VAC/DC, 50watt	Funnel: 24VAC/DC, 75watt Base: 24VAC/DC, 50watt
Height/ Weight:	30.5cm / 1.1kg	30.5cm / 1.1kg	30.5cm / 1.1kg

## 1.2. Sensor Signal Cable

The Sensor Cable is a vinyl-jacketed 2 conductor shielded cable connecting to the sensor via an internal terminal strip. Cable length is designated in XX feet on each cable part number label.

## 1.3. Heater Power Cable

The Heater Power Cable is a vinyl-jacketed 2 conductor shielded cable connecting to the sensor via an internal terminal strip. Cable length is designated in XX feet on each cable part number label.

# 2.0 Installation

## 2.1. Location

Choose a site where the height of any nearby trees or other objects above the sensor is no more than twice their distance from the sensor. A uniform surrounding of objects (such as an orchard) is beneficial as a windbreak. Non-uniform surroundings (such as a nearby building) create turbulence, which affects accuracy.

## 2.2. Setup

1. NOTE: The Rain gauge is designed for installation on a customer-built pedestal mount.
2. Prepare the pedestal for mounting and leveling the rain gauge.
3. Route the #3519 Signal Cable and if applicable the #3517 Heater Power Cable up through the pedestal center tube. (Refer to Figure 2.1)



FIGURE 2.1: 3519 SIGNAL CABLE

4. On the rain gauge, remove three screws/washers near bottom of housing that secure housing to base. Slowly and carefully lift the housing straight up from base.

NOTE: If rain gauge is heated carefully disconnect the funnel heater from the heater wiring terminal block. Insure that all wiring is connected properly before closing the housing.



FIGURE 2.2: HEATED FUNNEL ASSEMBLY

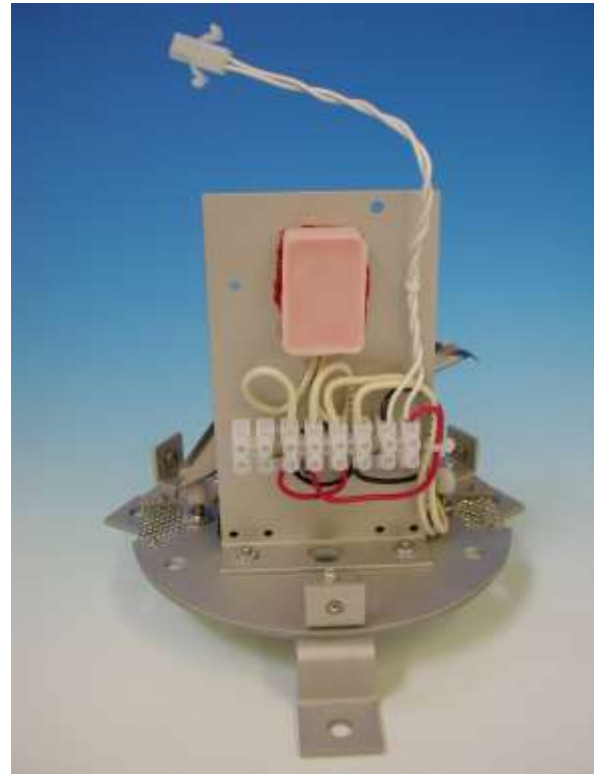


FIGURE 2.3 HEATER TERMINAL ASSEMBLY

5. Connect the #3519 Signal Cable & #3517 Heater Power Cable (if applicable). (Refer to Figure 2.4).

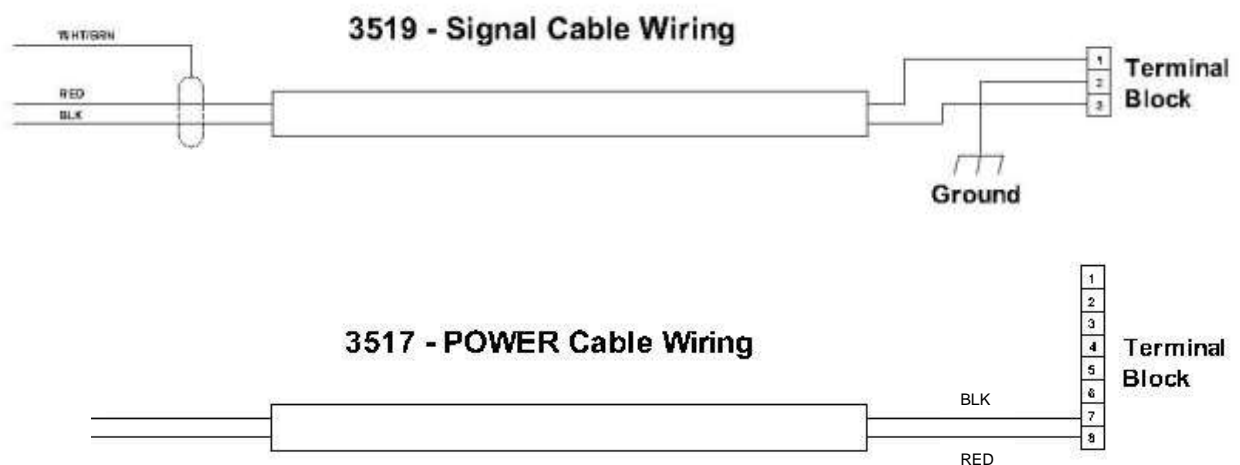


FIGURE 2.4: 3519 SIGNAL CABLE WIRING & 3517 HEATER POWER CABLE WIRING

6. While pushing cable down into the pedestal center tube check cable routing under the rain gauge for kinks or binding, correct as required.

