

## RIM-7499-BOM



## Document History

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## Revision History

This document has been revised by:

Revision Number	Revision Date	Summary of Changes	Author
V1.01	31-07-17	Updated general content	Ludovic Grosjean
V1.02	24-10-17	Warranty conditions	Ludovic Grosjean

## Reference Documents

Please see the following documents for more information:

Document Name	Download from	Author
Online Training documents	<a href="http://download.observator.com/files/?dir=User manuals/">http://download.observator.com/files/?dir=User manuals/</a>	Ludovic Grosjean
RIM-7499-BOM Manual	<a href="http://download.observator.com/files/?dir=User manuals/">http://download.observator.com/files/?dir=User manuals/</a>	Ludovic Grosjean

## Distribution list

This document has been distributed to:

Name	Company, Position	Action
Dana Galbraith	Director at Observator Instruments	Review
Niran Pelpola	Manager at Observator Instruments	Update



**ABN 56 007 283 963**  
**8-10 Keith Campbell Court, PO Box 9039**  
**Scoresby, VIC 3179 AUSTRALIA**  
**Tel: +61 3 8706 5000, Fax: +61 3 8706 5049**  
**Email: [info.au@observator.com](mailto:info.au@observator.com)**  
**Web: [www.observator.com](http://www.observator.com)**

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# 1. RIM-7499-BOM INTRODUCTION

Thanks for purchasing the new RIM-7499-BOM Rain Gauge. It will give you years of service if you install and maintain it according to guidelines set out in this Manual.

The RIMCO 7499 range of siphon controlled tipping bucket rain gauges are designed and constructed for long-term operation with minimal maintenance under almost all climatic conditions. All materials used are corrosion resistant. These proven instruments are accurate to within 1% for rainfall rates up to 250mm/hr and 3% up to 500mm/hr.

RIM-7499-BOM key features:

- Rugged and corrosion resistant construction. Low friction, non-seizing bucket bearings. Gold plated buckets for minimal retention. Reed switch output with dual switch option. Stable calibration.
- Built-in bubble level.
- Optional self-powered internal counter.
- Optional heater allowing operation below -30°C.

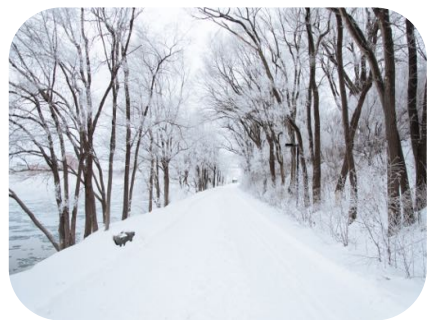
RIMCO 7499 rain gauges are manufactured to exacting standards including those of the Australian Bureau of Meteorology requirements.

## 2. APPLICATIONS

RIM-7499-BOM device typical use include applications such as:

1. **General meteorology.**
2. **Water resources studies.**
3. **Hydrology.**
4. **Flood warning systems.**
5. **Automatic logging systems.**
6. **Remote and long term logging deployments.**

The RIMCO Rain Gauges are great solution for rain measurement.





### 3. SAFETY



**For correct functioning of Observator RIM-7499-BOM the Rain Gauge must be installed according installation instructions.**



