

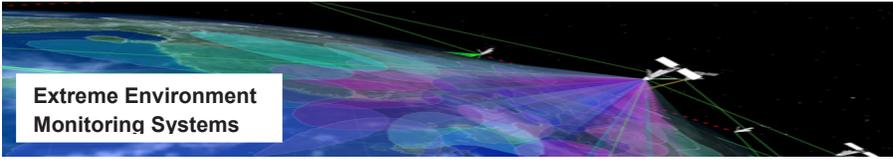


HOSKIN

SCIENTIFIC

GOES SATELLITE REMOTE HYDROMETRIC STATION IN PARTNERSHIP WITH ONTARIO POWER GENERATION

APPLICATION NOTE



**Extreme Environment
Monitoring Systems**

OPG Northeast Operations Remote Hydrometric Systems

Sutron Model: Satlink 3 Transceiver / Datalogger

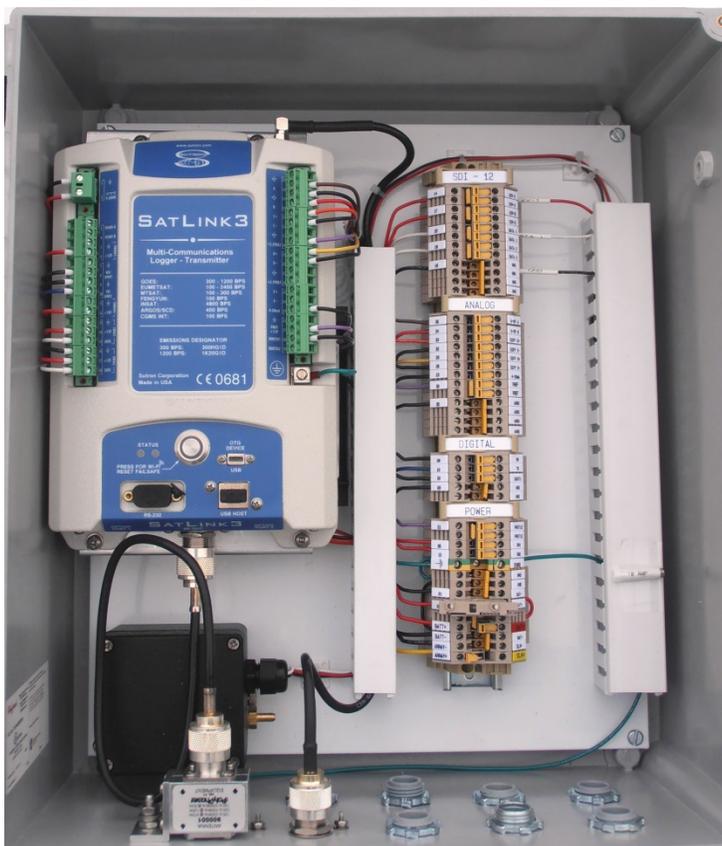
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System Overview:

The Ontario Power Generation remote hydrometric stations comprises of using Satlink3 using GOES satellite for remote monitoring, INW PT12 water level and temperature sensor, TB3 tipping bucket rain gauge and pluvio2 precipitation gauge.

The Satlink measures and transmits data to the GOES satellite on scheduled interval to data hosting site and can be decoded by the end user. The quick deployment stations measures the following parameters: water level, water temperature and system battery.

The stations have been programmed and tested at the Hoskin Scientific Ltd. Edmonton System Integration center. System testing includes; sensor verification using specialized test equipment and testing of the quick deployment stations GOES satellite communications.



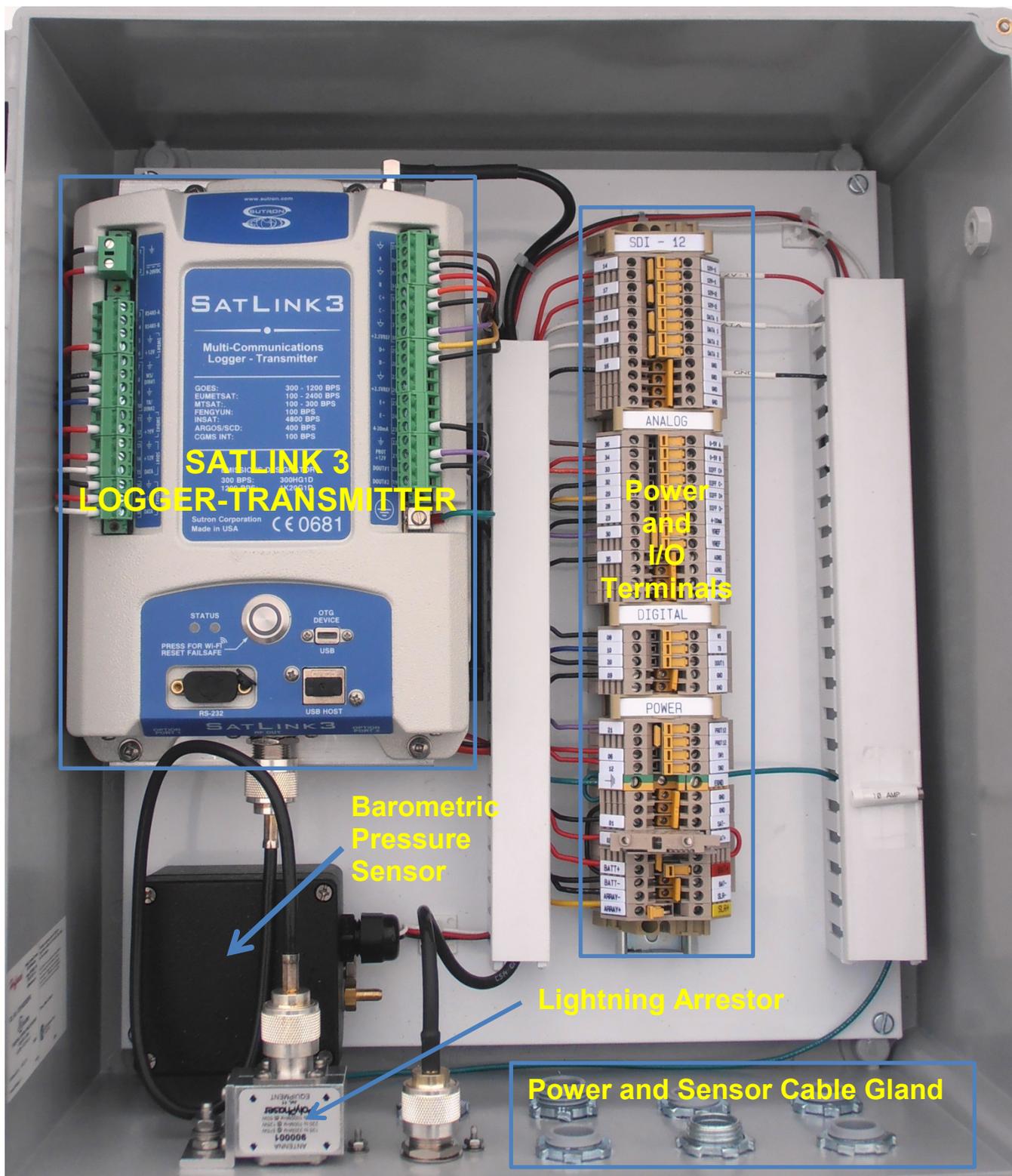
The 12 volt, 120 amp-hour battery, 90 watt solar panel and solar regulator make up an autonomous power supply that operates the system. The battery keeps the system running for extended periods of darkness and cloudy weather until sufficient sunlight allows recharging of the battery. The solar regulator monitors charging and shunts away surplus energy when the battery reaches full charge.

Lightning and electrical transient protection is installed for the power system and external sensors.

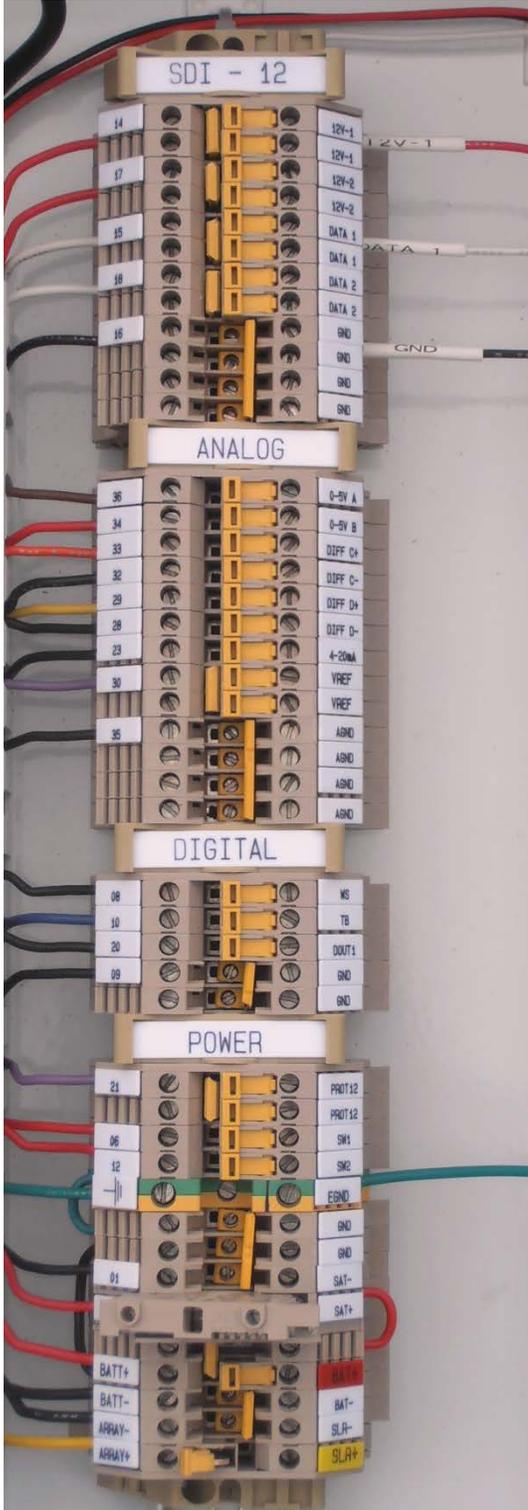
This document outlines the hardware configuration and programming options used in this project. Complete instructions are available from the manufacturers.

Sample Quick Deployment Hydrometric Station

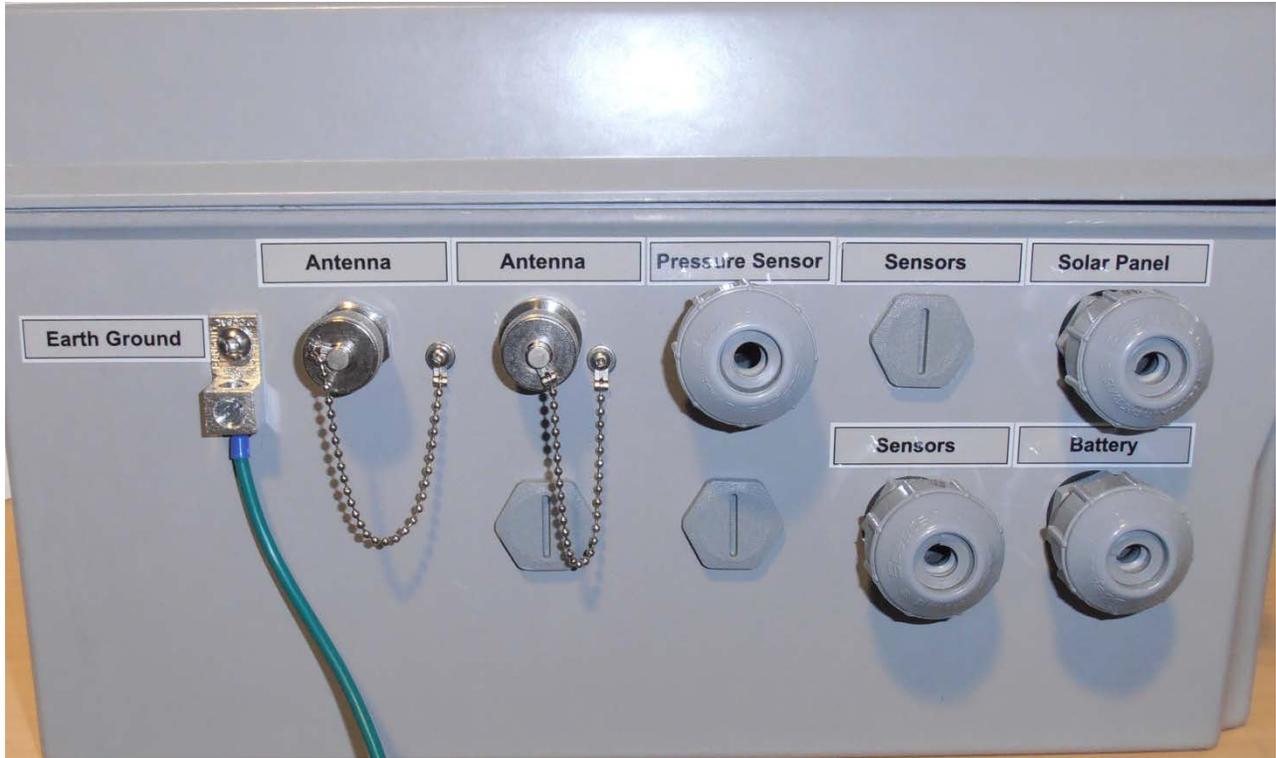




Power and I/O Terminal Connection



Enclosure Bottom View





Information Labels and Stickers:

The commissioning guide and wiring chart outline the procedure for making connections between components. A more detailed explanation of components and procedures follows

Satlink Transmitter Commissioning Guide

It is highly recommended that the system be tested in the lab before field deployment.

