

# TB71

User Manual

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# I Disclaimer

The information provided in this manual was deemed accurate as of the publication date. However, updates to this information may have occurred.

This manual does not include all of the details of design, production, or variation of the equipment nor does it cover every possible situation which may arise during installation, operation or maintenance. HyQuest Solutions shall not be liable for any incidental, indirect, special or consequential damages whatsoever arising out of or related to this documentation and the information contained in it, even if HyQuest Solutions has been advised of the possibility of such damages.

Any errors found in any HyQuest Solutions product should be reported to HyQuest Solutions where every effort will be made to quickly resolve the problem.

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## II Scope of Delivery

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


# III Safety Instructions

- Read the user manual including all operating instructions prior to installing, connecting and powering up the HyQuest Solutions TB71. The manual provides information on how to operate the product. The manual is intended to be used by qualified personnel, i.e. personnel that have been adequately trained, are sufficiently familiar with installation, mounting, wiring, powering up and operation of the product.
- Keep the user manual on hand for later reference!
- If you encounter problems understanding the information in the manual (or part thereof), please consult the manufacturer or its appointed reseller for further support.
- HyQuest Solutions TB71 is intended to be used in hydrometeorological or environmental monitoring applications.
- Before starting to work, you have to check the functioning and integrity of the system.
  - Check for visible defects on the TB71, this may or may not include any or all of the following mounting facilities, connectors and connections, mechanical parts, internal or external communication devices, power supplies or power supply lines, etc.
  - If defects are found that jeopardize the operational safety, work must be stopped. This is true for defects found before starting to work as well as for defects found while working.
- Do not use the HyQuest Solutions TB71 in areas where there is a danger of explosion.
- The present user manual specifies environmental/climatic operating conditions as well as mechanical and electrical conditions. Installation, wiring, powering up and operating the HyQuest Solutions TB71 must strictly comply with these specifications.
- Perform maintenance only when tools or machinery are not in operation.
- If guards are removed to perform maintenance, replace them immediately after servicing.
- Never make any electrical or mechanical diagnostics, inspections or repairs under any circumstances. Return the product to the manufacturer's named repair centre. You can find information on how to return items for repair in the relevant section of the HyQuest Solutions website.



-  Disposal instructions: After taking the HyQuest Solutions TB71 out of service, it must be disposed of in compliance with local waste and environmental regulations. The HyQuest Solutions TB71 is never to be disposed in household waste!



-  Inputs and outputs of the device are protected against electric discharges and surges (so-called ESD). Do not touch any part of the electronic components! If you need to touch any part, please discharge yourself, i.e. by touching grounded metal parts.

# 1 Introduction

Thank you for choosing our product. We hope you will enjoy using the device.

HyQuest Solutions manufactures, sells, installs and operates quality instrumentation, data loggers and communication technology. Products are designed with passion for environmental monitoring and with a deep understanding of the quality, accuracy and robustness needed to fulfil the requirements of measurement practitioners in the field.

The present User Manual will help you understand, install and deploy the device. If, however, you feel that a particular information is missing, incomplete or confusing, please do not hesitate to contact us for further support!

HyQuest Solutions' TB7 is a new generation high-quality tipping bucket rain gauge for measuring rainfall and precipitation in remote and unattended locations when used in conjunction with HyQuest Solutions' Undercover data logger (see flip side) or a smart communication module. TB7 is a reliable 'low cost' device with a very good accuracy across a broad range of rainfall intensities.

## 2 Installation

This chapter contains the following subsections:

- [Unpacking your TB7 Rain Gauge](#)
- [Site Selection and Setup](#)
- [Quick Instruction](#)

