



# BaroSCOUT 2X

Barometric/Temperature  
Smart Sensor and Datalogger



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The Seametrics BaroSCOUT 2X 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 100,000 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 field conditions.

The BaroSCOUT 2X 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 replaceable 2/3 AA 3.6v lithium battery powers the BaroSCOUT 2X. 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 2X with Seametrics Aqua4Plus 2.0 software, it is by no means limited to that software. You can use your own software or logging equipment to read measurements via RS485 or SDI-12, tying into your existing systems and data bases.

Note: The BaroSCOUT 2X is intended for use in atmosphere—not to be submerged.

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** 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 as well as impact damage can occur.
- Don't** bang or drop the device on hard objects.

Technical Specification

The Seametrics BaroSCOUT 2X 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 and/or SDI-12) 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 and SDI-12
Direct Modbus Read Output	32-bit IEEE floating point
Internal Math	32-bit floating point
SDI-12	(ver.1.3) ASCII
Operating Temp. Range	-20° C to 60° C
Storage Temp. Range	-40° C to 80° C

Logging

Memory	100,000 records
Logging Rate	Configurable down to 1/second
Software	Complimentary Aqua4Plus 2.0
File Formats	.xls / .csv / .a4d

Power

Internal Battery	One replaceable 2/3 AA 3.6 lithium battery
Expected Battery Life	4.4 years (at 4 readings per hour)

Temperature

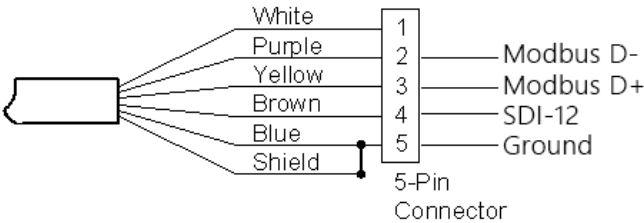
Element Type	Thermistor
Accuracy	± 0.1° C (from -20° C to 60° C)
Resolution	0.01° C
Units	Celsius, Fahrenheit, Kelvin

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	$\pm 0.008$ PSI ( 0.55 mbar) (@ 20° C) $\pm 0.02$ 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

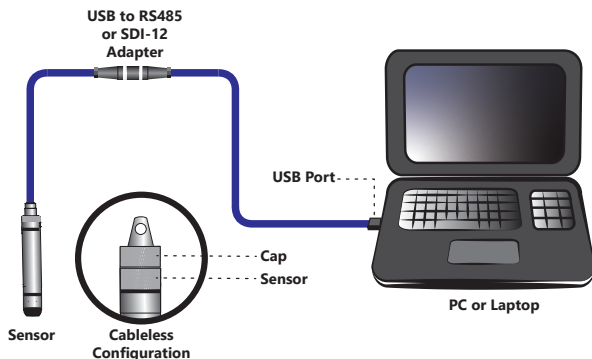


## Power

The BaroSCOUT 2X comes with a 2/3 AA 3.6v lithium battery.

## Connecting the BaroSCOUT 2X 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 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 2X 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 2X Without Aqua4Plus 2.0

Most users will use the BaroSCOUT 2X with Seametrics Aqua4Plus 2.0 software. However, the BaroSCOUT 2X is quite versatile, communicating via Modbus® RTU and/or SDI-12 allowing you to use your own software or logging equipment. (See page 28 for further details)

The BaroSCOUT 2X 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.

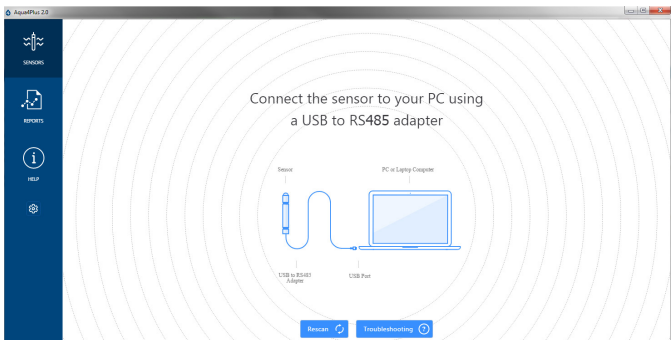
On cabled units be sure the supplied cap is securely placed on the weather-resistant connector at the top of the cable. Do not install such that the connector might become submerged with changing weather conditions. The connector can withstand incidental splashing but is not designed to be submerged.

