

INSTRUCTION MANUAL
TIPPING BUCKET RAIN GAUGE
MODEL TB7



QUALITY SYSTEM
ISO: 9001
CERTIFIED

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TIPPING BUCKET RAIN GAUGE MODEL TB7

I GENERAL

The HyQuest Solutions Pty Ltd Tipping Bucket Rain Gauge (TB7) is recognised as the standard for measuring rainfall and precipitation in remote and unattended locations.

The TB7 Rain Gauge operates on the tipping bucket principle. A receiver of 200mm diameter collects the rainfall which is strained by a gauze before being passed to the tipping bucket measuring system. Tips of the bucket occur with each 0.2mm, 0.5mm 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 TB7 RAIN GAUGE

This package should contain:

- TB7 Rain Gauge
- TB311/5 5 metre connecting lead
- Bird Spikes with Quick Instruction
- Allen Key

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 ASA UV stabilized funnel and enclosure.

Bucket capacity: Teflon Impregnated: 0.2 mm, 0.5 mm or 0.01 inch of rainfall.

Sensitivity: one tip.

Maximum intensity: 700 mm / hr without funnel surcharge.

Calibration: Batch calibrated

Accuracy:

Flow Rate mm/hr	0.2mm	0.01"	0.5mm
0-200 mm/hr	\pm 5%	\pm 5%	\pm 5%
200-500 mm/hr	NA	NA	Better than - 8%
OR \pm 2% at any set intensity specified by the user, calibration required			

Humidity: 0 to 100 %

Temperature: - 20 to +70°C

Contact system: dual reed switches potted in soft silicon rubber with varistor protection.

-Max Capacity: 0.5 amp, 24 Volts

- Resistance: Initial contact resistance 0.1 OHMS

- M.T.B.F: 10^8 to 10^9 Operations

Nozzle: Straight through nozzle

Bucket: Teflon impregnated 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 in the base and stainless steel mesh on the enclosure covering 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: 1.8 kg

Packed Dimensions: 24cm L x 24cm W x 42cm H x 4.5 kg (0.03m³)

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.

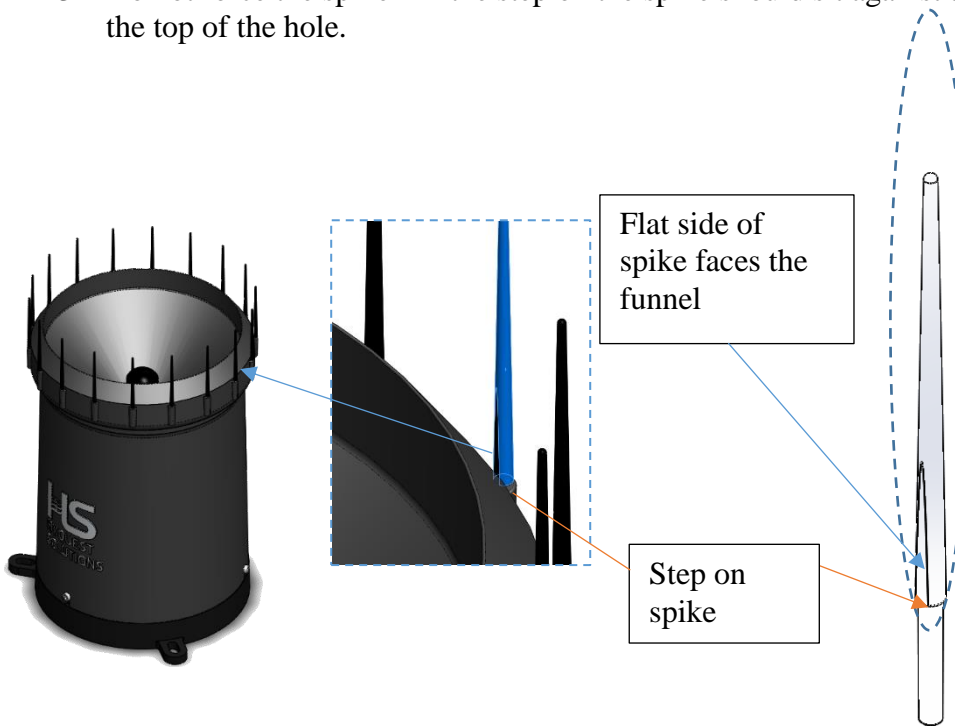
(ii) Setting up

- 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.