### 2.1 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.

### 2.2 Site Selection and Setup

#### 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.

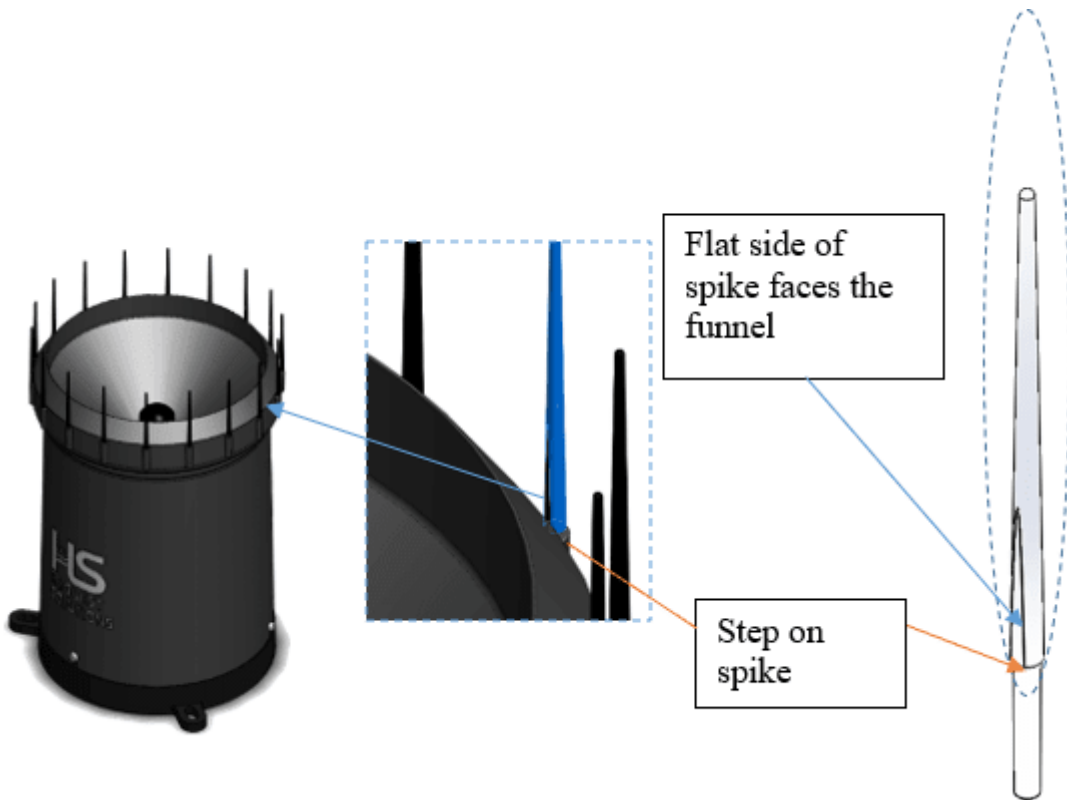
#### Setting up

- 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](#), and to the recording device, in accordance with manufacturer's instructions.

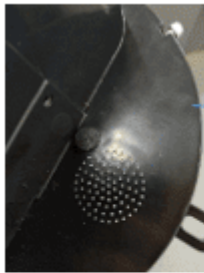
### 2.3 Quick Instruction

#### Assembling Bird Spikes

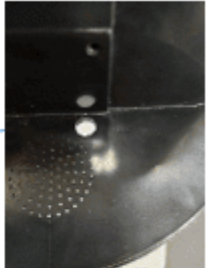

1. Quantity of bird spikes supplied 24 off, 18 off to assemble and 6 off as spares.
2. When assembling please ensure the flat side of the spike is facing the funnel ring
3. Do not force the spike in - the step on the spike should sit against the flat surface on the top of the hole.




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

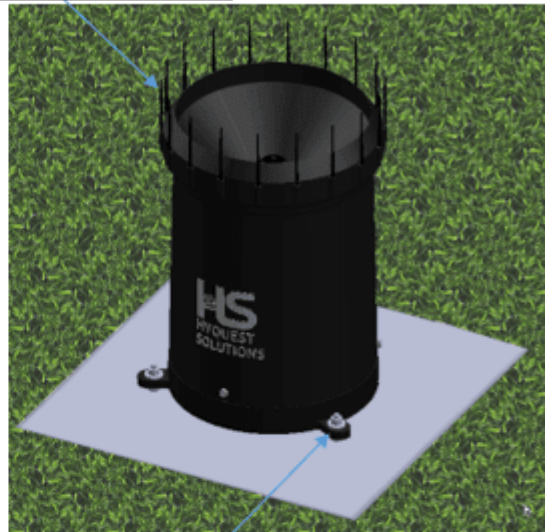
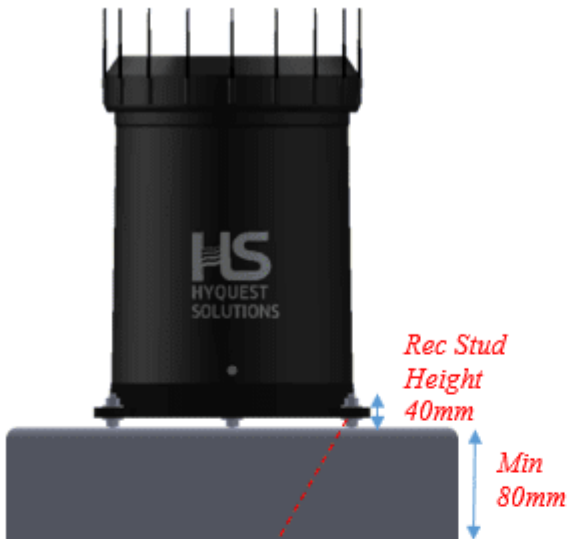
Blind hole drill 6.5 mm (1/4") Dia. to connect a panel mount SMA connector for antenna. Only for TB4 & TB6. For TB7 internal antenna can be used.



