BaroSCOUT
Barometric/Temperature
Smart Sensor and Datalogger

Introduction

Installation

Settings and Calibration

Operation

Maintenance

Troubleshooting

What is the BaroSCOUT?

The Seametrics BaroSCOUT Smart Sensor is designed to measure barometric pressure, along with temperature. It is an ideal companion to Seametrics' absolute pressure/level sensors and can be used to adjust their readings for atmospheric pressure.

This industry standard digital RS485 interface device records up to 50,000 records of pressure, temperature, and time data, operates with low power, and features easy-to-use software with powerful features. Constructed with 316 stainless steel, acetal, and Viton®, this sensor provides high-accuracy readings in rugged and corrosive field conditions.

The BaroSCOUT utilizes an extremely rugged and stable piezo-electric media-isolated pressure element combined with a 16-bit analog-to-digital converter. This provides extremely accurate and stable pressure input into the microprocessor on the circuit board that measures the pressure and stores the data in non-volatile memory.

A 1/2 AA 3.6v lithium battery powers the BaroSCOUT. The unit is programmed using Seametrics' easy-to-use Aqua4Plus 2.0 control software. Once programmed the unit will measure and collect data at the time interval programmed.

While most will use the BaroSCOUT with Seametrics Aqua4Plus 2.0 software, it is by no means limited to that software. You can use your own Modbus® RTU software or logging equipment to read measurements via RS485, tying into your existing systems and data bases.

Note: The BaroSCOUT is intended for use in atmosphere—not to be submerged.

Initial Inspection and Handling

Upon receipt of your smart sensor, inspect the shipping package for damage. If any damage is apparent, note the signs of damage on the appropriate shipping form. After opening the carton, look for concealed damage, such as a cut cable. If concealed damage is found, immediately file a claim with the carrier.

Check the etched label on the sensor to be sure that the proper range and type were provided. Also check the label attached to the cable at the connector end for the proper cable length.

Do's and Don'ts

Do handle the device with care.

Do store the device in a dry, inside area when not in use.

Do install the device so that the cable connector is kept dry.

Don't support the device with the connector. Use a strain relief device to take the tension off the connectors.

Don't allow the device to free-fall down a well as impact damage can occur.

Don't bang or drop the device on hard objects.

Techinical Specification

The Seametrics BaroSCOUT is a microprocessor based digital intelligent sensor designed to measure and record pressure, temperature, and time, utilizing state-of-the-art low power, battery operated circuitry.

Pressure is measured with an extremely rugged and stable piezo-electric media-isolated pressure element combined with an analog-to-digital converter. This provides extremely accurate and stable pressure input into the microprocessor on the circuit board. Temperature is measured with an epoxy bead thermistor. The data is stored in non-volatile memory. A serial communication link (RS485) provides communication to the host computer.

Length (cabled version)	6.6" (16.7 cm)
Length (cableless version)	5.1" (12.9 cm)
Diameter	0.875" (2.22 cm)
Body Material	316 stainless steel
Wetted Materials	316 stainless steel, acetal, fluoropolymer
Communication	RS485 Modbus® RTU
Direct Modbus Read Output	32-bit IEEE floating point
Internal Math	32-bit floating point
Operating Temp. Range	-20° C to 60° C
Storage Temp. Range	-40° C to 80° C

Logging

Memory	50,000 records
Logging Rate	1x per second
Software	Complimentary Aqua4Plus 2.0
File Formats	.xls / .csv / .a4d

Power

Internal Battery	One 1/2 AA 3.6 lithium battery
Expected Battery Life	4 years (depending on use)

Temperature

Element Type	Thermistor
Accuracy	± 0.1° C (from -20° C to 60° C)
Resolution	0.01° C
Units	Celsius, Fahrenheit, Kelvin

Pressure

|	
Transducer Type	Silicon strain gauge
Transducer Material	316 stainless steel
Units	PSI, FtH2O, inH2O, cmH2O, mmH2O, mH2O, inHg, cmHg, mmHg, Bars, mBars, kPa
Accuracy	± 0.008 PSI (0.55 mbar) (@ 20° C) ± 0.02 PSI (1.34 mbar) (@ -20° C to 60° C)
Resolution	0.001% FS (typical)

NOTE: Intended for use in atmosphere—not to be submerged.

Wiring and Component Information
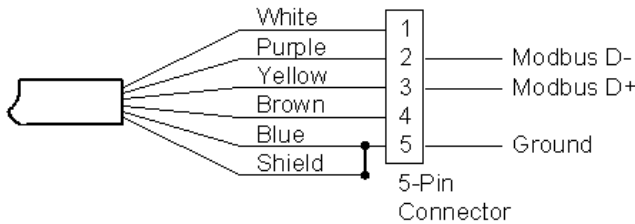
Power

The BaroSCOUT comes with a 1/2 AA 3.6v lithium battery.

Connecting the BaroSCOUT to a Computer

In its cabled configuration, the sensor cable is terminated with a weather-resistant connector. In its cableless configuration, the sensor is terminated with a weather-resistant connector inside a screw-cap. Connect the weather-resistant connector to your computer's USB port as shown below.
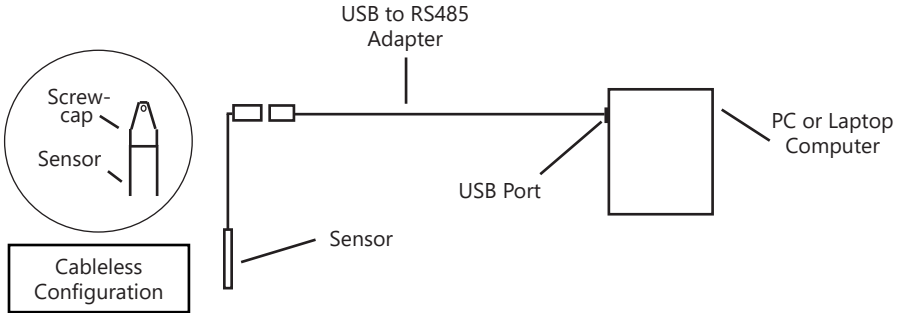
Connect the sensor to your PC using Seametrics' USB to RS485 adapter.

