

INSTRUCTION MANUAL
TIPPING BUCKET RAIN GAUGE
MODEL TB4/Series II



QUALITY SYSTEM
ISO:9001
CERTIFIED

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TIPPING BUCKET RAIN GAUGE MODEL TB4 Series II

I GENERAL

The HyQuest Solutions Tipping Bucket Rain gauge (TB4/Series II) is recognised as the standard for measuring rainfall and precipitation in remote and unattended locations.

The TB4 Series II Rain gauge operates on the tipping bucket principle. A receiver of 200mm diameter collects the rainfall which is strained by a metal gauze before being passed to the tipping bucket measuring system. Tips of the bucket occur with each 0.1mm, 0.2mm, 0.5mm 1.0mm or 0.01inch of precipitation collected and a reed switch detects these events and produces a momentary contact closure signal for:

- logging in our Rainfall Data Logger iRIS Undercover and using 4G to transmit the rainfall data.
- logging in our Rainfall Data Logger ML1A-FL
- transmission by our Rainfall Internet of Things (ML-IoT) to Kisters Cloud

II UNPACKING YOUR TB4 RAIN GAUGE

This package should contain:

- TB4 Series II Rain gauge
- TB311/5 5 metre connecting lead

Please verify you have received these items and that the Tipping Bucket Rain gauge resolution is as ordered.

To prepare the Tipping Bucket Rain gauge for installation:

- lift the unit from the carton and place on secure surface
- remove polythene bag
- loosen the three enclosure securing screws and back them off until screw head is clear of the enclosure.
- lift the enclosure from the gauge
- carefully remove the elastic band/support pad from the bucket.

Your Tipping Bucket Rain gauge is now ready for installation.

III SPECIFICATION

Receiver: 200 mm \pm 0.3 diameter heavy duty cast aluminium, Powder coated for 0.2mm, 0.01", 0.5mm and 1.0mm

282.84 \pm 0.3 mm diameter heavy duty cast aluminium, Powder coated for 0.1mm

Bucket capacity: Plastic: 0.1mm, 0.2 mm, 0.5 mm, 0.01 inch of rainfall.
Metal: 1.0 mm of rainfall

Sensitivity: one tip.

Maximum intensity: 700 mm / hr.

Calibration accuracy:

TB4 bucket capacity	Measuring range	Accuracy
0.1mm, 0.2mm, 0.01" & 1.0 mm	0-250mm/hr	\pm 2 %
	250-500mm/hr	\pm 3 %

Long term stable calibration.

Humidity: 0 to 100 %

Temperature: - 20 to +70°C

Contact system: dual reed switches moulded and sealed, with varistor protection.
 -Max Capacity: 0.5 amp, 24 Volts D.C.
 - Resistance: Initial contact resistance 0.1 OHMS
 - M.T.B.F: 10⁸ to 10⁹ Operations

Syphon: 0.4 mm (12ml) capacity of rainfall - made from brass with a non hydroscopic outer case. The syphon can be dismantled for routine cleaning and servicing.

Bucket: Two types of buckets, synthetic ceramic coated brass bucket balanced to + 0.05 gms for 1mm bucket only, and injection moulded non hydroscopic ASA UV stabilised balanced + 0.05gms for 0.2mm, 0.5mm and 0.01".

Base: injection moulded non-hydroscopic ASA plastic UV stabilised.

Level: bulls eye level fitted to base.

Mounting holes: three slots 20mm L x 10mm W equispaced @ 244 mm PCD in feet moulded to outside diameter of base.

Drain fittings: to attach 12 mm inside diameter tubing, to catch rainfall after passing through buckets.

Bucket pivot system: ground Sapphire Pivots with tough 316g stainless steel shaft.

Insect covers: in-built mesh and stainless steel mesh on all openings to prevent insects and ants entering gauge.

Outer enclosure:	keyed to enable the release of the outer enclosure without the need for the removal of the three securing screws.
Height:	330mm
Weight:	2.2 kg
Packed Dimensions:	24cm L x 24cm W x 42cm H x 5 kg (0.03m ³)

IV INSTALLATION

(i) Site Selection

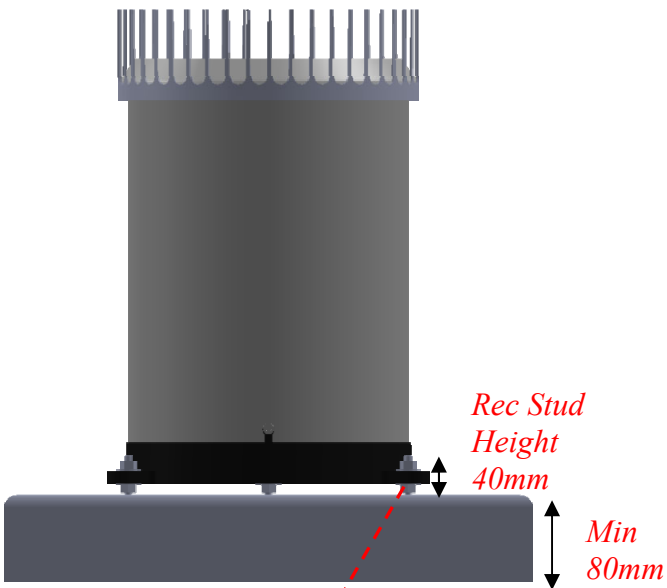
Rainfall measurements are intended to be representative of the actual rain falling on a given area. Some of the more important factors which influence the representativeness of a gauge are as follows:

- Site the gauge on level ground where possible. Avoid sloping sites.
- Site should have adequate protection from strong winds.
- Site should be free of large obstructions such as buildings and trees.
- Provide suitable ground surface to avoid splashing into the gauge.