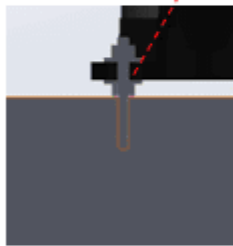


Floor Mount

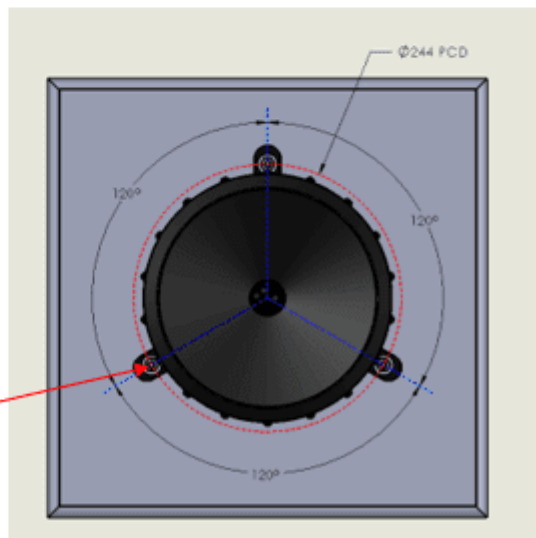
*In Built Bird Guard  
Part No. TB777-04*



*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.*



### Pole Mount

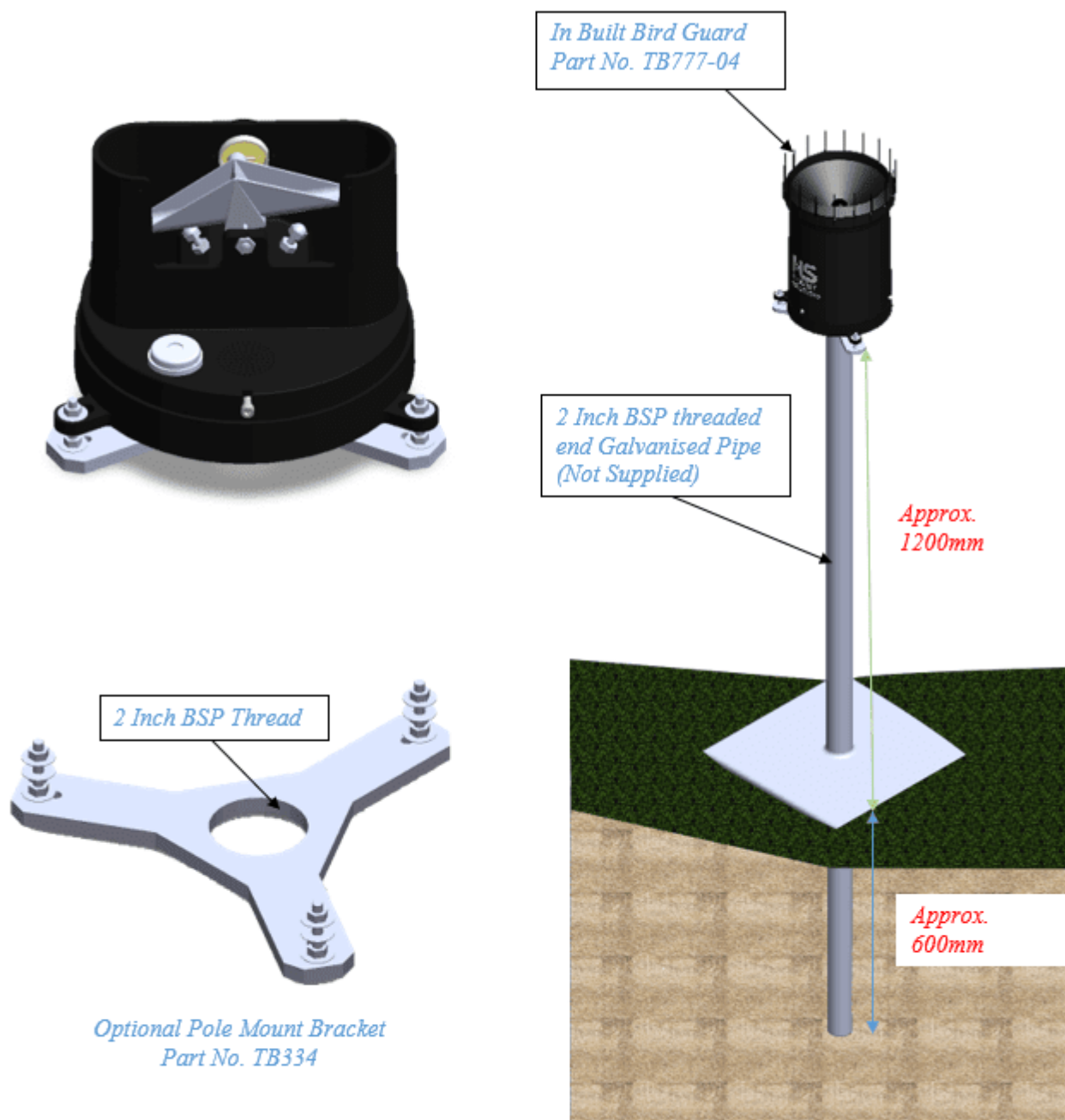
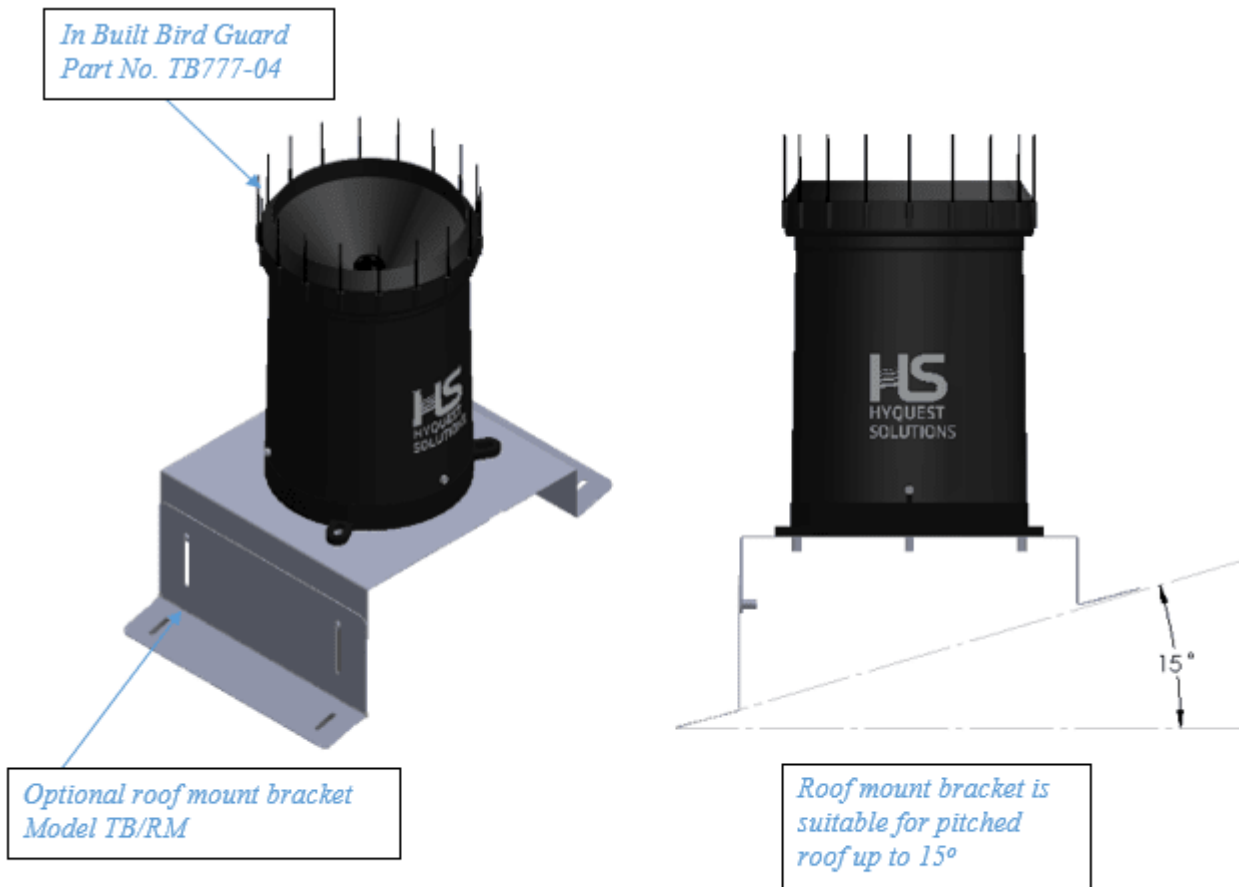