Installing the Aqua4Plus 2.0 Software

The BaroSCOUT comes with the Aqua4Plus 2.0 host software that is installed on your PC or laptop. Use this software to program the datalogger, to retrieve data from the logger, to view collected data, and to export data to external files for use with spreadsheets or databases.

Refer to the Aqua4Plus 2.0 manual for details on installing and using the software.

Using the BaroSCOUT Without Aqua4Plus 2.0

Most users will use the BaroSCOUT with Seametrics Aqua4Plus 2.0 software. However, the BaroSCOUT is quite versatile, communicating via Modbus® RTU, allowing you to use your own software or logging equipment. (See page 28 for further details)

Installing the Sensor

The BaroSCOUT can be installed outdoors, in a building, or inside the top of a well head. If installing inside a well head, be sure that it will be above the waterline at all times. If installed outside in direct sunlight, provide a shade cover to prevent overheating.

On cabled units be sure the supplied cap is securely placed on the weather-resistant connector at the top of the cable. Do not install such that the connector might become submerged with changing weather conditions. The connector can withstand incidental splashing but is not designed to be submerged.

The sensor can be installed in any position; however, when it leaves the factory it is tested in the vertical position. Strapping the sensor body with tie wraps or tape will not hurt it.

Battery Life Calculator

The BaroSCOUT has a battery life calculator that is set at the factory when batteries are first put in the sensor. If you need to replace the batteries, see the Maintenance section for replacement information and for information on resetting the battery life calculator. *If the battery life calculator is not reset, the remaining life information will be incorrect.*

Alternate Connection Options

Seametrics recommends connecting the sensor to your computer using the Seametrics USB cable. However, when using Aqua4Plus 2.0, the sensor can also be connected using an RS232 serial port or a USB-to-Serial cable, as described below.

Connecting via RS232 Serial Port

In its cabled configuration, the sensor cable is terminated with a weather-resistant connector. In its cableless configuration, the sensor is terminated with a weather-resistant connector inside a screw-cap. Connect the weather-resistant connector to your computer's serial port as shown below.
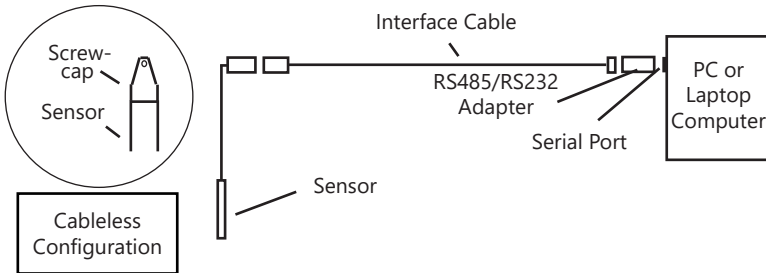
Connect the sensor to your computer using an RS485/RS232 adapter and an interface cable.

Connecting with a USB/Serial Adapter

USB-to-Serial cables are readily available from many electronics and computer stores, as well as numerous sites on the Internet. Seametrics has tested and recommends the Keyspan USA-19HS. It is available from Seametrics as well as from many sites on the Internet. Install as follows:

- Plug into USB port.
- Install the drivers provided with the particular unit.
- Once drivers are installed, connect to sensor.

Connecting to Sensors

Aqua4Plus 2.0 is designed to automatically detect your communication cable and scan for sensors. It is recommended you connect your USB/RS485 cable to your PC and have the sensor connected before opening Aqua4Plus 2.0.

If your cable and sensor were not connected before opening Aqua4Plus 2.0 simply connect and click Rescan. While scanning is active you'll see a green dot flash in the upper right corner of the program. Scanning is complete when this dot stops flashing.
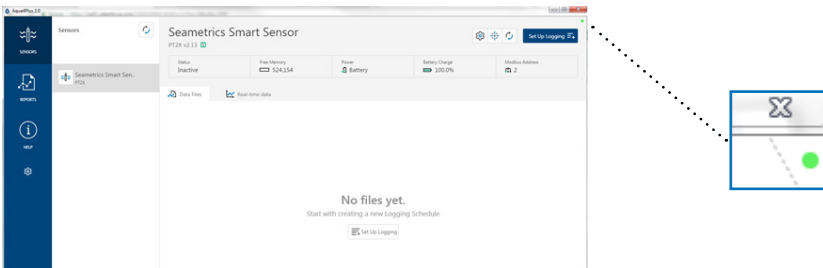
If your sensor still won't connect you can expand the Modbus address range under program settings here:

Simply drag the Address Range slider higher up to increase the maximum Modbus address scanned. If you've scanned all the way up through address 255 and still have no connection click Troubleshooting for further troubleshooting or contact Seametrics Tech Support for assistance.

Click ⟳ at any time to refresh sensor information.

A Word About Units

Readings from the PT2X Smart Sensor can be displayed in various units, such as PSI, Ft. H2O, or mm H2O for pressure, or degrees Celsius or degrees Fahrenheit for temperature. Select the units you want from Sensor settings.

Sensor Settings

Once connected you'll see the Sensor screen appear and display the connected sensor(s) details. Mousing over icons will provide tool-tips, mouse over 🛈 to view sensor firmware and serial number details.

To change general sensor settings click ⚙ in the sensor screen. This allows you to change the following:

Click ✎ to rename the sensor

To change Modbus address and/or Baud Rate simply select the desired address and/or Baud Rate from the drop down menus. Sensor will automatically reconnect at new address and/or Baud Rate

To change the Direct Read output units (for direct Modbus or SDI12 integration) simply select the desired output units from the drop down menus. To change Aqua4Plus 2.0 display units scaling see Program Settings.

Sensor Clock can be synced with your PC time or set manually if desired. To set manually enter your desired date/time and click Set Time.

When batteries are changed out make sure to reset the battery information here, simply check the I have just put in new batteries box and select the battery type that was installed from the drop down menu.

Program Settings

To view/change Aqua4Plus 2.0 settings click [⚙] in the blue side-bar menu.

Under the General Settings tab you can change the default data folder location. This is where your Reports are saved to on your PC.

The Zoom Factor slider can be used to adjust the font size within Aqua4Plus 2.0.

