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MiniDOT + Extech RTH50 User's Manual

2013

miniDOT₂T



Revision History

Date	Revision Description
20-JUL-2010	Initial document

Introduction

The miniDOT Logger measures and records oxygen concentration in water. This is an absolute measurement and is simply the amount of oxygen that is dissolved into a volume of water.

In some cases it is useful to express this measurement in “saturation” terms, often in percent saturation. The saturation is the ratio of the measured value to some reference value. A common reference value is the amount of oxygen that would exist in an equilibrium contact of water measured with air at the temperature of the measurement and at the atmospheric pressure existing at the time of the measurement.

miniDOT does not have a way of sensing atmospheric pressure and so miniDOT measurements can not be expressed in saturation terms. However miniDOTPlot software allows the entry of a single pressure, which it uses together with the measurement of oxygen to produce a saturation value. Technically, this procedure is not correct since only one value of pressure is used for an entire set of measurements and since atmospheric pressure has likely varied during the period of the measurements.

PME provides a special method for determining saturation concentrations. This method depends upon an additional barometric sensor that is placed somewhere nearby the miniDOT, but out of the water and in the atmosphere. The sensor PME supports is the Extech RHT50, and inexpensive barometer costing about USD\$150.



This sensor can be obtained from PME or from various other sources.

PME provides miniDOTExtechPlot for customers using this barometer. MiniDOTExtechPlot reads miniDOT files and also files recorded by the Extech. It merges these measurements and produces plots of all and an enhanced CAT.txt file containing the merged measurements.

Operation of the miniDOT

The miniDOT is operated in the usual way as described in the miniDOT manual. There are no special requirements. The normal display program, miniDOTPlot can be used to display the data, but of course it will not support the use of the Extech.

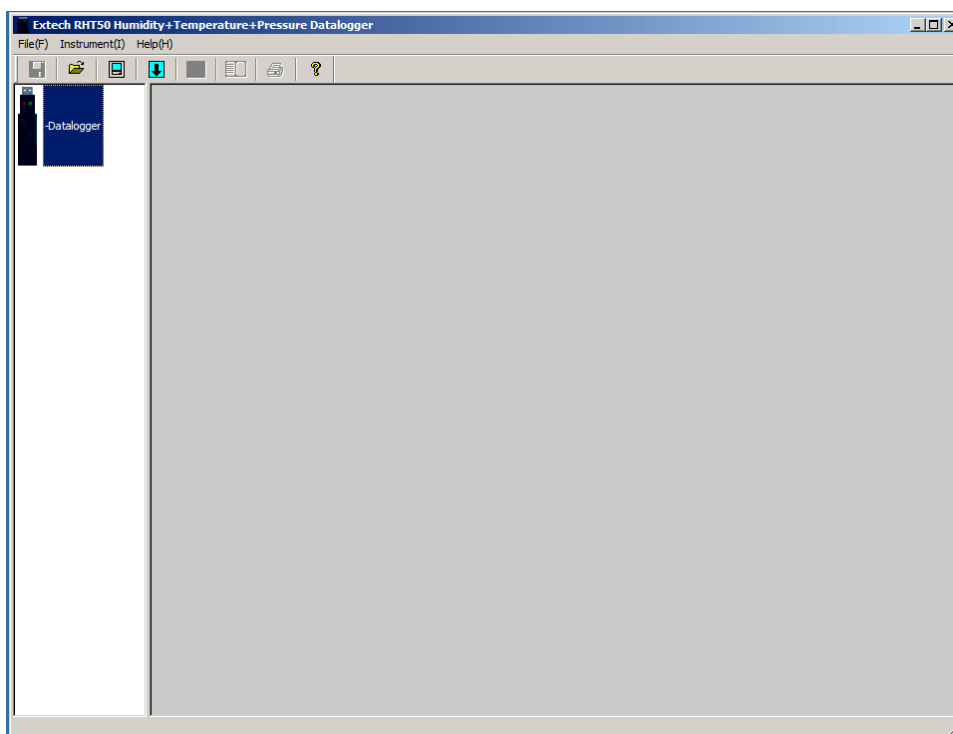
See the miniDOT manual for installation of the normal miniDOT software

Operation of the Extech RHT50

The Extech will provide pressure measurements for use in computing oxygen concentrations in saturation terms. It must be located in air nearby the miniDOT. The Extech is not waterproof and so it must be protected from rain but in a way that allows free entry of air. One Extech can provide pressure information for many miniDOTs provided that the miniDOTs are relatively close, something on the order of a few miles. The Extech must be recording measurements during the period that the miniDOTs are deployed.

