Manual

Tipping Bucket Rainfall Gauge

Model 6506A and 6506C

Revision History

File name / Revision	Date	Authors & Change Details	Checked/ Approved
Previous version BX	2004	RS/ JH	MS
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Unidata Manual - 6506 Tipping Bucket Rain Gauge Issue 3.0	11 09 13	MP	MS
Unidata Manual - 6506A and 6506C Tipping Bucket Rain Gauge Issue 4.0.docx	04 06 14	IM/CB Update	MS

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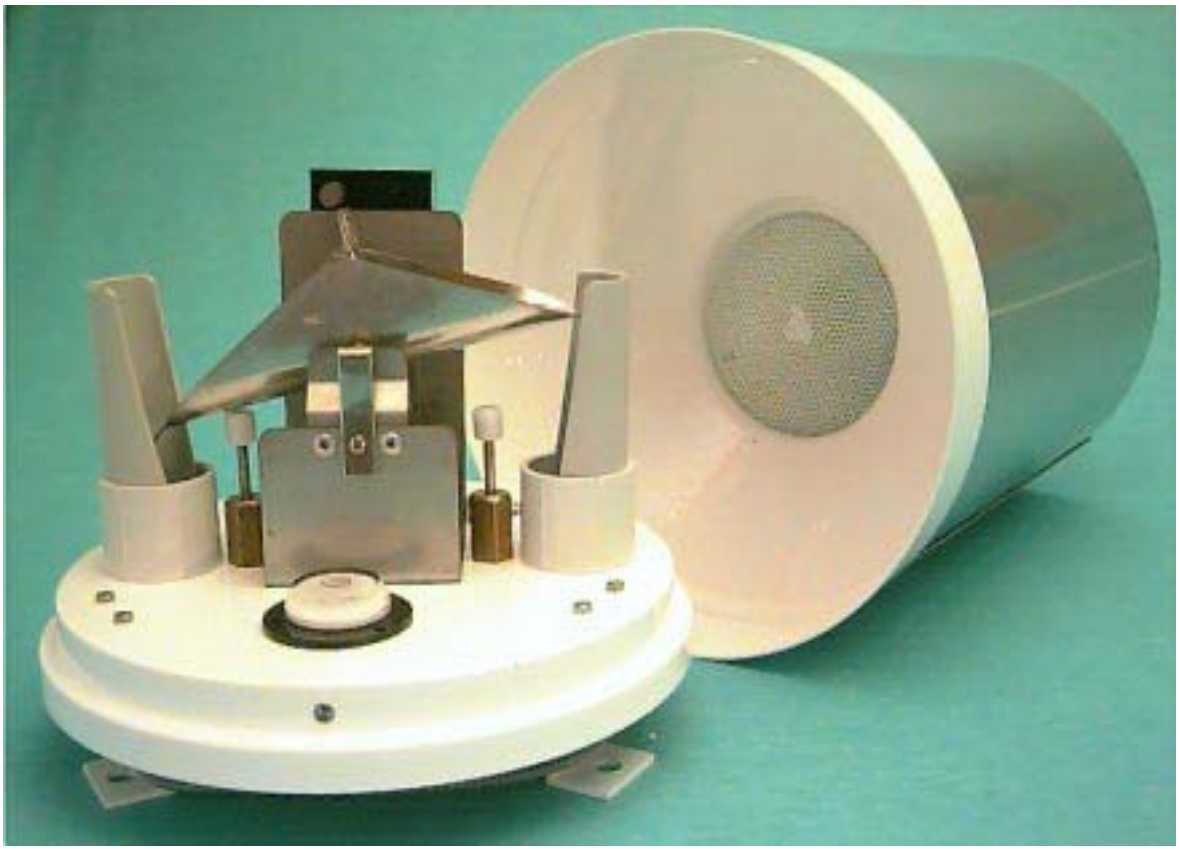
1.0 INTRODUCTION

The tipping bucket rainfall gauge (Model 6506A and 6506C), which operates on the tipping bucket principle, is designed to measure rainfall autonomously and is ideal for long-term unmanned weather monitoring with a Starlog Data Logging System.