Uncheck the Allow app to collect anonymous usage statistics box if you would like to opt out. This information is used to track Aqua4Plus 2.0 reliability across different system configurations.
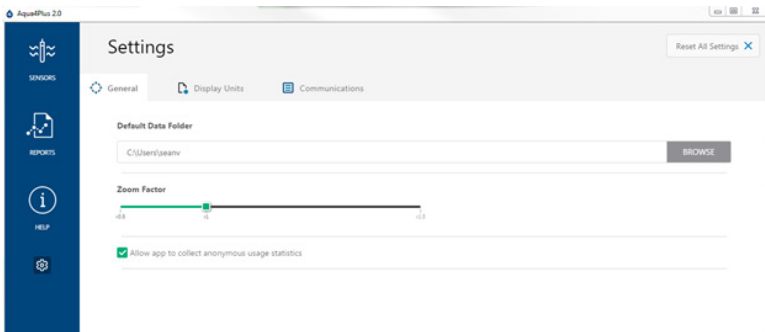

Under the Display Units tab you can select your desired display units for the supported channels. These may be changed at any time and associated Real-Time readings and Reports will rescale to the currently selected display unit. To change Direct Read units scaling see Sensor Settings.
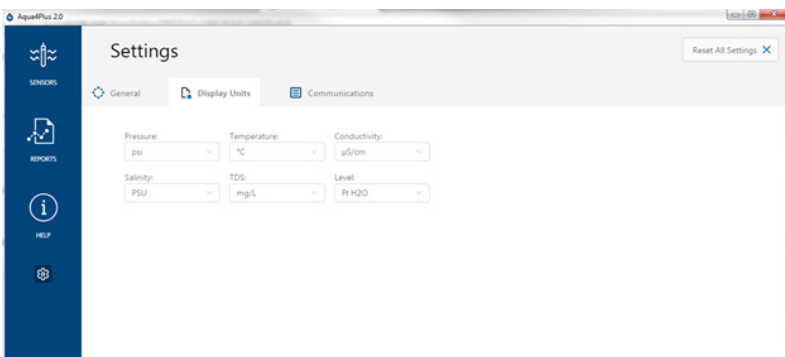
Under the Communications tab you can change your Modbus communication settings. Typically you will only need to change the address range to connect to sensors outside of Modbus address 1-10. In certain cases we may need to change the Retry and Timeout settings to overcome communication issues on very long, or corroded cabling. See Troubleshooting section or contact Seametrics Tech Support for details.
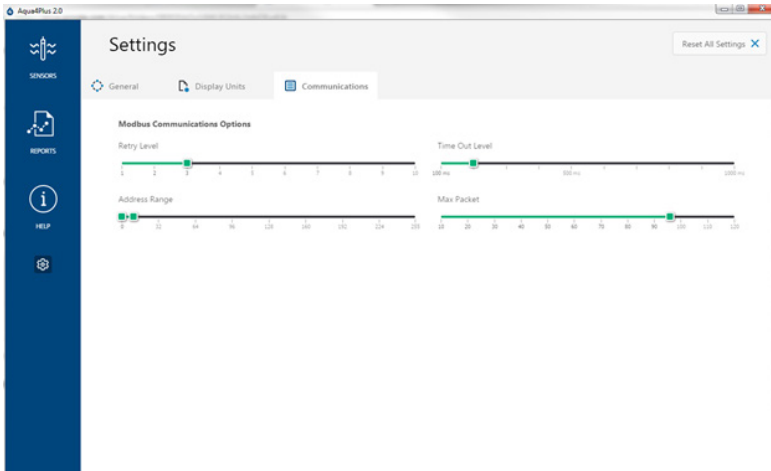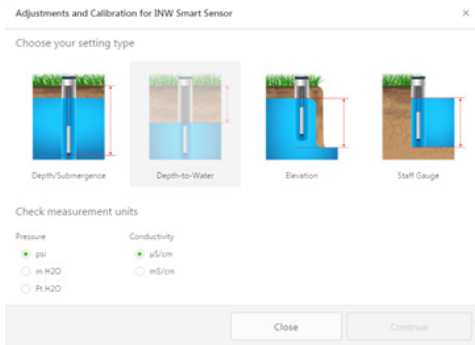

To restore factory default settings click [Reset All Settings ✕]
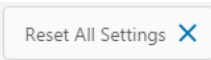
Pressure Calibration

To perform a calibration setup on the pressure channel first connect to the sensor and ensure all data has been uploaded and erased from the sensor. Next select the calibration button.

Next select the calibration setup you'd like to perform:

Confirm desired measurement units and click Continue.

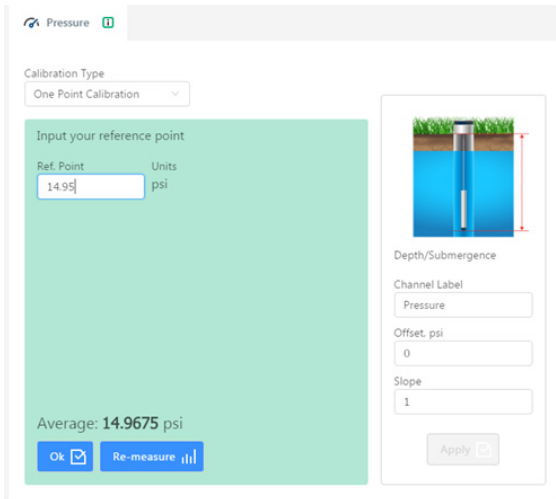### Submergence:

One Point/Zero Point Calibration:

To zero pressure output to atmospheric pressure position the sensor in air in its desired installation position (typically vertical, if sensor will be installed horizontally position as such during 0 point calibration). Select 1 point Calibration under Calibration Type.

For PSIG sensors use 0 as the reference value and click Measure.

For PSIA sensors enter current barometric pressure from a known accurate barometer set to matching units. Enter your reference value in the Ref. Point box and click Measure.
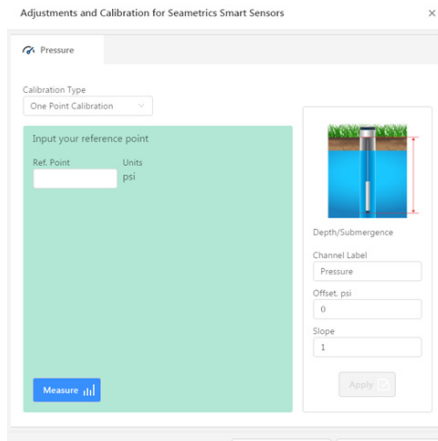
Aqua4Plus 2.0 will take 10 readings and display the average. Watch for stability while the software is measuring to ensure an accurate calibration.