For software installation, follow the description provided with the Extech.

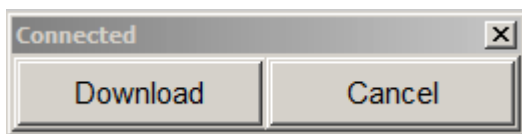
When software is installed, connect the Extech to the computer USB port and begin software operation. An empty workspace will appear as shown below:



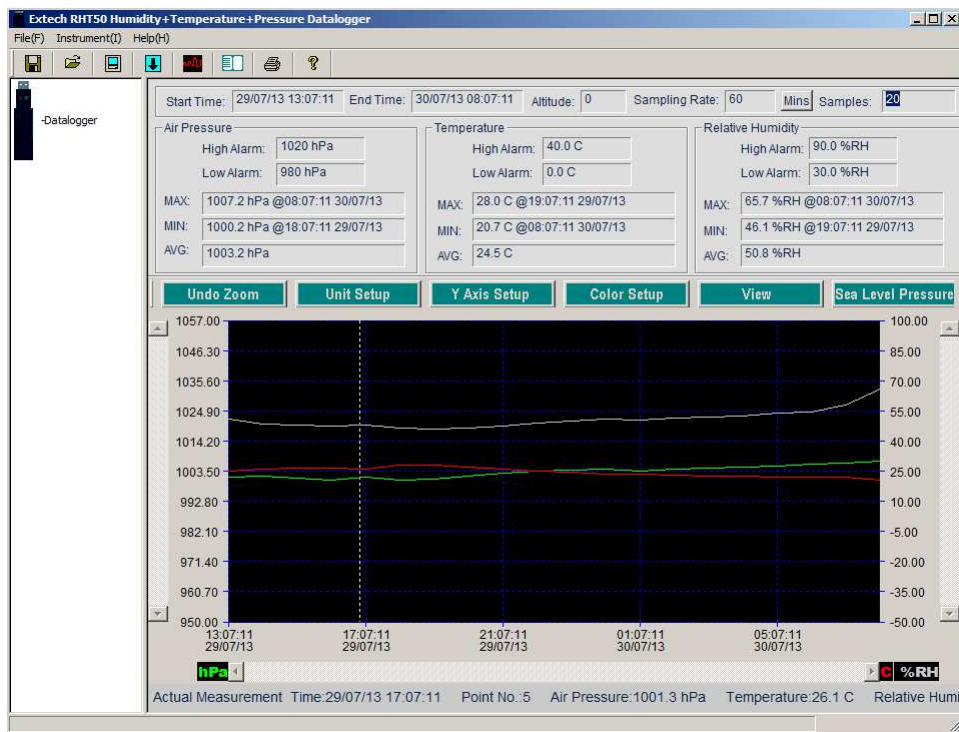
Click on the download button



A Connected dialog appears.



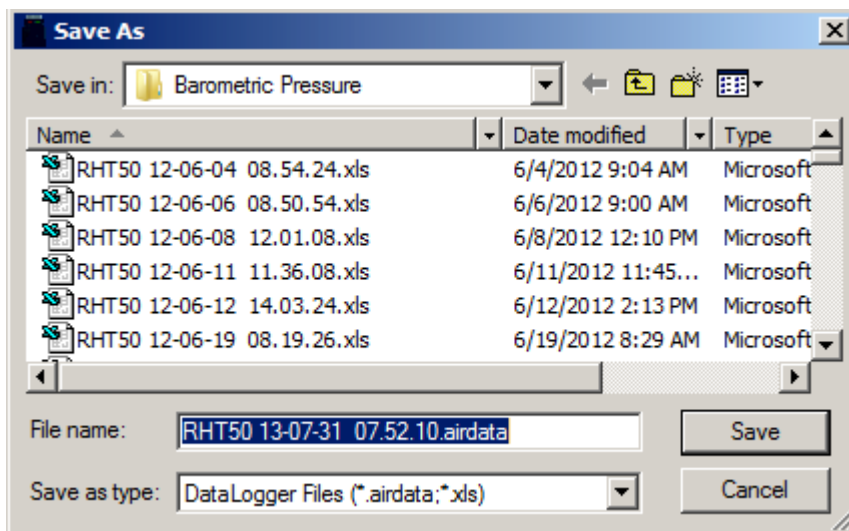
Click Download. The measurements are downloaded from the Extech.



