



1328 Parkway Court • Beaver Creek • OH • 45432
Phone: (937) 426-2703 • Fax: (937) 426-1125 • E-Mail: info@NexSens.com
Visit us on the web at <http://www.NexSens.com>

**Generic Modbus RTU
RS232/RS485
Sensor Interface Manual
Revision 08.01.27**

Table of Contents

Keeping iChart Up to Date.....	1
Wiring.....	2
Adding to iChart.....	4

About NexSens Technology, Inc.

NexSens software and real-time data logging systems are designed to simplify the setup and operation of environmental monitoring networks. NexSens products automate much of the tedious programming, data collection, and manual data processing common with other systems.

iChart is an easy-to-learn, easy-to-use Windows-based software program designed to interface with the industry's most popular environmental monitoring sensors and systems. A large multi-vendor instrument library makes setup quick and easy. iChart automates much of the tedious programming, data collection and manual data processing common with other environmental data collection systems.

The NexSens iSIC (Intelligent Sensor Interface and Control) is a state-of-the-art line of data loggers that simplify the collection of real-time data from environmental sensors and monitoring instruments. The iSIC data logger supports multi-vendor sensor connections and is designed for environmental data monitoring with NexSens communication equipment and software.

How to Use This Manual

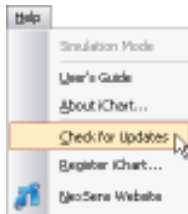
This manual is designed to provide you with detailed instructions for interfacing specific sensors to the NexSens iSIC data logger.

This manual provides you with all the information needed to interface your sensor with the iSIC data logger. For advanced system and sensor reference material:

- Review the material in the iSIC operations manual:
 - <http://www.nexsens.com/support/manuals.htm>
- Review the sensor manufacturer's operations manual. This information should have been provided with the purchase of the sensor. This material can also typically be found at the instrument manufacturer's website. If you are still having difficulty, email your technical support question to:
support@nexsens.com

Keeping iChart Up to Date

NexSens periodically releases new versions of iChart software and iSIC firmware to be downloaded free of charge. The updated versions typically add new features, improve existing features, and/or add more reliability to the system. It is important that iChart is updated to the latest version before connecting a new sensor to your iSIC data logger. Your computer will require internet access to update automatically.

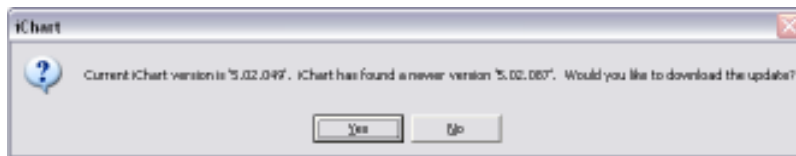


To obtain the latest version of iChart software, open the program on your computer. In the **Help** menu, select **Check for Updates**.

If your software is up to date, iChart will confirm that your computer is running the current software release.



If a newer version of iChart is available, a dialog box will appear asking if you would like to upgrade to download the update.



Click **Yes**. iChart will begin downloading the update.

Note: Depending on your connection speed, this update may take a few minutes. You can continue running other applications on your computer while the download is progressing.



When the update has finished the downloading process, click **OK** and close iChart.

Reopen iChart. When the program opens, iChart will automatically begin the installation process. Follow the step-by-step installation windows to complete the iChart software update.

