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**NexSens Accustage
Smart Level Sensor
Sensor Interface Manual
Revision 08.06.17**

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Technical

The NexSens AccuStage vented water level sensor is a completely self-contained pressure transducer designed for use in a wide variety of environmental monitoring applications. With +/-0.1% Full Scale accuracy, the AccuStage provides high performance and extreme accuracy over a wide range of operating conditions.

The AccuStage internal electronics employ the latest technology to obtain high accuracy and resolution level data. Measured values are mathematically compensated for all linearity and temperature errors of the pressure sensor. Both water temperature and level are output via 2.5 VDC analog or RS485 digital output.

The sensor's small size and integral signal conditioning makes installation quick and easy for both groundwater and surface water applications. Options include 316L Stainless Steel or Titanium construction, 10m, 20m or 30m cable lengths, and built-in lightning protection.

AccuStage is ideally suited for long-term environmental monitoring applications in surface water, streams and reservoirs. The pressure level sensor is perfect for measuring water level in weirs, flumes, irrigation channels, and small to large streams. The sensor features a plug-and-play interface to NexSens iSIC data loggers via RS485 digital output.



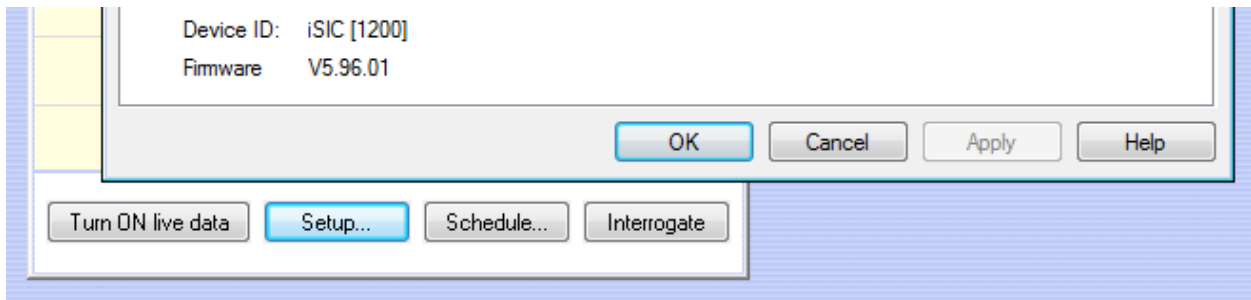
The Accustage is offered in six models:

- AS-SS-5-10 Vented level sensor, stainless steel, 0-5m water column, 10m cable
- AS-SS-5-20 Vented level sensor, stainless steel, 0-5m water column, 20m cable
- AS-SS-5-30 Vented level sensor, stainless steel, 0-5m water column, 30m cable
- AS-TLP-5-10 Vented level sensor with titanium construction, lightning protection, 0-5m water column, and 10m cable
- AS-TLP-5-20 Vented level sensor with titanium construction, lightning protection, 0-5m water column, and 20m cable
- AS-TLP-5-30 Vented level sensor with titanium construction, lightning protection, 0-5m water column, and 30m cable

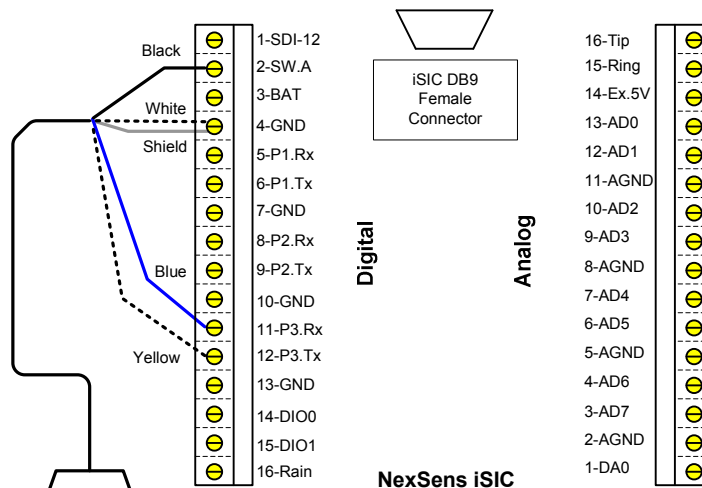
Wiring

NexSens Accustage sensors communicate to data loggers via RS485 Modbus RTU protocol. This protocol is supported in data logger versions 5, 6 and 7. The version of the data logger can be determined by the first number in the firmware version, which is shown by clicking the setup button in the main instrument control screen.