**For correct measurement, perform regular service and calibration of the Rain Gauge.**



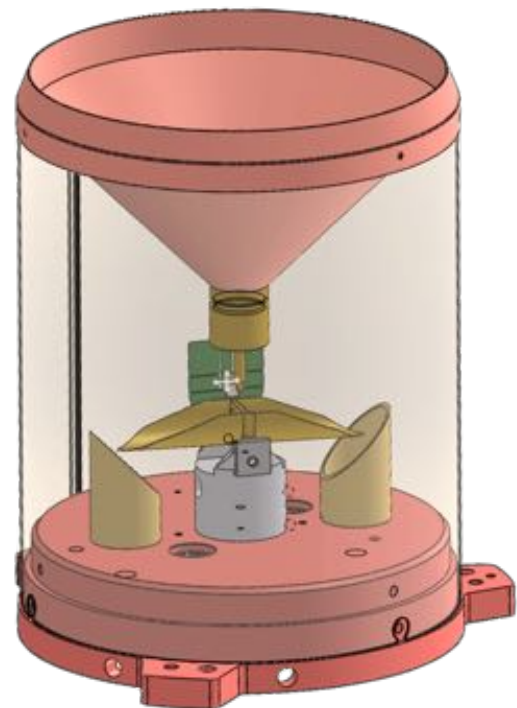
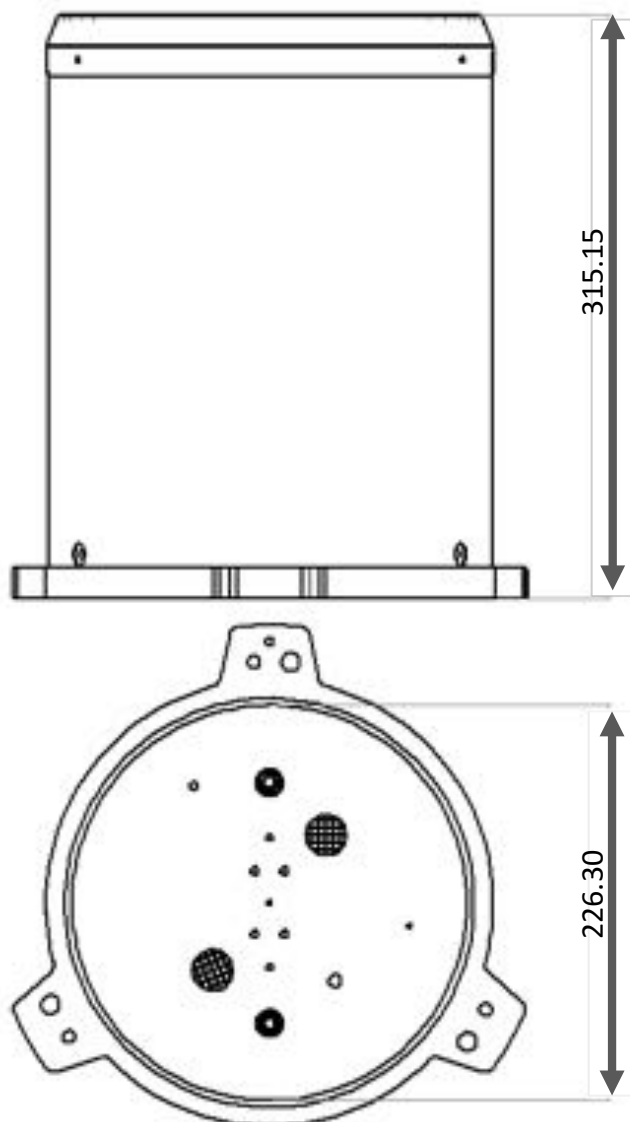
**Always install the Rain Gauge according to procedures.**



**After end of life dispose this product according local regulations or return to manufacturer.**

## 4. SPECIFICATION

RIM-7499-BOM Dimensions	
Length	315mm
Diameter	230mm
Net Weight	5.5kg
Shipping Body Diameter	7.0kg
Volumetric Weight	7.8kg
Packing carton	330x330x430mm
Mounting	3 holes threaded to 3/8" BSW on 256mm diameter at 120° pitch. Will allow up to M8 bolts to pass through mounting holes.





Specification	
Collection Diameter	203 ± 0.2mm.
Accuracy	±1% to 250mm/Hr. +0 to -7% from 250 to 500mm/Hr.
Resolutions available	0.2, 0.25, 0.5 or 1.0mm
Contacts	One normally open magnetically actuated reed switch. Dual reed switch assemblies available as option.
Magnet	Rare earth type.
Reed Switch Rating	50V AC/DC @ 0.5A non-inductive.
Closure Timing	50 milliseconds min. 150 milliseconds max. Max bounce time 0.75 milliseconds up to 350mm/Hr.
Termination	Screw termination (2.5mm <sup>2</sup> ) and 4.8mm male spade terminations on Reed Switch Holder. 2m cable normally provided.
Switch Protection	14mm MOV across contacts, 30V and 8.5 Joule nominal rating.