Note: If an internet connection is unavailable on the computer, iChart can be downloaded onto another computer and then moved to the computer where it needs installed. The latest version of iChart can be downloaded here:

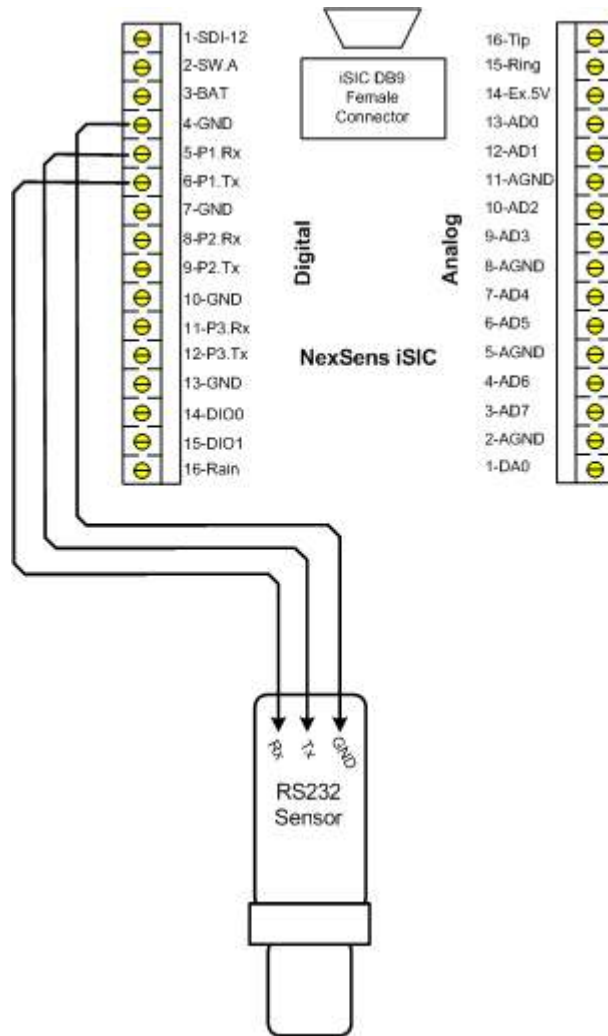
<http://www.nexsens.com/support/downloads.htm>

Wiring

RS232:

Three RS232 ports are available on the internal Digital terminal strip; ports 1, 2, and 3. To connect your RS232 sensor to the iSIC, open the enclosure, unscrew the correct pins on the terminal strip, and attach the wires from your sensors cable to the connector. A diagram showing the proper wiring for Port 1 is shown below:

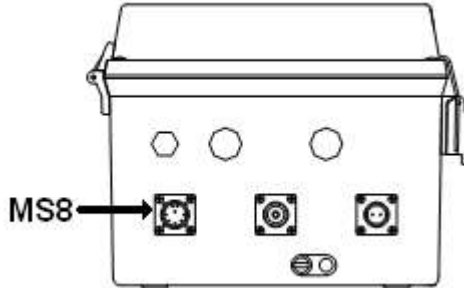
Simply connect the Rx pin of the sensor to the Tx pin on the iSIC and the Tx pin of the sensor to the Rx pin on the iSIC.



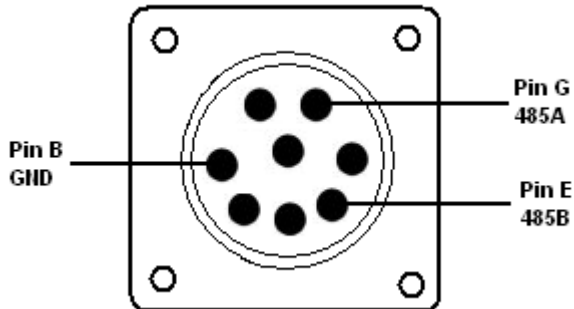
RS232 Ports 2 and 3 can be accessed through the same terminal strip. Port 2 uses pins 7 through 9, Port 3 uses pins 10 through 12. RS232 Sensors requiring a 12V power supply to operate should connect the wire for power to pin 3, BAT, on the terminal strip.

RS485:

The NexSens iSIC supports RS485 communication, up to 57600 baud*, between the data logger and a RS485 network. RS485 connections are available on the MS8 connector, located on the outside of iSIC enclosures.