To operate, a funnel in the rainfall gauge collects the rainfall which is strained by metal gauze before being passed to the metallic tipping bucket measuring system. The bucket tips each time 0.2mm of precipitation is collected and this can be adjusted from 0.1mm to 0.5mm. A reed switch detects that the bucket has tipped and produces a momentary contact closure signal. This cycle continues while rainfall continues to fall.

When the rainfall gauge is connected to a data logger, this signal is detected and recorded via a counter channel.

Up to four units may be connected to the data logger at any one time.



Model 6506A Tipping Bucket Rainfall Gauge

2.0 USING THE TIPPING BUCKET RAINFALL GAUGE IN A STARLOG SCHEME

Unidata's tipping bucket rainfall gauge is designed for automatic monitoring and collection of rainfall data in a Data Logging System. When the gauge is connected to a datalogger, data sensed by the instrument is logged and stored according to a program you define using Starlog Software.

Using the program, you generate a data logging program, called a Scheme, then load the Scheme into a datalogger.

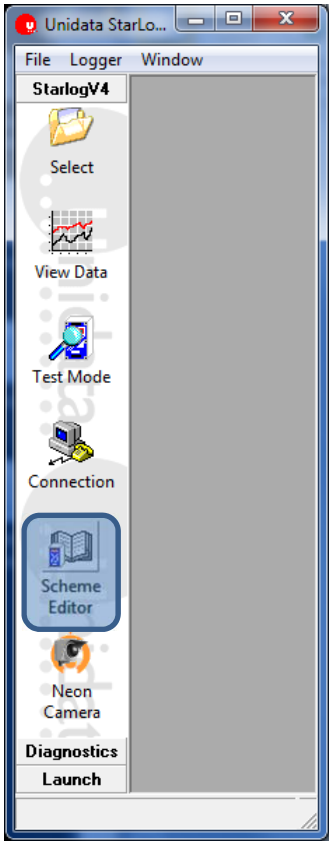
This section provides you with information you will find helpful in creating and executing a rainfall monitoring scheme.

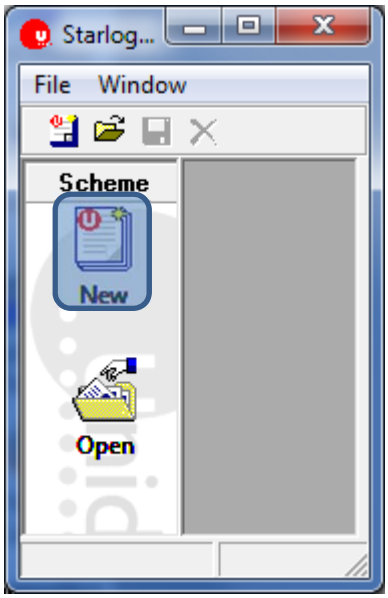
2.1 Choosing a Data Logger and Creating the Scheme

Any Unidata datalogger can be used with the Rainfall Gauge to record rainfall. Each logger offers a counter channel with sufficient resolution to record the pulses sent by the instrument. In fact, an 8-bit channel is sufficient for most rainfall monitoring projects.