If this is the first time the Exttech is used there may not be measurements to download.

Click on the File Save button. 

The Save As dialog appears.

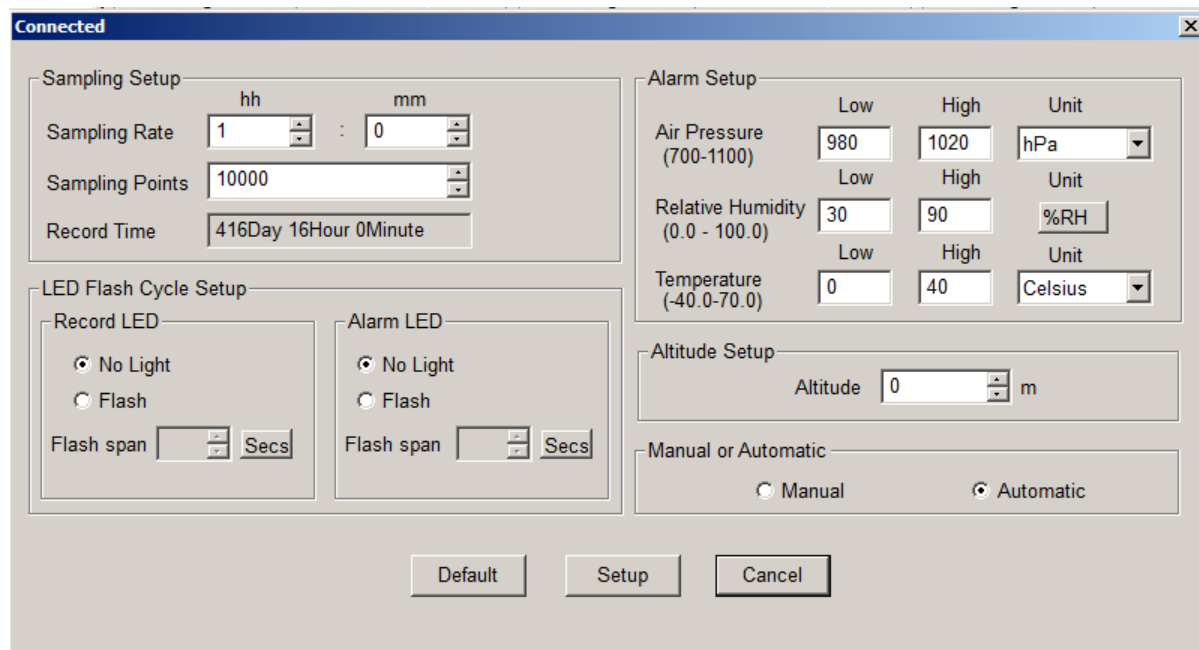


Select a folder and save the file. Do not change the File name or the Save as type. You can save the file in any folder, but PME suggests you save it at C:\miniDOT\RHT50. Please note that whatever folder you select, it MUST NOT contain any files except those produced by the RHT50.

This procedure removes the measurements from the Exttech. You may download the Exttech as often as you like. Subsequent software reads all files in the folder and concatenates them.

Click on the Datalogger Setup button. 

The Connected dialog appears.

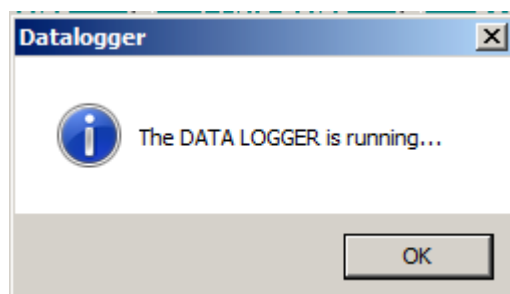


The 'Connected' dialog box is used for configuring the datalogger. It contains several sections:

- Sampling Setup:** Includes fields for Sampling Rate (1 hh, 0 mm), Sampling Points (10000), and Record Time (416Day 16Hour 0Minute).
- LED Flash Cycle Setup:** Contains two sub-sections: 'Record LED' and 'Alarm LED'. Each has radio buttons for 'No Light' (selected) and 'Flash', and a 'Flash span' field with a 'Secs' button.
- Alarm Setup:** Includes fields for Air Pressure (Low: 980, High: 1020, Unit: hPa), Relative Humidity (Low: 30, High: 90, Unit: %RH), and Temperature (Low: 0, High: 40, Unit: Celsius).
- Altitude Setup:** Includes an 'Altitude' field (0 m).
- Manual or Automatic:** Includes radio buttons for 'Manual' and 'Automatic' (selected).