MS8 Connector:



Using NexSens MS8 to flying lead cables:

Green - RS485A

Blue - RS485B

Black - GND

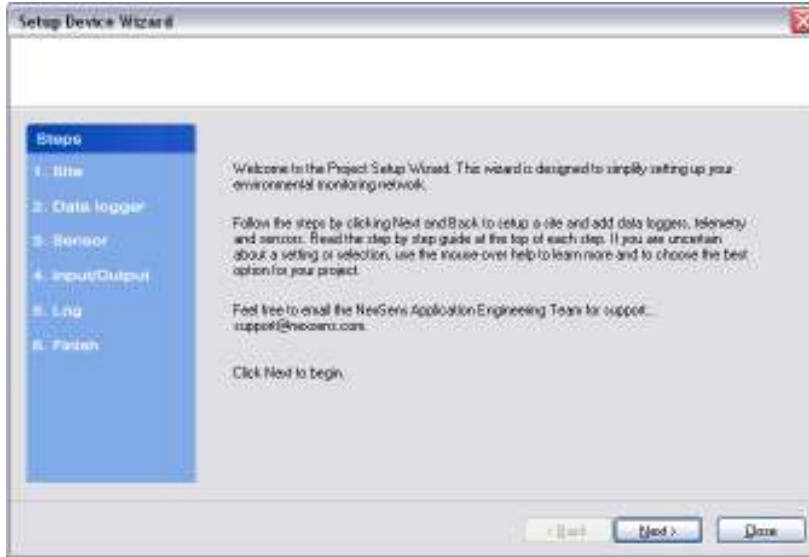
RS485 networks can connect to an RS485 iSIC using an RS485 MS8-Flying lead cable.

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**.