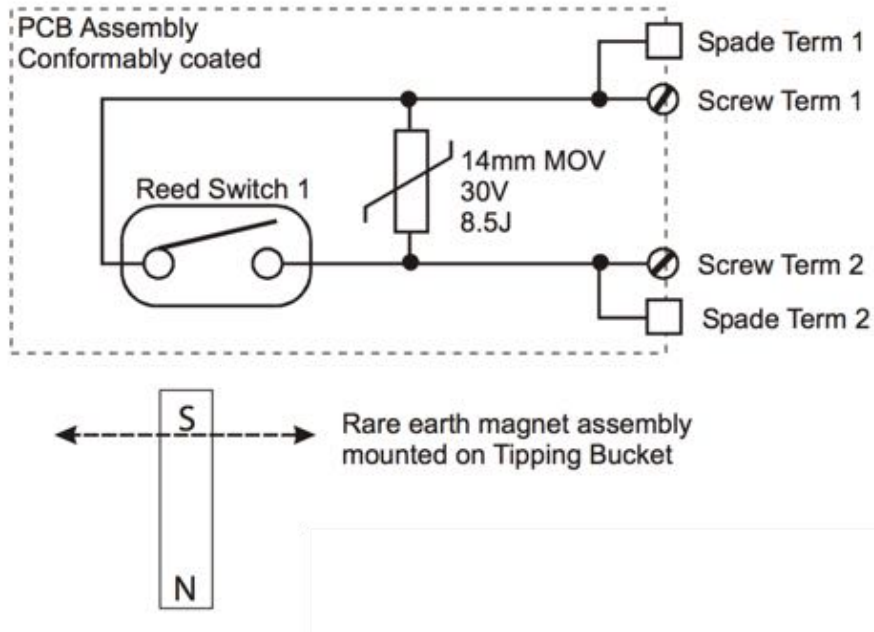
	Operating	Storage
Temperature	0° to +50°C	-65°C to +55°C
Humidity	10% to 100%	5% to 100%
Wind	0 to 50km/hr (may affect accuracy)	0 to 180km/hr
Vibration	High, consistent with high winds.	High consistent with shipping and handling.

	Operating	Survive
Precipitation	Heavy rain, hail or snow (may affect accuracy – as with all rain gauges).	Accumulation of up to 15mm of freezing precipitation accompanied by wind gusts of 100km/Hr (may affect accuracy during this condition, but rain gauge will continue to operate once extreme conditions have subsided).

Further Specification	
Shock	Will sustain a 1.3m drop in packing carton.
Corrosion	Extremely low even in coastal environs.
EMI/Transient	To CE (EU), C-Tick (Australia/NZ) mark and ANSI C37.90a/ IEEE Std 472 (1974). May be affected by cabling arrangement between the rain gauge and the recording equipment.

## 5. WIRING DIAGRAM

The RIM-7499-BOM Switch schematic is the following:






### Notes:

- 1) Screw terminals can accept conductors up to 2.5mm<sup>2</sup>
- 2) Spade terminal is standard 4.8mm male.
- 3) Contact closure is 50 - 150mS during bucket tip.
- 4) Contact rating 0.5A AC/DC resistive.
- 5) Contact life 10 million minimum.
- 6) The protection MOV may be replaced with other two terminal protection devices as required.
- 7) Also available in dual version (SWH80-2)

## 6. DESCRIPTION

When the product is delivered, this is what you will find in the box:



Items found in the box		
Figure 1.1.	RIM-7499-BOM Rain Gauge	
Figure 1.2.	Calibration certificate	
Figure 1.3.	5mm (across flats) hex key (for receiving cylinder removal)	

The carton should be retained for storage and transit purposes. When transporting the rain gauge for calibration or repair purposes it is best shipped in its original carton using the foam inserts. This will ensure that the rain gauge will not sustain damage due to normal transit handling and vibration.