Buttons at the bottom: Default, Setup, Cancel.

PME suggests 1 hour interval and 10000 points. This will save battery life and provide sufficient measurements. Select other settings as shown. Click Setup. The lights on the Extech should flash a few times.



Click OK. Disconnect and deploy the Extech. Repeat this sequence whenever you need to obtain measurements from the Extech.

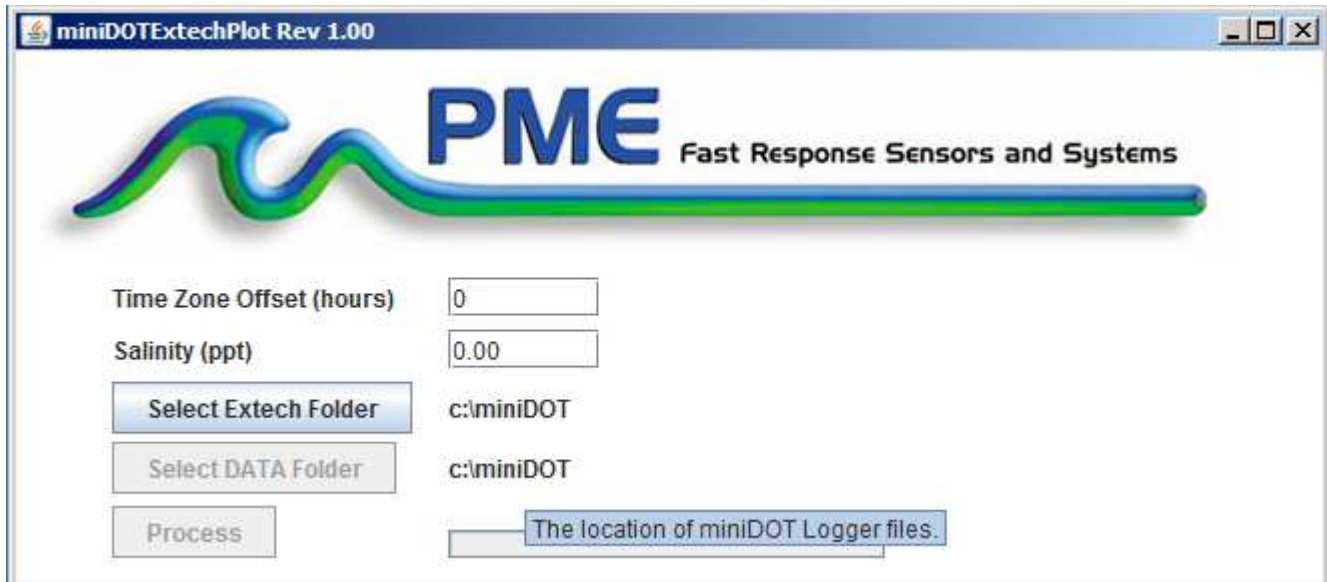
Operation of miniDOTExtechPlot

PME provides miniDOTExtechPlot software to read both miniDOT files and Extech RHT50 files. This software combines the two measurements to produce oxygen saturation measurement and others.

To install the software simply copy miniDOTExtechPlot to any folder on your computer's hard drive. Note that this program depends upon the Java Runtime Environment. See the miniDOT manual for instructions on installing this software.

Begin software operation by clicking on miniDOTExtechPlot. The following screen will appear.

This Extech will provide pressure measurements for use in computing oxygen concentrations in saturation terms. It must be located in air nearby the miniDOT.



Enter your time zone as described in the miniDOT manual for the corresponding entry into miniDOTPlot. Enter salinity.