- 1) Open the orange switches on the disconnect terminals: BAT(+), SLR(+), and the fused terminals SAT+(Satlink).
- 2) Connect the earth ground wire from ground rod to enclosure earth ground terminal. Also connect Earth Ground wire to tripod using U-bolt clamp.
- 3) Connect the sensor to enclosure terminals as per wiring diagram
- 4) Connect battery cable from battery to enclosure terminals:
BAT(+) (White wire), BAT(-) (Black Wire).
- 5) Connect battery cable terminals inside the battery enclosure to battery:
POS+ (White), NEG-(Black).
- 6) Connect solar panel cable to terminals:
SLR+ (White), SLR- (Black).
 - a) Close terminal BAT(+). This will connect the 12VDC battery to the solar regulator system.
 - b) Close terminal SLR(+)
The charging LED on solar regulator should now come on if in sunlight. Make sure you close the battery switch first.
 - d) Close terminal SAT+ which will power on the Satlink.
- 7) Use the provided Linkcomm software to confirm operation of the station. In Satlink setup confirm satellite ID and enable self-timed transmission to GOES satellite.

When turning the system off open terminal SLR(+) first before opening BAT(+)

Sensor and Power Connection

Battery Connections

Enclosure Terminals	Wire Color	Battery Terminal
Bat(+)	White	POS(+)
Bat(-)	Black	NEG (-)

Solar Panel Connections

Enclosure Terminals	Wire Color	Solar Panel Terminals
SLR (+)	White	Solar Panel (+)
SLR (-)	Black	Solar Panel (-)

PT12 Pressure Sensor 1

Enclosure Terminal	Wire Color	Description
12V-1	White	12VDC
DATA-1	Brown	SDI-12 Signal
GND	Blue	Ground

PT12 Pressure Sensor 2

Enclosure Terminal	Wire Color	Description
12V-2	White	12VDC
DATA-2	Brown	SDI-12 Signal
GND	Blue	Ground

Sutron Accubar Pressure Sensor **(Already Connected)**

Enclosure Terminal	Wire Color	Description
12V-1	Red	12VDC
DATA-1	White	SDI-12 Signal
GND	Black	Ground

Pluvio2 Precipitation Gauge

Enclosure Terminal	Wire Color	Description
12V-2	Red	12VDC
DATA-2	Orange	SDI-12 Signal
GND	Blue	Ground



TB3 Tipping Bucket Rain Gauge

Enclosure Terminal	Wire Color	Description
TB	Red	TB+
GND	Black	TB-

Connection to Heater Battery Box

Solar Panel Connections

Enclosure Terminals	Wire Color	Solar Panel Terminals
SLR (+)	White	Solar Panel (+)
SLR (-)	Black	Solar Panel (-)

TB3 Tipping Bucket Rain Gauge

Enclosure Terminal	Wire Color	Description
TB	Red	TB+
GND	Black	TB-
TBHT+	White	Heater+
TBHT-	Black	Heater-

Another LTC Cable from battery box (TB+/TB-) connects to system enclosure (TB+/TB-) from.

Sensor Configuration Table

Evelyn Lake Station

Project # 42836-Evelyn Lake Station					Client : Ontario Power Generation Inc.				
Description	Name in logger	Analog/ Digital Channel	SDI Port	SDI12 Address	SDI12 Cmd	SDI12 Para	Slope	units	Sampling/ ogging interval
Sutron Accubar Pressure	PA	-	1	0	M!	1	0.70308	mH2O	15min
Absolute Water Level1	ABS-WL1	-	1	1	M4!	1	-	mH2O	15min
INW-Water Temperature 1	INW-WT1	-	1	1	M4!	4	-	C	15min
Absolute Water Level2	ABS-WL2	-	2	0	M4!	1	-	mH2O	15min
INW-Water Temperature 2	INW-WT2	-	2	0	M4!	4	-	C	15min
Precipitation Rate TB3	PR	TB	-	-	-	-	-	mm	15min
Precipitation Accumulation TB3	PT	TB	-	-	-	-	-	mm	15min
Water Level1	WL1	-	-	-	-	-	-	mH2O	15min
Water Level 2	WL2	-	-	-	-	-	-	mH2O	15min
Battery	BAT	-	-	-	-	-	-	VDC	15min



Mistinikon Lake Station

Project # 42836-Mistinikon Lake Station					Client : Ontario Power Generation Inc.			
Description	Name in logger	SDI Port	SDI12 Address	SDI12 Cmd	SDI12 Para	Slope	units	Sampling/Logging interval
Sutron Accubar Pressure	PA	1	0	M!	1	0.70308	mH2O	15min
Absolute Water Level1	ABS-WL1	1	1	M4!	1	-	mH2O	15min
INW-Water Temperature 1	INW-WT1	1	1	M4!	4	-	C	15min
Absolute Water Level2	ABS-WL2	2	0	M4!	1	-	mH2O	15min
INW-Water Temperature 2	INW-WT2	2	0	M4!	4	-	C	15min
Water Level1	WL1	-	-	-	-	-	mH2O	15min
Water Level 2	WL2	-	-	-	-	-	mH2O	15min
Battery	BAT	-	-	-	-	-	VDC	15min

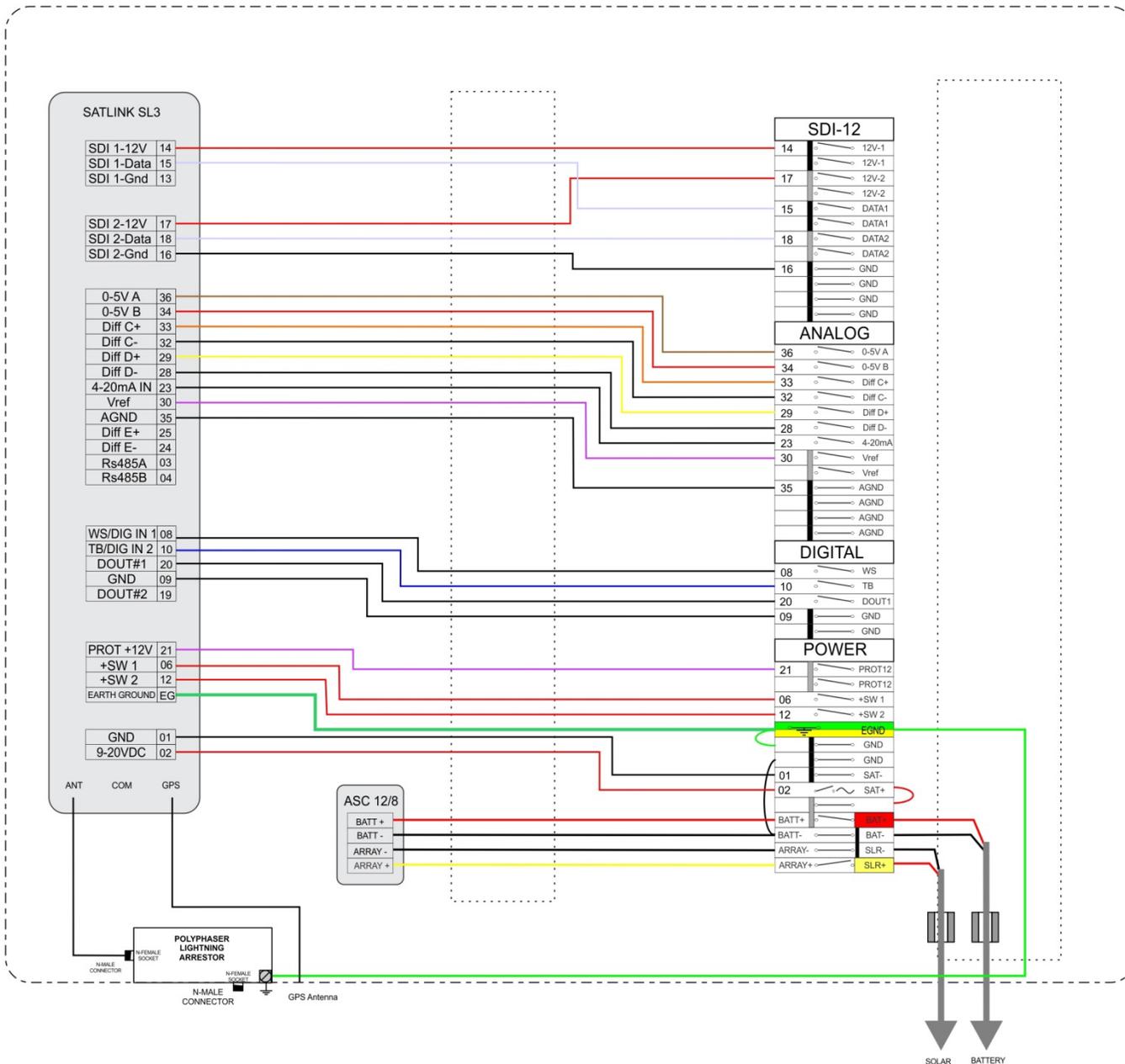
Rabbit Lake Station

Project # 42836-Rabbit Lake Station					Client : Ontario Power Generation Inc.			
Description	Name in logger	SDI Port	SDI12 Address	SDI12 Cmd	SDI12 Para	Slope	units	Sampling/Logging interval
Sutron Accubar Pressure	PA	1	0	M!	1	0.70308	mH2O	15min
Absolute Water Level1	ABS-WL1	1	1	M4!	1	-	mH2O	15min
INW-Water Temperature 1	INW-WT1	1	1	M4!	4	-	C	15min
Absolute Water Level2	ABS-WL2	2	0	M4!	1	-	mH2O	15min
INW-Water Temperature 2	INW-WT2	2	0	M4!	4	-	C	15min
Pluvio2-Accu NRT	Accu NRT	2	1	M!	3	-	mm	15min
Pluvio2-Accu TNRT	Accu TNRT	2	1	M!	4	-	mm	15min
Pluvio2-Bucket NRT	Bucket NRT	2	1	M!	5	-	mm	15min
Water Level1	WL1	-	-	-	-	-	mH2O	15min
Water Level 2	WL2	-	-	-	-	-	mH2O	15min
Battery	BAT	-	-	-	-	-	VDC	15min

Technical Information

Satlink-E16 Wiring Diagram

This drawing is included to assist users requiring technically specific information related the actual routing of wires in the system.



Liquid Tight Cable Connection

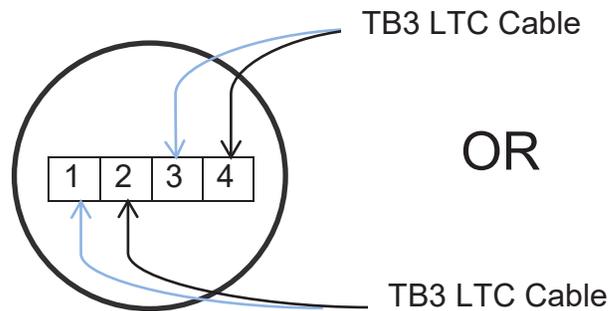


Picture here shows bottom view of the tipping bucket. Knock off the top filter cap and install provided LTC connector as shown in picture below.





Once LTC connector is installed, pass the LTC cable through it and attach the cable to terminals



While connecting cable to terminals make sure you connect either to terminal 1-2 or terminal 3-4. There is no polarity for the wire.

Example Mounting of TB3/TB4 Stand pipe with leveling Fixture Mounting

Anthomac® TB3/TB4 Stand Pipe:

Where possible, a stand pipe offers the most robust installation for the Hydrological Services® TB3 rain gauge. The stand pipe is designed for bolting onto a preprepared concrete slab.





Wiring Diagram

Pulsed Output connection

Xlink Wiring

TB3 Wiring	Enclosure Terminal
TB+	TB
TB-	GND

9210 logger wiring

TB3 Wiring	Enclosure Terminal
TB+	I/O 2
TB-	GND

Satlink Wiring

TB3 Wiring	Enclosure Terminal
TB+	TBKT
TB-	TBKT GND

Sensor Verification

- Once logger has been setup with programming (slope usually 0.2mm), manually tip the catch filter 5 times.
- This will create contacts and generates pulsed output.
- Check the logger reading if is correct.

For TB3 with 1tip=0.2

5 tips=1mm

If you don't get this verification passed check the connection and visual inspection for troubleshooting.