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.

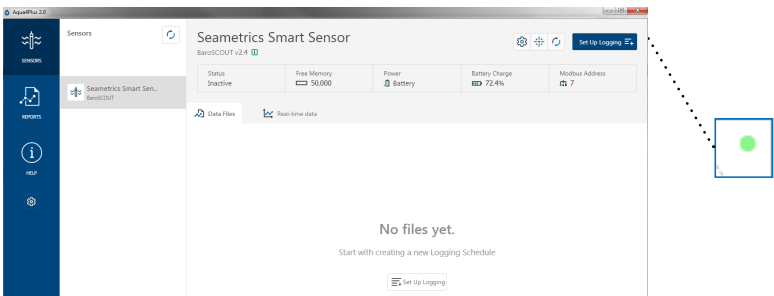
The BaroSCOUT 2X has a battery life calculator that is set at the factory when batteries are first put in the sensor. If you need to replace the batteries, see the Maintenance section for replacement information and for information on resetting the battery life calculator. ***If the battery life calculator is not reset, the remaining life information will be incorrect.***

Connecting to Sensors

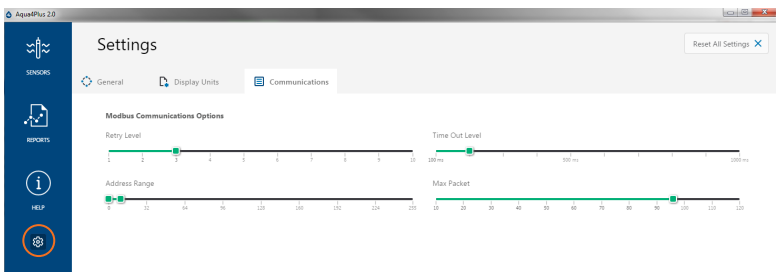
Aqua4Plus 2.0 is designed to automatically detect your communication cable and scan for sensors. It is recommended you connect your USB/RS485 cable to your PC and have the sensor connected before opening Aqua4Plus 2.0.




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 BaroSCOUT 2X 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 Program 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:

Sensor Settings

Seametrics Smart Sensor

BaroSCOUT

Modbus

Modbus Address

7

Baud Rate

38,400

Direct Read Units

Temperature

°C

Pressure

psi

Sensor Clock

PC Time

16-Mar-18 10:22:40

Sensor Time

16-Mar-18 10:22:42

Sync with PC Time

Battery Information

☐ I have just put in fresh batteries

Battery Type

LevelSCOUT/BaroSCOUT Battery

Level

72.4%


Battery Voltage

3.44 V

Last Changed

08-Jun-17

Save

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.

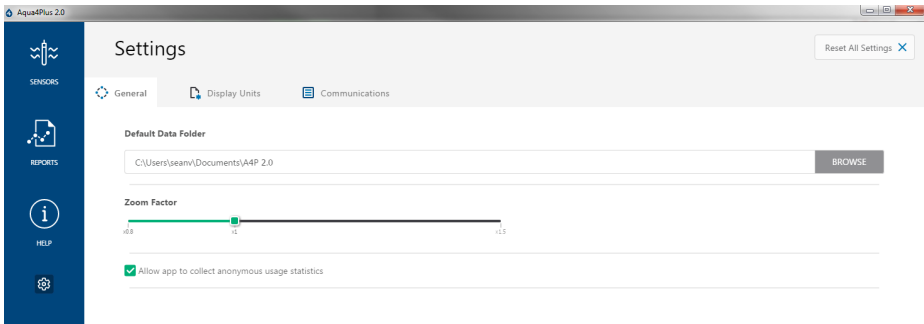
Program Settings

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

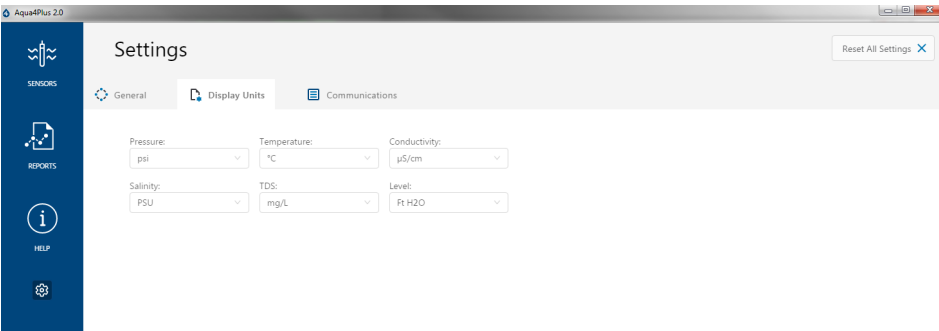
Under the General Settings tab you can change the default data folder location. This is where your Reports are saved to on your PC.