Diagram 2

### Roof Mount

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



*Diagram 3*

## 3 Configuration

This chapter contains the following subsections:

- [Calibration](#)

### 3.1 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:

- **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.
- **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)
- **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.

## 4 Operation

This chapter contains the following subsections:

- Test Operation
- Electrical

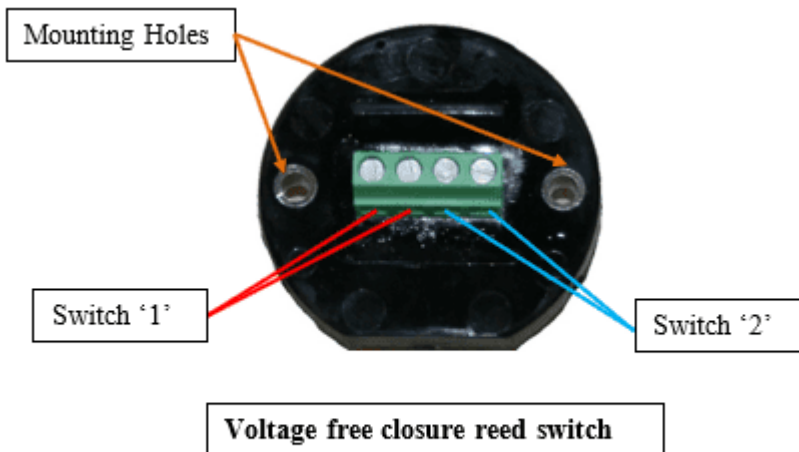
### 4.1 Test Operation

- 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.

