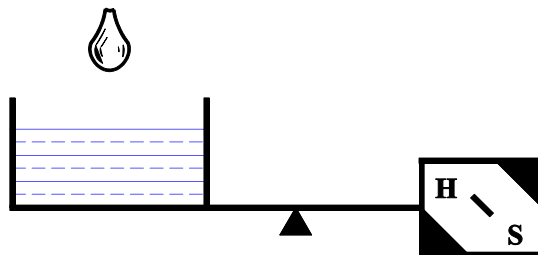


INSTRUCTION MANUAL
TIPPING BUCKET RAINGAUGE
MODEL TB4



QUALITY SYSTEM
ISO
9001
2000
CERTIFIED

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I HYDROLOGICAL SERVICES STANDARD WARRANTY TERMS

WARRANTY, DISCLAIMER AND LIMITATION OF LIABILITY:

We warrant this product to be free from defects in material and workmanship for a period of one year from the date of shipment hereof or its total rated life, whichever first occurs.

During the warranty period, we will repair or replace this product if it is returned to us with shipping charges prepaid and we determine it to be defective. This warranty shall not apply if this product has been subjected to misuse, negligence, accidents, or misapplied, or modified or repaired by unauthorised persons, or improperly installed, and we shall not be liable to any person for personal injury or property damage caused by such a product.

All other warranties, express and implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE, are disclaimed. All other remedies and liabilities, including incidental, consequential, and special damages, losses, and expenses, are excluded.

Note: It is Hydrological Services' policy to support all of our products. If design or workmanship problems arise after this statutory warranty period we request that you contact us.

TIPPING BUCKET RAINGAUGE MODEL TB4

II GENERAL

The Hydrological Services Tipping Bucket Raingauge (TB4) is recognised as the standard for measuring rainfall and precipitation in remote and unattended locations.

The TB4 raingauge 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 0.2mm, 0.5mm or 0.01inch of precipitation collected and a reed switch detects these events and produces a momentary contact closure signal for:

- C logging in our Rainfall Data Logger
- C transmission by our Radio Reporting Raingauge, or
- C display on our Rainfall Counter.

III UNPACKING YOUR TB4 RAINGAUGE

This package should contain:

- C TB4 Raingauge
- C TB411 a 10 metre connecting lead
- C This manual

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

To prepare the Tipping Bucket Raingauge for installation:

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

Your Tipping Bucket Raingauge is now ready for installation.

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IV SPECIFICATION

Receiver:	200 mm \pm 0.3 diameter machined aluminium rim. Powder coated.
Bucket capacity:	0.2 mm, 0.5 mm or 0.01 inch of rainfall.
Sensitivity:	one tip.
Measuring range:	0 to 500 mm / hr.
Calibration accuracy:	\pm 2 % for intensities from 25 to 300 mm/hr \pm 3 % for intensities from 300 to 500 mm/hr
Humidity:	0 to 100 %
Temperature:	- 20 to +70°C
Contact system:	dual reed switches potted in soft silicon rubber with varistor protection. - Capacity: 0.5 amp, 12 Volts D.C. - Resistance: Initial contact resistance 0.1 OHMS - M.T.B.F: 10^8 to 10^9 Operations
Syphon:	made from brass with a non hydroscopic outer case. The syphon can be dismantled for routine cleaning and servicing.
Bucket:	chrome plated injection moulded, ABS bucket balanced to \pm 0.05 gms. Retains less than 0.2 ml of water in each bucket after tipping.
Base:	injection moulded non hydroscopic plastic.
Level:	bulls eye level fitted to base.
Mounting holes:	three 10 mm diameter mounting holes at 117 mm p.c.d. 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:	two stainless spring steel rolling bearings, clamped at 90 degrees to bucket stainless spring steel axle.
Insect covers:	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 kg
Packed Dimensions:	4 kg 0.03m ³