PT12 Pressure Transducer

Part No: E317-2B41852

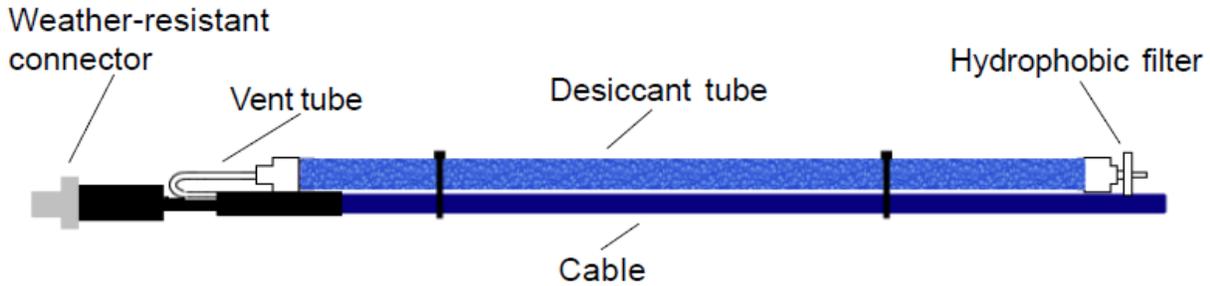
Overview

The PT12 transducer has been designed to provide trouble-free submersible operation in liquid environments, when properly installed and operated. The PT12 measures pressure, temperature, and supply voltage. The most common application is measuring liquid levels in wells and tanks.

In order to do this, the transducer must be installed below the water level at a fixed depth. The installation depth is 3.51 meter and the transducer should not be installed at a depth below 3.51meter. If the transducer is installed below its maximum range, damage may result to the transducer and the output reading will not be correct.



Desiccant Tube(Barometrically compensated models only)



Inspect the desiccant tube at least once every two months. The desiccant tube prevents moisture in the air from being sucked into the vent tube, which can cause erratic readings and sensor damage. The desiccant is a bright blue color when active and dry. As moisture is absorbed the color will begin to fade, becoming a light pink, which indicates full saturation and time to replace.

The desiccant tube prevents water intrusion through the vent tube. Be sure to replace the desiccant when it turns pink, as that indicates it is saturated.

Wiring Instruction

Sutron 9210, Xlink, Satlink loggers

Wire Color	Description	Enclosure Terminal
White	12VDC	12V
Brown	SDI-12 Signal	Data
Blue	Ground	GND

Sensor Verification

- Take a bucket of water or graduated cylinder. Fill it with water and measure the water level using tape measure.
- Insert the sensor in the water and secure it. Now take the reading from logger and note down.
- Now pour some water in the bucket or graduated cylinder and measure the water level with tape and note down.
- Now again measure the water level reading from logger and get the rate of change in water level.
- This should match with the tape measure reading

Pluvio Manual

Part No: E653-70.020.000.9.0

Overview

The OTT Pluvio² is an all-weather precipitation gauge that uses superior weight-based technology to measure the amount and intensity of rain, snow, and hail. It employs a high precision load cell and algorithms that compensate for wind, temperature, and evaporation, ensuring the highest accuracy precipitation measurement over time.

Connecting Power and I/O to Pluvio 2

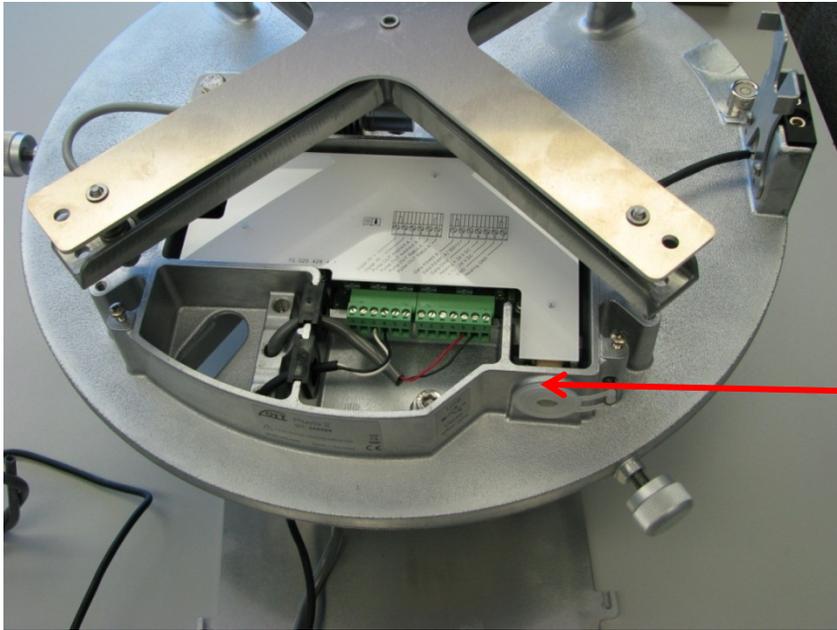


OTT Pluvio 2 Base with load cell plastic cover about to be removed



OTT Pluvio 2 terminal cover being removed

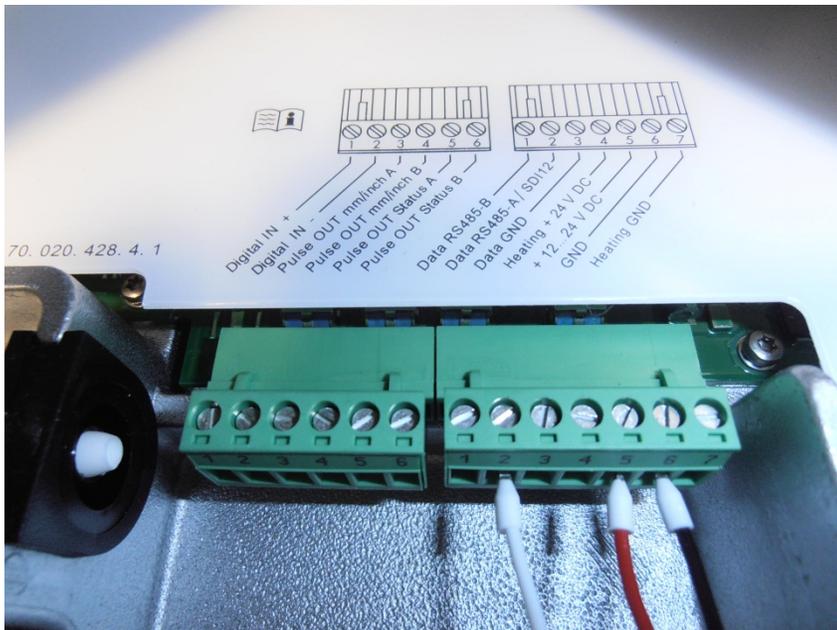
OTT Pluvio 2 base with wiring cover removed showing power and I/O connections



You can connect to Pluvio 2 software using usb cable to usb port on pluvio.

**USB
Connection**

OTT Pluvio 2 Wiring



SDI-12 Connections

RIGHT WIRING BLOCK/TERMINAL#5 - + 12...24V DC = Red Connect to Enclosure Terminal '12V'

RIGHT WIRING BLOCK/TERMINAL#6 – GND = Black Connect to Enclosure Terminal "GND"

RIGHT WIRING BLOCK/TERMINAL#2 - Data RS-485 A/ SDI-12 ---Connect to Enclosure Terminal "Data"

Xlink/ 9210 logger/ Satlink wiring

Wire Color	Pluvio Wiring	Enclosure Terminal
RED	+12..24 VDC	12V
ORANGE	DATA RS485-A/ SDI12	DATA
BLACK	GND	GND

Pulse Output Connection

Xlink Wiring

Wire Color	Pluvio Wiring	Enclosure Terminal
WHITE	Pulse out mm/inch A	TB
BLACK	Pulse out mm/inch B	GND

9210 logger wiring

Wire Color	Pluvio Wiring	Enclosure Terminal
WHITE	Pulse out mm/inch A	I/O 2
BLACK	Pulse out mm/inch B	GND

Satlink Wiring

Wire Color	Pluvio Wiring	Enclosure Terminal
WHITE	Pulse out mm/inch A	TBKT
BLACK	Pulse out mm/inch B	TBKT GND

Pluvio Alter Shield with Pipe Mount Installation with Bottom Flange

(Note the Pluvio central pipe can be ordered in custom lengths up to 2 meters.
Standard lengths are 1M and 2M)



Central Alter Shield Pipe Union



Pluvio Installed in the Field with Alter Shield with Central Pipe

(Note liquid tight conduit running to data acquisition system for cable protection on the ground)

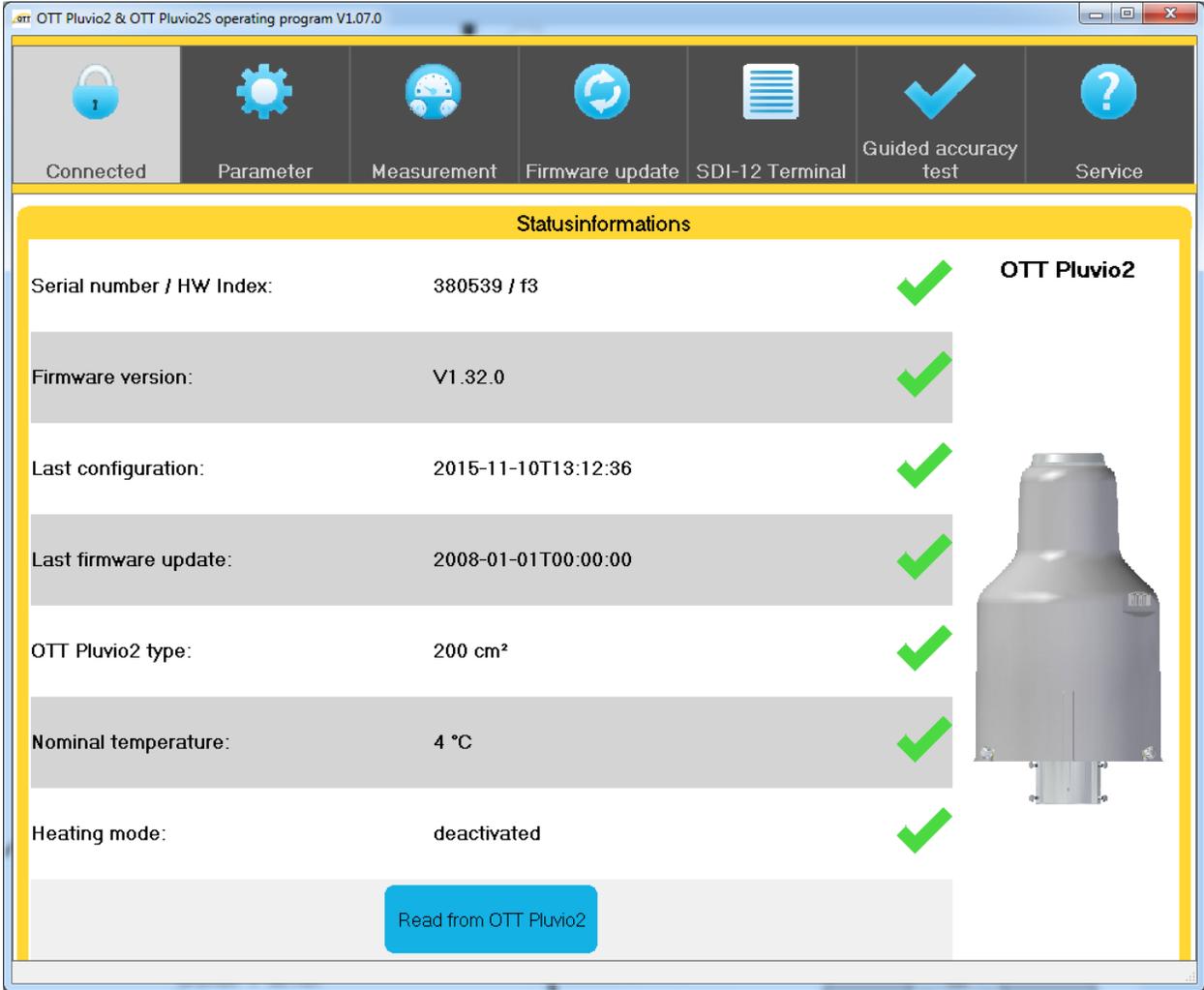


Pluvio 2 Precipitation Gauge software configuration

Pluvio Software

This software is available for free from the OTT website. The software can be used to configure and calibrate the Pluvio and take real-time measurements. It will also let you know if any components of the system are malfunctioning.

Software Status tab gives current status information of connected pluvio.



