# NXIC CTD

## Quick Start Reference

## Introduction to the Calibration of External PH and Turbidity Sensors

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**Rev 2**

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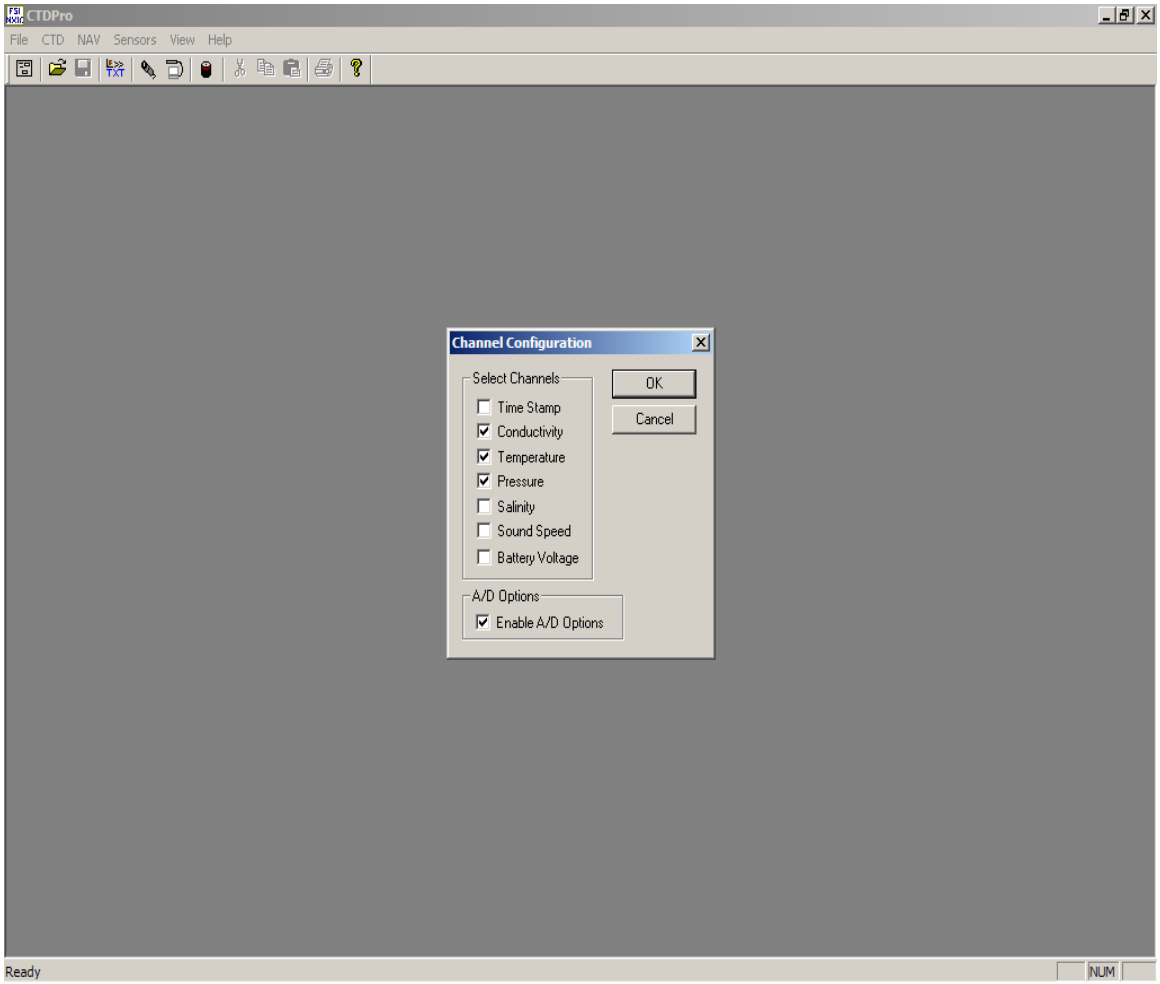
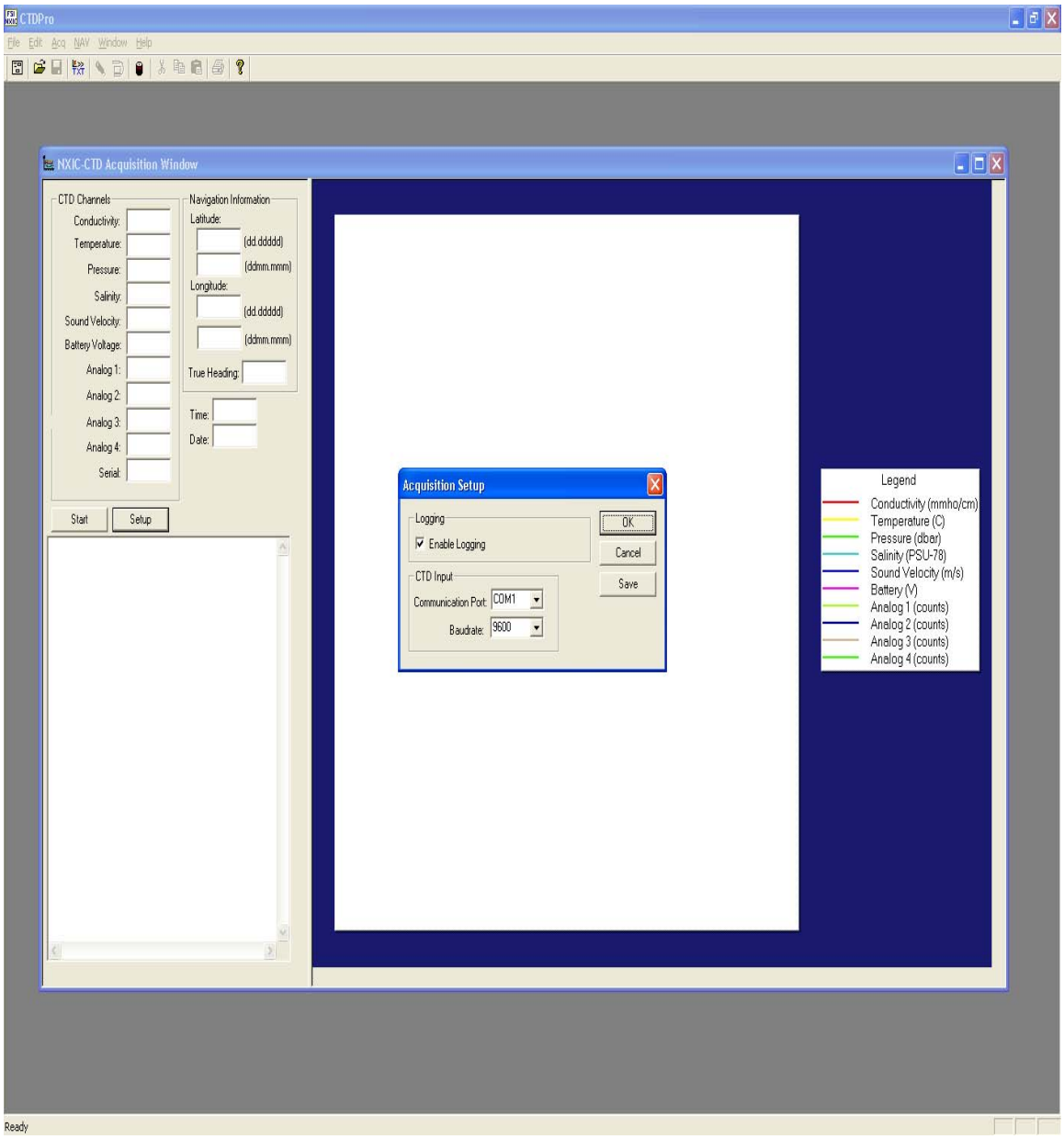
Congratulations on the purchase of your Falmouth Scientific NXIC CTD with integrated external sensors. Included with this shipment is the manual for the NXIC CTD as well as the manual from the vendor of the OEM external sensor. Please reference these manuals for any specific topics of interest. This application note is written as an introduction to CTD PRO and can be used as a reference tool. Through a series of screen captures, deployments and data retrievals will be shown. Lastly, a series of screen captures will guide the user through a typical calibration of a turbidity and pH sensor.