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

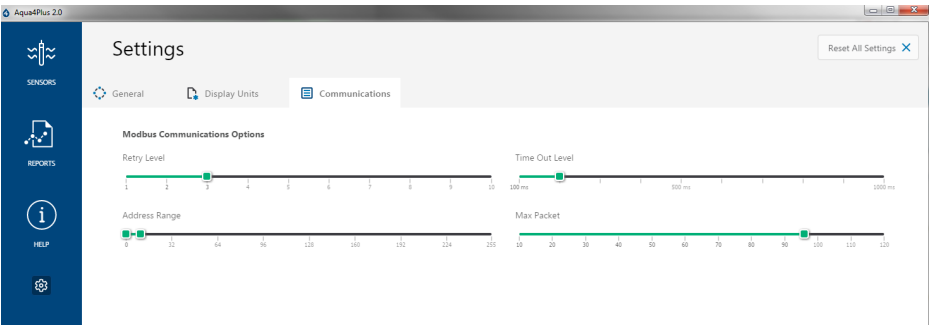
Uncheck the Allow app to collect anonymous usage statistics box if you would like to opt out. This information is used to track Aqua4Plus 2.0 reliability across different system configurations.



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 


Adjustments and Calibration for Seametrics Smart Sensor

Choose your setting type

  
Depth/Submergence

  
Depth-to-Water

  
Elevation

  
Staff Gauge

Check measurement units

Pressure

- ☒ psi
- ☐ m H2O
- ☐ Ft H2O

Conductivity

- ☒ µS/cm
- ☐ mS/cm

Close

Continue

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.

Adjustments and Calibration for Seametrics Smart Sensor

Pressure

Calibration Type


- One Point Calibration

Input your reference point

Ref. PointUnits

psi

Measure

  
Depth/Submergence

Channel Label

Pressure

Offset, psi

0

Slope

1

Apply

Back

Close

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

Pressure

Calibration Type

One Point Calibration

Input your reference point

Ref. Point

Units


14.64

psi

Average: 14.6512 psi

Ok

Re-measure



Depth/Submergence

Channel Label

Pressure

Offset, psi

0

Slope

1

Apply

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:

Pressure

Calibration Type

One Point Calibration

Input your reference point

Ref. Point

Units


14.64

psi

Average: 14.6512 psi

Ok

Re-measure



Depth/Submergence

Channel Label

Pressure

Offset, psi

-0.011150276167168011

Slope

1

Apply

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

Adjustments and Calibration for Seametrics Smart Sensor

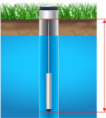
Pressure

Calibration Type  
Two Points Calibration

Input your second reference point

Ref. Point  
30

Units  
psi



Depth/Submergence

Channel Label  
Pressure

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:

Pressure


Calibration Type  
One Point Calibration

Input your reference point

Ref. Point

Units  
psi

Measure



Depth/Submergence

Channel Label  
Pressure

Offset, psi  
0

Slope  
1

Apply

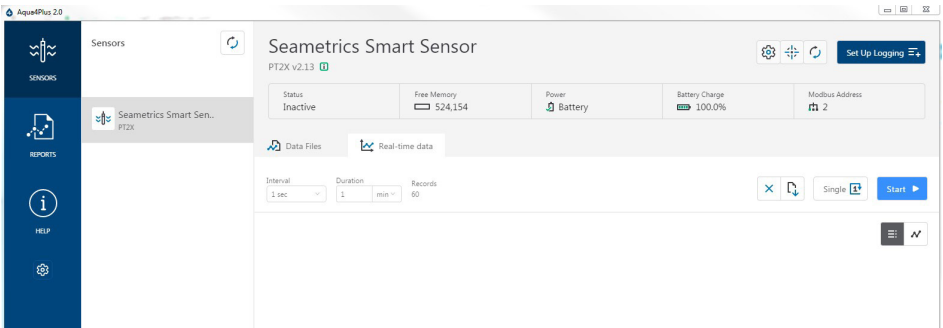
Click Apply to confirm settings and Aqua4Plus 2.0 will provide a real time reading to confirm.

