SENSORSOFT®

Sensorsoft® Graphing Tool (SGT) User's Manual Software Version 3.0

Manual P/N 071-0147 Rev 3   June 5, 2020

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About This Manual

This documentation contains information about configuring, using and troubleshooting the Sensorsoft Graphing Tool (SGT).

When other sections of this manual are referenced, i*talics* are used.

Glossary of Acronyms

RWME – Remote Watchman Enterprise software

SGT – Sensorsoft Graphing Tool software

HTML – Hypertext Markup Language

URL – Universal Resource Locator

TCP/IP – Transmission Control Protocol / Internet Protocol

RAM – Random Access Memory

OS – Operating System

VM – Virtual Machine

Signed App – An app with a security certificate declaring its originator

JRE – Java Runtime Environment

Overview

Sensorsoft Graphing Tool (SGT) is a signed Java app that allows you to graph data files recorded by Sensorsoft RWME software or files recorded in a compatible format. SGT is a first class analytical tool that almost anyone can use. It profiles and graphs data with just a few mouse clicks. SGT runs on your desktop as a Java Web Start app.
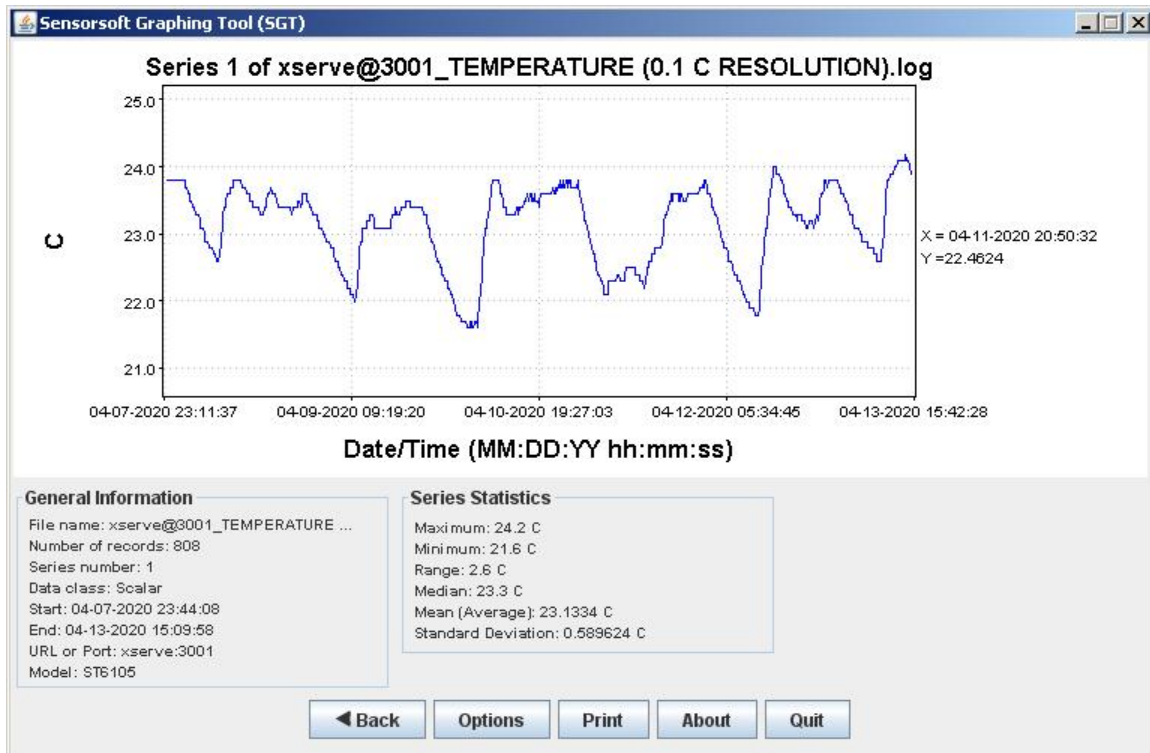
Figure 1: SGT app graphing temperature data

System Requirements for Running SGT

OS: Any operating system that supports the Java Runtime Environment (JRE) Version 5.0 or later
Minimum Graphics Screen Resolution: 1024×768 pixels
TCP/IP LAN or Internet connection is required

Specifications of SGT

Graph type: Line graph
Number of records that can be graphed: Tested with 10 million records
Maximum data value that can be graphed: 9×10^{15}
Minimum data value that can be graphed: -9×10^{15}
Statistics for scalar series: maximum, minimum, range, median, mean (average) and standard deviation
Statistics for Boolean series: duty cycle
Statistical precision: User selectable; 3 to 10 significant digits
Minimum time between readings to cause a break in line graph: 90 minutes

Launching SGT

SGT is a signed Java Web Start app that launches from a web browser or directly from your desktop. SGT can be launched from the Remote Watchman Enterprise (RWME) web interface in two ways:

- Click the Graph Data link on left side of Monitor List (see Figure 2)
- Click the pop-up menu Graph Data for a specific variable reading (see Figure 3)

Figure 2: Graph Data link for launching SGT

Figure 3: Pop-up menu appears for variable reading to launch SGT

Figure 3 shows when you move your mouse pointer over the variable reading with a hyperlink a pop-up menu will appear. Choose the Graph Data menu option to launch SGT. If you don't see the hyperlink, this indicates that data logging is turned off for this variable in the RWME software.