## Acquisition Mode:

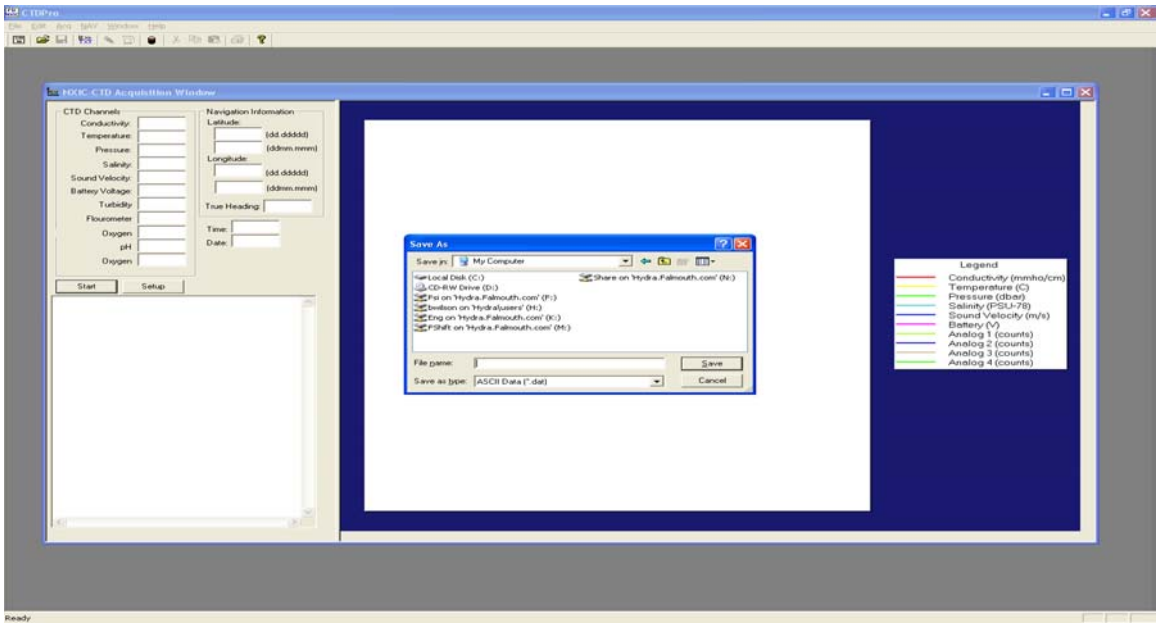
This mode is intended for use when the instrument is interfaced to a cable and being used for real time data acquisition. Select the desired channels via CTD-Channels in the menu bar.



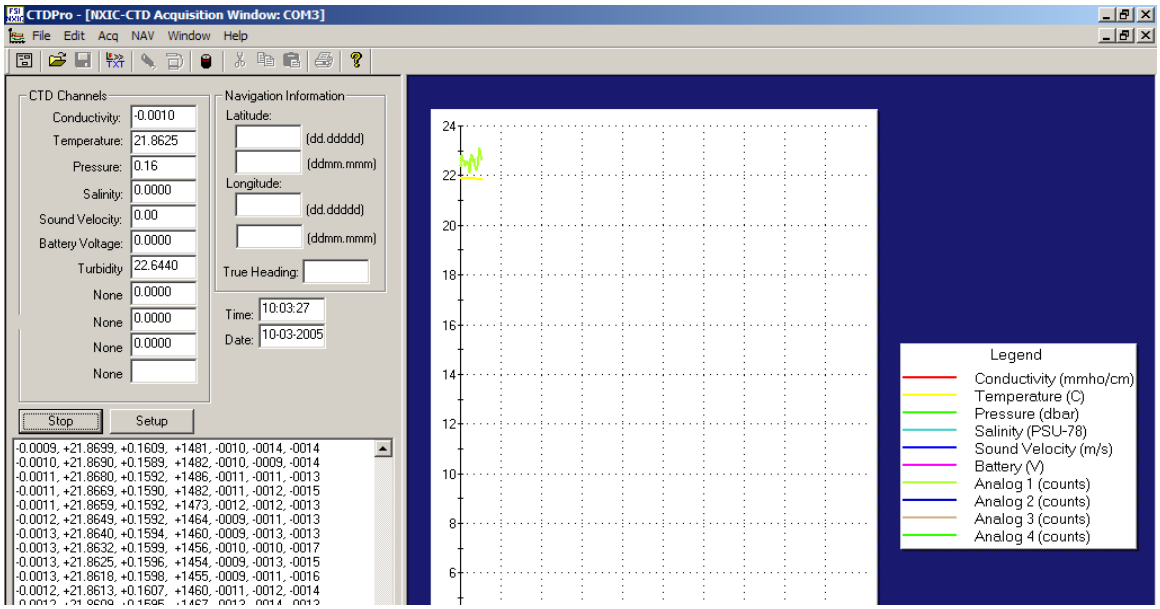
Select the desired channels and click the OK button. Now select CTD-Acquisition and the following window will be displayed.



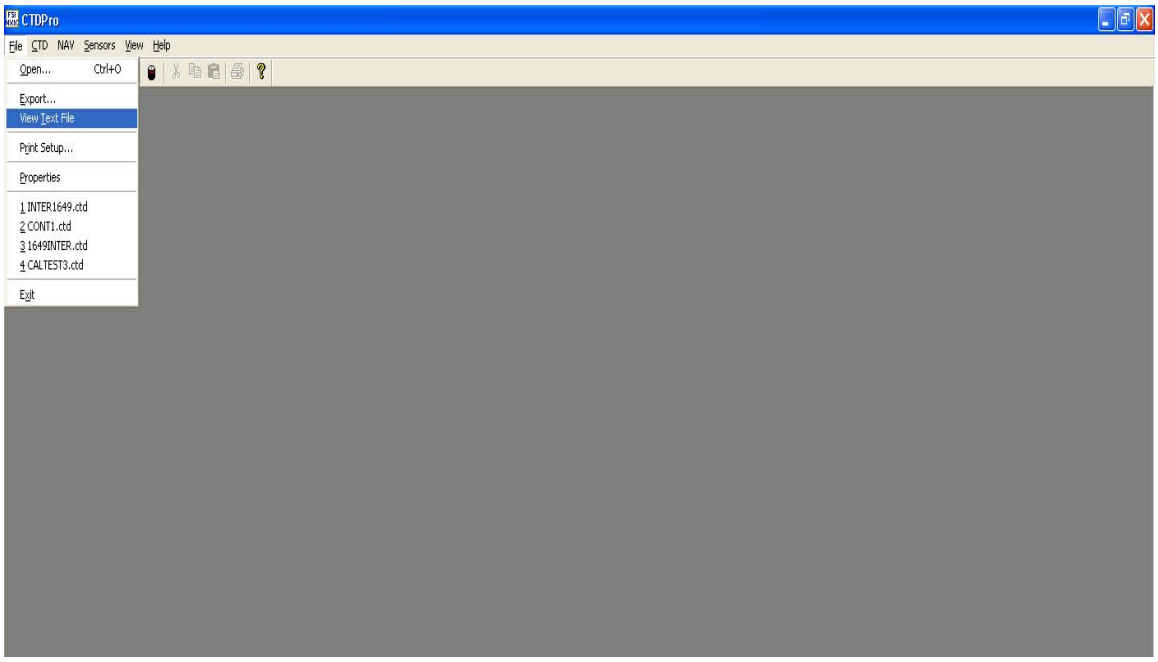

Selecting the setup button will launch the Acquisition Setup window. To log data to the hard drive select enable logging. The Comm Port and baud rate should agree with your settings. Select OK and you will be prompted to save a file.