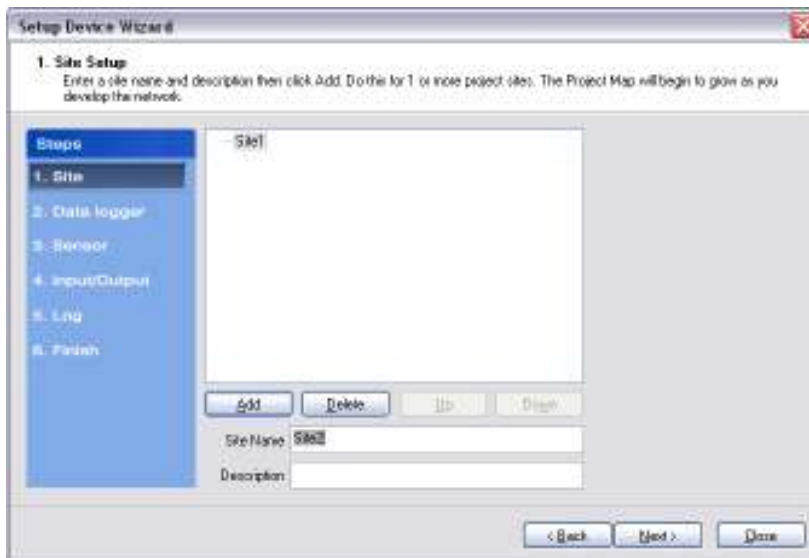
Setup Device Wizard

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



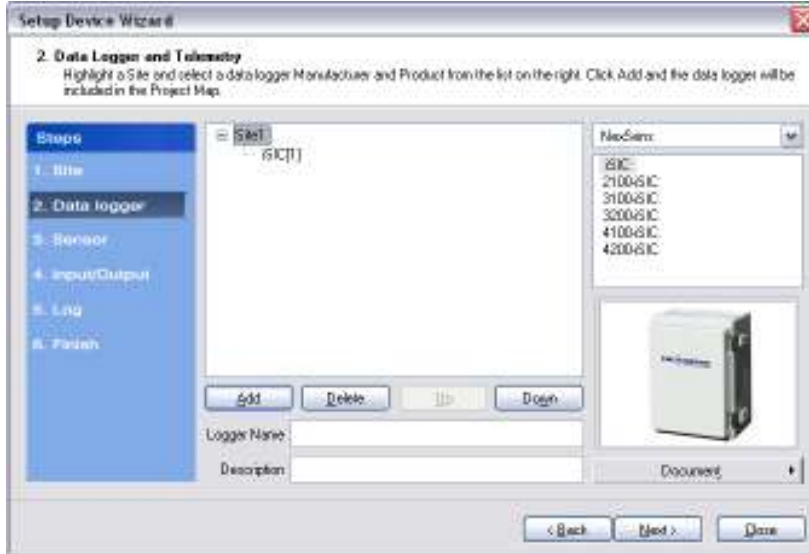
Step 1 – Site Setup

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

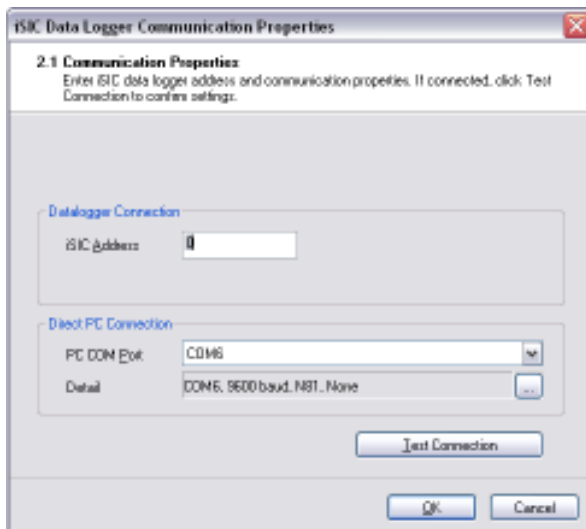
The next step is to add the data logger(s) to the sites created in the previous step. Select a site to add a data logger to. Then select the data logger model number from the list at right and click **Add** or select a data logger that has already been added from the navigation list, if simply adding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

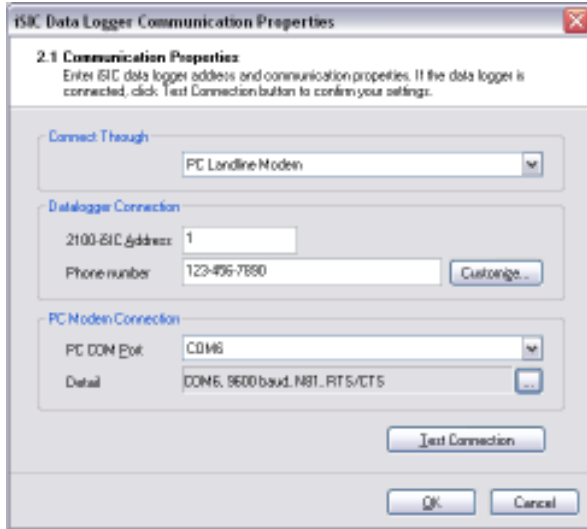
For an **iSIC** data logger, enter the iSIC address and select the PC COM Port that the data logger is connected to.

- 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.



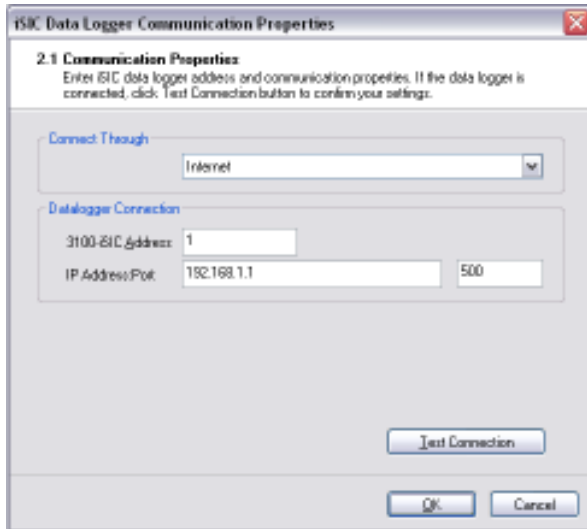
For a **2100-iSIC**, enter the 2100-iSIC address, phone number, and PC COM Port that the computer phone modem is connected to.