7. Connect the #3519 Signal Cable to the logger/counting device. Connect the #3517 Heater Power Cable to the power source.

NOTE: Before turning on power to heated rain gauge insure proper voltage and wattage are being applied. Refer to the heater specifications in section 1.1.

8. Level the rain gauge by observing the location of the bubble in the bubble level (adjust as required). Note: This rain gauge has been calibrated at the factory with the bubble centered; any deviation from this could affect accuracy. (Refer to Figure 2.5).

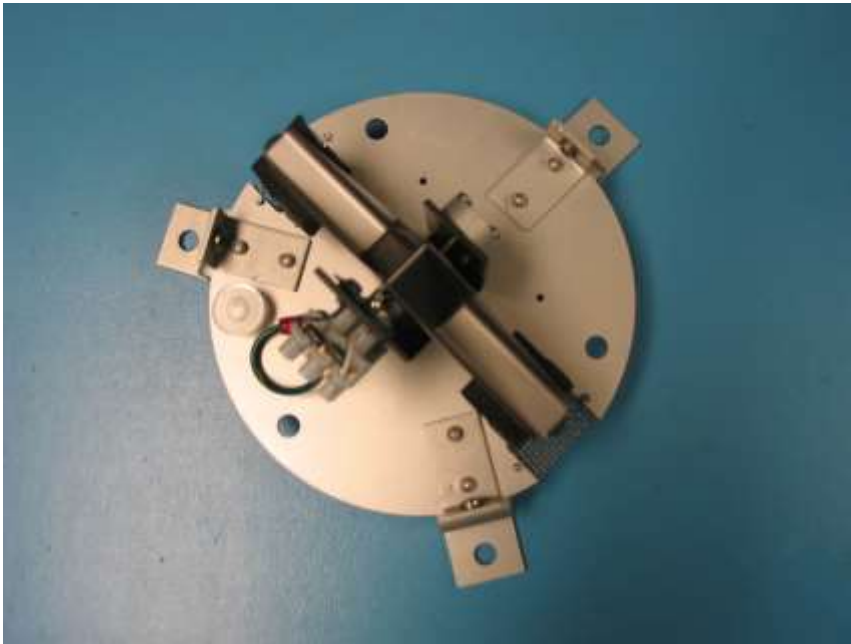


FIGURE 2.5: BUBBLE LEVEL & MOUNTING ADJUSTMENT

**CAUTION**

Gently remove the foam shipping restraints (Refer to Figure 2.6) from the tipping bucket. Manually tip the bucket for specified calibration rainfall recorded per each tip. If no output, check connections.

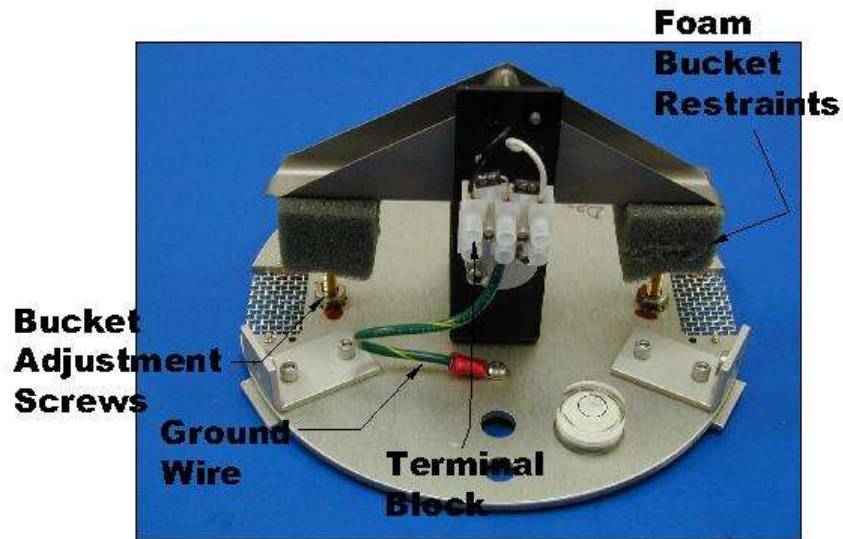


FIGURE 2.6: FOAM BUCKET RESTRAINTS

9. Insure that all wiring is connected properly before closing the housing.
10. Install the housing onto the rain gauge base.
11. Align holes in housing and captive nuts in base. Re-install three screws and washers to secure housing onto base.
12. Remove both screens from plastic bags and install in funnel as shown below. (Refer to Figure 2.7). Care must be taken at the sharp-edged orifice to avoid personal injury and damage to the thin edge.