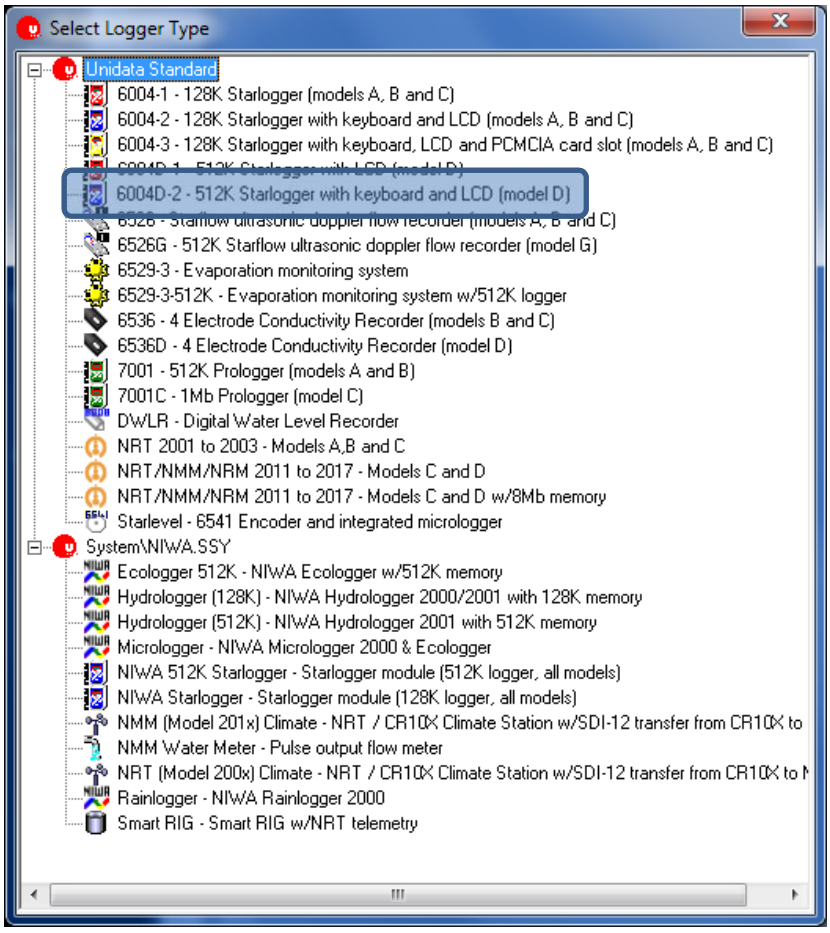
2.1.1 Adding an Instrument

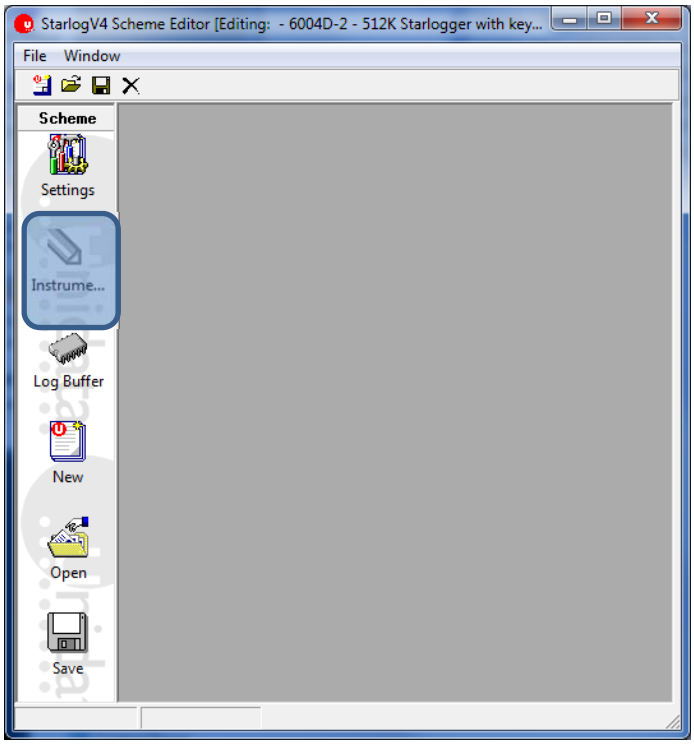
To create a rainfall monitoring scheme, select a Scheme Editor, New