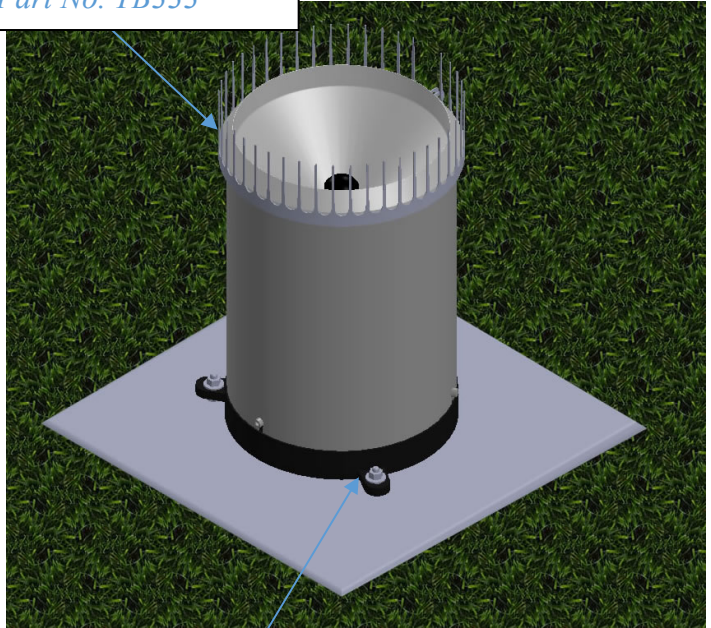
(ii) Setting up

- Install the gauge on the foundation. A suggested foundation is shown in Diagram 1.
- Loosen the three enclosure securing screws and the enclosure.
- The gauge is provided with a bull's eye level. Adjust the nuts on mounting bolts until gauge is level.
- Connect lead to the Rain Gauge terminals, refer to Diagram 7 page 11, and to the recording device, in accordance with manufacturer's instructions.

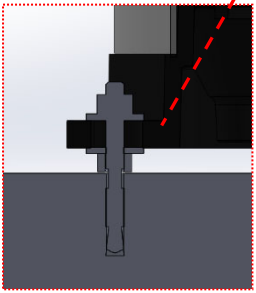
Floor Mount:



*Optional Bird Guard
Part No. TB333*



*M6 Stainless Steel Anchor Studs
(Not Supplied, required quantities 3 off)*



Drill 3 x holes equispaced on a 244 Dia PCD, to suit M6 Stainless Steel Anchor Studs.

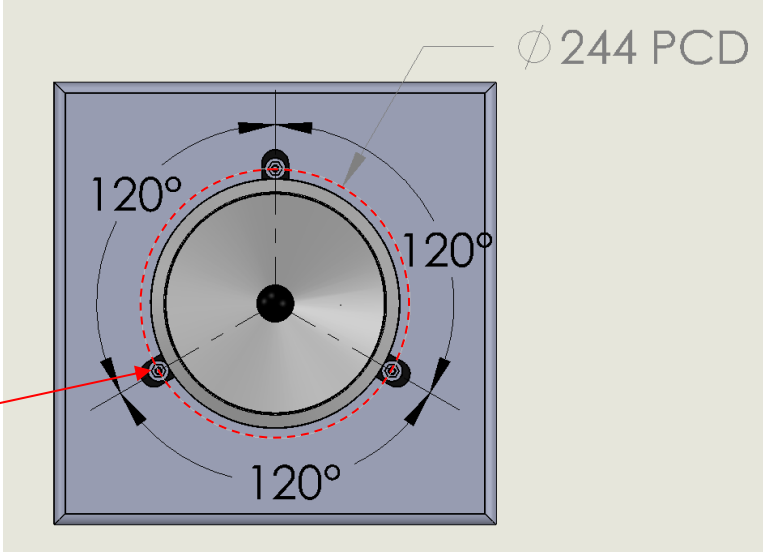
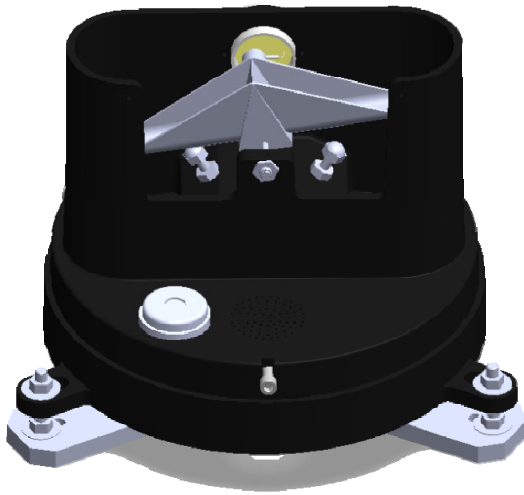


Diagram 1

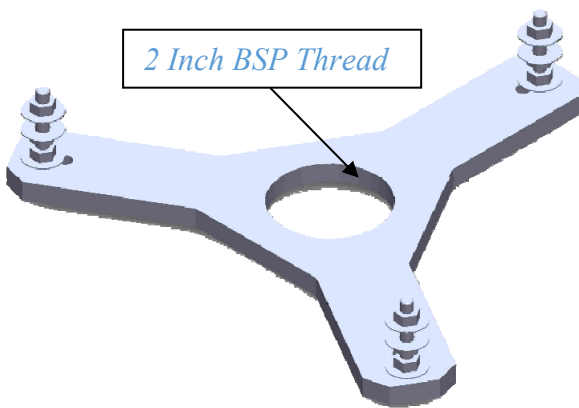
Pole Mount:



*Optional Bird Guard
Part No. TB333*

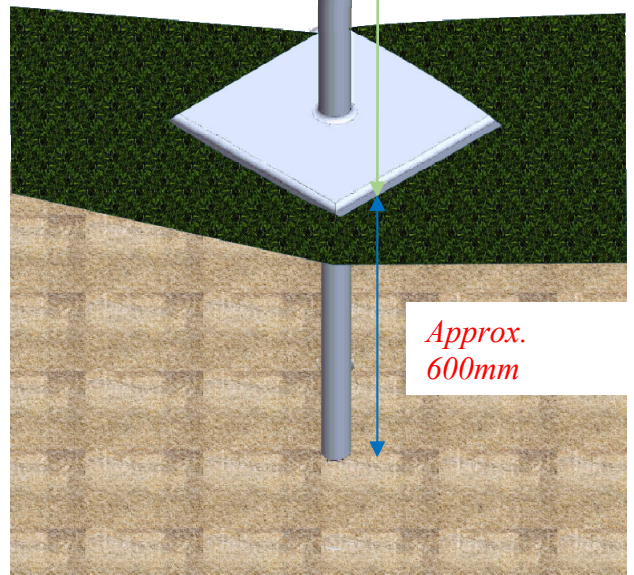
*2 Inch BSP threaded
end Galvanised Pipe
(Not Supplied)*

*Approx.
1200mm*



2 Inch BSP Thread

*Optional Pole Mount Bracket
Part No. TB334*



*Approx.
600mm*

Diagram 2

Roof Mount:

The Rain Gauge can also be mounted on a pitched roof with maximum angle of 15 degrees.