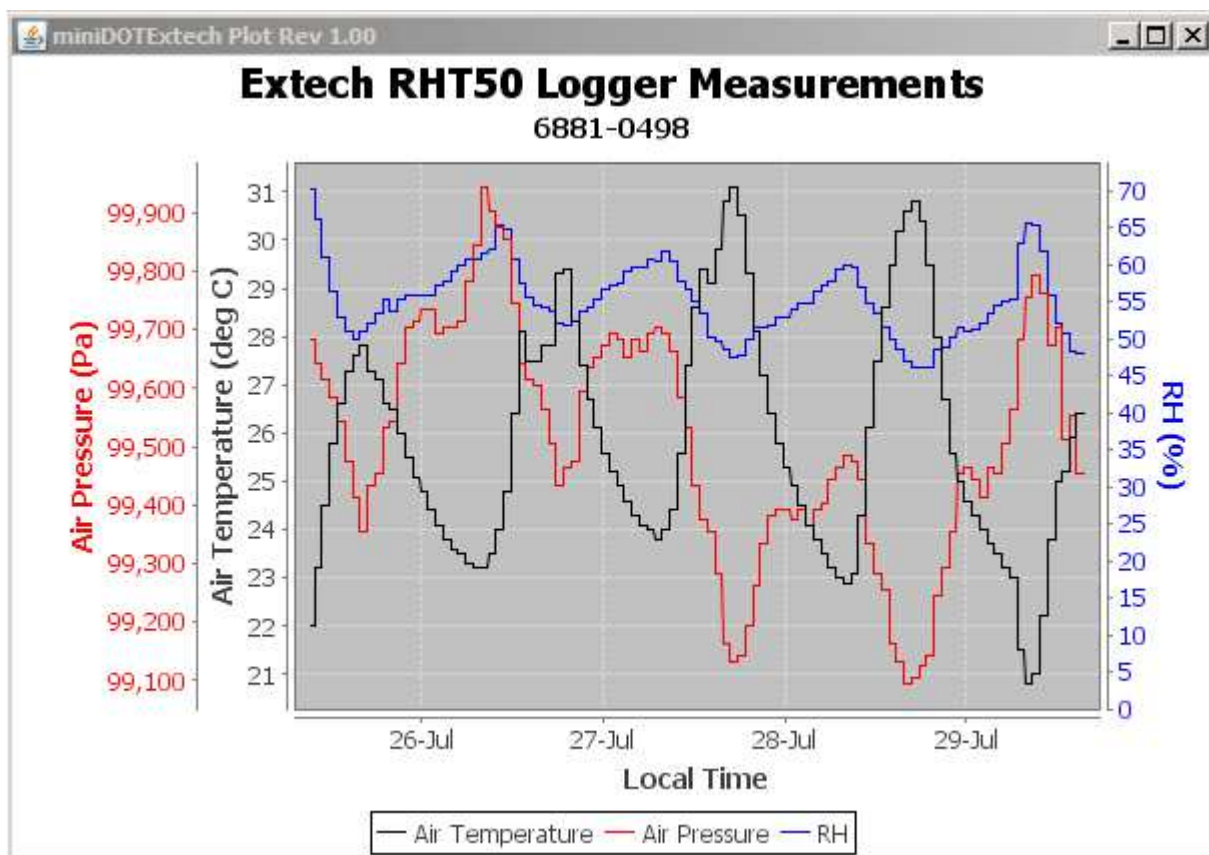
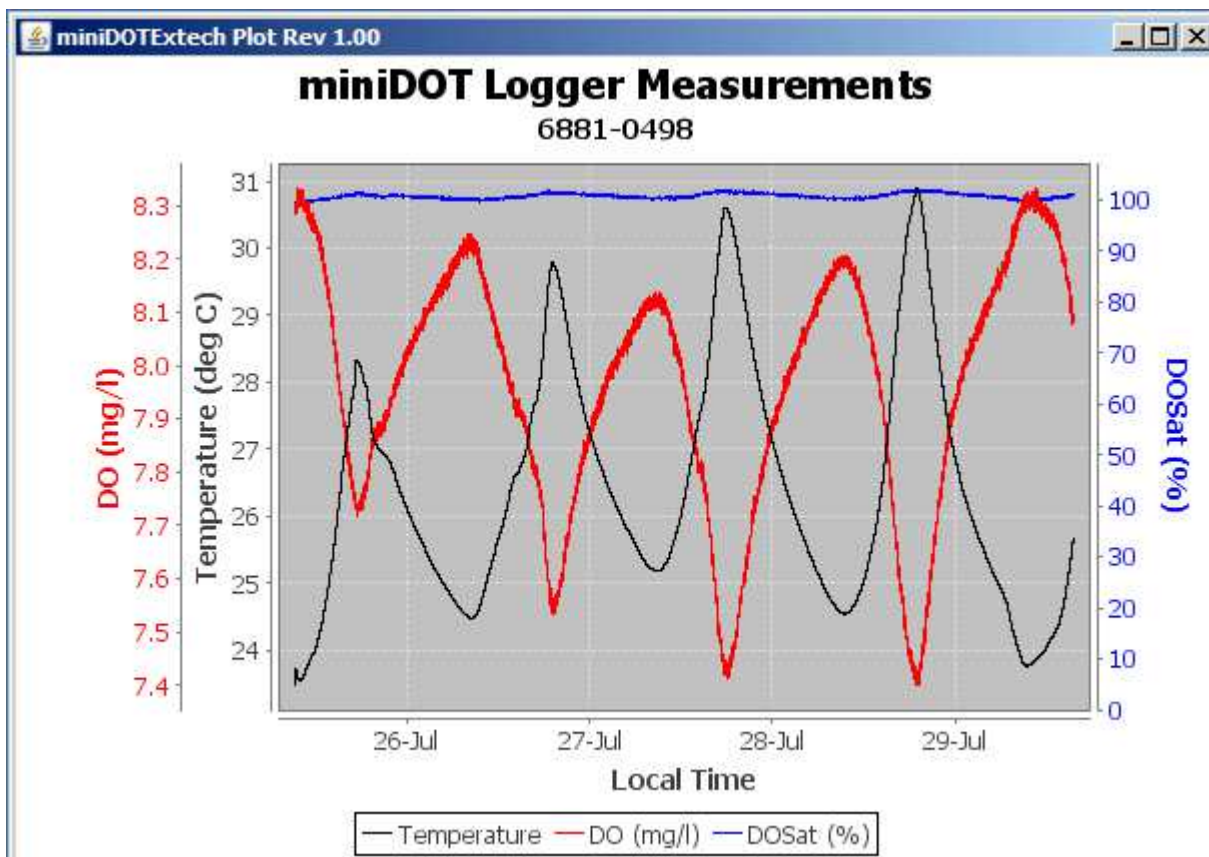
Click Select Extech Folder. A Select Extech folder dialog appears. Browse to the folder where you store the Extech files. Select this folder.