### 4.2 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*

## 5 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

### Dismantle Details

- a. Push filter in and pull straight through Nozzle out
- b. Clean filter
- c. Clean straight through nozzle

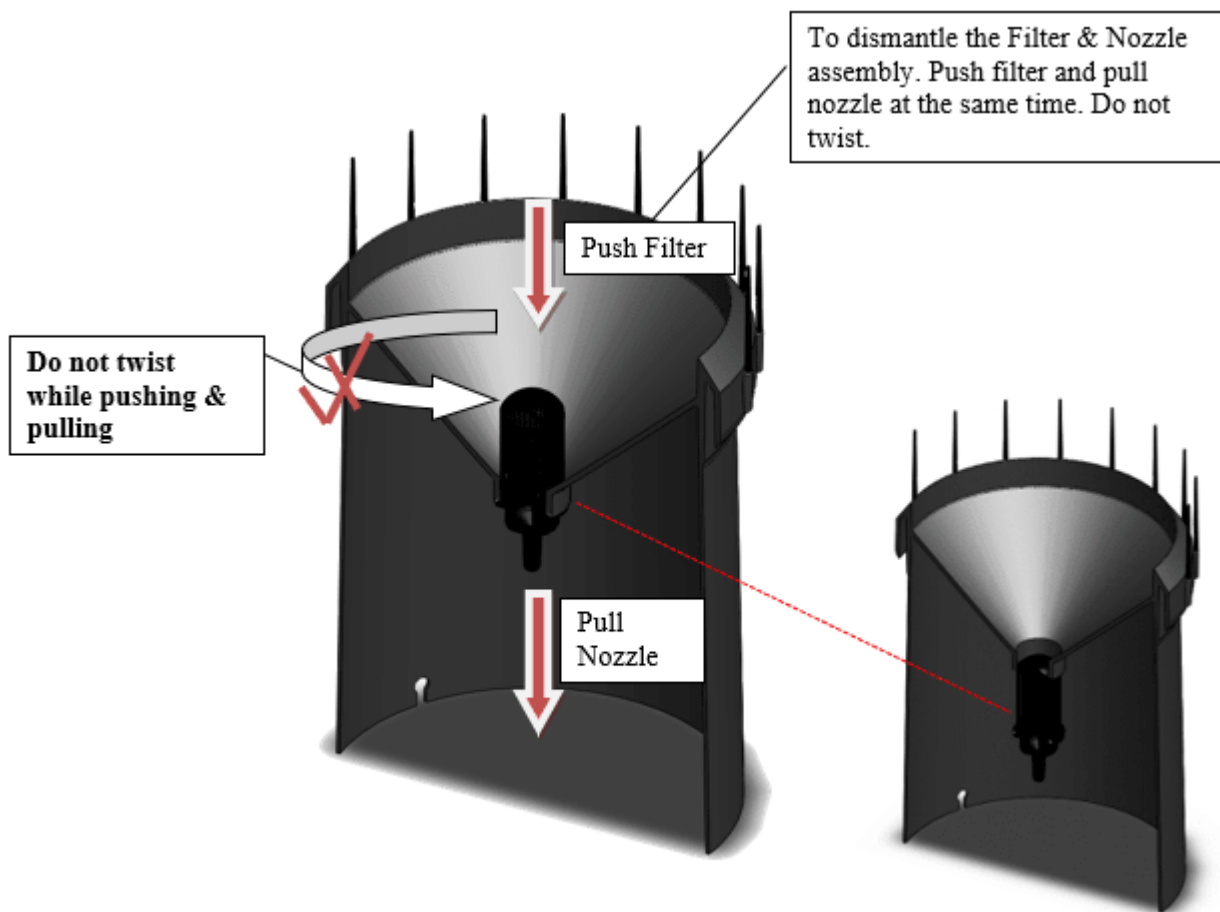


Diagram 4

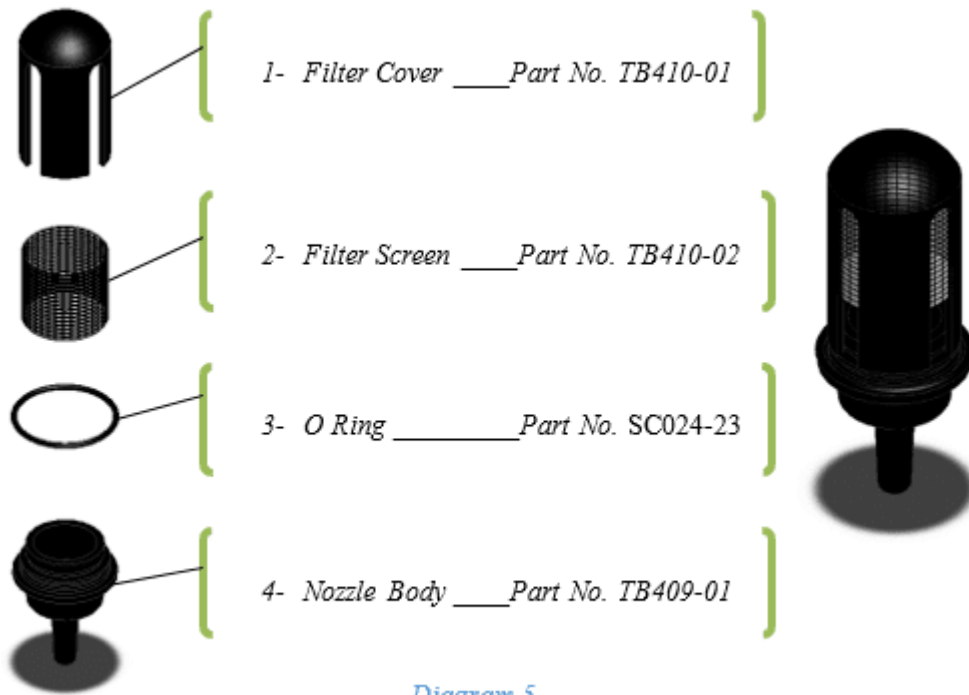


Diagram 5

### Assembly Details

- Assemble filter to straight through Nozzle body
- Push assembly into funnel

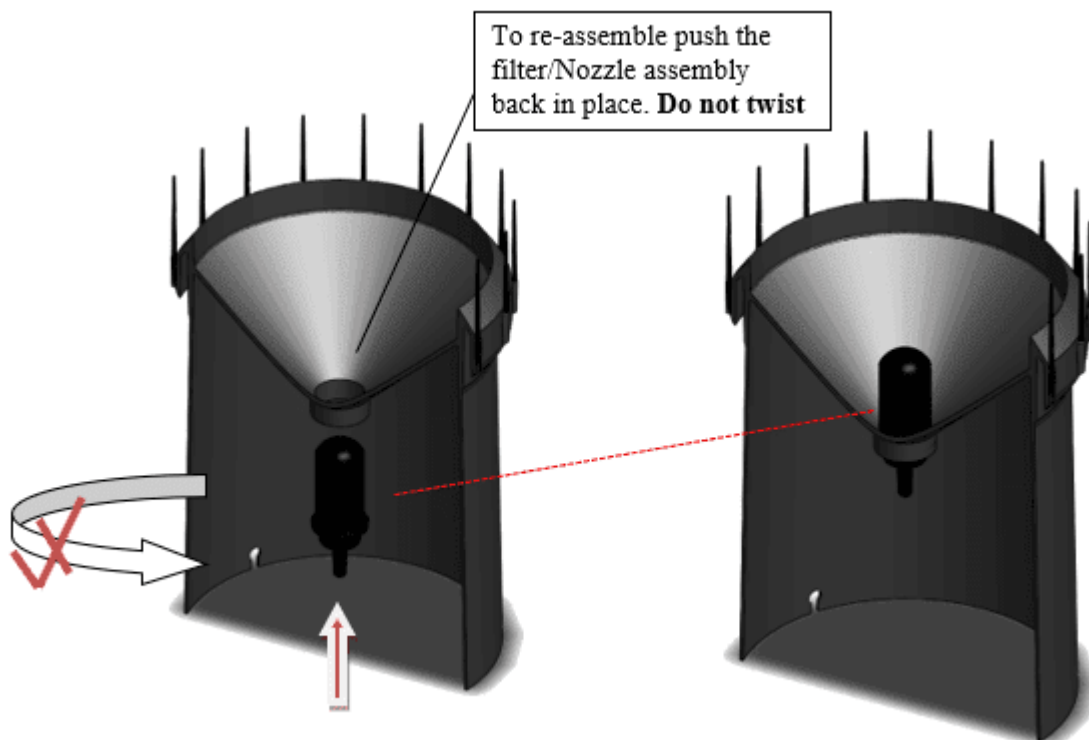


Diagram 6

## 6 Repair

HyQuest Solutions precision instruments and data loggers are produced in quality-controlled processes. All HyQuest Solutions production and assembly sites in Australia, New Zealand and Europe are ISO 90001 certified. All equipment is factory tested and/or factory calibrated before it is shipped to the client. This ensures that HyQuest Solutions products perform to their fullest capacity when delivered.

Despite HyQuest Solutions most rigorous quality assurance (QA), malfunction may occur within or outside of the warranty period. In rare cases, a product may not be delivered in accordance with your order.

In such cases HyQuest Solutions' return and repair policy applies. For you as a customer, this means the following:

1. Contact HyQuest Solutions using the Repair Request Form made available online:  
[https://cdn.hyquestsolutions.eu/fileadmin/Services/Downloads/HS-RepairRequestForm\\_EU.pdf](https://cdn.hyquestsolutions.eu/fileadmin/Services/Downloads/HS-RepairRequestForm_EU.pdf)  
 In response you will receive a reference number that must be referenced on all further correspondence and on the freight documents accompanying your return shipment.
2. Please provide as much information and/or clear instructions within the return paperwork. This will assist our test engineers with their diagnosis.
3. Please do not ship the goods prior to obtaining the reference number. HyQuest Solutions will not reject any equipment that arrives without reference number; however, it may take us longer to process.

Custom requirements for items sent to HyQuest Solutions for warranty or non-warranty repairs: Check with your national customs/tax authorities for details, processes and paperwork regarding tax exempt return of products. Typically, special custom tariff codes are available (such as HS Code = 9802.00) that verify the item is being returned for repair and has no commercial value. Please note that the customs invoice / dispatch documents should also clearly state: "Goods being returned to manufacturer for repair - No Commercial value". It is mandatory to have any returned goods accompanied by a commercial invoice on headed paper. HyQuest Solutions reserves the right to charge the customer for time spent rectifying incorrect customs documents.

**Note:** Please ensure that your goods are packed carefully and securely. Damage that occurs during transit is not covered by our warranty and may be chargeable.