ie. below is a version 5 data logger:



Wiring for version 7 data loggers:



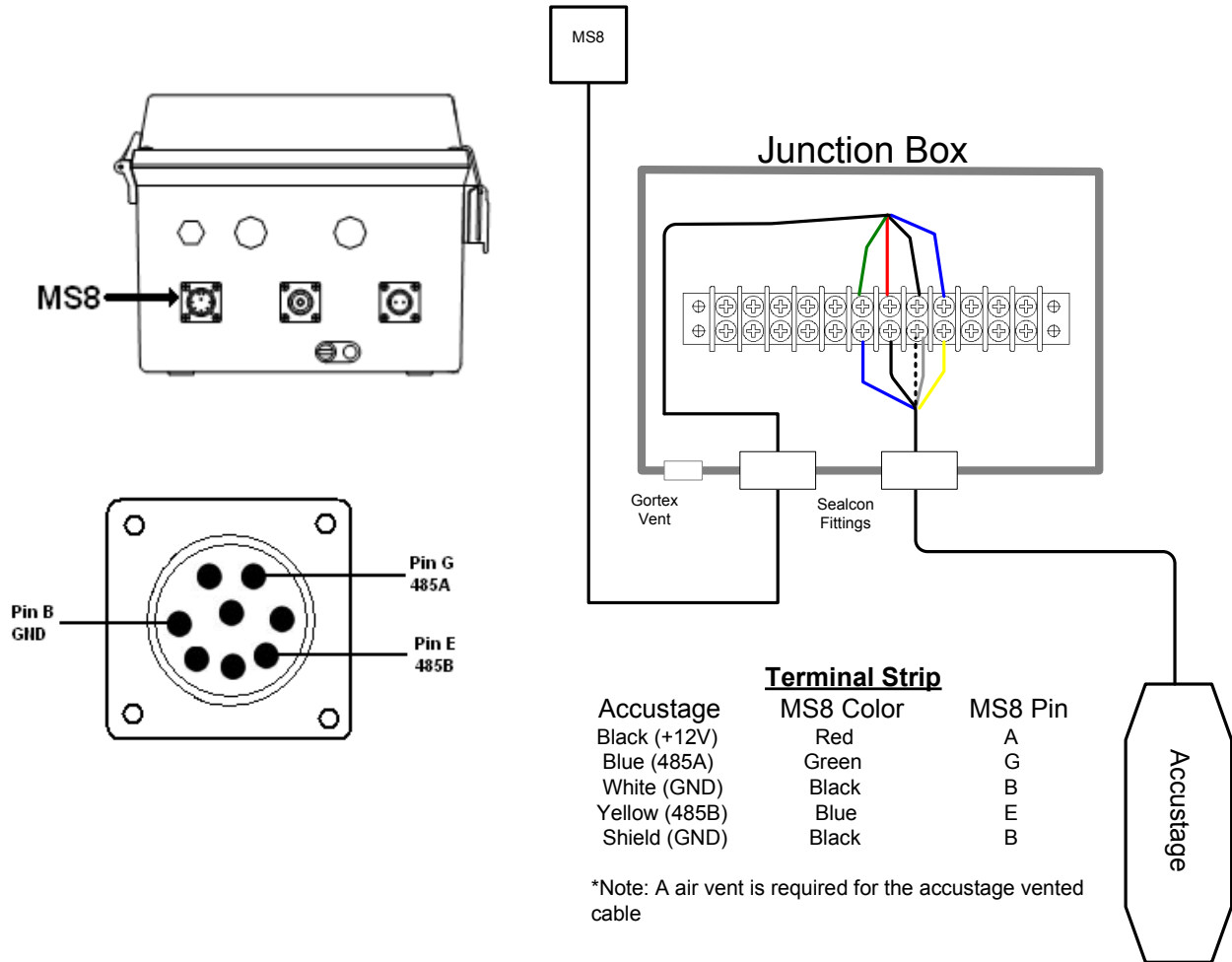
<u>AccuStage</u>	<u>Signal</u>	<u>iSIC Pin</u>
Black	+12V	2-SW.A
Blue	RS485A	11-P3.Rx
White	Ground	4-GND
Yellow	RS485B	12-P3.Tx
Shield	Ground	4-GND



Note: the green terminal strip unplugs from the iSIC

Wiring for Version 5 and 6 data loggers:

The NexSens iSIC data logger communicates to the Accustage via RS485 located on the MS8 Connector of each data logger. NexSens Part# A50 junction box with NexSens Part # A70 Gortex vent is shown below.