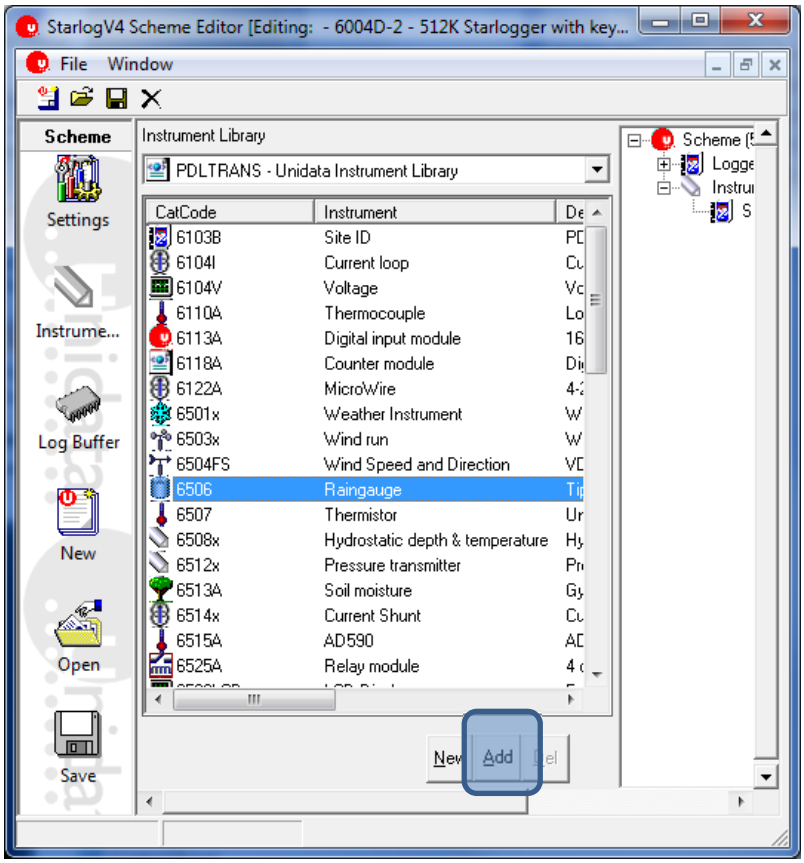


Select logger that you intend to use (e.g.6004-2 512K Starlogger), select Instruments