Adjusting for specific gravity

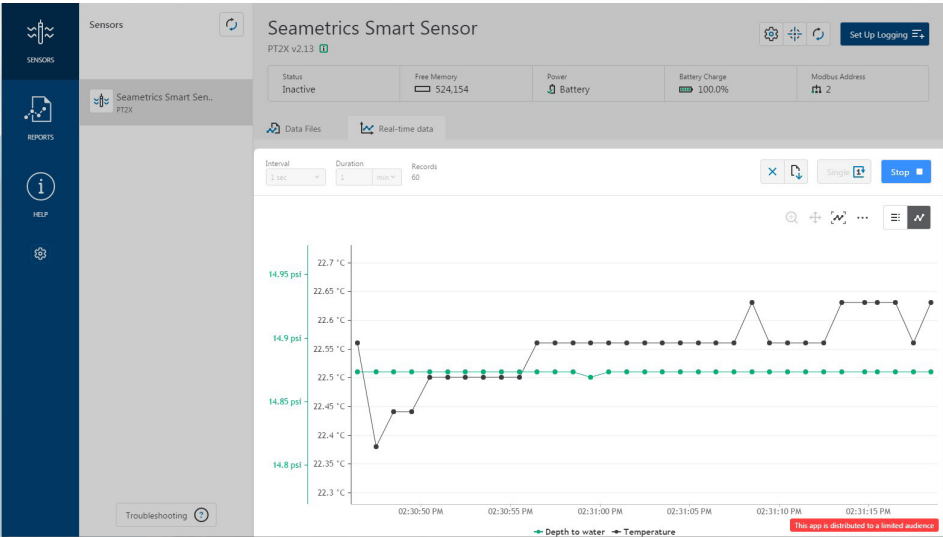
You man enter the specific gravity of your fluid in the Slope field to adjust for specific gravity when needed. Click Apply to confirm settings and Aqua4Plus 2.0 will provide a real time reading to confirm.

Real-time Data

Connect to sensor and select the Real-time data tab



To start 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:

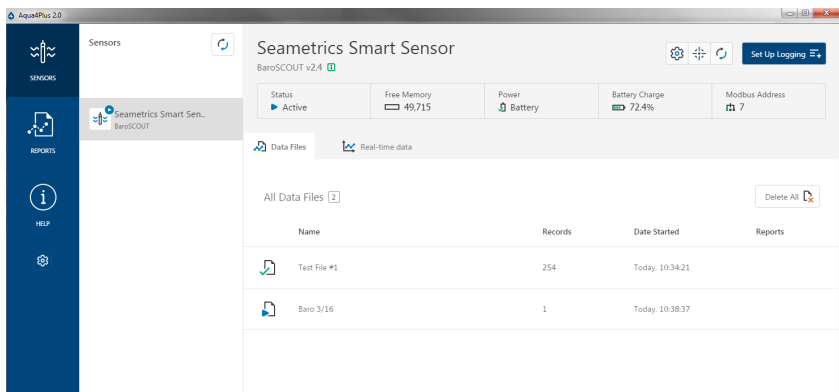
**Data Files**   **Real-time data**

Interval: 1 sec   Duration: 1 min   Records: 60

To save this data to the Reports section click the button located next to the Single button in the Real-Time tab. This will permanently save this real-time data set to your Reports database.

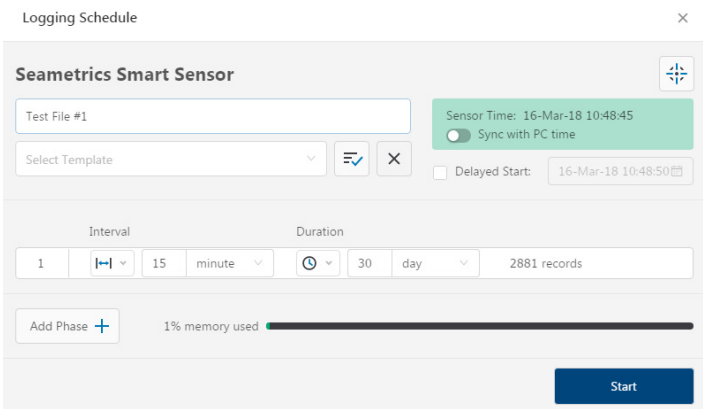
Data Logging

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 (supported sensors only) Select your continuous rate from the dropdown 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




30


day

2881 n

 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: 16-Mar-18 10:48:45



 Sync with PC time

☐ Delayed Start:

16-Mar-18 10:48:50


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 Sensor

Test File #1

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.