- 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.



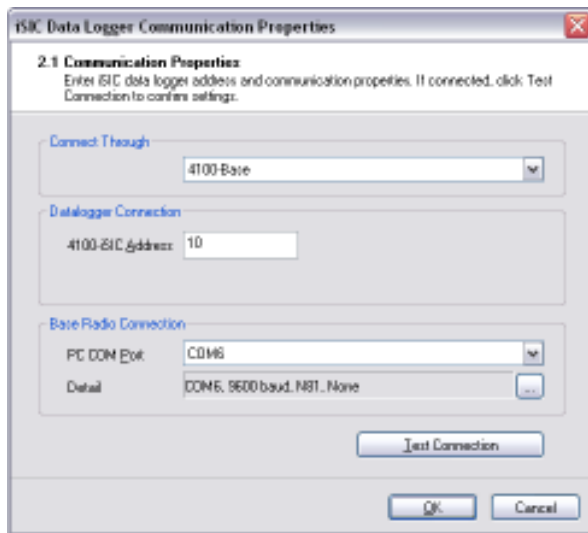
For a **3100-iSIC**, enter the 3100-iSIC address and the IP address of the data logger.

- 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).

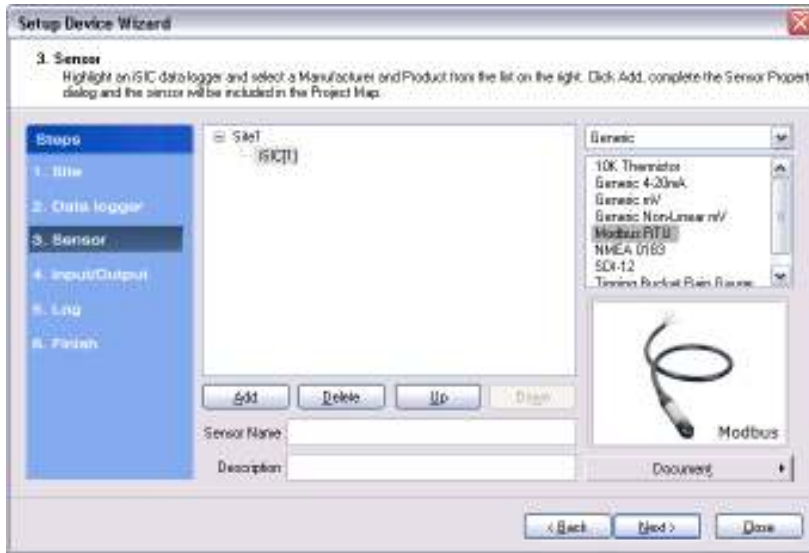


For a **4200-iSIC**, enter the iSIC address and PC COM port the data logger is connected to.