### 6.1 TB7 Part List



**Note:**

*The TB7 Rain Gauge is ordered with a synthetic ceramic coated brass bucket for 1mm size bucket only or 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**

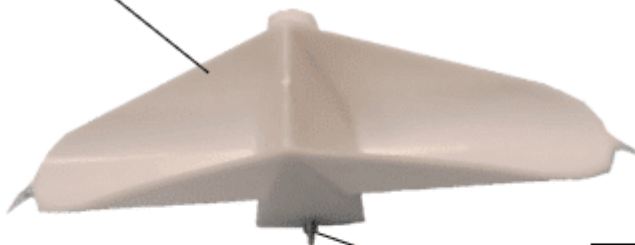


REFERENCE	PART_ID	DESCRIPTION	QTY_PER
1	TB701-01	BASE-INJECTION MOULDED	1
2	TB701-03	BRASS INSERT	2
3	SC008-29	M5x0.8 SS304 HEX NUT	3
4	SC045-21	SOC HD CAPSCREW M5x0.8x12 SS304	3
5	TB301-05	PIVOT SCREW	2
6	TB301-06	PIVOT SCREW LOCK NUT	2

REFERENCE	PART_ID	DESCRIPTION	QTY_PER
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**

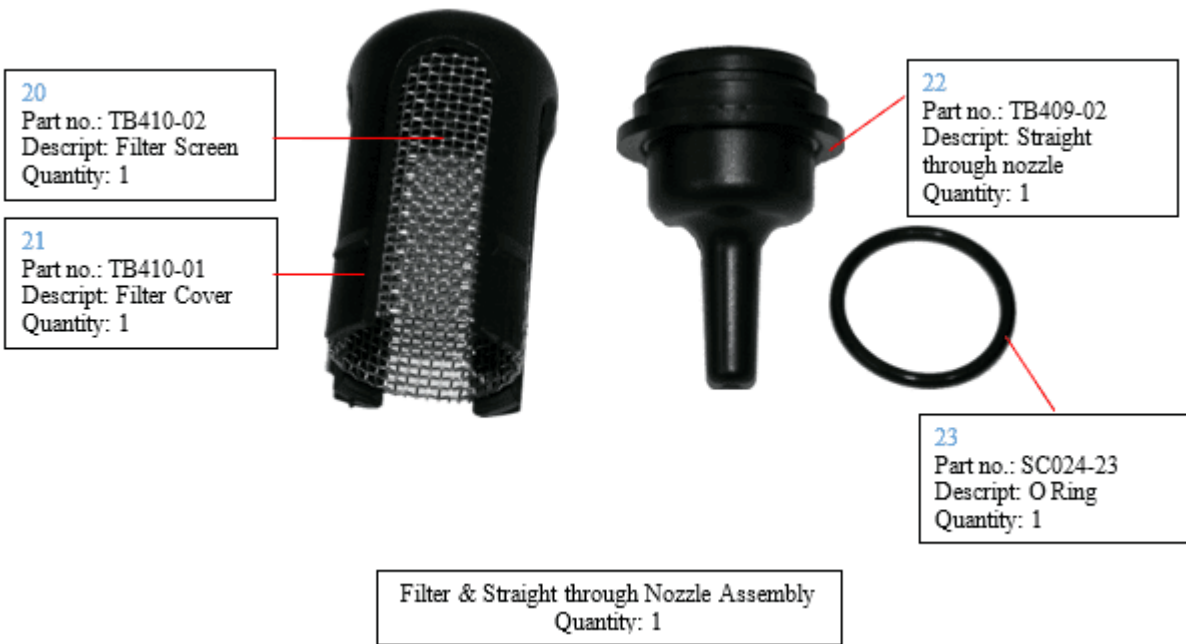
**16**  
 Part no: TB304/0.2P/TEF  
 Descript: Bucket (0.2mm, 0.01")  
 or  
 Part no: TB304/0.5P/TEF  
 Descript: Bucket (0.5mm)  
 Quantity: 1