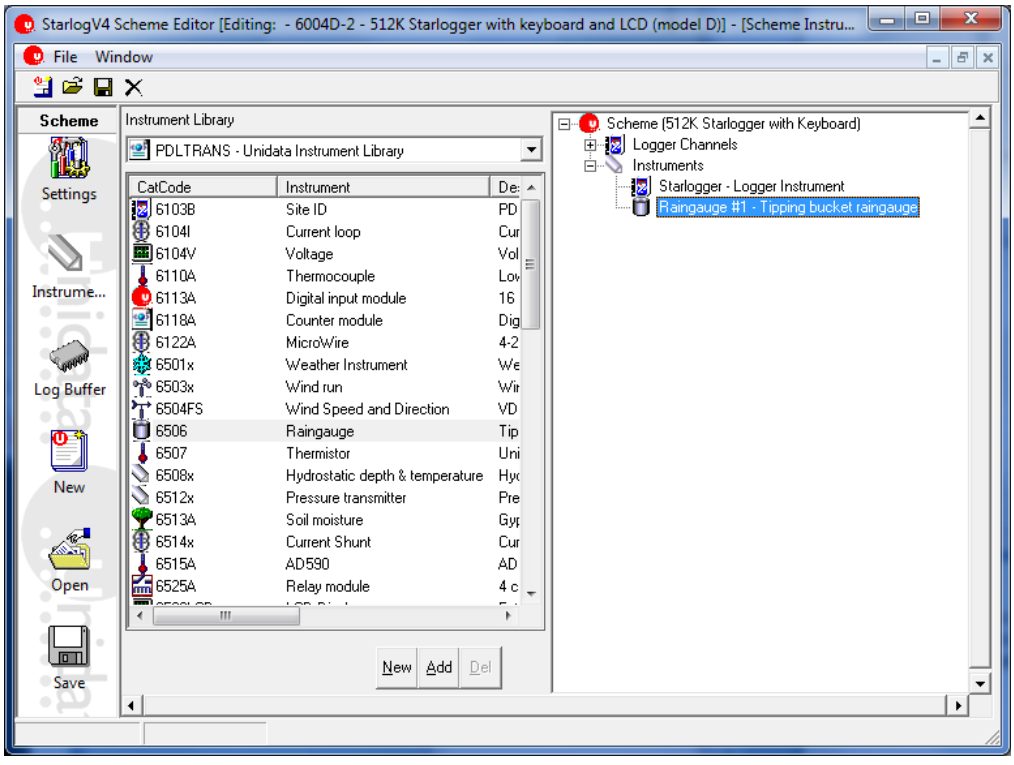




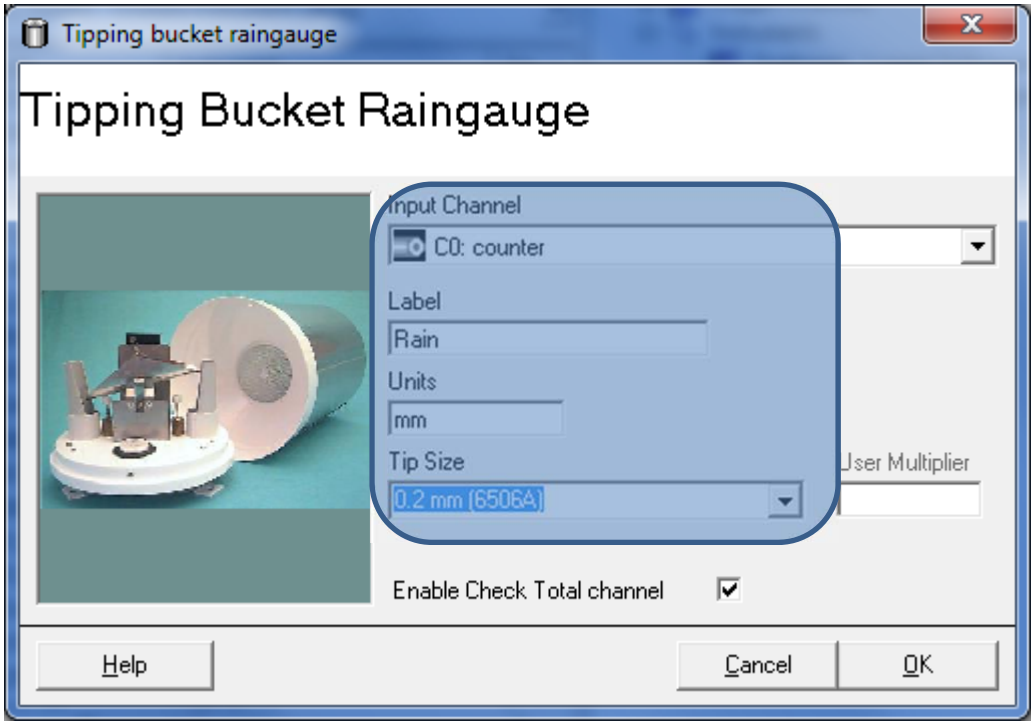
Select 6506 Raingauge and Add



Double click on selected scheme



Select counter channel (default C0), and Tip Size and OK



If you choose to log using a channel other than the default as listed here, ensure that you make the connection to the correct terminal of the Field Termination Strip (e.g. 6103E)