Quick Instruction:

Assembling Bird Spikes

- 1- Quantity of bird spikes supplied 24 off, 18 off to assemble and 6 off as spares.
- 2- When assembling please ensure the flat side of the spike is facing the funnel ring
- 3- Do not force the spike in - the step on the spike should sit against the flat surface on the top of the hole.



Base Instruction



Removable plug to pass the reed switch signal to an external RTU or to enter the solar cable to power the internal RTU Undercover



Blind hole drill 6.5 mm (1/4") Dia. to connect a panel mount SMA connector for antenna. Only for TB4 & TB6. For TB7 internal antenna can be used.

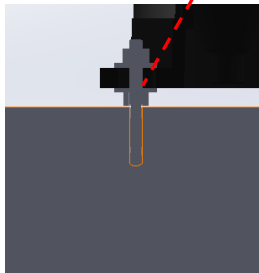
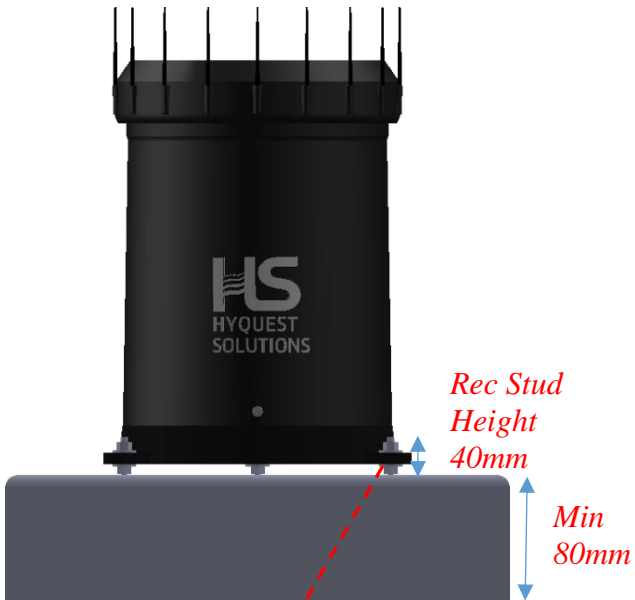


Floor Mount:

*In Built Bird Guard
Part No. TB777-04*



*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.*

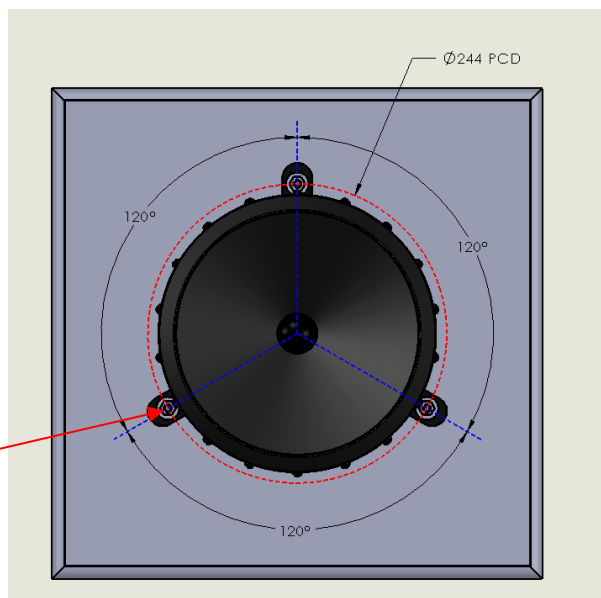


Diagram 1

Pole Mount:

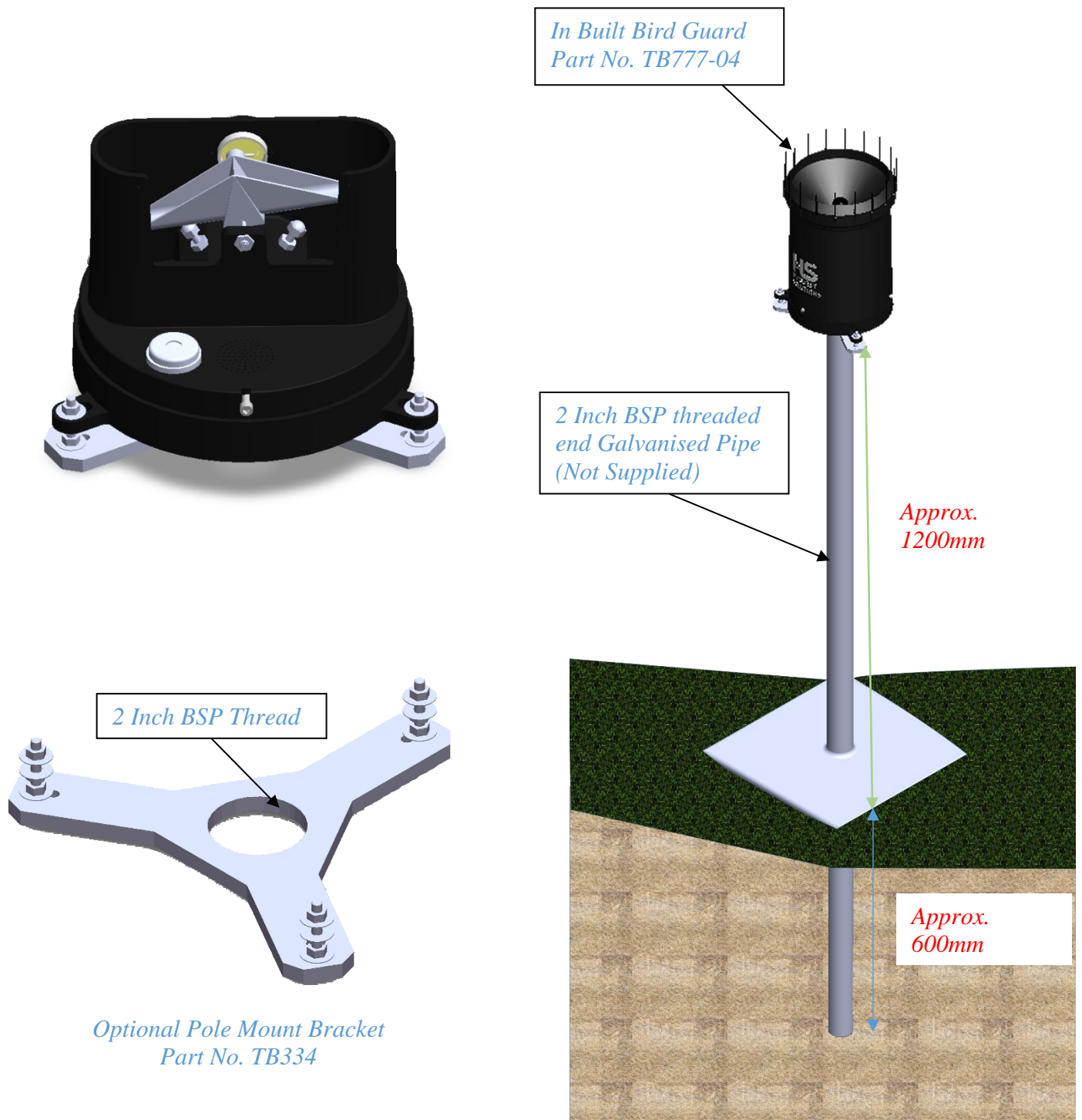


Diagram 2

Roof Mount:

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

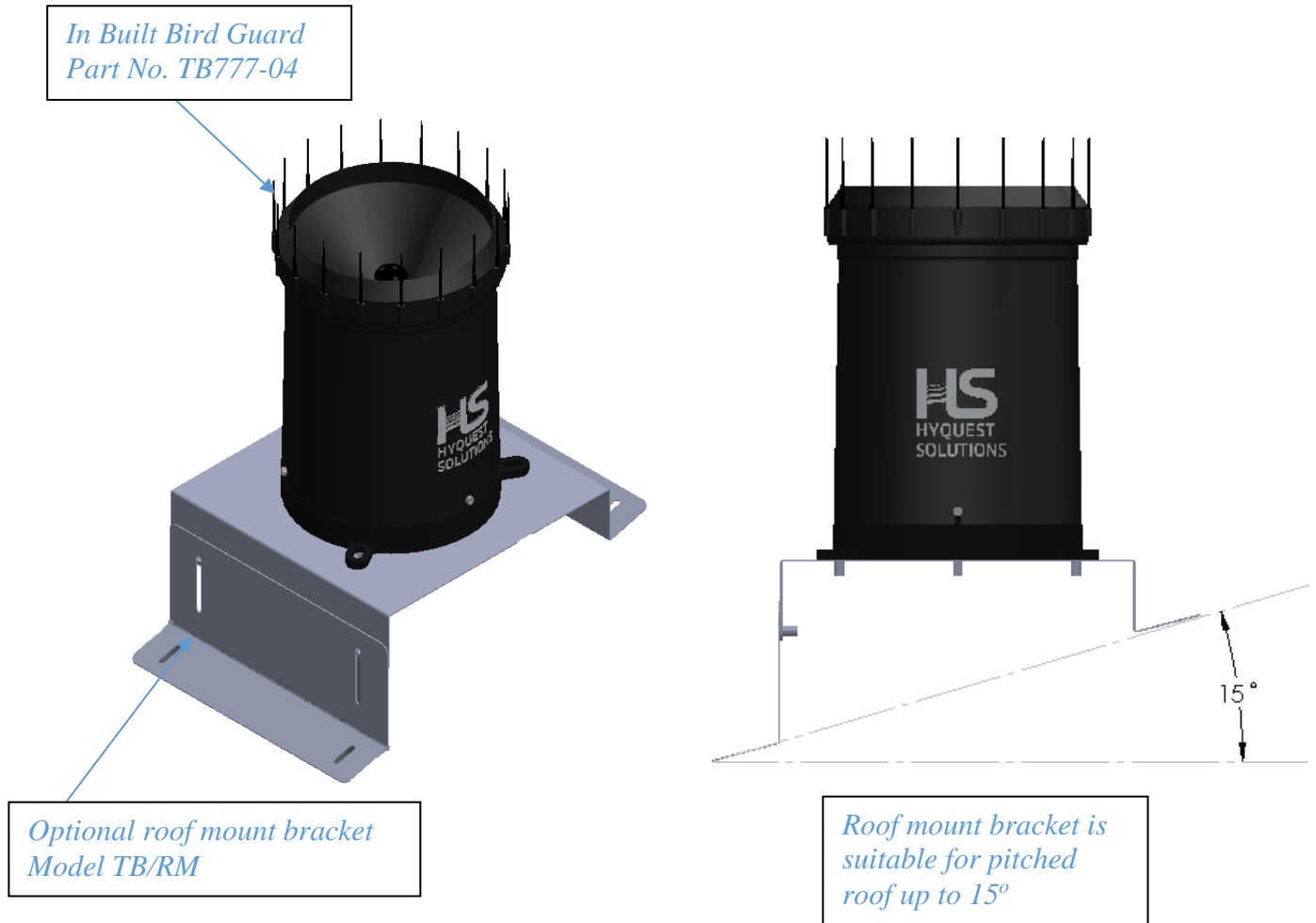


Diagram 3

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**
- **Straight through Nozzle (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) Push filter in and pull straight through Nozzle out
- (b) Clean filter
- (c) Clean straight through nozzle