Click Ok to accept the reading and Aqua4Plus 2.0 will calculate a new pressure offset. Click Apply to confirm the new offset value and Aqua4Plus 2.0 will provide a real time reading to verify calibration was successful:
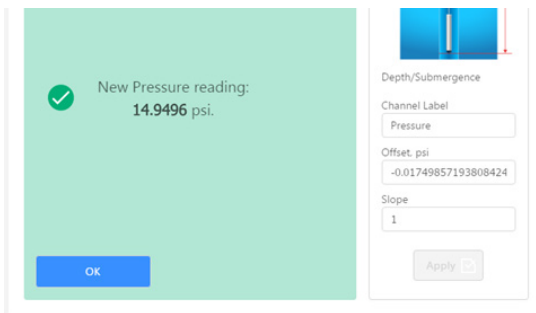

2 Point submergence calibration **ONLY RECOMMENDED IF YOU HAVE AN ACCURATE PRESSURE REFERENCE**. Our Smart Sensors rarely change slope during normal use, however if you have an accurate pressure source it is possible to perform a 2 point calibration on the pressure channel.

Select 2 point Calibration under Calibration Type

Perform first point calibration as listed above and click Next

Enter known pressure value in matching units in the Ref. Point box for second point measurement
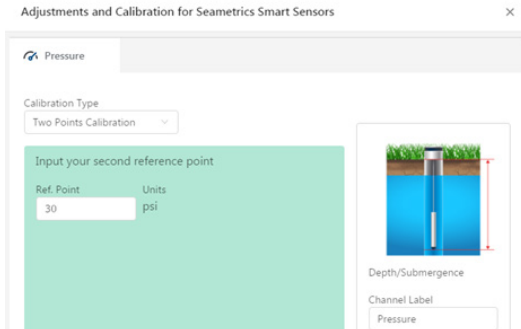

Aqua4Plus 2.0 will take 10 measurements and display the average. Watch for stability while the software is measuring to ensure an accurate calibration.

Click Ok and Aqua4Plus 2.0 will calculate the new slope and offset values. Click Apply to confirm the new slope and offset values and it will provide a real time reading to verify calibration was successful.

Removing calibration setup values

To return to factory default simply enter an offset of 0 and slope of 1 in the Offset and Slope boxes:
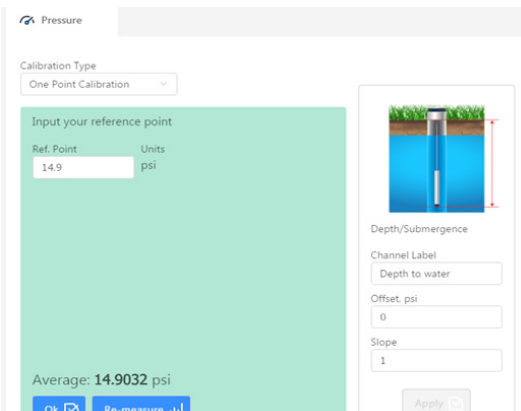

Click Apply to confirm settings and Aqua4Plus 2.0 will provide a real time reading to confirm.

Adjusting for specific gravity

You man enter the specific gravity of your fluid in the Slope field to adjust for specific gravity when needed. Click Apply to confirm settings and Aqua4Plus 2.0 will provide a real time reading to confirm.

Real-time Data

Connect to sensor and select the Real-time data tab
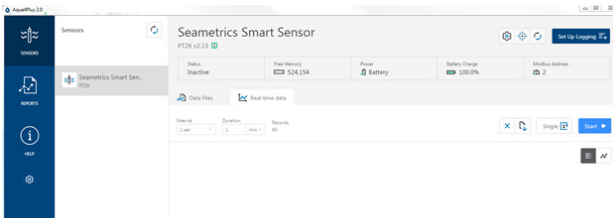
To sytart real-time readings click Start, readings default to table view. To switch to Real-time graphing view click the graph icon
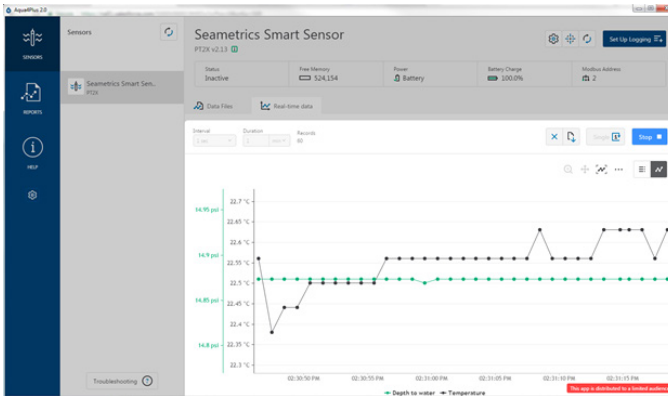

Real-time readings default to a 1 second interval for 1 minute, to adjust enter your desired settings here:

Note: Currently this data is not saved and is for viewing current conditions only. To save the data to sensor memory see Data Logging section. You can run Real-time Data while logging is active.

Data Logging

Select Set Up Logging from the sensor screen. If there are no files currently on the sensor you'll see the Set Up Logging button active under the Data Files tab as well as in the upper menu. Once files have been started/logged on the sensor they will be displayed under the Data Files tab.
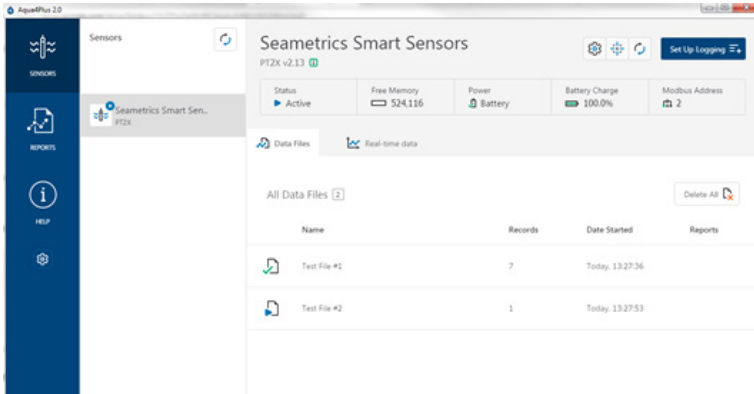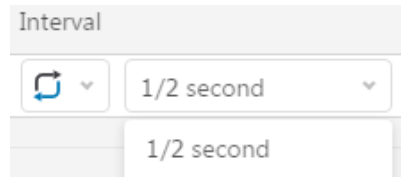