## 7. ACCESSORIES

Observator Instruments offers a wide range of accessories for RIM-7499-BOM range of product directly available from the website:



Accessories		
Figure 2.1.	Field Verification Unit (RIM-FVU)	

<b>Spare parts</b>	
7499-B02	Bucket Assembly 0.2mm for all RIMCO Rain Gauges.
7499-B025	Bucket Assembly 0.25mm for all RIMCO Rain Gauges.
7499-B05	Bucket Assembly 0.5mm for all RIMCO Rain Gauges.
7499-BRB	Bridge Bearing.
7499-BRG	Complete Bridge Assembly including bearings and end plates.
7499-BUB	Bucket Bearing for all RIMCO Rain Gauges buckets.
7499-FIL	Filter Screen (Leaf Guard) for all RIMCO Rain Gauges
7499-FUN	Funnel and Rim Assembly for RIM-7499 series
7499-JKT	Stainless Steel Outer Jacket for RIM-7499 and RIM-8500 series
7499-MAG	Magnet Slug and Arm for all RIMCO Rain Gauges
7499-ReedKit1	Single switch and magnet replacement kit for all RIMCO Rain Gauges
7499-ReedKit2	Dual switch and magnet replacement kit for all RIMCO Rain Gauges
7499-SWH-2	RIM-7499 Dual Reed Switch Kit — see 80SWH-2
7499-SYPO2B	Syphon 0.2mm for all RIMCO Rain Gauges
7499-SYPO2	Syphon 0.2mm for all RIMCO Rain Gauges
7499-SYP025	Syphon 0.25mm for all RIMCO Rain Gauges
7499-SYPO5	Syphon 0.5mm for all RIMCO Rain Gauges
7499-SYP10	Syphon 1.0mm for all RIMCO Rain Gauges
7499-TCH	Thermostatically controlled Heater Kit (12/24V @ 4/2A)
7499-TX12	Heater Transformer 240/12V AC, 50VA double insulated and fused.
7499-TX24	Heater Transformer 240/24V AC, 50VA double insulated and fused.
7499-SWH-1	Reed Switch kit for all RIMCO Rain Gauges.
7499-SWH-2	Dual Reed Switch Kit for all RIMCO Rain Gauges.

<b>Options</b>	
Heating option	12 or 24V AC/DC (48W max) operation with electronic thermostatic control (P/N 7499TCH). Isolated power supplies to allow operation from 110V AC or 220V AC, 50/60Hz are also available (P/N 7499TX12 or P/N 7499TX24).
Counter option	Liquid Crystal 6 Digit Counter (self-powered) installed in body (P/N 7499-LCD).
Dual Reed Switch Option	Dual reed switch assembly fitted (add suffix -2) to the rain gauge part number.

## 8. INSTALLATION

### Install the Rain Gauge for the first time

#### 1. Site Selection:

The WMO make the following comments regarding the location of a rain gauge:

- “The location of precipitation stations within the area of interest is important, because the number and location of gauge sites determine how well the measurements represent the actual amount of precipitation falling in the area. For more detailed information, see the WMO Guide to Hydrological Practices (WMO-No. 168).
- In choosing a site, the systematic wind field deformation above an elevated gauge orifice, as well as the effects of the site itself on the air trajectories, should be considered.

The effects of the former can be reduced by selecting a sheltered site, but not so sheltered that surrounding objects interfere sufficiently to cause a reduction of the precipitation collected. Preferably, however, the effects can be reduced by using a ground-level gauge for liquid precipitation or by making the airflow horizontal above the gauge orifice using the following techniques.

These are listed in the order of decreasing effectiveness:

- a) In area having homogeneous dense vegetation, the height of such vegetation should be kept at the same level as the gauge orifice by regular clipping;
- b) In other areas, by stimulating the effect in (a) by using an appropriate fence structure;
- c) By using wind shields around the gauge.