Note: YSI cables use Gray instead of Green and Green instead of Blue as the MS8 Color.



A vent made of Gortex material is installed on the outside of the enclosure to allow air to pass and keep moisture out. This keeps the enclosure pressure at equilibrium with the atmosphere.

Gortex vents can be purchased as part #A70.

http://www.nexsens.com/products/nexsens_a70.htm

Deployment and Maintenance

AccuStage Deployment:

Most users either suspend the NexSens AccuStage in a stilling well or house them inside of a deployment pipe assembly. This is done to prevent damage to the transmitter from shock caused by water turbulence. For industrial applications, it is not advisable to tie your transmitter to a pump or to piping, as any problem with the transmitter could require that the pump be pulled from the installation.

NexSens deployment pipes:



Deployment pipe assembly, 2". Perforated 2" schedule 80 PVC pipe, 2" schedule 80 PVC male threaded adapter, stainless steel stop bolt and nuts, 24" total length

2" deployment pipe assemblies can be purchased as part #912.
http://www.nexsens.com/products/deployment_pipes.htm

Be careful when deploying the sensor to avoid cable damage. The AccuStage cable is a rugged, Hytrel™ cable jacket to minimize the risk of cuts and abrasion. Still, make sure the cable does not drag over sharp edges and avoid dropping the transmitter from the surface.

Additionally, while the cable is quite flexible, care should be taken to keep the cable from bending at more than a 1 inch radius which can pinch the vent tube (preventing an accurate vented level reading).

AccuStage Maintenance:



Every iSIC Data logger ships with 5 pouches of desiccant. Remove one pouch from the zip lock bag and place it in the enclosure the vented AccuStage cable is housed. This may be a junction box or iSIC data logger enclosure. Replace the desiccant bag (NexSens Part #A71) twice per year, or more often if frequent access to the enclosure is needed. This will keep the AccuStage vented cable free from moisture.

AccuStage Cleaning:

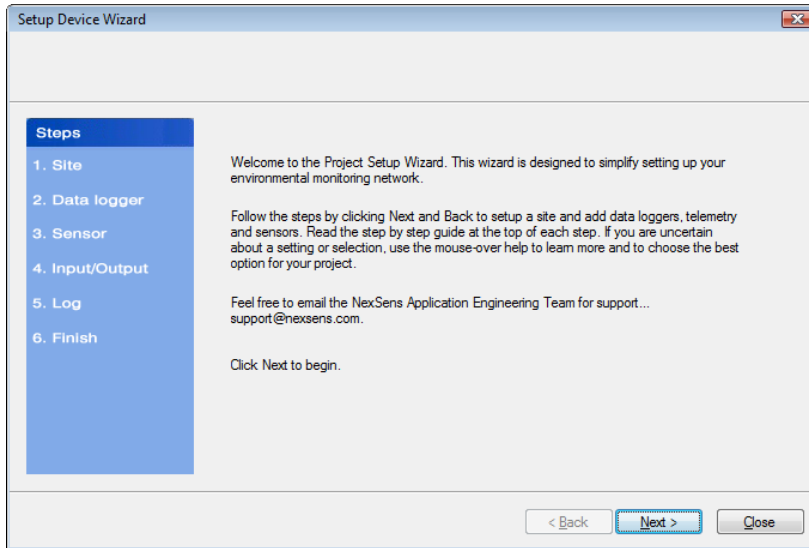
A clogged nose cap could result in erroneous readings from the AccuStage. Never attempt to clean the AccuStage nose cap or diaphragm with a sharp object. This could dent the sensor diaphragm and cause permanent damage to the transmitter. To clean the transmitter, it is recommended that a soap, scum, and hard-water stain remover be used. Fill a suitable container with the cleaner. Fill another bowl with a mixture of the cleaner and fresh water. Fill a third bowl with fresh water. Beginning with the first bowl, hold the cable about six inches from transmitter and stir gently in the solution for 20-30 seconds. Second, repeat in the mixture bowl. Finish by stirring in the fresh water bowl. Wipe dry with a soft rag or towel.

Adding to iChart

Once all wiring is completed, the device is ready to be added to an iChart database. To add the device to an existing database, select **Instrument | Add Device**. To create a new database, select **File | New Project**.