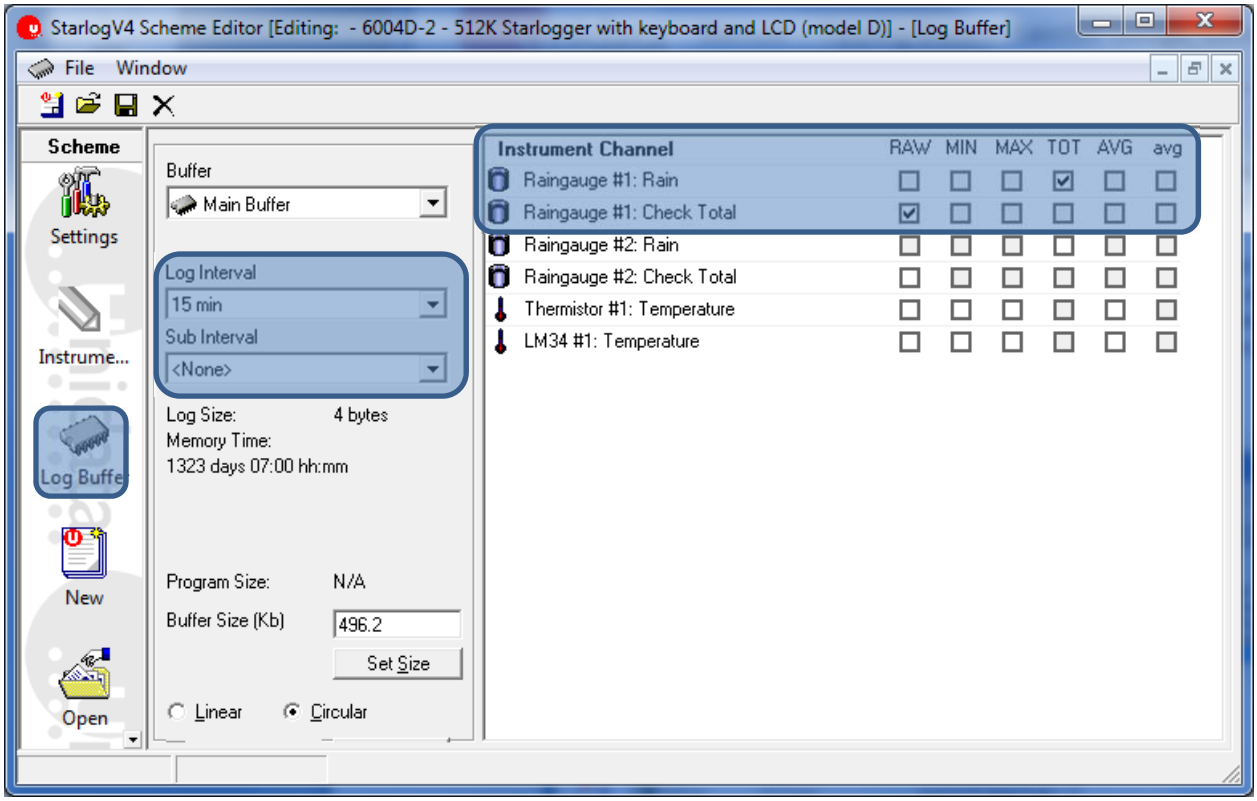
6506C Rain Gauge Tipping Bucket

2.1.2 When To Log

For a time-based scheme, set the log interval to suit your particular application. For instance, if you are logging daily rainfall, use a long interval like 24 hours. If you are logging small changes, use a brief interval like 15 minutes.

For an event-based scheme, define the event which will trigger the logging of data and/or the transmission of an output signal to alert you. For instance, you could program the logger to log only when rain falls (when the bucket tips and sends a signal from the Rainfall Gauge on c0). Then, logging would occur at every log interval if it is raining.

Select Log Buffer, set Log Interval and values to measure



3.0 INSTALLATION AND MOUNTING

The rainfall gauge should be bolted to a concrete foundation or metal post.

Select an outdoor site where:

- Ground is flat.
- Rainfall as measured is unaffected by air disturbances caused by tall buildings or trees.
- Measured rainfall may be regarded as representative of the surrounding area.

The bucket in this rain gauge has a rubber band preventing it from tipping. This is essential during transport to prevent damage occurring to the mechanism.

To remove the rubber band, undo the 3 screws near the base and lift the cover off.

1. Remove the cover which is secured by screws
2. Level the base using the “bull’s eye” spirit level and packing the hold-down fittings as necessary.
3. Connect the signal cable to the Data Logger FTS. The rainfall gauge comes complete with 5 metres (or custom length) of two core shielded cable. The red/white is the signal output and the green/black cable is the ground

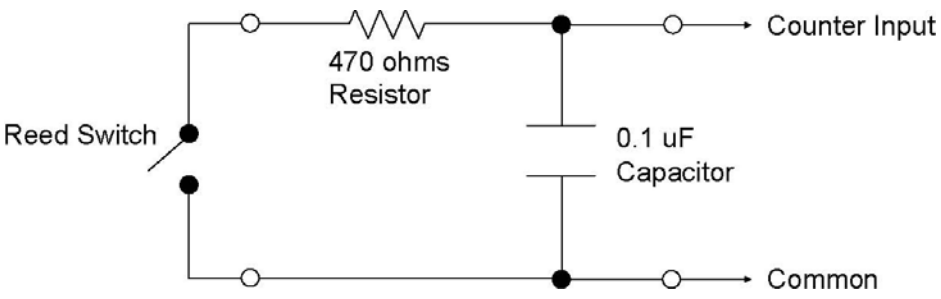
Wire Colour	FTS Pin (6103E&7100E)
Red/white signal	9
Green/black GND	10

For mounting assembly using metal post please refer to handbook supplied with the instrument

3.1 Contact Bounce

There is an RC filter factory-fitted to eliminate contact bounce. This ensures that there is only one pulse per bucketful of water.

Early models did not include this RC filter. If you discover errors due to contact bounce, it is recommended that you install this filter. You can verify that this error is occurring by observing the Counter channel’s memory location in **Scheme Test Mode**.