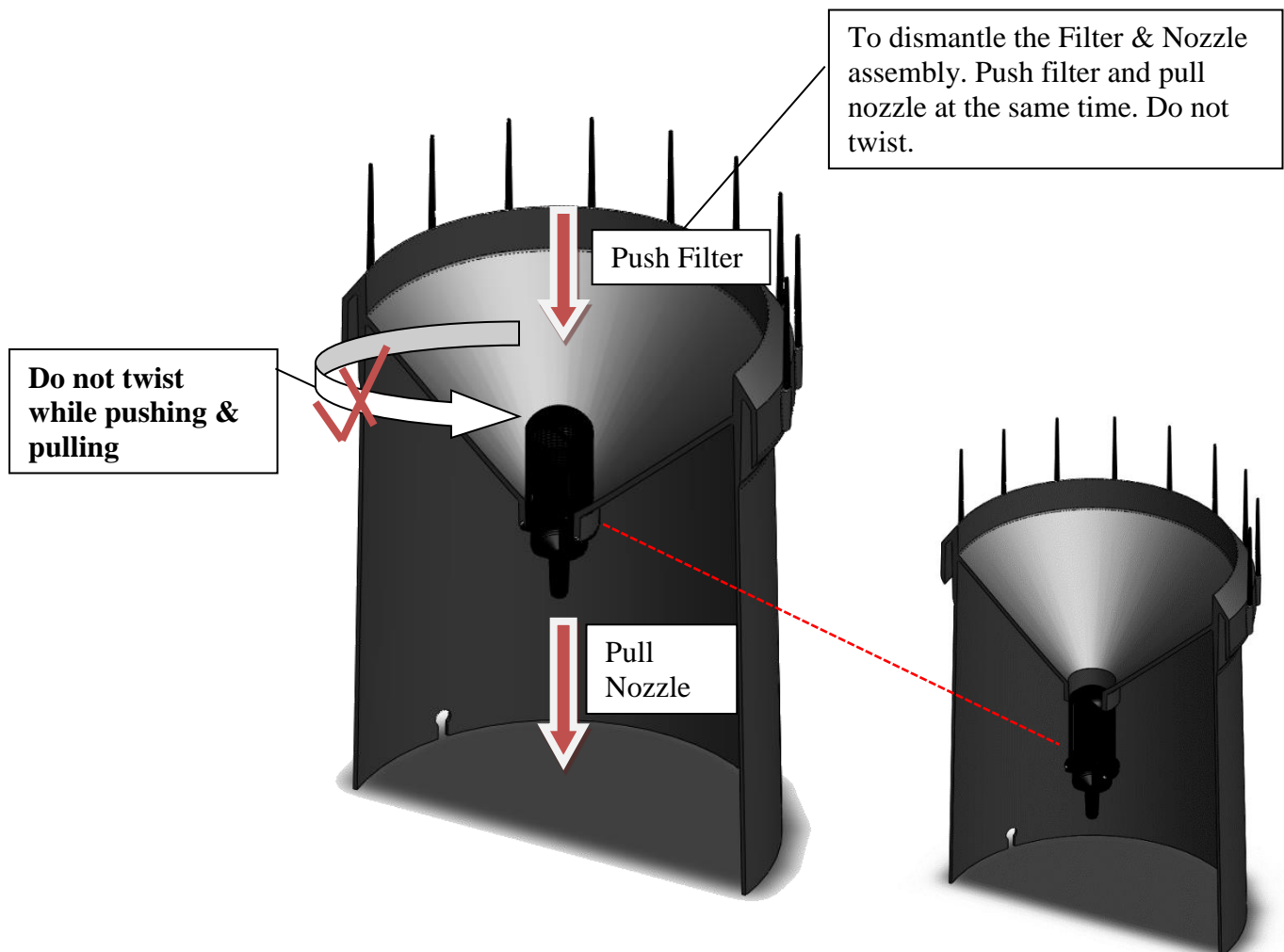


Diagram 4

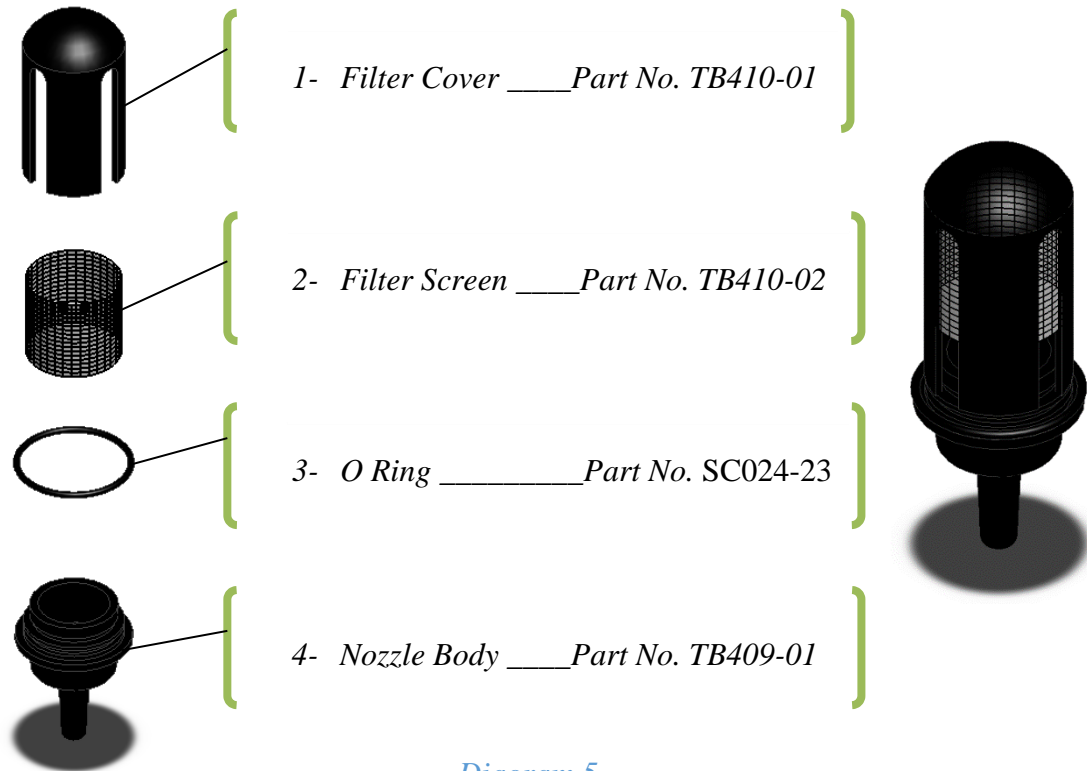


Diagram 5

ii. Assembly Details

- (a) Assemble filter to straight through Nozzle body