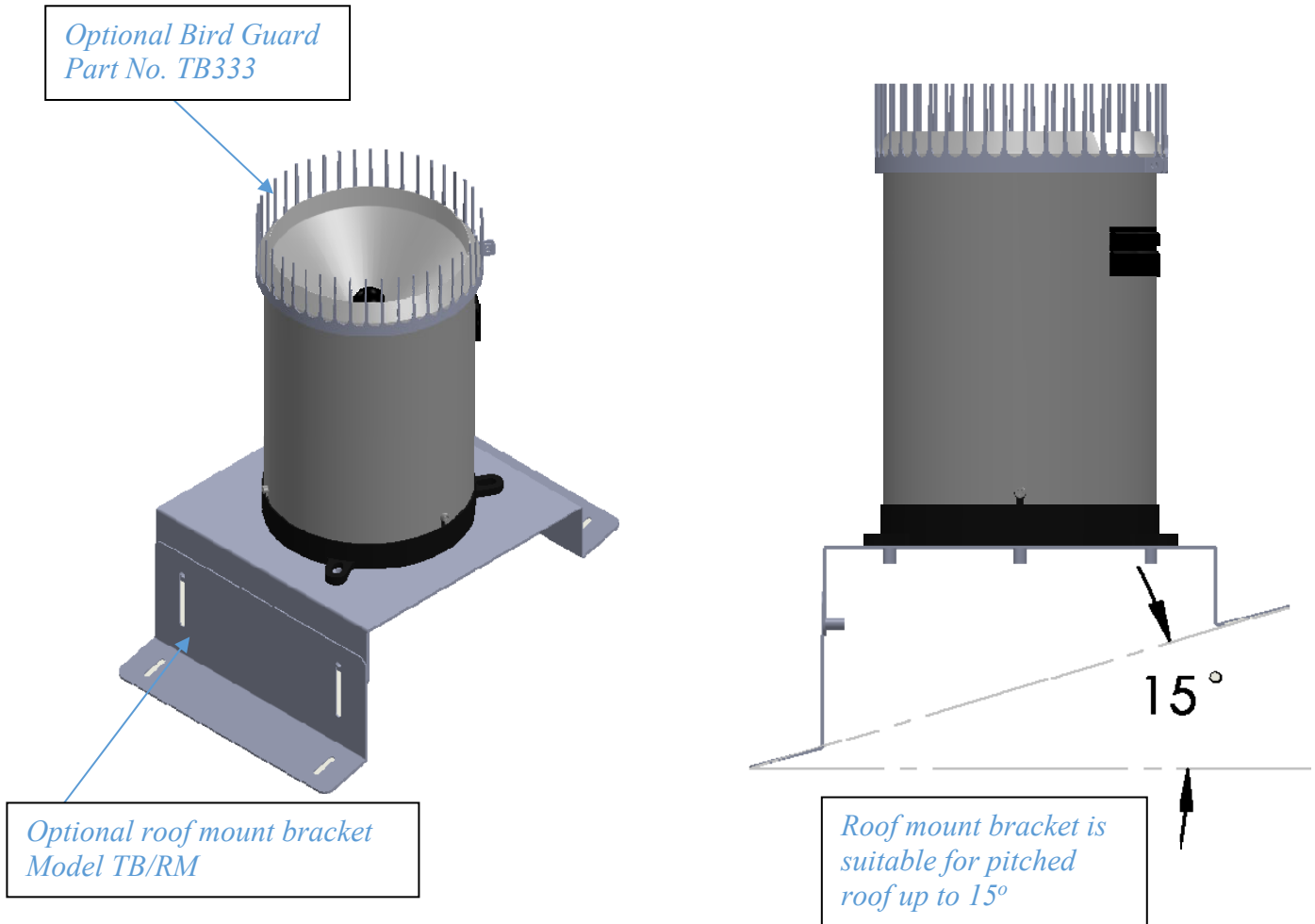


Diagram 3

V TEST OPERATION

- manually tip the bucket a number of times, ensuring that each tip is being recorded and that the tilting mechanism is operating freely.
- Replace and secure the enclosure.

VI MAINTENANCE

The only routine maintenance required is cleaning. The following items should be checked regularly for cleanliness:

- **Catch filter**
- **Syphon (refer diagram 5)**
- **Interior of bucket**
- **Top surface of adjusting screws**
- **Enclosure locking screws - lightly lubricate after cleaning**
- **All insect screens**

i. Dismantle Details

- (a) Unscrew nut
- (b) Lightly press stem down on surface until stem pops out of syphon body.
- (c) Remove stem from syphon body.
- (d) Unscrew cap
- (e) Clean all items