The effects of the site itself can give rise to local excesses and deficiencies of precipitation falling onto the site. In general, objects should not be closer to the gauge than a distance twice their height above the gauge orifice. For each site the average angle of obstacles should be estimated, and a site plan made. Sites on a slope or on the roof of a building should be avoided. The surface surrounding the precipitation gauge can be covered with short grass or gravel or shingle, but hard, flat surfaces such as concrete should be avoided to prevent excessive in-splashing. Sites selected for measurement of snowfall and/or snow cover should be in areas sheltered from the wind as much as possible. The best sites are often found in clearings within forests or orchards, among trees, in scrub or shrub forests, or where other objects act as an effective wind-break for winds from all directions.

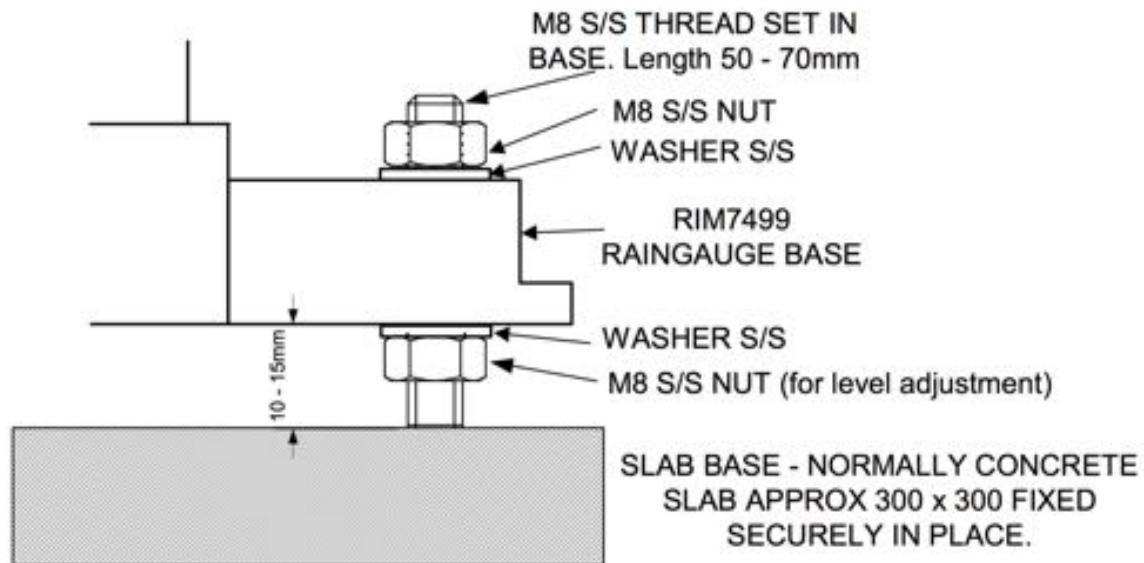
The fact that data analysis is made easier if the same gauges are used and if siting criteria are similar should be a serious consideration in the planning for networks.”

Consequently, we recommend that rain gauges be bolted onto small concrete slabs in such a way that they are easily levelled on site and then securely fasten to stop movement due to vibration as well as minimizing theft.

## 2. Installation:

The slab should be approximately 300mm x 300mm with three M8 stainless steel mounting studs set in at a 120° pitch on a 256mm diameter. The threaded studs should protrude at least 50mm from the base of the slab.

The rain gauge is then fastened to the bolts as detailed below.



- Choose a suitable site and prepare a rigid slab for the rain gauge that allows discharged water to flow away freely. The rain gauge should preferably be installed on bolts mounted in a concrete slab (about 300 x 300mm) at ground level.
- Remove the rain gauge from its carton by opening the carton flaps at the top and removing the exposed moulded foam packing vertically. This will expose the rain gauge. The User Manual, Calibration Certificate and 5mm hex-key are normally placed in the collection funnel when packaged in the factory – remove these. Carefully lift out the rain gauge vertically and place on a stable bench or work area. Return the foam packing in the carton and store away, or dispose of, in an environmentally acceptable manner.
- Loosen the three hex cap-head screws near the bottom of the stainless steel jacket with the hex-key provided and carefully remove the receiving cylinder assembly by lifting it vertically. The copper receiving funnel may have already begun to oxidize (discolor) – this is normal and eventually the funnel will oxidize to a dull dark finish which is the ideal finish.
- If necessary install the cabling and terminate on the switch assembly using either the screw terminations or the 4.8mm male spade connector.
- Screw on a stainless nut on each of the threaded studs set into the concrete slab so that the bottom of the nut is about 5 – 10mm from the base of the slab. Then place a stainless steel washer on top of each of the nuts.