OTT Pluvio2 & OTT Pluvio2S operating program V1.07.0

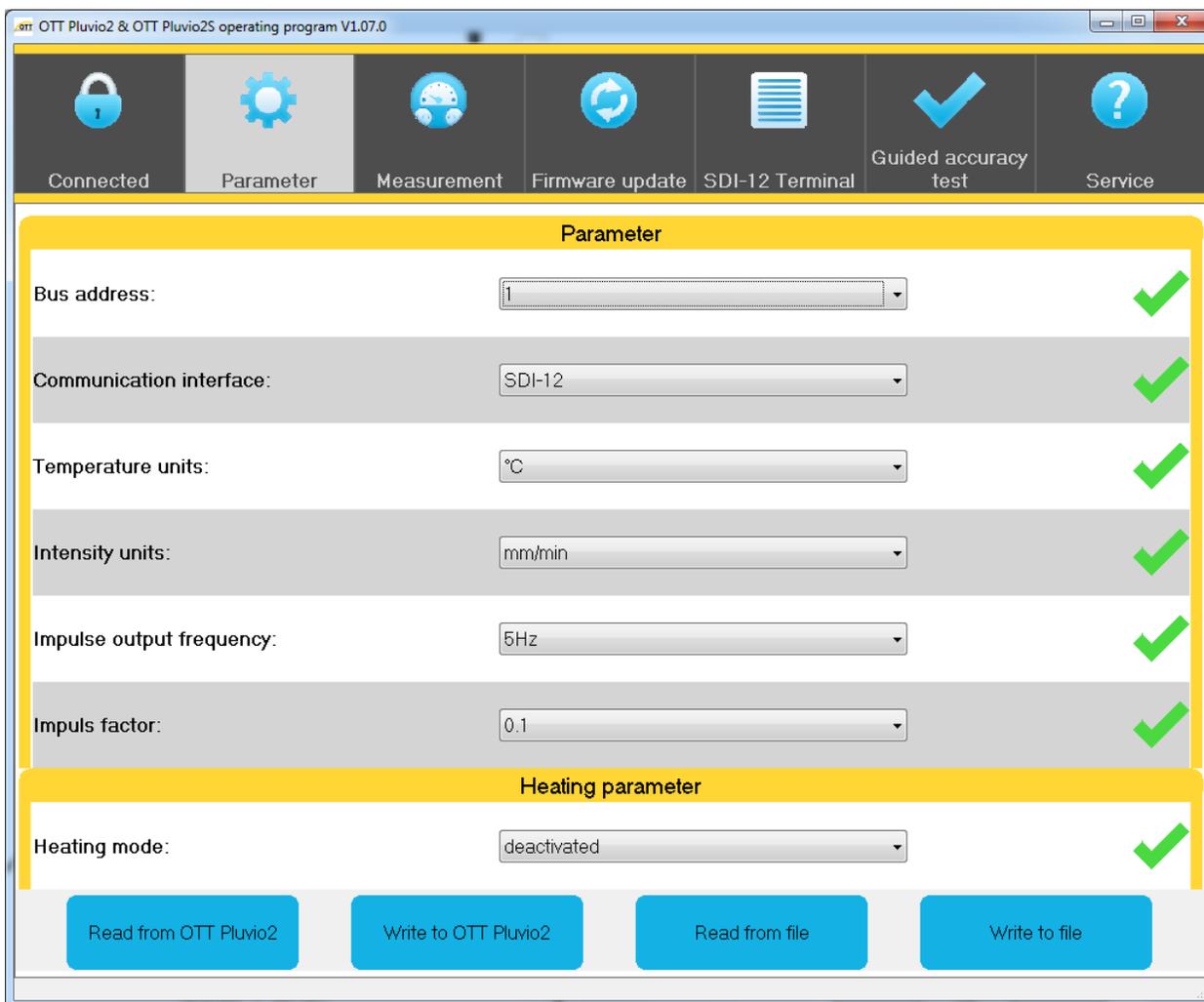
Connected Parameter Measurement Firmware update SDI-12 Terminal Guided accuracy test Service

Status information

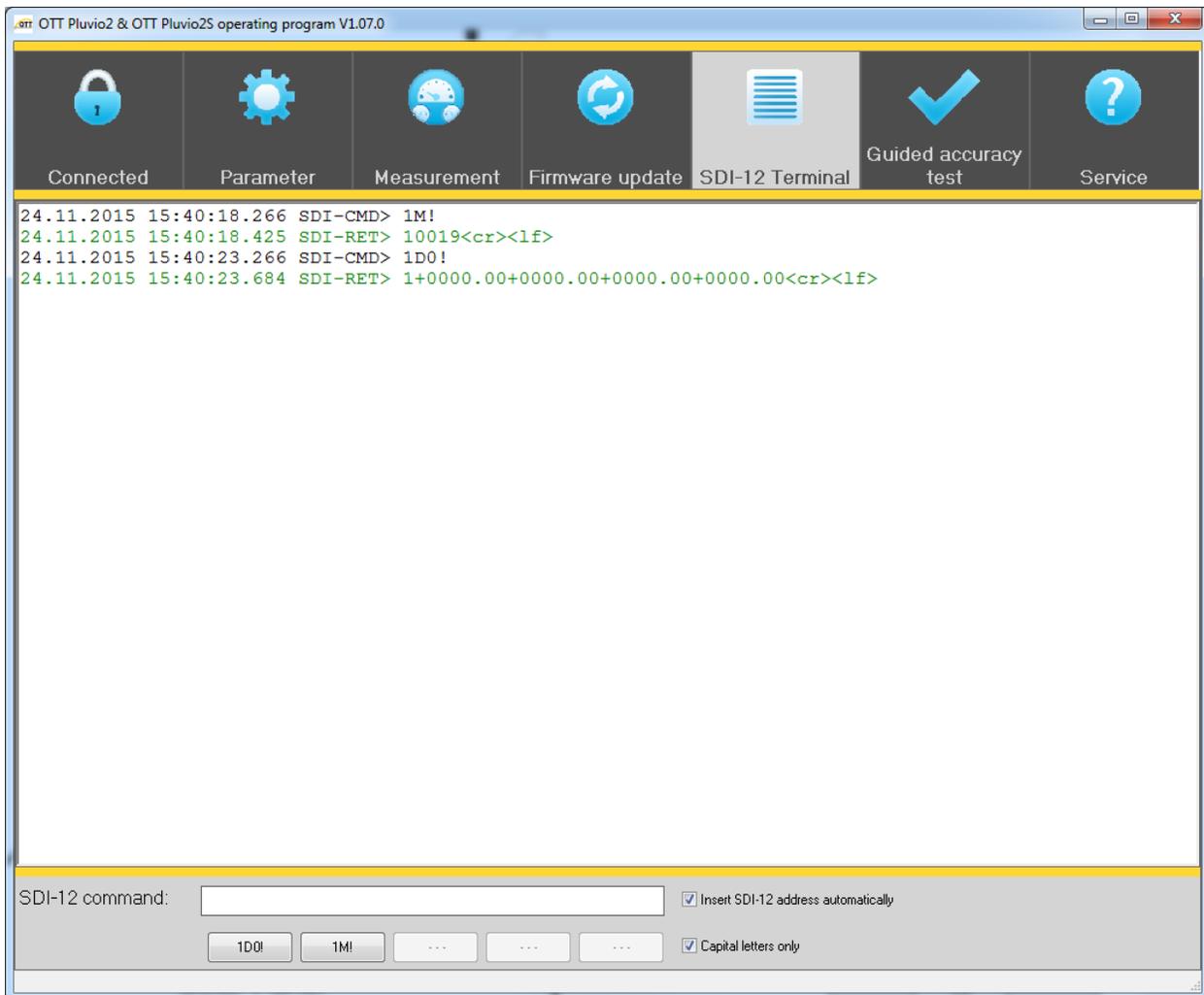
Serial number / HW Index:	380539 / f3	✓	OTT Pluvio2 
Firmware version:	V1.32.0	✓	
Last configuration:	2015-11-10T13:12:36	✓	
Last firmware update:	2008-01-01T00:00:00	✓	
OTT Pluvio2 type:	200 cm ²	✓	
Nominal temperature:	4 °C	✓	
Heating mode:	deactivated	✓	

Read from OTT Pluvio2

Parameter tab allows access to configure SDI address, temp units, intensity units, impulse factor and impulse output frequency.



SDI Terminal allows sending SDI12 commands to sensor.



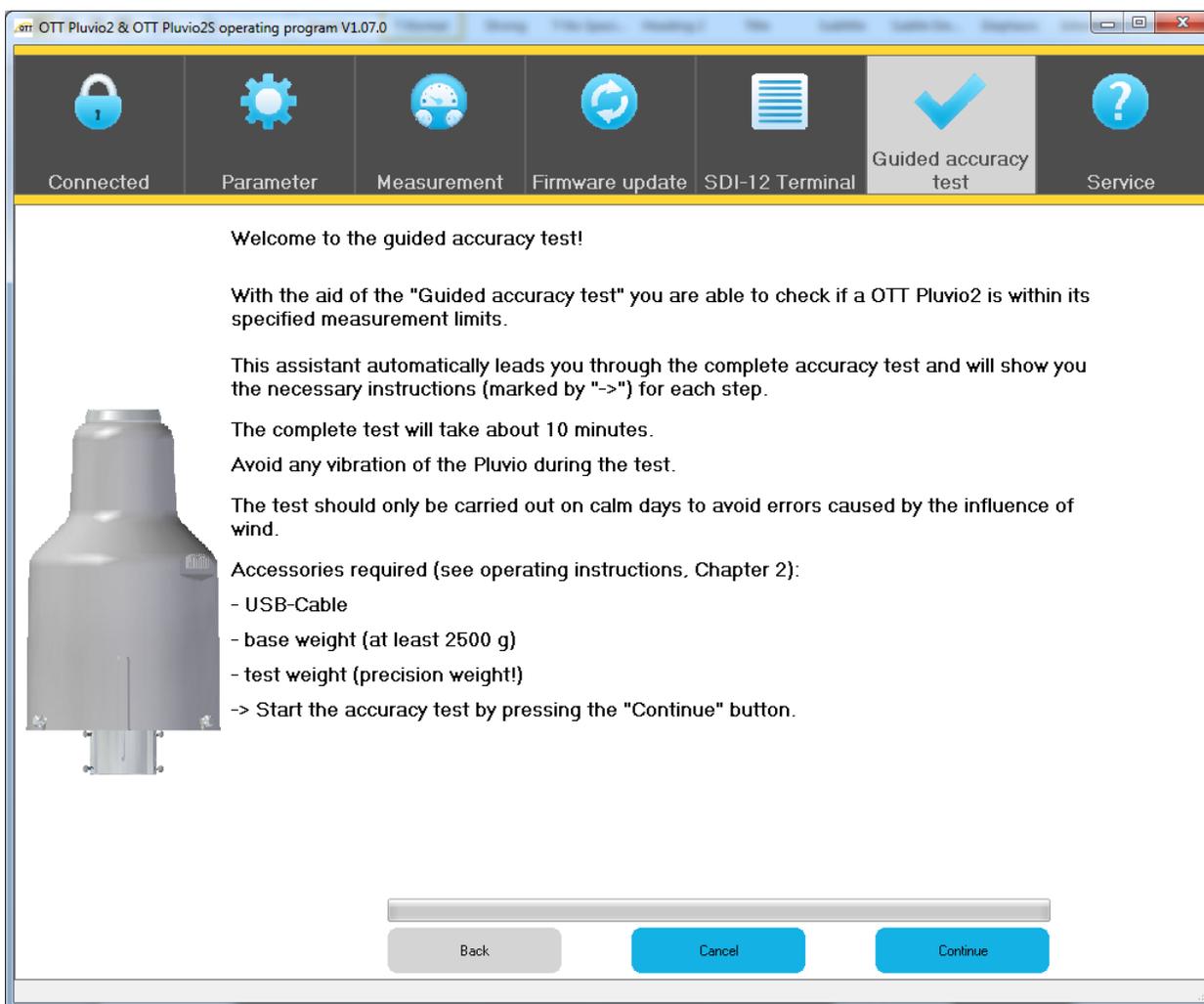
Sending M! Command will be replied back with 4 values.

Important parameters

Parameters 3- Accumulated NRT

Parameter 4- Accumulated total NRT

Guided accuracy test allows user to check if pluvio2 is within its specified measurements limits.



You will require calibration weight (at least 2500g) for this test. Follow on screen instruction and your test result will be displayed at the end.



Sensor Verification

Sensor verification is highly recommended to ensure that sensor is working properly after installation.

Stuff you need:

Adjustable clamp laboratory stand
Empty plastic bottle with cap
Water

Procedure:

- 1) Punch a small hole in bottle cap.
- 2) Fill the bottle with 500ml of water and close the cap.
- 3) Arrange the laboratory stand next to pluvio and clamps above the pluvio bucket.
- 4) Attach the bottle upside down and tight it to the clamp. Now punch a small hole at bottle end for air intake. Water should start dripping in the bucket now.
- 5) Once all water is dripped out, check the reading in logger or pluvio2 software.