Depending how your browser implements Java Web Start you will see one of the following:

Google Chrome

This browser displays a download warning as in Figure 4 for a Java JNLP file and asks you to confirm. Click the **Keep** button.

Figure 4: Google Chrome displays JNLP download with confirmation message/buttons
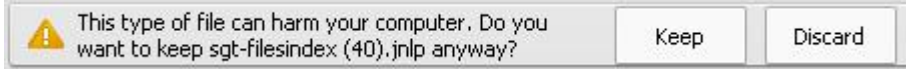
Chrome will then download the JNLP file and display it as in Figure 5 and expects you to click on the file which will then launch SGT.

Figure 5: Chrome download JNLP file

The Oracle Java banner is then displayed and prompts you with a Java security dialog as in Figure 7. Click the **Run** button and the app will load and display on your desktop. If you want to view our security certificate click the link, More Information.

Microsoft Internet Explorer

This browser opens a new blank tab and displays a JNLP file download warning at bottom of browser as in Figure 6 and asks you to respond. Click the **Open** button.

Figure 6: Internet Explorer displays JNLP download with confirmation message/buttons

The Oracle Java banner is then displayed and prompts you with a Java security dialog as in Figure 7. Click the **Run** button and the app will load and display on your desktop. If you want to view our security certificate click the link, More Information. Once the SGT app displays you can close the blank Internet Explorer tab.

Mozilla Firefox

This browser opens a new blank tab, displays the Oracle Java banner and then prompts you with a Java security dialog as in Figure 7. Click the **Run** button and the app will load and display on your desktop. If you want to view our security certificate click the link, More Information. Once the SGT app displays you can close the blank Firefox tab.

Figure 7

Launching SGT directly from desktop without a web browser

This example is based on a Windows operating system. Using Windows file system navigate to your Downloads directory as per the following example:

```
C:\Documents and Settings\smithm\My Documents\Downloads
```

Locate the file **sgt-filesindex.jnlp**. If you don't see this file, you will need to launch SGT from your web browser as shown in Figure 2 above. Right click on this file and choose:

```
Send To->Desktop (create shortcut)
```

Locate the newly created desktop shortcut and right click on it choosing rename. Give it the name SGT.

You can launch SGT by double-clicking this shortcut icon.

Graphing a Data File

Depending on how you launched SGT it might load with a single data file or a list of data files.

To graph a data file do the following:

1. If a single data file just click the Graph button. If a list of data files (see Figure 8) select the one that you would like to graph by clicking on its name. Then click the Graph button.