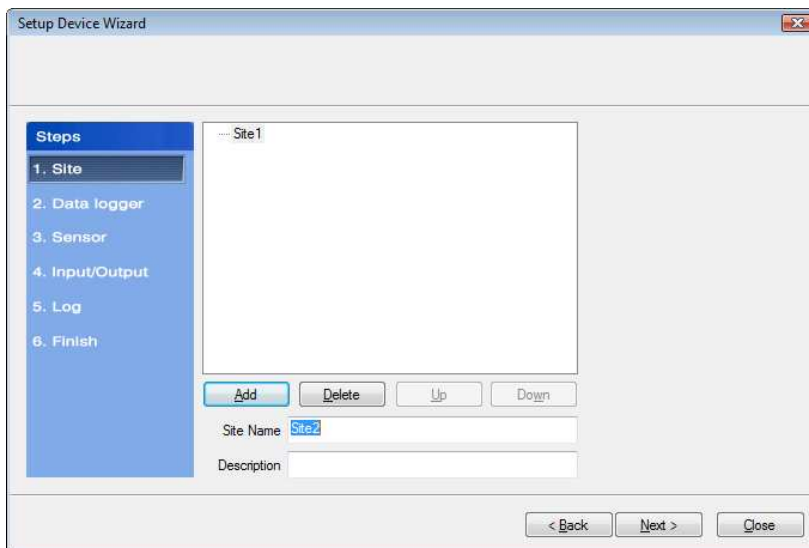
Setup Device Wizard

The Setup Device Wizard will begin. Click **Next** to continue.



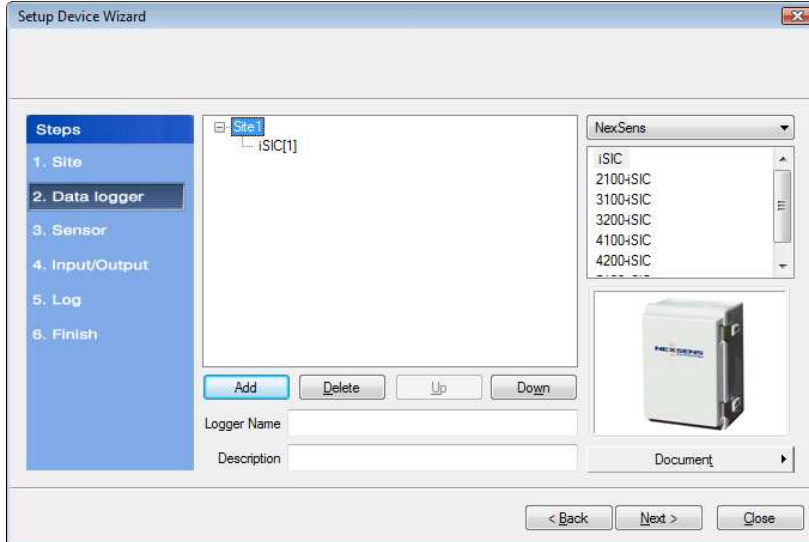
Step 1 – Site Setup

The first step is to create a site for data loggers and sensors to be located in. If this is an existing project, sites may already exist. Enter a **Site Name** and click **Add** or simply select a site that has already been added from the navigation list.



Step 2 – Data Logger & Telemetry

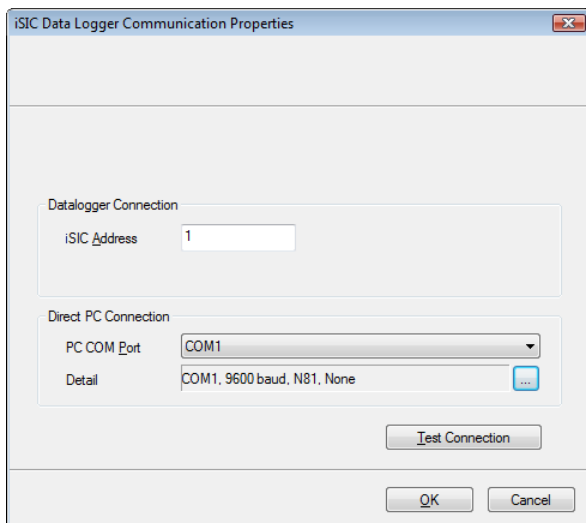
The next step is to add the data logger(s) to the sites created in the previous step. Select a site to add a data logger to. Then select the data logger model number from the list at right and click **Add** or select a data logger that has already been added from the navigation list, if simply adding the sensor to a data logger that has already been setup.