- (b) Push assembly into funnel

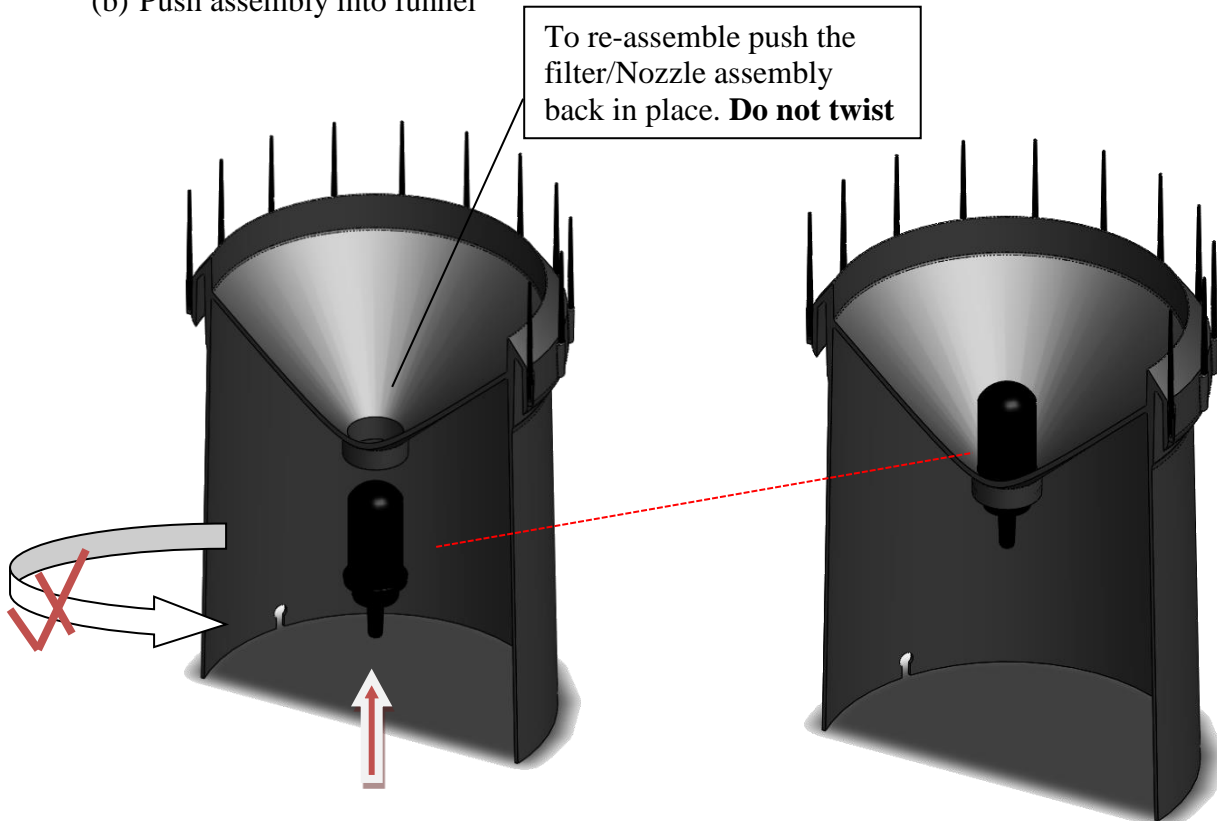


Diagram 6

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.