V INSTALLATION

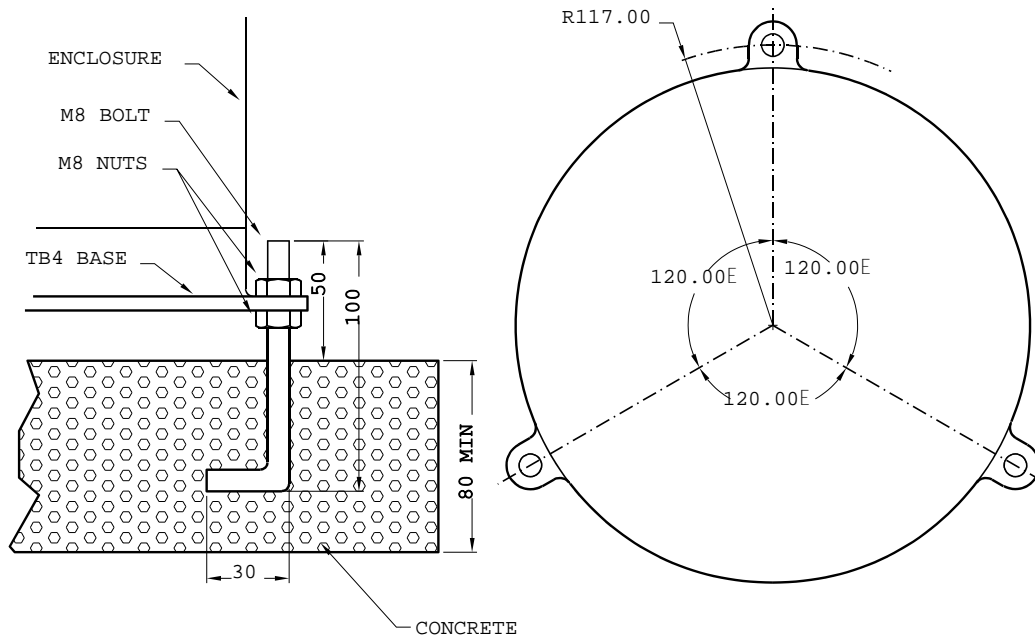


DIAGRAM 1

(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:

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

(ii) Setting up

- C Install the gauge on the foundation. A suggested foundation is shown in Diagram 1.
- C Loosen the three enclosure securing screws and the enclosure.
- C The gauge is provided with a bull's eye level. adjust nuts on mounting bolts until gauge is level.
- C Connect lead to the rain gauge terminals, refer to Diagram 3 page 9, and to the recording device, in accordance with manufacturer's instructions.

VI TEST OPERATION

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

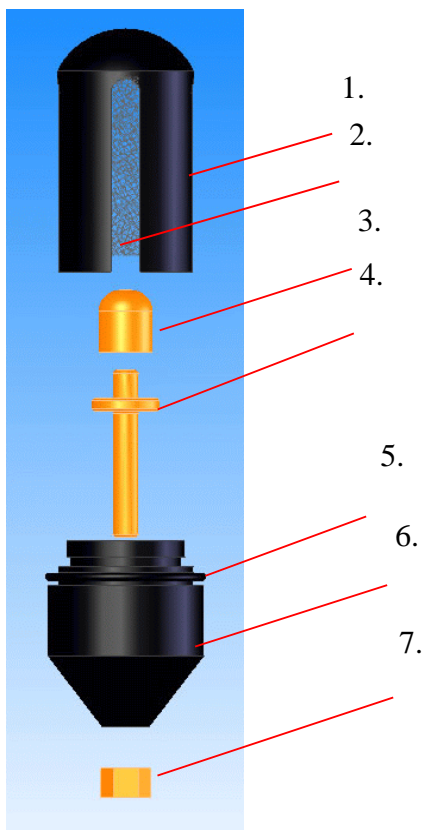
VII MAINTENANCE

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

- **Catch filter**
- **Top surface of adjusting screws**
- **Syphon (refer diagram 2)**
- **Interior of bucket**
- **All insect screens**

Syphon

- (i) Dismantle Details
- Unscrew nut
 - Lightly press stem down on surface until stem pops out of syphon body.
 - Remove stem from syphon body
 - Unscrew cap
 - Clean all items
- (ii) Assembly Details
- Screw cap on stem. Finger tight only.
 - Push stem into syphon body
 - Replace nut and tighten. Do not over tighten..



1. FILTER COVER	TB410
2. FILTER SCREEN	TB410A
3. STEM CAP	TB309-03
3. STEM	TB309-02
5. O-RING	SC024-23
6. SYPHON BODY	TB412-01
7. BRASS NUT	SC008-38

DIA

GRAM 2

VIII ELECTRICAL

Dual reed switches are provided for several reasons:

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

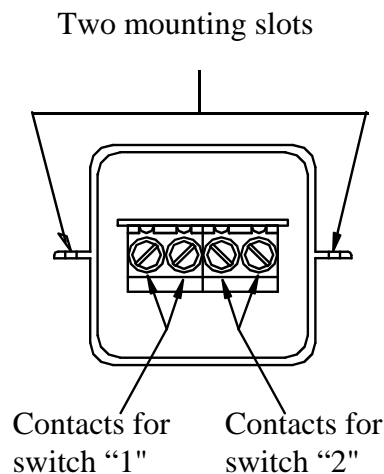


DIAGRAM 3

IX CALIBRATION

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

- C Field Calibration Device, Model TB320, for routine field check calibrations, supplied with operating instruction sheet (refer to page FCD 110-01).
- C Laboratory Calibration Unit, Model TB340, for calibration after servicing in workshops, supplied with operating manual.
- C Recalibration Service at Hydrological Services' factory.