The **iSIC Data Logger Communication Properties** dialog box will appear. Enter the required iSIC data logger connection information (see below for model-specific instructions) to finish adding the data logger to the selected site. When complete, click **OK**.

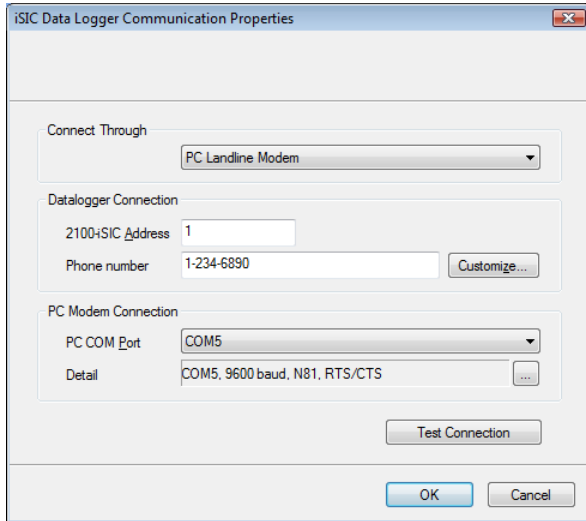
For an **iSIC** data logger, enter the iSIC address and select the PC COM Port that the data logger is connected to.

- The iSIC address is typically '1'. If unknown, enter '0' and click **Test Connection** to determine the address.
- The PC COM Port drop-down menu is the list of available COM ports iChart detected on the computer.



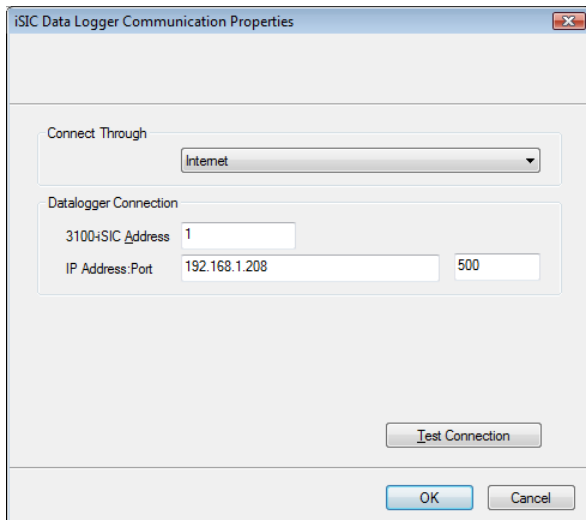
For a **2100-iSIC**, enter the 2100-iSIC address, phone number, and PC COM Port that the computer phone modem is connected to.

- The 2100-iSIC address is typically '1'. If unknown, enter '0' and click **Test Connection** to determine the address.
- The PC COM Port drop-down menu is the list of available COM ports iChart detected on the computer. Internal PC phone modems are typically set to COM3.



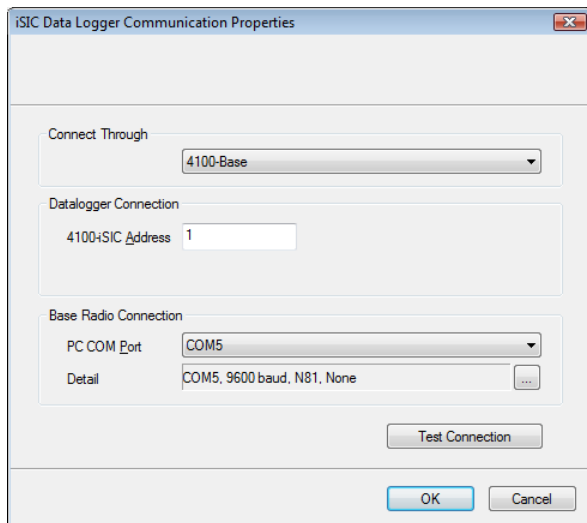
For a **3100-iSIC**, enter the 3100-iSIC address and the IP address of the data logger.

- The 3100-iSIC address is typically '1'. If unknown, enter '0' and click **Test Connection** to determine the address.
- The IP address is provided by the cellular service provider in which your cellular data account is setup. The port is set to 500 by default.



For a **4100-iSIC**, select the method in which the 4100-iSIC is connected to your PC and enter the 4100-iSIC address.