Figure 8: List of data files for graphing
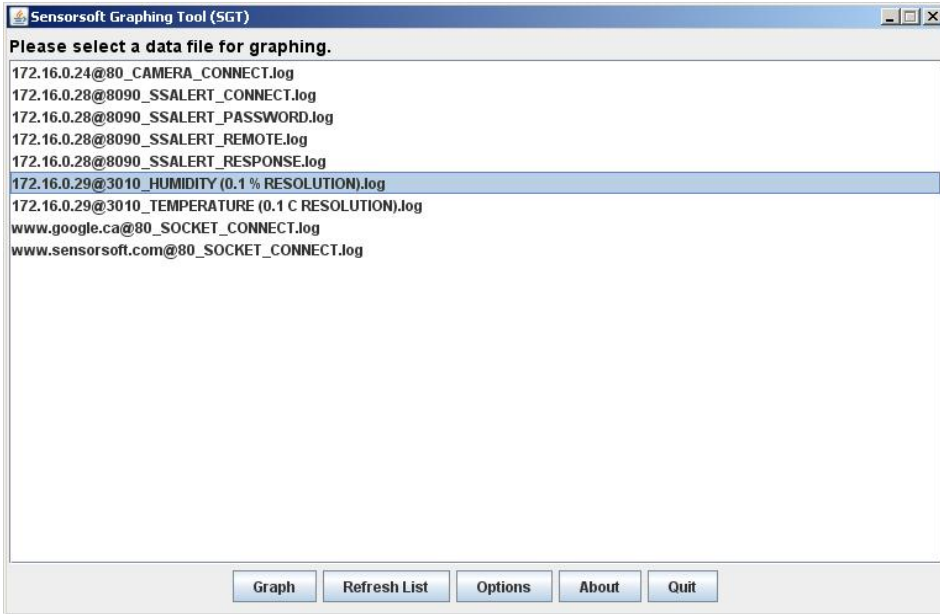
2. The app will begin to download the data file from the server and profile it. Once the profiling is complete, you will see a message at the top of the app: "…please select a series to be graphed". Depending on the data you may see one or multiple series being displayed. Select a series and click the Graph button (Figure 9)
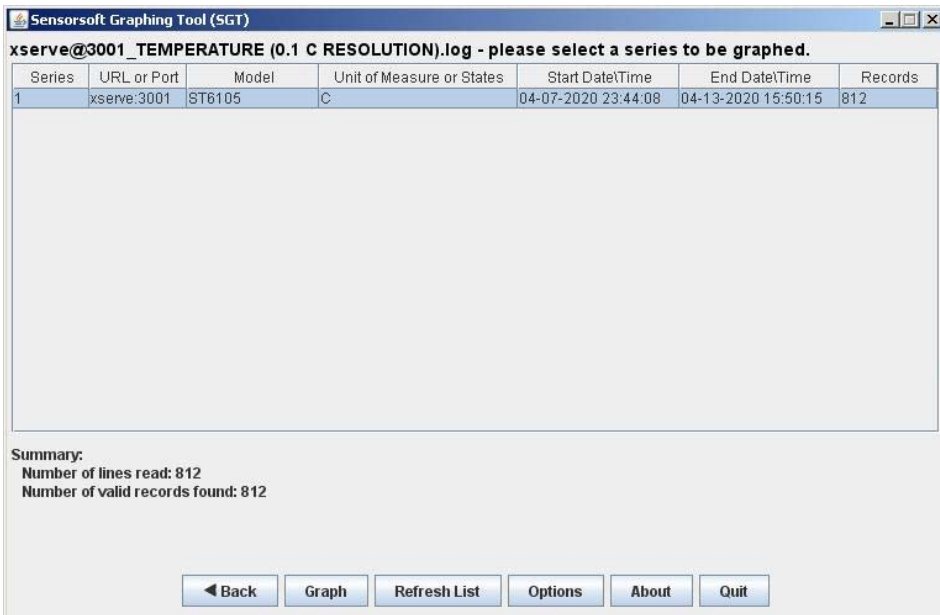
Figure 9: List of series' available for graphing

3. A graph of the selected series will be displayed. To graph a different series in the same data file, press the Back button to return to the previous view, and select another series from the list. To graph a different data file, press the Back button until you have returned to the list of data files, and select another data file from the list.
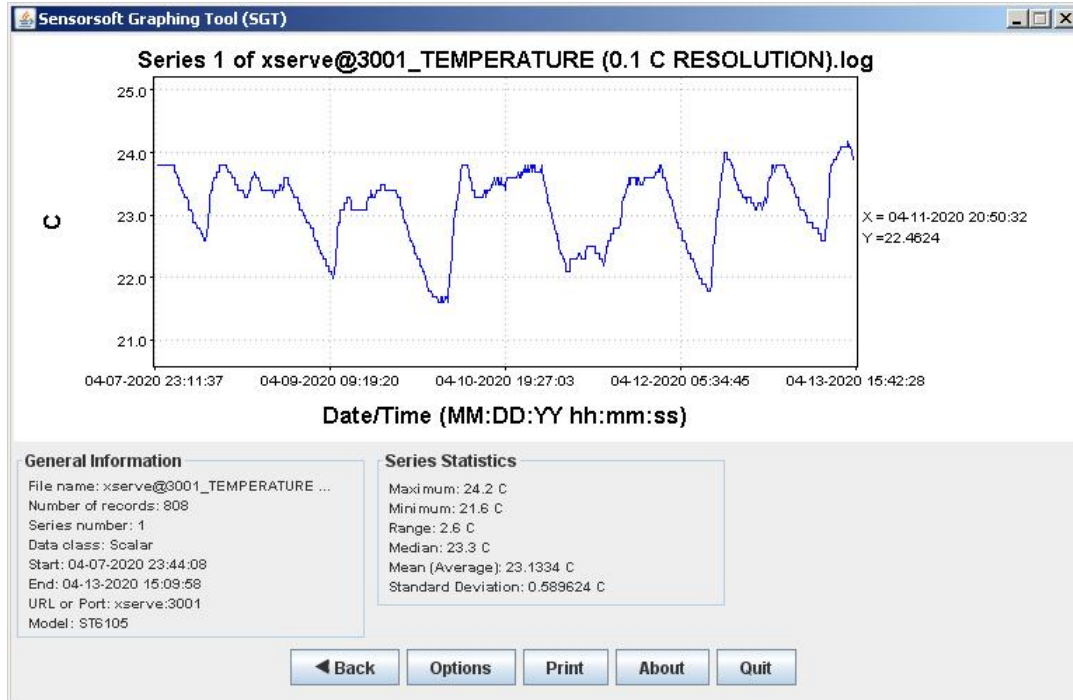
Figure 10

If you have encountered any problems during graphing, please refer to the *Common Problems* section.