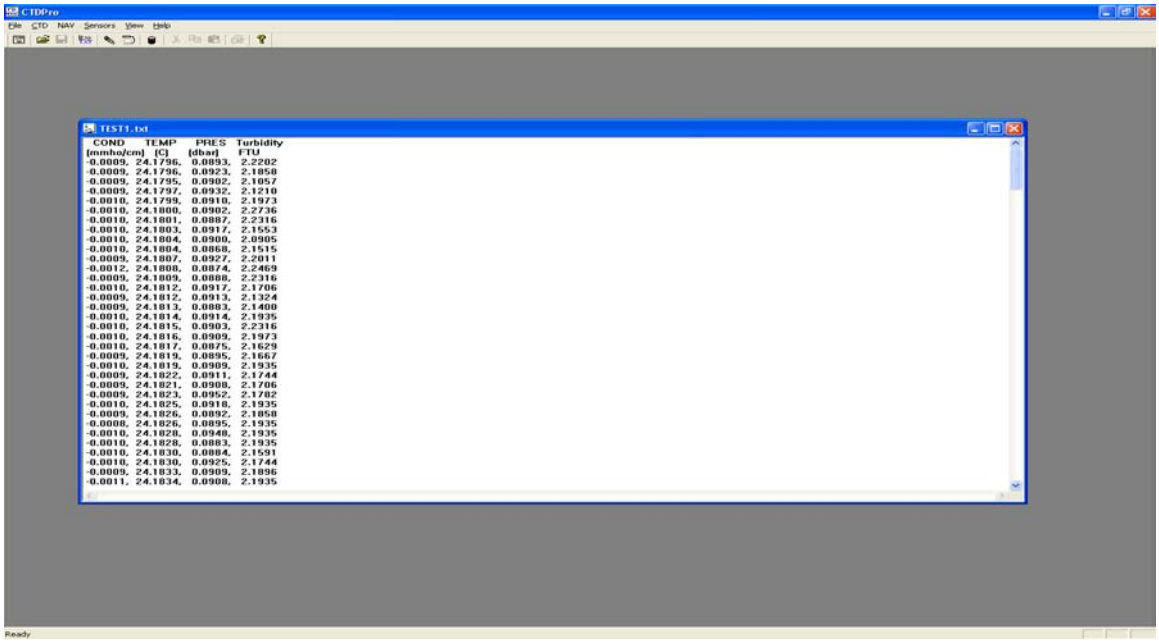
After the file path has been selected choose save. Data will now be shown in the CTD Channels window. If navigation information is being interfaced via another Comm port it will be shown in the Latitude and Longitude placeholders. Time and Date information will be displayed. Data will also be scrolling vertically in the lower left window and will be plotting left to right in the graphical presentation. Consult the manual for specific set up procedures.



To end the file and stop the acquisition of data, select the stop button. Now go to File-View text file- to view the data file.

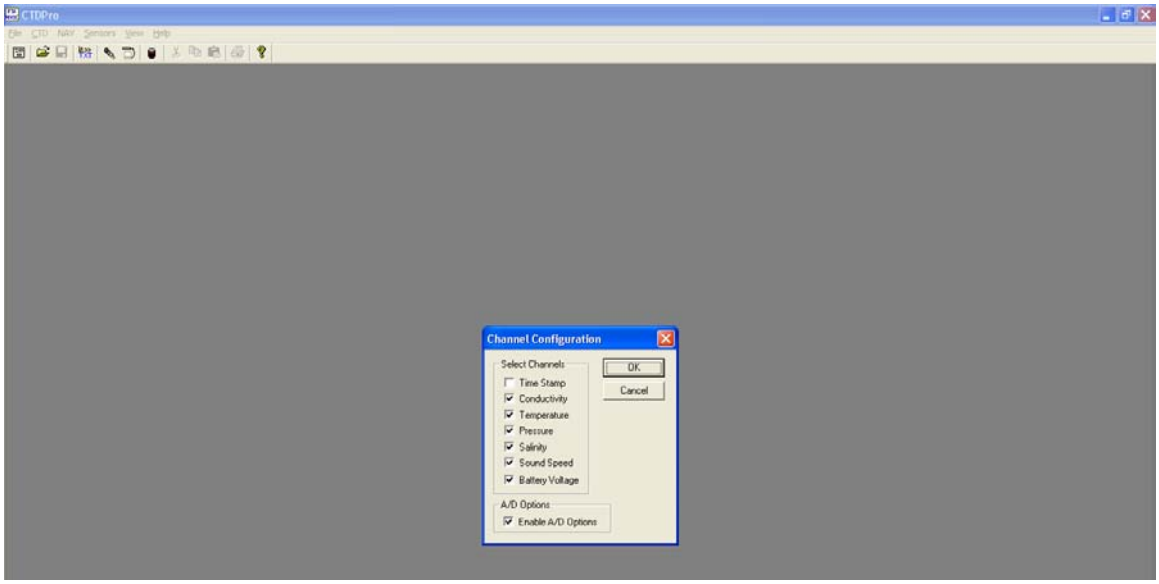



The following data will be shown as the text file.

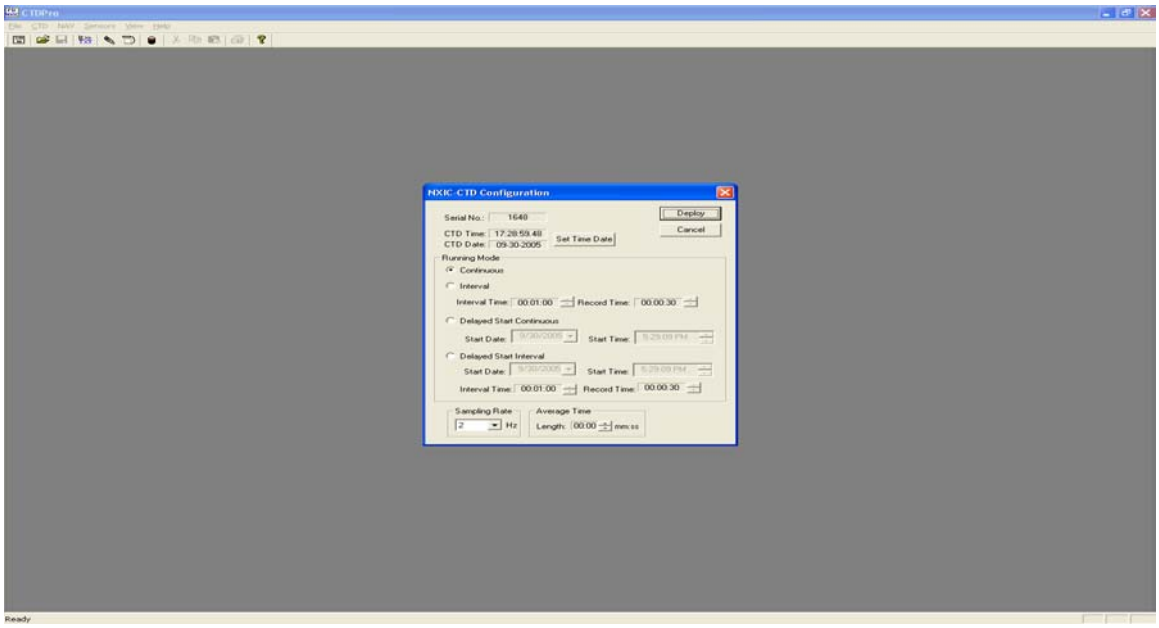


## Deployment Mode:

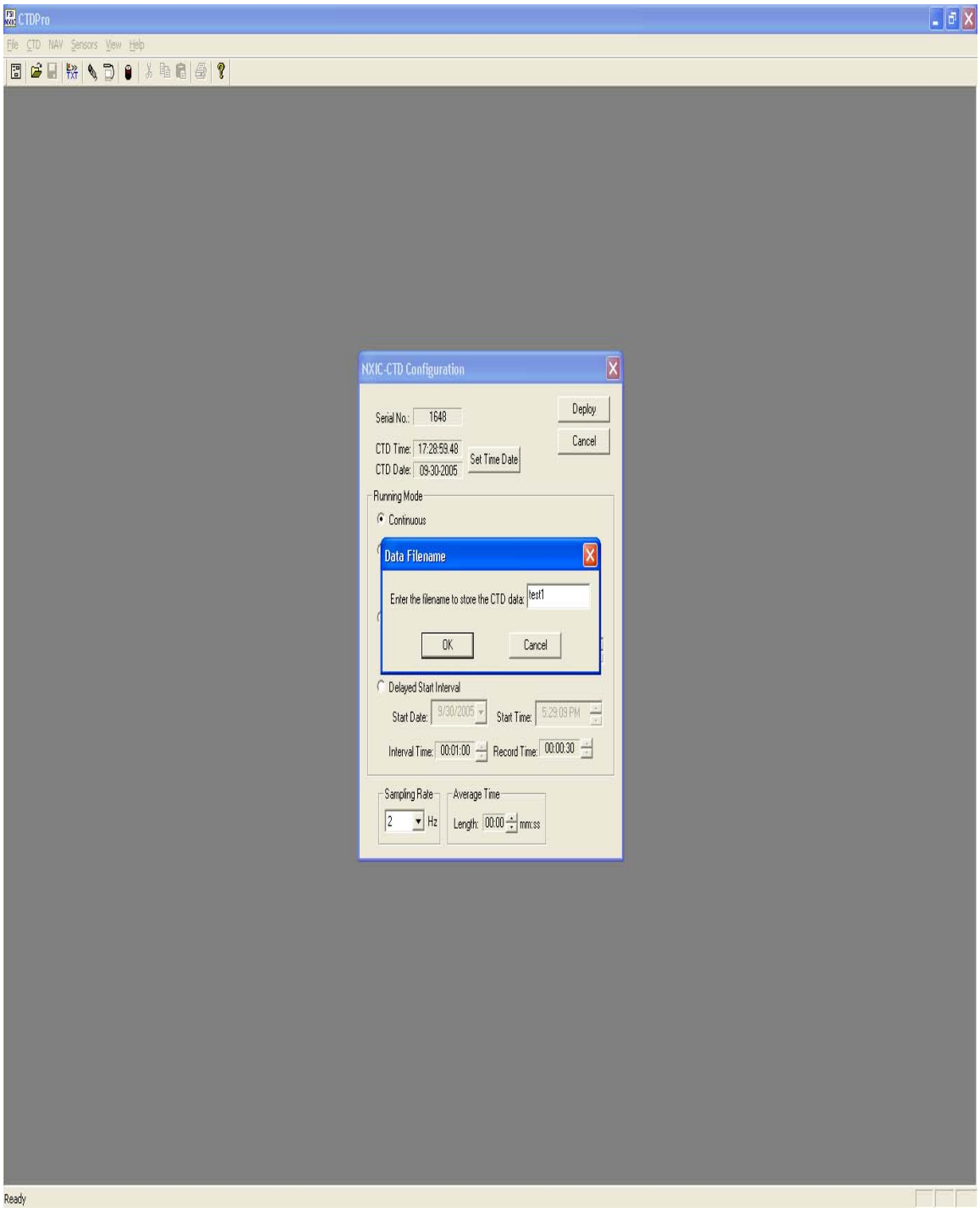
Your CTD can be deployed writing to its internal memory. Select the desired channels via CTD-Channels in the menu bar.