Set Up Logging Window

Here you will name your data file and set up the recording interval and duration of each logging phase. Select your desired recording interval and duration for each phase, Aqua4Plus 2.0 will display the available memory at the bottom of the window.
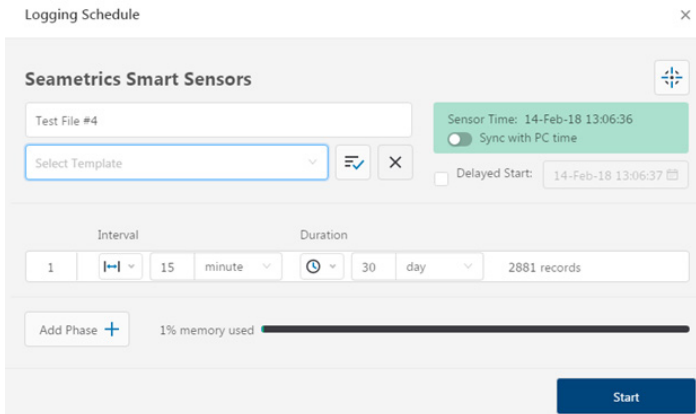
Click [⊢⊣ ⌄] to switch between interval and continuous data recording (PT2X & CT2X only) Select your continuous rate from the drop down box (on the right).

Interval

🗘 ⌄   1/2 second ⌄

1/2 second

Duration can be set by either number of records or by setting a duration time, as shown on the right.
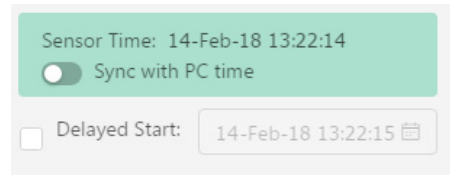
Duration

▦ ⌄   100   a minute

▦ Records

🕐 Duration

When set by number of records the time of the recording phase will be displayed detailing how long that phase will run. When set by time, the total number of records for that phase will be displayed.

If you need to check settings or perform a calibration click [✛] before proceeding with logging setup to switch to the Settings and Calibration screen.

You may sync the sensor clock with the PC clock when starting logging by clicking the slider shown on the right.
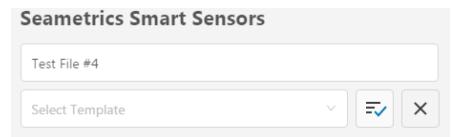
Sensor Time: 14-Feb-18 13:22:14
◯ Sync with PC time

☐ Delayed Start: 14-Feb-18 13:22:15 📅

Check the Delayed Start box and enter the desired date/time you would like logging to start. This is useful for syncing data when setting up multiple sensors on a site. Data will start logging at the set date/time rather than immediately when Start is pressed.

Data file name defaults to Test File # and may be re-named here, like on the right.

Seametrics Smart Sensors
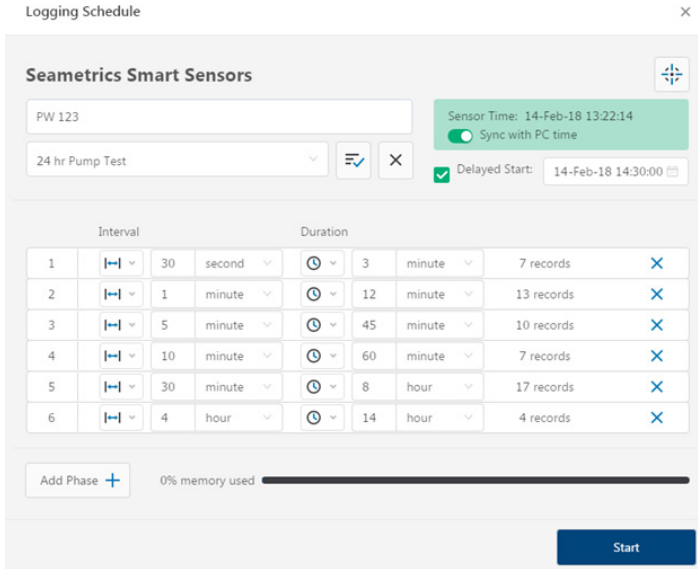
Test File #4

Select Template ⌄   ☰✓   ✕

The 3 previous Logging Schedules that were programmed to a sensor will be listed under the Select Template drop down menu. There you will also find pre-programmed logging schedules such as 24 hour pump test, along with any custom logging schedules saved by the user.

To save a logging schedule as a template enter desired settings and click ⧉ This will add your custom schedule to the Select Template menu.

Once all the desired settings are made simply click Start to begin logging.

This will return you to the Sensor screen and your status will change to Active with the data file displayed under the Data Files tab. Mouse over an active file to pause, terminate, download, or view logging setup details.

Data files already downloaded will show in the Reports column, clicking here will bring you to the reports screen to view the data. See Reports section for details.