Zooming

Zooming In

Zoom in on any part of the graph by doing the following:

1. Place the mouse pointer over the white graphing panel.

2. Point the mouse to where you want to begin the zoom. Hold down the left mouse button and drag the mouse pointer horizontally across the graph until you have selected the portion of the graph that you want to zoom in on. Then release the mouse button.
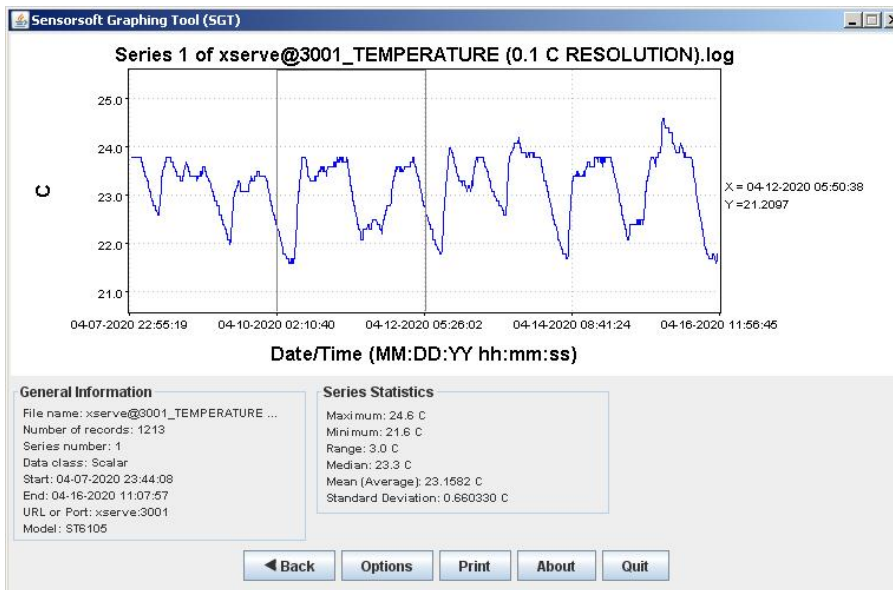
Figure 11: Selecting zoom area

3. The graph will now zoom in on the portion that you selected.

Figure 12: Graph shows zoomed area

Zooming Out

Zoom out by clicking the mouse pointer anywhere on the graph area.

Printing a Graph

You can print a graph and its stats in SGT by clicking on the Print button located on the bottom panel as shown on Figure 13.