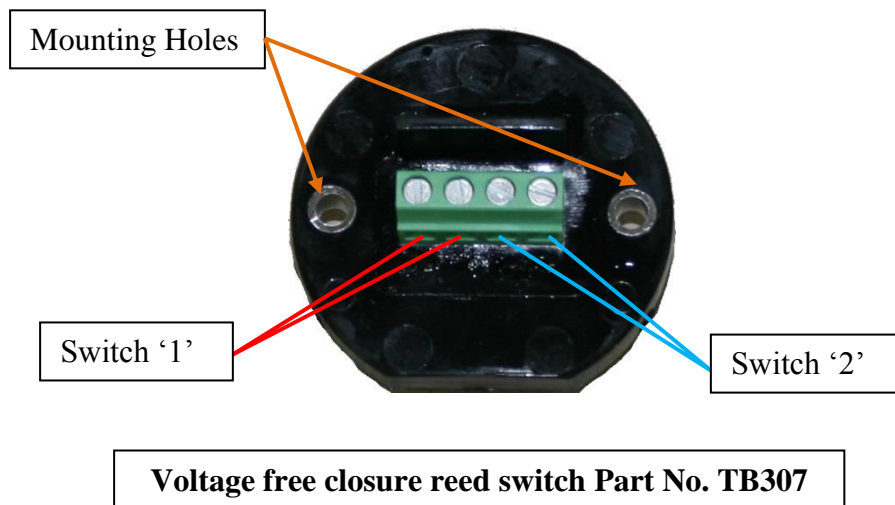


Diagram 7

VIII CALIBRATION

The Model TB7 Tipping Bucket Rain Gauge is batch calibrated. The batch calibration process guarantees that each rain gauge supplied will work within the range of accuracy specified by HyQuest Solutions, namely “0 to 200 mm per hour: +/-5 % for 0.2mm, 0.01” and 0.5mm buckets, 200-500 mm per hour: Better than +/-8%” for 0.5mm bucket only. The batch calibration process is detailed below:

i) Buretting:

Each side of the tipping bucket is balanced and buretted to the practical volume applicable to the resolution of the gauge (i.e. 0.2mm or 0.5mm or 0.01"). The buretting is carried out with NATA calibrated and certified equipment.

ii) Initial Calibration:

The initial production run of 50 rain gauges are all buretted, as described in Item i) above and calibrated on our TB340A Laboratory calibrator, over a range of intensities (50mm/hr to 500mm/hr)

iii) Ongoing Calibration:

From every batch of 50 units thereafter, one gauge will be randomly selected and fully calibrated as per Item ii) above, to ensure the specified accuracy and repeatability are maintained.

On request a full calibration can be undertaken at additional cost.

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

IX TB7 Part List



Teflon Impregnated
UV stabilised



Note:

The TB7 Rain Gauge is ordered with a UV stabilised Teflon impregnated injection moulded for the 0.2mm, 0.5mm or 0.01”.

Rain Gauge Part No.	Rain Gauge Description
TB7/0.2	Tipping Bucket Rain Gauge, bucket capacity 0.2mm, bucket type UV stabilised Teflon impregnated injection moulded
TB7/0.01”	Tipping Bucket Rain Gauge, bucket capacity 0.01inch, bucket type UV stabilised Teflon impregnated injection moulded
TB7/0.5	Tipping Bucket Rain Gauge, bucket capacity 0.5mm, bucket type UV stabilised Teflon impregnated injection moulded

TB7 Base Part List

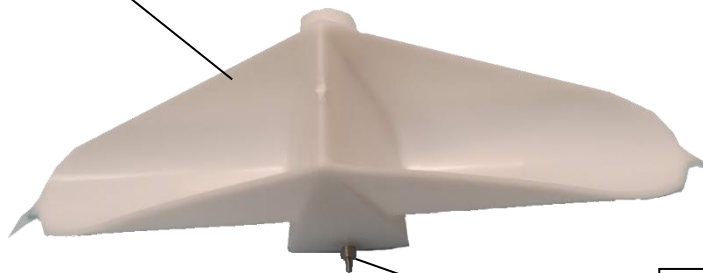


REFERENCE	PART_ID	DESCRIPTION	QTY_PER
1	TB701-01	BASE-INJECTION MOULDED	1
2	TB701-03	BRASS INSERT	2
3	SC008-29	M5x0.8 SS304 HEX NUT	3
4	SC045-21	SOC HD CAPSCREW M5x0.8x12 SS304	3
5	TB301-05	PIVOT SCREW	2
6	TB301-06	PIVOT SCREW LOCK NUT	2
7	SC006-12	MINIATURE P CLIP #20-PTC 6.4B	1
8	SC022-114	6GA x 1/4 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