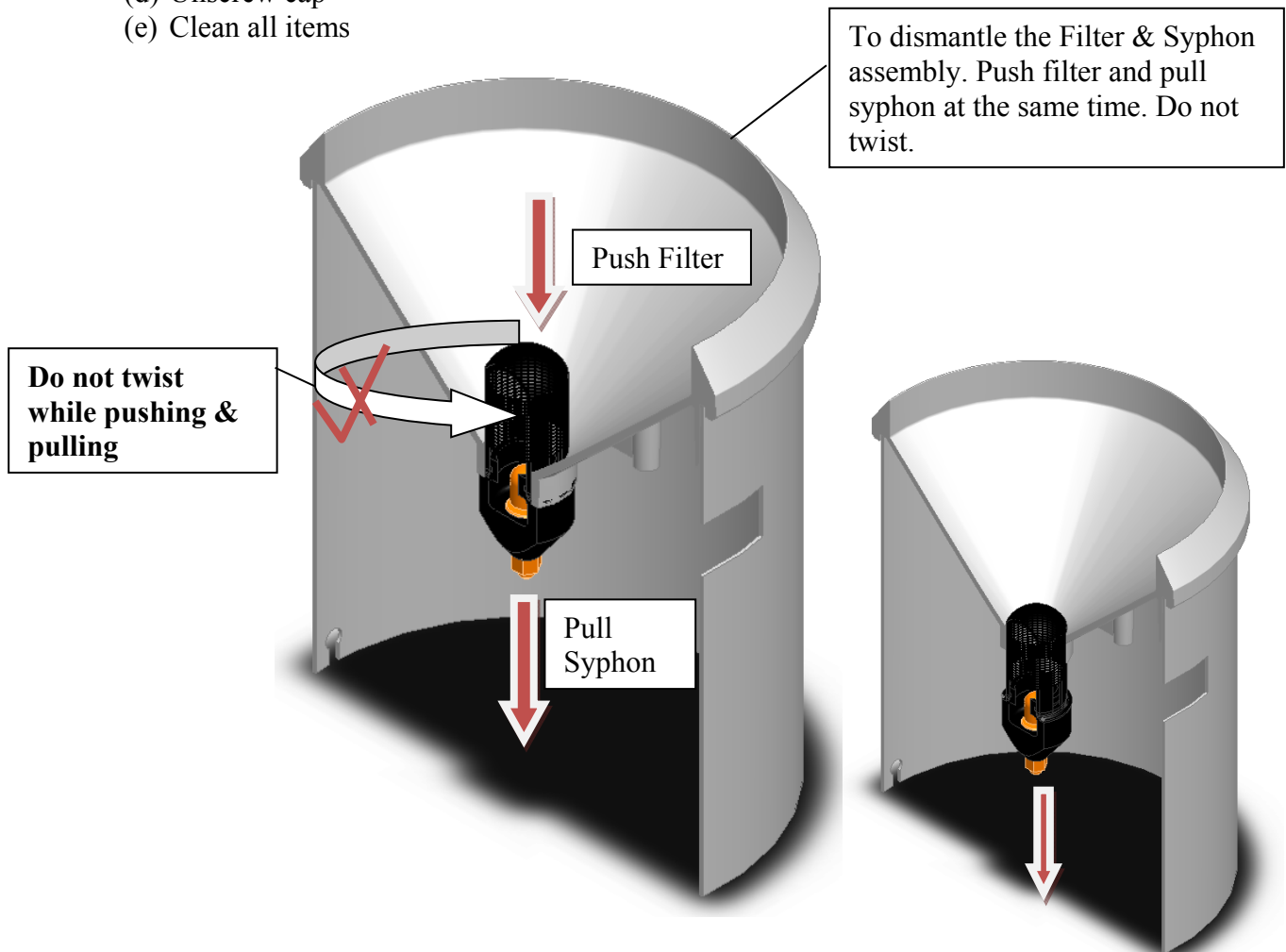


Diagram 4

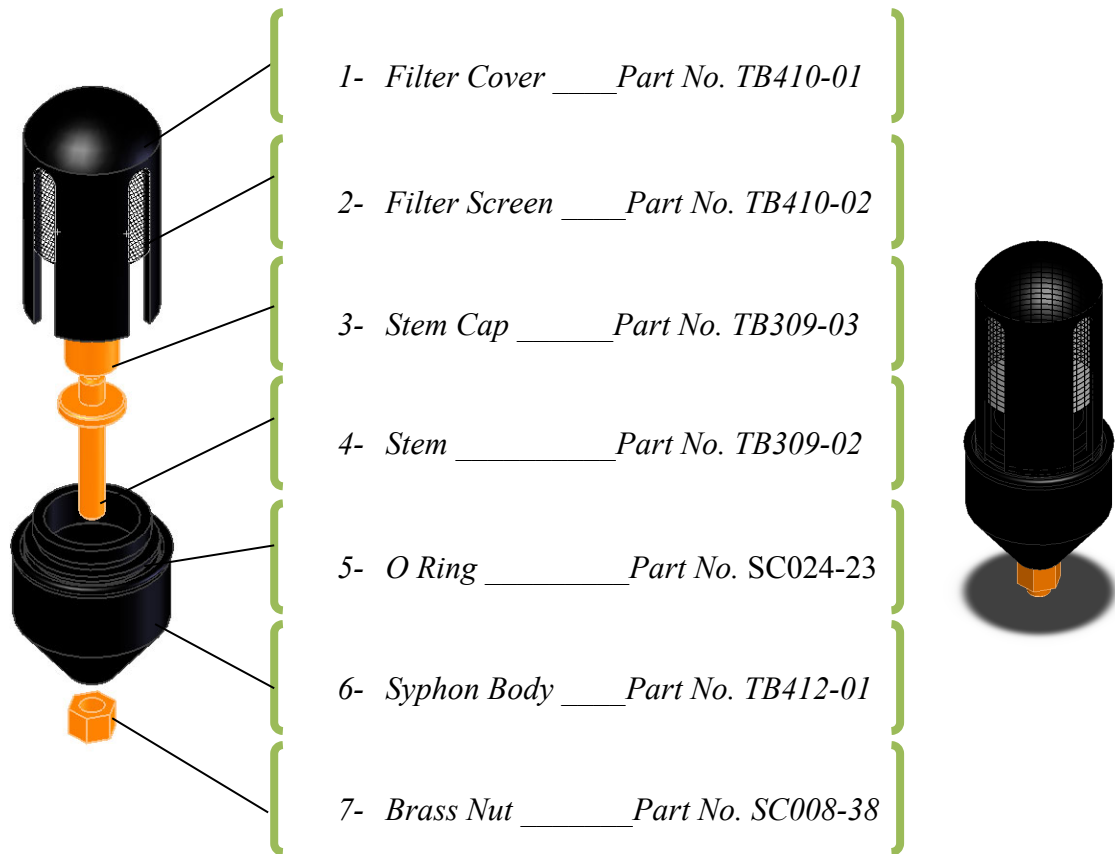


Diagram 5

ii. Assembly Details

- (a) Screw cap on stem. Finger tight only.
- (b) Push stem into syphon body.
- (c) Replace nut and tighten. Do not over tighten.