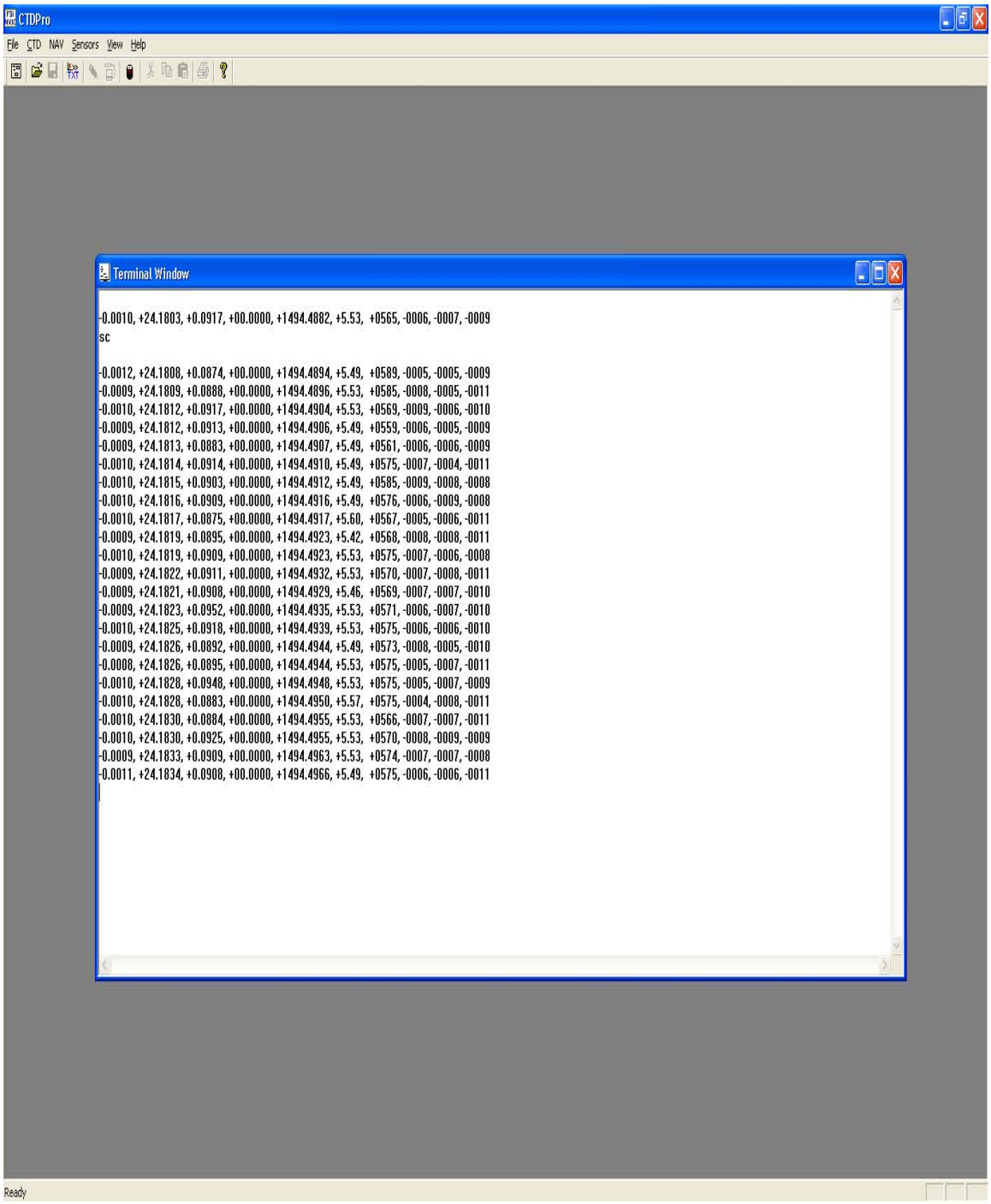

Now go to CTD-Configure and deploy.



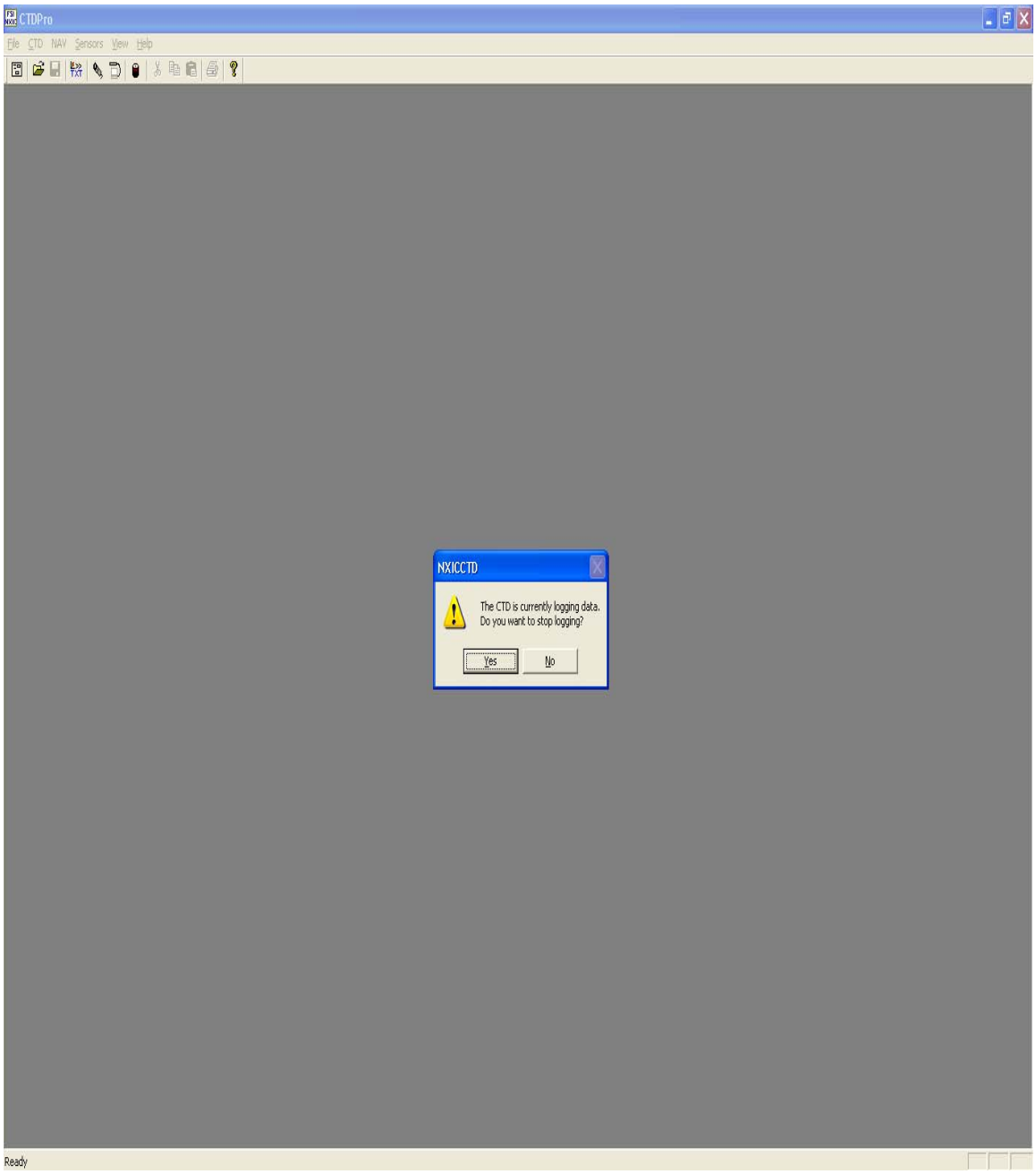
Set up the instrument to the desired configuration and deploy the CTD saving the file. Reference the manual for specific setup instructions.