Figure 13

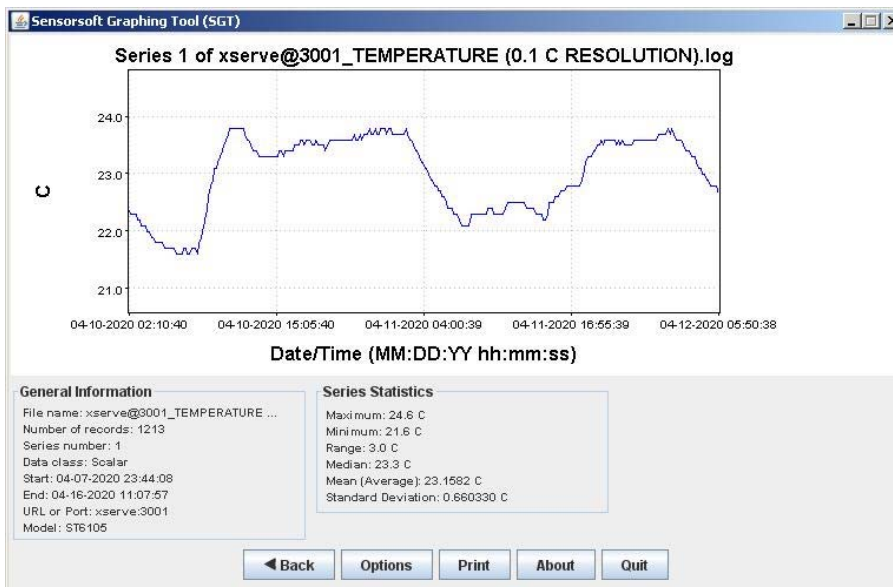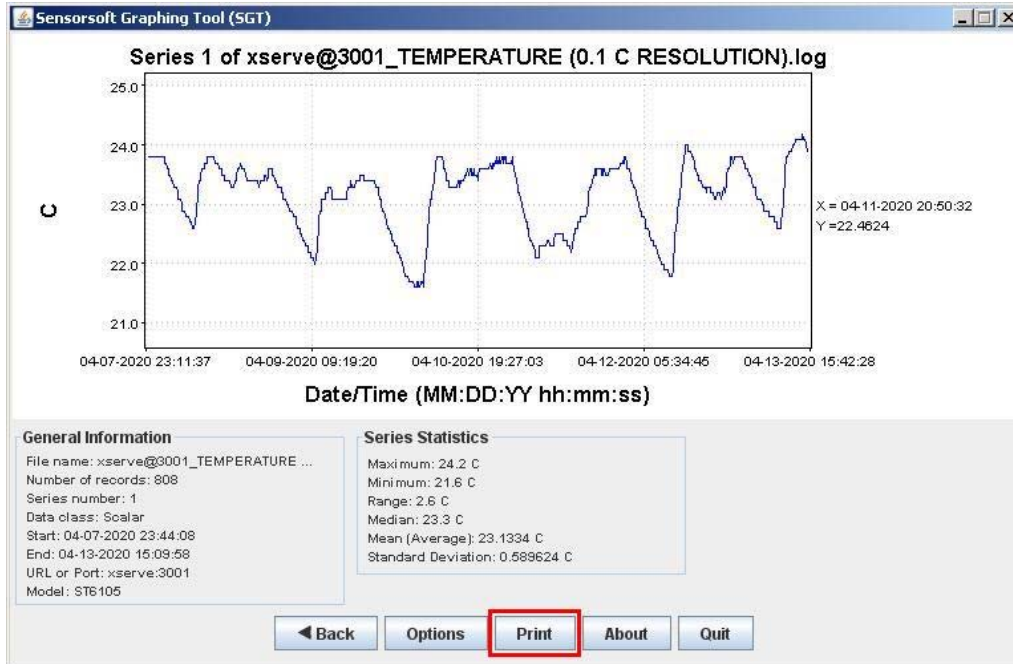The Java Print dialog window will now appear with your printer(s):
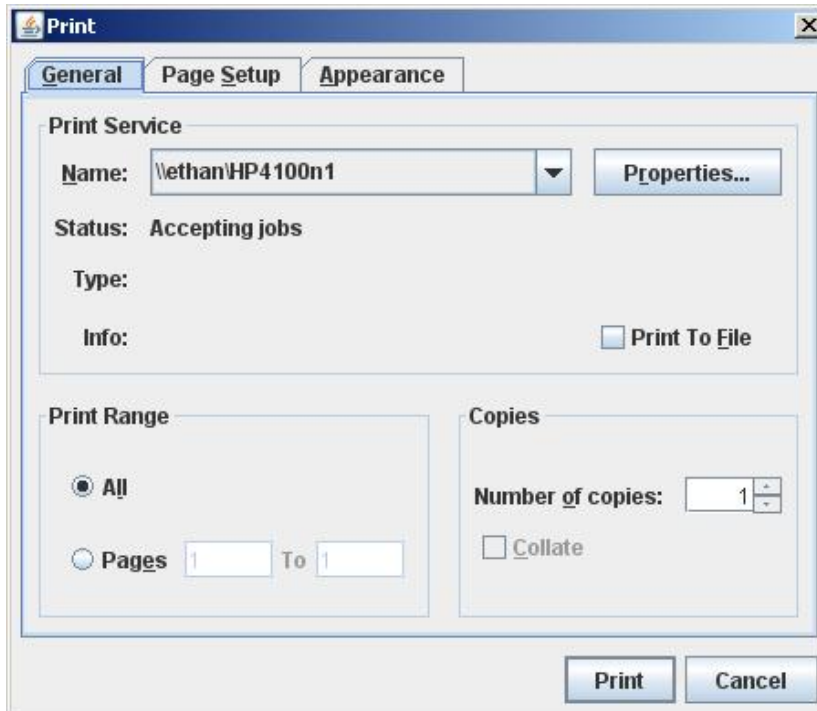
Figure 14

Select your desired printer and click the Print button. The graph will now be sent to this selected printer.

Changing Text Labels on the Graph

Certain text labels on the graph are editable, thus giving you some control over the graph's appearance. The following is a list of text labels that you can change.