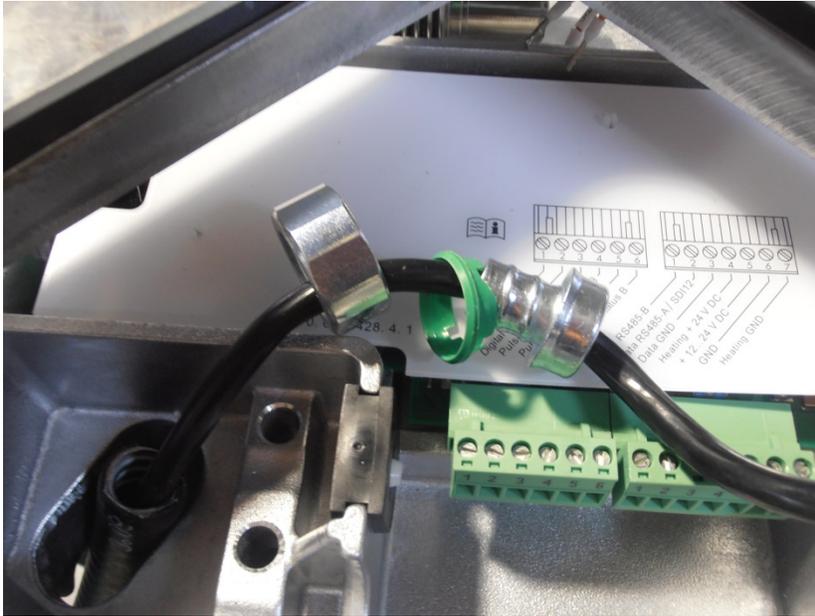
Conclusion:

Bucket 200mm² than 500ml=25mm

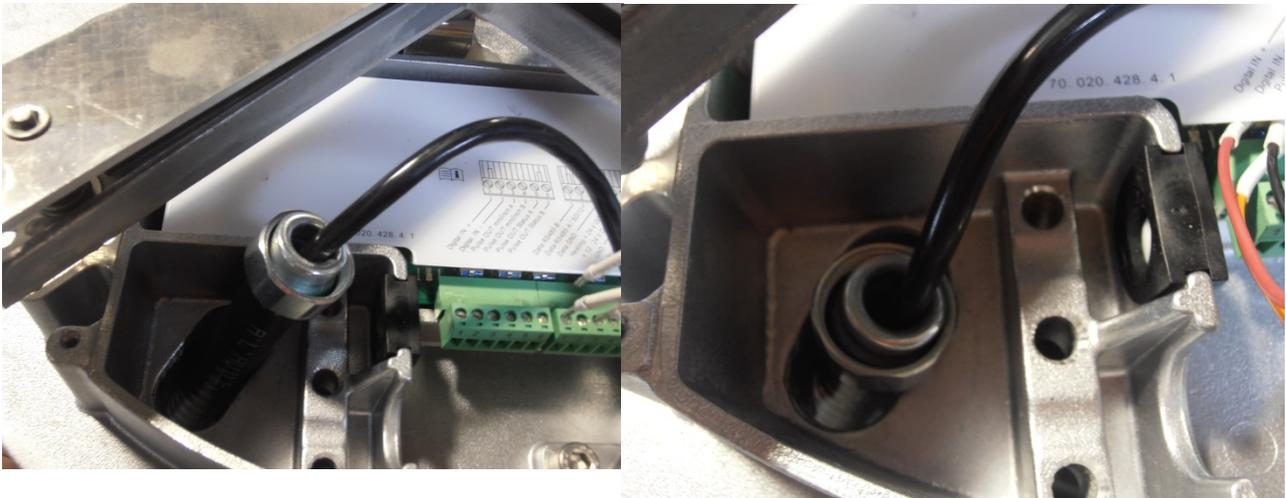
Bucket 400mm² than 500ml=12.5mm

If your reading match with above numbers for respective version of pluvio than you just verified the sensor.

3. Now insert LTC connector back to the cable as shown in picture.

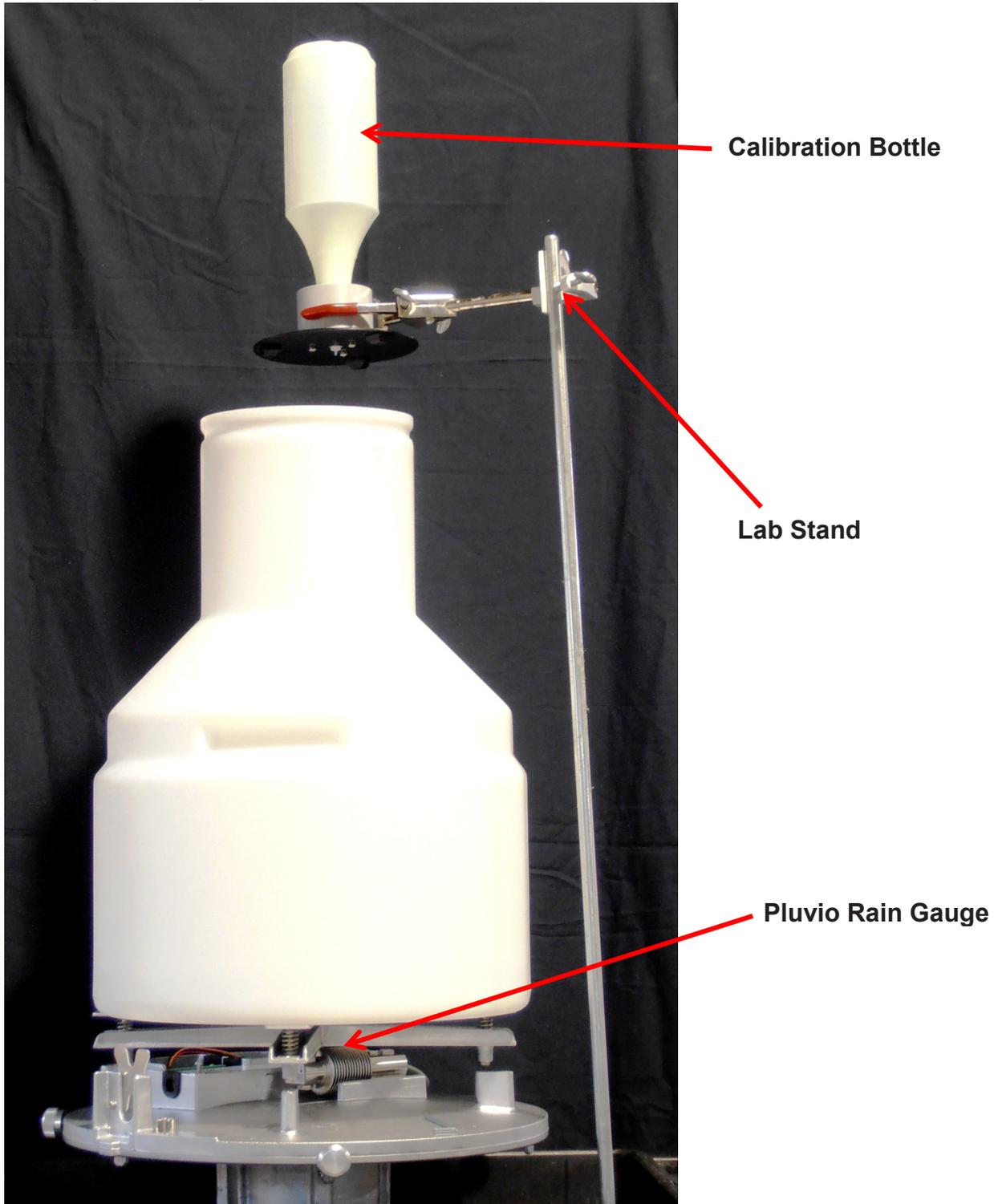


4. This will stop LTC cable from pulling out and secure the connection.



5. Connect sensor wire to pluvio terminal as tagged.

Example setup of sensor verification



Sutron Barometric Pressure Sensor

E-EA82-5600-0120

Overview

The Sutron barometric pressure sensor is solid-state pressure transducer suitable for data collection and monitoring applications.



It is best compatible with Sutron 9210, Xlink and Satlink logger. It supports SDI 12 protocol which makes it easy to integrate with wide variety of data loggers.

Wiring Diagram

Sutron 9210, Xlink and Satlink

Enclosure Terminal	Wire Color	Sensor J5 Terminal
12V	Red	4
Data	White	5
GND	Black	6

Mounting

When purchasing with complete station from Hoskin, the barometric sensor will come already mounted inside the enclosure. The air pressure inside the enclosure is same as outside the enclosure due to gortex vents that are mounted to the unit and enclosure.

If purchasing separately, it can be mounted to metal place with 4 self-tapping screws.

Verification

Compare reading with elevation and atmospheric pressure to verify the sensor reading.

Linkcomm Software Configuration

Overview

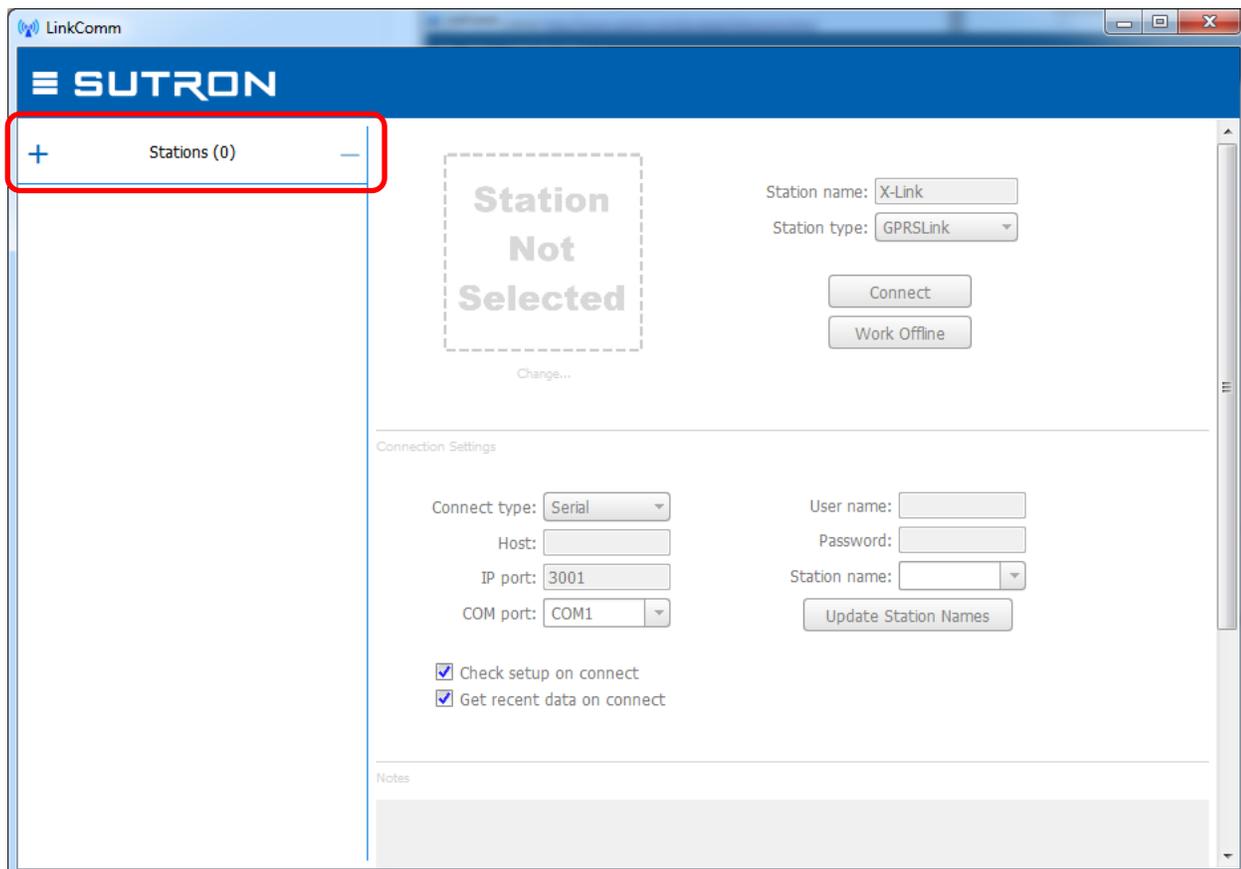
Linkcomm is Sutron's communication software allows users to communicate to series of datalogger includes satlink3, satlink2, xlink, 9210datalogger etc.

The setup consists of information such as the measurement setup, logging setup, the assigned transmission ID, transmission time, and interval. Satlink Logger stores this configuration into permanent memory so that once configured; it will remember the configuration and restore it each time it is powered up.

Download the linkcomm software from sutron website <http://www.sutron.com/product/linkcomm.htm/>
For USB connection you will require USB cable supplied with the system

Serial Connection

Add new station by selecting "+".



Connect to the station by selecting connection type and com port.

Connection Settings

Connect type: Serial

Host:

IP port: 3001

COM port: COM1

Check setup on connect

Get recent data on connect

USB Connection

Connect provided USB cable to logger. PC will automatically install required driver for it. Once it done select device ID assigned to it and hit connect.