TB7 Bucket Part List

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

Quantity: 1



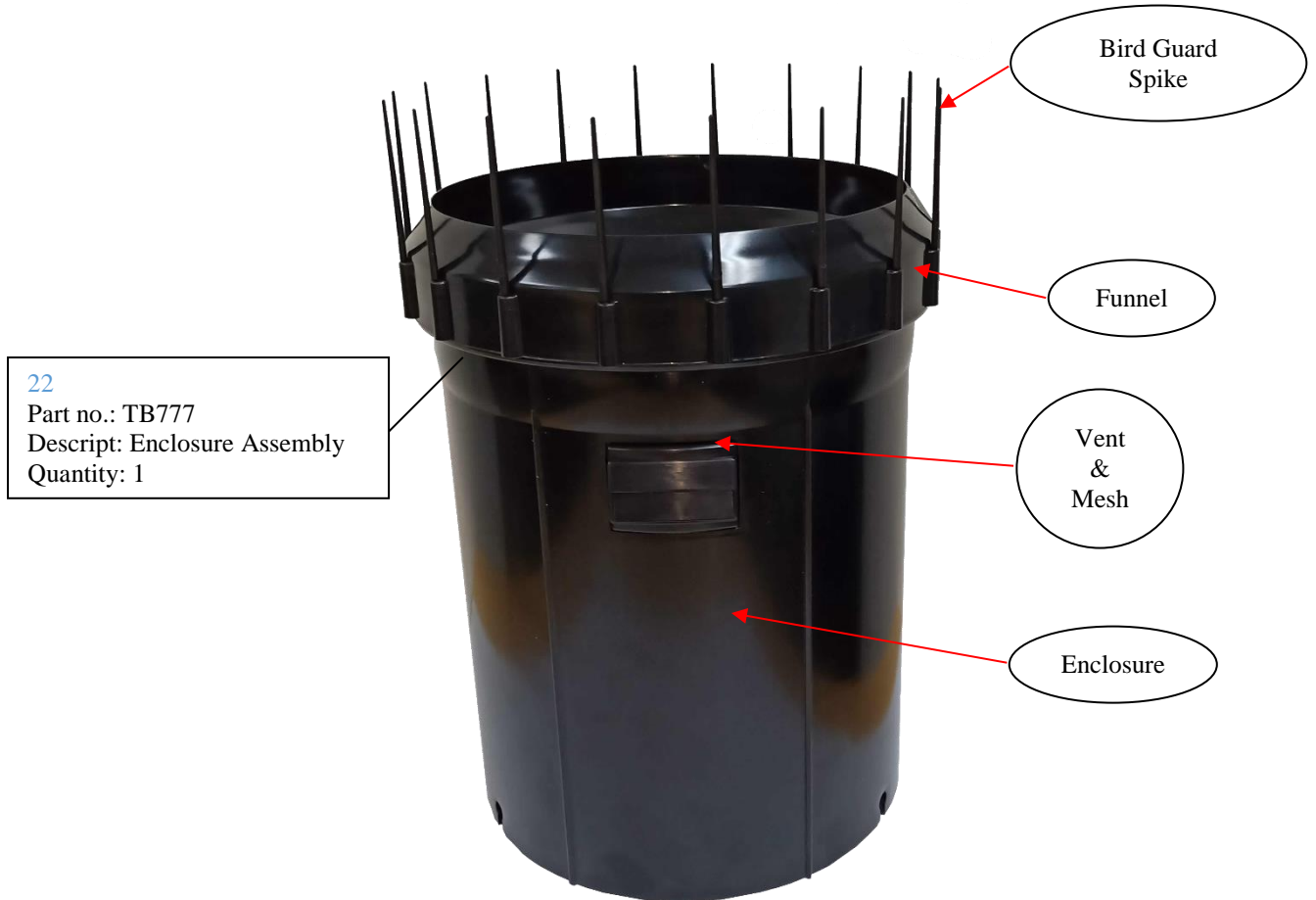
Teflon Impregnated UV
stabilized Bucket

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

Filter/Nozzle Part List



Enclosure Part List



Part no.	Description	Quantity
TB777-01	Funnel	1
TB777-02	Enclosure	1
TB418-06	Vent	1
TB408-05	Mesh	1
TB777-04	Bird Guard Spike	18 + 6 Spares

TB777 breakdown assembly