Name	Description
Graph title	This text is located at the top of the graph (see Figure 15). By default, it is set to "Series <series number> of <URL or Port>".
X-Axis label	This text is located at the bottom of the graph (see Figure 15). By default, it is set to "Date/Time (MM:DD:YY hh:mm:ss)".
Y-Axis label	This text is located at the far left of the graph (see Figure 15). If you have graphed a scalar series this text will be the unit of measure, by default. If you have graphed a Boolean series, this text will be blank by default.
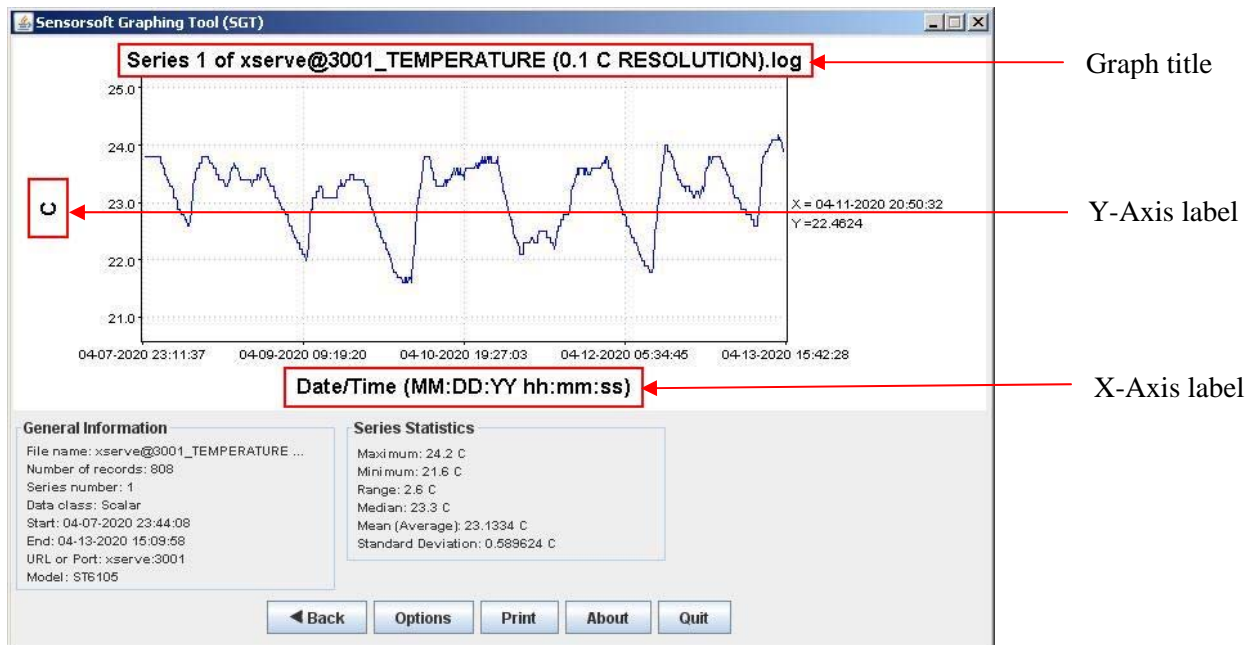
Figure 15

To change a graph's text label, do the following:

1. Make sure the graph is on the screen as shown in Figure 15 above.

2. Click the Options button to bring up the Options dialog.

3. In the Options dialog, edit the field corresponding to the text label that you want to change (see Figure 16).

4. Click OK. The new text label will now be displayed.

Important Note: Any changes you make to these text labels will be lost after returning to the list of data files or closing the app window.
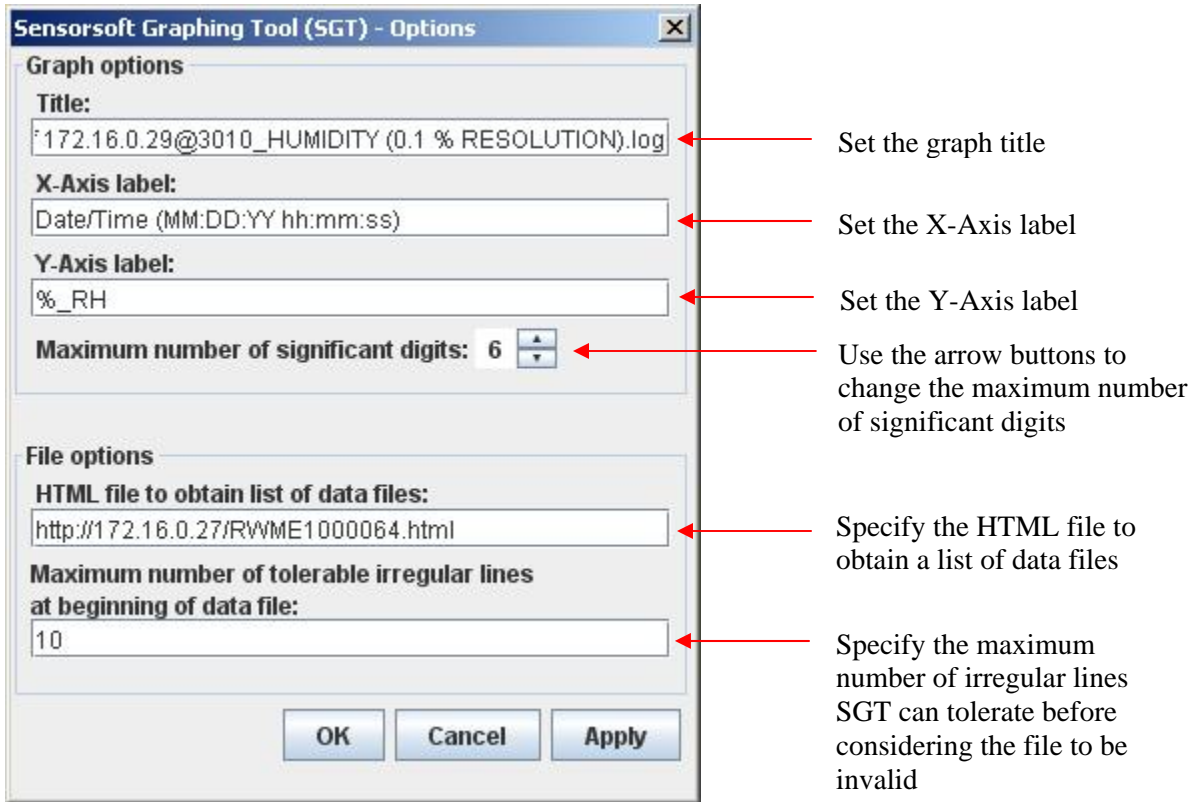
Figure 16

Changing the Number of Significant Digits

You can change the number of significant digits in the Y-Axis scale and the statistics by following the procedure below:

1. Click the Options button to bring up the Options dialog.

2. In the Options dialog, change the "Maximum number of significant digits" field by using the arrow buttons beside it (see Figure 16).