Connection Settings

Connect type: USB

Host: Redirector
Serial

IP port: USB

Device: Station Wi-Fi
TCP/IP

Get recent data on connect

Connection Settings

Connect type: USB

Host:

IP port: 3001

Device: 00:1e:c0:2b:31:58

Get recent data on connect



Remote Connection (Currently for cell modem network)

For remote connection to the station select TCP/IP as connect type and enter static Ip address as host and port number as shown below

Connection Settings

Connect type: TCP/IP ▼

Host: 192.168.0.5

IP port: 3001

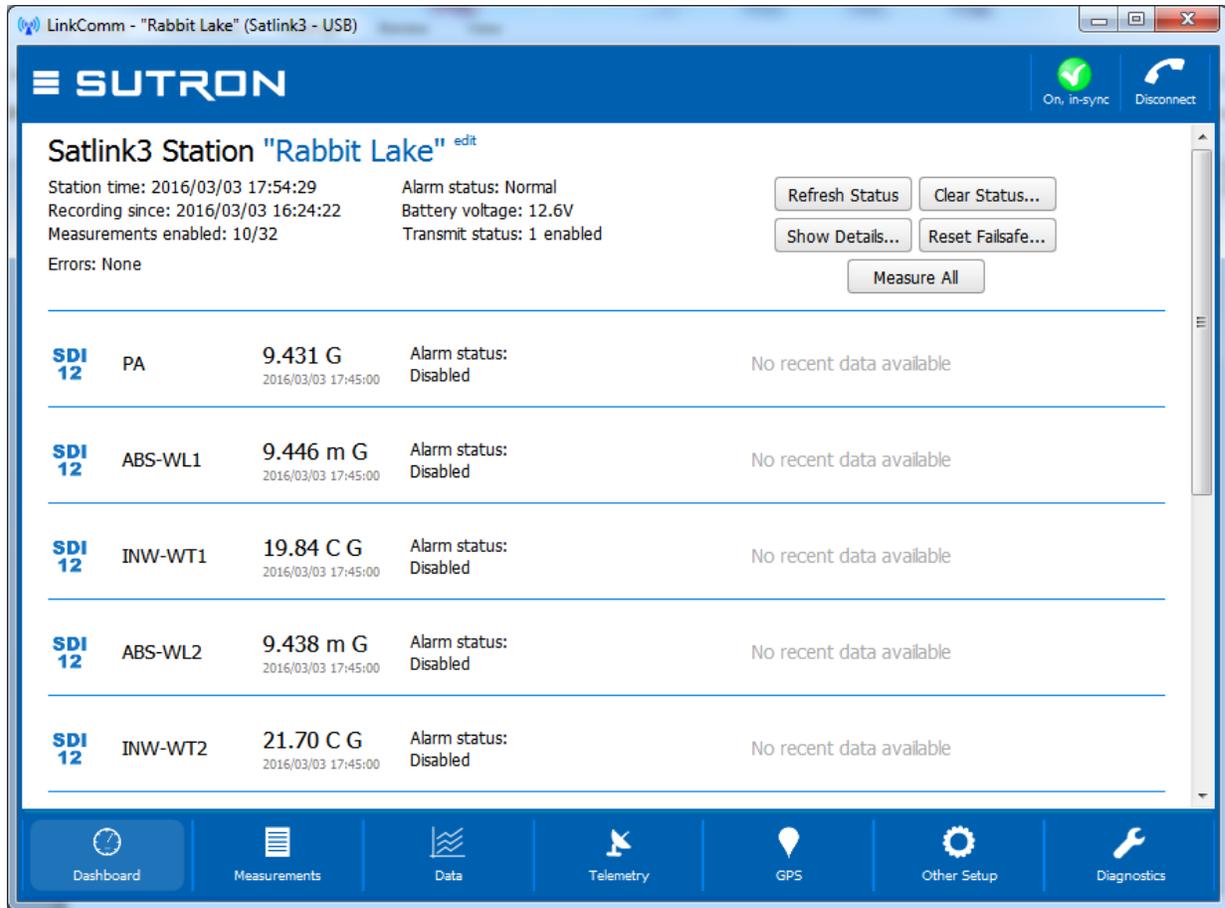
COM port: COM1 ▼

Check setup on connect

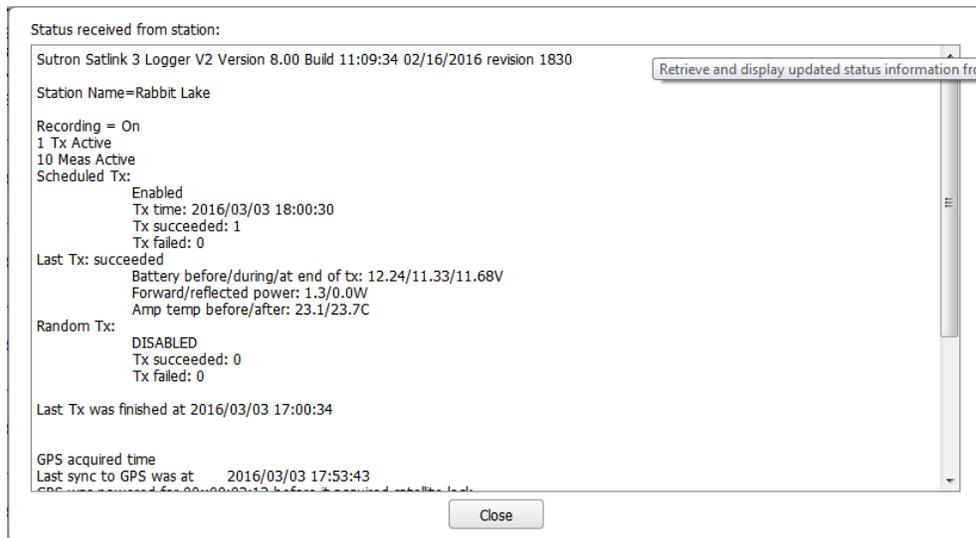
Get recent data on connect

Once above setting configured select “connect”. It will connect to xlink logger.

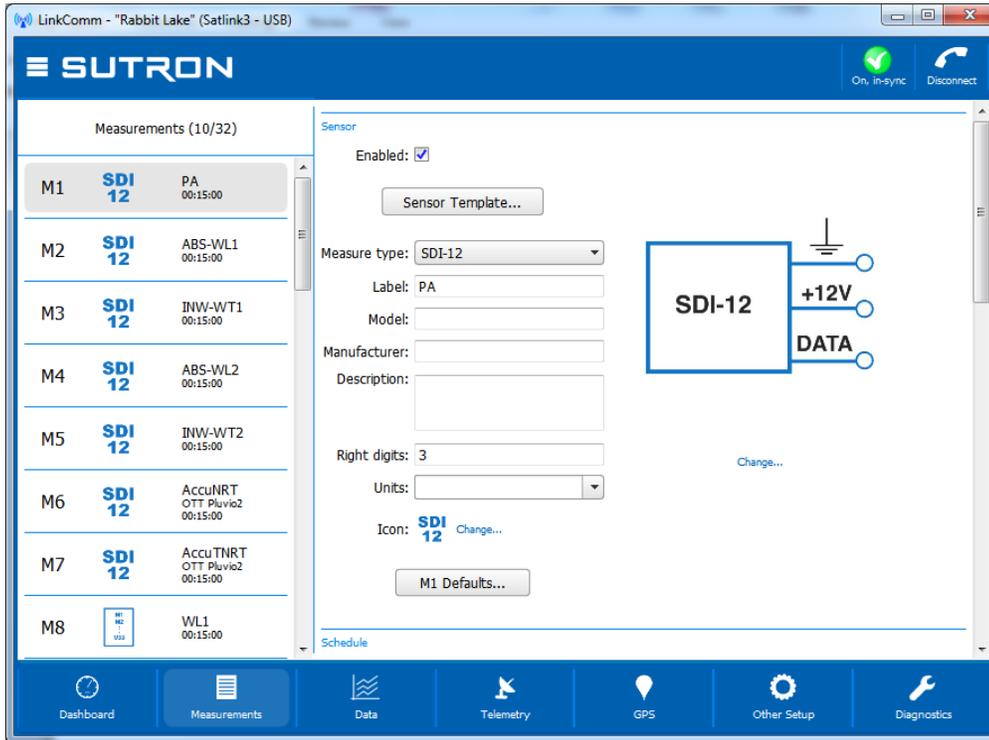
Once you connected Dashboard tab shows current status of sensors.



Show Details gives you quick status of the system.

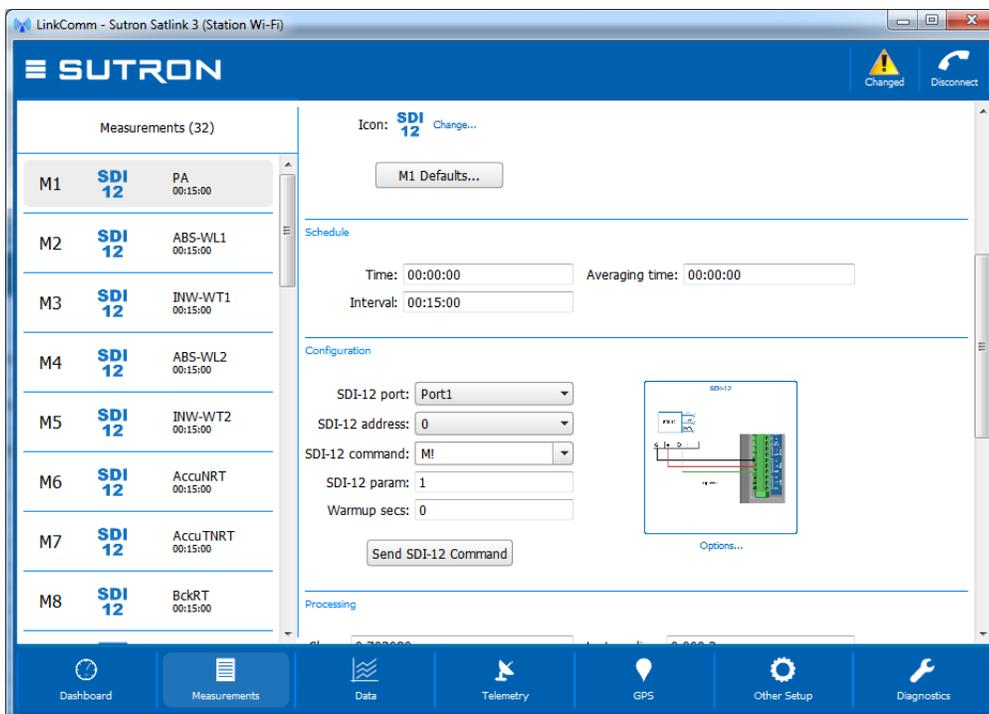


Select measurements tab to view and edit sensor setting. Slide bar on the side gives you more access to setting

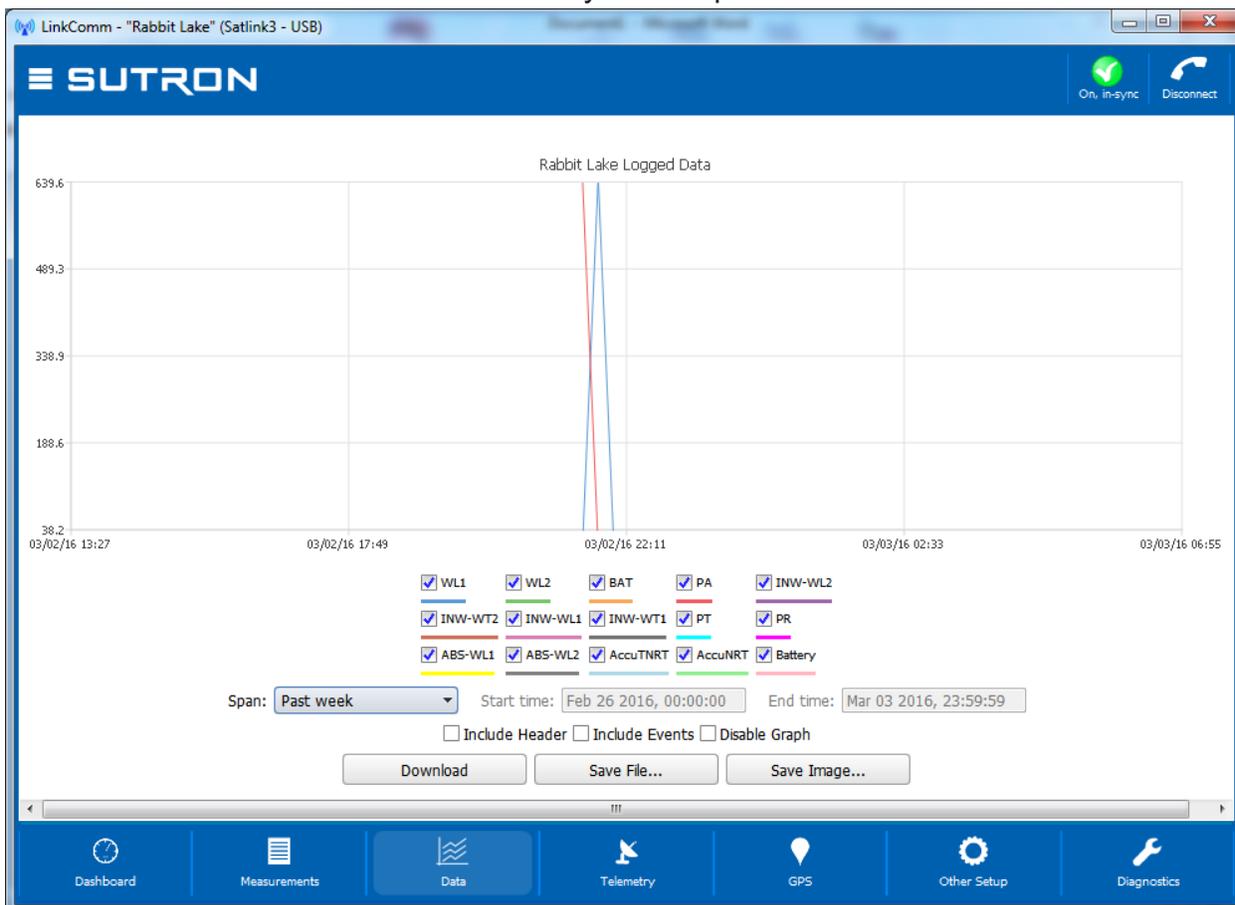


You can set measurement interval, logging interval, slope and offset under this tab.