Logging Schedule ×

Seametrics Smart Sensor ⛶













PW 123

24 hr Pump Test ⌵  ×

Sensor Time: 16-Mar-18 10:53:21

☒ Sync with PC time

☒ Delayed Start: 16-Mar-18 11:00:00 ⌵


Interval			Duration		
1	 <span>⌵</span>	30 second <span>⌵</span>	 <span>⌵</span>	3 minute <span>⌵</span>	7 records <span>×</span>
2	 <span>⌵</span>	1 minute <span>⌵</span>	 <span>⌵</span>	12 minute <span>⌵</span>	13 records <span>×</span>
3	 <span>⌵</span>	5 minute <span>⌵</span>	 <span>⌵</span>	45 minute <span>⌵</span>	10 records <span>×</span>
4	 <span>⌵</span>	10 minute <span>⌵</span>	 <span>⌵</span>	60 minute <span>⌵</span>	7 records <span>×</span>
5	 <span>⌵</span>	30 minute <span>⌵</span>	 <span>⌵</span>	8 hour <span>⌵</span>	17 records <span>×</span>
6	 <span>⌵</span>	4 hour <span>⌵</span>	 <span>⌵</span>	14 hour <span>⌵</span>	4 records <span>×</span>


Add Phase +


0% memory used







Start


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

 Real-time data

All Data Files 2 Delete All 

Name	Records	Date Started	Reports
 Test File #1	254	Today, 10:34:21	
 Baro 3/16	<div>   </div> 2	Today, 10:38:37	

Data files already downloaded will show  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.

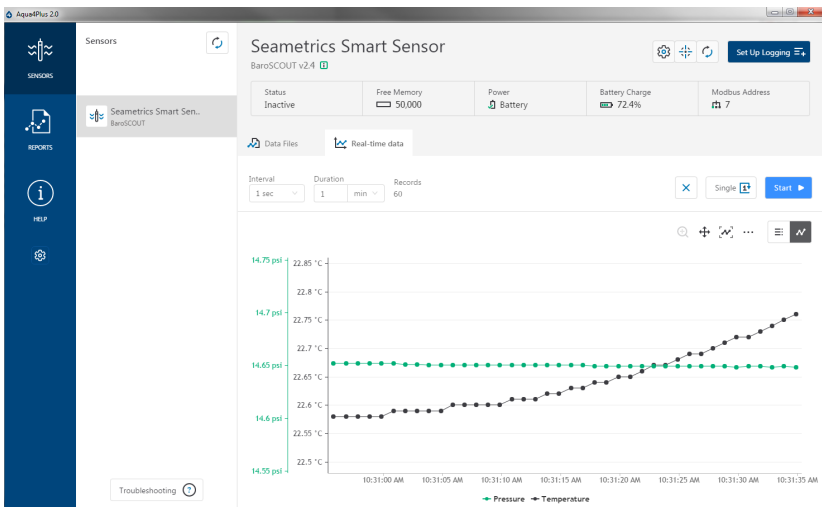
Do you want to schedule new logging?

This device already has an active logging schedule. Do you want to terminate it?

Cancel

OK

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.

Erase all data files?

All data files on this sensor will be erased.

Cancel

Erase All

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.

REPORTS

REPORTS

HELP

SETTINGS

All Reports

Group by

Date

Size

Name

Search

Delete All

Name	Date Modified	Records	Source	Created By
March 2018				
Baro 3-15 Today 10:38:37 - Today 10:53:37	Today 10:57:39	2	Downloaded	seamr
Baro 3-12 12-Mar 12:52:32 - Today 10:14:32	Today 10:15:32	5,543	Downloaded	seamr
Deck 3-12 12-Mar 14:02:55 - 13-Mar 15:10:55	13-Mar 15:20:14	1,509	Compensated	seamr
Deck 3-12 12-Mar 14:02:55 - 13-Mar 15:10:55	13-Mar 15:11:39	1,509	Downloaded	seamr
Deck CT2X 3-12 12-Mar 13:05:53 - 12-Mar 13:59:53	13-Mar 15:11:03	5	Downloaded	seamr
February 2018				
300k test 21-Feb 15:20:09 - 22-Feb 07:40:51	22-Feb 12:02:29	232,971	Downloaded	seamr
Test File #2 21-Feb 15:19:36 - 21-Feb 15:22:55	21-Feb 15:30:43	400	Downloaded	seamr