You may only have 1 active data file recording on each sensor, however you can store multiple files in memory if desired.
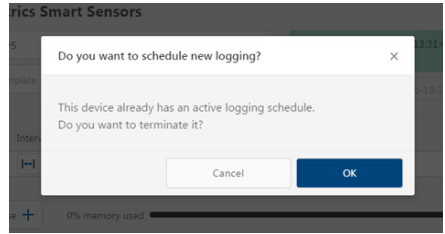
Starting a new file will automatically terminate the active logging and begin the new logging schedule. Real-time data is available during active logging.
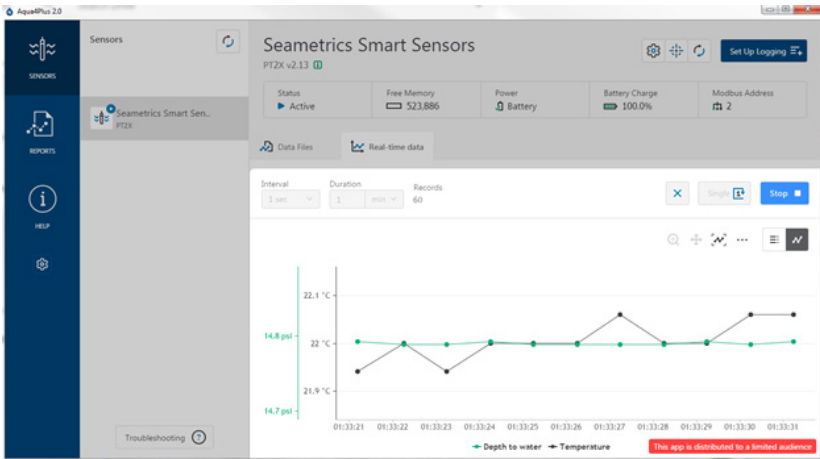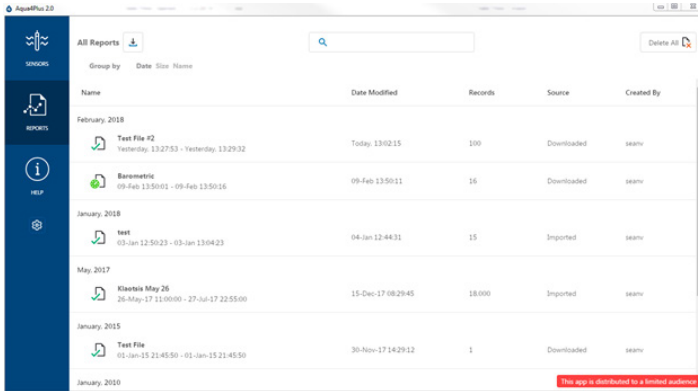
To delete files from memory make sure they have all been downloaded to Reports. Files are removed from memory all at once rather than individually.

Once confirmed files are permanently deleted from the sensor memory.
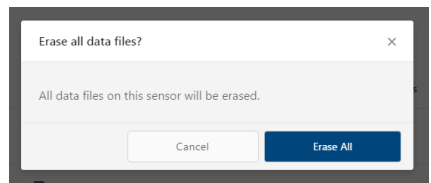
Reports

Data downloaded from your sensor is stored in the Reports section of Aqua4Plus 2.0 for viewing and editing. The files will be saved to default data folder on your PC as well. See Program Settings for default data folder location.

In the main view you'll see a list of reports sorted by date, size, or file name as selected here:

You can also search reports by keyword using the search box

Click on a report to bring up the report details.

Reports are displayed in graphing view by default. You can zoom to specific sections by selecting a section with you mouse or by adjusting the slider below the graph.
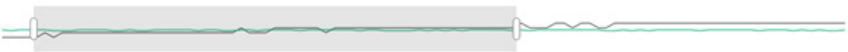
Graph saving and export options are available here
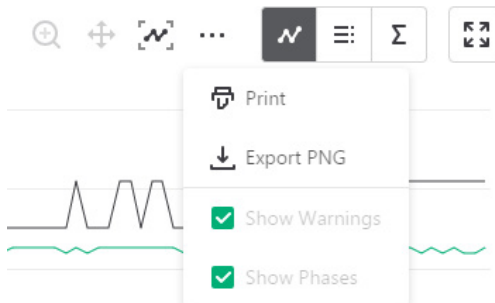
Report Details

			Status	Records	Date Started
Test File #2			Completed	100	🕐 13-Feb-18 13:27:53

ⓘ Information   🔀 Data   ≡₊ Schedule

#	Date / Time	Temperature (°C)	Depth to water (psi)
1	13-Feb-18 13:27:53	21.63	14.856
2	13-Feb-18 13:27:54	21.63	14.852
3	13-Feb-18 13:27:55	21.63	14.856
4	13-Feb-18 13:27:56	21.63	14.856
5	13-Feb-18 13:27:57	21.63	14.856
6	13-Feb-18 13:27:58	21.69	14.856
7	13-Feb-18 13:27:59	21.63	14.852
8	13-Feb-18 13:28:00	21.69	14.852

Delete 🗙   Export ⬇   Close

Click [⛶] to switch to full screen graphing view

Click [≡] to view data as a table

Click [Σ] to view data statistics

The Information tab is a new feature allowing users to add metadata to their reports such as site location, field notes, or comments. The Schedule tab will display the logging setup details for the report.

Report Details

	Status	Records	Date Started
Test File #2	Completed	100	🕐 13-Feb-18 13:27:53

ⓘ Information   🎲 Data   ≡₊ Schedule

Report Name

Test File #2

Location(GPS or Job Site)

Comment

Sensor name
Seametrics Smart Sensors

Sensor type
PT2X

Serial number
0021739050

Last modified
🕐 14-Feb-18 13:02:15

Downloaded
🕐 14-Feb-18 13:02:15

Delete 🗑   Export ⬇   Close

Click Export to export the report as a .csv file or .a4d file for distribution or use in 3rd party software.

Click Delete to delete the report from Aqua4Plus 2.0

You can also import .a4d files from compatible sensors into Aqua4Plus 2.0 by clicking ⬇ at the top of the Reports screen.