Please contact either Hydrological Services Pty Ltd or our local distributor for further information.

X SCHEMATIC LAYOUT TB4

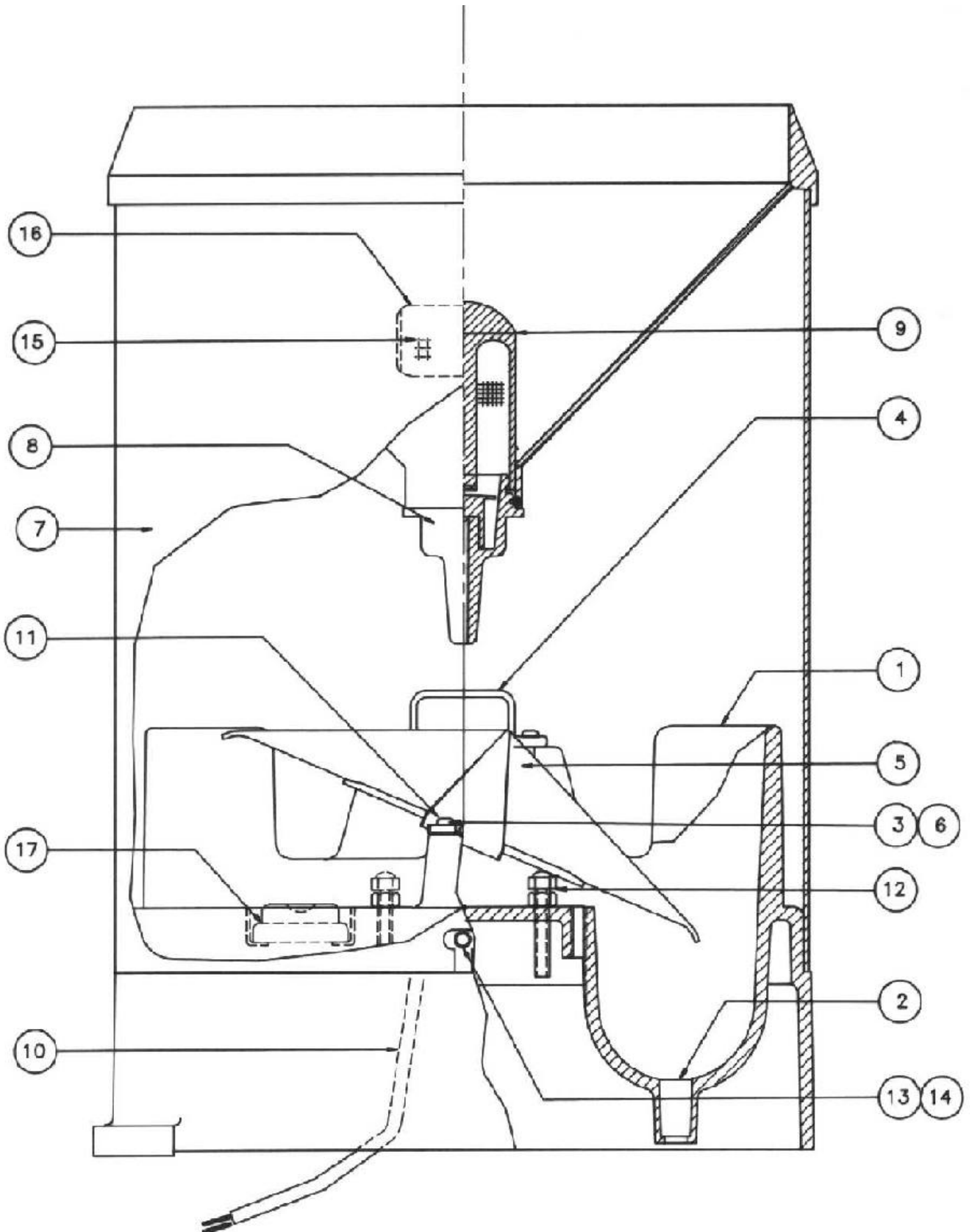


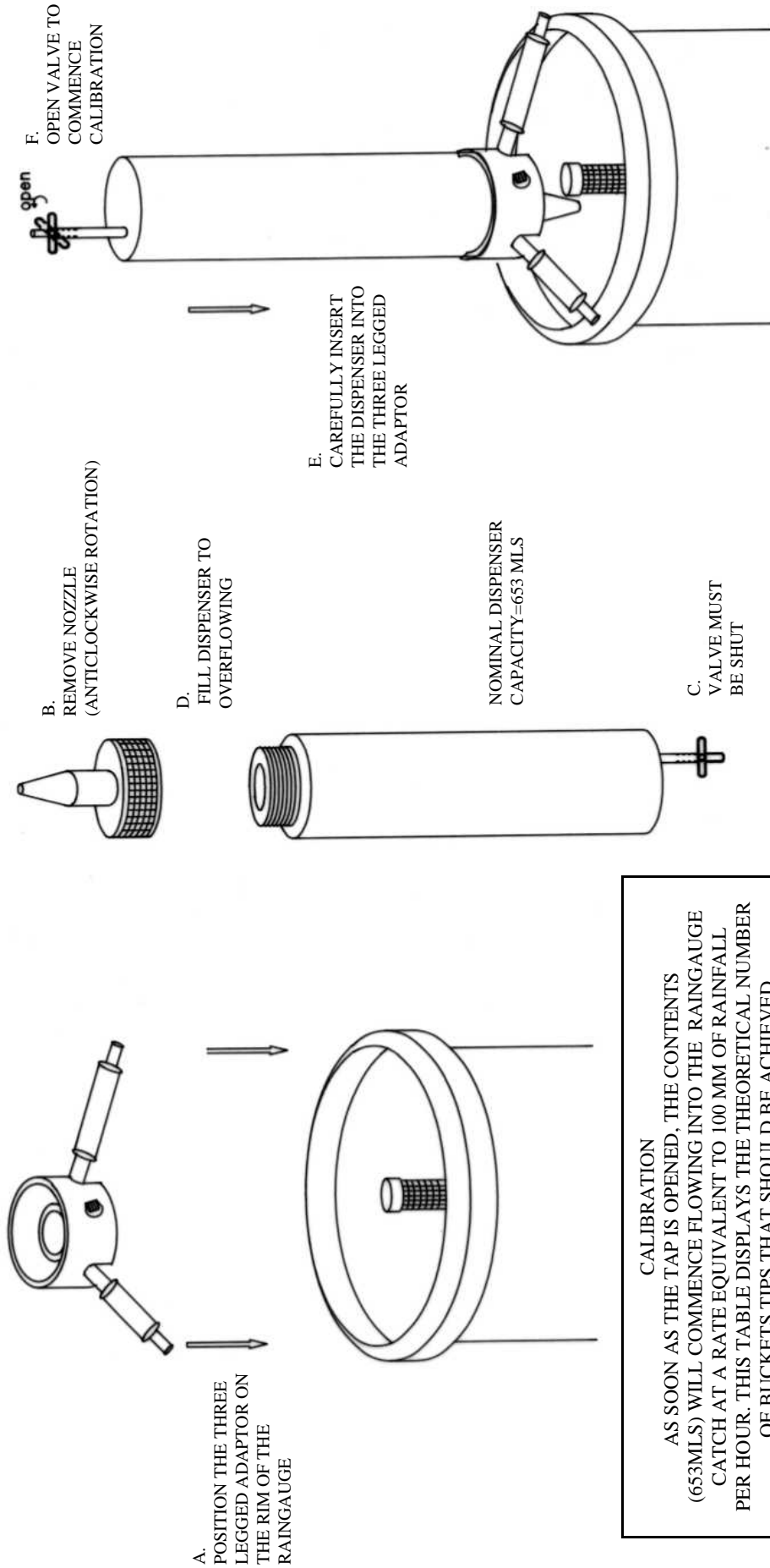
DIAGRAM 4

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PARTS LIST

ITEM	DESCRIPTION	PART NO.	QTY / ASSY
1	BASE	TB401-01	1
2	INSECT SCREEN	TB401-03	2
3	AXLE BEARINGS	TB404-03B	2
4	ASSY REED SWITCH	TB403	1
5	ASSY BUCKET	TB404 (0.2 mm) TB405 (0.5 mm) TB406 (0.01 inch)	1
6	BUCKET AXLE	TB404-03	1
7	ASSY ENCLOSURE	TB408	1
8	ASSY SYPHON	TB412	1
9	ASSY FILTER	TB410	1
10	CONNECTING LEAD	TB411	1
11	SCREW	SC022-44	6
12	ADJUSTING SCREW	TB312	2
13	HEX NUT	SC008-29	5
14	ENCLOSURE SCREW	SC045-21	3
15	INSECT SCREEN (ENCLOSURE)	TB408-05	1
16	LOUVER	TB418-06	2
17	BULLSEYE LEVEL	SC023-09	1

NOTE: PLEASE WET RAINGAUGE PRIOR TO CALIBRATION



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 BUCKETS TIPS THAT SHOULD BE ACHIEVED.

THEORETICAL NUMBER OF TIPS		
BUCKET SIZE	200 MM CATCH	203 MM (80) 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

RAINGAUGE FIELD CALIBRATOR (FCD)