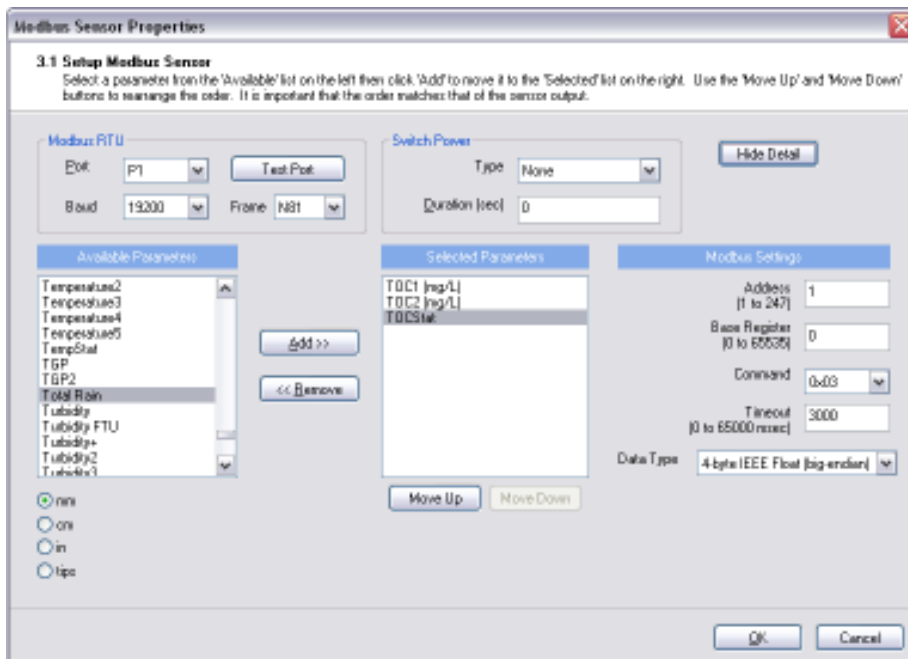
- The 4200-iSIC address is typically 250. When communicating with a 4200-iSIC, any communication using the 4200-iSIC address will be sent to the 4200-iSIC data logger.
 - Communications using any other address will be broadcast to any 4100-iSIC(s) in your radio network.
- **Note:** Do not use address '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 **Generic** from the drop-down list of manufacturers. Then select the **Modbus RTU** model number associated with your device and click **Add**.



The **Sensor Properties** dialog box will come on the screen. Click the **Show Detail** button and then fill in the sensor specific Modbus information from the drop menus provided:



Note: not exactly sure if your settings are correct? Click the **Test Port** button to test communication. However, make sure that the settings selected match your sensor documentation. These settings can be changed at a later time.

Modbus RTU:

- **Port:**
 - The iSIC port the Modbus sensor is connected to. Select **RS-485** if using an RS485 Modbus sensor.
- **Baud:**
 - Select the baud rate the sensor communicates at. Options are 9600 or 19200.
- **Frame:**
 - Select the way the data is framed from the sensor. Options are N81, E81 or O81, corresponding with either No, Even or Odd parity, 8 data bits, 1 stop bit.

Switch Power:

- Can be left at **None** unless pin SW.A on the digital green terminal strip is used to power the Modbus sensor.

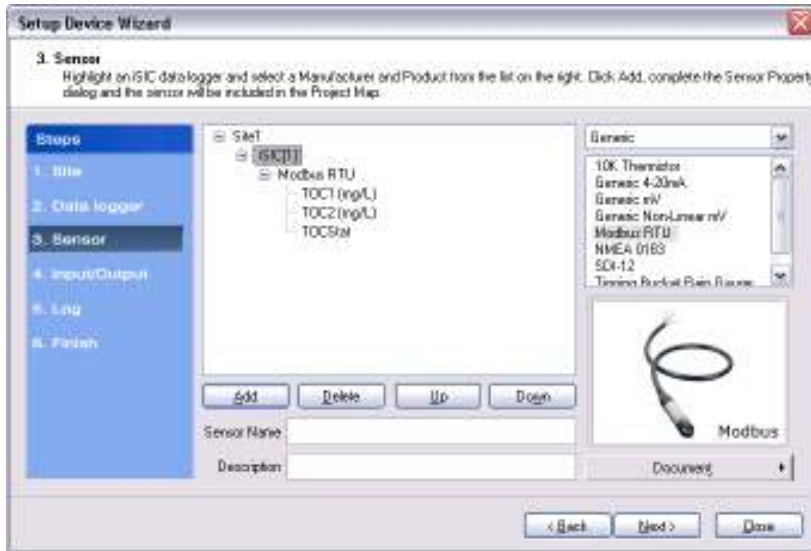
Available Parameters / Selected Parameters:

- From the **Available Parameters** list, select the appropriate parameter and unit of measurement in the order they are stored on the Modbus sensor and then click **Add**. If a particular parameter is not available in the list, select the "Parm" parameters. The name and unit can be changed after the database has been created.