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

All Reports

Group by

Date

Size

Name

Search

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

Zoom In

Zoom Out

Fit

More

Line Graph

Table

Sum

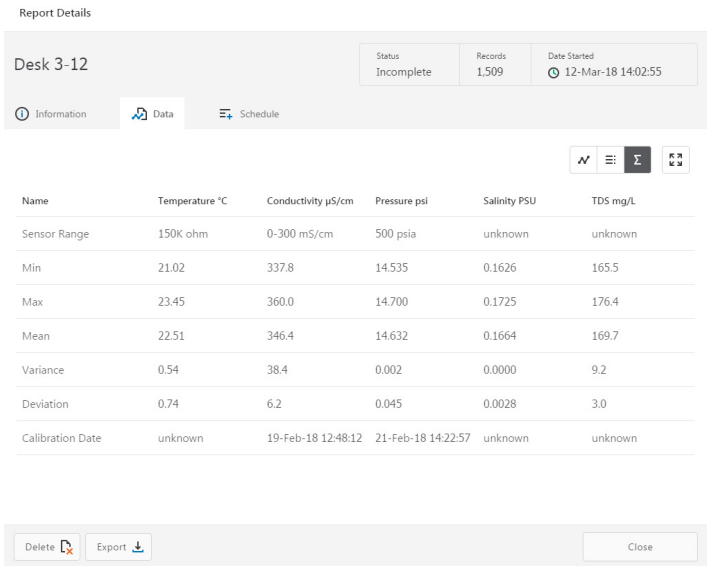
Fullscreen


Print

Export PNG

Show Warnings

Show Phases

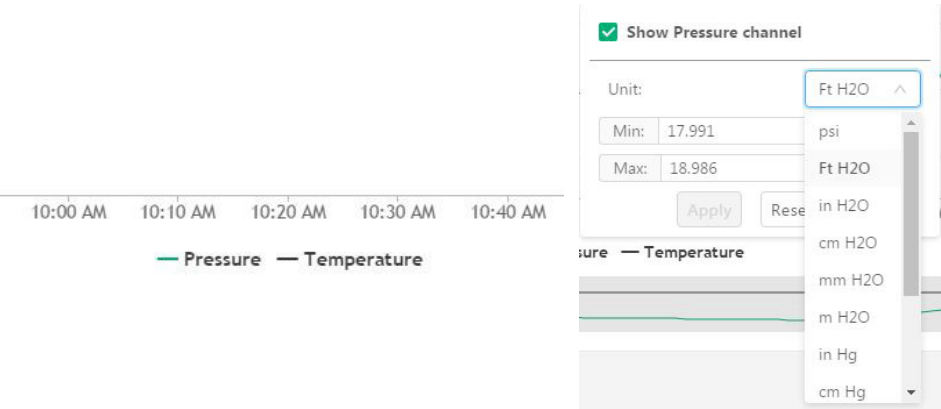


Click  to switch to full screen graphing view

Click  to view data as a table

Click  to view data statistics

You may change the display units within the graph view by selecting the appropriate channel here:



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

Desk 3-12

Status  
Incomplete

Records  
1,509

Date Started  
🕒 12-Mar-18 14:02:55

🕒 Information

📊 Data

📅 Schedule

Report Name

Desk 3-12

Location(GPS or Job Site)

Comment

Sensor name  
Seametrics Smart Sensor

Sensor type  
CT2X

Serial number  
0021746043

Last modified  
🕒 13-Mar-18 15:11:39


Downloaded  
🕒 13-Mar-18 15:11:39

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  on a report to compensate the data for barometric pressure.