4.0 SPECIFICATIONS

6506A

Mechanism: Tipping Bucket, Reed Contact model
Measurement Units: millimetres (mm)
Operating Range: Up to 450mm/hr
Accuracy: ±2% at low rainfall rates
±5% at rainfall rates above 300mm/hr
Resolution: 0.2mm per tip
Housing: Stainless steel barrel and chassis, powder coated aluminium base and funnel
Dimensions: Funnel Dia 203mm
Height 315mm
Base Dia 250mm
Supply Voltage: 6 to 24V DC Nominal

6506C

Mechanism: Tipping Bucket, Reed Contact model
Measurement Units: millimetres (mm)
Operating Range: Up to 500mm/hr
Accuracy: ±2% to 200mm/hr
±3% to 380mm/hr
Resolution: 0.2mm, 0.25mm or 0.5mm per tip
Housing: Stainless steel barrel and chassis, powder coated aluminium base and funnel
Dimensions: Funnel Dia 230mm
Height 300mm
Base Dia 275mm
Supply Voltage: 6 to 24V DC Nominal

5.0 TESTING

To determine whether a Rain Gauge is calibrated properly and operating correctly you can use the test facility in Starlog Software. This section describes how to test and calibrate the instrument.

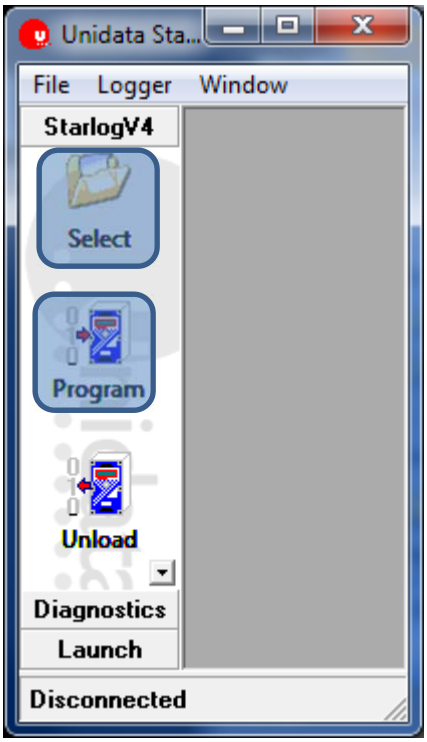
5.1 Using Software Scheme Test Mode

When connected to a data logger, a computer running Starlog V4 Software can be used to interrogate a Rainfall Gauge for real time data readings and programming information.