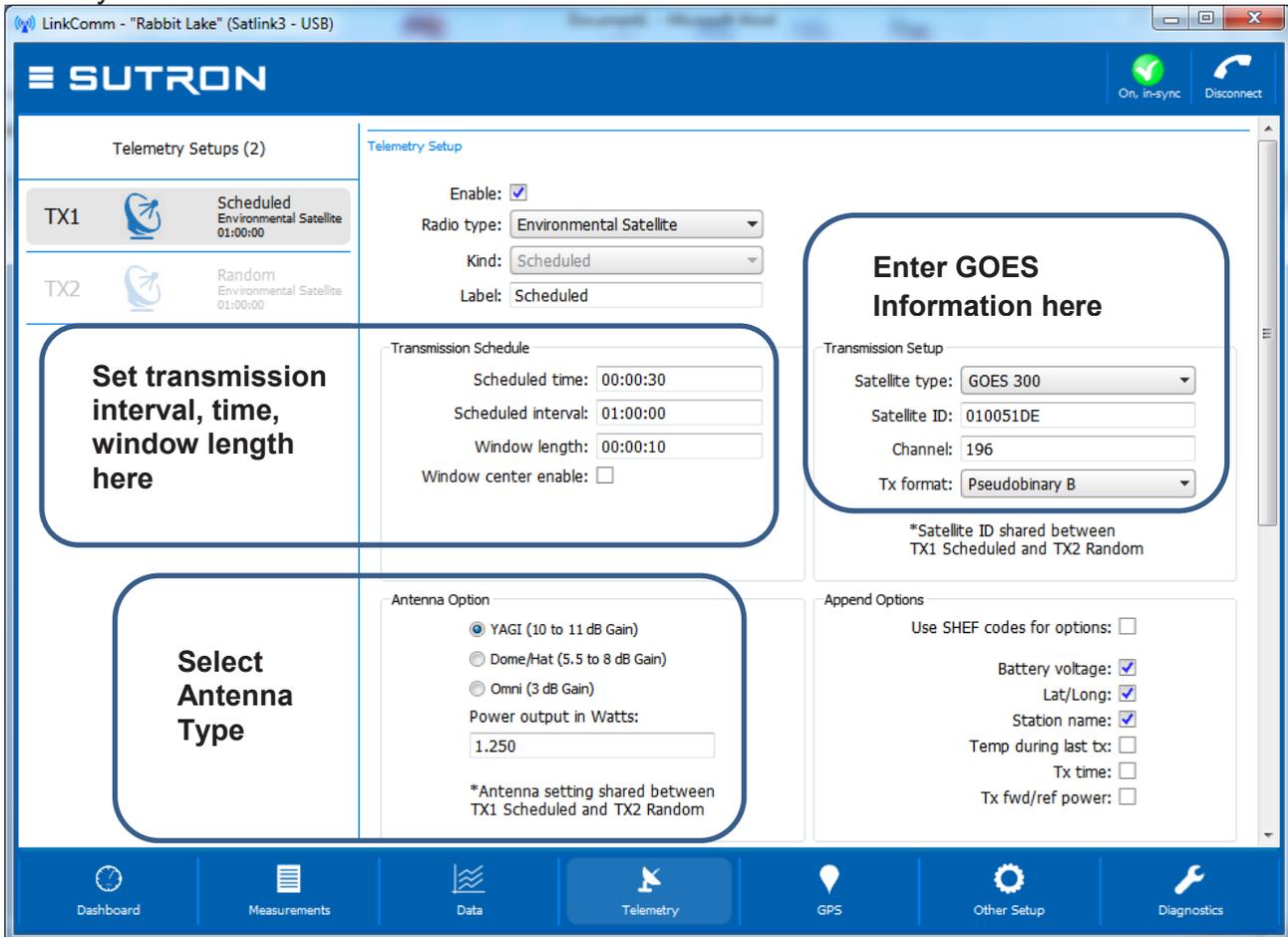
Once you done editing hit yellow tab on top and it will send the setup to logger.



Data tab shows last logged data in graphical format. You can save data by selecting save file. It saves the data file as CSV in your computer.



Telemetry tab allows setting transmission schedule and shows status of transmission activity.



The screenshot shows the SUTRON Telemetry Setup interface. The window title is "LinkComm - 'Rabbit Lake' (Satlink3 - USB)". The interface includes a navigation bar with the SUTRON logo and status indicators for "On, in-sync" and "Disconnect".

Telemetry Setups (2)

TX	Mode	Satellite	Time
TX1	Scheduled	Environmental Satellite	01:00:00
TX2	Random	Environmental Satellite	01:00:00

Telemetry Setup

Enable:

Radio type: Environmental Satellite

Kind: Scheduled

Label: Scheduled

Transmission Schedule

Scheduled time: 00:00:30

Scheduled interval: 01:00:00

Window length: 00:00:10

Window center enable:

Transmission Setup

Satellite type: GOES 300

Satellite ID: 010051DE

Channel: 196

Tx format: Pseudobinary B

*Satellite ID shared between TX1 Scheduled and TX2 Random

Antenna Option

YAGI (10 to 11 dB Gain)
 Dome/Hat (5.5 to 8 dB Gain)
 Omni (3 dB Gain)

Power output in Watts: 1.250

*Antenna setting shared between TX1 Scheduled and TX2 Random

Append Options

Use SHEF codes for options:

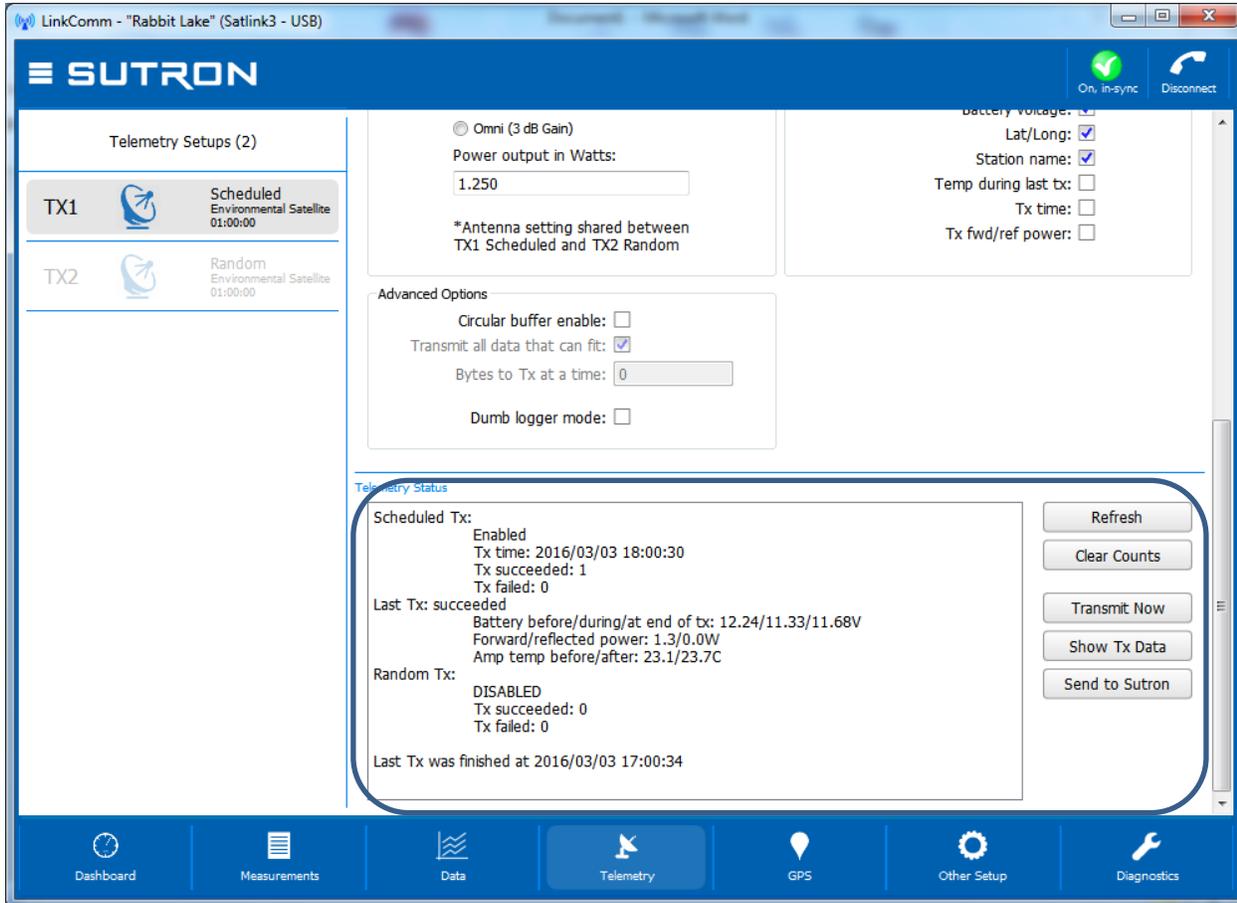
Battery voltage:
 Lat/Long:
 Station name:
 Temp during last tx:
 Tx time:
 Tx fwd/ref power:

Annotations:

- Set transmission interval, time, window length here** (points to Transmission Schedule section)
- Enter GOES Information here** (points to Transmission Setup section)
- Select Antenna Type** (points to Antenna Option section)

Navigation Bar: Dashboard, Measurements, Data, Telemetry, GPS, Other Setup, Diagnostics

Telemetry status show recent activity of transmissions.



Send to Sutron tab gives access to send data to sutron GOES web interface for testing purpose. The send to Sutron command allows the user to test the GOES satellite communications when at the site without having to wait for a standard scheduled transmission. After the user selects Send to Sutron the user can see the transmission using the Sutron DCP Monitor web site: www.sutronwin.com/dcpmon/