3. Click OK for the new setting to take effect.

Specifying the HTML file to obtain a List of Data Files

When SGT is launched, it displays a list of data files for the user to graph (see Figure 8). This list is obtained by reading an HTML file that contains links to data files and extracting the file names and URLs. This HTML file can be specified in the Options dialog. If your SGT is integrated into RWME, then the HTML file is set to RWME1000064.html, and you should never change it. If

you are running SGT from a different type of web server, then it will be necessary to specify the HTML file. For example, there may be several HTML files that contain links to different data files that you wish to graph, and the only way SGT can find these HTML files is for you to specify them. Keep in mind that the HTML file you specify must exist on the same host as SGT in order for SGT to be able to access it. You can specify the HTML file by doing the following:

1. Click the Options button to bring up the Options dialog.

2. In the Options dialog, set the "HTML file to obtain list of data files" field to the URL of the HTML file (see Figure 16).

3. Click OK. If an error message appears on the screen, it means that the HTML file you have specified is on a different host name or does not exist at all.

4. Go to the list of data files.

5. Press the Refresh button. The new list of data files will now be shown on the screen. If the app does not show any data files, it means the HTML file you have specified does not contain links to any data files.

Tolerable Irregular Lines at Beginning of Data Files

Data files that can be graphed by SGT must follow the Sensorsoft Data Log Format (see *Appendix B – Sensorsoft Data Log Format*). Any line in a data file that does not conform to this format is considered to be an irregular line. SGT will tolerate a certain number of irregular lines at the beginning of a data file before considering the file to be invalid. If you need to graph a data file that is valid but also contains many irregular lines at the beginning, you can increase the number of irregular lines that SGT will tolerate by doing the following:

1. Click the Options button to bring up the Options dialog.

2. In the Options dialog, set the "Maximum number of tolerable irregular lines at beginning of data file" field to a higher value (see Figure 16). You can make SGT tolerate an unlimited number of irregular lines by setting this field to -1.

3. Click OK for the new setting to take effect.

Common Problems

SGT does not load or hangs during loading

Make sure you have the Java Runtime Environment installed on your computer. If you have Java Runtime Environment installed you should have a program icon in your computer's OS control panel or settings like the one shown below:

If you do not have Java Runtime Environment installed on your computer it can be download and installed from the following Oracle Java web site:

https://java.com/en/download/

Unable to graph a data file

If you are unable to graph a data file, there are a few possible reasons:

- Make sure the file you have selected is not empty and is a valid data file (see *Appendix B – Sensorsoft Data Log Format*).

- Open the data file from your web browser and see if the first few lines are blank or contain invalid entries. If so, these irregular lines may be causing SGT to consider the file to be invalid. To adjust for this, open the Options dialog from SGT and then set a higher value in the field "Maximum number of tolerable irregular lines at beginning of data file". This will make SGT tolerate more irregular lines at the beginning of the data file before considering the file invalid. To make SGT tolerate an unlimited number of irregular lines, set the field to -1.

- If the data file you are graphing contains TCP server socket or Camera readings that were recorded by RWME 2002 Build 45 or earlier, these data entries will not contain the <model> field, and thus will not be in the proper Sensorsoft Data Log Format (see *Appendix B – Sensorsoft Data Log Format*). This may cause SGT to consider the file to be invalid. RWME 2002 Build 46 forward does record the TCP server socket and Camera readings in the proper format by setting the <model> field to "no_model". One way to adjust for a missing <model> field is to open the Options dialog from SGT and then set the field "Maximum number of tolerable irregular lines at beginning of data file" to -1. This will make SGT skip all the entries recorded by the older build of RWME. Alternately, you can shutdown RWME and manually edit the data file – adding the "no_model" string to each data entry.

After upgrading SGT or RWME its new version does not take effect

If you have upgraded the SGT or the RWME software that contains SGT and find that the previous build of SGT is still being launched instead of the new build, you need to clear the Java class loader cache as follows:

1. From your computer's Java Control Panel select the General tab.

2. Under section heading Temporary Internet Files click the View button.

3. Select all SGT applications and click delete or X icon.

4. The next time you launch SGT it will be the newest build.

Getting Help

Technical Support

Should you have problems using the Sensorsoft Graphing Tool we offer technical support to help you overcome your difficulties. Sensorsoft Corporation **does not** provide free support to those wishing to write their own software; this is available on a charge-per-incident basis only. Please contact support for current rates.