Barometric Compensation

For PSIA sensors we've built a new barometric compensation utility into the Reports section. Click [icon] on a report to compensate the data for barometric pressure.
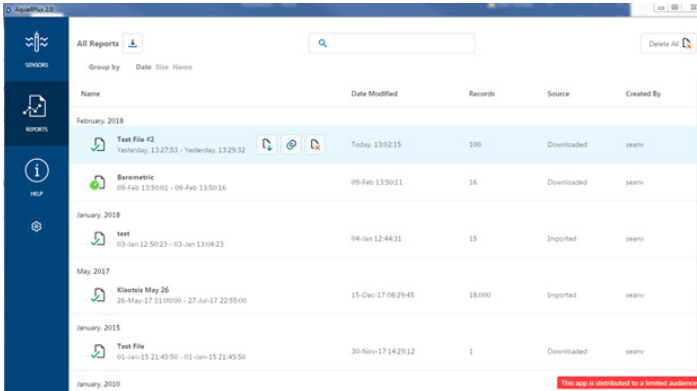
Corresponding barometric files are filtered by date/time and displayed to the left. Select the barometric file you would like to use to compensate the report, select either the Submergence or Depth To Water tab, then click Continue.
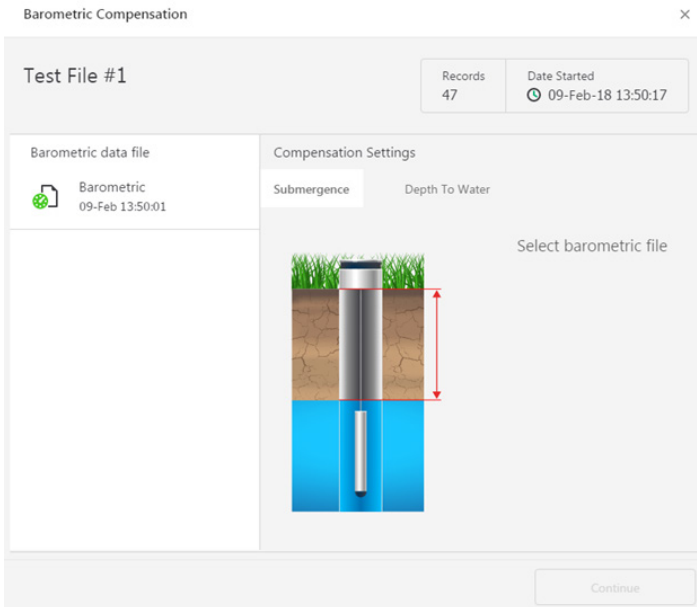
If compensating for Depth to Water enter your depth to water reference measurement and the date/time the measurement was taken (typically taken with a water level indicator before data is uploaded from the sensor) before clicking Continue.
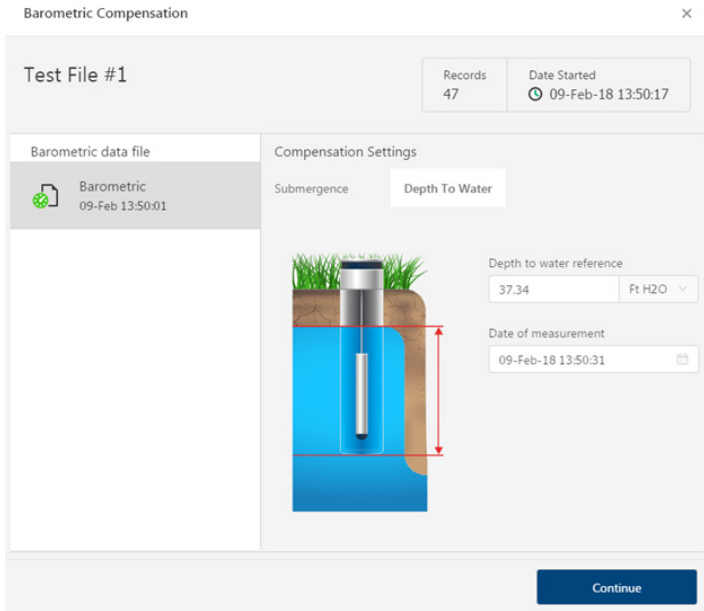
Aqua4Plus 2.0 will perform the barometric compensation and create a new compensated report. Original reports are retained as uploaded.
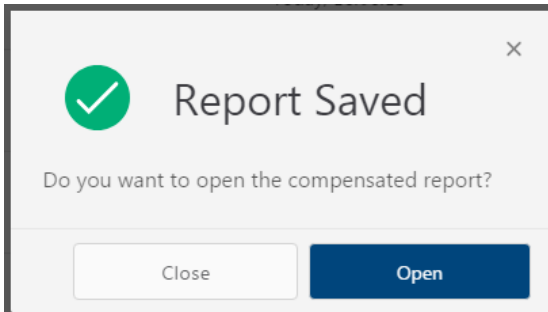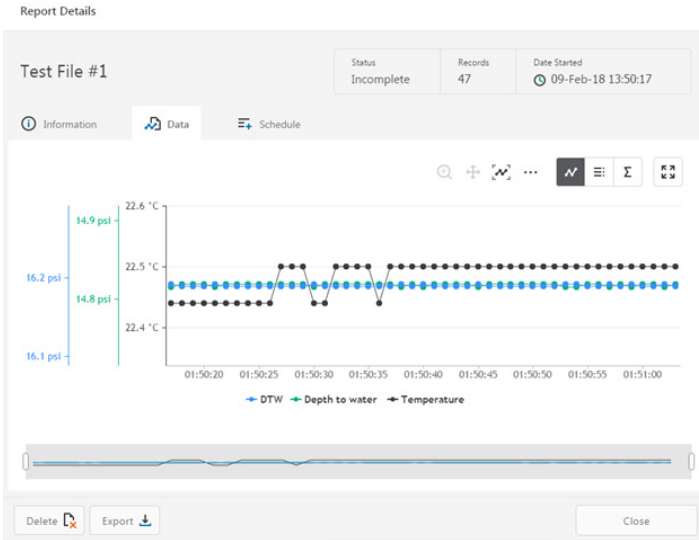
Compensated report can then be viewed and exported as needed.

Reading the BaroSCOUT via Direct Read

While the BaroSCOUT comes with Seametrics' easy to use Aqua4Plus 2.0 software, you can also use standard Modbus® RTU equipment to easily take readings, so as to tie into your existing equipment or networks.

Setting Units for Direct Read

By default, the BaroSCOUT uses the following units:

       Temperature   Degrees Celsius
       Pressure   PSI

However, you can select from a variety of units for direct read measurements. If you want to change to different units, for example, degrees Fahrenheit for temperature or feet of water for pressure, set these units using Aqua4Plus 2.0. See sensor settings.

Once set, these units are saved on the sensor and direct readings will return values using these units. (Note: These settings do not affect the units used on the Aqua4Plus 2.0 display. Refer to the software manual for details.)

Reading Via Modbus® RTU

Taking Measurements

Reading Registers

Read measurements using Modbus function 03 – Read Holding Registers. Readings are located in two registers each, starting at address 62592. (BaroSCOUT register addressing is zero based, i.e., starts at zero. If your equipment uses one based addressing, you will need to add one to the register addresses.)

Register addresses for BaroSCOUT		
	Zero Based	One Based
Temperature	62592	62593
Pressure	62594	62595

Measurement Timing

When you request a reading via Modbus, the sensor wakes up, returns the current values in the registers, and then starts taking new readings and updating the registers. After approximately four seconds, if no more readings have been requested, the sensor goes back to sleep.