1. Connect the Instrument to the data logger through matching FTS

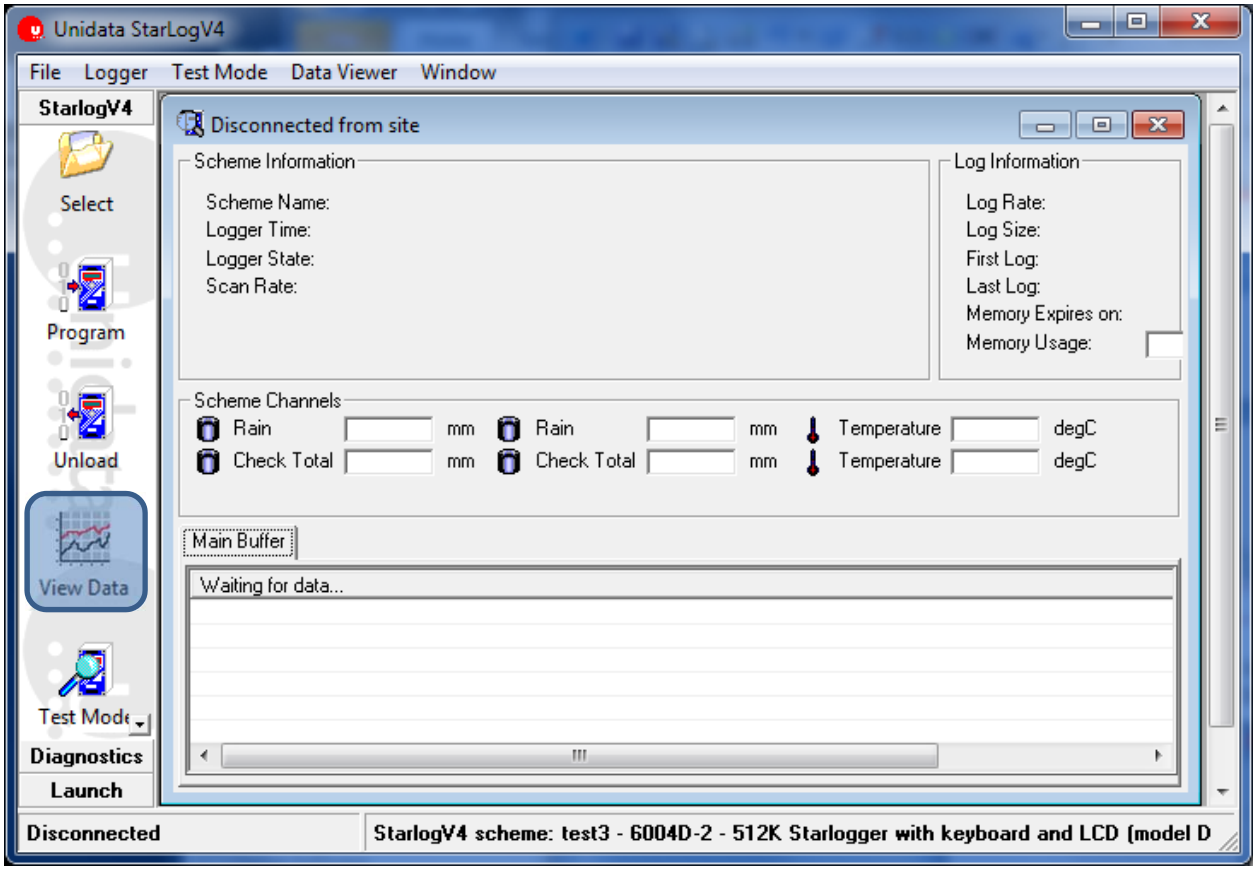
Wire Colour	FTS Pin (6103E&7100E)
Red/white signal	9
Green/black GND	10

2. Connect the data logger to the computer.
3. Start the Starlog V4 Software.
4. Select the Rainfall Monitoring Scheme (or create one, if you haven't yet).
5. If the Scheme has not been loaded, choose Program Logger with Scheme from the Control Panel. If the Starlog Data Logger is loaded with the Scheme, then...



6. From the Scheme's Control Panel, select Scheme Test Mode.

7. View the display to determine how the scheme is operating. The Test Window (upper window) displays scheme information from the Data Logger and its content is updated every Scan. The Log Entry Window (lower window) displays what has been logged.



You can also use Scheme Test Mode to create your own Test Screens

5.2 Calibration

The Rainfall Gauge is factory calibrated to tip at 0.2mm (or 0.1mm, 0.5mm) of rainfall. If the Rain Gauge is required to tip at a different amount of rainfall use the following calibration procedure. This procedure explains how to calibrate for 0.4 mm, this is equivalent to 12.96 ml per bucket. Please refer to the calibration table for other sensitivities

Sensitivity Required	Bucket Capacity	Testing Volume for 10 mm Rainfall
0.2 mm	6.48 mm each	324 ml
0.4 mm	13.0 mm each	324 ml
0.5 mm	16.2 mm each	324 ml

1. With a large screwdriver turn one bucket stop shaft till the bucket will hold its maximum.
2. Pipette 12.96 ml, (13.0 ml will ensure sufficient accuracy), into the bucket.
3. Turn the bucket stop shaft carefully until the bucket tips. Do this with the other bucket.
4. Replace the funnel and pour 650 ml at a slow drip rate into the funnel and expect 50 counts.
5. Make minute adjustments as necessary.

5.2.1 Testing Calibration

Measure a volume of water corresponding to 10mm of rainfall using a rainfall gauge (or measure out 324ml of water. 1mm of rain into 200mm is approximately 32.4ml).

Very slowly (over a 15 minute period) pour the water into the 203mm funnel. When all the water has passed through the recorder, the Logger should have registered 50 counts (10 mm) for a sensitivity of 0.2mm. You can check this with Starlog Software.

6.0 MAINTENANCE

Regular inspection once a month is required to:

- Clear the receiver of fallen leaves and dust.
- Check that the rainwater falls into the bucket properly.
- Check that the bearing of the tipping bucket is clean.
- Check that the instrument is still level