The instrument is now running. Confirmation can be confirmed through the View-Terminal selection.

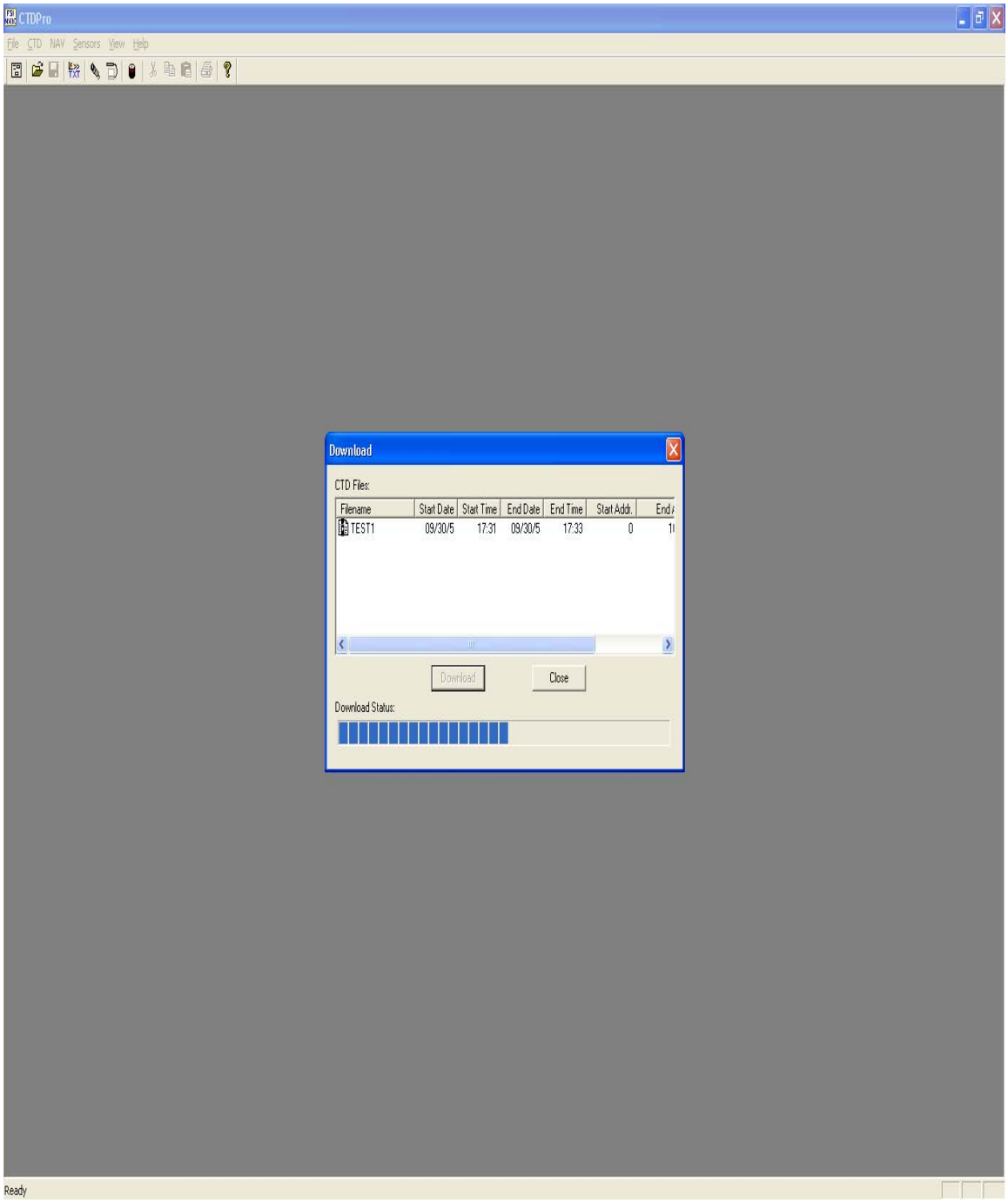


To stop the instrument from recording to memory select CTD-Memory-View files. You will be prompted with the following message. Select yes to stop logging.

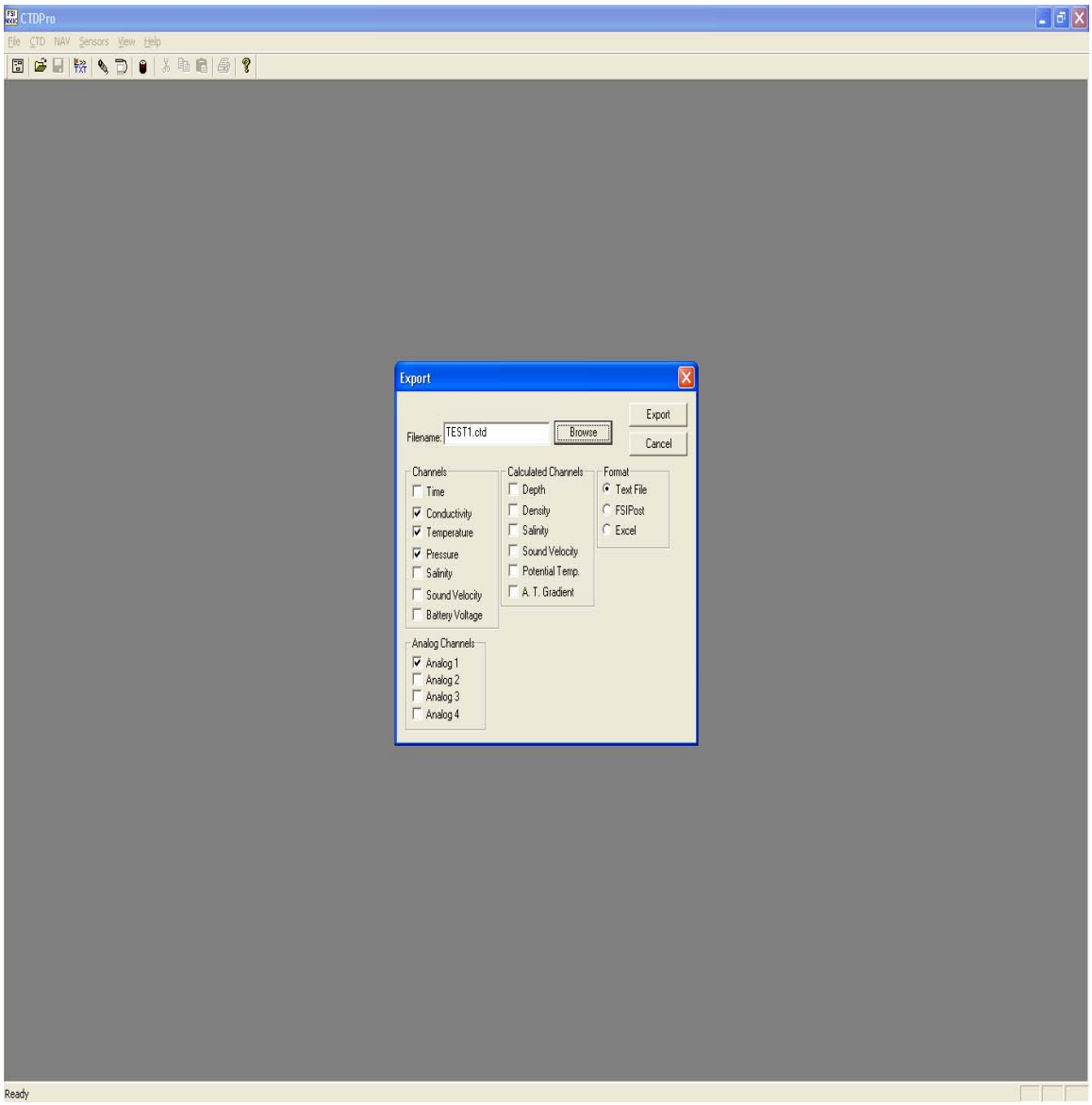



Select Yes to stop logging.