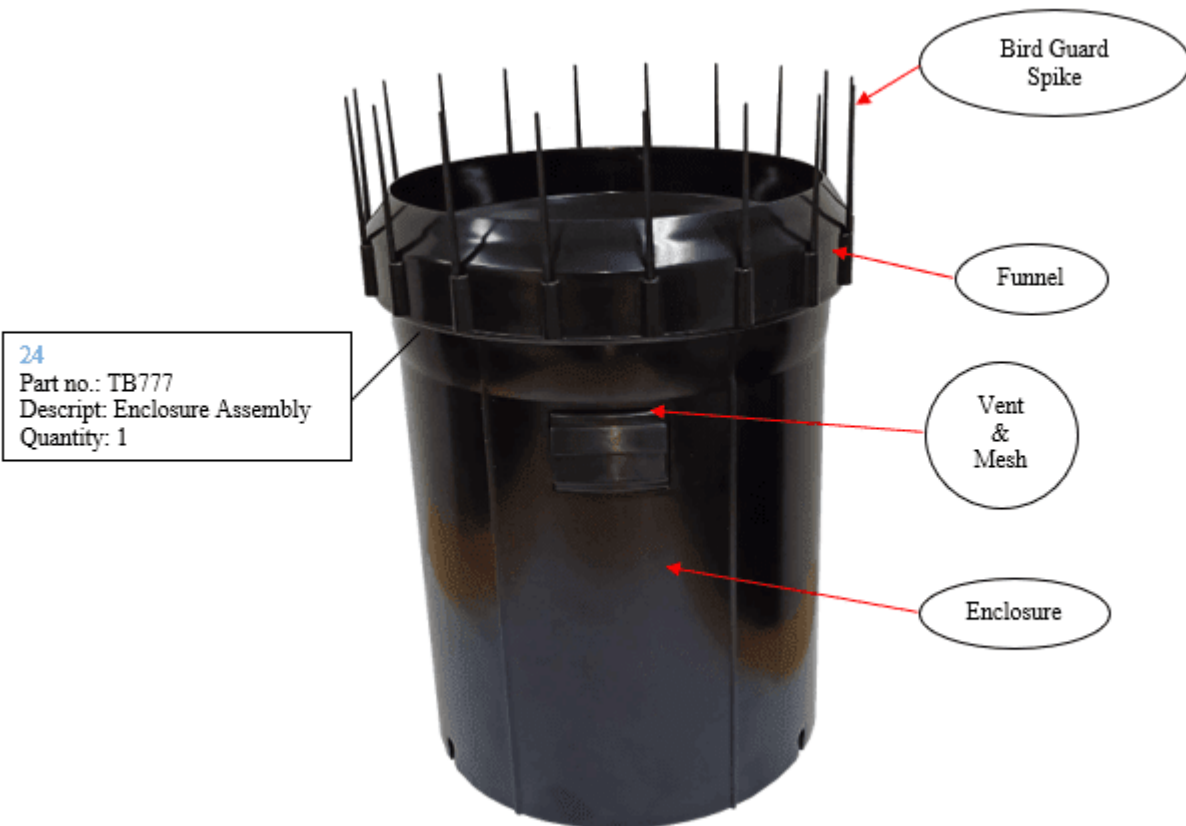
Teflon Impregnated UV stabilized Bucket

**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

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

TB777 breakdown assembly

## 7 Technical Data

Resolution	0.2 mm, 0.5 mm, 0.01"			
Range	700 mm per hour			
Accuracy	Resolution			
		0.2 mm	0.01"	0.5 mm
	Flow rate 0 - 200 mm/hr	±5 %	±5 %	±5 %
	Flow rate 200 - 500 mm/hr	NA	NA	better than -8 %
	Alternatively: Individual accuracy ±2 % at any set intensity specified by the user, calibration required (Please note: Additional costs for individually calibrated units)			
Enclosure and Base	UV-resistant ASA			
Pivots	Ground sapphire pivots			
Bucket	Teflon-impregnated injection-moulded			
Dimensions	<ul style="list-style-type: none"> <li>▪ Height: 310 mm</li> <li>▪ Catch: 200 mm diameter</li> </ul>			
Mass	2.1 kg			

## 8 Obligations of the Operator and Disposal

This chapter contains the following subsections:

- Obligations of the Operator [122](#)
- Dismantling / Disposal [22](#)

### 8.1 Obligations of the Operator

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#### *European Union*

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In the Single European Market it is the responsibility of the operator to ensure that the following legal regulations are observed and complied with: national implementation of the framework directive (89/391/EEC) and the associated individual directives, in particular 2009/104/EC, on minimum safety and health requirements for the use of work equipment by employees at work.

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#### *Worldwide*

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Regulations: If and where required, operating licences must be obtained by the operator. In addition, national or regional environmental protection requirements must be complied with, regardless of local legal provisions regarding the following topics:

- Occupational safety
- Product disposal

Connections: Local regulations for electrical installation and connections must be observed.

### 8.2 Dismantling / Disposal

When disposing of the units and their accessories, the applicable local regulations regarding environment, disposal and occupational safety must be observed.

#### **Before dismantling**

- Electrical Devices:
  - Switch off the units.
  - Disconnect electrical appliances from the power supply, regardless of whether the appliances are connected to the mains or to another power source.
- Mechanical devices:
  - Fix all loose components. Prevent the device from moving independently or unintentionally.
  - Loosen mechanical fastenings: Please note that appliances can be heavy and that loosening the fastenings may cause them to become mechanically unstable.

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#### *Disposal*

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Operators of old appliances must recycle them separately from unsorted municipal waste. This applies in particular to electrical waste and old electronic equipment.

Electrical waste and electronic equipment must not be disposed of as household waste!

Instead, these old appliances must be collected separately and disposed of via the local collection and return systems.

Integrated or provided batteries and accumulators must be separated from the appliances and disposed of at the designated collection point. At the end of its service life, the lithium-ion battery must be disposed of according to legal provisions.

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*EU WEEE Directive*

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As players in the environmental market, KISTERS AG and HyQuest Solutions are committed to supporting efforts to avoid and recycle waste. Please consider:

- Avoidance before recycling!
- Recycling before disposal!



This symbol  indicates that the scrapping of the unit must be carried out in accordance with Directive 2012/19/EU. Please observe the local implementation of the directive and any accompanying or supplementary laws and regulations.

# Contact Data

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