- A 4100-iSIC can connect to a PC through a 4100-BASE or a 4200-iSIC.
 - A 4100-BASE system connects to a PC via RS-232 cable.
 - A 4200-iSIC connects to a PC via landline telephone.
- The 4100-iSIC address is '1' by default.
 - If there is more than one 4100-iSIC in use, each 4100-iSIC should be programmed with different addresses (See the *4100-iSIC | iSIC Addressing* section in the iSIC manual).

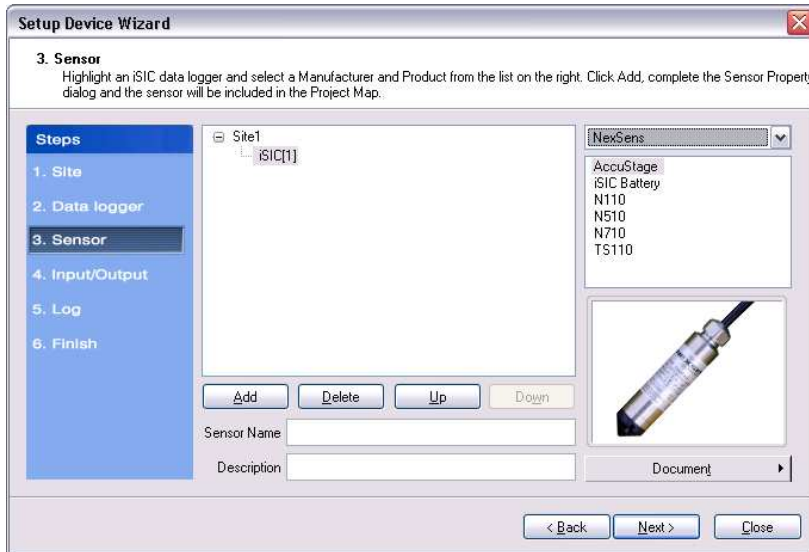


For a **4200-iSIC**, enter the iSIC address and PC COM port the data logger is connected to.

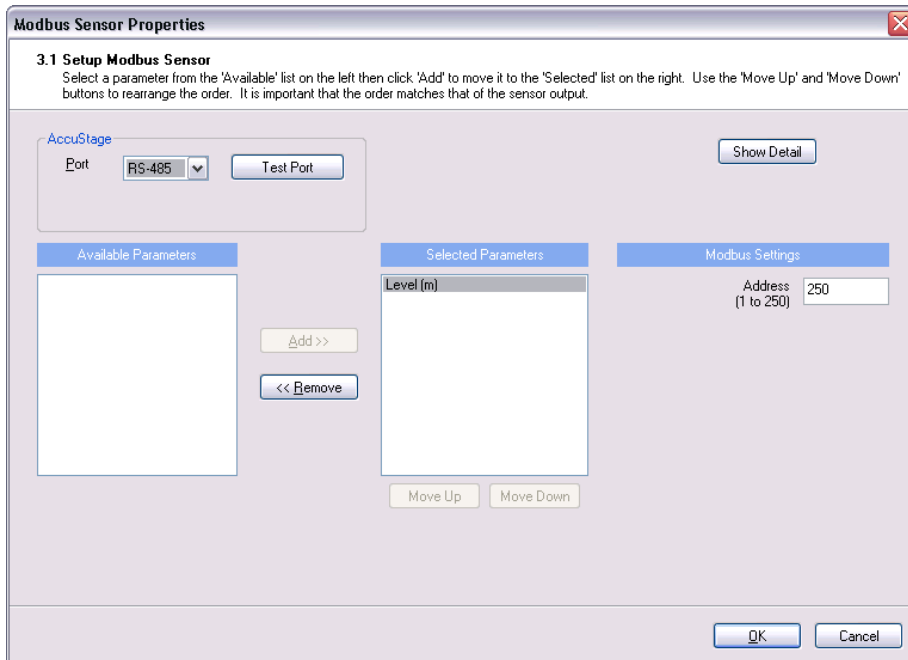
- The 4200-iSIC address is typically 250. When communicating with a 4200-iSIC, any communication using the 4200-iSIC address will be sent to the 4200-iSIC data logger.
 - Communications using any other address will be broadcast to any 4100-iSIC(s) in your radio network.
 - Note:** Do not use address '0' when communicating to a 4200-iSIC.
- The drop down menu of PC COM Port's is the list of available COM ports iChart detected on the computer. Internal phone modems are typically set to COM3.

Step 3 – Sensor

After selecting a data logger, click **Next** and select **NexSens** from the drop-down list of manufacturers. Then select the **Accustage** model number and click **Add**.