Highlight the specific file and select download to transfer the binary file from the instruments memory to the working directory on the computer. This file will have a .ctd extension.



After the download you can open the .ctd file and present the data in CTD PRO or export the .ctd file as a .txt file via the File-Export path. To export the file, select the .ctd file using the browse button. Select from the Channels, Analog Channels, Calculated Channels, and Format for the exported file. The text file will be written to your working directory with a .txt extension.



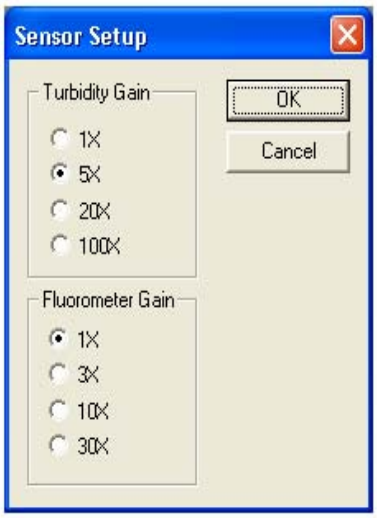

The exported text file can be opened via the File-View text file path.

The following calibration procedure has been written to assist in calibrating the Seapoint Turbidity sensors integrated to the NXIC CTD's. Please reference the manual from Seapoint Sensors for any specific topics of interest.

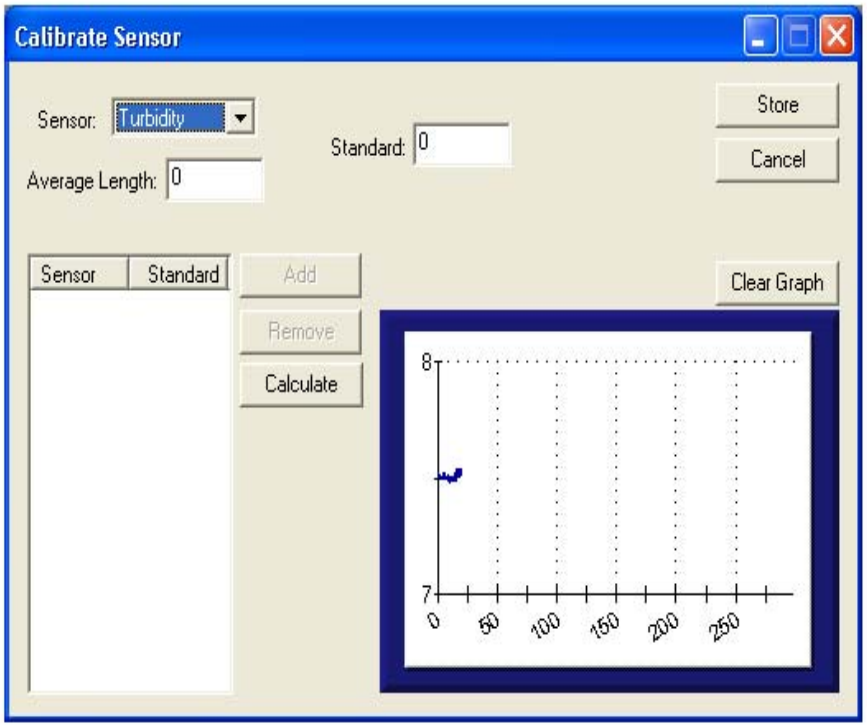
The website for Seapoint Sensors is: http://www.seapoint.com/

# Calibration Procedure for the NXIC Turbidity Sensors

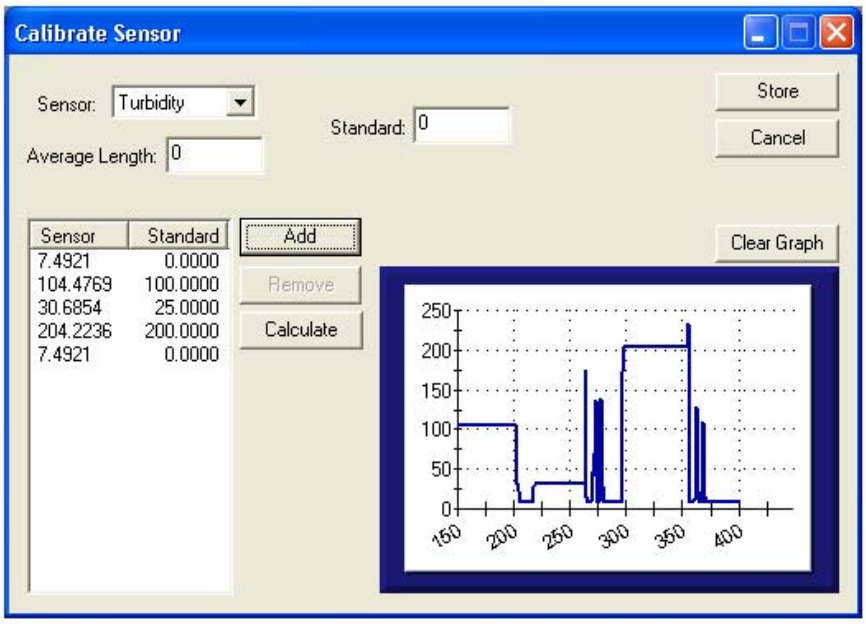
1) Open CTD Pro
2) Select Sensors from the menu bar.
3) Select Setup to select the preferred gain.
4) Select the preferred Turbidity Gain:
   1X, 5X, 20X, or 100X.



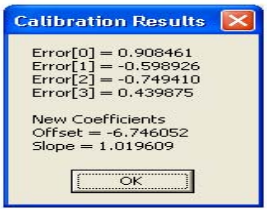

5) Close the window by selecting the OK button.
6) Select Sensors again and select "Calibrate".




7) In the sensor selection window select Turbidity.
8) Place tape over the optical windows on the sensor and enter "0" as the standard value. (You will have to re-enter "0" to highlight the add button.) Depress the add button to add the sensor and standard data to the table. If an error is made during the entry of data, the remove button will erase the data entry. Allow the data to stabilize as much as possible before selecting the add button.
9) Clean the sensor with mild soap and water and place the turbidity sensor into the next standard. Enter the standard value in the window.
10) Repeat this process for as many data points required.