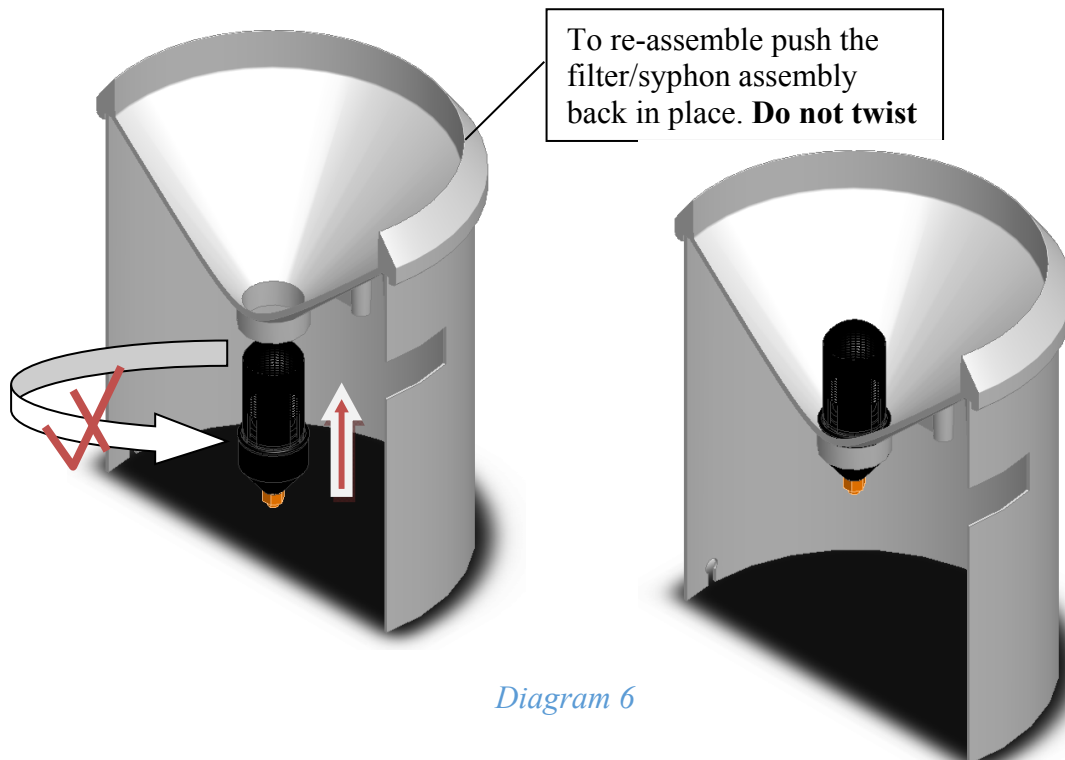
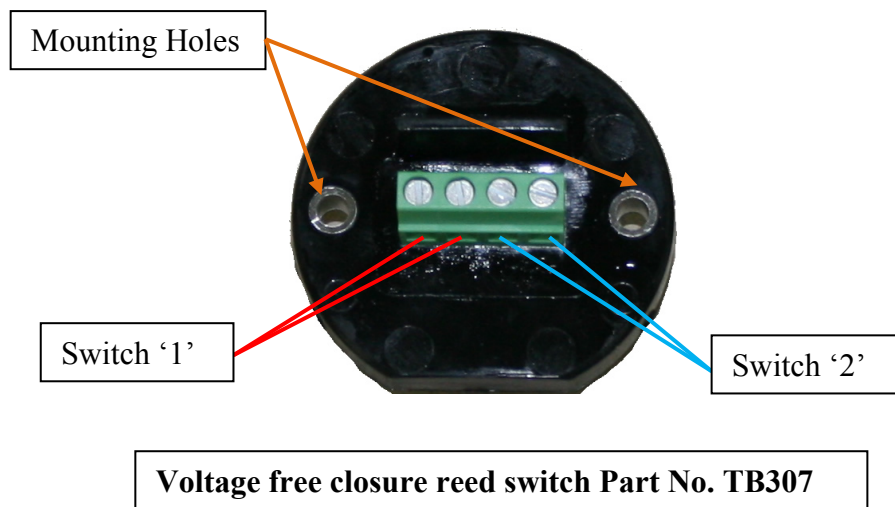


Diagram 6

VII ELECTRICAL

Dual reed switches are provided for several reasons:

- Two isolated switches permit the control of two separate circuits; e.g. a local counter and a telemetry circuit.
- Parallel connection of both switches increases the current carrying capacity of the contact system if required.
- Parallel switch operation confers a degree of redundancy in locations where data from the Rain gauge is critical to flood warning etc.



VIII CALIBRATION

All gauges have been calibrated by HyQuest Solutions Pty Ltd, prior to despatch. The following products and services are available from HyQuest Solutions Pty Ltd:

- Field Calibration Device, Model FCD, for routine field check calibrations, supplied with operating instruction sheet refers to page 18.
- Laboratory Calibration Unit, Model TB340A, for calibration after servicing in workshops, supplied with operating manual.
- Recalibration Service at HyQuest Solutions' factory.

Please contact either HyQuest Solutions Pty Ltd or our local distributor for further information.

IX TB4 PART LIST

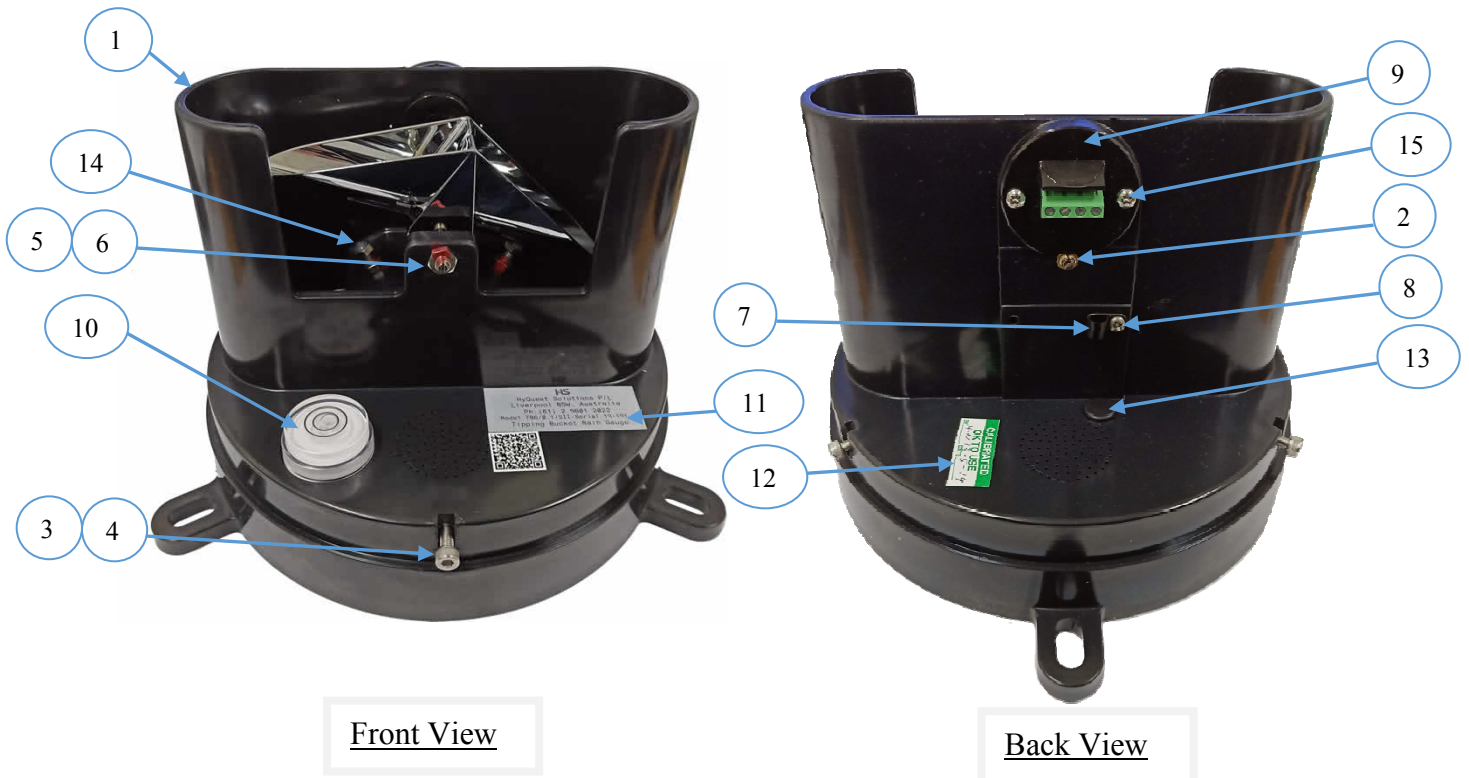


Note:

The TB4 Series II Rain gauge is ordered with a synthetic ceramic coated brass bucket for 1mm size bucket only or chrome plated injection moulded non hydroscopic plastic ABS for the 0.2mm, 0.5mm or 0.01”.

Rain gauge Part No.	Rain gauge Description
TB4/0.1/Series II	Tipping Bucket Rain gauge, bucket capacity 0.1mm, bucket type chrome plated injection moulded non hydroscopic plastic ABS UV stabilised
TB4/0.2/Series II	Tipping Bucket Rain gauge, bucket capacity 0.2mm, bucket type chrome plated injection moulded non hydroscopic plastic ABS UV stabilised
TB4/0.01/ Series II	Tipping Bucket Rain gauge, bucket capacity 0.01inch, bucket type chrome plated injection moulded non hydroscopic plastic ABS stabilised
TB4/0.5/ Series II	Tipping Bucket Rain gauge, bucket capacity 0.5mm, bucket type chrome plated injection moulded non hydroscopic plastic ABS stabilised
TB4/1.0/M/ Series II	Tipping Bucket Rain gauge, bucket capacity 1.0mm, bucket type synthetic ceramic coated brass

TB4 Series II Base Part List



REFERENCE	PART_ID	DESCRIPTION	QTY_PER
1	TB701-01	BASE-INJECTION MOULDED	1
2	TB701-03	BRASS INSERT	2
3	SC008-29	M5x0.8 SS304 HEX NUT	3
4	SC045-21	SOC HD CAPSCREW M5x0.8x12 SS304	3
5	TB301-05	PIVOT SCREW	2
6	TB301-06	PIVOT SCREW LOCK NUT	2
7	SC006-12	MINIATURE P CLIP #20-PTC 6.4B	1
8	SC022-114	6GA x 1/4 SELF TAPPING SCREW 304 PAN HD PHILLIPS STAINLESS STEEL	1
9	TB307	MODEL TB3 RAIN GAUGE 24V REED SWITCH ASSEMBLY	0.5
10	SC023-09	BULL'S EYE LEVEL	1
11	SC100-09	SERIAL PLATE	1
12	SC100-06	CALIBRATED LABEL	1
13	SC040-58	SPFM10 10MM FINNED SNAP IN PLUG BLACK	1
14	TB312	ADJUSTING SCREW ASSEMBLY	2
15	SC022-116	6GA x 1/2 SELF TAPPING SCREW 304 PAN HD PHILLIPS STAINLESS STEEL	2