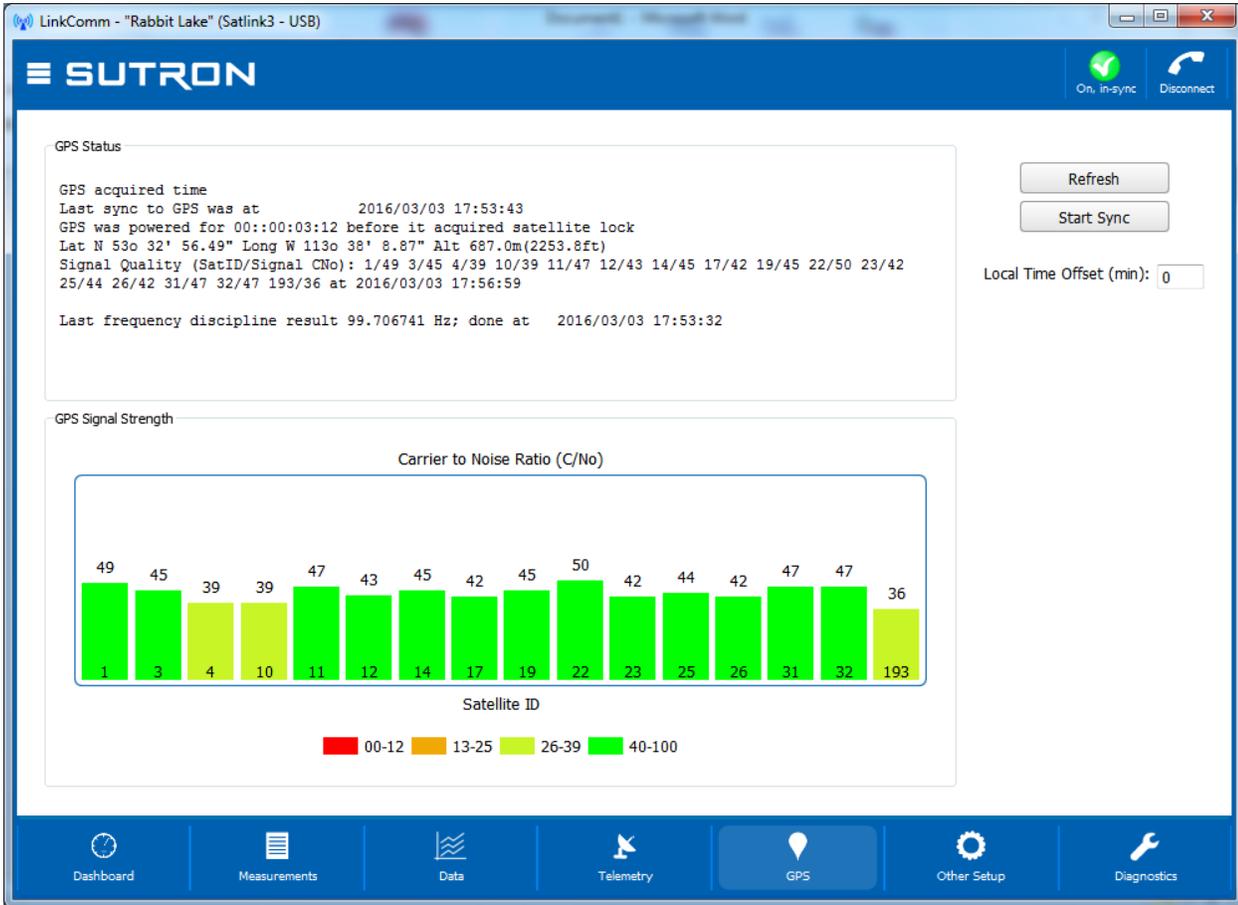
DCP Message Status

UTC: Fri May 01 23:02:09 2015

195 for 01 May 2015

DCP address	DCP name	Agency	First xmit time	Failure codes by hour of transmission																							
				0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Channel 45																											
38648666	38648666	ONTARI	00:24:50	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
Channel 195																											
001057E2	001057E2	FTSINC	00:00:00																								
100051DE	010051DE	SUTRON	00:00:00																								
2104C186	0104C186	CAMSCI	00:00:00											X													
01056384	01056384	SUTRON	00:00:00																								
12345678	12345678		00:00:00	I	I	I		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	
17EC5780	17EC5780	USGS01	00:00:00																								
475415D4	475415D4	MSCONM	00:00:00																							X	
5604222B	5604222B		00:00:00	?																							
7710061A	7710061A	MCRCOM	00:00:00			X																					
914367FF	014367FF		00:00:00	?																							
2453360B	0453360B		00:00:00																								
26118FE0	06118FE0		00:00:00																								

GPS tab allows you to force sync and shows GPS signal strength.



The screenshot shows the SUTRON software interface for the GPS tab. The window title is "LinkComm - 'Rabbit Lake' (Satlink3 - USB)". The interface includes a status bar with "On, in-sync" and "Disconnect" buttons. The main content area is divided into two sections: "GPS Status" and "GPS Signal Strength".

GPS Status

GPS acquired time
Last sync to GPS was at 2016/03/03 17:53:43
GPS was powered for 00:00:03:12 before it acquired satellite lock
Lat N 53o 32' 56.49" Long W 113o 38' 8.87" Alt 687.0m(2253.8ft)
Signal Quality (SatID/Signal CNo): 1/49 3/45 4/39 10/39 11/47 12/43 14/45 17/42 19/45 22/50 23/42 25/44 26/42 31/47 32/47 193/36 at 2016/03/03 17:56:59
Last frequency discipline result 99.706741 Hz; done at 2016/03/03 17:53:32

Buttons: Refresh, Start Sync
Local Time Offset (min):

GPS Signal Strength

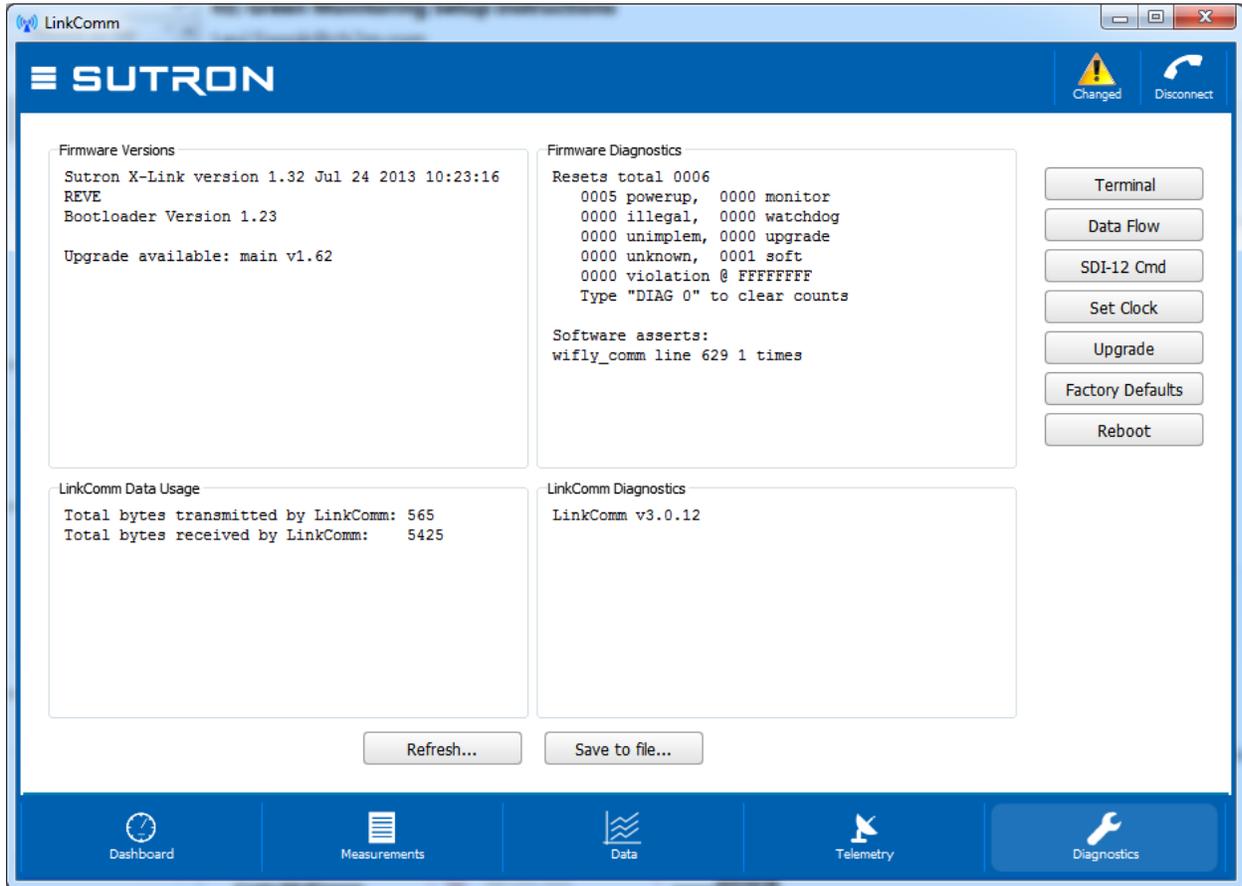
Carrier to Noise Ratio (C/No)

Satellite ID	C/No
1	49
3	45
4	39
10	39
11	47
12	43
14	45
17	42
19	45
22	50
23	42
25	44
26	42
31	47
32	47
193	36

Legend: 00-12 (Red), 13-25 (Orange), 26-39 (Yellow), 40-100 (Green)

Navigation bar: Dashboard, Measurements, Data, Telemetry, **GPS**, Other Setup, Diagnostics

Diagnostics tab allows sending SDI12 commands, set clock, factory reset etc.



Mounting

Concrete Slab Construction For TB3 Alter Shield, Pluvio Mount, Golden Nugget Tower and Pop Up mast

Concrete slab construction for Pluvio mount requires at least 45x45x80cm slab. Depth should be at least 5 inches.

Step1: Prepare the site

1. Prepare the site with digging in a square manner.
2. Drive four stakes to roughly indicate the corners of the slab.
3. Scrap off the sod and top soil and add gravel fill if needed.
4. If you have clay or loam soil, you should remove enough to allow 80cm.
5. Layer the compacted gravel under the new concrete.



Step 2: Build strong level forms

1. Put 4 straight boards around the edges of slab.
2. Align the boards as shown in above picture.
3. Spread and tamp in 3 in layers of granular fill to within 5 inch of the top of the forms.
4. Insert 4 stake bars in structure at 2'x2' dimension. This will give some extra strength to slab.

Step 3: Prepare and Mix the concrete

1. Open a bag of concrete ready mix and pour into your mixing container
2. Usually add 1gallon water per 80lb bag of concrete mix.
3. Mix it well with shovel or mixing drill.



Step 4: Pouring the concrete

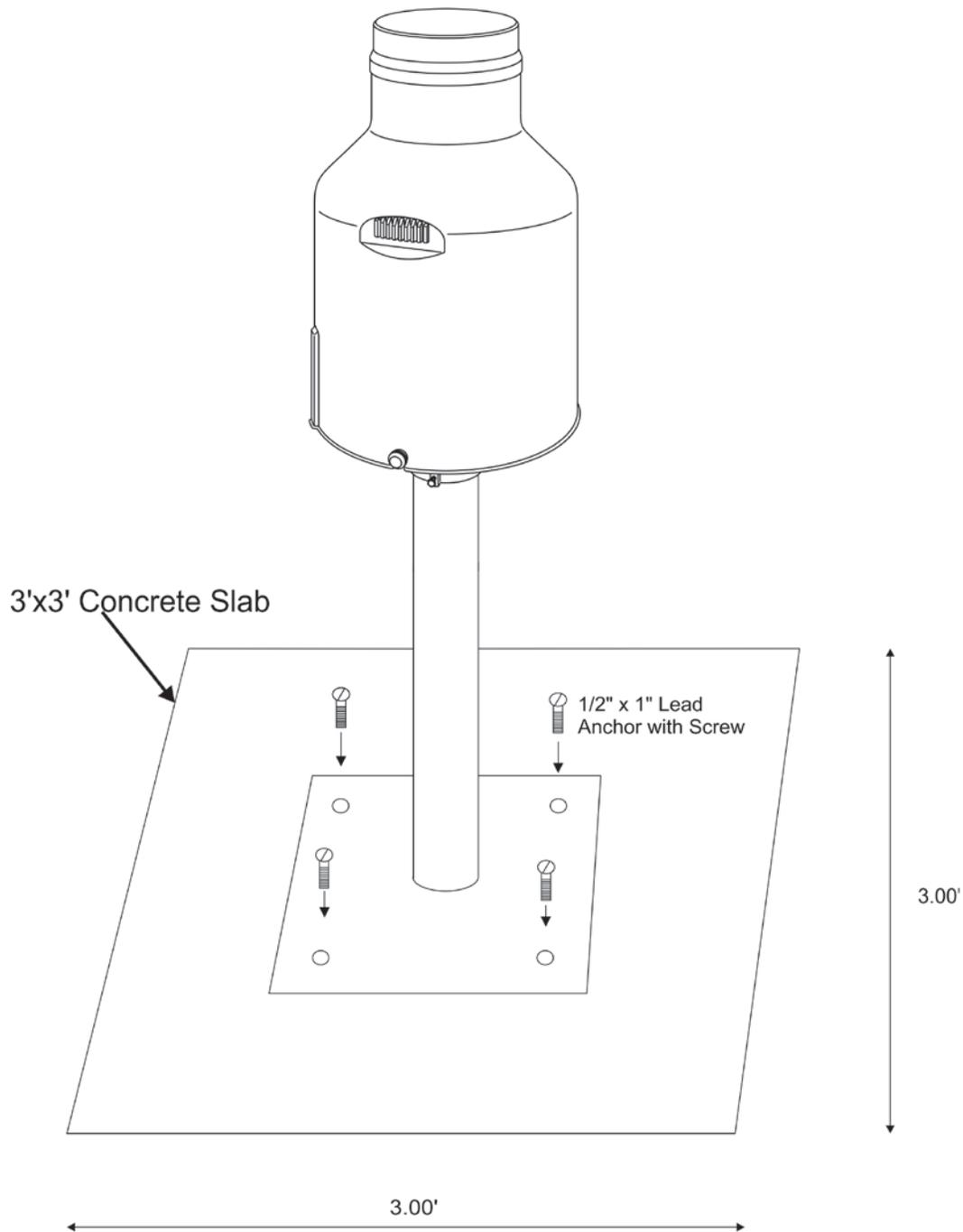
1. Fill the pour area up with concrete mix approximately to the height of the top of the formwork.
2. Tap around the outside of formwork with a hammer. This will vibrate the wet concrete and help it settle, as well as getting rid of any air pocket.
3. Smooth over the level concrete with a trowel or float.



4. Once this is done, drill a hole in the concrete with dimension of your mounting post.
5. Insert concrete bolts in this hole and tight them up.
6. Place shield in its place and tight the nuts.
7. Please follow specific instruction for each individual sensor regarding mounting for sensor alter shield.

For Pluvio Mount

Put pluvio installation tube approximately in center of the structure. Drills a hole in concrete pad align with mounting hole on tube. Read instruction for drill size and hole size came with lead anchors. Insert the 1/2" x 1" lead anchors in the hole and tight the bolt.



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