- f) Position the rain gauge onto the slab so that the three rain gauge mounting holes pass through threaded studs and rest on the stainless steel washers. Place another stainless steel washer on the stud (on top of rain gauge base) and loosely thread another nut on the three studs.
- g) Level the unit by adjusting the lower nuts until the bubble is in the center of the vial. Secure the rain gauge to the base by tightening the top nuts on the slab studs and ensure the rain gauge remains level.
- h) Carefully remove the rubber band and the protective tissue paper from the bucket mechanism. Remove the foam bearing protector strips by gently pulling them whilst gently lifting the bucket. Do not touch the inside of the bucket surface.
- i) Connect the rain gauge to its recording device and gently tilt the bucket from side to side and ensure the recorder acknowledges one count for each bucket tip.

**CAUTION: DO NOT TOUCH INSIDE OF THE BUCKET**

- j) Carefully replace the receiving cylinder assembly and secure the three cap-head screws with the key provided. Do not over tighten.



**Typical Installation**

### **3. Operation**

The rain gauge is now ready for normal operation and should only require infrequent maintenance as described in the following chapter.

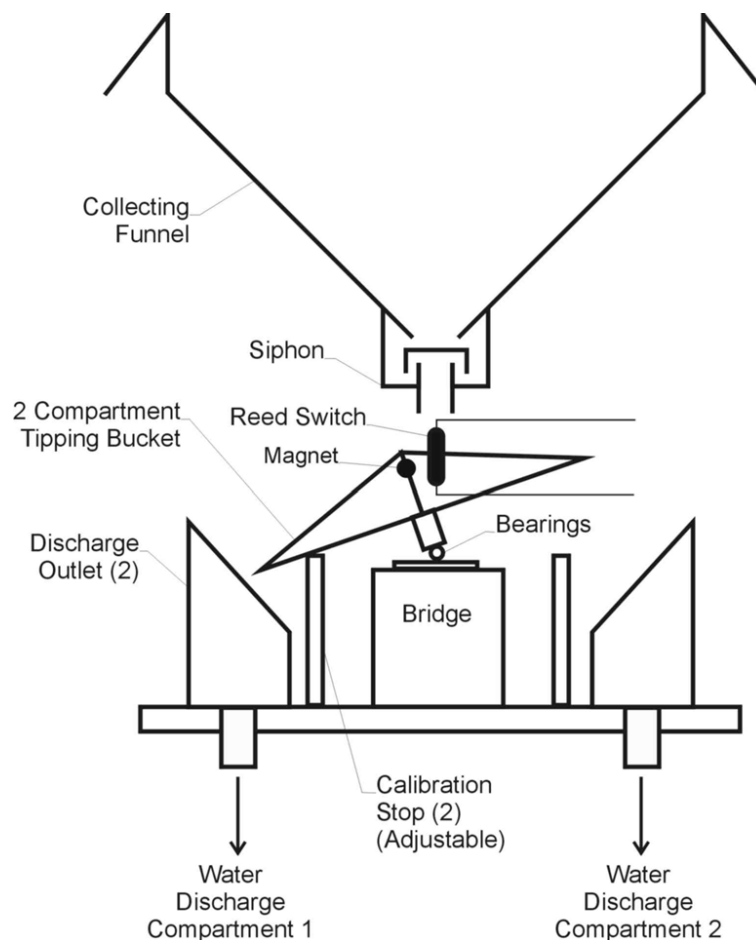


## 9. OPERATION THEORY

Rain falling on the 203mm collecting funnel is directed through a siphon control unit and discharges as a steady stream into a two compartment bucket mounted in unstable equilibrium.