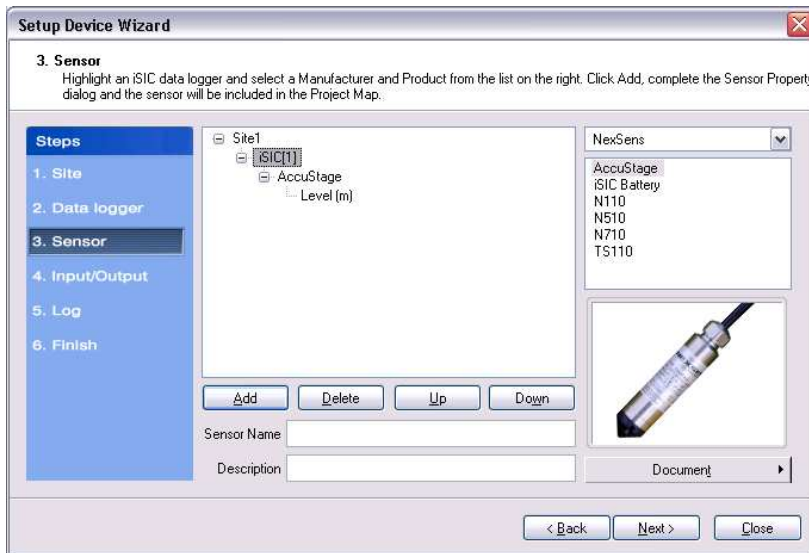


The **Sensor Properties** dialog box will come on the screen. Enter the address of the sensor and click OK. The default address of every Accustage sensor is 250. Unless more than one sensor will be using the RS485 bus, it is recommended that the address be left as 250.



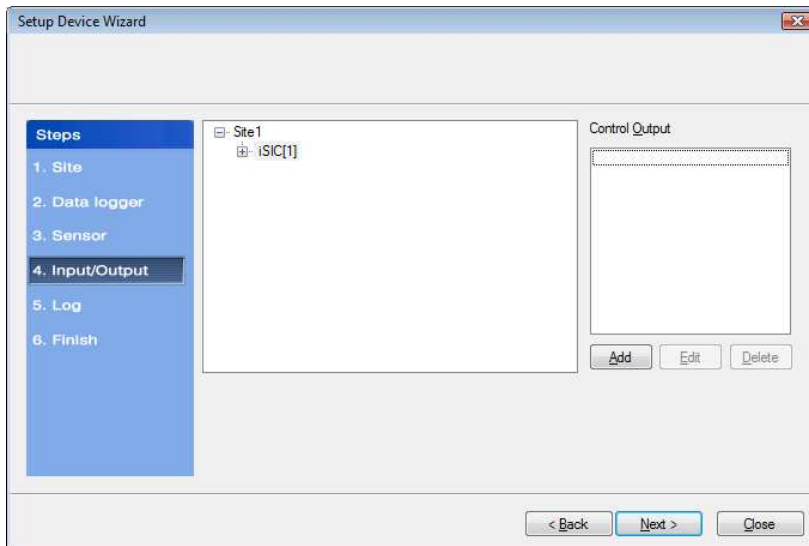
Note: not exactly sure if your settings are correct? Click the **Test Port** button to test communication.

Click **OK** and the sensor will be added to the selected data logger. More sensors can be added at this time by selecting the sensor manufacturer and then sensor model number from the drop down menu on the right. Click **Next** when finished adding sensors.



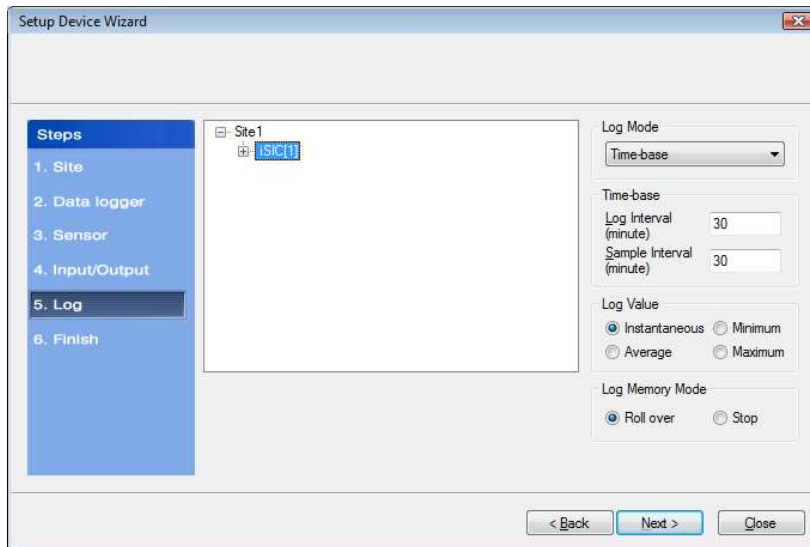
Step 4 – Input/Output

Enable any output and control features of the data logger. See the *iSIC* manual, section ***iSIC Controls*** for more information on this functionality.