AquaPlus 2.0

es | 80 | 22

Sensors

Reports

Help

Settings

All Reports

Group by Date Size Name

March, 2018

Name	Date Modified	Records	Source	Created By
Baro 3-16 Today, 10:38:37 - Today, 10:53:37	Today, 10:57:39	2	Downloaded	seamv
Baro 3-12 12-Mar 13:52:32 - Today, 10:14:32	Today, 10:15:32	5,543	Downloaded	seamv
Desk 3-12 12-Mar 14:02:55 - 13-Mar 15:10:55	13-Mar 15:20:14	1,509	Compensated	seamv
Desk 3-12 12-Mar 14:02:55 - 13-Mar 15:10:55	13-Mar 15:11:39	1,509	Downloaded	seamv
Desk CTZX 3-12 12-Mar 13:55:53 - 12-Mar 13:59:53	13-Mar 15:11:03	5	Downloaded	seamv

Delete All

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.

Barometric Compensation

Desk 3-12

Records 1,509

Date Started 12-Mar-18 14:02:55

Barometric data file

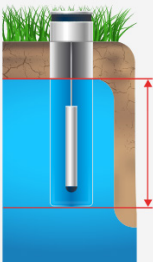
Baro 3-12  
12-Mar 13:52:32

Compensation Settings

Submergence

Depth To Water

Select barometric file



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.


Barometric Compensation

Desk 3-12

Records  
1,509

Date Started  
12-Mar-18 14:02:55

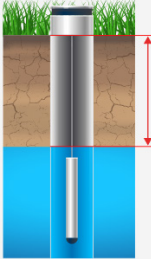
Barometric data file

 Baro 3-12  
12-Mar 13:52:32

Compensation Settings

Submergence

Depth To Water




Depth to water reference  
37.34 Ft H2O

Date of measurement  
14-Mar-18 11:07:00

Continue

Aqua4Plus 2.0 will perform the barometric compensation and create a new compensated report. Original reports are retained as uploaded.

Today 10:52:39



Report Saved

Do you want to open the compensated report?

Close

Open

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Compensated report can then be viewed and exported as needed.

Reading the BaroSCOUT 2X via Direct Read

While the BaroSCOUT 2X comes with Seametrics’ easy to use Aqua4Plus 2.0 software, you can also use standard Modbus® RTU and/or SDI-12 equipment to easily take readings, so as to tie into your existing equipment or networks.

Setting Units for Direct Read

By default, the BaroSCOUT 2X 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 2X 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 2X		
	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, available on our website at [www.seametric.com](http://www.seametric.com)

Reading Via SDI-12

Note: The default units setting for pressure is PSI. The default units setting for temperature is Celsius. To change these, use the Direct Read Units in the Aqua4Plus 2.0 Control Software.

Addressing

Default SDI-12 Address: 0

SDI-12 Command Nomenclature

<a> = Sensor address  
{crc} = SDI-12 compatible 3-character CRC  
<cr> = ASCII carriage return character  
<lf> = ASCII line feed character

highlighted values indicate variable data

All SDI-12 requests consist of a command followed by a request for values. Some software or equipment may combine these, making the second one unnecessary. Refer to your software or equipment documentation for details.

SDI-12 Commands

<b>Sensor Identification</b> <a>! <a>13 SEAMET LSCOUT <b>208</b> sssssssss<cr><lf>		Note: <b>208</b> will change to reflect current firmware version. sssssssss = device serial number
<b>Acknowledge Active, Address Query</b> <a>! <a><cr><lf> ?! <a><cr><lf>		
<b>Change Address</b> <a>A<b>! <b><cr><lf>		Change address to <b>
<b>Request Measurement</b> <a>M! <a>0022<cr><lf> <a>D0! <a> <b>+22.0512+12.0512</b> <cr><lf>  <a>M1! <a>0021<cr><lf> <a>D0! <a> <b>+22.0512</b> <cr><lf>  <a>M2! <a>0021<cr><lf> <a>D0! <a> <b>12.0512</b> <cr><lf>		Request all measurements Read temperature and pressure  Request temperature measurement only Read temperature  Request pressure measurement only Read pressure

Request Measurement with CRC

<a>MC! <a>0022<cr><lf>	Request all measurements with CRC
<a>D0! <a>+22.0512+12.0512{crc}<cr><lf>	Read temperature and pressure
<a>MC1! <a>0021<cr><lf>	Request temperature measurement only with CRC
<a>D0! <a>+22.0512{crc} <cr><lf>	Read temperature
<a>MC2! <a>0021<cr><lf>	Request pressure measurement only with CRC
<a>D0! <a>12.0512{crc} <cr><lf>	Read pressure