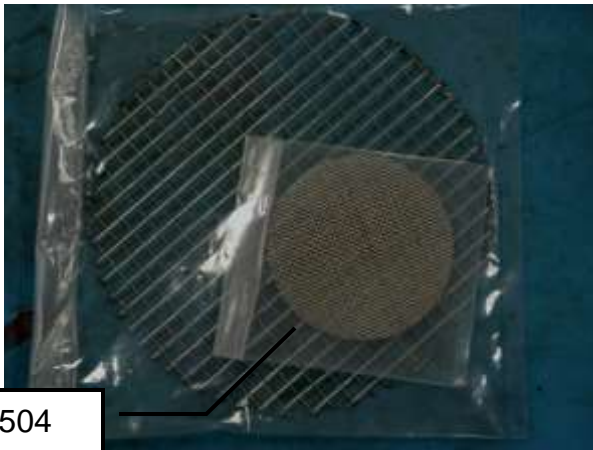


FIGURE 2.7: COLLECTION FUNNEL & ORIFICE SCREENS

13. Rain gauge is now ready for operation.

#### **CAUTION**

To avoid possible damage and loss of calibration during any further shipments, re-insert foam shipping restraints to immobilize the tipping bucket.



### 3.0 Calibration

The sensor is factory calibrated, recalibration is not required unless damage has occurred or the adjustment screws have loosened. To check or recalibrate, perform the following steps:

- a. Remove housing
- b. Check the bubble level to see if the sensor is level.
- c. Wet the tipping bucket assembly using a buret or graduated cylinder; slowly pour the measured quantity of water into the tipping bucket, which should then tip. Repeat for the alternate bucket. If both buckets tip when filled with the measured quantity of water, the sensor is properly calibrated. If they do not, recalibrate as follows:

TABLE 3-1: CALIBRATION QUANTITIES

Tip Calibration	Water Quantity
0.1mm	2.0 milliliters
0.2mm	4.0 milliliters
0.25mm or .01in	5.0 milliliters

1. Release the lock nuts on the cup adjustment screws.
  2. Move the adjustment screws down to the position that would place the bucket far out of calibration.
  3. Allow the measured quantity of water to enter the bucket.
  4. Turn the cup adjustment screw up until the bucket assembly tips. Tighten the lock nut.
  5. Repeat steps 3 and 4 for the opposite bucket.
  6. Measure the quantity of water necessary to tip the bucket several times to ensure proper calibration.
- d. After installation and calibration (if necessary), replace the housing on the gauge.


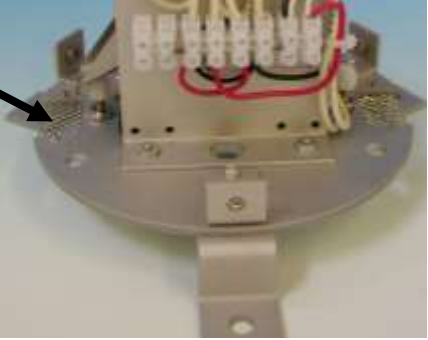
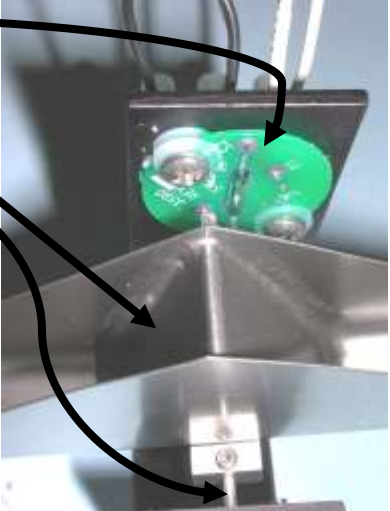

### 4.0 Maintenance\*

At six-month intervals, perform the following steps:

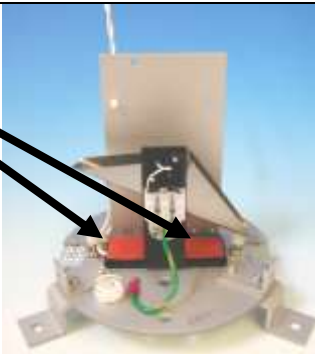
- a. Clean funnel and buckets.
- b. Do NOT lubricate the pivot shaft, as any lubricant may attract dust and dirt and cause wear or drag.
- c. Verify that the bucket moves freely and that translator card or data logger registers proper calibration for each bucket tip.

\*Based on average to adverse environments.

TABLE 4-1: 360 SERIES PART REPLACEMENT

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PART #</u>	<u>IMAGE</u>
1	Screen, 2-9/16 DIA., SST	2504	
2	Screen, Primary (6" RG)	3465	
3	Screen, Base	3522 (2 PLCS)	
4	Circuit Board Assy, Reed Switch	3487	
5	Assy, Tip Bucket (Plastic)	3554	
6	Assy, Tip Bucket (Metal)	3478	
7	Pivot Shaft	3477	
8	Heated Funnel Assy	10159	



9	Lower Heater Element	9684	
10	Lower Heater Thermostat	9685	