Because of this, the first reading you get will be old. If you are taking readings at intervals of less than four seconds, simply ignore the first reading — all remaining readings will be current. On the other hand, if you are taking readings at intervals of greater than four seconds, take a reading, ignore it, wait one second, take another reading. Record this second reading.

Data Format

The data is returned as 32-bit IEEE floating-point values, highword first, also referred to as big-endian or float inverse.

For further information and detailed Modbus examples, see Seametrics application note, "*Modbus Direct Read on Seametrics Smart Sensors*" available from our web site.

Changing Batteries

The BaroSCOUT is powered by a single 1/2 AA 3.6 lithium battery. In most situations the battery will last for years. If you need to replace the battery, contact Seametrics for information on getting it replaced. You cannot simply replace the battery itself but must replace the entire compartment.

> **IMPORTANT NOTE!**
>
> When changing batteries, it is important to reset the Battery Life Calculator. *If the battery life calculator is not reset, the remaining life information will be incorrect.* Access the Battery Life Calculator from the Configure Menu - Battery Information and Reset. If you have put in new batteries, checkmark the box "I have just put in fresh batteries." Click Save and Close.

Miscellaneous

Sensor: There are no user-serviceable parts, other than the batteries. If problems develop with sensor stability or accuracy, contact Seametrics. If the sensor has been exposed to hazardous materials, do not return it without notification and authorization.

Cable: Cable can be damaged by abrasion, sharp objects, twisting, crimping, crushing, or pulling.   Take care during installation and use to avoid cable damage.   If a section of cable is damaged, it is recommended that you send your sensor back to replace the cable harness assembly.

End Connections: The connectors used by Seametrics are not submersible, but are designed to be splash-resistant.

Erratic Readings

Erratic readings can be caused by a poor connection, damaged cable, moisture in the unit, or a damaged transmitter. In most cases, erratic readings are due to moisture getting into the system.   The first thing to check is the connection.   Look for moisture between contacts or a loose or broken wire. Next, check the cable for cracking or fraying. If the connections and cable appear OK, but the readings are still erratic, the transmitter may be damaged. Contact Seametrics for evaluation and repair. Erratic and erroneous readings can also occur due to improper grounding. See Grounding Issues, below.

Zero Readings

Continuous zero readings are usually caused by an open circuit which may indicate a broken cable, a bad connection, or possibly a damaged transmitter.   Check the connector to see if a wire has become loose or if the cable has been cut.   If damage is not readily apparent, contact Seametrics for evaluation and repair.

Grounding Issues

It is commonly known that when using electronic equipment, both personnel and equipment need to be protected from high power spikes that may be caused by lightning, power line surges, or faulty equipment. Without a proper grounding system, a power spike will find the path of least resistance to earth ground – whether that path is through sensitive electronic equipment or the person operating the equipment. In order to ensure safety and prevent equipment damage, a grounding system must be used to provide a low resistance path to ground.

When using several pieces of interconnected equipment, each of which may have its own ground, problems with noise, signal interference, and erroneous readings may be noted. This is caused by a condition known as a *Ground Loop*. Because of natural resistance in the earth between the grounding points, current can flow between the points, creating an unexpected voltage difference and resulting erroneous readings.

The single most important step in minimizing a ground loop is to tie all equipment (sensors, dataloggers, external power sources, and any other associated equipment) to a **single common grounding point.** Seametrics recommends connecting the shield to ground at the connector end.

Limited Warranty/Disclaimer BaroSCOUT Barometric Sensor

A.   Seller warrants that products manufactured by Seller when properly installed, shall be free from defects in material and workmanship.   Seller's obligation under this warranty shall be limited to replacing or repairing the part or parts or, at Seller's option, the products which prove defective in material or workmanship within TWO (2) years from the date of delivery, provided that Buyer gives Seller prompt notice of any defect or failure and satisfactory proof thereof.   Any defective part or parts must be returned to Seller's factory or to an authorized service center for inspection.   Buyer will prepay all freight charges to return any products to Seller's factory, or any other repair facility designated by Seller.   Seller will deliver replacements for defective products to Buyer (ground freight prepaid) to the destination provided in the original order.   Products returned to Seller for which Seller provides replacement under this warranty shall become the property of Seller.

This limited warranty does not apply to lack of performance caused by abrasive materials, corrosion due to aggressive fluids, mishandling or misapplication.   Seller's obligations under this warranty shall not apply to any product which (a) is normally consumed in operation, or (b) has a normal life inherently shorter than the warranty period stated herein.

In the event that equipment is altered or repaired by the Buyer without prior written approval by the Seller, all warranties are void.   Equipment and accessories not manufactured by the Seller are warranted only to the extent of and by the original manufacturer's warranty.

THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESSED, IMPLIED OR STATUTORY.   IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY.   SELLER'S WARRANTY OBLIGATIONS AND BUYER'S REMEDIES THEREUNDER (EXCEPT AS TO TITLE) ARE SOLELY AND EXCLUSIVELY AS STATED HEREIN.   IN NO CASE WILL SELLER BE LIABLE FOR CONSEQUENTIAL DAMAGES, LABOR PERFORMED IN CONNECTION WITH REMOVAL AND REPLACEMENT OF THE SENSOR SYSTEM, LOSS OF PRODUCTION OR ANY OTHER LOSS INCURRED BECAUSE OF INTERRUPTION OF SERVICE.   A NEW WARRANTY PERIOD SHALL NOT BE ESTABLISHED FOR REPAIRED OR REPLACED MATERIAL, PRODUCTS OR SUPPLIES.   SUCH ITEMS SHALL REMAIN UNDER WARRANTY ONLY FOR THE REMAINDER OF THE WARRANTY PERIOD ON THE ORIGINAL MATERIALS, PRODUCTS OR SUPPLIES.

B.   With respect to products purchased by consumers in the United States for personal use, the implied warranties including but not limited to the warranties of merchantability and fitness for a particular purpose, are limited to twenty four (24) months from the date of delivery.

Some states do not allow limitations on the duration of an implied warranty, so the above limitation may not apply to you.   Similarly, some states do not allow the exclusion or limitation of consequential damages, so the above limitation or exclusion may not apply to you.   This limited warranty gives you specific legal rights; however, you may also have other rights which may vary from state to state.