Concurrent Measurement

<a>C! <a>0022<cr><lf>	Request all measurements
<a>D0! <a>+22.0512+12.0512<cr><lf>	Read temperature and pressure
<a>C1! <a>0021<cr><lf>	Request temperature measurement only
<a>D0! <a>+22.0512<cr><lf>	Read temperature
<a>C2! <a>0021<cr><lf>	Request pressure measurement only
<a>D0! <a>12.0512<cr><lf>	Read pressure

Concurrent Measurement with CRC

<a>CC! <a>0022<cr><lf>	Request all measurements with CRC
<a>D0! <a>+22.0512+12.0512{crc}<cr><lf>	Read temperature and pressure
<a>CC1! <a>0021<cr><lf>	Request temperature measurement only with CRC
<a>D0! <a>+22.0512{crc} <cr><lf>	Read temperature
<a>CC2! <a>0021<cr><lf>	Request pressure measurement only with CRC
<a>D0! <a>12.0512{crc} <cr><lf>	Read pressure

## Changing Batteries

The LevelSCOUT 2X and BaroSCOUT 2X Smart Sensors feature a replaceable battery pack, the following describes how to perform battery replacement.

**NOTE: Changing the battery requires opening the sensor housing, exposing internal components. Although it is possible to replace the battery in the field it MUST be done in a clean, dry environment. Seametrics recommends replacing the battery indoors.**

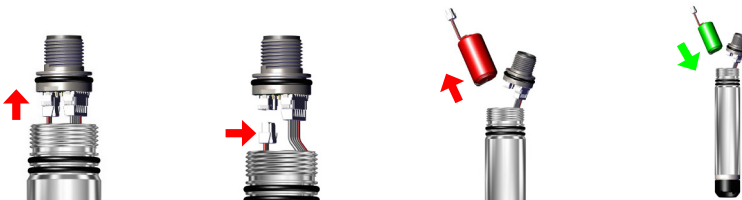
Required Items: Battery replacement kit 7A62115 (Includes battery, O-ring, & retaining clip).

After removing the cableless cap (or cable accessory) you will find a retaining clip around the inside edge of the housing. This holds the connector insert in place, to remove it slip small screwdriver (or preferred tool) under the retaining clip at the slightly angled portion. The clip will want to rotate around the channel in the housing, to prevent this hold the sensor in a way that allows you to hold the clip in place with your finger. Once you get the tool under the clip you can work it around the radius and the clip will pop out.



Next, remove the connector insert by carefully pulling straight up while working it side-to-side to help break the O-ring seal. You don't want to pull too hard causing the O-ring seal to release suddenly as that could damage the internal wiring. There is roughly 1/2" of slack in the internal wiring. Once the insert has been removed from the main housing you can disconnect the battery pack.

To disconnect the old battery simply press the locking lever located to the inside of the connector and pull straight out. Remove the old battery pack from the housing, insert the fresh battery pack, and re-connect to the connector insert.

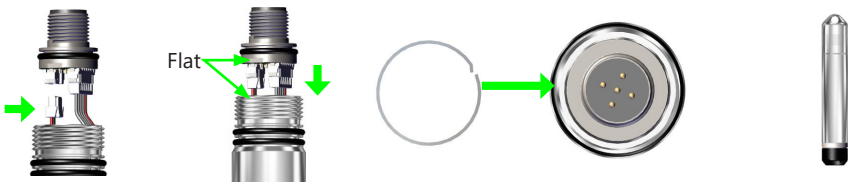


Before sealing the housing back up, replace the O-ring on the connector insert with the one provided. To reinstall the connector, insert push it straight back into the housing noting the two flats on the insert as well as inside the housing. These flats prevent the connector insert from rotating during normal use and must be properly keyed when re-installing the insert for the retaining clip to seat properly.

Once the connector is seated, install the new retaining clip and connect to Aqua4Plus to reset the battery life calculator.

**Note: The battery life calculator MUST be reset via Aqua4Plus to ensure a correct battery percentage display.**

Battery replacement is complete, proceed with normal operations.



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Miscellaneous

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**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.

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

### Erratic Readings

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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.

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### Zero Readings

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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.

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### Grounding Issues

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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.

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## Limited Warranty/Disclaimer BaroSCOUT 2X Barometric Sensor

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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.