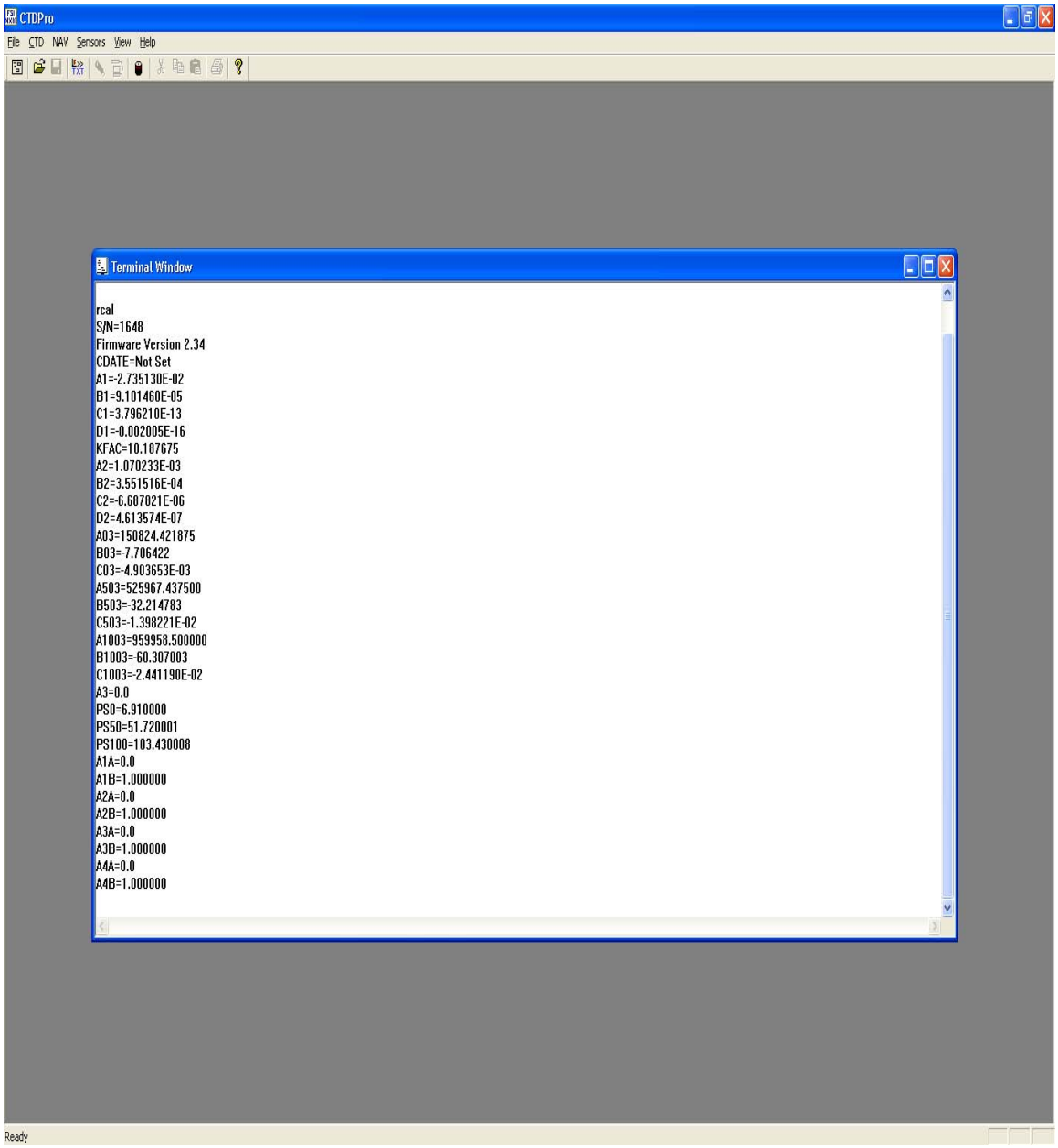



11) Select the calculate button to display the error percentages and calibration coefficients.




12) Select store to write the calibration coefficients into the NXIC CTD.

The CTD's were delivered with the offset term, A1A=0.0, and the slope term, A1B=1.000000. Via the VIEW-TERMINAL selection from the menu bar with the CTD in Open Mode the RCAL command will allow the user to view these coefficients. After the completion of the calibration procedure the corrected terms will be written to the instruments calibration file and saved. Below is a representation of that file.

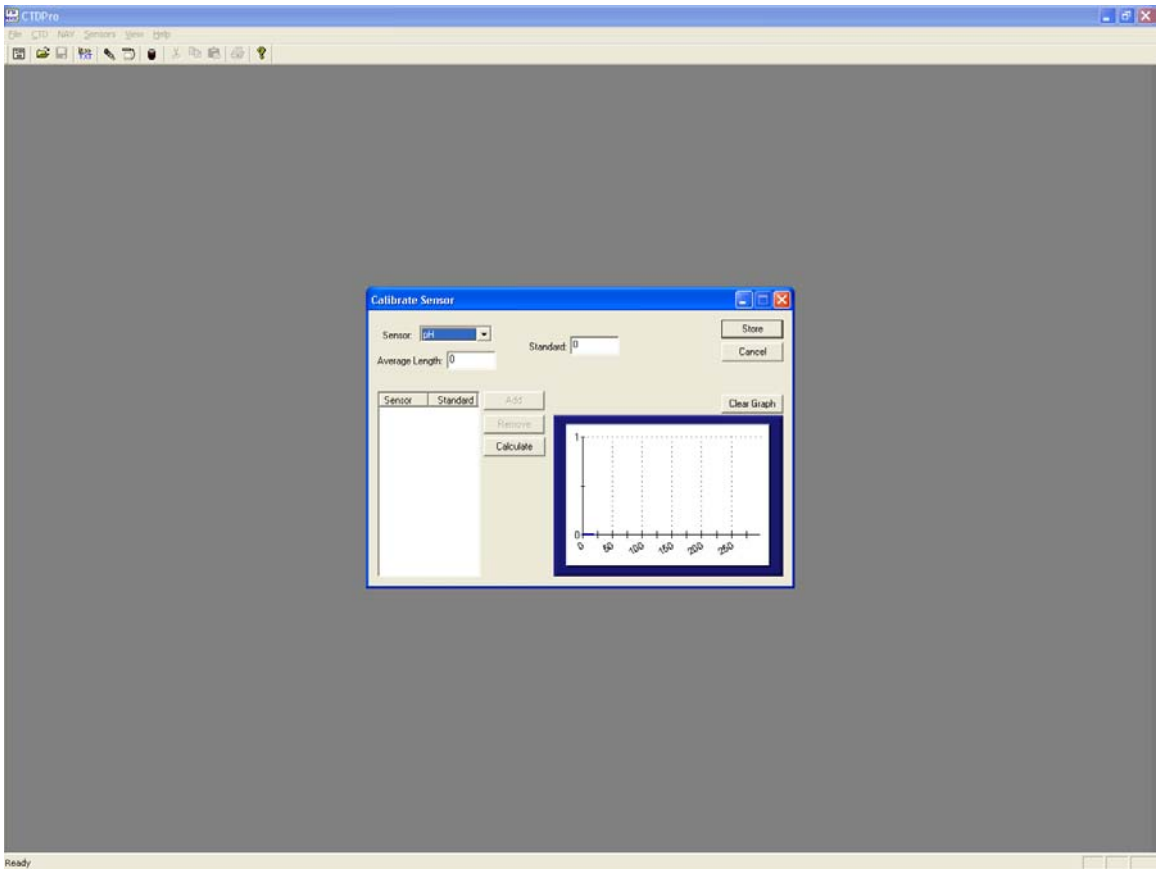


The following calibration procedure has been written to assist in calibrating the AMT pH sensor integrated to the NXIC CTD. The pH sensor was calibrated prior to the shipment using three known pH standards. Please reference the manual provided from AMT for any specific topics of interest.

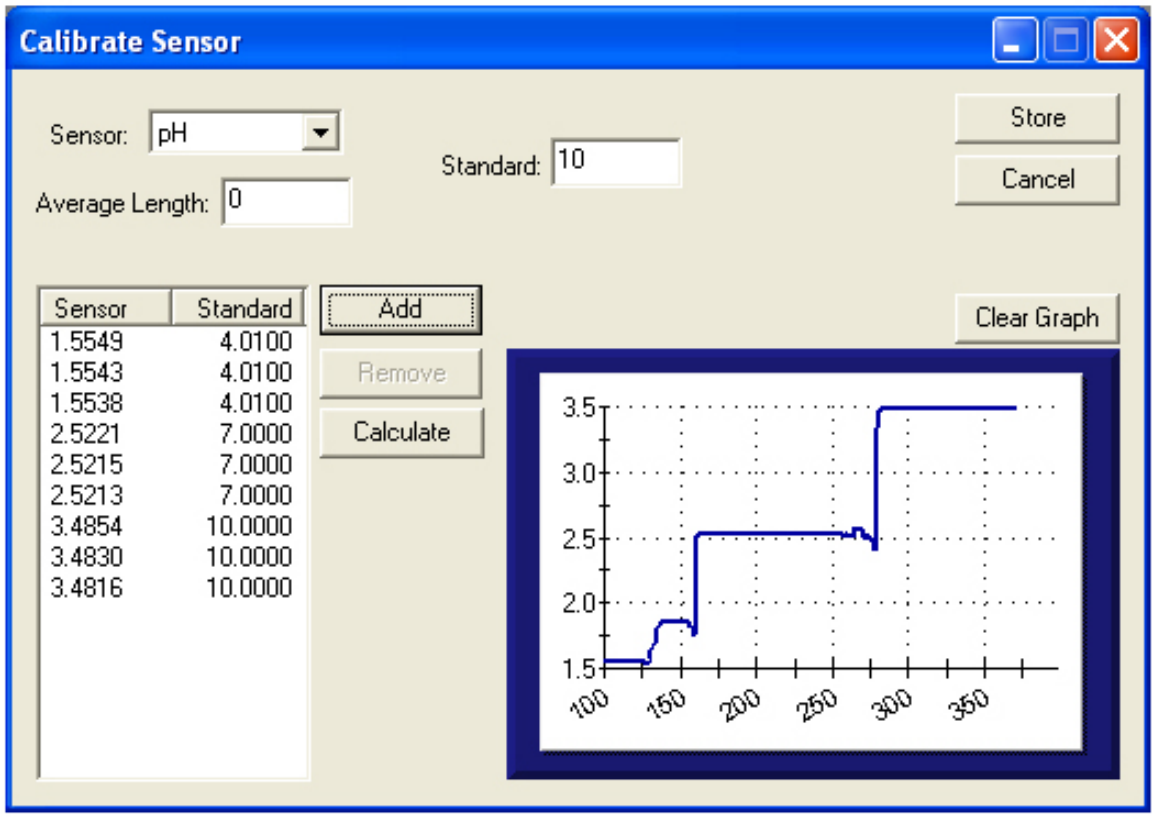
The web site address for AMT is: http://www.amt-gmbh.com/