- As each compartment fills the bucket tilts alternately about its axis. Each tip forces a momentary contact closure by magnetic means corresponding to 0.2, 0.25, 0.5 or 1.0mm of rainfall according to bucket capacity.
- The siphon discharge volume is normally adjusted to be nominally half that of each bucket compartment to ensure optimal timing performance. This is necessary when rain intensity measurements are required.
- Water discharged by each bucket compartment is passed through individual discharge outlets configured to allow for simple post measurement collection for confirmation purposes.

A simple schematic of the rain gauge is shown below.



# 10. MAINTENANCE

## Maintenance strategy

The RIM-7499 series of raingauges are designed for long term deployment with the minimum of maintenance required. The level of maintenance required is site specific and should be determined at time installation. If the site is subject to falling leaves then occasional clearing of the collection may be required as leaves collect. Similarly, if the site is subject to dust then the siphon may require more regular inspection.

Below are some points to assist in the determination of a maintenance strategy for the raingauges.

1. No lubrication is required on the bearing surfaces and they are normally self cleaning. If necessary, remove any dust from the bucket bearings with a small soft hair brush.
2. The inside of the bucket may be cleaned with a clean soft cloth wetted with mild soapy water followed by a clean water rinse. Do not touch the inside surface with fingers or greasy substances as this will increase the surface tension of the rainwater resulting in higher counts (rainfall over-estimation).
3. To clean the siphon unit, remove the siphon by unscrewing it from the underside of the collecting funnel. Please note the siphon also holds the mesh strainer cylinder in position - this may be cleaned at the same time.  
Unscrewing the slot inside the siphon anticlockwise will dismantle the siphon. The two parts may then be cleaned with a non-solvent cleaner such a detergent solution using a small stiff brush to remove dust and other debris. Use a pipe cleaner to clean the nozzle - never use an abrasive cleaner.  
Reassemble the siphon taking care not to over tighten the two siphon parts when screwing them together.
4. When testing the rain gauge with its cover removed the test water must pass through the siphon which should be positioned approximately 5mm above the bucket.
5. A bucket refurbishment kit for field use is available from Observer Instruments that will replat the bucket surface where signs of gold removal are evident. For proper application it should be used every 6 months to one year depending on the site conditions. Contact Observer Instruments or your local RIMCO distributor for more details.

# 11. CALIBRATION

Calibration should only be performed by experienced users who intent to configure the sensor in a different mode.

Before calibrating the sensor, please read the RIM-FVU calibration manual available on our website:

<http://download.observator.com/files/?dir=User manuals/>

Basically calibration of the rain gauges is implemented by discharging a known quantity of water into the rain gauge receiver funnel through a nozzle of known diameter and ensuring the number of bucket tips is within a defined range.

The nozzle diameter simulates a rainfall rate into a 203mm diameter receiver as tabled below:

Nozzle Diameter (mm)	Rainfall (mm/hr)	(inches/hr)
0.40	16	0.63
0.60	36	1.42
0.75	59	2.32
0.90	109	4.29
1.00	127	5.00
1.15	194	7.64
1.30	273	10.74
1.55	350	13.78

Observator Instruments normally calibrates the RIMCO rain gauges using 0.6, 0.9 and 1.55mm nozzles placed nominally 400mm above the base of the rain gauge. The volume of water used is 650, 810, and 1620cm<sup>3</sup> as tabled below.

The results should be:

Bucket Capacity	Bucket Volume	Test Quantity	Tips
(mm)	(cm <sup>3</sup> )	(cm <sup>3</sup> )	Number
0.2	6.48	650	100 ± 3
0.25	8.10	810	100 ± 3
0.5	16.2	1620	100 ± 3

- To allow for the possibility of some water remaining in the bucket and the siphon at the conclusion of a test, run the test at least three times and average the number of tips per test. This will reduce the error introduced by any water retention in the siphon and bucket.
- Make it a rule to begin all test runs with the bucket in the same starting position.
- Only make adjustments to the stop screws after several measurement test runs have determined a calibration discrepancy.
- Checking calibration by measurement of individual measurement of bucket capacity is not satisfactory and introduces errors of up to 20%.