Modbus Settings:

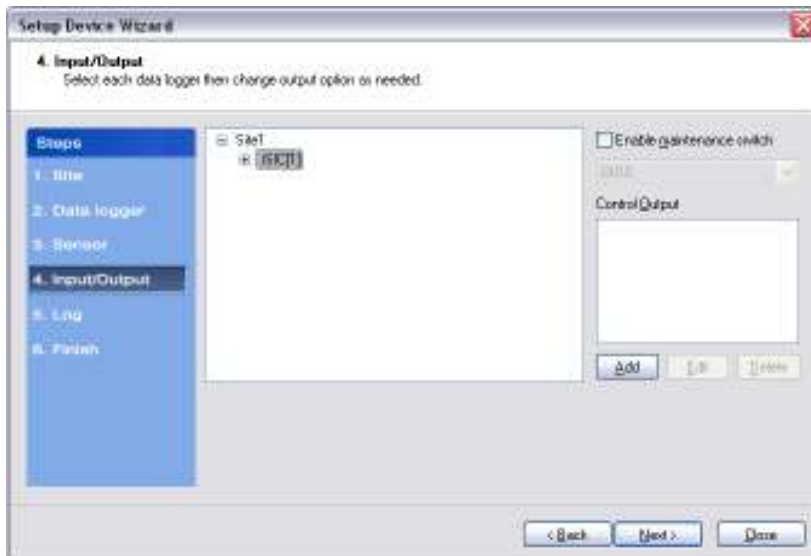
- **Address:**
 - The Modbus sensor address. This address can be set from 1 to 247 and should be preset on the device before hand.
- **Base Register:**
 - This is the base register address of the parameters the iSIC should retrieve from the sensor.
- **Command:**
 - This is the command used to retrieve data from the sensor. Based on the Modbus protocol, 0x03 is for reading holding registers. 0x04 is for reading input registers.
- **Timeout:**
 - Unless otherwise known for the specific sensor being used, the default time out of 3000 milli-seconds should be sufficient
- **Data Type:**
 - Select the type of data that is stored on the sensor. Options include 2-byte integer, 4-byte integer, and 4-byte IEEE float.

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.



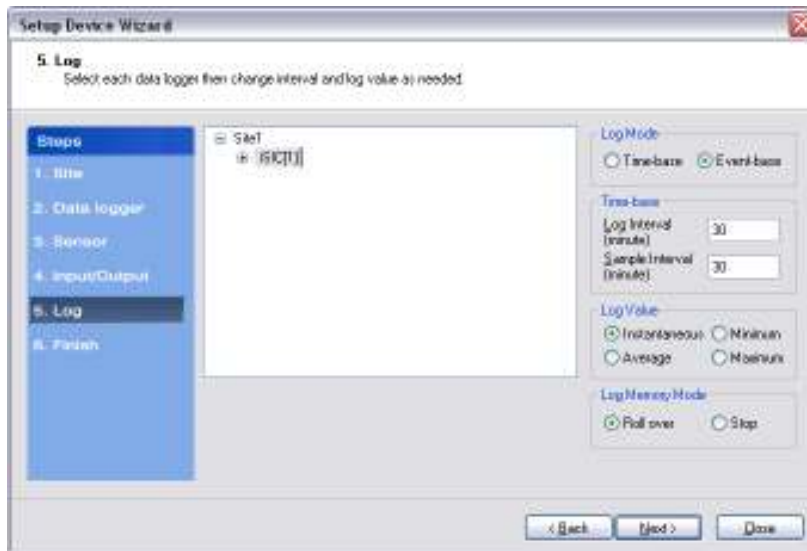
Step 4 – Input/Output

Enable any output and control features of the data logger. See the iSIC manual, section **4.4.2 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-based** 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.