Before contacting Sensorsoft Technical Support:

Go through the *Common Problems* section of this manual. Even if a direct answer to your question is not found there, it will be helpful for the support technician if you are able to provide information obtained from the diagnostic and troubleshooting process. Please ensure the problem is directly related to the Sensorsoft Graphing Tool (SGT) software.

World Wide Web: https://www.sensorsoft.com
E-mail: support@sensorsoft.com

Appendix A – Statistics Tutorial

Maximum

This is the value of the largest reading in the series.

Minimum

This is the value of the smallest reading in the series.

Range

This is the difference between the maximum and the minimum. It can be expressed mathematically as follows:

$$\text{Range} = \text{Maximum} - \text{Minimum}$$

Median

The median is the middle most reading by value when the readings are lined up from the smallest value to the largest value.

To find the median, you first need to know the total number of readings, N, in the series.

If N is odd, the median is the smallest reading that has no more than $(N - 1) / 2$ readings greater than it.

If N is even, the median is obtained by doing the following:

1. Find the smallest reading that has no more than $N / 2$ readings greater than it. Let the value of this reading be A.

2. Find the smallest reading that has no more than $(N + 1) / 2$ readings greater than it. Let the value of this reading be B.

3. Calculate the median by taking the average of A and B, which can be expressed mathematically as:

$$\text{Median} = (A + B) / 2$$

Mean (Average)

This is calculated by taking the sum of all the readings and dividing by the number of readings. It can be expressed mathematically as:

$$\text{Mean} = (\text{Reading}_1 + \text{Reading}_2 + \text{Reading}_3 + \cdots + \text{Reading}_N) / N$$

In the formula above, N is the total number of readings in the series.

Standard Deviation

The standard deviation tells you how closely or widely all the various readings are clustered around the mean. Standard deviation can be calculated by the following formula:

$$\text{Standard Deviation} = ((\text{Reading}_1{}^2 + \text{Reading}_2{}^2 + \cdots + \text{Reading}_N{}^2) / N - \text{Mean}^2)^{1/2}$$

In the formula above, N is the total number of readings in the series.

Duty Cycle

In a Boolean series, each reading can have one of two possible string values. Each string value represents a Boolean state. The duty cycle is always expressed in the form of a percentage followed by the Boolean state string, for example:

5.76% PWR_FAIL

This means that 5.76 percent of all the readings in the series have the string value of "PWR_FAIL". In general, the duty cycle is equal to the number of readings that have the indicated string value divided by the total number of readings in the series.

Appendix B – Sensorsoft Data Log Format

To graph data files with SGT, the data must be recorded in the Sensorsoft Data Log format as described in this section. All Sensorsoft products use this file format to record data files. SGT can also graph data created by other software programs, if they are recorded in this format.

The Sensorsoft Data Log Format requires each data record to be recorded on a separate line. It requires that each data field within the record be delimited by a space or tab character. The table below describes each of the fields in detail.

Scalar class data (see *Scalar Readings*) must use the following format:

```
<MM-DD-YYYY><hh:mm:ss><model><host:port><scalar value><UofM>
```

Boolean class data (see *Boolean Readings*) must use the following format:

```
<MM-DD-YYYY><hh:mm:ss><model><host:port><Boolean zero
string/Boolean one string><Boolean value string>
```

Description of Fields in the Sensorsoft Data Log Format:

Field	Class	Description
<MM-DD-YYYY>	All	This field contains the month (MM), day (DD), and year (YYYY) when the reading was taken.
<hh:mm:ss>	All	This field contains the hour (hh) (in 24-hour format), minutes (mm), and seconds (ss) when the reading was taken. SGT is aware of daylight saving time, and can properly handle daylight saving clock adjustments in your data files.
<model>	All	If the reading is taken from a Sensorsoft device or a Sensorsoft Alert unit, this field will contain the model number string. If the reading is taken from a TCP server socket or a Network camera this field will contain the string "no_model".
<scalar value>	Scalar	This field contains the numerical value of the reading.
<UofM>	Scalar	This field contains the reading's unit of measure.
<Boolean zero string/Boolean one string>	Boolean	This field contains the two possible Boolean strings separated by a forward slash. **Boolean zero string** represents the Boolean zero value; **Boolean one string** represents the Boolean one value. Although this field is optional, it is recommended. Inclusion of this field allows the SGT to display the two possible states even when the recorded data does not contain one of the states.
<Boolean value string>	Boolean	This field contains the value of the Boolean reading in string representation.

Scalar Readings

Scalar readings have numerical values that are continuous in nature. Examples of such readings are temperature and humidity. Many scalar readings also require a Unit of Measure.

Boolean Readings

Boolean readings are represented by a string, which can have only two possible states. An example of such readings is the output of a Sensorsoft Flooding Sensor, which can be either "WET" or "DRY".