## Calibration Procedure for the NXIC pH Sensor

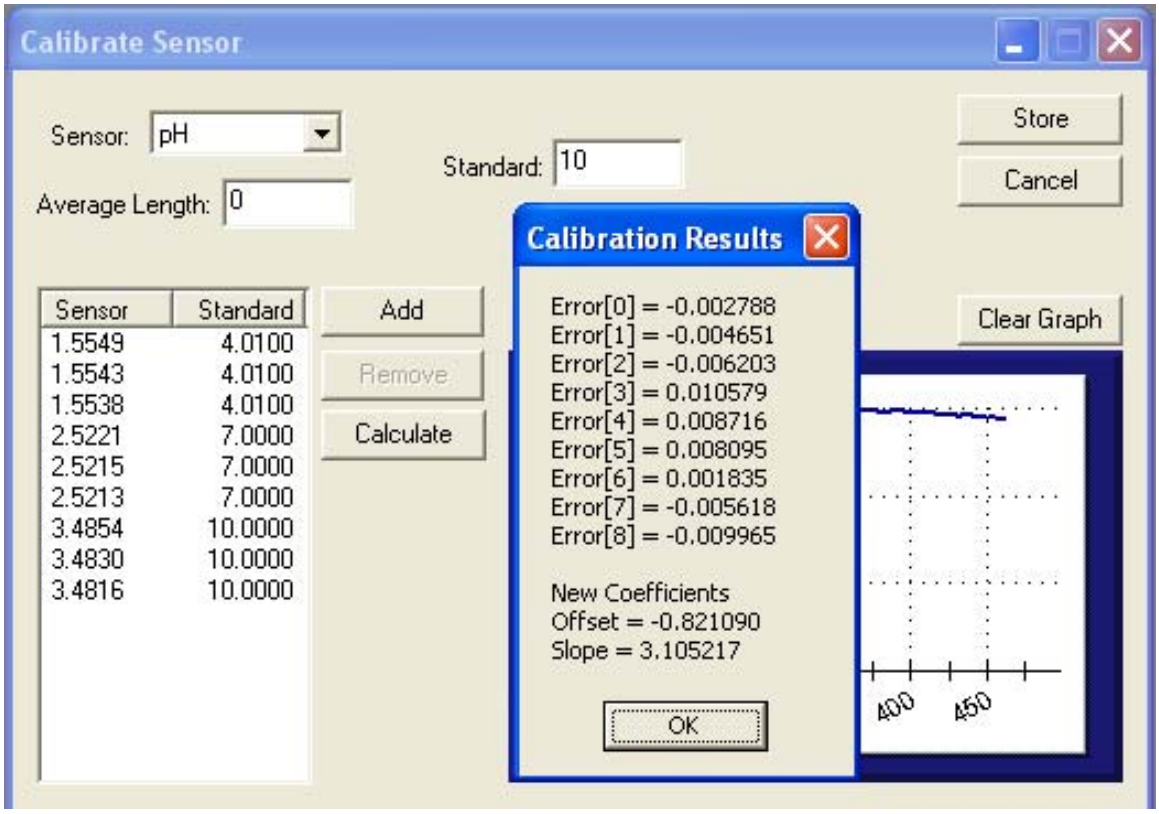
1) Open CTD Pro.
2) Select Sensors from the menu bar.
3) Select Calibrate from the sensors pull down selection.
4) Select pH in the sensor selection pull down.
5) You should observe the screen shown below.



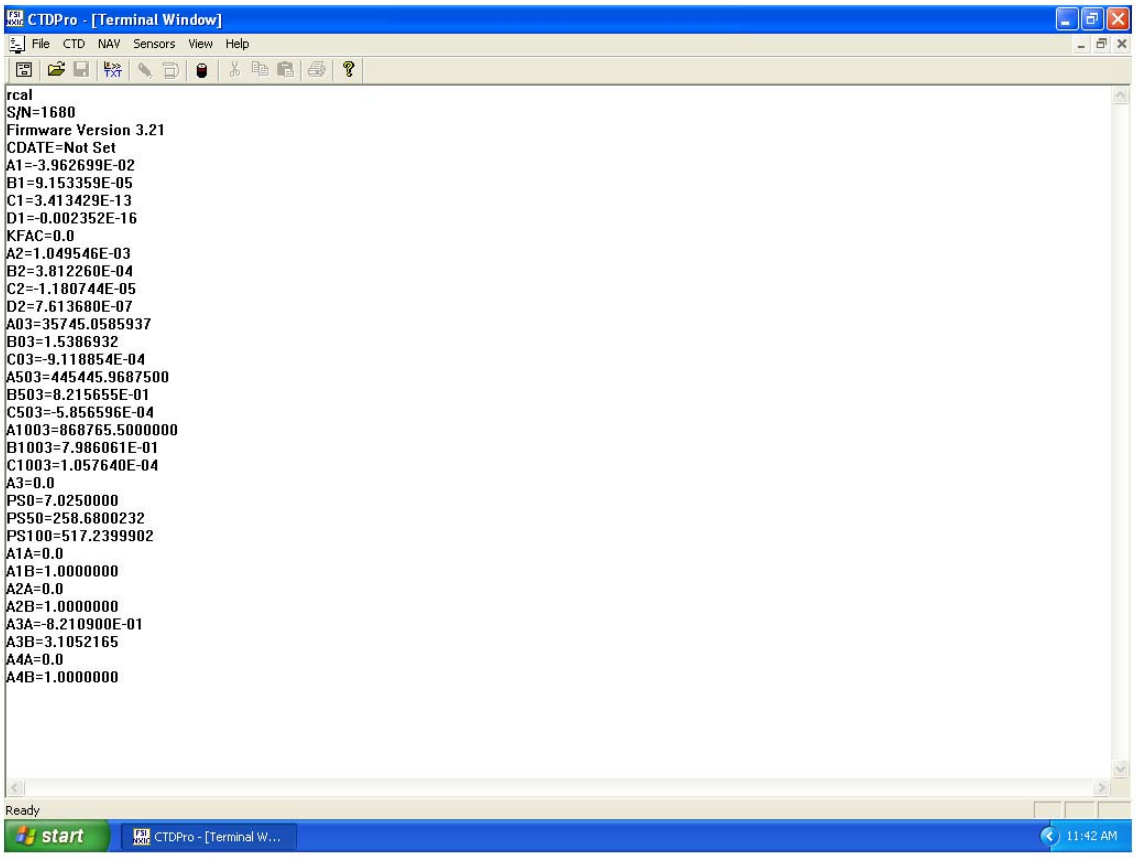
6) Remove the protective bottle from the pH sensor to expose the glass element. Be very careful not to spill the buffer. Follow the sensor manual for specific instructions.
7) Enter the standard value in the window and place the sensor into the buffer solution.
8) Depress the add button to add the sensor and standard data to the table. If an error is made during the entry of data, the remove button will erase the data entry. Allow the data to stabilize as much as possible before selecting the add button.
9) Repeat this process for as many data points required. For more specific information pertaining to the pH sensor reference to vendors manual.
10) The window below should represent the acquisition of pH data points with buffer values of 4, 7, and 10.
11) The numbers in the Y axis represent the 0-5VDC output of the pH sensor with respect to the 0-14 calculated value of pH. The X axis represents time.



12) When all of the points have been sampled and graphed select the calculate button to display the error percentages and calibration coefficients.
13) The Calibration Results display will appear as an overlay on the Calibrate Sensor window.
14) Select store to write the calibration coefficients into the NXIC CTD.



Below you can see the corrected A3A and A3B terms. Via the VIEW-TERMINAL selection from the menu bar with the CTD in Open Mode the RCAL command will allow the user to view these coefficients. After the completion of the calibration procedure the corrected terms will be written to the instruments calibration file and saved. Below is a representation of that file.



The instrument can be deployed in the Acquisition Mode as explained on page 1 of this manual. The window shown below is an example of the NXIC running in acquisition mode interfaced to a pH sensor and dissolved oxygen sensor. The pH sensor was placed into 3 different buffers with values of 4, 7, and 10 over a short time frame.

The data being displayed graphically is in units of pH vs. time. The data presented in the CTD channels window is numeric information. Each channel is labeled and the units of measure are displayed in the legend of the graph. The numeric data under the Start and Setup buttons with a value of +22841 is the 15-bit count representation of the pH sensor with a value of 10.