TB4 Series II Bucket Part List

16
Part no: TB304/0.2P
Descript: Bucket (0.2mm, 0.01")
or
Part no: TB304/0.5P
Descript: Bucket (0.5mm)
Quantity: 1

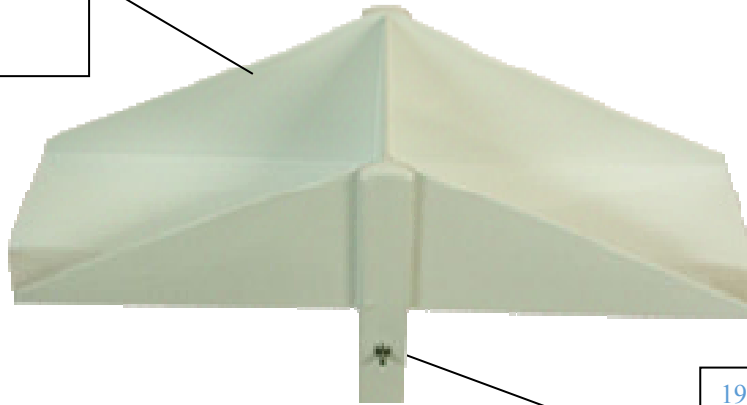


ABS UV
Stabilised
Plastic Bucket

17
Part no: TB304-03
Descript: Bucket Axle
Quantity: 1

OR

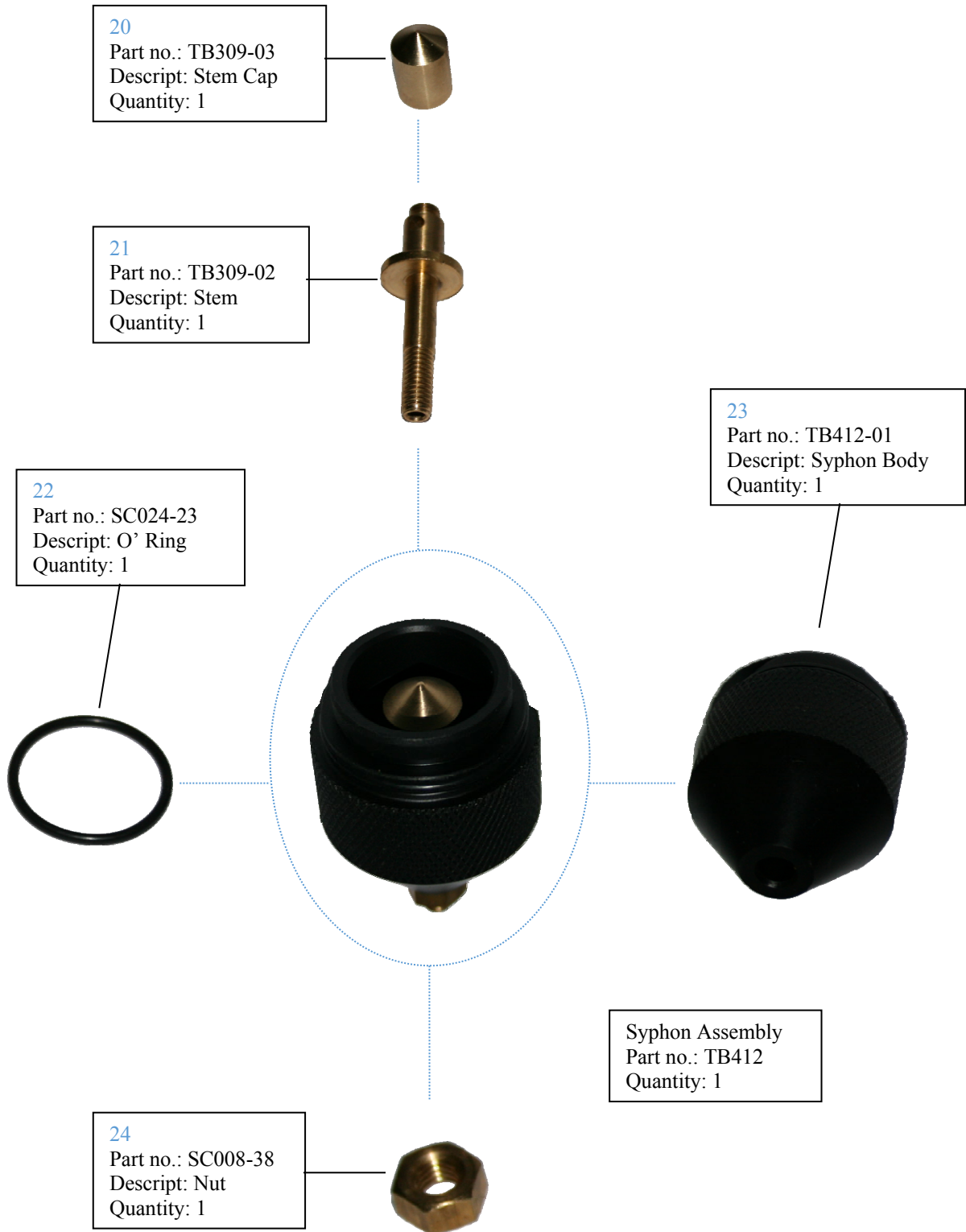
18
Part no: TB306
Descript: Bucket (1.0mm)
Quantity: 1