## Typical Calibration Certificate



### RIM-7499-BOM SERIES TIPPING BUCKET RAIN GAUGE Works Calibration Certificate.

Model: RIM-7499-BOM

Serial number:

Customer: \_\_\_\_\_

Bucket capacity: 0.2mm

Preliminary setting: ☒ 10 tips per side, 65cm<sup>3</sup> each side.

Calibrated at 0.75mm ☒ 100 ± 2 tips per 650ml at approx 60mm/hr.

Accuracy Run:

Nozzle dia.	Approx. flow	Run 1	Run 2	Run 3
0.75mm	60mm/hr			
0.6mm	36mm/hr			
0.9mm	110mm/hr			
0.75mm	60mm/hr			

Error allowed: ±2 tip up to 100mm/hr  
±3 tips from 101 to 200mm/hr

..... (Signature)

Date: .....

 **OBSERVATOR**  
instruments  
ABN 56 007 283 963  
8-10 Keith Campbell Court, PO Box 9039  
Scoresby, VIC 3179 AUSTRALIA  
Tel: +61 3 8706 5000. Fax: +61 3 8706 5049

## 12. SERVICE & SUPPORT COVERAGE



*RIM-7499-BOM*



### **Valid Warranty**

Warranty on Rimco products is one year.  
See our Warranty and Terms and condition for details.



### **Telephone Technical Support**

You can contact us any time about Technical Support.



### **Repair and Service Coverage**

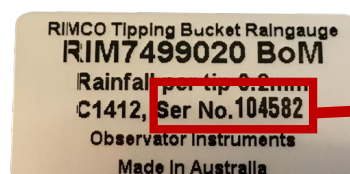
Please **enquire** about a maintenance program.

**If warranty or repair is required, please request an RMA  
number at the Observator Website:**

**<https://observator.com/en/support/rma-request>**

You will need: 1. Your Serial Number (can be found on the Rain Gauge sticker)

2. A valid E-Mail



S/N: 104582

## Warranty conditions

RIM-7499-BOM Rain Gauges are warranted against defects in material and workmanship for one year from date of warranty registration. The **warranty does not cover corrosion or leakage due to corrosion. Unauthorized service, tampering or abuse will void this warranty. Damage as a result of improper installation will also void this warranty.**

- 1) Damage caused by unauthorized repair, alteration or substitution of non-standard parts, incorrect installation, misuse, negligence, accident or similar cause, or usage other than in accordance with the operating instructions, or any third party or consequential damage, or loss, is not covered by this warranty.
- 2) No responsibility will be accepted for loss or damage in transit. Freight and insurance charges are to the owner's account.
- 3) This warranty is limited to the replacement or factory replacement cost of the faulty part(s) required.
- 4) The replacement of any part or labor involved will not have the effect of extending the warranty period of this equipment.
- 5) Any faulty part replaced under warranty becomes the property of the company for purposes of examination and claim under proprietary warranty.
- 6) Claims under the warranty will be considered only if proof of purchase can be furnished.
- 7) This warranty is not transferable by the original purchaser.

Should you require service (under warranty or otherwise) please **contact Observator Instruments distributor from whom you purchased the Rain Gauge, or our Service Centre.** If the Rain Gauge is being returned for service under warranty, please supply proof of purchase and the Warranty document which has been emailed to you during the warranty registration.

All support enquiries must include:

1. The serial number of the probe labelled on the casing of the Rain Gauge
2. The shipping address for Rain Gauge returns

## Contact & more information

Additional Information, including training video, this manual up-to-date and tutorials are available on our training page:

<http://download.observator.com/files/?dir=User manuals/>



ABN 56 007 283 963  
8-10 Keith Campbell Court, PO Box 9039  
Scoresby, VIC 3179 AUSTRALIA  
Tel: +61 3 8706 5000, Fax: +61 3 8706 5049  
Email: [info.au@observator.com](mailto:info.au@observator.com)  
Web: [www.observator.com](http://www.observator.com)