Click Select Data Folder. A Select miniDOT DATA folder dialog appears. Browse to the folder where you store miniDOT files. Select this folder.

Click Process. The software loads the miniDOT and Extech files.

If the miniDOT folder already contains a CAT.txt file, a Select an Option dialog appears asking if it this CAT file should be deleted. Answer yes or no.

After a brief time two plots appear. These appear directly on top of each other. Move on to see the other:



These plots show the miniDOT measurements and the Extech measurements during the period of miniDOT measurement.

If you make additional miniDOT or Extech folder selections and press Process, additional plots will appear.

Click on any X to close all screens.

Software Details

miniDOTExtechPlot operates by first reading all files in the selected miniDOT folder. These are concatenated to produce a continuous data set.

Next all files in the selected Extech folder are read. These are concatenated to produce a continuous data set. It is very likely that the Extech data set will cover longer times than the miniDOT set.

The final measurement is determined for each miniDOT measurement by finding the Extech measurement that is closest in time to the time of the miniDOT measurement. This measurement set is plotted in the two graphs and saved in the CAT.txt file.

miniDOT time is always set to UTC. However Extech time is set to the time of the computer when the Extech was started. MiniDOTExtechPlot understands this and uses the time zone of the host computer to translate Extech time into UTC. However if the Extech is started on a computer in one time zone, but the measurements are processed on a computer by miniDOTExtechPlot in a different time zone there will be measurement alignment problems.

miniDOTExtechPlot uses the nearest in time Extech measurement for each miniDOT measurement. This can have unanticipated results if there are no Extech measurements nearby. For example if the Extech is not downloaded then the software will find the nearest measurement (in this case from the last downloaded time, maybe last year!) and apply this to all new miniDOT measurements. Problems such as this can be detected by looking at the Extech plot. The normal variation will be absent and instead single measurement values will exist.

If the customer owns more than one Extech, then the customer will have to develop some file management plan so as to keep the correct Extech associated with the correct miniDOTs.