Step 5 – Log

Select each data logger from the site list and enter the desired **Log Interval** and **Sample Interval** for the data logger in the **Interval** section. In the **Log Value** section, select how the data logger should log data points.



Log Mode

The Log Mode controls when data is logged by an iSIC. In **Time-base** (the default and most common), data is logged at a specified interval, controlled in the **Time-base** section. In **Event-base** log mode, data is only logged when a ground pulse is sent to the Rain input pin on the iSIC digital terminal strip (such as from the contact closure of a tipping bucket rain gauge).

Log Value

By default, the **Sample Interval** and **Log Interval** are equal. When a sampling interval is different than the log interval, all the sampled measurements for the iSIC are used to calculate the average, minimum, or maximum of that logging interval (based on the log type selected, only one can be selected at a time). The individual data points that comprise the samples are not saved; only the final, average, minimum or maximum data point is saved at the specified log interval.

Log Memory Mode

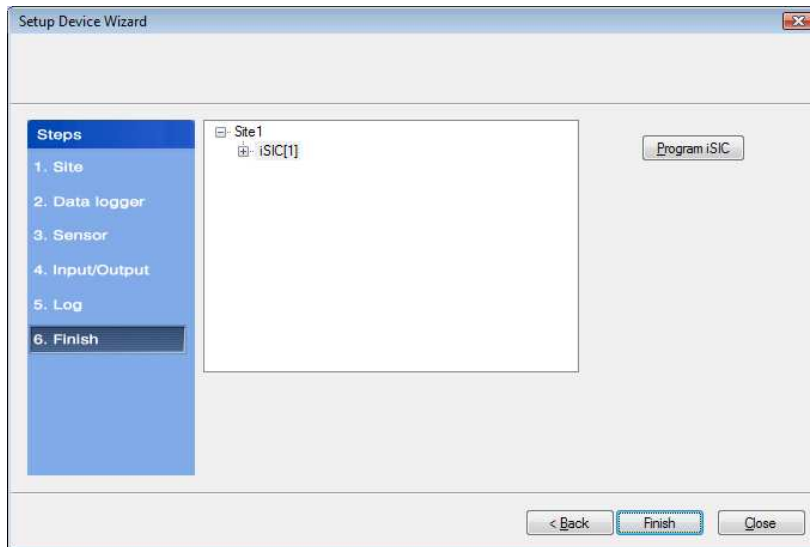
The default memory mode is **Roll over**, and is the recommended operating mode. In this mode, the last ~150K readings (when using 512K flash) will be stored in iSIC memory. When the iSIC memory has filled with readings it will “roll over” the original readings and keep logging. This is ideal for real time applications, where data is being uploaded to a PC as

In **Stop** memory mode, the first ~150K readings (when using 512K flash) will be stored in the iSIC memory. When the iSIC memory has filled with readings, it will stop logging until memory is cleared. When operating in this mode, it is recommended that memory is cleared every time data is uploaded.

Step 6 – Finish

All data loggers and sensors must be programmed before data collection can begin.

- Select an iSIC data logger and click the '**Program iSIC**' button. Before programming an iSIC:
 - The iSIC must be powered and connected to the computer.
 - The 2100-iSIC must be powered and connected to a phone line.
 - The 3100-iSIC must be powered and have a cellular data account.
 - The 4100-iSIC must be powered and be able to communicate to the computer through a 4100-base or 4200-iSIC
 - The 5100-iSIC must be powered and be able to communicate to the computer over Ethernet.
- Click **Finish** when programming is complete.



This wizard can always be revisited by selecting **Project | Setup Device Wizard** if you would like to program an iSIC at a later time or need to setup other sites, data loggers, and sensors.

Step 7 – Retrieve an Initial Data Set and Use the Instrument Within iChart

After your sensor has been added to the database, the main instrument control screen will appear. Wait until the sample interval period of time has gone by and click Interrogate to retrieve the first data set.