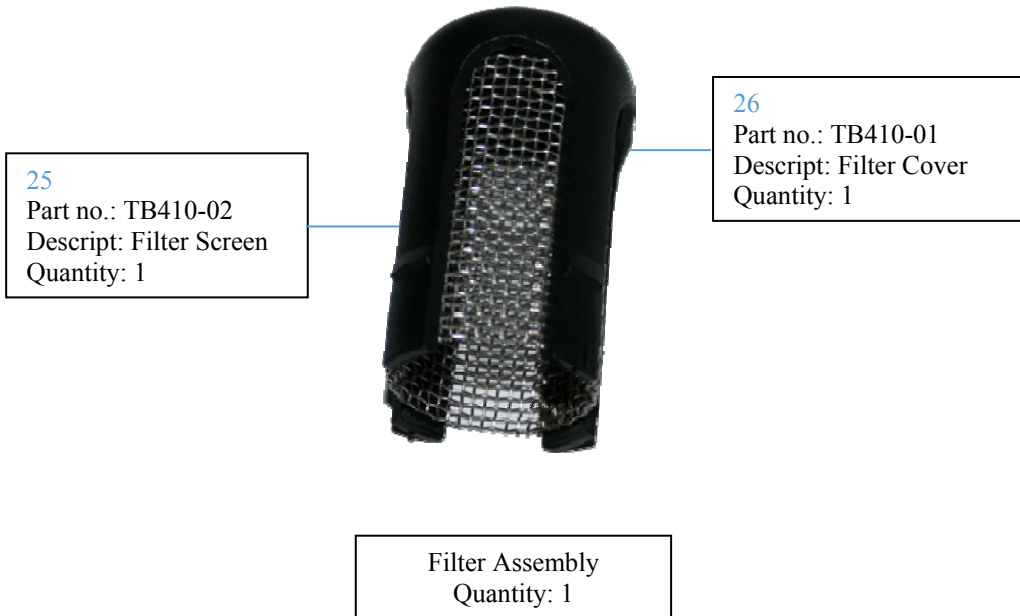
Metal Bucket
1mm only

19
Part no: TB304-03
Descript: Bucket Axle
Quantity: 1

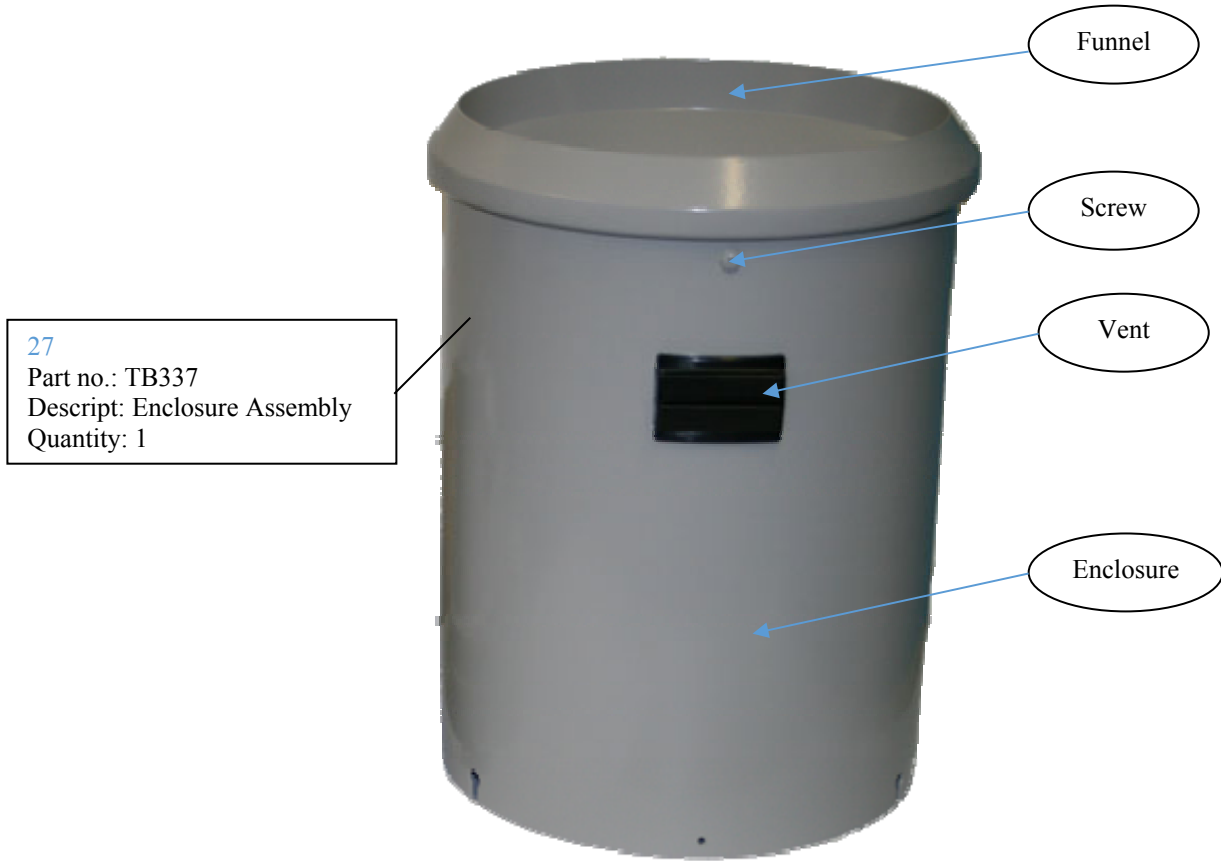
Syphon Part List



Filter Part List



Enclosure Part List

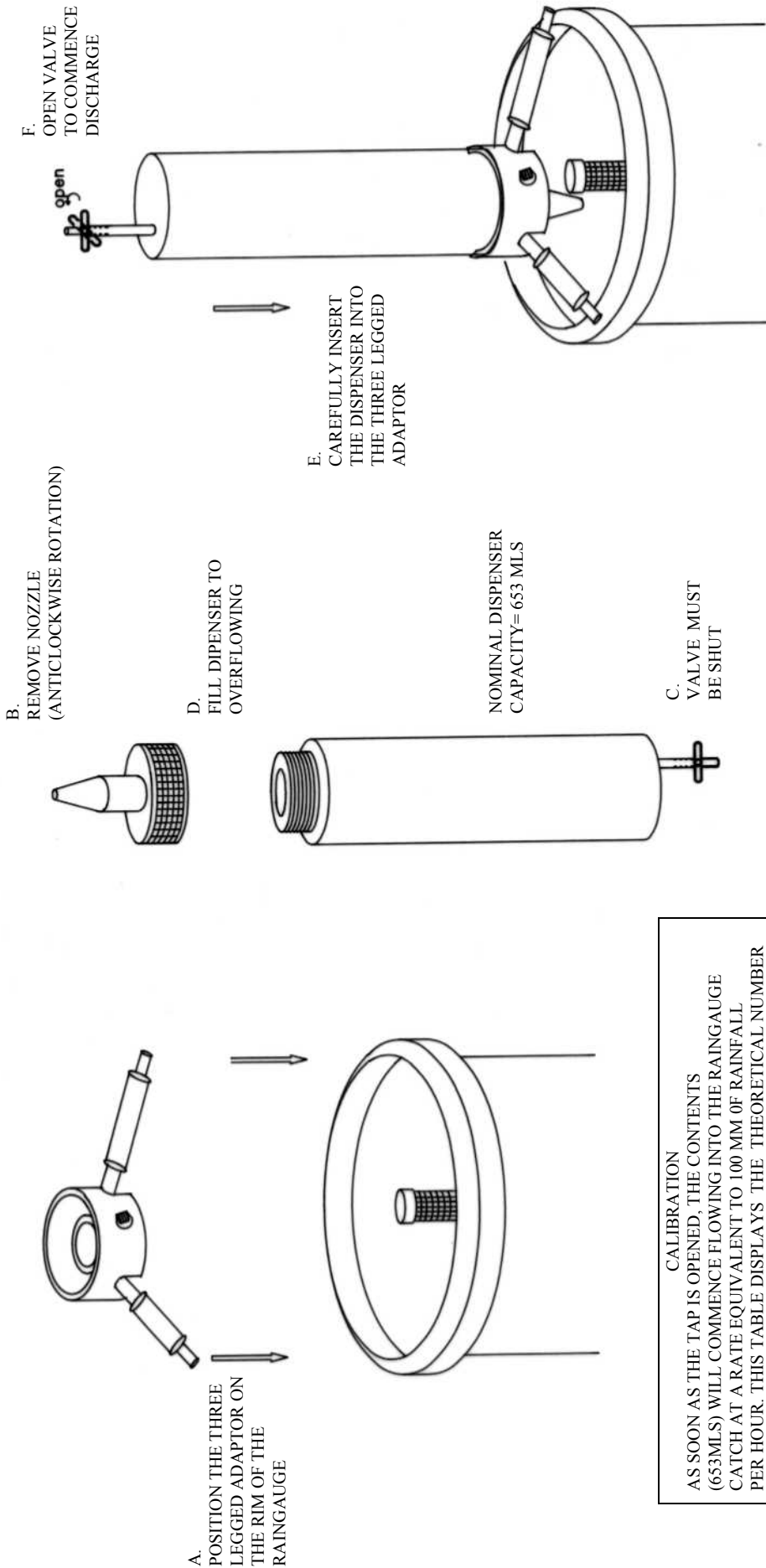


Part no.	Description	Quantity
TB337-01	Funnel	1
TB337-02	Enclosure	1
TB418-06	Vent	1
SC022-72	Screw	3

TB337 breakdown assembly

NOTE: PLEASE WET RAIN GAUGE PRIOR TO CALIBRATION

X FIELD CALIBRATION DEVICE



CALIBRATION		
AS SOON AS THE TAP IS OPENED, THE CONTENTS (653MLS) WILL COMMENCE FLOWING INTO THE RAINGAUGE CATCH AT A RATE EQUIVALENT TO 100 MM OF RAINFALL PER HOUR. THIS TABLE DISPLAYS THE THEORETICAL NUMBER OF BUCKET TIPS THAT SHOULD BE ACHIEVED.		
THEORETICAL NUMBER OF TIPS		
BUCKET SIZE	200 MM CATCH	203 MM (8") CATCH
0.2 MM	103.9	100.9
0.5 MM	41.6	40.4
0.01 INCH	81.8	79.4
IF THE OBSERVED RESULTS ARE UNACCEPTABLE THEN REFER TO THE RAINGAUGE INSTRUCTION MANUAL FOR APPROPRIATE ADJUSTMENTS		

INSTRUCTION FOR TIPPING BUCKET

RAIN GAUGE FIELD CALIBRATOR (FCD)